ANALYSING URBAN HOUSEHOLD FOOD SECURITY IN THE CAPE TOWN METROPOLE OF SOUTH AFRICA, WITH REFERENCE TO THE ROLE OF URBAN AGRICULTURE

By

JAN WILLEM SWANEPOEL

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BLOEMFONTEIN

Supervisors/ Promotors:

Dr. J.A. van Niekerk

Prof. C.J. van Rooyen

Prof. L. D'Haese

Date of submission:

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DECLARATION

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_____   _____

Jan Willem Swanepoel   Date

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To my daughter Jana, you fill my life with joy. You are the reason I live.

To my Heavenly Father, I cannot take one step without Your blessing and grace.

Thank you Lord for strength, courage and wisdom.

[10] He who supplies seed to the sower and bread for food will also supply and increase your store of seed and will enlarge the harvest of your righteousness.

2 Corinthians 9:10 (NIV)

May the seeds of this study grow and contribute to those that are in desperate need of food.

Soli Deo Gloria.

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ABSTRACT

Exceptional rural-urban migration took place into the Cape Town Metropolitan area over the past years and is continuing, with the bulk of these migrants residing in the informal settlement areas. The rate of urbanisation is however not concurrent with the rate of economic growth and as a result, the rates of urban poverty is worsening. Food insecurity is a direct result of urban poverty, causing urban populations to depend on urban food production. Currently, measurements for food security are inconsistent and it is unclear whether urban agriculture systems are sustainable and whether it contributes to the general household food security, albeit it is generally accepted that households engaged in urban agriculture should experience an improved food security status. Empirical research regarding the actual contribution of urban agriculture to household food security may be limited as well as lacking in consistency.

Against this setting, it was important to analyse urban household food security in the informal settlement areas of the Cape Town Metropole in South Africa, with focus on the contribution of urban agriculture towards alleviating food insecurity. The objectives to determine the required outcomes were:

- The measurement of the level of urban household food security of urban farmers and non-farmers;
- Factors that affect urban household food insecurity were identified;
- The contribution of urban agriculture to food security was determined;
- An optimal grouping of observations by utilising the identified critical factors that address household food insecurity were identified; and
- Policy recommendations were made for government on the alleviation of urban food security by using the outcomes of the above analysis.

The above objectives were achieved by firstly consulting literature to anchor the application into theory and report on past research conducted on the problem. The global and South African trends of food security and urban agriculture were placed in perspective together with the measuring of livelihood in an urban context.

Data collection took place in six informal settlement areas of the Cape Town Metropole, included both farming households and non-farming households.

Very high levels of food insecurity were observed in all dimensions of food security in the informal settlement areas of the Cape Town Metropole. When looking at access to food, the household food insecurity access scale (HFIAS) indicated that 78% of households are severely food insecure and just more than 50% reported an income level above the US$ 2 per capita per day. Households reported hunger especially during June and July, and November and December respectively. This is an indication of food unavailability during these months. Significant differences were observed between the areas in terms of the level of food security, but no significant difference in food security between farming and non-farming households was observed.

The households surveyed consisted of 99 male headed and 121 female-headed households with more males involved in urban agriculture. The average household comprised of 4.3 members. The factor analysis showed that the expenditure component accounts for 20.4% of variance and is characterised by factors relating to expenditure on food. The expenditure component is comprised by the share of food expenditure on income, the total value of food consumed and the household diet diversity score. The groups of food purchased (diversity) are dependent on the amount of purchase power available. Other components identified were the socio-economic indicators component, food security indicators component, urban farming component and geographical and market components.

The results presented in the study indicated that households engaged in urban agriculture are benefiting in terms of diet diversity, income and accessibility due to their involvement in this activity. However, there was no indication of a significant positive contribution of urban agriculture towards food security.

Three homogeneous clusters were characterised into a severely food insecure cluster, a moderately food insecure cluster and food secure cluster. Different food security measurement indicators, demographic indicators, livelihood indicators relating to income, production factors and the level of education were included in the analysis. These clusters of homogenous groups with similar proportions for different characteristics may

in turn serve as invaluable information for decision makers to identify destitute areas, make focused decisions and take specific supporting action.

Policy recommendations were made to enhance the effectivity of the current policy and contribute to the main goal of the National Food and Nutrition Security Policy i.e. to ensure that all the dimensions of food security are met. This include the availability, accessibility and affordability of safe and nutritional food at national and household levels.

Key words: Food security, Food insecurity, Urban Agriculture, Urban Farming, Socio-economic indicators, Food security indicators, Livelihood, Hunger

OPSOMMING

Buitengewone voortdurende migrasie vanaf Wes-Kaapse en ander landelike gebiede na die Kaapstadse metropolitaanse gebiede het gedurende die afgelope paar jare plaasgevind. Die grootste aantal migrante woon in informele nedersettingsareas. Die verstedelikingskoers hou nie tred met die tempo van ekonomiese groei nie, en het verdere verslegtende stedelike armoede tot gevolg. Voedselonsekerheid is 'n direkte gevolg van stedelike armoede aangesien stedelike bevolkings afhanklik is van stedelike voedselproduksie.

Tans is die maatstawwe vir voedselsekerheid onbestendig en is dit onduidelik of stedelike landbousisteme volhoubaar is, en of dit wel bydra tot die algemene huishoudelike voedselsekerheid. Alhoewel dit algemeen aanvaar word dat huishoudings wat by stedelike landbou betrokke is 'n hoër vlak van voedselsekerheid ervaar as die wat nie daarby betrokke is nie, kan empiriese navorsing aangaande nie die werklike bydrae van stedelike landbou tot huishoudelike voedselsekerheid bevestig nie, so-ook is daar 'n gebrek aan die konsekwentheid daarvan.

Gevolglik was dit belangrik om die stedelike huishoudelike voedselsekerheid in die informele nedersettingsareas van die Kaapstadse Metropool in Suid-Afrika te analiseer met verwysing na die bydrae wat stedelike landbou lewer om voedselonsekerheid te verlig. Die volgende doelwitte om die vereiste uitkomste te bepaal is geformuleer:

- Om die vlak van stedelike voedselsekerheid van stedelike boere en nie-boere te meet;
- Om die faktore wat stedelike voedselsekerheid in die huishouding raak, te bepaal;
- Om die bydra wat stedelike landbou tot voedselsekerheid lewer te bepaal;
- Om 'n optimale groepering van waarnemings te vind, deur gebruik te maak van die geïdentifiseerde kritiese faktore wat huishoudelike voedselonsekerheid aanspreek; asook
- Om beleidsaanbevelings oor die verligting van stedelike voedselsekerheid te maak aan die regering deur die uitkomste van bogenoemde analise te gebruik.

Bogenoemde doelwitte is bereik deur om eerstens literatuur te raadpleeg en sodoende die tesis se teorie te anker en verslag te doen oor vorige navorsing wat op die betrokke probleem gedoen is. Die globale en Suid-Afrikaanse neigings ten opsigte van voedselsekerheid en stedelike landbou is in konteks geplaas, tesame met die bekrywing van bestaansreg in 'n stedelike konteks.

Data-insameling het plaasgevind in ses informele nedersettingsgebiede van die Kaapstadse Metropool, bestaande uit huishoudings wat betrokke is in boerdery aktiwiteite asook huishoudings wat nie in enige boerdery akwtiwiteite betrokke is nie. Baie hoë vlakke van voedselonsekerheid is in alle dimensies van voedselsekerheid in die informele nedersettingsareas van die Kaapstadse Metropool waargeneem. Met betrekking tot toegang tot voedsel het die huishoudelike voedselonsekerheidskaal aangedui dat 78% van huishoudings erg voedselonseker is en net meer as 50% het aangedui dat hulle 'n inkomste bo US$ 2 per persoon per dag verdien. Huishoudings het aangedui dat honger voorkom veral gedurende Junie en Julie, sowel as November en Desember. Dit is 'n aanduiding van die gebrek aan beskikbaarheid van voedsel. Daar is beduidende verskille tussen die informele nedersettingsareas waargeneem ten opsigte van die vlak van voedselsekerheid, maar geen beduidende verskille in voedselsekerheid tussen huishoudings betrokke in boerdery en die wat nie betrokke is in boerdery nie.

Die datastel bestaan uit 220 huishoudings. Van hierdie huishoudings het 99 mans as hoofde en 121 huishoudings vroulike hoofde. Meer manlike hoofde is betrokke by stedelike landbou. Die gemiddelde grootte van huishoudings het uit 4,3 lede per huishouding bestaan. Volgens die faktorontleding het die uitgawe komponent die grootste proporsie opgemaak van faktore wat 'n invloed het op voedselsekerheid, naamlik 20,4%. Hierdie komponent word gekenmerk deur faktore wat verband hou met uitgawes aangegaan ten opsigte van voedsel. Die uitgawe komponent bestaan uit die proporsie van voedseluitgawes ten opsigte van inkomste, die totale waarde van voedselverbruik en die huishouding se dieet diversiteitstelling. Die verskeidenheid voedselgroepe (diversiteit) wat gekoop is, is afhanklik van die hoeveelheid koopkrag wat beskikbaar is. Ander komponente wat geïdentifiseer is, was die komponent vir sosio-ekonomiese faktore, die komponent vir voedselsekerheidsfaktore, die stedelike boerderykomponent en geografiese en markkomponent.

Die resultate van die studie toon aan dat huishoudings wat in stedelike landbou betrokke is voordeel trek met betrekking tot dieet diversiteit, inkomste en toeganklikheid as gevolg van hul betrokkenheid by hierdie aktiwiteit. Daar is egter geen aanduiding van 'n beduidende positiewe bydrae van stedelike landbou tot voedselsekerheid nie.

Drie homogene groeperings ten opsigte van voedselsekerheidstatus is ontwikkel naamlik: 'n ernstige voedselonseker groepering, 'n matige voedselonseker groepering en 'n voedselseker groepering. Verskillende meetinstrumente vir voedselsekerheid, demografiese aanwysers, bestaansreg indikatore met betrekking tot inkomste, produksiefaktore en die vlak van onderwys is in die analise ingesluit. Hierdie homogene groepe met soortgelyke waardes vir verskillende faktore kan op sy beurt as onskatbare inligting dien vir besluitnemers om kritieke areas of huishoudings te identifiseer, gefokusde besluite te neem en spesifieke ondersteunende aksie te neem.

Beleidsaanbevelings word gevolglik gemaak om die effektiwiteit van die huidige beleid te verbeter en by te dra tot die hoofdoel van die Nasionale Voedsel- en Voedingsekerheidsbeleid, naamlik om te verseker dat al die dimensies van voedselsekuriteit in ag geneem word. Dit sluit die beskikbaarheid, toeganklikheid en bekostigbaarheid van veilige voedsel met voldoende voedingswaarde op nasionale en huishoudelike vlakke in.

Sleutelwoorde: *Voedsel sekerheid, Voedsel onsekerheid, Stedelike landbou, Stedelike boerdery, Sosio-ekonomiese aanwysers, Voedselsekerheidsaanwysers, Bestaansreg, Honger*

ABBREVIATIONS

ANOVA	Analysis of Variance
ASPP	Agricultural Starter Pack Programme
ATT	Average Treatment effect on the Treated
CASP	Comprehensive Agricultural Support Programme
CSI	Coping Strategy Index
DFID	Department for International Development
EA	Energy availability
EIU	Economist Intelligence Unit
EPWP	Expanded Public Works Programme
FANTA	Food and Nutritional Technical Assistance
FAO	Food and Agriculture Organisation
FCS	Food Consumption Score
FP	Food poverty
FPL	Food poverty line
FPS	Food Parcel Scheme
FS	Food Security
HDDS	Household Dietary Diversity Score
HFIAS	Household Food Insecurity Access Scale
HI	Hunger index
IFAD	International Fund for Agricultural Development
IFSS	Integrated Food Security Strategy
ISRDP	Integrated Sustainable Rural Development Programme

LBPL	Lower bound poverty line
LCP	Land Care Programme
LEA	Low Energy Availability
LRAD	Land Redistribution for Agricultural Development
LRP	Land Restitution Programme
MAHFP	Months of Adequate Household Food Provisioning
MDG's	Millennium Development Goals
NDP	National Development Plan
NGO	Non-Governmental organisation
NGP	National Growth Path
NSNP	National School Nutrition Programme
OZCF	Oranjezicht City Farm
PFA	Principal factor analysis
PFs	Principal factors
PRP	Poverty Relief Programme
SANHANES-1	South African National Health and Nutrition Examination Survey
SCAGA	Siyazama Community Allotment Garden Association
SDG's	Sustainability Development Goals
SHARE	Share of food expenditure on total household expenditure
SLF	Sustainable Livelihoods Framework
STATSSA	Statistics South Africa
SPSS	Statistical Package for Social Sciences
TVC	Total Value Consumed
UA	Urban Agriculture

UN-Habitat	United Nations Human Settlements Programme
WCDOA	Western Cape Department of Agriculture
WHO	World Health Organisation
WFP	World Food Program
UBPL	Upper bound poverty line
USAID	United States Agency for International Development
USA	United States of America
ZAR	South African Rand

CHAPTER 1

GENERAL INTRODUCTION

1.1   Introduction

This introductory chapter sketches the background and theoretical considerations relevant to food security (FS) and the position of urban agriculture (UA) systems in this context.   It clarifies the relevant terminologies, proposes a clear problem statement related to urban FS and the contribution of UA is identified.   It discusses the problem statement, identify the research questions, objectives and sub-objectives, and the hypothesis is stated with the delimitations and the structure of the contents of the report.

1.2   Background and Problem Statement

The beginning of the millennium brought world leaders together to form a broad vision, compiled in the Millennium Development Goals (MDG's), to fight poverty in all its dimensions.[1]   These goals remained the framework for poverty reduction for the past 15 years.   A new set of goals, the Sustainable Development Goals (SDG's) were designed to replace the MDG's.   These were an identified and analysed set of indicators created to highlight critical gaps and challenges moving towards 2030 in a sustainable and food secure manner.   It would thus create a balance between the three dimensions of sustainable development namely the environmental, social, and economic dimensions.[2] The requirements to countries create challenges, since it is important to establish the world's current position to determine the way forward.   This new development agenda applies to all countries that signed the declaration, thus indicating a strong intention to achieve the stated goals, aiming to promote peaceful and inclusive societies, to enable job creation, and address FS and environmental challenges, especially climate change and as a result secure livelihoods.   According to the South African Minister of

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1 (United Nations, 2015)   2 (United Nations, 2016a)

Environmental Affairs, Edna Molewa, the SDG's are aligned to South Africa's National Development Plan (NDP), focusing on:[3]

- Addressing poverty on a social level;
- Zero hunger by increasing FS and nutrition; and
- Increasing good health and well-being.

From a global perspective, FS remains a central focus area, and although the MDG's like the eradication of extreme poverty and hunger; the promotion of gender and the reduction of child mortality, contributed to improved conditions over the past 15 years, FS is still a persisting global challenge.[4] In a report by the Food and Agriculture Organisation (FAO) *et al.* (2015)[5] it was stated that about 795 million people are undernourished globally. Even though this number has declined in the past years, many great challenges regarding FS remain. Slow economic development in some developing countries contributed to food insecurity. Regardless of this, the related but separate issues of hunger, malnutrition and under nutrition remains a persistent challenge globally. It was reported that 'economic growth' is necessary to reduce undernourishment and for that matter growth has to be inclusive and provide opportunities for improving food production and the livelihoods of the poor.[6]

In South Africa, the term FS was used since the 1970's, albeit focusing on different formats varying from production to consumption, FS related issues played a vital role in nearly each governance since the arrival of the Dutch East India Company in 1652.[7] There was a need for fresh food on the long trade journeys from Europe to the East. Since then agriculture was formally established in Cape Town. Further FS needs drove settlers north in search of more productive land.[8]

It is generally assumed that South Africa is not threatened by FS. Since South Africa is mostly a net exporter of agricultural commodities and the fact that it has a high per capita income for an emerging economy, the international viewpoint is that food is available and

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3 (Department of Environmental Affairs, 2016)
4 (United Nations, 2015)
5 (FAO, *et al.*, 2015)

6 (FAO *et al.*, 2015)
7 (Vink and Rooyen, 2009)
8 (Hendriks, 2013)

accessible to all South Africans.[9,10] For a developing country, South Africa has a well-established social welfare system and a large proportion of social spending goes towards social grants. Over 17 million of South Africans receive social grants. Social Grants are in place to improve standards of living and redistribute wealth to create a more equitable society.[11]

This is however an improper conclusion, since FS is a complex term with many different interpretations and measurements.[12] Studies from numerous researchers[13,14,15,16] showed that regardless of producing adequate food to feed the whole population, mal-nutrition is present in many households throughout the country. The degree of FS in South Africa differ amongst researchers due to a variety of methodologies and analytical viewpoints.[17] The FAO recently confirmed this and indicated that the number of undernourished people in Sub Saharan Africa continued to surge to a projected 220 million in 2014-16 compared to 175.7 million in 1990-92'.[18]

To address this situation, in 2002, Labadarios *et al.* (2011)[19] reported that the occurrence of food insecurity levels did decrease to a certain extent since 1999. Even though this is true, D'Hease *et al.* (2013b)[20] stated that previous studies used different definitions and calculations for food insecurity, food poverty, or hunger due to different analytical viewpoints. The South African population, particularly in rural areas, faces very high rates of food insecurity and hunger. According to Hendriks (2012)[21] the NDP of South Africa do not make mention of both agriculture and FS, while the National Growth Path (NGP) realises the importance of FS to establish stability and sustainable livelihoods for South Africans through economic growth by creating jobs and increasing the purchasing power of the poor.

From a food production viewpoint, the situation in South Africa is predominantly influenced by the severe droughts that occur every decade. The 'sub-continental'

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9 (De Cock *et al.*, 2013)
10 (Koch, 2011)
11 (BusinessTech. (2017)
12 (D'Haese, *et al.*, 2016)
13 (Battersby, 2011)
14 (Charlton and Rose, 2002)
15 (D'Haese, *et al.*, 2013b)

16 (De Cock *et al.*, 2013)
17 (D'Haese *et al.*, 2016)
18 (FAO, 2015)
19 (Labadarios *et al.*, 2011)
20 (D'Haese, *et al.*, 2013b)
21 (Hendriks, 2012)

drought, over the past two years had a detrimental effect on the South African economy.[22] The recent drought caused an increase in summer grain prices to import parity levels, which might have traded closer to export parity in a normal year.[23] In 2015, the lowest amount of rainfall since 1904 was recorded. South Africa, is one of the five largest food producers in Sub Saharan Africa, and typically exports surplus food to neighbouring countries.[24] The agricultural sector experienced a 14% decline in 2015.[25] In a regional context, Piesse (2016)[26] stated that the drought has caused 16 billion rand (US$ 1.4 billion) in lost revenue in the agriculture sector in Southern Africa during this dry spell. Prior to the drought, it was estimated that 14 million people in Southern Africa, excluding South Africa, were food insecure. Over the course of 2016, the number of food insecure people in the region could rise to 50 million, a level not seen since the regional food crisis of 2002-03.

Exceptional rural-urban migration took place in the region over the past years, since people believe that they will have a better chance of finding a job in the cities.[27] According to Leaning and Grant (2015)[28], the human settlements study of the United Nations, noted that Africa is the continent with the highest rate of urbanisation globally. Stewart *et al.* (2013)[29] stated that population growth in developing countries will be absorbed by cities during the next few decades.

The rate of urbanisation is however not concurrent with the rate of economic growth and is worsening rates of urban poverty.[30] Food insecurity and malnutrition are direct results of urban poverty causing urban populations to depend on urban food production.

In the South African environment, the General Household Survey conducted by Statistics South Africa (STATSSA) (2015)[31] indicated that 76% of the Western Cape population experienced adequate access to food. Of the remaining, 17.4% experienced inadequate food access, while 6.6% experienced severe inadequate food access. STATSSA

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22 (BFAP, 2016)
23 (BFAP, 2016)
24 (Hlomendlini, 2016)
25 (Piesse, 2016)
26 (Piesse, 2016)

27 (United Nations Human Settlements Programme (UN-Habitat), 2011).
28 (Leaning, 2015)
29 (Stewart *et al.*, 2013)
30 (Stewart *et al.*, 2013)
31 (Statistics South Africa, 2015a)

(2015)[32] also showed that food access problems were most common in the City of Cape Town with 31% of households affected, while an average of 17.7% of households living in metropolitan areas reported that they are experiencing food access problems. Since surveys could be biased, there is a growing interest from private companies and non-governmental agencies to find appropriate measures for FS[33]. According to Chitiga-Mabugu *et al.*, (2013)[34], the extent of food insecurity is unknown, although there exist a general perception of South Africa being food secure. The reason for this is largely due to the lack of good quality data at micro levels, as well as an accepted measure of FS from micro to macro levels in South Africa.[35,36,37] The accuracy of the General Household Survey was questioned by Chitiga-Mabugu *et al.* (2013) to accurately reflect the food status at such various levels.[38]

On matters relating to improved FS, Battersby (2011)[39] pointed out the need for more holistic interventions to address FS. These have to accompany improved problem understanding and base line measurement, and also be situated in a particular locality.[40]

Rural environments are generally considered the focus point for FS policies. Lemba (2009)[41] suggested intervention that integrates strategies, inter alia to improve farm productivity and non-farm income in poor rural environments.

According to van Rooyen *et al.* (1995)[42], the context of agriculture in urban environments creates an important but complex scope to contribute to FS at national and household levels. Such contributions would have to be positioned in context of the urban economic reality of a particular locality. In 1996 a study on urban agricultural development in the Gauteng Province of South Africa, showed that UA could contribute from a food production, employment creation, social stability and household FS perspective, but that farming in the urban environments of Gauteng essentially constituted a 'non-formal' land-use activity with limited status.[43] Farming in this constrained environment surrounding a

32 (Statistics South Africa, 2015a)

33 (D'Haese, *et al.*, 2016)

34 (Chitiga-Mabugu *et al.*, 2013)

35 (Altman *et al.*, 2010)

36 (Hart, 2009)

37 (D'Haese *et al.*, 2016)

38 (Chitiga-Mabugu *et al.*, 2013)

39 (Battersby, 2011)

40 (De Cock *et al.*, 2013)

41 (Lemba, 2009)

42 (Van Rooyen *et al.*, 1995)

43 (Van Rooyen *et al.*, 1995)

metropole such as Johannesburg, thus only contributed to a limited degree as it was essentially constituted as non-permanent, shifting and often illegal land-use activity. Agriculture under such circumstances at best could contribute only sporadic and at a restricted level. Agricultural land-use planning and support services would be required and would have to be tested through cost benefit analysis to determine its capacity to contribute to economic development and growth as suggested by Hoornweg and Munro-Faure (2008).[44] Kekane reached similar conclusions in a study on urban farming in Soshanguve, close to Pretoria in the Gauteng Province.[45]

Research from Slater (2010)[46], reported not only economic benefits towards the cultivation of crops in cities, but also social and cultural benefits, amidst negative attitudes. Slater (2010)[47] suggested the findings to be taken into account and to be incorporated in urban planning. In contrast to this, UA in developing countries like the Netherlands is growing in popularity to create greener, healthier and more attractive urban areas.[48] Van der Schans (2010)[49] stated that farming in the Netherlands was previously considered to be "*an activity functional to rural development*", but is now also considered to be advantageous to urban development. Large scale farmers are mostly geared for the global export markets, while urban farming mostly focuses on customers living in close proximity of the production hubs. Van der Schans (2010)[50] remarked: "*A shift has taken place from 'how can the city help solve the problems of farmers?' to 'how can the farmers help solve the problems of cities?'*" According to Hamilton *et al.* (2014)[51] the justification for UA in the developing countries is a matter of subsistence survival, while in the developed countries it forms part of capitalism and ideology. It was reported from Hamilton *et al.*'s results (2014)[52] that there exist economic contributions of food produced in UA, as seen in Australia. Marginalised communities in the USA and Canada practice UA both as a means to increase FS and for social and economic purposes.

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44 (Hoornweg and Munro-Faure, 2008)
45 (Kekana, 2006)
46 (Slater, 2010)
47 (Slater, 2010)
48 (Van der Schans, 2010)

49 (Van der Schans, 2010)
50 (Van der Schans, 2010)
51 (Hamilton *et al.*, 2014)
52 (Hamilton *et al.*, 2014)

The focus of this study will fall on household FS and the role of UA supplying food to the city; and in particular in improving the FS status of poor families residing in the city boundaries.

Urban households adopt livelihood strategies to improve their standard of living, provide a sufficient income, be more food secure, or in some cases just in order to survive. According to Philander, (2015)[53] the ability for households to assume these strategies depend on a consistent and stable availability of food products, as well as affordable and convenient access thereto. Poor urban households along with rising food prices, often find the formal urban food supply system unaffordable and inaccessible.[54] Due to indications of food insecure households in the Cape Town Metropole by the Department of Agriculture, numerous initiatives, e.g. community, household and institutional food gardens and feeding schemes were implemented to help improve household livelihoods and thus improve FS levels.[55] Both feeding schemes and urban food gardens are mostly dependent on funding from government, private institutions or NGO's. Many researchers have advocated UA as a livelihood strategy to contribute meaningfully to FS[56,57,58], while others[59] argued that UA presented some kind of a 'magic bullet'[60] or solution to eradicate hunger and poverty in urban areas and may also find that UA systems need big initial capital investments while they are not always sustainable or contribute significantly to FS. Webb (2011)[61] stated that some literature relies on advocacy rather than evidence. Chitiga-Mabugu *et al.* (2013)[62] reported that the actual extent of food insecurity is unknown, even though the perception that South Africa is food secure exists. Other researchers[63,64,65] confirmed this observation, and added that the lack of good quality data as well as an accepted measure of FS in South Africa is a limitation. Limited empirical research exists on the contribution of urban agricultural systems towards FS.[66]

53 (Philander, 2015)
54 (Stewart *et al.*, 2013)
55 (Western Cape Department of Agriculture, 2015)
56 (FAO *et al.*, 2015)
57 (Zezza and Tasciotti, 2010)
58 (Maxwell *et al.*, 1998)
59 (Crush *et al.*, 2011)

60 (Stewart *et al.*, 2013)
61 (Webb, 2011)
62 (Chitiga-Mabugu *et al.*, 2013)
63 (Altman *et al.*, 2010)
64 (Hart, 2009)
65 (D'Haese *et al.*, 2016)
66 (Van Averbeke, 2007)

Ngcamphalala (2009)[67] noted that the bulk of urban farming activities throughout South Africa, with few exceptions, are seen both as 'unplanned' and 'very inefficient'.

Against this setting, the researcher will attempt to assess the FS status of selected households in the informal settlement areas of the Cape Town Metropole and determine the contribution of UA to household FS in this urban environment.

For the purpose of this study, the description for UA by Veenhuizen and Danso (2007)[68] will be used. The description is as follow: "*UA can be defined as the growing of plants and the raising of animals for food and other uses within and around cities and towns, and related activities such as the production and delivery of inputs, processing and marketing of products.*" This definition broadens the concept to include farming and related value chain activities, but require a clear definition of the 'right' of agricultural land use to prevent the 'shifting', non-permanent nature as described above. This was also suggested by van Rooyen *et al.* (1995)[69] in his study on urban agricultural development in the Gauteng Province of South Africa.

Veenhuizen and Danso (2007)[70] and Jacobi *et al.* (1997)[71] identified the following main UA typologies:

- Home gardens – These are small areas of ground adjacent to the residence and managed by residents. Produce grown on these areas is primarily for home use. It is possible to generate income or to add value on goods produced.
- Community-based gardens – This is often a larger piece of land or plots and owned by the community or municipality. These stands could be found on the grounds of churches, housing developments, schools or community centres. Either the institution involved or the community take on the management responsibilities, while the members' households are involved in production and the purpose of these gardens are usually to feed school children, hospital residents or prisoners, or serve as income generation.

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67 (Ngcamphalala, 2009)
68 (Veenhuizen and Danso, 2007)
69 (Van Rooyen, *et al.* 1995)

70 (Veenhuizen and Danso, 2007)
71 (Jacobi *et al.*, 1997)

- Institutional gardens – Pieces of land owned by schools, hospitals or other institutions used to grow crops for the institution itself.
- Commercial urban farming - Land under private ownership used for agricultural purposes, such as high value vegetable/fruit/flower production under plastic tunnels, or chicken/fish production, etc.

According to Kirisimaa (2013)[72] the Resource Centre on UA and FS foundation (RUAF) (2017)[73], identified the following typologies of UA production systems:

- Micro-farming in and around the house;
- Community gardening;
- Institutional UA;
- Small-scale commercial horticulture;
- Small-scale commercial livestock and aquatic farming;
- Specialised UA and forestry production;
- Large-scale agro-enterprises; and
- Multi-functional farms.

In some developed countries like The Netherlands, the growing popularity of UA is not mainly due to feeding the poor, but to act as an instrument to access fresh food since agriculture in the Netherlands is primarily export orientated.[74] Rapid growing cities all over the world necessitated cities like Rotterdam and Beijing to ask the question "*How are we going to feed the cities of the future?*". This established further research and expansion in the fields of rooftop gardens, vertical gardening and floating gardens.

These types of UA methods will further be explored in context of an appropriate typology for UA in the Cape Metropole and suggestions will be made regarding selection of models for further research.

Exploring the link between FS and UA will thus require a particular enquiry system and analytical framework. This will be discussed further in the study.

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72 (Kirsimaa, 2013)

73 (Resource Centres for Urban Agriculture and Food Security (RUAF), 2017)

74 (Kirsimaa, 2013)

Fifty percent from the budgets of the poorer South African is being spent on food.[75] According to Hoornweg and Munro-Faure, (2008)[76] urban and peri-UA does have the capacity to contribute to poverty alleviation and local economic development. Even though it is generally accepted that households, who are engaged in UA could experience improvement in nutritional status and health standards, as well as provide income and employment [77,78], empirical research in the actual contribution of UA to household FS may be limited as well as lacking in consistency.[79]

This led to the problem statement pertaining to this study and include the following two focus areas:

- **The South African FS context**: Reporting on the degree of food insecurity in South Africa at household levels is inconsistent due to the complexity thereof. There are no regulated ways of monitoring FS due to the following reasons:
  - o Different methodologies;
  - o Different samples and sample techniques;
  - o Different aspects of FS are assessed; and
  - o The non-holistic nature thereof i.e. not all parameters are being taken into account, the lack of good quality data, and the indicators influencing it are unknown.

- **Farming and FS in the urban environment**: In relation with the above statement, there is opposing observations by researchers regarding the contributing role of UA to household and broader FS. Since there is no concrete evidence that UA contributes significantly to FS, many doubt whether UA deserves a place in urban planning and spending.

75 (Oxfam, 2014)

76 (Hoornweg and Munro-Faure, 2008)

77 (Battersby and Marshak, 2013)

78 (Mougeot, 2000)

79 (Altman *et al.*, 2010)

1.3   Research Questions

The following research questions pertain to the problem statement and gives context to the research objectives for the informal urban settlements of the Cape Town Metropole farmer and non-farmer:

- Due to the multifaceted dimensions of FS, validity of the measurements causes a problem. What is the level of urban household FS of urban farmers and non-farmers?

- What are the critical indicators that determine and affect urban household food insecurity within these households?

- Given contrasting perceptions regarding the contribution of UA to household FS, does UA in the informal settlement areas of the Cape Town Metropole contribute to household FS?

- What other indicators are critical to consider when addressing the different dimensions of food insecurity?

- Considering the outcomes of the above analysis, what policy and strategy recommendations can be made in order to alleviate urban FS? Who should take the lead in revising strategies and what is the role of communities - a critical aspect in the current South African society.

1.4   Objectives

In the context of the ambiguous and inconsistent FS measurement tools and reports regarding UA being the answer to household FS, it is necessary to determine whether it actually is the case or not. Thus, the main objective of the study is to analyse urban household FS in the informal settlement areas of the Cape Town Metropole in South Africa with reference to UA.

1.4.1   Sub-objectives
1. To measure the level of urban household FS of urban farmers and non farmers;
2. To determine the indicators that affect urban household food insecurity;
3. To determine the contribution of UA to FS;

4. To find an optimal grouping of observations by utilising the identified critical indicators that address household food insecurity; and

5. To make policy recommendations on the alleviation of urban FS by using the outcomes of the above analysis.

1.5   Hypothesis

It is a challenging but important undertaking to convert the vast amount of indicators affecting FS into an inclusive measurement model for FS. Together with this, UA systems, focussing on economically viable household food production, environmentally sound land use practises; and contributing to social stability and balanced urban design should be integrated into urban planning and developing.

From the above problem statement and research questions, the following hypothesis will guide the investigations and conclusions of this study:

1. The level of food insecurity of urban farming households is significant lower than that of non-farming households.

2. The most important factor influencing household FS, in both urban farming and non-farming households, is the level of income per capita in a household.

3. UA in lower income areas can significantly alleviate food insecurity, while good research, identification and implementation of the most suitable UA systems in the Cape Town Metropolitan area, has the ability to feed the ever increasing population in the future.

4. Smaller households with multiple income resources, headed by men, having land available for production carry less risk to experience household food insecurity.

1.6   Terminologies used in this study

1.6.1   Food Security

Food security is a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. Based on this definition, four FS

dimensions can be identified i.e. food availability, economic and physical access to food, food utilisation and stability over time. FS does not guarantee nutritional security.[80]

Food security is a term that was born in the mid-1900s. Between 1960 and 1970 it became more prominent in the Malthusian economics. According to Leaning (2015)[81], it was determined that the human population had started to grow exponentially, and that the current state of food production would not serve in the required demand.

Figure 1-1 illustrates how hunger may be considered as a subset of food insecurity, while this partly overlaps with under-nutrition. As mentioned above, nutrition insecurity envelops FS, hunger as well as under-nutrition.
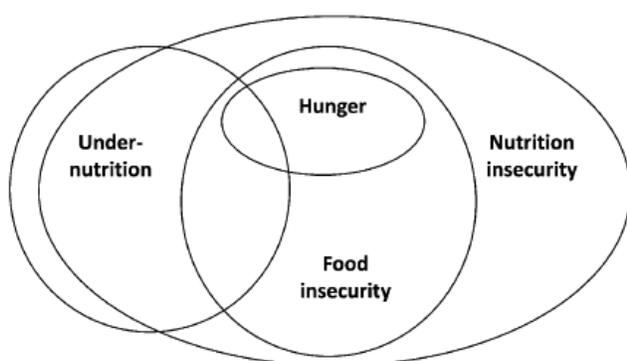
Figure 1-1 Overlapping concepts of hunger, under-nutrition, nutrition insecurity and food insecurity[82]

According to Hendriks, (2015)[83] the FS continuum (Table 1-1) serves as an additional tool in understanding the food insecurity phenomenon. Different levels of food insecurity are hereby categorised and matched with appropriate interventions at each stage. Hendriks, (2015)[84] noted that it may help to achieve two vital goals for a FS program which are:

- To attend to people's immediate needs; and
- To help build resilience in the face of stresses and shocks.

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80 (FAO *et al.*, 2015)
81 (Leaning, 2015)
82 (Jones *et al.*, 2013)

83 (Hendriks, 2015)
84 (Hendriks, 2015)

Table 1-1 Continuums of food insecurity, coping strategies and interventions[85]

Appropriate interventions	Reliance to food insecurity	Strategies employed	Characteristic	Classification	Food insecurity	Stage	Hidden hunger
Relief interventions: provision of food and other basic needs		Household collapse	Severe wasting, Emaciation, oedema, high mortality (under 5's) or low adult BMI	Food insecure		Starvation	
		Sell off productive assets	Severe underweight, and/or stunting or oedema or low BMI			Acute Hunger	
		Sell off non-productive assets	Wasting, underweight or stunting or low BMI			Chronic hunger	
Mitigation interventions and social protection to boost income and consumption and protect against consumption reduction		Consumption reduction and rationalisation	Sub-adequate intake and underweight			Inadequate intake	Hidden hunger
		Lack of dietary diversity	Micro-nutrient deficiencies, seasonal shortages, normal or underweight			Semi-adequate intake	
		Unbalanced diet and perhaps stress eating	Low cost, high carbohydrate and fat intake			Obesogenic intake	
Promotion of sustainable livelihoods		Worry about shortages	Generally adequate energy intake, normal weight, enjoys diet diversity	Vulnerable to becoming food insecure		Adequate intake but worry about future food access	
Encouraging the building up of savings, assets and insurances to draw on in times of shortage		N/A	Adequate intake of all nutrients, normal weight and good diet diversity	Food secure		Adequate intake with sustainable future supply of food	

85 (World Health Organization, 2010)

1.6.2   Urban Agriculture

The RUAF Foundation (Resource Centres on UA and Food Security) (2017)[86] described UA as follows: "*UA can be defined shortly as the growing of plants and the raising of animals within and around cities. The most striking feature of UA, which distinguishes it from rural agriculture, is that it is integrated into the urban economic and ecological system: UA is embedded in and interacting with the urban ecosystem. Such linkages include the use of urban residents as labourers, use of typical urban resources (like organic waste as compost and urban wastewater for irrigation), direct links with urban consumers, direct impacts on urban ecology (positive and negative), being part of the urban food system, competing for land with other urban functions, being influenced by urban policies and plans, etc. UA is not a relic of the past that will fade away (UA increases when the city grows) nor brought to the city by rural immigrants that will lose their rural habits over time. It is an integral part of the urban system.*"

In relation to the above, Kirsimaa, (2013)[87] acknowledged UA in being a favourable tool for a type of urban development that would lead cities towards greater urban resilience. This may include models such as urban private, institutional or community gardens, green roofs, vertical gardens and even parks or coastal wetlands can contribute to this purpose.

1.6.3   Food Insecurity

A situation that exists when people lack secure access to sufficient amounts of safe and nutritious food for normal growth and development and an active and healthy life is called food insecurity. It may be caused by the inavailability of food, insufficient purchasing power, inappropriate distribution or inadequate use of food at the household level. Food insecurity, poor conditions of health and sanitation and inappropriate care and feeding practices are the major causes of poor nutritional status.[88]   Food insecurity may be

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86 (Resource Centres for Urban Agriculture and Food Security (RUAF), 2017)

87 (Kirsimaa, 2013)

88 (Hendriks, 2015)

chronic (persisting for a long time or constantly recurring), seasonal (taking place at certain times of the year) or temporary.[89]

1.6.4 Nutritional Security

Figure 1-2 shows a basic model of how nutritional status are linked with ecological determinants at household level. This figure indicates that nutritional status is a product of food intake and health status. In turn, food intake and health status are influenced by four other determinants namely food access and caring capability, and health services and environmental conditions.

This theoretical framework emphasises the difference between FS, which refers to the area of causes and effects of food availability (dotted triangle) and 'Nutritional Security', which refers to entire relationships (large triangle).
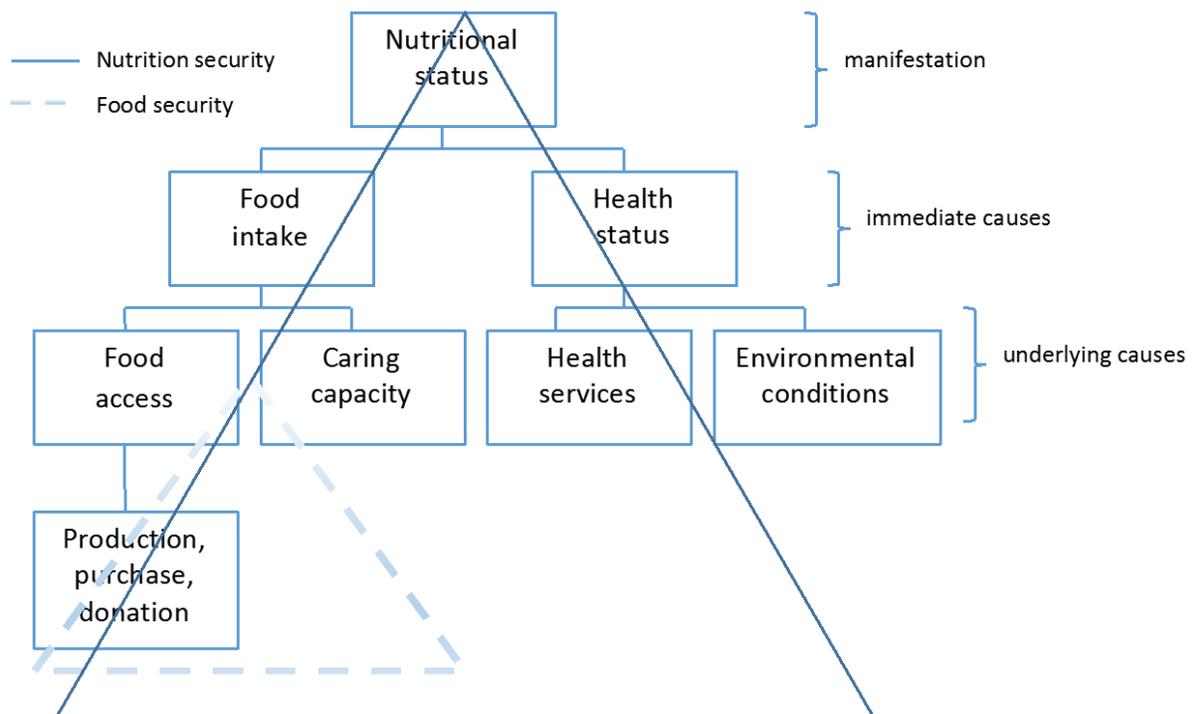
Figure 1-2 Factors determining food and nutritional security at household level[90]

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89 (FAO *et al.*, 2015)

90 (Gross *et al.*, 2000)

1.6.5 Livelihood

Chambers and Conway (1991)[91] suggested the following definition of livelihood:

"*A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stress and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base.*"

1.6.6 Hunger

In this study the term hunger is used as being synonymous with chronic undernourishment.

1.6.7 Food Security Surveys

According to De Cock *et al.* (2013)[92] it is important to investigate and develop an accurate measurement tool for FS at household level. Surveys are thus tools to measure the level of FS. Different methods and long time frames between surveys make it difficult to make comparisons and thus make it even more difficult to monitor household's FS status over long periods of time. Due to the fact that FS is multidimensional, it is difficult to make precise measurements and as a result thereof policy targeting is a big challenge. Many indicators are involved that may influence access to food and FS.

1.6.8 Malnutrition

Malnutrition is an abnormal physiological condition caused by inadequate, unbalanced or excessive consumption of macronutrients and/or micronutrients necessary for human health.[93] Malnutrition includes two basic types, namely:

- Protein-energy malnutrition - the lack of enough protein and calories which all the basic food groups provide which resembles the definition of hunger; and
- Micronutrient (vitamin and mineral) deficiency.

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91 (Chambers and Conway, 1991)
92 (De Cock *et al.*, 2013)
93 (The Free Medical Dictionary, 2017)

1.6.9   Undernourishment

A state, lasting for at least one year, of inability to acquire enough food, defined as a level of food intake insufficient to meet dietary energy requirements, is called undernourishment. For the purposes of this report, hunger was defined as being synonymous with chronic undernourishment.[94]

1.6.10   Undernutrition

Undernutrition is the outcome of undernourishment and/or poor absorption and/or poor biological use of nutrients consumed as a result of repeated infectious disease and/or the lack of availability of nutrients in food sources consumed. It includes being underweight for one's age compared to the national or international standards, too short for one's age, stunted, dangerously thin for one's height (wasted) and deficient in vitamins and minerals (micronutrient malnutrition).[95]

According to the FAO (2008)[96], the whole food system is susceptible to downfall when one or more of these components are not certain or secure. On the other hand, the World Food Programme (2007)[97] suggested that for people to be in a state of FS there would be sufficient access and availability of food at all times, which are safe to eat and contains the necessary nutrients for them to live an active healthy life.

1.6.11   Urban Agricultural Typology

Urban agricultural typology in this study refers to a classification according to general type or reason urban agricultural is being implemented. The typologies mentioned above are based on the following:[98]

- Economic orientation – The degree of commercial focus or type of market;
- Spatial orientation – Where the UA unit is situated;

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94 (Oxfam, 2014)

95 (Hendriks, 2015)

96 (FAO, 2008)

97 (World Food Programme, 2007)

98 (Kirsimaa, 2013)

- Social orientation – Dependant on family size of family, job security, head of house hold;

- Production type – Product type produced; and

- Programmatic orientation – The reason why a unit is established.

1.6.12   Framework of Analysis

In the framework of analysis can be seen in Figure 1-3. In relation to this, the layout of the chapters are discussed further in 1.9. The framework should explain the steps that will lead to the development of an innovative design of a comprehensive sustainable UA system for the Cape Town metropole.

Step 1

- Sketch background, problem statement, as well as theoretical considerations relevant to fs and the position of UA;
- Research questions, objectives, sub-objectives, hypothesis;
- Clarify relevant terminologies and delimitations.

Step 2

- The literature study is constructed to firstly anchor the application into theory and report on past research conducted on the problem;
- Global and South African trends of urbanization and FS;
- UA in context;
- Measuring livelihood in an urban context.

Step 3

- Analytical Framework: Describe the approach to the study with the appropriate methods to be used;
- Functional methods for data collection and analysis identified;
- Data handling - three phases:
  - Pre-data collection - identification of the sample population and project planning;
  - Data collection - quantitative and qualitative data will be collected from surveys and some focus groups;
  - Post-data collection - statistical analysis of the data, where the different methods of measurement of analysis will be used in order to get results towards each objective.

Step 4

- Results were distributed and shared in Chapters 4-7;
- The different chapters will include the following:
  - The level of urban household FS for urban farmers and non-farmers;
  - An analysis of the factors influencing household FS;
  - An analysis of the contribution of UA on household FS;
  - Options for addressing household FS.

Step 5

- The conclusions and recommendations in Chapter 8 lead to policy recommendations on the alleviation of food insecurity based on outcomes of previous chapters.

Figure 1-3 Framework of study

1.7   Organisation of the Study

The following steps were followed to conduct this study:

Step 1

- The first step was to clarify the context of the study in a thorough discussion of the background, problem statement and theoretical considerations relevant to FS and the position of UA in this context. Thereafter the research questions, objectives, sub-objectives and hypothesis for the study were developed. Clear definitions of the relevant terminologies were given, a schematic presentation of the study framework was designed with the organisation of the study and the delimitations explained.

Step 2

- The literature study was constructed to firstly anchor the application into theory and report on past research conducted on the problem.   The global and South African trends of urbanisation and FS followed by UA in this context were recognised. A thorough discussion of measuring livelihood in an urban context was made.

Step 3

- In Chapter 3 the approach to the study is described.
- Analytical framework and the justification of methods used are covered and the theoretical basis for the study was laid.
- In context of the study, problem statements and research questions, the objectives, sub-objectives and hypothesis for the study were formulated. Functional methods for data collection and data analysis were thus identified according to the above.
- Data handling took place in three phases:
    - o The first phase was the pre-data collection phase and included the identification of the sample population, the project planning regarding data capturing as well as the training of the data collectors (enumerators).
    - o The next phase was the data collection phase itself where quantitative and qualitative data was collected from surveys and some focus groups

o The post-data collection phase involved the statistical analysis of the data, where the different methods of measurement of analysis was used in order to get results towards each objective.

Step 4

- After analysis of data, the results will be distributed and shared in Chapters 4-7. The different chapters include the following:
  o The level of urban household FS for urban farmers and non-farmers;
  o An analysis of the indicators influencing household FS;
  o An analysis of the contribution of UA on household FS; and
  o Options for addressing household FS.

Step 5

- The conclusions and recommendations summarised in Chapter 8 will lead to policy recommendations on the alleviation of food insecurity based on outcomes of previous chapters.

1.8   Delimitations and Assumptions

Some delimitations and assumptions are made regarding the study i.e.:

- Although FS has many dimensions and building blocks, the nutritional part thereof will not be discussed.
- What makes the study unique is the fact that it was spatially fully situated in officially proclaimed urban areas and do not include rural areas.
- The term "urban farmer" was used for a household involved in agriculture related project household and community gardens funded by the Western Cape Department of Agriculture within the urban parameters of the Cape Town Metropole. Institutional gardens were seen as community gardens. These projects include community and household gardens. Some household heads within the urban farmer group may have alternative means of income, which might also serve as their primary means of income.

- For the purpose of the study two groups are used i.e. non-farmers (households not involved in urban farming) and urban farmers (household heads are in some way involved in urban farming).

- The control group, which consisted of non-farmers, were randomly selected in residential and community areas. The researcher believes that they are representative of the non-urban farming population.

- The study further assumed that the participating urban farmers are typical of marginalised South Africans in general and most of them are poor urban farmers in particular. The study was focused on UA households that fell within a low input farming model, and not commercial and futuristic intensive farming models.

- It is also assumed that the farmers understood the questions being asked of them and responded honestly in regards to their lives, experiences and attitudes; and that the interpretation of this data accurately reflected the farmers' perceptions and experiences.

- The study was done in six informal settlement areas in the Cape Town Metropole of the Western Cape Province. The researcher believes that these areas are representative of the poorer communities in the Cape Town Metropolitan area, but might not be similar to other metropolitan areas.

- The availability and quality of data on production, income, food consumption, size of land, etc. are based on opinion, since gardens are not run as businesses with project records.

- Potential misinterpretations among the enumerators and respondents were possible e.g. the respondents may forget what types of food they had during the past week, respondents may not always know the exact size of arable land they utilise or they may not accurately recall historical information. Moreover, the capacity of the respondents to remember precise information was limited. Nevertheless, additionally to the initial training of the enumerators, they were followed up during the first week of the data collection and daily practical corrections and advice meaningfully contributed to increase of the quality and consistency of the information. The large size of the sample enabled the capture of both the heterogeneity of the household situation and the general trends within the area.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter comprises of the literature study and is constructed firstly to anchor the application into theory and report on past research conducted on the problem. The researcher reports on food security (FS) as well as the measurement difficulties and opinions regarding the indicators used to determine the levels of FS. The global and South African trends of urbanisation, urban agriculture (UA) and FS are discussed. A comprehensive discussion of measuring livelihood in an urban environment is then made. This is done due to the fact that the livelihoods of urban households are directly influenced by the FS status of the households.

2.2 Household Food Security

Some literature exist on the topic of FS since there is a growing interest from governmental, non-governmental institutions as well as private companies that want to find the most appropriate way to measure household FS.[99] A study by D'Haese *et al.* (2016)[100] was done to design a composite index and furthermore identify and develop relevant measuring instruments to be used in a household survey.

2.2.1 Defining Food Security

D'Haese *et al.* (2016)[101] stated that it is difficult to define and understand FS due to the fact that it is a multidimensional phenomenon. The FS concept originated in 1990's, but has since changed in definition. The definition most widely used is based on the 1996 World Summit adopted definition: *"To attain universal physical, social and economic access to sufficient, safe and nutritious food by all the inhabitants at all times to meet their dietary and food preferences for an active and healthy life"*.[102] De Cock *et al.* (2011)[103] also used this definition in their study.

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99 (Battersby, 2011)
100 (D'Haese *et al.*, 2016)
101 (D'Haese *et al.*, 2016)

102 (NDA, 2002)
103 (De Cock *et al.*, 2013)

2.2.2   Complexity of Measuring Household Food Security

According to Hendriks (2015)[104], much research went into the understanding and development of indicators for food insecurity, yet there is still no universal measurement method that could be applied. Hendriks (2015)[105] noted that a good understanding of the experiences, causes and consequences of food insecurity is important in order to better predict who is most expected to be adversely affected by shocks. This may help to develop more suitable programs. Hendriks furthermore stated that a scale must be developed to measure FS against.

Rose *et al.* (1995)[106] made the following statement regarding food insecurity: *"Food insecurity is not a single experience but a sequence of stages reflecting increasing deprivation of basic food needs, accompanied by a process of decision making and behaviour in response to increasingly constrained household resources".*

As seen in Figure 2-1, the criteria as per definition by the FAO (1996)[107] is placed on a continuum of experiences ranging in severity, i.e. from, starvation to complete FS. FS interventions should aim not only to save people from dropping back into worse states of food insecurity but to move them along the continuum towards FS and resilience.

			Hidden hunger			Adequate intake but worry about future food access	Adequate quality and sustainable intake
Starvation	Acute hunger	Chronic hunger	Inadequate intake	Semi-adequate intake	Obesogenic intake		
←							→
Food insecure						Vulnerable to becoming food insecure	Food secure
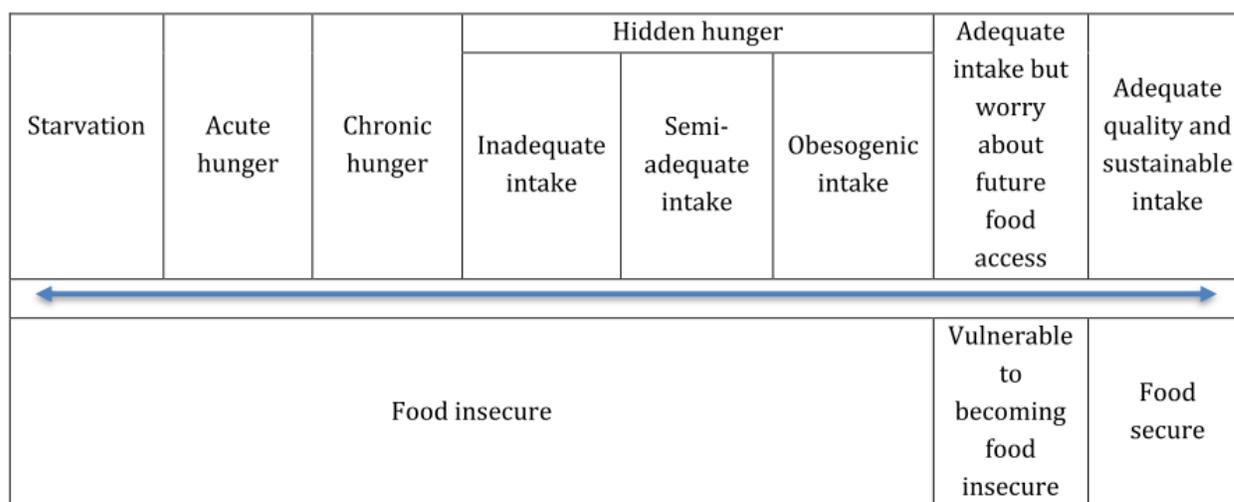
Figure 2-1. Food security continuum[108]

104 Hendriks (2015)
105 Hendriks (2015)
106 (Charlton and Rose, 2002)
107 (FAO, 2008)
108 (Hendriks, 2015)

D'Haese *et al.* (2016)[109] and Maxwell (2000)[110] identified three main shifts in FS:

- A shift from international and national level to the household and individual level;
- A shift from food first to livelihood perspective; and
- A shift from objective indicators to a subjective perception of FS.

The above shifts augmented measurement complexity. Further complexity lies in the four dimensions of FS at household level, therefore a combination of the following four main elements are suggested by both the FAO (2008)[111], World Bank (2012)[112] and World Food Programme (2007)[113] to define FS. These elements are food availability, food accessibility, food utilisation and food system stability.

2.2.3   Food Availability

To become food secure, sufficient quantities and the appropriate quality of food should be available. This is linked to the agricultural system to deliver in the demand of food. Food availability is thus related to stock on hand, as well as production thereof or the capacity to transport and receive food from elsewhere, through trade or aid. It is thus the ability of the entire agricultural system to meet the demand.[114]

2.2.4   Food Accessibility

Food accessibility is determined by the ability of a household or individual to secure certain resources, including legal-, political-, economic- and social resources that enables this individual to access food.[115] Consumers must therefore have the ability to regularly obtain sufficient quantities of food, through purchase, home production, exchange, gifts, borrowing or food aid. Sufficient food access includes the ability of individuals to adequately acquire suitable food for a nutritious diet. Access is not ensured by availability as a healthy and nutritional diet is not ensured by sufficient calorie intake. Distribution of food is vital at national, regional and household level.

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109 (D'Haese *et al.*, 2016)
110 (Maxwell *et al.*, 2000)
111 (FAO, 2008)
112 (World Bank, 2012)
113 (World Food Programme, 2007)
114 (Leaning, 2015)
115 (D'Haese *et al.*, 2016)

Accessibility is determined by the following criteria:[116]

- Affordability is determined by a households' or communities' purchasing power.
- Allocation relates to the mechanisms governing when, where, and how food can be accessed by consumers.
- Preference will depend on social or cultural norms and values that influence consumer demand for certain types of food. Determinants may include religion, seasons, advertising and preparation.

2.2.5   Food Utilisation

Food utilisation is linked to the nutritional value of food, and the individual's ability to absorb essential nutrients from it. It also includes the social value of food and food safety. Therefore, well-balanced diets are determined by the health status of food and the individual's ability to prepare it.[117] Food that is safe to eat, that contains the essential nutrients for people and that could be handled and prepared hygienically are important criteria for the consumers thereof to live an active healthy life.[118]

2.2.6   Food System Stability

This is reliant on the temporary or permanent loss of access to resources needed to consume adequate food.[119] Due to the fact that FS is determined by sufficient access to food at all times, the risk of losing access to resources needed to consume adequate food, may consequently result in a sudden shock (economic or climatic risks) or cyclical events (seasonal FS).   This may be temporary or permanent. Food stability requires both uninterrupted availability and access. Climate variability is an important cause of unstable access.[120,121]

2.2.7   Indicators that influence Food Security

According to D'Haese et al. (2016)[122] a good measure of FS needs to be relevant, valid, credible, low cost, time sensitive, appropriate for the decisions that need to be made and

116 (D'Haese *et al.*, 2016)

117 (Labadarios *et al.*, 2011)

118 (Labadarios *et al.*, 2011)

119 (D'Haese *et al.*, 2013b)

120 (D'Haese *et al.*, 2013a)

121 (Admire, 2014)

122 (D'Haese *et al.*, 2016)

FS needs to be comparable across locations and cultures. Since no fixed standard for measuring FS exists, a problem occurs in terms of the validity of the measures.

Some of the challenges that may be experienced for measuring FS are the following:

- The difficulty to measure how much food is sufficient;[123]
- The difficulty to determine if it meets the nutrient and energy requirements;[124]
- The difficulty to determine units of analysis;
- The difficulty to estimate caloric needs;
- The difficulty to determine how far individuals fall below the threshold;
- Problems regarding household choice exist regarding preferences, discrimination, etc.;
- The sensitive matter of household FS; and
- Financial and time constraints in measurement.

D'Hease *et al.* (2016)[125] identified a list of combinations of indicators across the different dimensions of FS, including availability, accessibility, utilisation and stability or sustainability, as well as the level of analysis which includes international-, national-, household- and individual levels. Table 2-1 shows a combination of FS indicators per dimension and level of analysis.

Table 2-1 Combination of food security indicators per dimension and level of analysis[126]

Availability	Accessibilty	Utilisation	Sustainability
Access land/water/ finances	Food consumption as a share of household expenditure (income, size, dependency ratio); Income level and sources; Food prices at household level; Food poverty index Household food inaccess scale	HDDS at household level	Periodical and cyclical shocks; Entitlement promotion and protection

The following indicators are most frequently assessed or taken into account in FS analysis at household level:[127]

- Household Food Insecurity Access Scale (HFIAS);

123 (Maxwell *et al.*, 2000)
124 (Pinstrup-Andersen, 2009)
125 (D'Haese *et al.*, 2016)
126 (D'Haese *et al.*, 2016)
127 (Jones *et al.* 2013)

- Household Dietary Diversity Score (HDDS);

- Hunger index (HI);

- Food poverty (FP) and Low Energy Availability (LEA) also known as the Rose and Charlton indices;

- Household expenditure and the share of the food consumption;

- Access to production factors/markets; and

- Income sources and income level and stability of:
  - Formal/informal income;
  - Access to food safety nets/ social grants/ school feeding schemes;
  - Access to remittances; and
  - Proportion of the population living under the poverty line and its link with food poverty.

2.2.7.1 Household Food Insecurity Access Scale (HFIAS)

The Food and Nutritional Technical Assistance (FANTA), that forms part of the USAID, developed a set of questions to identify and differentiate households, which experience FS and those who don't.[128] This set of questions can be used across different cultural contexts and represent all spheres of the household food insecurity.[129]

The HFIAS consists of nine items with four frequencies and three domains including anxiety and uncertainty about the household food supply, insufficient quality, and insufficient food intake.[130] The approach of this measurement is based on the households' experience regarding insufficient access to food such as feeling hungry, cutting down on the number of meals, eating food that is less liked or having a less diverse diet. Results are placed on a scale of severity, from food secure to severely food insecure.

The HFIAS measures food insecurity, which results in predictable reactions and responses that can be quantified and summarised in a scale.[131] But the scale only captures the access to food, not the utilisation.

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128 (Battersby, 2011)

129 (De Cock, 2012)

130 (Deitchler *et al.*, 2010)

131 (Coates *et al.*, 2007)

In Table 2-2 the components of HFIAS are listed. Each of the nine questions relate to the previous 30 days and are coded as follow:

- Never (0 times);
- Rarely (once or twice);
- Sometimes (3 to 10 times); and
- Often (more than 10 times).

Table 2-2 Components of Household Food Insecurity Access Scale

	Household Food Insecurity Access Scale (HFIAS)	Never	Rarely	Some-times	Often
1	Did you worry that your household would not have enough food?	0	1	2	3
2	Were you or any household member not able to eat the kinds of food you preferred because of a lack of money?	0	1	2	3
3	Did you or any household member eat just a few kinds of food day-after-day owing to a lack of money?	0	1	2	3
4	Did you or any other household member eat food that you preferred not to eat because of a lack of money to obtain other types of food?	0	1	2	3
5	Did you or any household member eat a smaller meal than you felt you needed because there was not enough food?	0	1	2	3
6	Did you or any other household member eat fewer meals in a day because there was not enough food?	0	1	2	3
7	Was there ever no food at all in your household because there was not money to get more?	0	1	2	3
8	Did you or any household member go to sleep at night hungry because there was not enough food?	0	1	2	3
9	Did you or any household member go a whole day without eating anything because there was no food?	0	1	2	3

2.2.7.2 Household Dietary Diversity Score (HDDS)

The Household Diet Diversity Score (HDDS) is based on the data of food consumed the day before the interview by the household members. The score relates to the number of the different groups of food consumed. A higher score shows higher diversity, thus the household is more food secure[132]. It can also be defined as the total of the amount of different foods or food groups consumed by an individual or household over a specific

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132 (Deitchler *et al.*, 2011)

time period.[133] This indicator is a determinant for diet quality and is highly correlated with adequate caloric and protein intake, quality of protein consumption, and household income.

Studies by de Cock *et al.* (2013)[134] and Grober (2013)[135] showed that the following variables are relevant determinants to be used in the above measurement:

- Gender;
- Household size;
- Age of the household head;
- Marital status of the head;
- Educational level of the head: dependency ratio;
- Household income

The higher the number of different food groups consumed may result in a better quality diet. A high amount of different food groups may be result in diversity in both macro- and micronutrients.[136]

2.2.7.3 Food Consumption as a share of Household Expenditure

Income and expenditure surveys may serve as a measure for FS. Some literature stated that food consumption, as a part of household spending, is a direct outcome indicator of FS.[137] According to D'Haese *et al.* (2016)[138] it is thus important to calculate the monetary value of the amount of food purchased, how much food is consumed coming from own production and amount of food received as donation or gift. Even though expenditure patterns of households may also give info regarding the quantities of different foods purchased per household member, and the contribution to total energy, the information do not indicate FS over time, or whether it has been disposed of in some or other way. Thus, not sufficient information regarding food intake is observed.

133 (Hoddinott and Yohannes, 2002)

134 (De Cock *et al.*, 2013)

135 (Grober, 2013)

136 (D'Haese *et al.*, 2016)

137 (Leroy *et al.* 2001)

138 (D'Haese *et al.*, 2016)

2.2.7.4 Months of Adequate Household Food Provisioning (MAHFP)

The number of months a household was able to provide food for itself during the past year are called Months of Adequate Household Food Provisioning (MAHFP). The relating question to the respondents was to enquire how many months in the past year the household didn't have access to sufficient food to meet their household needs. This measure of limited access to food is dependent on the source of the food, and may therefore include purchased food, food produced, etc. The MAHFP measure ranges between 0 and 12 and each hungry month confirmed gets a score of one.

2.2.7.5 Energy Availability

Low Energy Availability (LEA) means that all household members do not meet the sufficient or recommended energy requirements derived from the energy available in the household food supplies available. The numerator of this ratio is a sum of the energy available per month in each household's purchased food as well as the energy consumed from food produced by the household. The denominator is a sum of the recommended daily energy intakes for each individual in a household, multiplied by thirty to convert it to the same monthly time frame as the numerator. The FAO and World Health Organisation (WHO) have generated guidelines for populations in regards to nutrition, which states the average daily age-sex specific energy need of each household member.[139] Households scoring below one on this scale are expected to have LEA.

2.2.7.6 Food Consumption Score

Three aspects are included in the Food Consumption Score (FCS):

- Household dietary diversity using information on food group consumption in the past 7 days;
- Frequency of food group consumption (number of days in the past week); and
- Nutritional value using weights.

It is used to represent the household food access.

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139 (WHO, 2010)

2.2.7.7   Food Poverty Index

The food poverty index measures the portion of households who have the necessary funds or income to acquire a basic diet having adequate nutritional value. A distinction is made between 'food secure', 'food insecure' and 'situation of hunger' in this index.   The indicators used to calculate this index are income and food expenditure, household size, rural and urban food prices, monetary value of home production and the energy value of an adequate basic food plan.[140]

2.2.7.8   Coping Strategy Index

Household vulnerability analyses are used by Food and Early Warning systems, Food and Income Vulnerability Information Mapping Systems and the World Food Program aiming to assist in identifying long-term migration activities, targeting food aid and emergency activities and monitoring interventions. These analyses attempt to calculate the change in total food budget, consumption and sources of income as a result of a crisis when compared to normal periods.[141]

Hendriks (2005)[142] describes the Coping Strategy Index (CSI) developed by CARE International and the World Food Program as a way to measure FS and the impact of food aid programs in emergencies in a relative rapid way. A simple set of questions is used to determine how often households employ a list of coping strategies identified by community-level focus groups.

2.2.8   Global Trends of Food Security

An unacceptably large part of the world's population is experiencing a degree of food insecurity. In a report compiled by the FAO, IFAD (International Fund for Agricultural Development) and WFP (World Food Program) (2015)[143], estimates showed that about 795 million people – were undernourished between 2014 and 2016. This number is concerning, since one in about nine people in the world are hungry to a certain extent. Even more concerning is that more than 98% of these undernourished people live in developing countries. The occurrence of some extent of food insecurity in the developing

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140 (D'Haese *et al.*, 2016)   142 (Hendriks, 2005)
141 (Hendriks, 2005)   143 (FAO *et al.*, 2015)

countries has dropped from 44.5% during the 1990/1992 period to 13% during the 2014/2016 period.[144]

The world's existing geo-political and ecological environments are both volatile and closely linked. According to the World Bank Group (2012)[145], the rapid changes in the climate cause unpredictable weather patterns and are primarily affecting the southern areas which are the main sites identified for global food production. Rising sea levels, desertification and salinization of the oceans, all contributing to the destabilisation of the political and economic situation in many areas of the world.

A crucial aspect of climate change is that the influences thereof will not be felt equally everywhere. The poorer areas, is likely to be the least able to adapt to these changes. This report by the World Bank Group (2012)[146] suggested that Sub-Sahara Africa would experience more increased risks for extreme weather patterns such as droughts and flooding.[147]

2.2.9   South African Trends in Food Security

Frayne *et al.* (2010)[148] developed a schematic presentation for FS in South Africa (Figure 2-2). Key indicators including food availability, food accessibility, food reliability, food quality and food preference feature on this schematic presentation. Thus the socio-economic and political together with the four dimensions of food security together with food preference influence nutritional security.

144 (FAO *et al.*, 2015)
145 (World Bank, 2012)
146 (World Bank, 2012)
147 (World Bank, 2012)
148 (Frayne *et al.*, 2010)
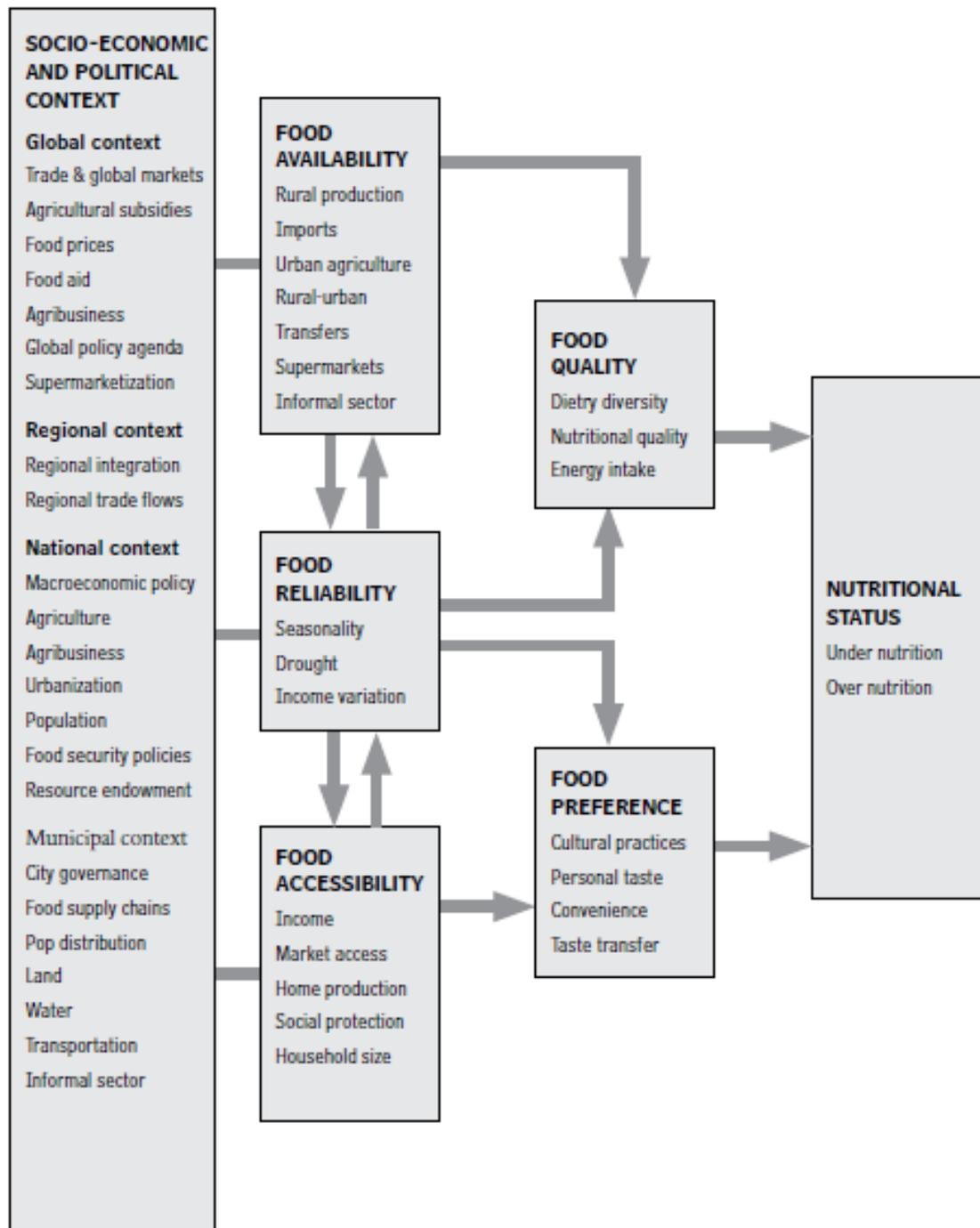
Figure 2-2 Food Security in the Context of Urban South Africa.[149]

The Global Food Security Index, developed by the Economist Intelligence Unit (EIU)[150] and sponsored by DuPont, considers the following three core pillars of FS:

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149 (Frayne *et al.*, 2010)   150 (EIU and DuPont, 2016)

- Affordability;
- Availability; and
- Quality and Safety.

The study was conducted across 109 countries. The index is a dynamic quantitative and qualitative benchmarking model, constructed from 28 unique indicators, that provides an objective framework for evaluating FS across a wide range of countries worldwide. By creating a standardised metric unit around FS, the EIU seeks to empower users to explore the issues surrounding FS, including the rankings and results, and draw conclusions for policy, business operations and future research. Figure 2-3 shows South Africa's FS indicators in relation to 108 other countries as determined by Economist Intelligence Unit (EIU).
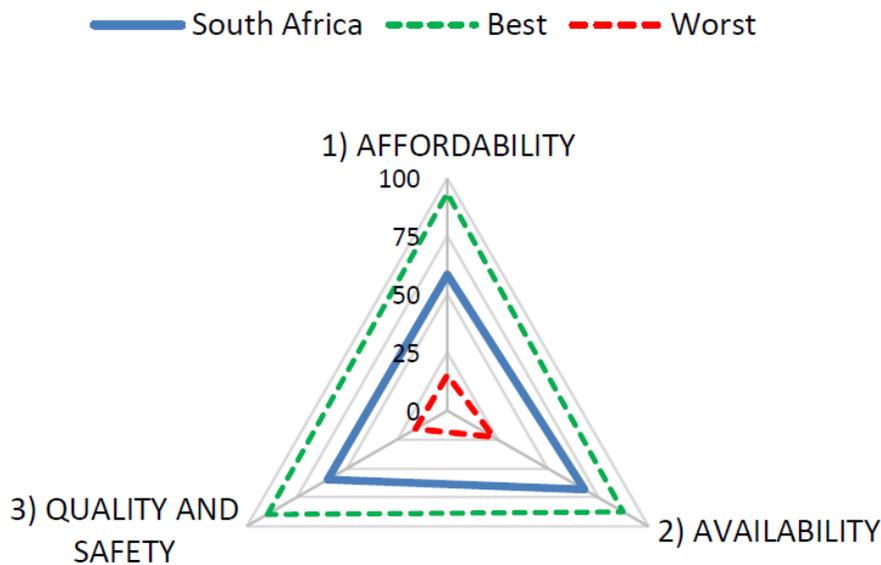
Figure 2-3 South Africa's Food security indicators in relation to 108 other countries as determined by Economist Intelligence Unit (EIU)[151]

In the study conducted by the Economist Intelligence Unit (EIU) (2016)[152], South Africa received an overall score of 62.9 out of 100 on the FS scale, with 58.6, 68.1 and 59.7 out of 100 for affordability, availability and quality and safety respectively (Table 2-3). This score has shown an increase of 2.1 points since 2012. Countries like America, Ireland,

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151 (EIU and DuPont, 2016) 152 (EIU and DuPont, 2016))

Singapore, Australia and The Netherlands are on the top of the scale with more than 80 points, while countries like Niger, Chad, Sierra Leone and Burundi are on the bottom of the list, with 29 or less points on the scale.

Table 2-3 South Africa's Food security indicators as determined by Economist Intelligence Unit (EIU)[153]

	Score / 100					Rank / 113				
	2012	2013	2014	2015	2016	2012	2013	2014	2015	2016
OVERALL SCORE	**60,8**	**61,0**	**62,3**	**62,3**	**62,9**	**47**	**48**	**46**	**46**	**47**
Affordability	55,5	55,1	58,8	58,8	58,6	55	56	53	54	53
Availability	66,5	67,4	66,8	66,5	68,1	36	29	31	33	31
Quality and safety	58,3	58,4	58,8	59,6	59,7	55	54	54	53	53

Since South Africa is a net exporter of agricultural produces and has a high per capita income for an emerging economy the international arena wrongfully considers South Africa not to be troubled by FS.[154,155] This is however an improper assumption. Despite producing sufficient food to feed the whole population, results from studies have revealed that under nutrition is present in a large part of the population.[156,157,158,159]

Government adopted the Integrated Food Security Strategy (IFSS) in 2002.[160] The vision of the IFSS is "*To attain universal physical, social and economic access to sufficient, safe and nutritious food by all South Africans at all times to meet their dietary and food preferences for an active and healthy life.*" The definition of FS of the FAO (2015)[161] is similar to the vision of the IFSS.

The Millennium Development Goals (MDG) of the FAO are linked to the goals of the IFSS. MDG one reads: *"To eradicate hunger, malnutrition and food insecurity by half by 2015"*.[162]

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153 (EIU and DuPont, 2016))
154 (Koch, 2011)
155 (De Cock *et al.*, 2013)
156 (Battersby, 2011)
157 (Charlton and Rose, 2002)

158 (D'Haese *et al.*, 2013b)
159 (De Cock *et al.*, 2013)
160 (NDA, 2002)
161 (FAO, 2015)
162 (FAO, 2015)

This strategy has identified five objectives:[163]

- To increase household production and trading;
- To improve income generation and job creation;
- To improve nutrition and food safety;
- To increase safety nets and food emergency management system; and
- To improve the analysis and information system management.

The IFSS adopted a broad developmental approach to FS, with household FS as its main goal. National FS is not ignored, even though South Africa is considered food secure on a national level. [164] In addition, Haysom, (2016)[165] stated that the flows of food to urban residents are neither consistent nor equitable, which in turn result in food insecurity. Frayne *et al.* (2010)[166] confirmed this statement by adding that high levels of food insecurity exist in Southern Africa. The HFIAS and HDDS were used to determine the level of FS and highlights the urban food challenges in South and Southern Africa and raises questions about the South African food system.

Projects have been initiated by Government to attain their goal of halving poverty between 2004 and 2014.

Increased budgets for social programmes were subsequently allocated in all areas of government which include:[167]

- School feeding schemes;
- Social grants - child support, pensions, disability etc.;
- Free health services for children between 0-6 years and expectant and breastfeeding mothers;
- Public works programmes; and
- Agricultural programmes.

Agricultural programmes initiated included the following:[168]

- Community food garden initiatives;

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163 (FAO, 2015)
164 (Koch, 2011)
165 (Haysom, 2016)

166 (Frayne *et al.*, 2010)
167 (NDA, 2002)
168 (NDA, 2002)

- Production loan schemes;

- Infrastructure grants for smallholder farmers;

- Presidential tractor mechanisation scheme; and

- Land reform and farmer settlement programmes.

Both undernutrition and obesity are reported in South Africa. The problem of food insecurity has been confirmed by several studies.[169,170] According to the National Food Consumption Survey (2015a)[171] hunger was reported in 52% of households, where the General Household Survey (2015b)[172] reported hunger in adults (10%) and children (12%).

The South African National Health and Nutrition Examination Survey (SANHANES-1) established by the Human Sciences Research Council provides a broad and comprehensive platform to study the health and nutritional status of South Africa.[173] The 2012 SANHANES-1 survey showed that 46% of the South African population were food secure, since they had some meaning to food access for all household members, with enough food at any time to ensure a healthy and active life. 28% were at risk of hunger, while 26% of the population experienced hunger.[174]

According to Labadarios et al. (2011)[175] the food insecurity levels decreased dramatically since 1999. Although this is the case, D'Hease et al. (2013b)[176] mentioned that previous studies used different definitions of food insecurity, food poverty, or hunger and that the South African population faces very high rates of food insecurity and hunger.

In 2012, five key points were identified by the South African Department of Agriculture considering FS and factors influencing it:[177]

- High unemployment rate is the reason for low number of income earners;

- Weak support networks and poor management of disasters like droughts and floods threaten the FS;

169 (Faber et al., 2011)
170 (Labadarios et al., 2011)
171 (Statistics South Africa, 2015a)
172 (Statistics South Africa, 2015b)
173 (Hendriks, 2013)

174 (Hendriks, 2013)
175 (Labadarios et al., 2011)
176 (D'Haese et al., 2013b)
177 (Leaning, 2015)

- Households do not produce food adequately and consistently and therefore are not able to feed their families on government grants alone;

- The lack of adequate safety nets due to high unemployment rates render the population with a weak purchasing power, resulting in lower monetary resources available to put towards food; and

- The lack of purchasing power due to high unemployment causes households to struggle to buy food. Thus a quarter of children under the age of six are stunted due to malnutrition of a chronic nature.

When factors affecting risk for food insecurity is considered, many different variables come to mind. Urban versus rural setting does not appear to be the only factor putting the population at risk for food insecurity, as both rural and urban poor are at risk, according to Faber *et al.* (2011).[178]

Jacobs (2009)[179] and Oldewage-Theron and Slabbert (2008)[180] correlate food insecurity with rurality, but nutrient deficiencies are also found in urban and peri-urban areas. The risk for food insecurity appears to be more related to the resources available rather than the setting it is found in. Resource factors such as decreased intellectual capital, a decline in the availability of money, the lack of land and / or transport all reduce the ability of poor to produce food.[181]

When the urban population increases, it brings about more problems. A rapid increase in population can lead to lack of housing, poor sanitation and sewage services, decreased access to clean water and low energy sources. This may also lead to high crime rates.[182] It was also noted that urbanisation may lead to lifestyle changes like reduced physical activity, dietary changes, tobacco and alcohol use.[183]

Informal settlements house 14% of the South African population. This unique setting provides challenges because of poor shelter conditions and limited access to water and

178 (Faber *et al.*, 2011)
179 (Jacobs, 2009)
180 (Oldewage-Theron and Slabbert, 2008)

181 (Faber *et al.*, 2011)
182 (Leaning, 2015)
183 (Leaning, 2015)

food.[184] The decreased monetary resources found in households with lower income leads to less money being available to purchase food.[185,186]

Many households depend only on government grants, old age pensions, disability grants, foster care grants and child support grants.[187] Charlton and Rose (2002)[188] reported that a higher demand for food is found in increased household sizes and that many of these households are also headed by females, leading to more limited access to resources.

Jacobs (2009)[189] however stated that food insecurity is determined by the wealth and the strategies of livelihood and not just by income. Faber *et al.* (2011)[190] listed the rising food prices as reason for greater food insecurity in impoverished households. Food price increases can be attributed to various influences including rising oil prices and domestic electricity supply issues[191]. Many rural households that are unable to purchase all their food, supplement food supply by own production. An estimated four million subsistence farmers are active in South Africa. Despite not providing a significant contribution to the gross domestic agricultural product, it does play an important role in improving FS in the communities in rural areas.[192]

The extreme socio-economic inequality found in South Africa is highlighted by the high Gini coefficient.[193] This inequality filters through to the low level of income distribution, health, employment and housing. According to Leaning, (2015)[194] it is reflected by the increased stunting rates in Black South Africans and the increased obesity in all ethnic groups.

2.2.10 Western Cape Food Security Status

In a report by Battersby (2011)[195] it was indicated that the layout of the City of Cape Town is a result of the Apartheid system. Rapid growth of the city because of fast urbanisation resulted in an increased state of poverty, a backlog in housing units and wide urban extension. According to Battersby (2011)[196] the apartheid model entrusted the poorer

184 (Oldewage-Theron and Slabbert, 2008)
185 (Charlton and Rose, 2002)
186 (De Cock *et al.*, 2013)
187 (Labadarios *et al.*, 2011)
188 (Charlton and Rose, 2002)
189 (Jacobs, 2009)
190 (Faber *et al.*, 2011)

191 (Faber *et al.*, 2011)
192 (D'Haese *et al.*, 2013a)
193 (D'Haese *et al.*, 2013a)
194 (Leaning, 2015)
195 (Battersby, 2011)
196 (Battersby, 2011)

part of the population to the city peripheral. This caused restricted access to important services and economic infrastructure. The unsustainable spatial design indirectly resulted in increased poverty and food insecurity.

Even though enough food is produced per person per day, there are nevertheless 23% of households that reported inadequate food status during the 2013 General Household Survey.[197]

D'Haese *et al.* (2013b)[198] agreed and stated that South Africa produces enough food to export to other countries, but still struggles with food insecurity within its borders. STATSSA's General Household Survey (2015a)[199] also showed that severely inadequate food access was experienced by 7% of the Western Cape population and 17% experienced inadequate food access and 76% of the Western Cape population experienced adequate access to food. This survey also found that 31% of households experienced that access to food in the City of Cape Town were a problem compared to 18% of households living in other metropolitan areas in South Africa.

Battersby (2011)[200] suggested more holistic intervention methods to the Malthusian way of addressing the issue of food security to match population growth with food production. As more than 60% of South Africa's population is already living in urban areas, FS should be addressed as an urban issue. Leaning (2015)[201] agreed to this and added that increased FS results in positive influences in terms of economy, environmental stability, employment rates and health costs. Leaning further added that FS should be seen as a constitutional right, but differed from Battersby in reporting that rural populations experience more severe food insecurity.

Battersby (2011)[202] reported enormously high levels of food insecurity in all of the areas in Cape Town surveyed in her study. She found that 80% of households were moderately or severely food insecure, while this number reached 89% in the Khayelitsha population. The same trend was seen in the Philippi. Some 31% of the population in Ocean view seemed to be food secure and in all three of the above areas the dietary diversity is

197 (Statistics South Africa, 2013)
198 (D'Haese *et al.*, 2013b)
199 (Statistics South Africa, 2015a)

200 (Battersby, 2011)
201 (Leaning, 2015)
202 (Battersby, 2011)

predominantly poor where 88% of the households went without food in the past six months, while 44% went without food for a week or more. Battersby (2011)[203] also found that the level of FS had a seasonal linkage, where more food insecurity is experienced in January and June. Both these months follow spending cycles during December festive season and the cold and wet winter season.   The June insecurity can be attributed to extreme weather patterns. The size of the household and household age did not have a significant effect on FS while the study showed that households with a female provider were more insecure, but not significantly so. The rate of income plays an important role, where high-income families experience less food insecurity and vice versa. Battersby's report (2011)[204] also stated that people living in informal housing or shacks are 20% more prone to food insecurity that those living in houses.

FS levels are influenced by spatial factors, whereby households on the outskirts of the city might experience physical or economic barriers to access food.   According to Battersby (2011), the poorer population may access food in the following ways:

- Formal safety nets and social networks where people can borrow, trade or share food;
- Own growth of food, very rare occurrence of urban farmers though; and
- Community food kitchens and food aid.

Battersby (2011)[205] concluded: "*Food insecurity in Cape Town is both severe and chronic and is worsening*". The increase of food insecurity rates will have damaging effects on both economic development and health. Income level is a helpful indicator for FS, but Battersby (2011)[206] found that the occurrence of food insecurity was present at all levels of income.

2.2.11   Categorical Indicators for Measuring Food Security

By dividing indicators into categories would assist to classify data in such a way that one group would be similar and different from indicators in the other.   De Cock (2012) designed four clusters relating to food security for households in the Limpopo province.[207]

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203 (Battersby, 2011)
204 (Battersby, 2011)
205 (Battersby, 2011)

206 (Battersby, 2011)
207 (De Cock, 2012)

It was found that food insecure households have low-income per capita, low education level, more members per household and often headed by women. Food secure households on the other hand were having a high income, have less members per household, likely to be headed by males and have a low dependency ratio.[208]

2.2.12   Urbanisation

The unprecedented rural to urban migration in the twenty first century has led to rapid urban growth. In 1900, thirteen percent of the world population resided in urban areas. This will, according to United Nations Human Settlements Programme (UN-Habitat) (2011)[209] estimate, increase to sixty percent by 2030. The twenty-first century is thus known as the 'first urban century'.

Increased pressure on urban resources will be felt in cities in low and middle-income countries where the population growth occurs. The right to food and urban FS will become one of South Africa's pressing needs. The growing urban population will rely on the availability, convenience and affordability of food. The formal urban food supply system does provide some challenges, as high levels of urban poverty combined with increasing food prices make food inaccessible to the poor urban population.

Existing along the formal farming structures, an informal supply system consisting of street vendors, informal markets and home based sellers satisfy the demand for easily accessible food.[210]

The concern of FS issues brought on by urbanisation requires attention. Africa is considered the most rapid urbanising continent by the United Nations human settlement programme. Urbanisation does not necessarily occur together with economic growth, and this leads to increased urban poverty. Under-nutrition and food insecurity are both indicators of urban poverty. These urban populations are largely dependent on producers in rural areas.[211]

208 (De Cock, 2012)
209 (United Nations Human Settlements Programme (UN-Habitat), 2011)
210 (Stewart *et al.*, 2013)
211 (Leaning, 2015)

2.3   Urban Agriculture

2.3.1   Introduction

The economic laws that govern agricultural location, whereby interactions of land pricing, distance from markets, the use of land and the farmer's need to maximise profit, were initially laid down by the classical work of Johann Heinrich von Thunen's 'The isolated state'.[212] Von Thunen's model served as a good platform to clarify and explain market-orientated relationships between spatial location and several types of land utilisation. Although Von Thunen's model focused more on land use patterns towards a centralised market, it lacked production-orientated locations serving as marketing hubs. This was included in the works of Weber.[213] In 1975 Leaman and Conkling hypothesised that a decrease in costs regarding technology and transportation will result in a decreased effect of distance from the market.[214] Barlowe, (1986)[215] reported that any given piece of land may have several uses, and the selection of use relates to the 'best use' thereof. Barlowe (1986)[216] emphasised five major determinants of land use. These include: city location; urban land use patterns and location of commercial, industrial and residential establishments. The impact on urban and peri-urban agricultural land depend heavily on the interactions between these determinants.

The roots of UA, as noted by Nel (2012)[217], originated from subsistence agriculture that served as foundation for the industrial societies. When economic development was still in its beginning phase, agriculture played a pivotal role with rural subsistence central to it. Due to the economic growth in cities and the rural decline, urbanisation drastically increased. Migrants in especially cities throughout Africa are often faced with challenges regarding unemployment. In order to survive, rural migrants fell back on what they know, namely agriculture.[218]

Increased levels of food insecurity, urban poverty, rising food prices, climate change and dependence on fast food chains or supermarkets are all direct results of the global phenomena of urbanisation.[219]

212 (Clark, C. 1967)

213 (Barlowe *et al.*, 2013)

214 (O'Kelly and Bryan, 1996)

215 (Barlowe, 1986)

216 (Barlowe, 1986)

217 (Nel, 2012)

218 (Nel, 2012)

219 (Hirsch *et al.,* 2016)

The short definition of UA as defined by the RUAF Foundation (2017)[220] is "*the growing of plants and the raising of animals within and around cities*". UA is different from rural agriculture in the sense that there is integration into the economic and ecological systems whereby UA interacts and forms part of the urban ecosystem. These linkages might be found in the fact that urban inhabitants act as labourers, they make use of available urban resources which may include organic waste as compost and urban wastewater for irrigation. Direct connections are formed with urban consumers and may have direct positive or negative impacts on the urban ecology. In the urban food system there would always be competition for land due to availability and policies and plans will also influence this directly. The RUAF Foundation (2017)[221] stated that UA is not only an artefact of the past, since it grows as the city grows and will not fade away, but also a vital part of the current urban system.

Webster (2006)[222] stated*: "To manage a city is to attempt to manage something spontaneous. Cities emerge, grow, and evolve as a result of vast numbers of individual decisions about where to live, work, locate a firm, source suppliers, recreate, get educated and so on… It is interconnections that make a city attractive…"*

Literature provides numerous definitions for UA.

Mougeot (2000)[223] identified UA as: "*UA is 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*".

Veenhuizen and Danso (2007)[224] described UA as follow: "*UA can be defined as the growing of plants and the raising of animals for food and other uses within and around cities and towns, and related activities such as the production and delivery of inputs, processing and marketing of products.*"

220(Resource Centres for Urban Agriculture and Food Security (RUAF), 2017)
221 (Resource Centres for Urban Agriculture and Food Security (RUAF), 2017)
222 (Webster, 2006)
223 (Mougeot, 2000)
224 (Veenhuizen and Danso, 2007)

Hirsch *et al.* (2016)[225] used the five aspects of UA as it was defined by Van der Schans and Wiskerke (2012)[226] as: "*A production system (also urban gardening as (co) producers) with urban and peri-urban location, which is directed to local markets and using waste and underused resources (closed material loops or closed loop farming).*"

UA can be subdivided in intra-urban and peri-UA.

- Intra-UA: Since most cities have vacant or under-utilised areas of land within the inner city that can be used for this purpose. Usually these areas could not be utilised for building or public areas are made available for this purpose.

- Peri-UA: This type of agriculture takes place on the outskirts of a city. It might be the case that these areas may undergo intense changes over time. An influx of people from urban as well as rural areas cause an increase in population density which in turn causes the price of land to go up in these areas. Agricultural production is often hampered and tends to become smaller. This however may lead to more intensive production, and shift from staple crops towards more perishable crops and animal production (meat, eggs, milk).

There is an indication from research that intra-UA is often on a smaller scale and subsistence-oriented than the peri-UA[227]. In this case various typologies, consisting of different types of UA can be observed:

- Community gardens (formal and informal);
- Home gardens;
- Institutional gardens (managed by schools, hospitals, prisons, factories);
- Nurseries;
- Roof top gardening; and
- Cultivation in cellars and barns (e.g. mushrooms, earthworms).

Kirisimaa (2013)[228] also identified intensive commercial agriculture production systems and include the following typologies:

- Specialised UA and forestry production;

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225 (Hirsch *et al.*, 2016)
226 (Van der Schans and Wiskerke, 2012)
227 (Veenhuizen and Danso, 2007)
228 (Kirsimaa, 2013)

- Large-scale agro-enterprises; and
- Multifunctional farms.

Rapid growing cities like Rotterdam and Beijing necessitated further research and development to produce agricultural products on a commercial base to make a significant contribution to feed these cities. Urban agricultural production systems in these cases are highly intensive and commercially focused. This include rooftop gardens, vertical gardening and floating gardens.

2.3.2   General Expectation of Urban Agriculture

D'Haese *et al.*, (2013a)[229] noted that there is a general expectation that, because of many support systems that are implemented by the government (child support grants and pensions and other schemes), an improvement in the levels of FS would be experienced. Even though that might be the case, it is still reported that food access insecurity levels are very high. Altman *et al.* (2010)[230] explained that FS couldn't be seen separately from other developmental resources. This may include sources of income, household demographics, rural and urban development and access to different types of resources, including access to water, land, credit, technology, and markets. The lack of income generation, poverty and unemployment is strongly associated with food insecurity in South Africa. South Africa experienced one of the highest Gini scores (0.63) in the world in 2011. This score is based on unequal income distributions[231]. This had been the situation before the fall of apartheid, but has also extended and dominated the post-apartheid period. Leibbrandt *et al.* (2007)[232] and Pauw (2007)[233] noted that inequality is not determined by differences between population groups, but it is also demonstrated within groups. D'Haese *et al.*, (2013b)[234] concluded that this might be the reason South Africa experiences such high poverty levels in relation to other middle-income countries. Depending on what poverty line is used, estimates show that between 45% and 57% of the population is considered to be poor.[235,236]

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229 (D'Haese *et al.*, 2013a)

230 (Altman *et al.*, 2010)

231 (World Bank, 2012)

232 (Leibbrandt *et al.*, 2007)

233 (Pauw, 2007)

234 (D'Haese *et al.*, 2013b)

235 (Charlton and Rose, 2002)

236 (Jacobs, 2009)

2.3.3   Advocacy on the Significance of Urban Agriculture

In South Africa, researchers have suggested emphasis on UA since the early nineties[237] with Rogerson (1998)[238] suggesting that UA should be encouraged. In their study on UA in South Africa, Austen and Visser (2002)[239] concluded that there is no more need to debate efficiency of UA in improving the livelihoods of the urban poor households and that Government should put enabling policies in place to advance further in this system.

2.3.3.1   Enhanced Urban Food Security and Nutrition

UA's most important aspect is that it contributes greatly to urban FS and a healthy nutrition. The production of food in urban areas is mostly a result of the lack of income and access to food. Mougeot (2000)[240] noted that urban food insecurity would increase due to logistical constraints in transporting food from rural to the urban areas, challenges and costs involved in importing food for the cities and uneven distribution challenges within the cities. The only resolve to enhance FS and nutrition is for urban residents to produce food themselves.

2.3.3.2   Local Economic Development

Veenhuizen and Danso, (2007)[241] identified UA as a very important source of income for urban households. Poor people spend a considerable amount of their disposable income (50 – 70%) on food, thus when surplus food are produced it could be sold to add to income and households save on household expenditures by growing their own food. Indirectly the development of SME's (small and medium enterprises) providing services (health services, packaging and processing), equipment (tools) and resources (compost, earthworms, etc.) may be enhanced.[242]

2.3.3.3   Social Impacts

UA may serve as an imperative strategy for poverty alleviation and social integration of disadvantaged groups (e.g. HIV/AIDS-affected households, disabled people, female-headed households with children, elderly people without pensions, jobless youth), with

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237 (Rogerson, 1998)

238 (Rogerson, 1998)

239 (Austen and Visser, 2002)

240 (Mougeot, 2000)

241 (Veenhuizen and Danso, 2007)

242 (Homem de Carvalho, 2005)

the purpose help them to get more involved in the urban network, creating better livelihoods and assist in the prevention of social problems like drug abuse and crime related activities.[243]

An important role may also be played by UA with regards to community building activities and providing recreational and educational activities to urban citizens.[244] Slater (2010)[245] found that UA cannot be justified economically, but it may play an important role in social terms, especially in the case where women that were involved in cultivation fled from abuse.

2.3.3.4 Contributions to Urban Environmental Management

UA has many positive environmental outcomes. These include the disposal of waste products or by turning it into resources like compost or by using wastewater for irrigation purposes.[246] It may contribute to the greening of the city and maintenance of biodiversity.[247] The cities' ecological footprints are enhanced by producing fresh foods close to the consumers, reducing energy from transport, packaging and cooling.

2.3.3.5 Contribution Towards Feeding Cities of the Future

Many developed countries are relying on and investing in highly commercialised UA initiatives to contribute to food provisioning of cities within these countries in the future.[248]

2.3.4 Criticisms on the Significance of Urban Agriculture

According to Webb (2011)[249] early studies that advocated UA, especially by Rogerson (1993)[250], Smit (1997)[251] and Wayburn (1985)[252], were generalisations and often repeated in literature. Schmidt and Vorster (1995)[253] could not find a link between food gardens and nutritional security and that no significant difference could be found between farming and non-farming households with regards to nutritional status.

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243 (Gonzalez Novo and Murphy 2000)
244 (Smit and Bailkey, 2006)
245 (Slater, 2010)
246 (Veenhuizen and Danso, 2007)
247 (Konijnendijk and Gauthier, 2006)
248 (Konijnendijk and Gauthier, 2006)

249 (Webb, 2011)
250 (Rogerson, 1998)
251 (Smit, 1997)
252 (Wayburn, 1985)
253 (Schmidt and Vorster, 1995)

Kasumba (2007)[254] analysed the sustainability of UA and considered amongst others the following facets: the contribution of UA to the cultivating household, social and psycological benefits, FS and environmental benefits. Kasumba reported cultivation yield produce for a three month period on avarage and that the value of the produce contributed to only 6% of household income (for 9.5% of the respondents).

In a study conducted by Van Averbeke (2007)[255] in the informal settlements of Atteridgeville, showed that the contribution to total household income and FS, household gardens, community gardens and production on open spaces, were mostly modest. UA, however did contribute to a better livelihood status.

Baiphethi and Jacobs (2009)[256] stated that high initial capital investments, climatic challenges like droughts, insufficient land for reduction and the difficulty to access markets may limit the success of food gardens.   Drimie *et al.* (2016)[257] confirmed the aforementioned and identified limited access to production technologies, inputs, water and markets as challenges for the urban farmer. Similar reasons were mentioned by Aliber and Hart (2009)[258] for the failure of food gardens in the Limpopo Province. Access to agricultural land results in uncertainty and stress for farmers according to Dovie *et al.* (2003)[259].

2.3.4.1   Health Risks

The main health risks associated with UA can be grouped into the following categories:[260]

- Occupational health risks, by means of improper handling of agrochemicals and untreated wastewater in food production and food-processing industries;
- Contamination of crops through heavy traffic and industry may expose soil, air or water to heavy metal contamination;
- Disease transmission from domestic animals to humans (zoonosis);
- Agricultural activities attract disease vectors like mosquitoes and ticks that could act as vectors in the transmission of diseases.

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254 (Kasumba, 2007)

255 (Van Averbeke, 2007)

256 (Baiphethi and Jacobs, 2009)

257 (Drimie *et al.*, 2016)

258 (Aliber and Hart, 2009)

259 (Dovie *et al.*, 2003)

260 (Birley and Lock, 2000)

- Crops and drinking water may be contaminated by fertilizers, pesticides and fungicides.
- Contamination of crops with organisms during irrigation that sources water from polluted streams, or inadequately treated wastewater, or contamination during the unhygienic handling of the produce during transport, processing and marketing.

2.3.4.2 Negative Environmental Impacts

Chemical fertilizers and pesticides may contaminate water resources. The excessive use of nitrate-rich manure (chicken or pig manure) may contaminate groundwater. Furthermore, inappropriate farming practices may lead to siltation of water and reduction of vegetation. Fragile ecosystems as wetlands and hill slopes may be harmed due to competition for land and bad land management.[261]

2.3.4.3 Challenges associated with Urban Agriculture

2.3.4.3.1 Lack of Urban Planning

Support by government differs from country to country, but in general it lacks in the fact that the urban planning is not always included in the conventional scope and structure thereof.[262]

2.3.4.3.2 Access to Land

According to Nel (2012)[263] the agricultural skills of rural migrants serve as an advantage to produce food in an UA setup. Access to land, however remains to be a challenge since UA takes place on marginal or geologically unsafe areas. Competition for land use with non-agricultural instances furthermore constrains crop production.

2.3.4.3.3 Access to Water

Access to and supply of good quality water is crucial when considering any type of agricultural venture. In urban areas, household water is often diverted for this reason. It is therefore important to educate urban farmers in rainwater harvesting and the use of

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261 (Veenhuizen and Danso, 2007)   263 (Nel, 2012)
262 (Drechsel and Dongus, 2010)

water-saving irrigation techniques in order to improve crop production. The optimal use of wastewater might also enhance production.[264]

2.3.4.3.4   Theft and Crop Damage

Due to a lack of proper fencing and the fact that farming takes place on common areas, theft of crops often occurs before crops reach maturity. Vandalism of crops and equipment is also a challenge for urban farmers. It is estimated that almost 50% of urban farmers may experience theft daily.[265]

2.3.4.3.5   Other Challenging Factors Influencing UA

Other challenging factors that may influence UA include:[266]

- Access to finance;
- Lack of proper skills and training;
- Amount of work required; and
- Environmental challenges.

2.3.5   Criteria for Classification of Urban Farming Systems

In an urban environment one will find a substantial diversity of food that could be produced depending on location, density of population and land availability. Densely populated urban areas are more prone to the following challenges:

2.3.5.1   Location

Veenhuizen and Danso (2007)[267] identified location of activity site as an important indicator since it may determine certain opportunities and constraints such as:

- Land occupancy situation;
- Degree of land access;
- Cost and time involved in travelling to and from the farming site;
- Access to markets; and
- Risks (theft, contamination by traffic and industry).

264 (Moglia, 2014)
265 (Eriksen-Hamel and Danso, 2013)
266 (Nel, 2012)
267 (Veenhuizen and Danso, 2007)

Activities may either take place on-site (at residence), and may include backyard-, rooftop-, balcony- or kitchen gardening, or on off-site (away from residence). On site farming may be combined with other household tasks and even running a small business.[268]

The land tenure situation of the farmer may influence the degree of formality of UA and directly affects the sustainability of agriculture at this location as well as the conditions for cultivation and organisational situation.[269]

2.3.5.2   Type of Crops Produced and Animals Raised

Veenhuizen and Danso (2007)[270] identified urban production systems to consist either of crop production or livestock production. Mixed crop-livestock production systems are less common in rural agriculture, but particularly in intra-UA. Linkages can often be seen between crop production systems, with the purpose of producing fodder and other feed ingredients, and sub- or intra-urban livestock enterprises.[271]

Vagneron (2006)[272] identified three main production systems:

- Specialised production systems devoted to a single crop or animal: rice, vegetables, fruit, fish, shrimp, chicken;
- Mixed production systems, which combine two activities (two main crops or mixed crop- animal); and
- Hybrid production systems, which combine more than two main activities (crops and/or animals).

2.3.5.3   Degree of Market-Orientation

UA in most cities in developing countries is for self-consumption, while surplus production are sold or traded. Veenhuizen and Danso (2007)[273] highlighted the fact that the economic value of market oriented UA is very important and should not be underestimated. Farm produce might be sold at the side of the road, in the neighbourhood, local shops, farmers' markets or even to small and medium sized

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268 (Waters-Bayer, 2000)

269 (Mubvami and Mushamba, 2006)

270 (Veenhuizen and Danso, 2007)

271 (Veenhuizen and Danso, 2007)

272 (Vagneron, 2006)

273 (Veenhuizen and Danso, 2007)

supermarkets. In general, fresh produce may be processed for own use, sold fresh, packaged and sold or cooked and sold on the streets to one or more of the above-mentioned outlet.

2.3.5.4   Scale and Intensity of Production

Schiere and van der Hoek (2001)[274] identified farming systems in terms of subsistence small-scale, semi-commercial small-scale, and large-scale industrialised. In South Africa it is classified in subsistence, small scale and commercial farmers. The intensive industrial systems specifically tend to concentrate the advantages of UA like income and tax benefits into just a few hands while the related disadvantages like pollution and odour are dispersed. The less intensive, small- scale subsistence and semi-commercial systems provide income and food for households and tend to be important for social relations at the community level.

2.3.5.5   Urban Agriculture Typologies - Multiple Criteria Classifications of Farming Systems

In a study by Hayson (2007)[275] the following typology aspects were identified:

- Types of products: The types of products in UA may comprise of different types of plants, animals, or combinations of these that include food and non-food items.
- Types of economic activities: There may be different production, marketing, processing and input production activities that define the type of UA.
- Types of location: The locations where UA may take place, may be either within the cities (intra-urban) or in peri-urban areas. The UA activities may also take place on the privately owned residentioal area (homestead), land away from the residence, public land, including common areas like parks, conservation areas, along roads, etc. or semi- public land which may include schoolyards and hospitals.
- Scales of production: Within urban areas one may find individual or family farms, group or cooperative farms and enterprises, micro, small and medium-sized enterprises, as well as large-scale undertakings.

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274 (Schiere and van der Hoek, 2001)   275 (Haysom, 2007)

- Product destination: Produce resulting from UA are usually for domestic consumption, with surpluses being traded. However, some market orientated farming enterprises should not be underestimated. Produce are often sold at the farm gate, in the neighourhood, to local shops and markets as well as to supermarkets.
- Types of actors involved: The people involved in UA may range from the urban poor to lower and mid-level government officials, school teachers and others involved in agriculture, as well as wealthier people who are seeking a good investment for their capital.

Veenhuizen and Danso (2007)[276] distinguished between three models as most applicable and suitable for urban planning. Although these models were suggested for Chicago in the United States, it may very much applicable to the South African system.

These systems are identified as the following:

- Home gardens: Small areas of ground adjacent to the residence and managed by residents. Production is primarily for home use. It is possible to generate income or to add value on goods produced.
- Community-based gardens: This is often a larger piece of land or plot and owned by the community or municipality. These stands could be found on the grounds of churches, housing developments, schools or community centres. Either the institution involved or the community take on the management responsibilities, while the members' households are involved in production. The purpose of these gardens are usually to feed schoolchildren, hospital residents or prisoners, or for income generation.
- Commercial gardens and small farms: Plots vary in size, but are usually larger than those in homes or community gardens worked by households. They are usually located in vacant lots in commercial or residential areas either owned or leased by the producer.

Jacobi *et al.* (1997)[277] identified the following types of urban farming types:

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276 (Veenhuizen and Danso, 2007)   277 (Jacobi *et al.*, 1997)

- Home garden production: Also called backyard farming and belongs to the residential plot. The main use is for home consumption.

- Livestock production in urban homesteads: Livestock may include cattle, sheep, pigs, goats and poultry. Feed is usually obtained from grazing on public land or next to the roads. Cattle keepers are looking after these animals.

- Community Gardens: These gardens are found in open plots in residential areas. It is often bigger than household gardens. People from the community work the gardens and may get a small wage and or some of the crops produced.

- Open space production: Public land, not suitable for constructions, as well as private land are used for intra urban crop production. Often close to water resources like rivers or dams and cultivated by more than one farmer.

- Peri-urban production: As cities grow more rapidly, original rural areas are swallowed by urban areas. The areas are usually low-density areas.

2.3.6   Urban Farmers

Urban farmers vary in origin. Although many urban farmers are from the poorer population, many other levels are involved, with lower and mid-level government employed officials, teachers and even more wealthy individuals invest in agriculture. Not only persons with a rural background will choose agriculture.

Many urban and peri-urban farmers have been residing in the area for longer periods, thus enabling then to gain access to resources such as land and others.[278]

Women have most of the responsibility in regards to feeding their household. It can thus be observed that women represent an important portion of urban farmers while men tend to seek other employment.

In the event of being employed in the city, travelling might infringe on time that could be spent on the farming activities. When the women remain at home, they could include the farming activities with their other domestic duties during the day, providing that the available land be close to home. The role of cultural constraints to women is a barrier to UA.[279] Urban farmers are organised in various set ups, and they operate individually or

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278 (Drakakis-Smith *et al.*, 1995)   279 (Danso *et al.*, 2004)

in a family basis, formally or informally. In some instances, urban farmers are organised in a group, cooperative or other types of farming collaborations.

2.3.7 Global Trends of Urban Agriculture

Since UA is a prevalent practice in developing countries in recent years, concerns regarding FS and climate resulted in increased interest in urban agricultural practices in developed countries.[280] [281] The ever-increasing global population growth in urban areas necessitates alternative long-term and sustainable food supply systems.[282] More than 100 cities globally signed the Milan Food Policy Act in 2015, committing themselves, in coordination with municipalities and community, to develop sustainable urban food systems.[283] According to Hirsch *et al.* (2016)[284] there is a global UA movement arising to support production, distribution and consumption of food in urban areas.

In African countries, it seems like UA seems more prominent in cities where economic decline is high, although it is not always the urban poor that is involved [285].

According to Smit (2016)[286] it is difficult to govern urban food systems which hence have an impact on FS as well. This might be due to insufficient knowledge.

Atkinson (1995)[287] reported that UA households in Latin America contribute between 10 and 30% to their food costs. A certain degree of success has been reached through UA in other African countries like Uganda, especially most of families that lived in Kampala, farmed in order to survive and have a sense of FS.[288] Studies by Eriksen-Hamel and Danso (2013)[289] conducted in Kumasi, Dakar, Accra and Dar es Salaam indicated that almost 80% of vegetable needs are met by UA, while positive results were also experienced in Kathmandu, Shanghai, Singapore and Karachi.

Specht *et al.* (2014)[290] stressed the importance of innovative forms of UA in urban areas on a larger and more intensive scale to ultimately contribute to social and economic purposes. This may include improving FS, linking consumers to fresh food production

280 (Caputo, 2012)
281 (Hall *et al.*, 2014)
282 (Hirsch *et al.*, 2016)
283 (Forster *et al.*, 2015)
284 (Hirsch *et al.*, 2016)
285 (Frayne *et al.*, 2014)

286 (Smit, 2016)
287 (Atkinson, 1995)
288 (Slothower, 2009)
289 (Eriksen-Hamel and Danso, 2013)
290 (Specht *et al.*, 2014)

and the provision of educational facilities. These agricultural initiatives may comprise of rooftop gardens, vertical gardens, urban greenhouses, indoor farms, and other urban-related methods of sustainable large scale food production. According to Specht *et al.* (2014)[291], UA seems to have a high potential in environmental, social, and economic respects and has already found promoters across all disciplines from all over the world. At the same time, it is a very new concept for food production, and thus at an early stage of research and development and facing some limitations and difficulties

2.3.8   South African Trends of Urban Agriculture

In South African UA a connection is often made between issues of FS, social welfare and local economic development.[292]   The acknowledgements of urban farming in policy documents are showing the importance in discussions within municipal establishments to the appropriate response towards UA. Since national FS is a priority for the South African Government, the Integrated Food Security Strategy (IFSS) for South Africa was made custodian of FS. In more recent interventions by government, municipalities are urged to provide government with help in assisting urban farming projects by any means possible.[293] This may include:

- Provision of grants;
- Relationship building with supportive NGO's;
- The inclusion of food gardens in development programs;
- Community development; and
- The availing of land for urban farmers.

Together with the South African Department of Agriculture, Forestry and Fisheries (DAFF), agricultural interventions were implemented such as starter pack distribution for food gardens, as well as the erection of community, school and hospital food gardens. According to the Siyakhana Initiative for ecological Health and FS the supply and distribution of agricultural inputs and training initiatives are significant, but remains flawed in the sense that it is centralised and not sustainable.[294]   Ngcamphalala (2009)[295]

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291 (Specht *et al.*, 2014)

292 (Rogerson, 2011)

293 (Moodley, 2009)

294 (Kroll *et al.*, 2012)

295 (Ngcamphalala, 2009)

concluded that UA is often only an extension of other urban development programs or policies, thus having wider economic mandates, without realising the importance thereof. The result thereof is a lack of financial support and unavailability of human resources.

Oxfam (2014)[296] reported 1.7% of households in South Africa to be actively involved in UA and mainly use the produce as source of food, while 17% of households cultivate some food to supplement food purchased, but the majority of rural households are unable to feed their families.

According to Van Averbeke (2007)[297] it is reported by Schmidt and Vorster (1995)[298] that a vegetable garden has the potential to produce almost 8kg of fresh produce per m^2 if it is under constant irrigation. This is however not the case in UA setting where only about 10% of the yield is obtained. The study by Schmidt and Vorster (1995)[299] reported the average food garden produce about 1.7kg of produce per month, which contribute to less than 7% of the average household vegetable needs.

Frayne *et al.* (2014)[300] stated significant differences between Southern African cities with regards to household agricultural engagement, which ranges from 6% in Windhoek to 60% in Blantyre.

2.3.9   Policy Trends regarding Urban Agriculture – Nationally and Internationally

The Resource Centres on UA and Food Security Foundation (RUAF)[301] identified three main policy perspectives on UA:

- Social viewpoint: Related to subsistence farming and livelihoods. The focus is on production of food and plants for households' consumption with low profitability although some positive effects may come from urban farming like high levels of social inclusion, enhanced FS, poverty alleviation, community development, etc.
- Economic viewpoint: More related to types of agriculture, which are more market-oriented and include small to large enterprises. Both food and non-food (flowers,

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296 (Oxfam, 2014)
297 (Van Averbeke, 2007)
298 (Schmidt and Vorster, 1995)

299 (Schmidt and Vorster, 1995)
300 (Frayne *et al.*, 2014)
301 (Resource Centres for Urban Agriculture and Food Security (RUAF), 2017)

medicinal, etc.) items are included and may result in higher profitability and greater economic input than social viewpoint.

- Ecological viewpoint: Raises the interdisciplinary or inter-sectorial approaches to agriculture. They purpose is to produce agricultural products as well as nurture economic affluence, but also resolve to increase environmental management through initiatives such as composting and waste management.

The above viewpoints are not mutually exclusive nor are they all including; successful initiatives must mix aspects of each viewpoint depending on the program or project.[302]

Since UA is rapidly increasing globally, cities are revising and formulating policies regarding UA.[303] Urban farmers globally operate without recognition of their foremost livelihood activity and lack the support of appropriate municipal policies and legislation. Suitable policies and guidelines are required to mitigate potential risks and enhance the potential of UA. UA should rather be experienced by means of social, economic and environmental benefit rather than a liability.

2.3.10   Urban Agriculture in Cape Town

As mentioned previously, South Africa committed to increasing FS by 2030 as part of the MDG's.[304] Consequently, the City of Cape Town introduced the Urban Agricultural Policy in June 1997.[305] This policy identified three main outcomes:

- To provide poor communities the opportunity to utilise UA as a survival strategy and thereby contribute to household FS;
- To create sustainable economic opportunities that will create jobs and income; and
- To allow previously disadvantaged people to participate in land redistribution for agricultural development programmes and provide training and development in technical, business and social skills.

NPO's reacted to this and contributed by initiating community food garden projects across the Cape Flats where most of the poorer households are situated. The purpose of this

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302 (Leaning, 2015)
303 (Veenhuizen and Danso, 2007)

304 (Crush and Frayne, 2010)
305 (City of Cape Town, 2007)

was to allow people, without land of their own, the opportunity to cultivate land and harvest crops to subsequently contribute to FS.

2.3.11   Urban Agriculture Initiatives in Cape Town

According to Future Cape Town (2014)[306], UA in Cape Town will result in the following benefits:

- Improved air quality and reduction in energy costs;
- Money will be kept within communities;
- Decrease the city's carbon footprint; and
- Increase in employment and connect people together through their food.

Modern urban life makes healthy eating more difficult, as there is often less than one person in charge of cooking meals and fast food options are readily available. Furthermore, fried foods are perceived to be better than boiled foods, which are seen as a thing of the past. Fried foods signify modernity and affluence.[307]

As the World Design Capital for 2014, much attention has been paid to urban revivalism, sustainable 'green' design, and physical spaces fostering social inclusion, creativity and innovation. UA is a pivotal part of urban development, sustainability and urban revivalism. The Cape Town Partnership aims to foster resilience in the city: *"an umbrella term for the planning and design strategies needed to help Cape Town develop the necessary capacity to meet the challenges of the future. These include energy efficiency and climate change, food security, transport connectivity, and social and economic cohesion".*[308]

The Cape Town Partnership is promoting resilience in the city through two main programmes: The Low Carbon Central City Strategy and the Green Clusters Initiative. The latter aims to bring together different sectors and interests of those *"who believe there is an urgent need to embrace UA on a city wide scale – from town to township, and across socio-economic divides".*[309]

The Cape Town Partnership noted the good success of the Green Clusters Initiative, seen through from the massive amount of positive feedback received: *"Clearly, food – and*

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306 (Future Cape Town, 2014)
307 (Joubert, 2012)

308 (Makalima-Ngewana, 2014)
309 (Makalima-Ngewana, 2014)

sustainable food production, in particular is an issue that bridges divides, affecting and connecting us all in fundamental ways".[310]

Government sponsored food gardens are beginning to provide opportunities for unemployed community members to participate in these projects.

2.3.11.1   FoodPods

FoodPods is a social enterprise that trains entrepreneurial members of the community to start and run small agri-businesses for their families and neighbours.[311] They grow their seedlings in crates to avoid issues of poor soil quality and sell them to farmers when they are market-ready (this avoids the initial period of non-profitability when growing) and once the farmers sell all of the crates, they return and exchange the empty crate for a full one.[312] The sellers are specially trained by the growers and utilise mobile sales carts. FoodPods operates in two areas: Philippi and Kayamandi.

2.3.11.2   Creating Change

Creating Change operates in Ocean View by teaching kids how to farm and cook food at home. The organisation works in school and community centres and shows kids how to use accessible materials such as recycled wood and plastic bottles to make their gardens.[313]

2.3.11.3   Sokwakhana Food Garden

Supplies food and produce from the garden to local HIV/AIDS and TB clinics.[314]

2.3.11.4   Elsies River Green Grow Project

This is one of Cape Town's National Expanded Public Works Programme projects. It is a vegetable farm on over two hectares of open public space and supplies food and produce to over 800 residents with over 60 new employment positions. This project is now being replicated elsewhere in the city.[315]

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310 (Makalima-Ngewana, 2014)
311 (Leaning, 2015)
312 (FoodPods, 2014)
313 (Makalima-Ngewana, 2014)

314 (Leaning, 2015)
315 (City of Cape Town, 2007)

2.3.11.5 Oranjezicht

Project started in 2013 under the name Oranjezicht City Farm (OZCF). Three fulltime staff members and two interns who receive stipends run the project, but most of the energy and effort comes from the enthusiastic volunteer members. OZCF hosts student groups/school tours from both affluent areas nearby in the City Bowl area and less affluent areas from nearby townships. These school groups range from 3-5-year-old children to middle schoolers and provide them with an introduction to gardening and agriculture in the urban setting. OZCF sells its produce on Saturday markets but as its purpose is mainly educational demonstrations, they do not produce enough of each crop to meet the demand, thus they go out to other certified organic farms and bring in produce for their market days.[316]

2.3.11.6 Abalimi Bezekhaya

Abalimi runs The Powerline Project, or Siyazama Community Allotment Garden Association (SCAGA). Their website notes that this is 'the leading micro-UA model in Cape Town and almost certainly in South Africa'. They employ poor community members, simultaneously providing them with employment and teaching them how to grow and prepare organic foods while promoting conservation and alternative farming techniques. The keystone of this project is that it is 'micro-urban' agriculture, as many poor households have very little if any space to grow produce.

2.3.11.7 Box Schemes

Thom and Conradie (2012)[317] reported the existence of box schemes in the Cape Town Metropolitan area. The initiatives they studied were Wild Organic Foods, Ethical Co-op and Harvest of Hope. The box schemes serve a part in the value chain whereby a composition of fresh organic produce are packed into a box or a bag, by a farmer, that is then purchased by a consumer on regular basis.

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316 (Leaning, 2015)   317 (Thom and Conradie, 2012)

2.3.11.8   Philippi Horticulture Area

The Philippi Horticultural Area is an area of over 1000 hectares zoned for food production. It is located next to the Philippi informal settlement area, a poorer are of the Cape Town Metropole. Much fresh produce is harvested from this area, feeding many of the city's residents.[318]

2.4   Measuring livelihood in an Urban Agriculture context

2.4.1   Introduction

In order to improve standard of living, urban households may adopt many livelihood strategies.[319] The ability to pursue different livelihood strategies are dependent on the households' capabilities, resources and assets. Many researchers motivated that UA could indeed be a viable livelihood strategy in order to improve household FS.[320,321]

2.4.2   Defining Livelihood

If somebody is asked the question: "" it would be easy for that person to give an answer. Answers would be anything from *"To make a living"*, or *"To have a job"*, to *"support my family"*. All of these answers will inherently focus on one's purpose to survive. There is more complexity hidden, especially when government or other organisations try to assist people who struggle to make a living, or when their means of living is damaged or even destroyed.   Chambers and Conway (1991)[322] suggested the following definition of livelihood:

"A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stress and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base."

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318 (Haysom, 2012)
319 (Philander, 2015)
320 (Battersby, 2011)
321 (Mougeot, 2000)
322 (Chambers and Conway, 1991)

Figure 1. Sustainable livelihoods framework

Key
H = Human Capital   S = Social Capital
N = Natural Capital   P = Physical Capital
F = Financial Capital

LIVELIHOOD ASSETS

VULNERABILITY CONTEXT
- SHOCKS
- TRENDS
- SEASONALITY

H
S   N
P   F

Influence & access

TRANSFORMING STRUCTURES & PROCESSES

STRUCTURES
- Levels of government   • Laws
- Private sector   • Policies
                          • Culture
                          • Institutions

PROCESSES

LIVELIHOOD STRATEGIES

in order to achieve

LIVELIHOOD OUTCOMES
- More income
- Increased well-being
- Reduced vulnerability
- Improved food security
- More sustainable use of NR base

Figure 2-4 Sustainable Livelihoods Framework[323]

The UK Department for International Development (DFID) (1999)[324] developed the Sustainable Livelihoods Framework (SLF) to elucidate how people develop and maintain livelihoods.[325]   This serves as an analysis tool to clarify factors affecting people's livelihood and how it interacts. A schematic presentation of the Sustainable Livelihoods Framework can be seen in Figure 2-4. This framework serves as an analysis tool and is beneficial in understanding the factors that affect a person's livelihood and how those factors interact with each other.

The SLF views livelihoods as systems and provides a way to understand:

- The assets people draw upon;
- The strategies they develop to make a living;
- The context within which a livelihood is developed; and
- Those factors that make a livelihood more or less vulnerable to shocks and stresses.

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323 (Departement for International Development, 1999)   325 (Morse *et al.*, 2009)
324 (Departement for International Development, 1999)

2.4.3   Livelihood Assets in an Urban Agriculture Context:

Assets could either be tangible or intangible. Tangible assets would include food stores, cash savings, trees, land, livestock, tools, and other resources. Intangible assets would include claims one can make for food, work, and assistance as well as access to materials, information, education, health services and employment opportunities. A summary of these assets can be seen in Table 2-4.

Table 2-4 Summary of Livelihood Assets[326]

Livelihood Assets	Description
Human capital:	Skills, knowledge, health and ability to work, the education and health status of the household members and the community, and the ability to find and use information to cope, adapt, organise and innovate
Social capital:	Social resources which people draw upon in pursuit of their livelihood objectives, including informal networks, membership of formalised groups and relationships of trust that facilitate co-operation and economic opportunities. Social capital is enhanced by a culture of human rights and democracy and by vibrant local institutions.
Natural capital:	Natural resources including: • marine resources, woodland and forest products including edible plants and fruit • building and weaving materials, thatch, fuel and wood for carving • wildlife, edible insects, honey, medicinal herbs and grazing • climate, soils and land capabilities, minerals, quarries, sand deposits, clay, wetlands, water catchments, groundwater sources and biodiversity
Physical capital:	Basic infrastructure, such as roads, water and sanitation, schools, ICT, dams electricity supply, communication and information; and producer goods, including tools, livestock and farm equipment. These assets are essential to carry out livelihood activities
Financial capital:	Financial resources are assets and entitlements that carry a cash value. This includes savings, credit, and income from employment, pension, trade and remittances

2.4.4   Livelihood Contexts

Within political, economic and social contexts, livelihoods are shaped. Institutions, processes and policies, such as markets, social norms, and land ownership policies affect our ability to access and use assets for a favourable outcome. As these contexts change they create new livelihood obstacles or opportunities.[327]

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326 (International Recovery Platform and United Nations Development Programme India, 2010)

327 (International Recovery Platform and United Nations Development Programme India, 2010)

2.4.4.1   The Urban Human Environment

The human environment is determined by the way religion, history, gender, relationships, ethnicity and culture affect the livelihoods of different groups within a community.[328,329]

2.4.4.2   The Urban Production Environment

To ensure their livelihoods, households engage in certain production activities. The number of assets they have access to, and their capabilities to use these assets determines the number of activities they are able to engage in. Some examples mentioned by Oxfam (2002)[330] include:

- Brewing, baking, processing food for sale;
- Keeping poultry;
- Collecting honey, wild fruits, firewood or medicinal herbs;
- Hunting and fishing;
- Construction, brick making, carpentry, metalworking, welding;
- Repairing motor cars;
- Formal employment or casual work;
- So-called 'grey' economic activities – for example, growing and selling;
- Practising medicinal herbalism;
- Hiring out draught animals;
- Homestead gardening, growing crops, herding and keeping livestock;
- Produce, hiring out a telephone, running a taxi;
- Weaving, sewing, craftwork, carving;
- Joining weeding and reaping parties;
- Running a market stall, spaza shop, tavern or shebeen, selling fresh;
- Operating a tractor or a hammer mill; and
- Dagga, poaching, sex work and other illegal activities.

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328 (International Recovery Platform and United Nations Development Programme India, 2010)

329 (Morse *et al.*, 2009)

330 (Oxfam, 2002)

2.4.4.3   Urban Income Sources

Although the income measures of poverty are criticised, people are continuously seeking an increase in net monetary returns on their activity to create an increases in the total amount of money entering the household budget (or their own pocket). Increased income generates the impression of the economic sustainability of their livelihoods.[331]

Income is meant to indicate resources that are brought into the household. Each of these incomes or income-generating activities contribute directly toward the achievement of a livelihood and also requires certain assets in order achieve. Such assets are cited in the sub-sections that follow. For example, if formal employment is to be pursued as a livelihood activity or a source of income, a person might not only require human capital, good health and skills; but also social capital, networks, and physical capital such as transportation and a means of communication.[332] Income may be generated by means of craft making, entrepreneurship, formal employment, pension and remittances.

2.4.4.4   The Urban Institutional and Governmental Environment

The institutions and policies of the Transforming Structures and Processes can have an effect on the availability and access to assets by means of the following:[333]

- Creating assets: E.g. government investing in basic infrastructure (physical capital) or technology generation (yielding human capital) or the existence of local institutions that reinforce social capital;
- Determine access: E.g. ownership rights, institutions regulating access to common resources; and
- Influence rates of asset accumulation: E.g. policies that affect returns to different livelihood strategies, taxation, etc.

Livelihood strategies and outcomes are transformed by the environment of structures and processes. When reference is made to structures, this include organisations in both the public and private sector responsible for setting and implementing laws and policies, and affect livelihood by service delivery and performing functions like purchase and trade.[334]

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331 (Departement for International Development, 1999)
332 (Njagi, 2005)

333 (Departement for International Development, 1999)
334 (Knutsson, 2006)

When reference is made to processes it encompasses embracing the laws, regulations, policies, land operational arrangements, agreements, societal norms, and practices that, in turn, determine operation of a structures. Policy-determining structures are only effective when appropriate institution and processes are present to effectively implement policies. Processes may include the following:

- It provides incentives that stimulate people to make better choices;
- It grants or deny access to assets;
- It enables people to transform one type of asset into an- other through markets; and
- It influences interpersonal relations strongly.

One of the main problems the poor and vulnerable face is that processes may not benefit them unless the government adopts pro-poor policies that, in turn, filter through to legislation and less formal processes.

2.4.4.5   Vulnerability Context

Chambers and Conway (1991)[335] defined vulnerability as: *"defencelessness, insecurity and exposure to risk, shocks and stresses, and difficulty in coping with them"*.

Vulnerability has two sides namely external and internal sides. The external side of risks is the shocks or stresses that the household or the individual is subjected to. When the internal side of vulnerability is considered, it refers to defencelessness, namely the inability to cope with loss.

Many different viewpoints exist on the extent to which people can control and manage the factors that contribute to their vulnerability. For example: People's livelihoods and the wider availability of assets are fundamentally affected by critical trends as well as by shocks and seasonality, over which they have some or no control.

Vulnerability is the ability of a household to resist, anticipate, cope with or recover from disasters.[336]   The external environment will not affect each household in the same manner.

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335 (Chambers and Conway, 1991)   336 (Madhuri *et al.*, 2014)

This section deepens understanding of concepts introduced in earlier sessions including differentiation, relative vulnerability and resilience; change over time, and adaptive and coping strategies. To understand vulnerability, a concept of the context is essential to construct interventions that will have the desired positive effect on the livelihood of households.

Assessing the local vulnerability context is a key part of livelihoods analysis. Poor households are often insecure, but some factors may cause further insecurity. To analyse vulnerability, an analysis has to be done on many factors and long-term trends. These factors may be several levels away from the immediate environment and include:

- Climate change;
- Seasonal variability;
- Drought and floods;
- Epidemics;
- Political conflict;
- Tenure insecurity;
- A government macroeconomic policy that promotes retrenchment, inflates consumer prices and devalues the currency; and
- Conservation policy that restricts access to key resources and livelihood opportunities.

2.4.4.5.1 Shocks and Stresses

Shocks are sudden events that impact on livelihood security. It may destroy assets directly. It may also force people to leave their homes or get rid of assets (land) prematurely as part of coping strategies. There are many different types of shock. They include:

- Human health shocks which may include the untimely death of an economically active household member due to an occupational hazard, an illness like AIDS or a traffic accident; outbreaks of infectious diseases such as foot-and-mouth which affect pigs, cattle, sheep and goats;
- Natural shocks like floods and fires that destroys grazing and crops;
- Conflicts like political violence and instability;

- Economic shocks;

- Crop or livestock health shocks; and

- Theft.

Stresses are long-term trends that undermine livelihood potential. These include inadequate public services, poor transport, bad communications, inferior education and inadequate health systems. Other stresses include a steady decline in the quantity and quality of stocks of natural resources, climate change, political instability and national or regional economic decline that negatively impact on household livelihoods. Some stresses stem directly from within the household and may include frequent illness, alcoholism, and violent or disruptive behaviour of a household member.

2.4.4.5.2   Seasonality

Some of the greatest sources of hardship for developing nations are the seasonal shifts in prices, employment opportunities and food. Various components of the Vulnerability Context will influence different people in different ways. In the event of a natural shock, the agricultural sector may be more affected than the urban sector. In a similar fashion, changes in the international commodity prices might have little influence on individuals that trade in a local informal market. However, a change in the international commodity price will more acutely affect individuals who grow, process and export commodities. Grasping the concept of the nature of vulnerability is a key step in sustainable livelihoods analysis.

Seasonality is usually associated with rural economies. It may possibly be equally problematic for poor people in urban areas, especially when these people spend a large part of their income on food, in an environment with volatile prices.

2.4.4.5.3   Trends

Trends may (or may not) be more benign, though they are more predictable. They have a particularly important influence on rates of return (economic or otherwise) to chosen livelihood strategies.

2.5   Discussion and Conclusions

This literature review's purpose is firstly to help the reader understand the aspects pertaining to FS; the complexity in measuring the level of FS due to its many dimensions; the indicators reported to have an influence on FS and the current trends of food security globally and in South Africa.

There has been much research and discussion conducted on the contribution of UA on FS. This section of the literature study gives a background on the general expectation of UA and the advocacies for and criticisms against UA. Feedback is given on the global trends of UA as well as current initiatives in the Cape Town Metropole.

Lastly, a report on research regarding the livelihood of households in an urban environment context is given. The literature review as a unit provides the setting for this study.

CHAPTER 3

FRAMEWORK OF ANALYSIS AND METHODOLOGY

3.1 Introduction

This chapter will explain the research methodology. The study approach will be explained and will include the research questions and an overview of the study area. Thereafter the method of data collection and framework of analysis will be clarified.

3.2 Study Approach

3.2.1 Main Research Questions

Due to the multifaceted dimensions of food security (FS), validity of the measurements causes a problem. The following research questions have been formulated in response to the problem statement and research objectives:

1. What is the level of urban household FS of urban farmers and non farmers?

2. What are the critical factors that determine and affect urban household food insecurity within these households?

3. Given contrasting perceptions regarding the contribution of Urban Agriculture (UA) to household FS, does UA in the informal settlement areas of the Cape Town Metropole contribute to the households' FS?

4. What other factors are critical to take into consideration to address the different dimensions of food insecurity?

5. Considering the outcomes of the above analysis, what policy and strategy recommendations can be made in order to improve urban FS? Who should take the lead in revising strategies and what is the role of communities - a critical aspect in the current South African society.

3.2.2 Overview of the Study Area

The Western Cape's agricultural sector is unique from other provinces in South Africa, mostly in terms of physical resource differences. The winter rainfall region of the Winelands and the year-round rainfall of the Southern Cape enable a variety of crop mix

and production potential. The province's agricultural sector is known for its production stability and is supported by well-developed infrastructure for input supply and output processing. It is known that agriculture plays a significant role in the Western Cape economy with a total value-addition to the economy of R14.7 billion in 2011, and about 23% of the national agricultural value addition.[337]

In Figure 3-1 one can see a map of the Cape Town Metropole with the informal settlement areas used in the study.
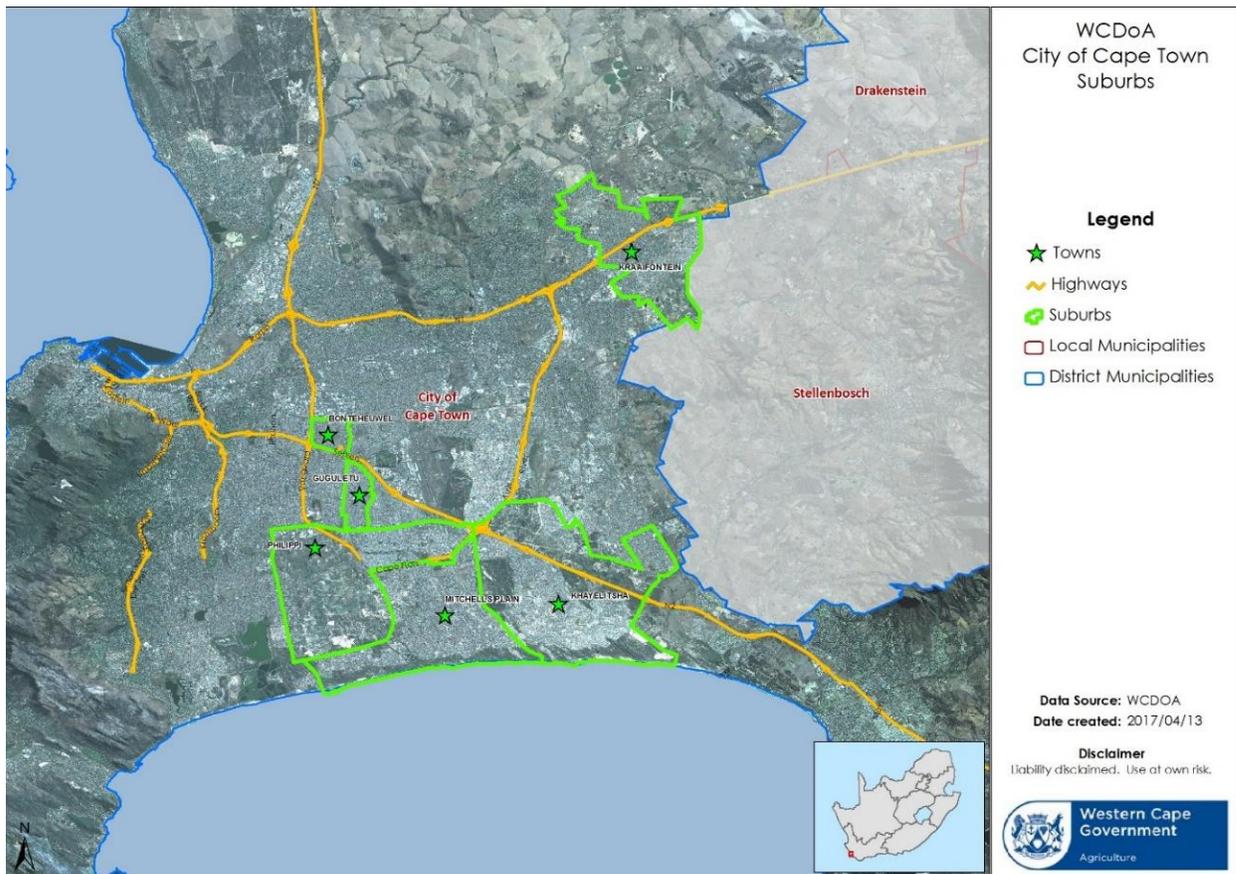
Figure 3-1 Map of the Cape Town Metropole with the informal settlements (Source: Western Cape Department of Agriculture, 2017)

Cape Town is known for its harbour, its well-known landmarks like Table Mountain and Cape Point and its natural setting in the Cape Floral Kingdom. The Cape Town Metropolitan area is approximately 2,461 km^2 and according to the 2011 statistics houses

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337 (Tregurtha and Vink, 2008)

3 740 025 people with an unemployment rate of 23.8%. Cape Town is the second largest urban area in South Africa and migration rates account for 41% of the annual population growth in Cape Town.[338] It is the provincial capital of the Western Cape, as well as the legislative capital of South Africa, where the National Parliament and many government offices are located.

An increase in population size of 29% was seen from 2001 to 2011. During this period growth occurred mostly in the informal sector, due to the fast growth of informal settlements. According to Leaning (2015)[339], a positive correlation could be seen between the rise of informal settlements with rising poverty and unemployment rates. The number of households increased by 38%, but the size of the average household size declined in the same time from 3.7 to 3.5. Citywide GDP in 2011 was R203 581 million. At this time there were more than 129 918 informal settlements in Cape Town with 38% of households that lived below the poverty line with a combined household income of less than R 3 500. Certain challenges arose in these areas due to the fact that 4% of the households have no access to electricity for lighting; 9% have no access to sanitation on site and 232 027 households registered as impoverished. In 2010 the occurrence of HIV and tuberculosis was 19% and 28,656 per year respectively.[340] In Table 3-1 one can see a summary of the population statistics of the Cape Town Metropolitan area.

338 (Battersby, 2011)
339 (Leaning, 2015)

340 (Western Cape Government, 2012)

Table 3-1 Summary of Population Statistics in the Cape Town Metropole[341]

Population	3 740 026
Age Structure	
Population under 15	24.80%
Population 15 to 64	69.60%
Population over 65	5.50%
Dependency Ratio	
Per 100 (15-64)	43.60
Sex Ratio	
Males per 100 females	95.90
Population Growth	
Per annum	2.57%
Labour Market	
Unemployment rate (official)	23.90%
Youth unemployment rate (official) 15-34	31.90%
Education (aged 20 +)	
No schooling	1.80%
Higher education	16.60%
Matric	29.80%
Household Dynamics	
Households	1 068 573
Average household size	3.30
Female headed households	38.20%
Formal dwellings	78.40%
Housing owned	54.20%
Household Services	
Flush toilet connected to sewerage	88.20%
Weekly refuse removal	94.30%
Piped water inside dwelling	75.00%
Electricity for lighting	94.00%

Table 3-2 shows that only 3.3% (34 383) of households in the City of Cape Town are involved in agricultural activities. Many households involved in agricultural activity are involved in more than one activity at a time.

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341 (Statistics South Africa, 2013)

Table 3-2 Number of households [342]

Local municipality	Household involved in agricultural activities	Household not involved in agricultural activities
City of Cape Town	34 383	1 034 190
Province	**84 575**	**1 549 426**

As seen in Table 3-3, households are more or less evenly distributed over different activities, however, 17 136 (52%) of the households are involved in vegetable production. Other agricultural activities range from 29% (10 187) (fodder grazing) to 34.5% (11 892) (Poultry production) while 34% (11 727) of households are involved in livestock production.

Table 3-3 Number of agricultural households involved in specific activity [343]

Local municipality	Livestock production	Poultry production	Vegetable production	Production of other crops	Fodder grazing	Other
City of Cape Town	11 727	11 892	17 136	11 245	10 187	17 068
Province	**28 334**	**29 177**	**39 338**	**22 725**	**16 517**	**23 804**

40% (13 865) of agricultural households in the City of Cape Town are black compared to 26.7% (22 580) in the province, while 29% are white and coloured in Cape Town compared to almost 45% of coloured households and 30.2% of white households that are involved in agriculture in the province (Table 3-4).

Table 3-4 Number of agricultural households by population group of household head [344]

Local municipality	Black African	Coloured	Indian or Asian	White	Other
City of Cape Town	13 865	9 872	410	9 628	607
Province	**22 580**	**34 882**	**524**	**25 549**	**1 039**

342 (Statistics South Africa, 2013)
343 (Statistics South Africa, 2013)
344 (Statistics South Africa, 2013)

As seen in Table 3-5, 12 107 (5%) of agricultural households are headed by women and the rest by men.

Table 3-5 Number of agricultural households by sex of household head [345]

Local municipality	Male	Female
City of Cape Town	22 276	12 107
Province	**61 398**	**23 176**

According to Table 3-6, the highest number of household heads in Cape Town (9 357 - 27%) involved in agriculture is between the ages of 35-45 years. 24% (8 214) and 22.3% (7 668) of household heads are in the age groups between 15-34 and 46-55 years respectively.

Table 3-6 Number of agricultural households by age group of household head [346]

Local municipality	Less	15-34	35-45	46-55	56-64	+65
City of Cape Town	30	8 214	9 357	7 668	4 865	4 249
Province	**79**	**16 771**	**21 482**	**19 967**	**13 893**	**12 382**

Of these household heads, almost half of them dropped out of school before grade 11. As seen in Table 3-7, 8 193 (24%) of agricultural household heads in Cape Town completed school, while another 8311 (24%) of them completed a tertiary qualification.

Table 3-7 Number of agricultural households by education level of household head [347]

Local municipality	No schooling	Grade 1 to grade 11/Std9	Grade 12/Std 10	Completed tertiary	Other
City of Cape Town	983	16 627	8 193	8 311	269
Province	**4 543**	**44 860**	**18 477**	**16 162**	**534**

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345 (Statistics South Africa, 2013)
346 (Statistics South Africa, 2013)

347 (Statistics South Africa, 2013)

As seen on Table 3-8, more than half (18 661) of household heads earn less than R38 400 per year, where 7 062 (20.5%) of Cape Town residents involved in agriculture reported to have no financial income at all. 31% (10 704) of heads of agricultural households earn between R38 400 and R307 200 annually. The income reduces drastically towards the higher amounts (Table 3-8).

Table 3-8 Number of agriculture households by income level of household head [348]

Local municipality	No income	R1 - R38 400	R38 401 - R307 200	R307 201 - R1 228 800	Above R1 228 800	Unspecified
City of Cape Town	7 062	11 599	10 704	3 104	427	1 487
Province	**13 922**	**36 393**	**24 119**	**5 685**	**863**	**3 592**

Mixed farming are popular among households in the City of Cape Town (28.6%), while almost a third of farmers produce crops only and 5 019 (15%) farm only with animals (Table 3-9). In the Western Cape Province though, there are a higher percentage (26%) in relation to the livestock farmers in the city. Regarding livestock farmers, one can see on Table 3-9 that there are a lot more poultry farmers (2 366 - 47%) and combined animal farmers (2 047 - 41%) than the other livestock commodities in Cape Town.

Table 3-9 Number of agriculture households by type of activity [349]

Local municipality	Animals only	Crops only	Mixed farming	Other
City of Cape Town	5 019	10 195	9 850	9 320
Province	**21 997**	**29 542**	**19 687**	**13 348**

When moving out of the city, it was recorded that there are still a lot of poultry farmers 10 411 (47%) in the Western Cape Province, while an increase in the amount of cattle and sheep farmers can be seen (Table 3-10).

348 (Statistics South Africa, 2013)   349 (Statistics South Africa, 2013)

Table 3-10 Number of agriculture households owning only livestock [350]

Local municipality	Cattle only	Sheep only	Goats only	Pigs only	Poultry only	Animals combined	Other livestock
City of Cape Town	115	56	67	75	2 366	2 047	294
Province	**1 294**	**1 136**	**407**	**947**	**10 411**	**7 169**	**634**

As seen in

Table 3-11, Table 3-12, Table 3-13, Table 3-14 and Table 3-15 most households only own a small number of the specific livestock mentioned in the tables. This is a sign that the farmers will predominantly fall under subsistence or small farmers' categories.

Table 3-11 Number of agricultural households owning cattle [351]

Local municipality	1-10	11-100	+100	Total
City of Cape Town	251	166	77	495
Province	**2 487**	**2 187**	**1 260**	**5 933**

Table 3-12 Number of agricultural households owning Sheep [352]

Local municipality	1-10	11-100	+100	Total
City of Cape Town	154	121	72	347
Province	**1 677**	**1 737**	**2 846**	**6 259**

Table 3-13 Number of agricultural households that own Goats [353]

Local municipality	1-10	11-100	+100	Total
City of Cape Town	190	130	29	350
Province	**1 188**	**739**	**461**	**2 387**

350 (Statistics South Africa, 2013)
351 (Statistics South Africa, 2013)
352 (Statistics South Africa, 2013)
353 (Statistics South Africa, 2013)

Table 3-14 Number of agricultural households owning Pigs [354]

Local municipality	1-10	11-100	+100	Total
City of Cape Town	175	83	50	307
Province	**2 602**	**590**	**159**	**3 352**

Table 3-15 Number of agricultural households owning other livestock [355]

Local municipality	1-10	11-100	+100	Total
City of Cape Town	529	120	36	685
Province	**1 848**	**804**	**333**	**2 985**

About 7 487 (64%) of men and 4 241 (36%) of women heads the households farming with livestock in the City of Cape Town (Table 3-16). This ratio is similar for poultry production (Table 3-17), vegetable production (Table 3-18), other crop production (Table 3-19), fodder / pasture / grass production for animals (Table 3-20) as well as other agricultural activities (Table 3-21).

Table 3-16 Number of agricultural households in livestock production by sex of household head [356]

Local municipality	Female	Male	Total
City of Cape Town	4 241	7 487	11 727
Province	**7 173**	**21 161**	**28 334**

Table 3-17 Number of agricultural households in poultry production by sex of household head [357]

Local municipality	Female	Male	Total
City of Cape Town	4 330	7 562	11 892
Province	**8 114**	**21 062**	**29 177**

354 (Statistics South Africa, 2013)
355 (Statistics South Africa, 2013)
356 (Statistics South Africa, 2013)
357 (Statistics South Africa, 2013)

Table 3-18 Number of agricultural households in vegetable production by sex of household head [358]

Local municipality	Female	Male	Total
City of Cape Town	6 123	11 013	17 136
Province	**11 619**	**27 719**	**39 338**

Table 3-19 Number of agricultural households in production of other crops by sex of household head [359]

Local municipality	Female	Male	Total
City of Cape Town	4 201	7 044	11 245
Province	**6 760**	**15 965**	**22 725**

Table 3-20 Number of agricultural households in the production of fodder /pasture/grass for animals by sex of household head [360]

Local municipality	Female	Male	Total
City of Cape Town	3 872	6 315	10 187
Province	**5 474**	**11 043**	**16 517**

Table 3-21 Number of agricultural households in other agricultural activities by sex of household head [361]

Local municipality	Female	Male	Total
City of Cape Town	6 411	10 657	17 068
Province	**8 584**	**15 220**	**23 804**

A very positive aspect of the Western Cape and the City of Cape Town, is that 77 462 (91.5%) and 30 643 (89%) of agricultural households respectively have piped water inside there yards, while 5 764 (7%) and 3 392 (10%) respectively have piped water outside their yards and less than 2% don't have access to water (Table 3-22). Predominantly

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358 (Statistics South Africa, 2013)
359 (Statistics South Africa, 2013)
360 (Statistics South Africa, 2013)
361 (Statistics South Africa, 2013)

municipal water is utilised for irrigation purposes (95.7%), while boreholes, dams and rainwater tanks are also used for this purpose (Table 3-23).

Table 3-22 Number of agricultural households by access to water [362]

Local municipality	Piped water inside the dwelling/yard	Piped water outside the yard	No access to piped water
City of Cape Town	30 643	3 392	348
Province	**77 462**	**5 764**	**1 349**

Table 3-23 Number of agricultural households by main source of water [363]

Local municipality	Local water scheme	Borehole	Spring	Rain-water tank	Dam / pool	River/ stream	Water tanker	Other
City of Cape Town	32 903	485	46	46	160	21	147	576
Province	**63 555**	**8 088**	**2 460**	**1 759**	**3 878**	**2 260**	**1 082**	**1 494**

It is noted in Table 3-24 that 91% (31 395) of agricultural households in Cape Town have a flush toilet connected to a sewerage system, while this is the case with 88% (74 783) of agricultural households in the Western Cape Province. Other means of toilets are also available. The same ratio can be seen in where 94% (32 508) of agricultural households in Cape Town and 93% (78 914) of agricultural households in the Western Cape Province have electricity.

Table 3-24 Number of agricultural households by main type of toilet [364]

Local municipality	Flush toilet (connected to sewerage system)	Chemical toilet	Pit latrine	Bucket latrine	Other	None
City of Cape Town	31 395	421	185	1 217	284	880
Province	**74 783**	**659**	**2 616**	**2 073**	**1 855**	**2 589**

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362 (Statistics South Africa, 2013)   364 (Statistics South Africa, 2013)
363 (Statistics South Africa, 2013)

Table 3-25 shows the type of energy used by agricultural households in Cape Town and the Western Cape respectively as method of lighting.

Table 3-25 Number of agricultural households by type of energy, mainly use for lighting [365]

Local municipality	Electricity	Gas	Paraffin	Candles	Solar	None
City of Cape Town	32 508	81	1 063	579	75	77
Province	**78 914**	**194**	**1 706**	**2 940**	**650**	**170**

94% (32 333) and 92.4% (78 154) of agricultural households in Cape Town and the Western Cape respectively use either electricity or gas to cook (Table 3-26).

Table 3-26 Number of agricultural households by type of energy, mainly use for cooking [366]

Local municipality	Electricity	Gas	Paraffin	Wood	Coal	Animal dung	Solar	Other	None
City of Cape Town	28 222	4 111	1 147	197	41	15	36	544	69
Province	**68 940**	**9 214**	**1 968**	**3 396**	**112**	**37**	**135**	**639**	**134**

The above statistics based on agriculture are key to serve as base for comparing other research. The data can be used for FS, green economy and environmental studies.

3.3   Data Collection Processes

3.3.1   Introduction

The data collection process consisted of three phases: 1) pre-data collection phase; 2) data collection phase and 3) post-data collection phase.

3.3.1.1   Pre-Data Collection Phase

The following informal settlement areas in the Cape Town Metropole were selected to conduct the surveys in:

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365 (Statistics South Africa, 2013)   366 (Statistics South Africa. 2013)

- Guguletu;
- Khayelitsha;
- Kraaifontein;
- Mitchelsplain;
- Bonteheuwel; and
- Philippi.

Above areas are all informal settlements and form part of the Cape Town Metropole. Selection of households in these areas pertains to the fact that these areas house the poorer households and to analyse the situation within these areas. In all these areas, the Western Cape Department of Agriculture assisted people to start with household gardens or community gardens. The gardens are funded and supported by the Department of Agriculture.

The researcher used Space™, a project coordinating company for technical assistance regarding data collection and capturing onto a central server to be analysed. The surveys were prepared and uploaded onto devices (tablets). It was decided to have one day for training of the enumerators and monitors before data collection should start. On the 22nd of August 2016 training took place in Stellenbosch, South Africa.

2.1.1. Data Collection Phase

The Western Cape Department of Agriculture randomly selected a combination of community and household farmers involved in project gardens funded by them in each area specified. These farmers are mostly farming on a small scale or at subsistence level. Every day during the collection phase, the Department organised the urban farmers in a specific area to gather at a predetermined location where all the surveys could be conducted. After the surveys were conducted, at least 8 non-farmers of the same area were randomly selected to do the same survey. The non-farmers would thus serve as a control group.

As from 23 August 2016, five enumerators collected data on different characteristics of the household, the FS situation on the bases of different FS indicators, household income and expenditure, household food production, access to water and to markets, and access to governmental support programs. It thus contributed to an in-depth comprehension of

the social and economic aspects of FS at household level and the identification of the factors influencing FS (vulnerability) at household level; based on four major FS components: food availability, food accessibility, food utilisation and food system stability. The above investigations are expected to lead to advice the Government to help improve the FS at household level in the regions under investigation.

The enumerators were monitored throughout the data collection phase to ensure consistency, to identify outliers and to ensure accuracy of data received.

A total of 223 surveys were completed, and this was 23 more than the targeted 200 in the six areas. Three of the surveys were eliminated due to outlying values after quality checking. In each of the informal settlement areas of the Cape Town Metropole 22 or more farmers were interviewed. Farmers comprised of those owning house gardens and those involved in community gardens. AI farmers formed part of the Western Cape Department of Agriculture's projects. A summary of the type of agriculture in different areas can be seen in Table 3-27.

Table 3-27 Type of agriculture production

	Area						
	Guguletu	**Khaye-litsha**	**Kraai-fontein**	**Mitchels-plain**	**Bonte-heuwel**	**Philippi**	**Total**
Non-Farmers	8	14	14	10	8	12	**66**
Farmers	27	24	31	24	27	22	**154**
Total	**33**	**38**	**45**	**35**	**35**	**37**	**220**

2.1.2. Post Data Collection Phase

The data collected on the portable devices used by the enumerators, were transferred automatically to a central server. Data from the household survey was analysed using SPSS (Version 24).

3.3.2   Data Collection Limitations

Several limitations regarding the accuracy of the data, similarly to other questionnaire-related techniques, can be linked to potential misinterpretations among the enumerators

and the respondents. Moreover, the capacity of the respondents to remember precise information was limited.   Nevertheless, additionally to the initial training of the enumerators, they were followed up during the first week of the data collection and daily practical corrections and advice contributed considerably to increase of the quality and consistency of the information. The large size of the sample enabled the capture of both the heterogeneity of the household situation and the general trends within the area.

3.3.3   Questionnaire Questions

Within each section certain types of questions were answered to determine the extent of household FS or insecurity situation. The following questions were used:

Section 1: Household demographics and characteristics of the household

- What is the current status of human capital in the household?
- Is there a link between human capital and FS status of the household?
- What is the importance of migration and remittances for the household?

Section 2: Food availability, consumption and dietary diversity in the household

- What is the current FS status in the area?
- Which types of food are most important in the area?
- Is there a link between FS status and food consumption?
- What are the most important food sources in the area?

Section 3: Food production in the household

- What is the average farm size in the area?
- What is the current access to resources in the area?
- What is the situation related to land use (access, problems, tenure structure)?
- What is the average crop and livestock production in the area?
- What is the average added value in crop and livestock production in the area?
- Is there a link between household FS and household farm production?

Section 4: Income and expenditure of the household

- What is the average income in the area?
- What different types of income sources (livelihood strategies) are there?

- What is the importance of the different income sources?
- What are the socio-economic determinants of the importance of different income sources? (Who does what?)
- What is the outcome of different livelihood strategies?
- Is there a link between FS and livelihood strategies?
- What is the average expenditure pattern?
- Is there a link between FS and (food) expenditure pattern?

Section 5: Stresses, shocks and coping

- What are the common shocks and stresses?
- What are the coping strategies with sudden and severe decrease in income?
- What are the coping strategies for food shortage?

Section 6: Food and Nutrition Aid Programs

- Which projects were launched and which were the most attended?
- Who was involved in the specific projects?
- Did the projects have an impact on the FS status of participation households?

3.3.4   Data Sources and Collection

Qualitative and quantitative data at the household level were collected between the 21st of August 2016 and the 1st of September 2016 in the Cape Town Metropolitan Area of the Western Cape Province.   The following divisions and sub-divisions were part of the questionnaire:

Household Characteristics:

- Average household size;
- Average age of household head;
- Education level of the head of the household;
- Importance of migrant workers:
    - Total household migration,
    - Total months spent away from home,
    - Average months spent away from home, and
    - Reasons for absence;

- Migration/Remittances;

- Dependency ratios;

- Number of active persons (16-65)/Total Household size;

- Number of persons with income/total household size;

- Farm/home garden size;

- Ethnical group;

- How long have you been living in the area;

- Access to land;

- Access to water;

- Importance of access to water/irrigation;

- Dependency ratio;

- Number of active persons/total household size;

- Number of persons with income/total household size;

- Farm/home garden size;

- Ethnical group;

- Period living in the area;

- Access to facilities;

- Access to water;

- Importance of access to water/irrigation; and

- Financial assets.

Household Food Availability, Consumption and Dietary Diversity:

- Household access to food;

- Poverty measure;

- Food consumption and dietary diversity;

- Main sources of food;

- Consumption per type;

- Cost per type;

- Intra household food distribution;

- Dietary modification;

- Link between human capital and FS status;

- Number of people in household / FS status;
- Link between active persons in household / FS status;
- Hungry periods;
- Anthropometry; and
- Body weight and height.

Household Food Production:

- Access to factors of production:
    - Land,
    - Water,
    - Extension and information resources,
    - Access to output markets, and
    - Access to input markets;
- Land tenure structure;
- Problems in land cultivation;
- Food production:
    - Crop Index,
    - Most important crops,
    - Production per crop,
    - Market value,
    - Subsistence ratio [share of production consumed],
    - Importance of processing [share of production processed],
    - Production per vegetable, and
    - Production per fruit;
- Livestock production;
- Livestock units owned [per type]:
    - Total market value of livestock,
    - Cattle production,
    - Sheep production,
    - Goat production,
    - Poultry production, and
    - Livestock production and Livestock Index;

- Production costs:
  - Added value [market value total production {5 most important crops}-production costs].

Household Income

- Income sources, income generation, income decisions;
- Main sources of income through the year by area;
- Income sources grouped in categories:
  - Main income,
  - Remittance,
  - Grants or gifts,
  - Farm income,
  - Skilled labor income,
  - Unskilled labor income, and
  - Other income.
- Average income per month for the household; and
- Average income per year for the household.

Stresses, Shocks and Coping Strategies:

- Analysis by province, district, municipality or area, type of agriculture, ethnical groups and income category;
- Occurrence in the last 12 months;
- Households experience specific stress;
- Household experience specific shock;
- Household applying specific coping strategy; and
- Coping with hunger.

Aid Programs:

- On-going AID projects;
- Overview by province, district, municipality, area and farm type; and
- Number of total aid programs.

3.3.5 Analytical Methods

3.3.5.1 The Level of Urban Household Food Security of Urban Farmers and Non-Farmers in the Informal Settlement Areas of the Cape Town Metropolitan Area

To determine the level of household FS it is important to consider the multidimensional characteristics thereof. Household characteristics were used for the purpose to explain the variation in food insecurity. The main characteristics that were used include characteristics regarding demography, capability, livelihood strategies and entitlements of the households. Thus the following instruments were used to get a complete representation of household FS:

- Household Food Insecurity Access Scale (HFIAS)
  - The HFIAS was translated into HFIA prevalence categories (HFIAP) following Food and Nutritional Technical Assistance (FANTA) methodology. Only three groups (food secure, moderately food insecure and severely food insecure) were obtained from the scale.
- Household Diet Diversity Scale (HDDS)
  - Households were asked to report their household dietary consumption during the previous 7 days through a constructed 18 food group questionnaire. Due to portion sizes measuring difficulties, this analysis was restricted to the diversity of household diet.
- Food poverty (FP)
- Months of adequate household provisioning (MAHFP),
- Energy availability (EA) proxied as Total Value Consumed (TVC) and
- Share of food expenditure on total household expenditure (SHARE).

The Pearson correlation coefficients and graphs were used to compare of the outcome indicators on HFIAS, HDDS, MAHFP, TVC and total share of food expenditure on total food expenditure.

The P-Alpha poverty index was used to analyse household food poverty levels.[367] For the purpose of this study the food poverty line as described by Statistics South Africa

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367 (Foster *et al.*, 1984)

(STATSSA) (2015b).[368] This food poverty line is described as: *"the food poverty line is the Rand value below which individuals are unable to purchase or consume enough food to supply them with minimum per-capita-per-day energy requirement for good health (which is about 2 100 kilocalories)".*[369]

The equation defined by Foster, Greer and Thorbecke (1984)[370] is defined as follows :

$$P(y,z) = \frac{1}{n} \sum_{n=1}^{q} (G_i)$$

Whereas:

y = value of food consumption per capita in each household,

z = recommended food poverty line (R352 per capita per month)[371]

$G_i = z - y_i$ = the ith household food poverty gap

q = number of poor households

n = the total number of households in the area

3.3.5.1.1 Household Food Insecurity Access Scale (HFIAS)

FANTA, which is part of the USAID, developed a set of questions to identify and differentiate households as those that experience FS and those who don't. These set of questions can be used across different cultural contexts and represent all spheres of the household food insecurity. The scale consists of nine items with four frequencies and three domains including anxiety and uncertainty about the household food supply, insufficient quality, and insufficient food intake.[372] Results are place on a scale of severity, from food secure to severely food insecure. This food insecurity scale was used to measure food insecurity in the Cape Town Metropole.

This approach of this measurement is based on the households' experience regarding insufficient access to food such as feeling hungry, cutting down on the number of meals, eating food that is less liked or having a less diverse diet.

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368 (Statistics South Africa, 2015b)
369 (Statistics South Africa, 2015b)
370 (Foster *et al.*, 1984)

371 (Statistics South Africa, 2015b)
372 (Deitchler *et al.*, 2011)

Information gathered from the nine items through the survey allow the construction of the following food insecurity determinants:

- Household Food Insecurity Access Scale (HFIAS);
- Household Food Insecurity Access category; and
- Household Dietary Diversity score (HDDS).

The HFIAS measures food insecurity, which result in predictable reactions and responses that can be quantified and summarised in a scale.[373]   But the scale only captures the access to food, not the utilisation.

The HDDS is based on the data of food consumed the day before the interview by the household members. The score relates to number of the different groups of food consumed. A higher score shows higher diversity, thus the household is more food secure. [374]

For this purpose, the categories food secure and mildly food insecure were grouped together and consider as food secure, while the food insecure and severely food insecure categories were combined and considered as food insecure.

Studies by de Cock *et al.* (2013)[375] and Grober (2013)[376] showed that the following variables are relevant determinants to be used in the above measurement:

- Gender;
- Household size;
- Age of the household head;
- Marital status of the head;
- Educational level of the head dependency ratio; and
- Household income.

373 (Coates *et al.*, 2007)
374 (Deitchler *et al.*, 2011)
375 (de Cock *et al.*, 2013)
376 (Grober, 2013)

2.1.3. An analysis of the indicators/factors affecting urban household food insecurity

Statistical analysis of experimental data carried out with the SPSS (Statistical Package for Social Sciences) 24.0 software to determine the level of FS in the Cape Town Metropole. Pearson's correlation coefficient (r) was computed between different food insecurity levels in order to determine the extent to which values of both parameters are correlated. Tukey-Kramer method was the multiple comparisons procedure used for the simultaneous estimation of pairwise differences of means in one-way Analysis of Variance (ANOVA).

Principal factor analysis (PFA) was performed to measure the significance of different factors affecting FS. The purpose of this multivariate statistical technique is used to reduce correlated data into a few uncorrelated components or factors explaining the maximum variance.[377] As explained by Reimann *et al.*, (2002)[378] the principal factors (PFs) were calculated based on a correlation matrix. In this study, the Kaiser normalisation, a varimax orthogonal rotation, was used as the rotation method.

It is specified as:

$P_1 = a_{11}x_1 + a_{12}x_2 + *** + a_{1n}x_n$

$P_2 = a_{21}x_1 + a_{22}x_2 + *** + a_{2n}x_n$

$P_3 = a_{31}x_1 + a_{32}x_2 + *** + a_{3n}x_n$

$P_n = a_{n1}x_1 + a_{n2}x_2 + *** + a_{nn}x_n$

Where;

$P_{1p2} P_n$ = observed variable/factors constraining FS

$A_1 a_n$ = factor loading correlation coefficients

$X_1 x_2 X_n$ = unobserved underlying factors constraining the study selected factors with

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377 (Vialle *et al.*, 2011)   378 (Reimann *et al.*, 2002)

3.3.5.2 An analysis of the contribution of UA to household food security in the informal settlements of the Cape Town Metropole

3.3.5.2.1 Propensity score matching

Matched comparison evaluation techniques are the most researched methods of evaluation methodology.[379] Baker (2000)[380] stated that it is one of the best quasi-experimental design techniques to use as an alternative towards experimental design. Rosenbaum and Rubin (1983)[381] defined the propensity score as the conditional probability of receiving a treatment given pre-treatment observable characteristics.

To determine the contribution of UA on household FS, the propensity score matching method is used. According to Randolph *et al.* (2014)[382] the attributing outcomes to programme interventions are often challenging since difficulties are experienced in observing outcome in both counterfactual and treatment situations. The authors concluded that it is clear that propensity score matching is a useful tool for reducing selection bias and strengthening causal conclusions. Another reason the propensity score matching method was used to determine the contribution of UA on household FS is due to the lack of historic data on the control group. Therefor the econometric model was used to estimate the effect of urban farming on income and FS of the households experiencing food insecurity. A statistical counterfactual group is thus created based on the probability of the group contributing to UA by using observed household characteristics. The validity of this method, however, depends on the provisional independence and overlap in propensity scores across the treated and control group. Whilst propensity score matching is data dependent for both the number of variables required to estimate participation and outcomes as well as in the number of participants and non-participants entering the matching process.[383] Therefore results based on small samples of non-participants should be interpreted with caution. However, studies by Bryson *et al.* (2002)[384] showed that even though the propensity score matching method requires data to show good matches, where single treatment is being evaluated efficient small samples can be sufficiently analysed.

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379 (Baker, 2000)
380 (Baker, 2000)
381 (Rosenbaum and Rubin, 1983)

382 (Randolph *et al.*, 2014)
383 (Bryson *et al.*, 2002)
384 (Bryson *et al.*, 2002)

2.1.3.1.1.   Model specification and estimation

The first step in propensity score matching is to make an estimation regarding the probability of participation of urban farming. This is done by means of the Probit model, which in turn is required to estimate propensity scores. Heinrich *et al.* (2010)[385] identified the Probit model as follows:

$$P\{X \equiv \Pr(D = 1|X) = E(D|X)\}$$

The particular pre-treatment household characteristics influencing urban farming determines the conditional probability of participation.

D = (0, 1) indicator of participation in UA,

X = vector of pre-participation household characteristics

The most important household characteristics showing significance include:

- Access to land;
- gender of household head; and
- distance from selling markets.

Where D=1, a household would participate in urban farming, and where D=0, the household would not participate in urban farming. The smaller number of conditional variables provide more robust outcomes.

When propensity scores are measured, matching is done by using methods as suggested by Heinrich *et al.* (2010)[386] i.e. nearest neighbour matching, Kernel Matching, and Stratification Matching algorithms. The most likely outcomes are then defined by Y1 (D1) for the total population. The treatment effect on the total population is written as:

$$\tau = Y1 - Y0$$

It is not possible to determine the effect of an individual treatment since it would produce only one possible outcome, thus the focus is on average impact.[387] The main purpose of this analysis is to determine the Average Treatment effect on the Treated (ATT) i.e. the display of the outcome of contribution of UA towards FS and income. This analysis

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385 (Heinrich *et al.*, 2010)
386 (Heinrich *et al.*, 2010)
387 (Heinrich *et al.*, 2010)

therefor shows the difference in outcome between households involved in UA and households not involved in UA. Heinrich *et al.* (2010)[388] defined this analysis as:

$$ATT = E(Y1 - Y0|D = 1) = E(Y1|D = 1, P(X)) - E(Y0|D = 0, P(X))$$

Y1 = income per month or FS outcomes for households involved in UA

Y0 = the situation for households not involved in UA.

3.3.5.3 Options for addressing urban household food insecurity. A cluster analysis

A cluster analysis was done to sub-divide urban farmers in different groups or typologies based on certain characteristics that are different from each other. These clusters or typologies are based on the level of food insecurity. With this analysis the purpose is to classify data in such a way that the objects in one cluster are similar and different from the objects in the other clusters.

3.4 Discussion and Conclusions

The methodology gives a description of the processes before, during and after data collection. The application of the above methodologies will enable the researcher to analyse the data to result in a detailed analysis of the dataset obtained. The outcomes resulting from the analysed data will consequently contribute to the answering of the objectives identified for this study.

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388 (Heinrich *et al.*, 2010)

CHAPTER 4

THE LEVEL OF URBAN HOUSEHOLD FOOD SECURITY OF URBAN FARMERS AND NON-FARMERS

4.1 Abstract

Different food security (FS) indicators were used to determine the level of FS on all dimensions of FS in the informal settlement areas of the Western Cape Metropole. With regards to food access, 78% of households are severely food insecure, while just more than 50% of households earn more than the US$ 2 per capita per day food poverty line with 21% of the households falling below the critical point of US$ 1.25 per capita per day. The average total household expenditure on food is R338.26, and the share of income spent is an average of 52.5% of household income.

Households experience 4.3 hungry months in a year, meaning challenges are experienced with regards to food availability. The household diet diversity score (HDDS) was used to measure utilisation and it was found that 10.4 out of 18 different food groups/categories were consumed.

Most significant differences can be seen for FS indicators between areas, but no significant differences were measured between farming and non-farming households. This means that households involved in farming are not more food secure than those not involved in farming. Bonteheuwel and Kraaifontein were the two areas most severely affected by food insecurity according to Household Food Insecurity Access Scale (HFIAS), Household Diet Diversity Score (HDDS) as well as Months of Adequate Household Food Provisioning (MAHFP) and the food poverty measures. Gugulethu and Khayelitsha on the other hand seem to be the most food secure of all these areas.

Key words: Urban, Household, Food Security, Measurement

4.2 Introduction

According to Frayne (2010)[389] urban FS is not about the amount of food produced or supplied. One has to take into consideration the other dimensions of FS which include food availability, food quality, food reliability and food accessibility.

Hendriks (2015)[390] described food insecurity as a problem with multiple manifestations. Factors contributing to this challenge include social norms, individual behaviour and stages in the human life cycle, food availability and quality. Due to the difficulty in merging the above and diverse understandings thereof it is thus a challenge to improve our response to the problem.

Labadarios *et al.* (2011)[391] confirmed that there was never a national survey conducted to assess all dimensions of FS. In addition D'Haese *et al.* (2016)[392] observed that there are no regularised ways of monitoring FS in South Africa since different methodologies, samples and sampling techniques are used and different aspects of FS are assessed. This bound to give different results and it is thus difficult to compare indicators across studies and come up with a single FS estimate for South Africa.

This chapter has the purpose to analyse the level of household FS of urban farming and non-farming households in the informal settlement areas of the Cape Town Metropole with reference to all dimensions of FS.

4.3 Objectives

To estimate the level of urban household FS of urban farmers and non-farmers in the informal settlement areas of the Cape Town Metropole.

4.4 Hypothesis

The level of food insecurity of urban farming households is significant lower than that of non-farming households.

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389 (Frayne *et al.*, 2010)

390 (Hendriks, 2015)

391 (Labadarios *et al.*, 2011)

392 (D'Haese *et al.*, 2016)

4.5   Delimitations

With regards to HDDS, consumption of the types of food groups were based on consumption during the seven days prior to the survey. It thus was assumed that there was zero consumption during the same month and thus the correspondent expenditure was zero. This might cause a bias since some of the households may consume food from another group earlier during the month. Even though the consumption of the type of food group might not be well represented, one gets a general idea about the household food diversity. Another limitation might also be that the respondents answered the questions based on what they remembered.

4.6   Methodology

4.6.1   Study Area and Data Collection

The study was conducted in the informal settlement areas that form part of the Cape Town Metropole of the Western Cape in South Africa. Households in the study area included a combination of community and household farmers involved in project gardens funded by the Department of Agriculture in the Western Cape. Farmers comprised of those owning house gardens or those involved in community gardens. Randomly selected non-farming households of the same area thus served as the control group.

The informal settlement areas in the Cape Town Metropole selected to conduct the surveys are:

- Guguletu;
- Khayelitsha;
- Kraaifontein;
- Mitchelsplain;
- Bonteheuwel; and
- Philippi.

These areas are known to house some of the poorer community in the Cape Town Metropole.

Quantitative and qualitative data was collected by using questionnaires that included questions constructed to include different social characteristics of the household, the FS

situation based on different FS indicators, household income and expenditure, household food production, access to water and to markets and access to governmental support programs. It thus contributed to an in-depth comprehension of the social and economic aspects of FS at household level and the identification of the factors influencing FS at household level by including the four major FS components i.e. food availability, food accessibility, food utilisation and food system stability.

A total of 223 surveys were completed and three were eliminated due to outlying values, leaving 220 households that were analysed.

4.6.2   Data Analysis

To determine the level of household FS it is important to consider the multidimensional characteristics thereof. Household characteristics were used for the purpose to explain the variation in food insecurity. The main characteristics that were used include characteristics regarding demography, capability, livelihood strategies and entitlements of the households. Thus the following instruments were used to get a complete representation of household FS:

- Household Food Insecurity Access Scale (HFIAS)
    - The HFIAS was translated in to HFIA prevalence categories (HFIAP) following Food and Nutritional Technical Assistance (FANTA) methodology. Only three groups (food secure, moderately food insecure and severely food insecure) were obtained from the scale.
- Household Diet Diversity Scale (HDDS)
    - Households were asked to report their household dietary consumption during the previous 7 days through a constructed 18 food group questionnaire. Due to portion sizes measuring difficulties, this analysis was restricted to the diversity of household diet.
- Food poverty (FP)
- Months of adequate household provisioning (MAHFP),
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- Share of food expenditure on total household expenditure (SHARE).

The Pearson correlation coefficients and graphs were used to compare of the outcome indicators on HFIAS, HDDS, MAHFP, TVC and total share of food expenditure on total food expenditure.

The P-Alpha poverty index was used to analyse household food poverty levels.[393]   For the purpose of this study the food poverty line as described by Statistics South Africa (STATSSA) (2015b).[394] This food poverty line is described as: *"the food poverty line is the Rand value below which individuals are unable to purchase or consume enough food to supply them with minimum per-capita-per-day energy requirement for good health (which is about 2 100 kilocalories)"*.[395]   The equation defined by Foster, Greer and Thorbecke (1984)[396] is defined as follows:

$$P(y,z) = \frac{1}{n}\sum_{n=1}^{q}(G_i)$$

Whereas:

y = value of food consumption per capita in each household,

z = recommended food poverty line (R352 per capita per month)[397]

$G_i = z - y_i$ = the ith household food poverty gap

q = number of poor households

n = the total number of households in the area

4.7   Results

4.7.1   Household Food Insecurity Access Scale

According to the HFIAS scale it was calculated that 78% of households over all the informal settlement areas surveyed in the Cape Town Metropole experience severe food insecurity. 14% of them experience moderate FS, while 8% of households surveyed are food secure. Battersby (2011)[398] reported that 80% of the households they surveyed in the Cape Town Metropole experienced either moderate or severe food insecurity. This

393 (Foster *et al.*, 1984)

394 (Statistics South Africa, 2015b)

395 (Statistics South Africa, 2015b)

396 (Foster *et al.*, 1984)

397 (Statistics South Africa, 2015b)

398 (Battersby, 2011)

number is also similar to Crush *et al.* (2011)[399] that found that the informal areas of Cape Town experienced that 80% of households were severely food insecure.

As seen in Table 4-1 the area with the lowest mean score on the HFIAS scale is Guguletu (10.1) and the highest average scores were measured in Bonteheuwel with a score of 15.8 and Kraaifontein with 15.9. There are significant differences between the informal settlement areas in terms of the level of FS. Non-farming households scored 14.1 and urban farmers 13.5 on the HFIAS scale. Although this is an indication that urban farmers are more food secure than households not involved in agricultural activity no significant difference were found between the FS levels between urban farming households and non-farming households.

Table 4-1 HFIAS mean scores for different informal settlement areas of the Cape Town Metropole

Area	N	Mean
Guguletu	33	10.12 (5,22)
Khayelitsha	38	11.29 (7.51)
Kraaifontein	45	15.87 (6.24)
Mitchelsplain	35	13.29 (6.05)
Bonteheuwel	33	15.82 (5.62)
Philippi	36	15.11 (7.31)
F Statistic		5.25***
Farming	154	13.52 (6.83)
Non-Farming	66	14.05 (6.48)
T Statistic		0.538
Total	**220**	**13.67 (6.72)**

∗Significant at the 10% level; ∗∗significant at the 5% level; ∗∗∗significant at the 1% level. Values in parenthesis are standard deviation

According to the HFIAS 84.8% of households from Bonteheuwel experience severe food insecurity and 9.1% moderate food insecurity (Table 4-2). Kraaifontein and Philippi also experience severe food insecurity with levels over 80%. Gugulethu and Khayelitsha have the lowest levels of severe food insecurity with 66.7% and 68.4% respectively, however, these areas do experience moderate food insecurity in 24.2% of households in Gugulethu

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399 (Crush *et al.*, 2011)

and 15.8% of households in Khayelitsha. The analysis on the FS status of farming and non-farming households shows that in both cases more than 75% of households experience severe food insecure, with a higher percentage of farming households experiencing severe food insecurity.

Table 4-2 HFIAS categories for the different informal settlement areas of the Cape Town Metropole

Area %	N	Food Secure	Moderately Food Insecure	Severely Food Insecure
Guguletu	33	9.1	24.2	66.7
Khayelitsha	38	15.8	15.8	68.4
Kraaifontein	45	6.7	8.9	84.4
Mitchelsplain	35	8.6	14.3	77.1
Bonteheuwel	33	6.0	9.1	84.8
Philippi	36	8.6	13.6	77.7
Farming status %				
No Farming	64	6.06	18.18	75.76
Farming	156	9.74	11.69	78.57
Total	**220**	**8.64**	**13.64**	**77.73**

The majority of respondents over all the informal settlement areas in the Cape Town Metropole reported that they often (more than 10 times during the past 30 days) worried that there would not be enough food for the household to eat. Respondents from Gugulethu and Khayelitsha sometimes (three to nine days of the past 30 days) worried that the household would not have enough food to eat, while households from Kraaifontein, Mitchelsplain, Bonteheuwel and Philippi often worried that there would not be enough food for the household to eat.

The households in all the informal settlement areas reported that one of the household members were not able to eat the kinds of food they preferred because of a lack of money.

It was reported that on average in the Cape Town Metropole one or more of the household members eat just a few kinds of food day-after-day owing to a lack of money. Gugulethu and Khayelitsha respondents once again reported that they experience this situation sometimes during the past 30 days while households from Kraaifontein, Mitchelsplain,

Bonteheuwel and Philippi often experienced that one or more of the household members eat just a few kinds of food day-after-day owing to a lack of money.

The households in all the informal settlement areas reported that one of the household members often had to eat food that they preferred not to eat because of a lack of money.

On average, it was reported that in the Cape Town Metropole it often occurred for one of the household members to eat a smaller meal than they felt they needed since there was not enough food. Respondents from Gugulethu and Khayelitsha sometimes, while households from Kraaifontein, Mitchelsplain, Bonteheuwel and Philippi often experienced this.

Households were asked whether the household head or any other household members ate fewer meals in a day due to food shortage. It was found that they often experienced that one or more household members had to eat fewer meals in a day because there was not enough food. This was sometimes experienced in Gugulethu and Khayelitsha, but often in Kraaifontein, Mitchelsplain, Bonteheuwel and Philippi.

On average it sometimes happened that households in the Cape Town Metropole had no food at all in their households because there were no funds available to buy more. This occurrence sometimes took place in Gugulethu, Khayelitsha and Mitchelsplain and often in Kraaifontein, Bonteheuwel and Philippi.

According to most of the respondents over all the informal settlement areas surveyed in the Cape Town Metropole it sometimes occurred (three to nine days of the past 30 days) that one of the household members went to sleep at night hungry because there was not enough food. It sometimes took place in all the areas individually as well.

It occurred that most of the respondents over all the areas surveyed in the Cape Town Metropole it sometimes happened (three to nine days of the past 30 days) that one of the household members went a whole day without eating anything because there was no food available. It sometimes took place in all the areas individually as well.

4.7.2   Household Diet Diversity Scores

The HDDS is based on the data of food consumed the day before the interview by the household members. The score relates to the number of the different groups of food

consumed. A higher score shows higher diversity, thus the household is more food secure.[400] It can also be defined as the total of the amount of different foods or food groups consumed by an individual or household over a specific time.

In Figure 4-1 the frequency of the HDDS can be seen in the surveyed areas of the Cape Town Metropolitan Area. The highest values were calculated for the region between 8 and 12 on the HDDS where 61.3% of the total surveyed group falls within his area.
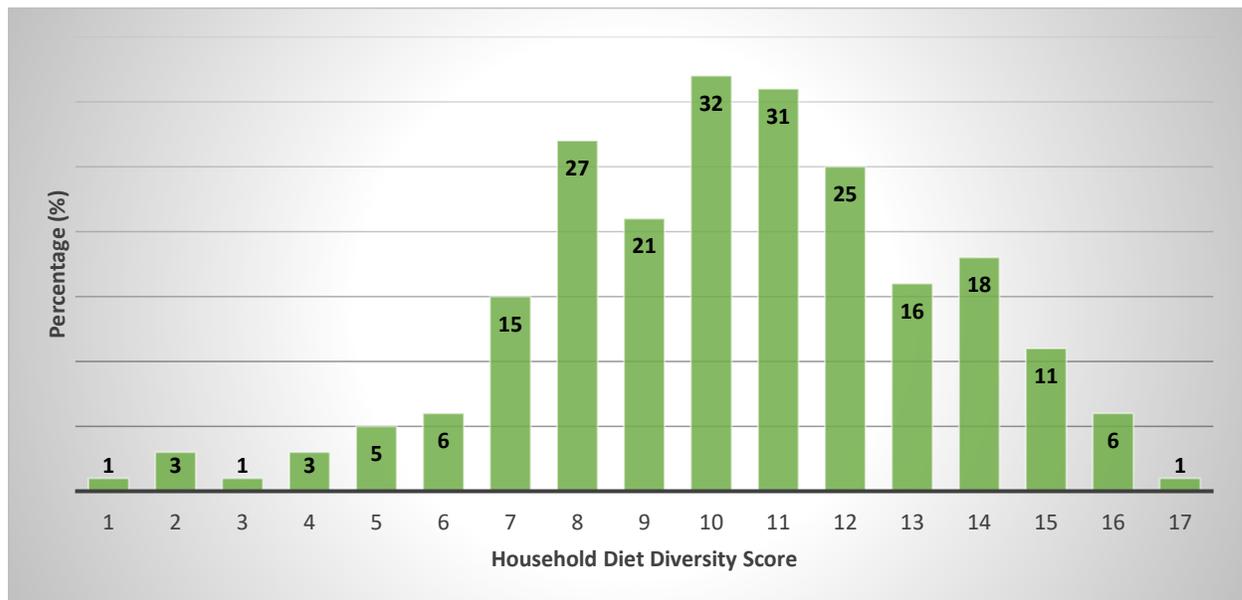
Figure 4-1 Frequency of Household Diet Diversity Score for the Cape Town Metropolitan Area

As seen in Table 4-3 Mitchelsplain (11.7) and Gugulethu (11.1) have the highest HDDS while Bonteheuwel has a much lower HDDS of 9.3. This is an indication that the Bonteheuwel area experience higher levels of food insecurity. There are significant differences between the HDDS of the different informal settlement areas.

400 (Deitchler *et al.*, 2010)

Table 4-3 The mean Household Diet Diversity Scores (HDDS) for the different informal settlement areas and the different types of agriculture in the Cape Town Metropole

Area	N	Mean
Guguletu	33	11.1 (2.89)
Khayelitsha	38	10.92 (3.29)
Kraaifontein	45	9.62 (2.39)
Mitchelsplain	35	11.69 (2.29)
Bonteheuwel	33	9.27 (2.81)
Philippi	36	9.69 (3.22)
F Statistic		4.5***
Non-Farmers	66	10.30 (3.15)
Urban Farmers	154	10.42 (2.86)
T Statistic		-0.259
Total	**220**	**10.38 (2.94)**

∗Significant at the 10% level; ∗∗significant at the 5% level; ∗∗∗significant at the 1% level. Values in parenthesis are standard deviation

There is almost no difference in value and no significant difference of the HDDS between farming and non-farming households in the Cape Town Metropole. In a study conducted by The Western Cape Department of Agriculture (2015)[401], it was reported that the households that participated in food production have a generally higher HDDS. According to Battersby (2011)[402] the HDDS was generally poor in households in Philippi and Khayelitsha, with a mean of 6.33 out of 12.

4.7.2.1 Main sources of food

4.7.2.1.1 Consumption per type

Figure 4-2 shows the percentage of household consumption per food group during the past seven days of farmers and non-farmers in the Cape Town Metropole. The figure represents each food group; thus, each bar is based on the total share of consumption among households. The four main groups consumed without taking into account the beverages during the past seven days include poultry, other cereals (including bread), maize products and dairy. In the Ekurhuleni area study by D'Haese *et al.* (2013a)[403],

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401 (Western Cape Department of Agriculture, 2015)
402 (Battersby, 2011)

403 (D'Haese *et al.*, 2013a)

reported that oil and butter, maize and maize products, sugars and other cereals (including bread) were the main food groups consumed.
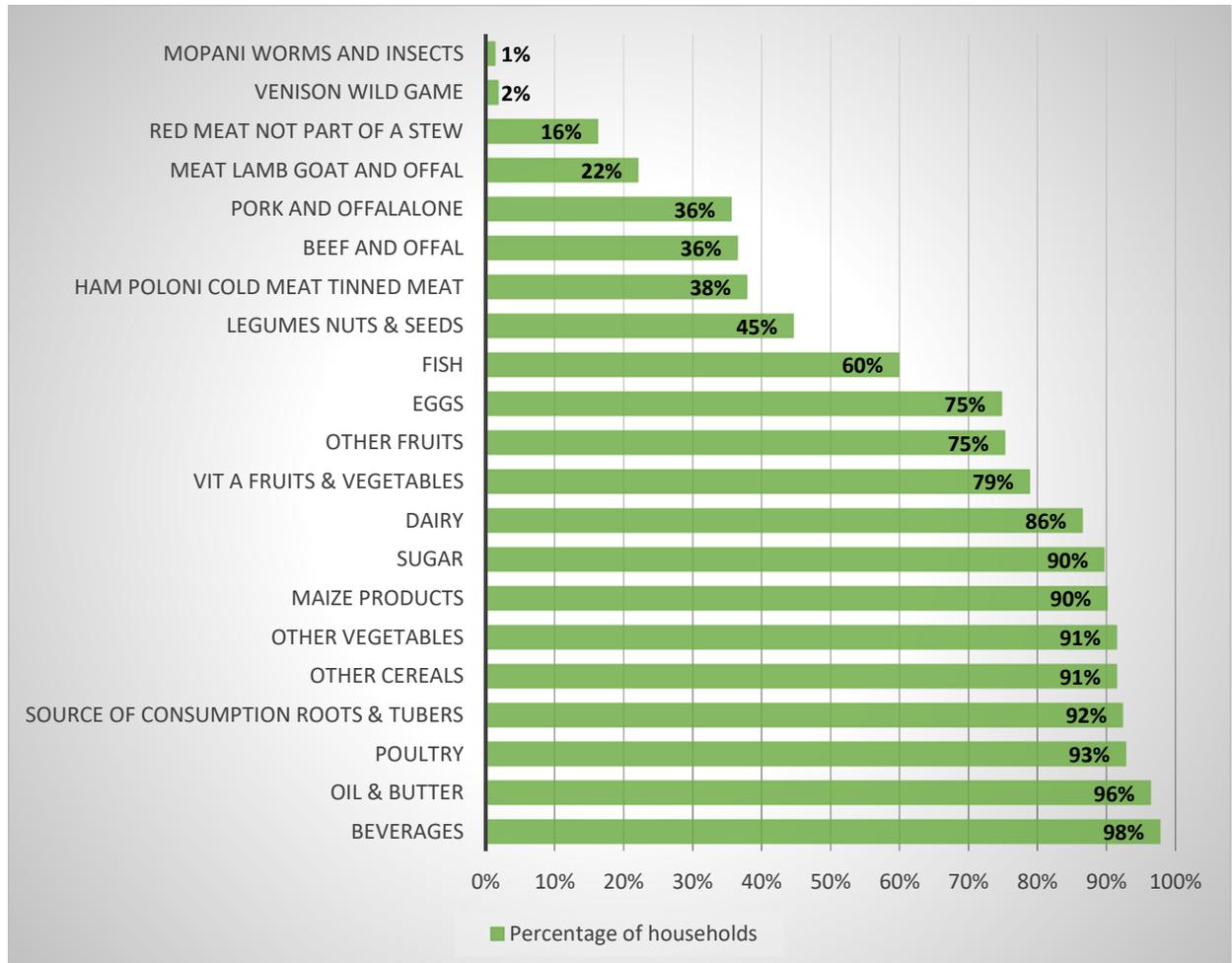
Figure 4-2 The percentage of household consumption per food group during the past seven days in the Cape Town Metropole

Farming households consume more roots and tubers, vitamin A fruit and vegetables, other vegetables and maize than non-farming households. This might be because farming households produce some of the above mentioned food groups. On the other hand, non-farming households consume more meat, pork, mutton, lamb and goat, and much more poultry than farming households.

4.7.2.1.2   Cost per type

Figure 4-3 gives a good indication of the average expenditure per month on food consumption for households in the Cape Town Metropole on the different groups of food. The average total expenditure per month per household in the Western Cape is R1066.24. Money is mostly spent on other cereals, which includes bread with an average of R177.49 per month, followed by poultry and maize products with R176.84 and R134.37 respectively spent by households. Venison, wild and game, mopani worms and other insects and eggs were the food groups the least amount of money were spent on. In the Ekhurhuleni district D'Haese *et al.* (2013a)[404], reported that most money was spent on cereals, followed by poultry and maize.
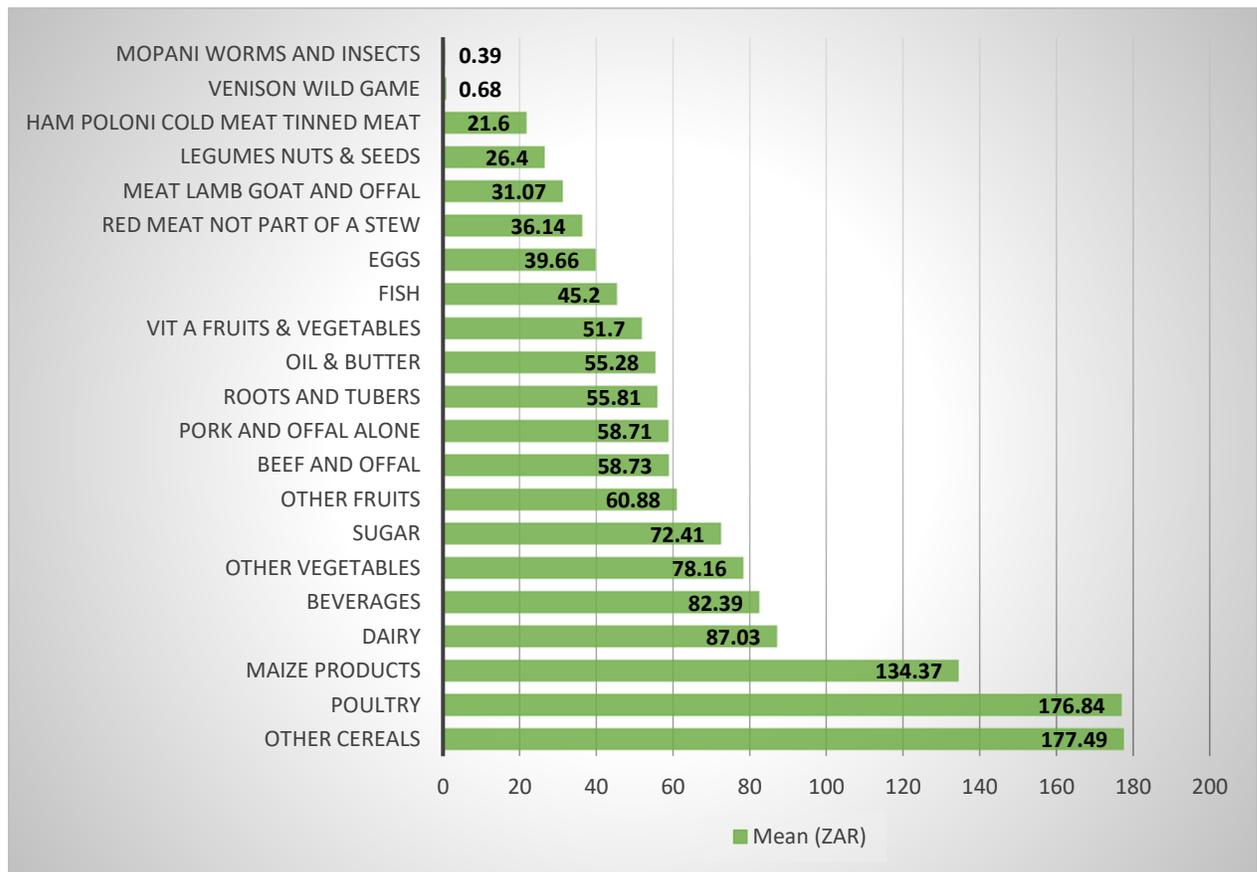
Figure 4-3 The average expenditure per month consumption for the different groups of food in the Cape Town Metropole

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404 (D'Haese *et al.*, 2013a)

As seen in Figure 4-4 the percentage of the frequency that different sources are used to get food for the household is represented. For all the groups it is clear that purchase is the main source of obtaining food in all the categories. For roots and tubers, other cereals, other vegetables and vit A fruits and vegetables the second source of obtaining is by self -production with 6.3%, 2.7%, 14% and 14.4% respectively. As a second source for obtaining some other food groups is by receiving as gifts. These include beverages, maize, dairy, other fruits, fish, beef ad offal and red meat.
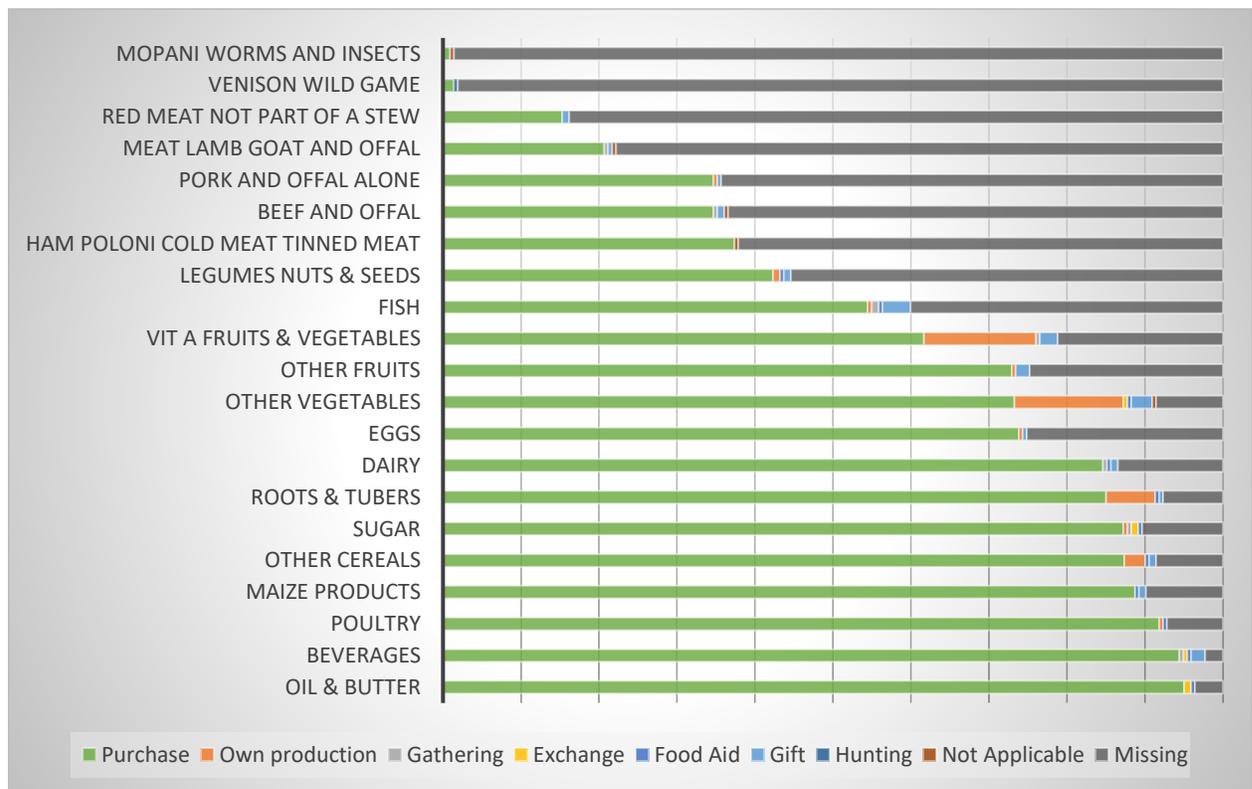
Figure 4-4 Sources per food group per household for the Cape Town Metropole

4.7.3 Hunger Index (Total Hungry Months)

The average total number of hungry months experienced by households in the Cape Town Metropole was 4,3 months during the previous 12 months. This means that during the 12 months prior the day of the survey there were on average 4.3 months where one or more of the household members had to go hungry due to a lack of food. In Figure 4-5 one can see that in 29 (13.1%) of the households there was someone that had to go hungry at least once each month.
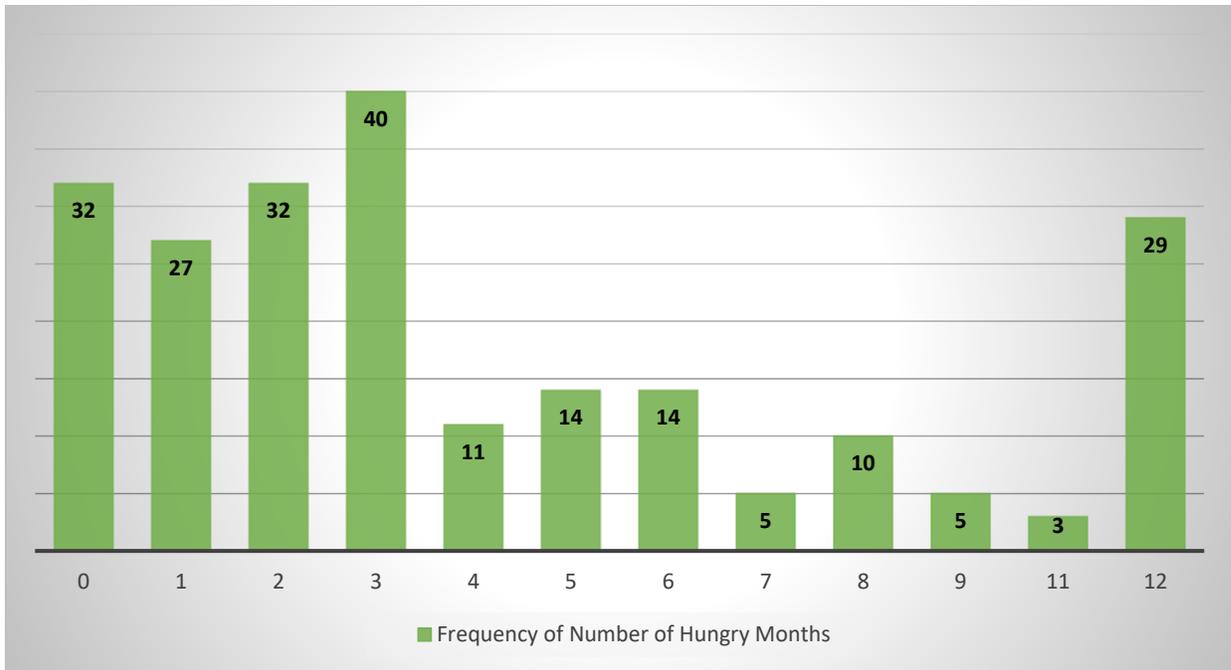
Figure 4-5 Average total number of hungry months experienced in the Cape Town Metropole

According to Table 4-4, Khayelitsha and Gugulethu households can adequately provide in 9.3 and 8.7 months of the year respectively, while this is the case for 7 and 6 months for Kraaifontein and Bonteheuwel respectively.

Table 4-4 The mean (standard deviation) Months of Adequate Household Provisioning Indicator (MAHFP) for the informal settlement areas of the Cape Town Metropole

Area	N	Mean
Guguletu	33	8.72 (0.54)
Khayelitsha	38	9.26 (0.46)
Kraaifontein	45	7.00 (0.63)
Mitchelsplain	35	7.74 (0.63)
Bonteheuwel	33	6.06 (0.72)
Philippi	36	7.57 (0.72)
F Statistic		2.987***
Farmers	64	7.47 (4.08)
No-Farmers	156	8.24 (3.35)
T Statistic		1.253
Total	**220**	**7.74 (3.84)**

∗Significant at the 10% level; ∗∗significant at the 5% level; ∗∗∗significant at the 1% level. Values in parenthesis are standard deviation

In Figure 4-6 it is clear that the food secure households (according to the HFIAS) experience a much lower number of hungry months, while the severely food insecure households have an average of almost five months wherein one or more of the household members went hungry.
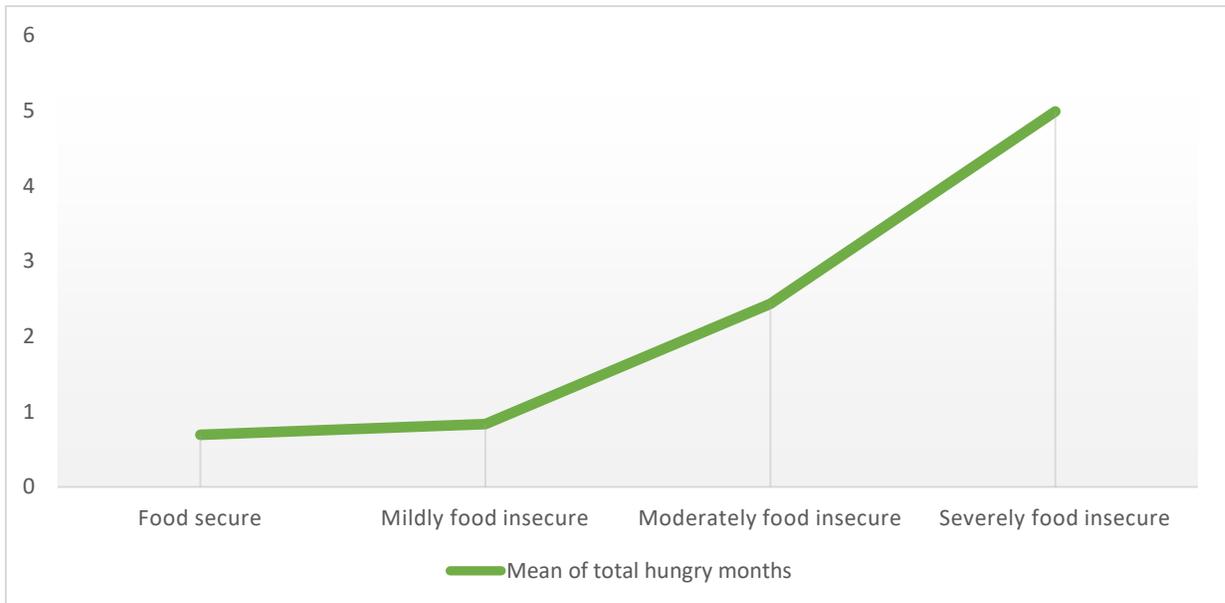
Figure 4-6 A comparison between the number of hungry months and the level of food security in the Cape Town Metropole

Households from the Bonteheuwel area have a high frequency of hungry months (5.6 months average) (Figure 4-7). Gugulethu and Khayelitsha households experienced the lowest amount of hungry months with only 2.9 and 3.1 months respectively. On average, the households from the other surveyed informal settlement areas (Kraaifontein, Mitchelsplain and Philippi) experienced between four and five hungry months.
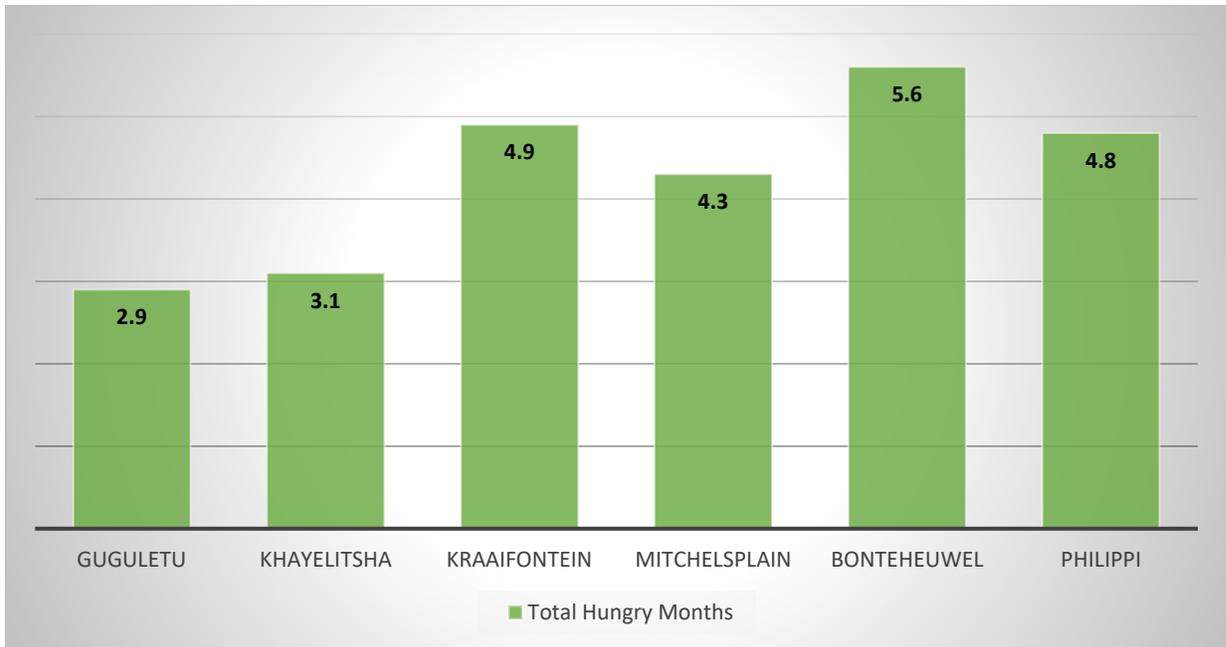
Figure 4-7 Total hungry months experienced by households per informal settlement areas

A trend can be seen between the average total of hungry months and the level of food security in the Cape Town Metropole as seen in Table 4-5. Food secure households have an average total of 0.8 hungry months per year, while the moderate and severely food insecure households on the other hand have 2.4 and 5 hungry months per year. The two assessments (HFIAS and HDDS) for FS verifies each other.

Table 4-5 A comparison between the total hungry months and the level of food security in the Cape Town Metropole

Area	N	Mean
Food Secure	19	0.77 (1.05)
Moderately Food Insecure	30	2.43 (1.61)
Severely Food Insecure	171	5.02 (4.04)
F Statistic		16.41***
Total	**220**	**4,30 (3.88)**

∗Significant at the 10% level; ∗∗significant at the 5% level; ∗∗∗significant at the 1% level. Values in parenthesis are standard deviation

Figure 4-8 shows the distribution of the percentage of households experiencing hungry months over the course of a year. More than 40% of all households are affected by hunger during June and July, and a sharp rise in hunger can be seen in 46% of households in November and 66% of households in December. It can also be noted that the percentage of non-farming households experiencing hungry months are mostly less than farming households, except in July. Battersby (2011)[405] reported similar results for June, but also reported January to be one of the months where food insecurity is experienced in the Western Cape. A main contribution to this peak reporting of hungry periods are due to the fact that the two longest school holidays fall within these months, thus the schools' feeding schemes are not operational. The burden is consequently on the households to provide for food during these periods. This seasonal linkage for both these months furthermore follow spending cycles during December festive season and the cold and wet winter season during June when insecurity can be attributed to extreme weather patterns.
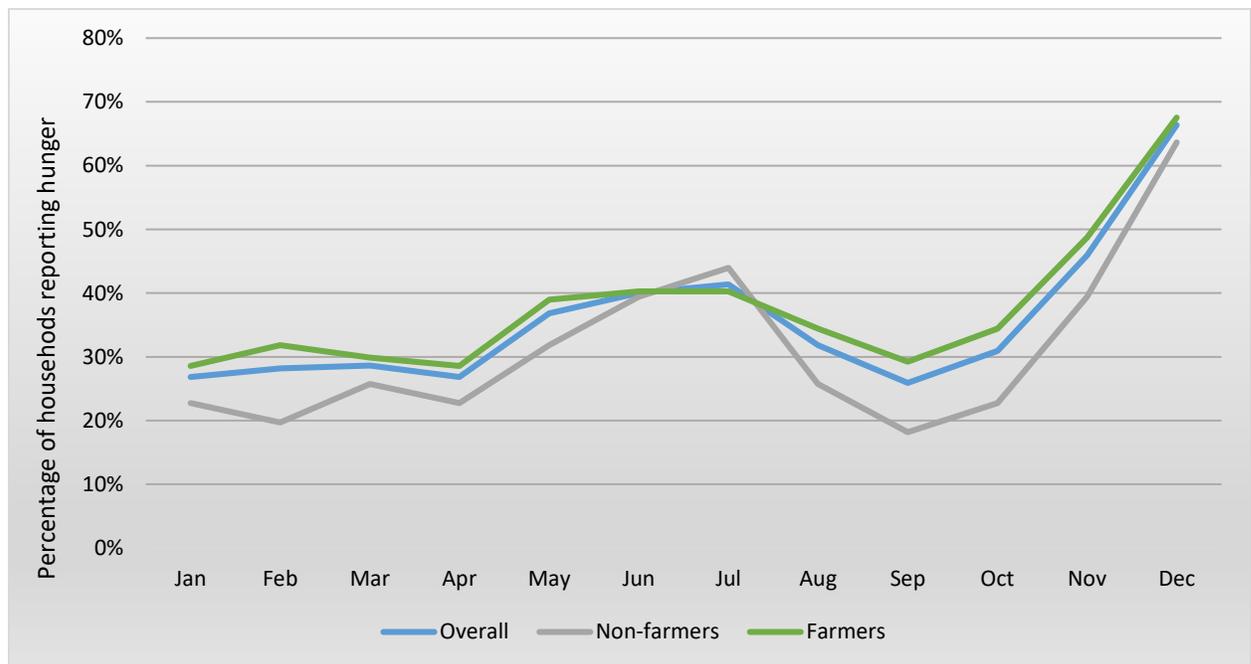
Figure 4-8 The percentage of households experiencing hungry months distributed over a year

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405 (Battersby, 2011)

4.7.4   Food Poverty Measures

Internationally, poverty is measured by using a set standard of the levels of per capita income of US$ 1.25 and US$ 2 per day. Total household income is converted from Rand to Dollar and into income per household member per day. This variable was used to create two categories of households depending on whether household members acquire more or less than US$ 1.25 per capita per day. The same procedure was applied for the US$ 2 per capita per day poverty measure.

Philander (2015)[406] reported that respondents in Langa employed in the urban food garden projects' income ranges between R300 and R1200, while 80% of all respondents receive an income of between R300 and R800. This suggests that the average household live on about R11 per day.

The poverty line in South Africa were reviewed in 2015 by using the Income Expenditure Survey from 2010/2011 to update the basket of goods and services. In other words, the minimum amount of money one need to afford basic goods and services to survive. Those falling below this line thus live in poverty.[407]

The three lines of poverty that are used by STATSSA can be seen in Table 4-6.

Table 4-6 Rebased food, lower bound and upper bound poverty lines[408]

	Food poverty line (FPL)	Lower bound poverty line (LBPL)	Upper bound poverty line (UBPL)
	Unable to afford enough food to meet a minimum energy intake (2,100 kilo-calories per day)	Unable to afford adequate food items and non-food items. Have to sacrifice food to pay for things like transport and airtime.	Can generally afford both food and non-food items.
Value per person per month	R335	R501	R770
Poverty Headcount	21.7%	37%	53.8%
Poverty Headcount	10 944 089	18 632 646	27 117 973
Poverty Gap	6.9%	14.5%	25.8%
	extremely poor	**Poor**	**not poor**

406 (Philander, 2015)

407 (Nicolson, 2015)

408 (Statistics South Africa, 2015)

When looking at per capita income per day, 79.1% of households reported an income of more than US$ 1.25 per capita per day, while 20.9% of the households are below this critical point. There are however 51.4% of the respondents that earn above US$ 2 per capita per day, with the rest below this amount.

As seen in Table 4-7, the levels of per capita income per day in US$ in the different informal settlement areas show that more than 50% of households from Gugulethu, Khayelitsha and Philippi earn above US$ 2 per capita per day. 37.1% of Mitchelsplain households earn more than US$ 2 per capita per day, while this is the case for only 22.2% of Kraaifontein households and 21.2% of Bonteheuwel households.

Table 4-7 Levels of per capita income per day in US$ in the different informal settlement areas of the Cape Town Metropole

	More than US$ 2 per day	Less than US$ 2 per day	More than US$ 1,25 per day	Less than US$ 1,25 per day
Guguletu	51.50%	48.50%	84.80%	15.20%
Khayelitsha	50.00%	50.00%	71.10%	28.90%
Kraaifontein	22.20%	77.80%	48.90%	51.10%
Mitchelsplain	37.10%	62.90%	68.60%	31.40%
Bonteheuwel	21.20%	78.80%	54.50%	45.50%
Philippi	52.80%	47.20%	69.40%	30.60%
Pearson Chi-Square	16.787***		13.618**	
Likelihood Ratio	17.370***		14.094**	
Non-Farmers	45.50%	54.50%	63.60%	36.40%
Urban Farmers	35.70%	64.30%	66.20%	33.80%
Pearson Chi-Square	1.849		0.247	
Likelihood Ratio	1.831		0.239	
Total	38.60%	61.40%	65.50%	34.50%

∗Significant at the 10% level; ∗∗significant at the 5% level; ∗∗∗significant at the 1% level. Values in parenthesis are standard deviation

Although 52.8% of Philippi households earn above US$ 2 per capita per day, 30.6% of them earn below US$ 1.25 per capita per day. 45.4% of Bonteheuwel households and 51.1% of Kraaifontein households earn less than US$ 1.25 per capita per day. This

shows that households in the Kraaifontein and Bonteheuwel areas are in a very bad situation concerning income (Table 4-7). 45.5% of non-farmers earn more than US$ 2 per capita per day, while this is the case for only 35.7% of urban farmers. The values are more or less the same for the US$ 1.25 level for non- and urban farmers. There are significant differences for both the US$ 1.25 and US$ 2 levels between informal settlement areas, but no significant difference could be found for farm type.

When comparing the food poverty scales with the HFIAS (Table 4-8) significant differences can be observed for both the US$ 1.25 and US$ 2 levels. It can be observed that only 57.9% of households earning more than US$ 2 per capita per day are food secure according to the HFIAS, while 40.4% earning less than US$ 1.25 are food insecure.

Table 4-8 A comparison of the per capita income per day in US$ with HFIAS scale

|	More than US$ 2 per day	Less than US$ 2 per day	More than US$ 1,25 per day	Less than US$ 1,25 per day
Food secure	57.90%	42.10%	84.20%	15.80%
Moderately food insecure	53.30%	46.70%	86.70%	13.30%
Severely food insecure	33.90%	66.10%	59.60%	40.40%
Pearson Chi-Square	7.311**		11.475***	
Likelihood Ratio	7.154**		12.836***	
Total	**38.6 0%**	**61.40%**	**65.50%**	**34.50%**

∗Significant at the 10% level; ∗∗significant at the 5% level; ∗∗∗significant at the 1% level. Values in parenthesis are standard deviation

4.7.5   Food Consumption as a Share of Household Expenditure

Income and expenditure surveys may serve as a measure for FS. Some literature[409] stated that food consumption, as a part of household spending, is a direct outcome indicator of FS. According to D'Haese *et al.* (2016)[410] it is thus important to calculate the monetary value of the amount of food purchased i.e. how much food is consumed coming

409 (Leroy *et al.* 2001)   410 (D'Haese *et al.*, 2016)

from own production and amount of food received as donation or gift. Even though expenditure patterns of households may also give info regarding the quantities of different foods purchased per household member, and the contribution to total energy, the information do not indicate FS over time, or whether it has been disposed of in some or other way. Thus, not sufficient information regarding food intake is observed.

Table 4-9 shows that households from Gugulethu spent the most money on food consumed (R478.54) per month, while households from Khayelitsha, Kraaifontein and Bonteheuwel spent less than R300 on food consumed per month. Khayelitsha also spent the lowest share of household expenditure (43%) on food consumed. Kraaifontein spend 57% and Philippi 62% of household expenditure on food consumed per month. There are significant differences between areas for both the value spent on food consumed per month as well as the share of household expenditure spent on food. On the other hand, non-farming households spent R286.35 per month, while farming households spent R359.35 on food consumed.

Table 4-9 The value of food consumed and a share of expenditure for households

Area %	N	Value-Consumed (ZAR)	Share
Guguletu	33	478.54 (70.71)	0.51 (0.17)
Khayelitsha	38	271.01 (24.19)	0.43 (0.19)
Kraaifontein	45	290.95 (55.53)	0.57 (0.22)
Mitchelsplain	35	416.97 (63.94)	0.50 (0.19)
Bonteheuwel	33	280.59 (46.11)	0.51 (0.24)
Philippi	36	316.16 (24.96)	0.62 (0.23)
F Statistic		2.69**	3.69***
Farming status %			
No Farming	64	286.35 (196.14)	0.47 (0.21)
Farming	156	359.50 (349.29)	0.51 (0.21)
T Statistic		0.071	0.646
Total	**220**	**338.26**	**0.52**

*Significant at the 10% level; **significant at the 5% level; ***significant at the 1% level. Values in parenthesis are standard deviation

Although non-farming households spend about R70.00 per month less on food consumed than farming households, there is no significant difference between the two. This is also

the case for the share of household expenditure spent on food by non- farming (47%) and farming households (51%).

4.7.6   Intra Household Food Distribution

When the respondents were asked when there is not enough food for every member of the household, which members will get less to eat than necessary to fulfil their needs, it was clear that female and male adults will get less to eat. As seen in Table 4-10, 47.7% of female adults and 41.4% of male adults are most likely to receive less food. It was mentioned that in some households 3.2% of children under five years of age and 9.9% of children over the age of five years old are more likely to receive less food when there is not enough to eat. In a study on a rural area by De Cock *et al.* (2013)[411] similar values were reported for when food shortages arise where 48% of female adults would eat less, while children under 5 years would mostly have enough food to eat.

Table 4-10 If there is not enough food for every member of the household, which members will get less to eat than necessary to fulfil their needs in the Cape Town Metropole?

	Yes	
	N	**%**
Children younger than 5 years	7	3,2
Children older than 5 years	22	9,9
Female adults older than 18 years	106	48.2
Male adults older than 18 years	91	41,4

Respondents in the surveyed informal settlement areas of the Cape Town Metropole reported that 51% of adults and 85.7% of children had three or more meals the day previous to the survey. 39.4% of adults had only two meals, while 10% of them only had one meal the day prior to the survey. In the Limpopo province, De Cock *et al.* (2013)[412] found that most adults ate on average two or three times a day, with 54.6 % of the household having two meals and 35.4 % having 3 meals a day. As seen in

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411 (De Cock *et al.*, 2013)   412 (De Cock *et al.*, 2013)

Table 4-11, 24% of children had four meals and 11% of them had two meals the day prior to the survey. Only 3.3% of them had one meal only.

Table 4-11 The frequency of the amount of times adults and children ate the previous day in the Cape Town Metropole

	Adults		Children (3-6y)	
Frequency	N	Valid %	N	Valid %
1	22	10	3	3.3
2	85	38.6	10	11
3	106	48.2	52	57.1
4	5	2,3	22	24.2
5	1	0,5	4	4.4

When a comparison is made between the numbers of meals ate the previous day and the level of FS (HFIAS) for adults in the Cape Town Metropole there are no significant differences between the groups. The food secure group of adults had on average 2.6 meals the previous day, while those moderately and severely food insecure had 2.4 and 2.4 meals on average respectively (Table 4-12).

Table 4-12 A comparison between the number of meals ate the previous day and the level of food security for adults in the Cape Town Metropole

	N	Mean
Food secure	19	2.63 (0.60)
Moderately food insecure	29	2.38 (0.78)
Severely food insecure	171	2.43 (0.73)
Total	219	2.44 (0.72)
F Statistic		0.774

∗Significant at the 10% level; ∗∗significant at the 5% level; ∗∗∗significant at the 1% level. Values in parenthesis are standard deviation

Table 4-13 shows the comparison between the numbers of meals ate by children the day prior to the survey and the level of FS in the Cape Town Metropole. There are no significant differences between the groups. The food secure group of children had on average 5.16 meals the previous day, while those severely food insecure had 4.7 meals.

Table 4-13 A comparison between the number of meals ate the previous day and the level of food security for children in the Cape Town Metropole

	N	Mean
Food secure	19	5.16 (1.34)
Moderately food insecure	29	5.03 (1.45)
Severely food insecure	171	4.74 (1.52)
Total	219	4.82 (1.50)
F Statistic		1.009

∗Significant at the 10% level; ∗∗significant at the 5% level; ∗∗∗significant at the 1% level. Values in parenthesis are standard deviation

4.8   Discussion and Conclusions

The HFIAS scale showed that 77.7% of households in the informal settlements area in the Cape Town Metropole experience severe food insecurity, while only 8.6% are food secure. Guguletu households reported the lowest mean score on the HFIAS scale (10.1) and the highest food insecurity levels of 16.1 and 15.9 were measured for Bonteheuwel and Kraaifontein respectively. There are significant differences between the areas in terms of the level of FS, but no significant difference in FS between farming and non-farming households.

A value of 10.4 (2.94) were measured on the HDDS scale for the Cape Town Metropole. The areas showing the highest diet diversity were Mitchelsplain (11.7) and Gugulethu (11.3), while the measure for Bonteheuwel was very low at 8.97. This is an indication that households in the Bonteheuwel area experience higher levels of food insecurity and a much lower diversity in their diet. There are significant differences between the HDDS of the different areas, but none between farming and non-farming households. It thus can be concluded that Urban Agriculture (UA) does not make a significant contribution on either access or diet diversity.

It was noted that farming households consume more roots and tubers, vitamin A fruit and vegetables, other vegetables and maize than non-farming households. This might be due to the fact that farming households produce some of the above mentioned food

groups. Non-farming households, on the other hand, consume more meat, pork, mutton, lamb and goat, and much more poultry than farming households.

The average total expenditure per month per household on food is R338.26. An average of R177.49 per month is spent on other cereals, which includes bread, followed by R176.84 spent on poultry and R134.37 spent on maize products.

Households in the informal settlement areas of the Cape Town Metropole experienced almost 4,5 hungry months during the previous 12 months. In 13.1% of the households, hunger was experienced by someone in the household at least for once a month during the past year.

It is noteworthy that households are especially affected by hunger during June and July, and in November and December. This might be due to the long school holidays when school feeding schemes are inactive and households have to provide for food for children.

79.1% of households reported an income of more than US$ 1.25 per capita per day, while 20.9% of the households are below this critical point. Only 51.4% of the respondents earn above the US$ 2 per capita per day level, with the rest below this amount.

Gugulethu households spend the most on food per month (R478.54), while Khayelitsha, Kraaifontein and Bonteheuwel spend less than R300.00. Khayelitsha also spend the lowest share of household expenditure (43%) on food. Kraaifontein spend 57% and Philippi 62% on household expenditure on food per month.

When food shortages arise, female and male adults are most likely to receive less food.

To conclude, when looking at the different dimensions of FS, the following levels in FS in the informal settlement areas of the Cape Town Metropole can be observed:

- Access:
  - The **Household Food Insecurity and Access Scale** shows that 77.7% of households are severely food insecure,
  - With regards to the **food poverty lines**, just over 50% earn more than US$ 2 per capita per day, while 20.9% of the households are below the critical point of US$ 1.25 per capita per day, and

- On average, the average **total household expenditure** on food is R338.26, an average of 52.5% of household expenditure is spent on food (**share of expenditure spent**);

- Availability:
  - The **Hunger Index** shows that 4.3 months of the year in all households and in 13.1% of the households, at least for once a month during the past year, someone had to go hungry;

- Utilisation:
  - 10.4 out of 18 on the **Household Diet Diversity Score** was measured for the different food groups/categories consumed, and
  - 47.7% and 41.4% of female and male adults respectively are most likely to receive less food when shortage occurs. Children to a much lesser extent. **(Intra household food distribution);** and

- Sustainability:
  - The ability to have sufficient access to food at all times is contained in a mix of the above measurements.

The levels in food insecurity in the informal settlement areas of the Cape Town Metropole are very high as measured in all FS dimensions.

Significant differences can be seen for all FS indicators between areas. Households in the Bonteheuwel and Kraaifontein areas are severely food insecure as measured by the HFIAS scale, while Gugulethu and Khayelitsha has the lowest appearance measured according to this scale. Bonteheuwel, Kraaifontein and Philippi has the lowest HDDS, while Gugulethu, Mitchelsplein and Khayelitsha have the highest HDDS. With regards to Months of Adequate Household Provisioning Indicator (MAHFP), Bonteheuwel and Kraaifontein have the lowest values, proving to be more food insecure, while Gugulethu and Khayelitsha have the highest values. The same result can be seen with food poverty measures.

According to the results obtained, the stated hypothesis is not true since there is no significant difference in the level of food insecurity between urban farming households and non-farming households. Both of these groups tend to be severely food insecure.

4.9   Recommendations

Due to the many dimensions of FS, it is important to consider all of these when doing an analysis of the level of FS of a specific population. The questionnaire used in this study may be a suitable method of measuring the level of FS.

CHAPTER 5

AN ANALYSIS OF THE INDICATORS AFFECTING URBAN HOUSEHOLD FOOD INSECURITY

5.1 Abstract

Households in the informal settlement areas of the Cape Town Metropole face different challenges in terms of poverty and food security (FS). Challenges are determined by the social and economic circumstances these households subside in. A thorough analysis of these indicators is imperative to initiate development planning. 26.1% of household heads completed school, while 33.8% did not reach secondary school (grade 7) with 4.5% with no schooling the education levels. The average household size is 4.29 persons in the study area. The average age of household head was 48 and 50.64 years for non-farmer group and urban farming households respectively. The average monthly income per household was R3543.22. The main source of income generated throughout the year derive from formal salaries or wages (46.4%), while child support grants and pension funds also contribute to income. Expenditure factors accounts for 20.4% of the variance of factors affecting FS. The expenditure component is comprised by the share of food expenditure on income, the total value of food consumed and the household diet diversity score. The socio-economic indicators component forms the second largest component group (15.15%), while the components with a lesser effect include a food security component, an urban farming component and a geographical and market component.

Key words: Urban Agriculture, household gardens, community gardens, food security, household size, age, gender, education level, migrant workers, household income.

5.2 Introduction

With countries recognising the level of food insecurity, platforms were established to progress towards an international state of adequate food availability, access, utilisation and stability. Accordingly, South Africa agreed to the vision statement of the Integrated Food Security Strategy (IFSS), which is *"to attain universal physical, social and economic*

access to sufficient, safe and nutritious food by all South Africans at all times to meet their dietary and food preferences for an active and healthy life".[413]

The Food and Agriculture Organisation (FAO) *et al.* (2015)[414] defined FS where a situation exists where all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.

Development programs aiming to alleviate food insecurity and reduce poverty need methods to identify and target those households most affected. It is however, challenging to develop a perfect method of measurement due to the multi-dimensional nature of FS. Subsequently, policy making and development programs are dependent on standardised indicators in order to improve the accuracy on measurement and evaluation of FS.

The multiple factors that influence the access to food are not well understood, with this more evident at household level.[415] Measurements that are inaccurate and not precise may limit the usefulness of indicators. Certain validation criteria must be met in order to monitor the impact of policy implications on FS. Within this framework the factors or indicators affecting FS will be analysed in this chapter.

5.3 Objectives

To determine the factors that affect urban household food insecurity of households in the informal settlement areas of the Cape Town Metropole.

5.4 Hypothesis

The most important factor influencing household FS, in both urban farming and non-farming households, is the level of income per capita in a household.

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413 (NDA, 2002)

414 (FAO *et al.*, 2015)

415 (Abu and Soom, 2016)

5.5   Methodology

5.5.1   Study Area and Data Collection

The study was conducted in the informal settlement areas that form part of the Cape Town Metropole of the Western Cape in South Africa. Households in the study area included a combination of community and household farmers involved in project gardens funded by the Department of Agriculture in the Western Cape. Farmers included both those owning house gardens and those involved in community gardens. Randomly selected non-farming households of the same area thus served as the control group.

The informal settlement areas in the Cape Town Metropole selected to conduct the surveys in were:

- Guguletu;
- Khayelitsha;
- Kraaifontein;
- Mitchelsplain;
- Bonteheuwel; and
- Philippi.

These areas are known to house some of the poorer community in the Cape Town Metropole.

Quantitative and qualitative data were collected by using questionnaires that included questions constructed to include various social characteristics of the household, the FS situation based on different FS indicators, household income and expenditure, household food production, access to water and to markets and access to governmental support programs. It thus contributed to an in-depth comprehension of the social and economic aspects of FS at household level and the identification of the factors influencing FS at household level by including the four major FS components i.e. food availability, food accessibility, food utilisation and food system stability.

A total of 223 surveys were completed and three were eliminated due to outlying values, leaving 220 households that were analysed.

5.5.2 Data Analysis

Statistical analysis of experimental data Statistical treatment of data was carried out with the SPSS (Statistical Package for Social Sciences) 24.0 software to determine the level of FS in the Cape Town Metropole. Pearson's correlation coefficient (r) was computed between different food insecurity levels in order to determine the extent to which values of both parameters are correlated. Tukey-Kramer method was the multiple comparisons procedure used for the simultaneous estimation of pairwise differences of means in one-way Analysis of Variance (ANOVA).

Principal factor analysis (PFA) was performed to measure the significance of different factors affecting FS. The purpose of this multivariate statistical technique is used to reduce correlated data into a few uncorrelated components or factors explaining the maximum variance.[416] As explained by Reimann *et al.*, (2002)[417] the principal factors (PFs) were calculated based on a correlation matrix. In this study, the Kaiser normalisation, a varimax orthogonal rotation, was used as the rotation method.

It is specified as:

$P_1 = a_{11}x_1 + a_{12}x_2 + {***} + a_{1n}x_n$

$P_2 = a_{21}x_1 + a_{22}x_2 + {***} + a_{2n}x_n$

$P_3 = a_{31}x_1 + a_{32}x_2 + {***} + a_{3n}x_n$

$P_n = a_{n1}x_1 + a_{n2}x_2 + {***} + a_{nn}x_n$

Where;

$P_{1p2}\ P_n$ = observed variable/factors constraining FS

$A_1\ a_n$ = factor loading correlation coefficients

$X_1x_2\ X_n$ = unobserved underlying factors constraining the study selected factors

416 (Vialle *et al.*, 2011)　　　　417 (Reimann *et al.*, 2002)

5.6 Results

5.6.1 Household Demographic Characteristics

Table 5-1 shows a summary of the household characteristics of the informal settlements in the Cape Town Metropolitan Area.

Table 5-1 Household characteristics of the informal settlements in the Cape Town Metropolitan area

	N	Mean
Household size	220	4.32 (2.11)
Age household head (years)	220	49.84 (14.16)
Male household head	99	
Female household head	121	
Highest education or qualification	220	3.9 (1.35)
Household migration (persons)	53	1.94 (1.22)
Total household migration (months)	220	0.905 (2.31)
Average household migration (months	220	0.528 (1.58)
Household members live away	15	0.027 (0.18)
Active adult / household members	220	3.04 (1.63)
Ratio active adult / household members	220	0.744 (0.23)
Dependency ratio	220	0.388 (0.32)
Average years living in the area	220	20.68 (14.80)

5.6.1.1 Household Size

The average household size for the surveyed households in the informal settlement areas of the Cape Town Metropolitan area consisted of an average of 4.3 members per household (

Table 5-1), while in the whole Cape Town Metropole it was reported to be 3.5 members per household[418] by the Cape Town Government in 2011 and 3.3 by Statistics South Africa (STATSSA) (2013).[419] In comparison, the average household size reported by D'Haese, *et al.* (2013a)[420] in the Ekurhuleni district of the Gauteng province consist of

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418 (Western Cape Government, 2012)
419 (Statistics South Africa, 2013)

420 (D'Haese *et al.*, 2013a)

5.66 members on average, while Frayne, *et al.* (2009)[421] reported the average household size for Cape Town to be 3.9 and for Johannesburg to be 3.8. On average, a household in rural areas of Limpopo is composed of 6.5 household members.[422] The biggest household consist of 12 members and 17 households mentioned that they only consist of a single member.

When comparing average household size between urban farmers and households not involved in farming, the average households consist of 4.17 and 4.56 members respectively.   There is no significant difference between urban farming households with households not involved in farming.   There are however significant differences in household size between areas. Khayelitsha has the highest average household size with 5.3 members per household, while Philippi and Guguletu the lowest average household size with 3.4 and 3.6 respectively. This can be seen in Table 5-2. It was found that female headed households have a higher average household size (4.4) than male headed households (4.2) in the study area.

Table 5-2 Total household size

Area	N	Mean
Guguletu	33	3.63 (1.56)
Khayelitsha	38	5.29 (2.48)
Kraaifontein	45	4.47 (1.78)
Mitchelsplain	35	4.46 (2.24)
Bonteheuwel	33	4.52 (2.41)
Philippi	36	3.39 (1.48)
F Statistic		4.179***
Farmers	154	4.19 (2.05)
Non Farmers	66	4.61 (2.19)
T Statistic		1.356
Total	**220**	**4.32 (2.10)**

∗Significant at the 10% level; ∗∗significant at the 5% level; ∗∗∗significant at the 1% level. Values in parenthesis are standard deviation

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421 (Bruce Frayne *et al.*, 2009)   422 (De Cock *et al.*, 2013)

5.6.1.2   Average Age of Household Head

As seen in

Table 5-1, the average age of household heads in the informal settlement areas of the Cape Town Metropole was 49.8. This corresponds with a study done in Gauteng [423] with an average age of the household head to be 47 years old; and is lower than household heads in Limpopo.[424]   Battersby (2011)[425] reported average age of the head of the household to be 52 and 46 years respectively for Philippi and Khayelitsha.

With regards to the average age of household head, the non-farmer group had an average age of 48, while people involved in urban farming were on average 50.6 years old at the time of the survey. Gugulethu had the lowest average age (46.21), while Mitchelsplain the highest (52.91 years) (

Table 5-1).   There are no significant differences between areas or households not involved in agriculture and those involved in agriculture in terms of the average age of the household head.

The survey showed that 100 (45%) of the household heads were male with an average age of 48.7 years, while 122 (55%) of the surveyed household heads were women with an average age of 50.7 years. There is no significant difference between the ages of male and female household heads. The average age of female headed households in the Cape Town Metropole were 50.7 years and males were on average 48.7 years old.

5.6.1.3   Education Level of Household Head

With regards to education, seven levels were identified:

- 01 = no schooling;
- 02 = Junior primary (Grade 0 through to Grade 4 / Standard 2);
- 03 = Senior primary (Grade 5 / Standard 3 to Grade 7 / Standard 5);
- 04 = Some Secondary (Grade 8 / Standard 6 to Grade 11 / Standard 9);
- 05 = Completed high school (Grade 12 / Standard 10 / Form 5 / Matric);
- 06 = Courses or certificates for formal training; and

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423 (D'Haese *et al.*, 2013a)   425 (Battersby, 2011)
424 (De Cock *et al.*, 2013)

- 07 = Diploma or degree.

The average education level of the household heads interviewed were below grade eight. Thus, most of the household heads (40.1%) only reached lower secondary grades (grade 8 to grade 11). As seen in Figure 5-1, only 26.1% of household heads completed school, whereof 16.4% of the completed school (matric), 5% did some courses or certificates for formal training and 3.6% attained diploma or degree. 33.8% did not reach secondary school (grade 7) with 4.5% with no schooling. The educational level of the surveyed area are much lower than the 1.8% of no schooling, 16.6% higher education and 29.8% that reached matric in the whole of the Cape Town Metropole reported by Statistics South Africa (STATSSA) (2013).[426] There is no difference between the average level of education of household heads.
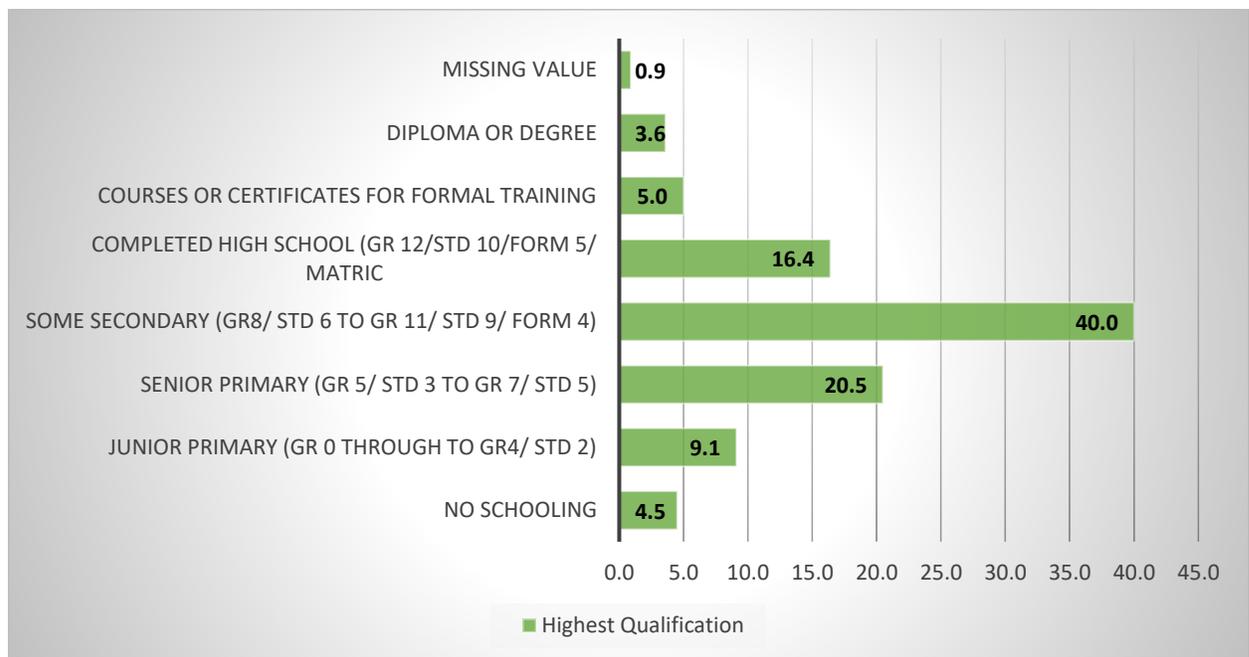
Figure 5-1 Highest level of qualification of household heads

A study done in Langa showed 63% of household heads involved in UA received some secondary education and similarly, 7% completed school, 5% completed college and

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426 (Statistics South Africa, 2013)

another 2% completed university.[427] In the rural areas of Limpopo it was reported that 8.3% of household heads completed school and 17.9% had secondary income.[428]

When looking at the highest level of education by household head in the different areas, Kraaifontein household heads could only reach senior primary level or grade 7 on average, while all the other areas had an average education level up to some secondary level or grade 11. There was no difference between qualification level between males and females.

5.6.1.4   Migration

76% of household members in the Cape Town Metropole reported no migration, 7.2% (16) reported a total of 1-month migration, 3.6% (8) reported a total of 2 month's migration, 4.1% (9) reported migration for a total of three months, 2.3% (5) reported migration for a total of four months and the remaining 7% (15) reported a total of 5 or months migration.

The reasons provided for being absent were mostly to visit a spouse or family. Other reasons provided were to go on vacation, schooling, personal reasons, employment elsewhere or living with another partner.

Only seven households (3.2%) of all questioned reported that migrants contribute to the household financially, while three of these contribute every few months, and four of the seven are reported to contribute every month. It was reported that the average contribution by migrating household members is R3114.29.

There is no significant difference between the number of members migrating from the non-agriculture group and the urban farmers group. Gugulethu households reported the highest incidence of members migrating (2.44 members per year), while Philippi reported the lowest incidence of migrants (1.33 members per year) with a maximum of two members away from the primary residence. There are no significant differences between the informal settlement areas of the Cape Town Metropole.

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427 (Philander, 2015)   428 (De Cock *et al.*, 2013)

5.6.1.5 Dependency Ratios

It is important to calculate dependency ratios as this calculation serves as an indication to determine the extent to which the household members are dependent on the other working members providing an income for the household.

5.6.1.5.1 Activity Ratio

The number of active persons (activity ratio) (people between 18 and 65 years old) were divided by the total household size. This ratio for the Cape Town Metropole was 0.74 (

Table 5-1). This provides an interdependency ratio that depicts the ability for a household to earn an income to support the rest of the household members. An activity ratio higher than 0.5 indicates that the number of the active people in the household is larger than the non-active members (including members below the age of 18 and above the age of 65), making it possible for them to be employed.

In Table 5-3 the activity ratios per informal settlement area can be seen.   The highest average activity ratio is experienced in Mitchellsplain (0.77) and the lowest in Gugulethu (0.69), with all the other areas in between. Hence there are no significant differences between the areas. This is slightly lower than reported by De Cock (2012)[429] in the rural areas of Limpopo.

Table 5-3 Activity ratios per informal settlement area and farm type of the Cape Town Metropole

	N	Mean (Std Dev)
Guguletu	33	0.69 (0.24)
Khayelitsha	38	0.70 (0.23)
Kraaifontein	45	0.74 (0.24)
Mitchelsplain	34	0.77 (0.21)
Bonteheuwel	35	0.75 (0.26)
Philippi	34	0.76 (0.21)
F Statistic		1.811
Farmers		0.73 (0.24)
Non Farmers		0.75 (0.20)
T Statistic		0.69
Total	220	0.74 (0.23)

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429 (De Cock, 2012)

*Significant at the 10% level; **significant at the 5% level; ***significant at the 1% level. Values in parenthesis are standard deviation

It is interesting to note that all areas have an activity ratio higher than 0.5, which indicates that the number of the active people in every household is larger than the non-active members (including members below the age of 18 and above the age of 65). The areas with higher activity ratios will most probably have a greater advantage if new working opportunities emerge.

When looking at the number of active adults in a household, the non-farmer group vs urban farmer group reported 0.75 and 0.73 active adults in the households respectively. There was also no significant difference between the number of active adults between non-farming and farming households as well as between the areas.

5.6.1.5.2 Dependency Ratio

The dependency ratio of 0.39 is calculated upon members contributing to the household income over the total household members. This threshold of lower than 0.5 indicates that there are fewer people working towards an income than members of the household that are unemployed. Values that are closer to 0.3 indicate that the financial responsibility on the household members earning income are very high, since they have to support a higher number of family members.

Table 5-4 demonstrates the Average number of persons receiving an income per household size.

Table 5-4 Average number of persons receiving an income per household size

	N	Mean (Std Dev)
Guguletu	33	0.51 (0.36)
Khayelitsha	38	0.42 (0.26)
Kraaifontein	45	0.34 (0.28)
Mitchelsplain	35	0.37 (0.35)
Bonteheuwel	33	0.29 (0.31)
Philippi	36	0.41 (0.32)
F Statistic		9.33***
Farmers	134	0.40 (0.32)
Non Farmers	66	0.36 (0.40)
T Statistic		-0.742
Total	220	0.39 (0.32)

The number of persons earning an income per household size are 0.36 and 0.40 for non-farmers, urban farmers respectively. These values do not differ significantly. However, significant differences for the number of persons receiving an income per household size can be seen between areas. The value for Gugulethu is 0.51, which is above the threshold of 0.5, indicating that there are fewer household members earning an income than members of the household that do not earn an income. For Khayelitsha, Philippi, Mitchelsplain and Kraaifontein this ratio was calculated to be 0.42, 0.41, 0.37 and 0.34 respectively. Only Bonteheuwel had a value of 0.294, which is lower than 0.3. Values below 0.3 indicates that there is a high responsibility on the household members that receive an income, as they have to support a high number of other family members.

5.6.1.6   Period Living in the Area

From the information collected, it can be seen that the majority of households have been living in the respective informal settlement areas of the Cape Town Metropole for an average of about 20 years. It was reported that the household heads lived on average 14.4 years in Kraaifontein, which are the shortest time and for an average of 29.5 years in Bonteheuwel, which is the longest time. This can be seen in Table 5-5. Long periods of residence are often proof of stability due to good public policies. On average, urban farmers resided longer (21.6 years) than non-farmers (18.2 years) in the same area.

Table 5-5 Number of years household head resided in informal settlement areas of the Cape Town Metropole

	N	Mean (Std Dev)
Guguletu	33	17.80 (18.64)
Khayelitsha	38	22.05 (13.36)
Kraaifontein	45	14.36 (9.14)
Mitchelsplain	35	22.15 (13.69)
Bonteheuwel	33	29.54 (15.16)
Philippi	36	19.74 (14.94)
F Statistic		17***
Farmers	134	21.57 (16.06)
Non Farmers	66	18.21 (11.18)
T Statistic		-1.543

Total	220	20.55 (14.81)

*Significant at the 10% level; **significant at the 5% level; ***significant at the 1% level. Values in parenthesis are standard deviation

5.6.1.7   Gender

The households surveyed consisted of 99 male headed and 121 female headed households. This is consistent with reports by Frayne *et al.* (2010).[430]

In Bonteheuwel, Mitchelsplain and Kraaifontein, more than 60% of households are female headed, Philippi and Guglethu have about 3% more female than male head households, while Kayelitsha is the only household with more male than female headed households. This can be seen in Figure 5-2.
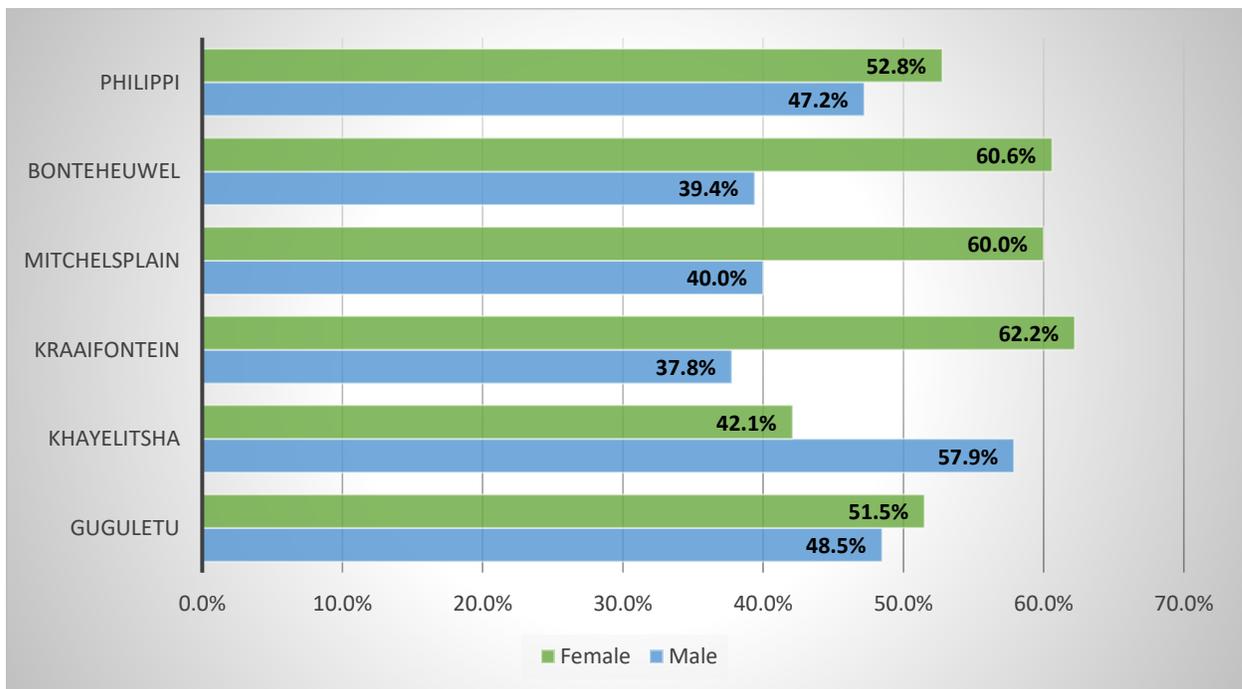
Figure 5-2 Percentage of male and female household heads in the different informal settlement areas of the Cape Town Metropole

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430 (Frayne *et al.*, 2014)

There is no significant difference between the levels of education between male and female headed households.

5.6.1.8 Ethnical group

The majority of the households surveyed belonged to the African ethnical group (83.3%). 15.3%, 0.9% and 0.5% were of Coloured, Indian and White ethnicity respectively. All the informal settlement areas, except Bonteheuwel, which had predominantly Coloured households (80%), consisted of mostly African households.

5.6.1.9 Household Demographics Food Security Indicators

Although there are no significant differences between groups, household size does not have an effect on FS on the surveyed households in the Cape Town Metropole. The average household size for mildly food insecure households are 5.3 and that for severely food insecure households 4.2 and 4.5 for food secure households. According to Charlton and Rose (2002)[431] high food poverty rates were found with an increase in household size.

Table 5-6 HFIAS category in relation to household characteristics (One-Way Anova and Chi-square tests)

	Food secure	Moderately food insecure	Severely food insecure	
N	**19**	**30**	**171**	
Demographic characteristics				Statistic
Age of household head	55.42(13.78)	50.20(15.43)	49.14(13.20)	0.187
Gender of household head: Female	47.37	66.67	53.80	2.19
Working status of household head	57.89	60.00	54.39	0.38
Household size	4.2(2.35)	4.5(1.43)	5.3(2.17)	0.522
Activity ratio	0.50(0.28)	0.56(0.32)	0.63(0.32)	0.153
Dependency ratio	0.50(0.28)	0.44(0.32)	0.37(0.32)	0.153
Years of living in the area	21.94(13.18)	18.43(11.13)	19.20(13.26)	0.655

*Significant at the 10% level; **significant at the 5% level; ***significant at the 1% level. Values in parenthesis are standard deviation. For continues variables, mean and standard deviation are reported from One-Way ANOVA, Chi-

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431 (Charlton and Rose, 2002)

square is reported for categorical variables in %. Within a row, values inflated with same superscript letter are statistically different.

There are no significant differences between the level of FS in a household and the number of active adults in a household in the surveyed informal settlement areas of the Cape Town Metropole. There is a tendency for households with more active adults to be more food secure and vice versa. The reason for this might be that there are more adults that may contribute to the total household income.

Households that are food secure and mildly food insecure have two or more income earners on average in a household, while the households that experience moderate to severe food insecurity has fewer than 1.4 income earners on average in the household.

5.6.2   Household Livelihood Characteristics

5.6.2.1   Total Household Income

94.5% of respondents divulged income information. The rest might have considered information as confidential and thus did not share this information. The mean average total household income of the 209 respondent providing income information reported an average income of R3543.22 per month. This is higher than the average household income reported for the Limpopo area (R2953 per month), although this amount might be higher since the Limpopo study was already done in 2013.[432] The minimum amount of total household income per month was reported to be R200 and the maximum R35000. The frequency of the different levels of total household income per month in the Cape Town Metropole can be seen in Table 5-7. 20% of households within the Cape Town metropole have a total income of R1001 to R1500; 14.4% have a total income of R1501-R2000, 17.2% have a total income of R2001 – R3000 and 17.2% have a total income of R3001 to R4000. Thus 68.9% of all households have a total income of R1001 to R5000 per month.

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432 (De Cock *et al.*, 2013)

Table 5-7 Frequency of different levels of total household income per month

	Guguletu	Khayelitsha	Kraaifontein	Mitchelsplain	Bonteheuwel	Philippi
R1- R500	0,0%	2,9%	2,3%	3,0%	9,4%	11,8%
R501- R750	3,1%	2,9%	4,5%	3,0%	0,0%	11,8%
R751- R1000	9,4%	0,0%	4,5%	0,0%	9,4%	0,0%
R1001- R1500	12,5%	11,8%	31,8%	24,2%	21,9%	14,7%
R1501- 2000	9,4%	17,6%	15,9%	12,1%	18,8%	11,8%
2001- 3000	21,9%	11,8%	15,9%	27,3%	21,9%	5,9%
3001- 5000	12,5%	17,6%	18,2%	12,1%	12,5%	29,4%
5001- 7500	12,5%	23,5%	4,5%	6,1%	3,1%	8,8%
7500 -10000	12,5%	8,8%	2,3%	6,1%	0,0%	2,9%
10001-25000	6,3%	2,9%	0,0%	6,1%	0,0%	2,9%

Table 5-8 shows that the average total income per year for households involved in Urban Agriculture (UA) is R41 837.60 and for those not involved in UA is R44 280.00. There is no significant difference between the two groups.

As seen in Table 5-8 Guguletu has the highest average yearly income over all the groups with R69 506.25. A maximum income of R420 000.00 was reported by one household in Guguletu. Kraaifontein and Bonteheuwel were reported to have the lowest annual household income of R28 412.73 and R25 490.32 respectively. There are significant differences between the areas in terms of household income.

Table 5-8 Average yearly household income per informal settlement areas of the Cape Town Metropole

	N	Mean (Std Dev) (ZAR)
Guguletu	32	69506.25 (91902.99)
Khayelitsha	34	50611.76 (34220.85)
Kraaifontein	44	28412.73 (19347.98)
Mitchelsplain	33	48254.55 (63371.51)
Bonteheuwel	31	25490.32 (15950.58)
Philippi	34	37238.82 (30674.39)
F Statistic		3.784***
Farmers	58	41837.60 (50798.16)
Non Farmers	150	44280.00 (50321.80)
T Statistic		0.097
Total	208	42518.65 (50556.19)

∗Significant at the 10% level; ∗∗significant at the 5% level; ∗∗∗significant at the 1% level. Values in parenthesis are standard deviation

5.6.2.2   Source of Income

According to Philander (2015)[433], the growth of UA could provide more job opportunities. He stated that UA may provide income less than R1000, that remain a low source of income, but at least serves as a source of income. The households indicated that their principal sources of income throughout the year come from formal salaries or wages (46.4%), while 13.1% and 11.7% reported that child support grants and pension funds respectively are also main sources of income. Battersby (2011)[434] reported that the main source of income in the informal settlement areas is from wages. The study in Langa, also in the Cape Town Metropole showed that 49% of the respondents receive income from social grants, while 30% receive income from part-time work and only 16% from full-time work.[435] To a lesser extent, as seen Figure 5-2, other forms of social grants (8.6%), and food or crop production (7.7%) also contribute to household income.

433 (Philander, 2015)
434 (Battersby, 2011)
435 (Philander, 2015)
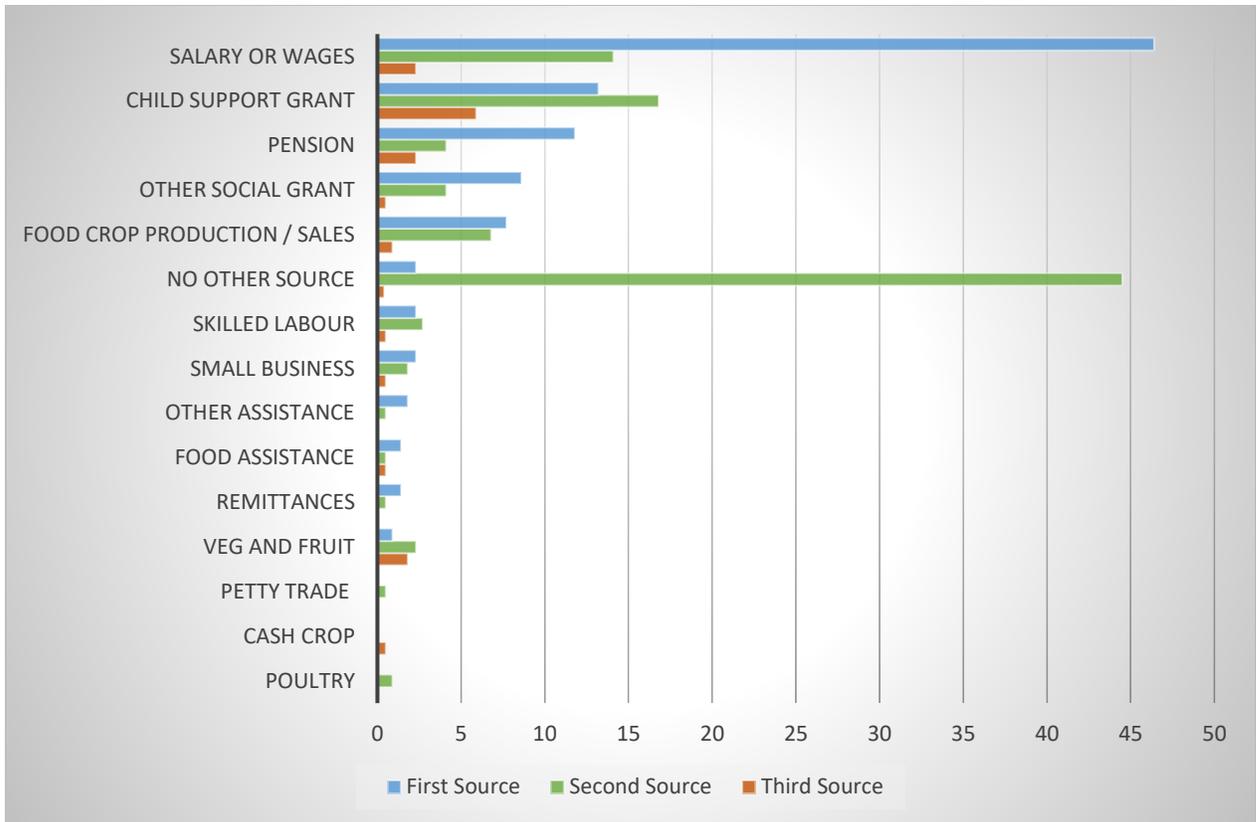
Figure 5-2 Sources of income for the Cape Town Metropole

44.5% of households reported that they had no second source of income. Other sources for a second income include child support or grant (16.8%), formal salary or wages (14.1%) and to a lesser extent, all farming combined activities contributed to 10% of the secondary income source. The Household Survey indicates that 36.5% of the households in the Western Cape receive social grants.[436]

Both Altman, *et al.* (2010)[437] and Frayne, *et al.*, (2009)[438] reported that social grants are the most important contributor to reducing hunger, poverty and food insecurity in poor households. A further 88 households (40%) reported no third income stream, while some sources of a third income stream include child support or grant (5.9%) and the rest of the sources each contributing less than 2.5%.

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436 (Statistics South Africa, 2015)
437 (Altman *et al.*, 2010)

438 (Frayne *et al.*, 2009)

Chitiga-Mabugu *et al.* (2013)[439] reported that at national level the main source of income reported by households include salaries (63%) and grants (45%). At the provincial level, the largest percentage of households that reported salaries as main source of income was from Western Cape (74%) and Gauteng (73%). Limpopo (59%) and Eastern Cape (57%) reported the highest percentages of grant income. These two also have the highest poverty levels in the country.

In the whole study area, it was reported that more than half the time (50.5%), it was the household head that generated the income followed by 14.5% of children only. The spouse and household head contributed 8.2% to the household income. With regards to a second income stream, 18,2% of income generators are the household head, 16.4% are children only and 8.2% are spouse of the head of the household only. Children generate income because they are supported by child support grants.

The head of the household makes decisions regarding resource usage 58.6% of the time. The spouse of the head of the household only makes decisions 14.5% of the time and in 11.8% of the time, the household head and spouse of household head make decisions together. In some instances, the adults (5.0%) and women only (5.9%) makes decisions on how resources are used.

In the event of a second source of income, the main decision makers are the head of the household (28.2%), and 9.5% are the spouse of the household only. Women only (5.5%) and household head and spouse of the household head jointly (5%) makes decisions regarding the second stream of income to a lesser extent.

Income from skilled labour and business was the main source of income for four households in Mitchelsplain (11.4%), two in Kraaifontein (4.4%) and two in Philippi (5.6%) areas, but to a much lesser extent in Guguletu (one household – 3.0%), Khayelitsha (no household – 0.0%) and in one household in Bonteheuwel (3.0%).

As seen in Table 5-9 households from Guguletu (12.1%), Khayelitsha (18.4%) and Kraaifontein (13.3%) reported farm income to be the main source of income. In Mitchelsplain and Philippi only 2.9% and 2.8% of households respectively reported that

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439 (Chitiga-Mabugu *et al.*, 2013)

farm income is the main source of income, while no household in Bonteheuwel reported farm income to be the main source of income. The Pearson Chi-Square test showed significant differences between different informal settlement areas for farm income as main source of income.

Table 5-9 Farm income per informal settlement areas of the Cape Town Metropole

	Guguletu	Khayelitsha	Kraaifontein	Mitchelsplain	Bonteheuwel	Philippi
Not main income source	87,9%	81,6%	86,7%	97,1%	100,0%	97,2%
Main income source	12,1%	18,4%	13,3%	2,9%	0,0%	2,8%

5.6.2.3 Household Livelihood Food Security Indicators

Table 5-10 shows the HFIAS level in relation to some livelihood characteristics. As seen, significant differences can be observed between the level on the HFIAS scale for income less than US$ 1.25 and US$ 2.00 per capita per day. There are significant differences observed for access to formal salary as well as access to grants and gifts. There were also significant differences between the levels of food security with regarding to farm income.

Table 5-10 HFIAS category in relation to household livelihood characteristics (One-Way ANOVA and Chi-square tests)

	Food secure	Moderately food insecure	Severely food insecure	
N	**19**	**30**	**171**	
Livelihoods characteristics				Statistic
Income less than US$ 1.25 (%)	18.75	15.38	40.35	11.48***
Income less than US$ 2.00 (%)	42.10	53.33	68.42	6.89**
Access to formal salary (%)	73.68	66.67	50.29	5.83*
Access to grants and gifts (%)	42.11	53.33	82.46	6.89**
Farming (Yes)	78.95	60.00	70.76	2.20
Main income: Farm income	42.11	53.33	68.42	6.89*
Vegetable Index	3.30(2.31)	3.15(1.68)	3.28(1.52)	.967

*Significant at the 10% level; **significant at the 5% level; ***significant at the 1% level. For continues variables, mean and standard deviation are reported from One-Way ANOVA, Chi-square is reported for categorical variables in %. Within a row, values inflated with same superscript letter are statistically different.

Table 5-11 displays the farming status in relation to the different food security indicators identified to influence FS.   As seen, there is no significant difference between the non-farming and farming households for any of the FS indicators.

Table 5-11 Food security indicators for farming status

Variable		Household farming status	
		Non-farming	Farming
HFIAS[a]		14.05 (6.48)	13.51 (6.83)
	t-stat.	0.538	
HDDS[b]		10.30 (3.15)	10.41 (2.86)
	t-stat.	-0.259	
MAHFP[c]		8.24 (3.35)	7.47 (4.08)
	t–stat.	1.3	
Value Consumed[d]		286.77 (196.14)	359.50 (349.29)
	t-stat.	0.071	
SHARE[e]		0.47 (0.21)	0.51 (0.21)
	t-stat.	0.646	

∗Significant at the 10% level; ∗∗significant at the 5% level; ∗∗∗significant at the 1% level. Values in parenthesis are standard deviation

[a] Household Food Insecurity Access Score, [b] Household Dietary Diversity Score, [c] Months of Adequate Household Provisioning, [d] Value of food calories consumed in South African Rand, [e] Share of food expenditure in total expenditure

There were significant differences between both the food poverty indexes for the US$ 1.25 and US$ 2.00 levels for HFIAS, HDDS, MAHP and the value of food calories consumed in South African Rand, but not for the share of food expenditure in total expenditure (Table 5-12). This was also the case where both farming and formal salaries and wages were reported to be main sources of income.   Where the main source of income was reported to be grants and gifts, it was significant for only HFIAS and value of food calories consumed in South African Rand. Participatory decision-making was not significant for any of the food security indicators.

Table 5-12 Food security indicators for levels of household income

Variable		Household income level		Household income level	
		>US$ 1.25/day	< US$ 1.25/day	> US$ 2 /day	<US$ 2/day
HFIAS[a]		12.13 (6.82)	16.61 (5.45)	11.72 (7.01)	14.93 (6.24)
	t-stat.	5.3***		-3.5***	
HDDS[b]		10.72 (2.60)	9.75 (3.43)	11.02 (2.80)	9.97 (2.97)
	t-stat.	2.2**		2.6***	
MAHFP[c]		8.37 (3.62)	6.45 (4.07)	8.39 (3.93)	7.26 (3.80)
	t–stat.	3.5***		2.1**	
Value Consumed[d]		396.89 (300.84)	223.71 (304.65)	482.70 (338.06)	243.74 (255.14)
	t-stat.	4.0***		5.9***	
SHARE[e]		0.51 (0.21)	0.54 (0.22)	0.52 (.23)	0.53 (0.21)
	t-stat.	-998		-0.278	

∗Significant at the 10% level; ∗∗significant at the 5% level; ∗∗∗significant at the 1% level. Values in parenthesis are standard deviation

[a] Household Food Insecurity Access Score, [b] Household Dietary Diversity Score, [c] Months of Adequate Household Provisioning, [d] Value of food calories consumed in South African Rand, [e] Share of food expenditure in total expenditure

5.6.3 Household Production and Institutional Environment

5.6.3.1 Access to Production Factors

5.6.3.1.1 Land

Households from the Cape Town Metropole reported to primarily use communal land to grow crops (26.8%) and 20.9% utilise their own private land to grow crops, while 5.5% use rented land to grow crops. Communal land is mostly used for grazing (2.3%), but only two respondents reported to have their own land for grazing (Figure 5-3).
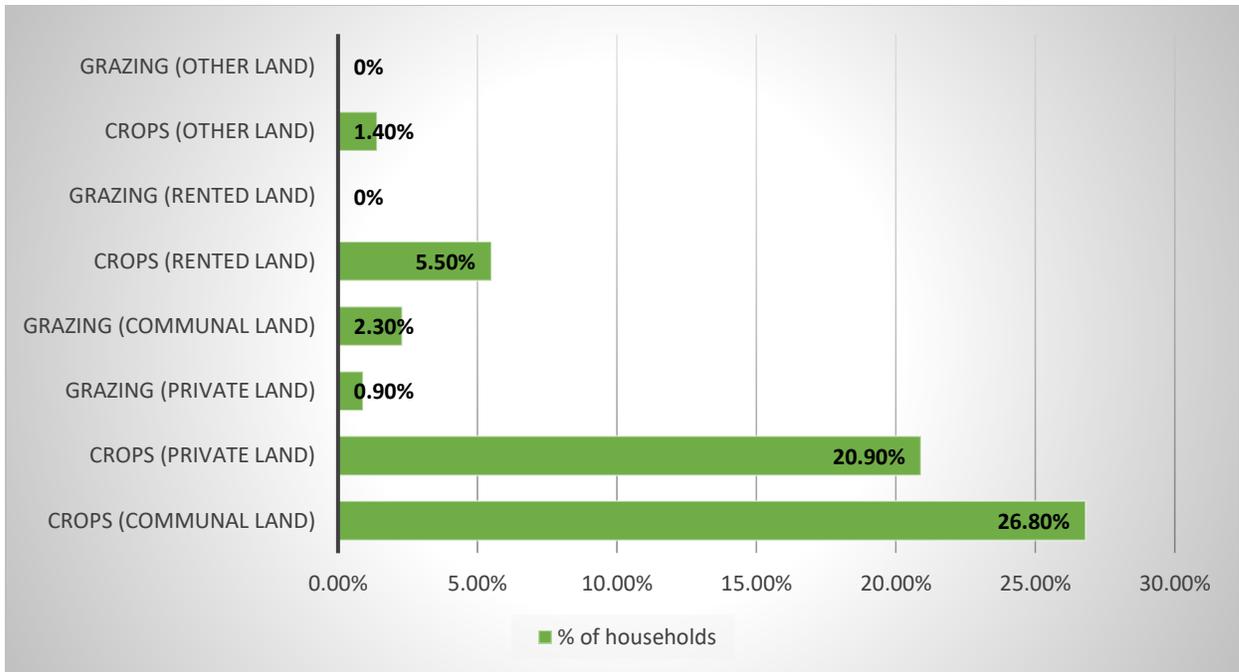
Figure 5-3 Percentage of different types of land utilisation for crop and grazing

The average size of land households has available for food production was 1211.63m^2. Gugulethu households have land for crops with an average size of 3995.6 m^2 and Philippi households have an average size of 1534.89m^2. Bonteheuwel and Khayelitsha households have an average size of 989.5 and 959.4 m^2. Mitchelsplain residents reported 263.2m^2 of land to produce crops, while Kraaifontein households only has 24.9m^2. There is a significant difference between the sizes of land between the informal settlement areas.

As seen in Table 5-13 very little of the available land for crops are privately owned. Only Mitchelsplain households own most of the land available, while Kraaifontein and Philippi households own about 50% of available land. In all the areas, crops are irrigated to some extent. 65.7% of Gugulethu, almost 100% of Khayelitsha and Bonteheuwel, a third of Philippi and Kraaifontein and only 1.5% of Mitchelsplain land available for crop production is irrigated.

There are significant differences between areas in terms of the size of land irrigated. Irrigation takes place usually from boreholes (12.3%), tanks (4.1%), rain (14.1%),

neighbours (5%), hosepipe (3.2%) or tap (3.2%). 40% of household farmers found the lack of water to be a big constraint for crop production.

Table 5-13 Mean average size of land available to produce crops for the surveyed informal settlement areas of the Cape Town Metropole

	N	Total Mean	Private Mean	Rented Mean	Irrigated
Guguletu	33	3995.61	31.61	0.00	2625.61
Khayelitsha	38	959.39	29.87	4.92	954.29
Kraaifontein	45	24.93	12.42	0.91	8.33
Mitchelsplain	35	263.24	261.00	0.11	4.14
Bonteheuwel	33	989.52	2.91	9.70	957.18
Philippi	36	1534.89	499.44	14.39	555.06
F Statistic		2.005	1.365	0.818	2.31**

∗Significant at the 10% level; ∗∗significant at the 5% level; ∗∗∗significant at the 1% level. Values in parenthesis are standard deviation

Table 5-14 shows that there exists significant differences between informal settlement areas of the Cape Town Metropole in terms of their crop indexes.

Table 5-14 Crop index (total crops cultivated)

Area	N	Mean
Guguletu	33	0.88 (1.14)
Khayelitsha	38	0.37 (0.88)
Kraaifontein	45	0.02 (0.15)
Mitchelsplain	35	0.26 (0.56)
Bonteheuwel	33	0.24 (0.66)
Philippi	36	0.17 (0.45)
F Statistic		6.442***
Total	**220**	**0.30 (0.74)**

∗Significant at the 10% level; ∗∗significant at the 5% level; ∗∗∗significant at the 1% level. Values in parenthesis are standard deviation

60% of households in Gugulethu have arable crops, while this is the case with 54.5% of households in Bonteheuwel, 48.6% in Mitchelsplain, 33.3% in Philippi, 31.6% in

Khayelitsha and 13.3% in Kraaifontein (Table 5-15). There are significant differences between the areas.

During the previous year 68.6% of Mitchelsplain and 54.5% of Bonteheuwel households harvested vegetables, while they also harvested the most fruit with 15.2% and 5.7% respectively. Only two households in Khayelitsha had owned cattle in the past year, one owned five cattle and the other household 38. None of the households had owned sheep in the past year, whilst only a single household in Khayelitsha owned goats (62 goats) and one household owned pigs (12 pigs). One household in each of Gugulethu, Khayelitsha, Kraaifontein and Bonteheuwel owned poultry in the past year. The number of poultry owned ranged between five and 24.

Table 5-15 Percentage of crops harvested in informal settlement areas of the Cape Town Metropole

	*Arable Crops Currently (%)	*Harvest vegetables last year (%)	*Harvest fruit last year (%)	Owned Cattle in past year (%)	Owned sheep in past year (%)	Owned sheep in past year (%)	Owned sheep in past year (%)	Owned poultry in past year (%)
Guguletu	60	39.4	3	0	0	0	0	3
Khayelitsha	31.6	31.6	0	5.3	0	2.6	2.6	2.6
Kraaifontein	13.3	28.9	0	0	0	0	0	2.2
Mitchelsplain	48.6	68.6	5.7	0	0	0	0	0
Bonteheuwel	54.5	54.5	15.2	0	0	0	0	3
Philippi	33.3	47.2	0	0	0	0	0	0
Pearson Chi-square	25.076***	17.043***	17.444***	12.729	3.352	6.869	1.875	6.869
Likelihood Ratio	26.736***	17.308***	16.366***	11.271	4.541	6.772	2.231	6.772

∗Significant at the 10% level; ∗∗significant at the 5% level; ∗∗∗significant at the 1% level. Values in parenthesis are standard deviation

## 5.6.3.1.2   Water

Water in all informal settlement areas of the Cape Town Metropole is mostly provided by an internal pipe (51.4%) or a tap in the yard (40.5%). It was also reported that free water from a public tap was used to a lesser extent. Bonteheuwel households primarily used

internal piped irrigation (68%), while Philippi used 50% and Gugulethu, Khayelitsha, Kraaifontein and Mitchelsplain between 42 and 43% internal piped irrigation.

Khayelitsha and Bonteheuwel households irrigates almost all of the land they have available, while Mitchelsplain irrigates almost nothing, and Kraaifontein 33.3% (Table 5-16). There are significant differences for the total mean area irrigated between the studied areas.

Table 5-16 Total mean area of land that is irrigated (m^2) in each informal settlement areas of the Cape Town Metropole and a percentage of the total land available

Area	N	Mean	% of Total
Guguletu	33	2625.61	65.7%
Khayelitsha	38	954.29	99.5%
Kraaifontein	45	8.33	33.3%
Mitchelsplain	35	4.14	0.16%
Bonteheuwel	33	957.18	99.8%
Philippi	36	555.06	36.2%
F Statistic		**2.312****	
Total	**220**	**795.44**	

∗Significant at the 10% level; ∗∗significant at the 5% level; ∗∗∗significant at the 1% level. Values in parenthesis are standard deviation

5.6.3.1.3   Access to Output Markets

Households from all informal settlement areas of the Cape Town Metropole reported that basic food items could be bought from shops that are on average less than a walk of nine minutes away. Markets to buy goods and food are a bit further away, and it would take households between 14 to 22 minutes to get there. In all areas, banks and post offices are on average less than 28 minutes away, whilst the post office in Khayelitsha is on average 34.4 minutes of travel away from households.

5.6.3.1.4   Access to Input Markets

It would take households from the different informal settlement areas of the Cape Town Metropole between 16 and 23 minutes to get to the closest market to sell their goods and food. There are no significant differences in the distance to markets between areas.

5.6.3.2 Challenges Regarding Production

One of the challenges mentioned by households in the informal settlement areas was a lack of experience and that this hampers their production. In Gugulethu the lack of seeds, the lack of fertilizer, the lack of money and presence of pests were the biggest challenges.

For Khayelitsha insufficient funds was their biggest concern, followed by pests. The lack of seeds, the lack of fertilizer and the lack of money were the biggest challenges Kraaifontein households faced.   This were followed by a lack of water and labour. Mitchelsplain reported the lack of seeds, the lack of fertilizer and the lack of money as the biggest challenges, while Bonteheuwel and Philippi identified the lack of money as their biggest challenge concerning production followed by the lack of seeds and the lack of fertilizer. These results can be seen in Table 5-17.

Table 5-17 Production challenges faced by different informal settlement areas of the Cape Town Metropole as a percentage of the total

	Lack of Seeds	Lack of Fertilizer	Lack of Water	Lack of Labour	Pests	Rented Out	Too old/young /weak	Too Little Money	Not Interested
Guguletu	12%	12%	0%	3%	12.1%	6.1%	3%	12.1%	0%
Khayelitsha	5.2%	7.9%	5.3%	7.9%	10.5%	2.6%	0%	15.8%	5.3%
Kraaifontein	24%	22.2%	15.5%	11.1%	6.7%	0%	6.7%	20%	2.2%
Mitchelsplain	31%	22.9%	8.6%	8.6%	8.6%	0%	14.3%	22.9%	5.7%
Bonteheuwel	21%	21.2%	12.2%	0%	12.1%	9.1%	3%	24.2%	0%
Philippi	22%	22.2%	8.3%	16.7%	8.3%	5.6%	2.8%	33.3%	2.8%

Other reasons mentioned as production challenges were: all available land has been used for crops; lack of equipment; lack of land; material to maintain the land; money; no space; does not own land; no space in yard; not enough equipment; not enough information; not enough land; still preparing land; etc.

5.6.3.3 Stresses, Shock and Coping Strategies

The stresses and shocks mentioned by the respondents can be seen in Table 5-18. The increase of food prices was the most common stress factor reported, with 26 occurrences during the past year, while the increase in food production costs also played a role with 16 occurrences.

When respondents were asked whether any situations occurred due to any stresses or shocks that made the household suffer in some way the past year, only 15% reacted that this was true. Mostly households from Bonteheuwel (24.2%), Mitchelsplain (22.9%) and Gugulethu (21.2%) experienced shocks or stresses.

Table 5-18 Stresses and shocks experienced by Cape Town Metropole households as a percentage of total population and the number of occurrences during the past year

Stresses or Shocks Experienced	% of Cape Town Metropole	Number of occurrences
Increase the number of people in the family/household	3.2%	7
Increase in food production costs (water, rent, equipment, seeds, fertilizer)	7.3%	16
Cut-off or decrease of government grant which is not a result of death of beneficiary	1.8%	4
Flood	0%	0
Storm	1.4%	4
Drought	0.9%	2
Serious injury or chronic illness keeping household member from doing normal activities	3.2%	8
Loss of a job of a breadwinner in the household	3.2%	8
Loss of remittances (money received from migrants)	0%	0
Loss of possessions, theft	4.5%	11
Death of many livestock	0%	0
Food cost or food price increases	11.8%	26
Death of a family member	5.9%	13

The increase in food production costs were especially experienced as a stressor by households from Gugulethu, with seven occurrences during the past year (15%), Mitchelsplain with eight occurrences during the past year (14.3%) and Bonteheuwel with six occurrences during the past year (15.2%). The other areas did not experience this factor as a stressor. 9.1% of Bonteheuwel residents reported that serious injury or chronic illness during the previous 12 months kept a household member from doing normal activities which causes the household to suffer to a certain extent. This informal settlement area was also influenced by job loss of the breadwinner (9.1%). Theft was one of the stress factors mentioned by Gugulethu (9.1%), Mitchelsplain (8.6%) and

Bonteheuwel (6.1%) households. The increase in food prices was a stressor that affected Gugulethu (21.2%), Mitchelsplain (22.9%) and Bonteheuwel (18.2%) households most. The death of a family member was especially prominent in reports by Gugulethu (9.1%), Khayelitsha (7.9%) and Mitchelsplain (14.3%) households.

In households where none of the members are employed, there were eight occurrences during the past 12 months where higher production costs were reported to be a stress factor for households in the Cape Town Metropole, while there were six occurrences when one member was employed and only two occurrences with two employed household members. This show that the more members of the household are employed, the less effect higher production costs would have on them. The same trend could be seen with the increase of food prices. Most occurrences took place with no employed members (nine), eight occurrences with one working member, six occurrences with two working members, two occurrences with three employed members and one occurrence where four members are employed.

A severe or sudden drop in income was reported by 6.4% of households in the Cape Town Metropole. Some strategies were adopted by households to serve as buffer for the severe or sudden drop in income. The strategies households applied were mostly to borrow money from friends and family, households also reduced spending, while others borrowed from unregistered credit providers like loan sharks ("mashonisa") and to a lesser extent some households sold some assets, used savings or did some additional work.

When food shortages arose in the surveyed households, several strategies were put in place by the households. In Table 5-19 one can see the nine most implemented strategies to overcome food shortages.

8.2% of households reported that they mostly rely on other family members in difficult times, 6.4% rely on neighbours, 5.5% rely on family or relatives elsewhere, while 3.6% rely on the church. Help is often provided by means of food (10%), money (9%), counselling (4.1%) or childcare (1.8%)

Table 5-19 Strategies implemented by households to overcome food shortages

Strategies	% of households
Eat less preferred food	8.6%
Reduce food intake	8.2%
Borrow food	4.1%
Exchange one type of food for another	3.2%
limit or reduce portion size	6.8%
Restrict consumption in favour of children	7.7%
Skip meals for an entire day	7.7%
Asked neighbours/family relatives or use savings	6.8%
Borrowed money for food	7.3%

6.4% or 14 of households in the Cape Town Metropole reported a severe or sudden drop in income. This include four households in Gugulethu, one in Khayelitsha, five in Mitchelsplain and four in Bonteheuwel. Households in Bonteheuwel borrowed food from friends, used savings, borrowed money from family or friends, borrowed from "mashonisa", reduced spending or reduced food consumption to adapt to a sudden drop in income. The same strategies were also applied by households in Gugulethu, Khayelitsha and Mitchelsplain, except that none of these reported selling assets. Borrowing money played a big role in all the informal settlement areas of the Cape Town Metropole. Households in Gugulethu especially reduced food consumption when income dropped.

To overcome food shortages more than 10% of households from Gugulethu and Mitchelsplain reported to mostly eat less preferred food, reduce food intake, borrow money for food and restrict consumption in favour of children. Mitchelsplain and Bonteheuwel limited or reduced portion size. Only Bonteheuwel households (15.2%) skipped meals for an entire day due to food shortages. Bonteheuwel, Gugulethu and Mitchelsplain households asked neighbours or families' assistance or used savings.

5.6.3.4 Governmental Services

Since the study analysed the FS situation of urban farming initiated by governmental projects, numerous aids were provided. 15 households reported to have received agricultural starter packs.

Sixteen households were involved in the Comprehensive Agricultural Support Programme (CASP) and fourteen households were beneficiaries of municipal implemented FS projects. Other programmes and schemes implemented is shown in Figure 5-4.
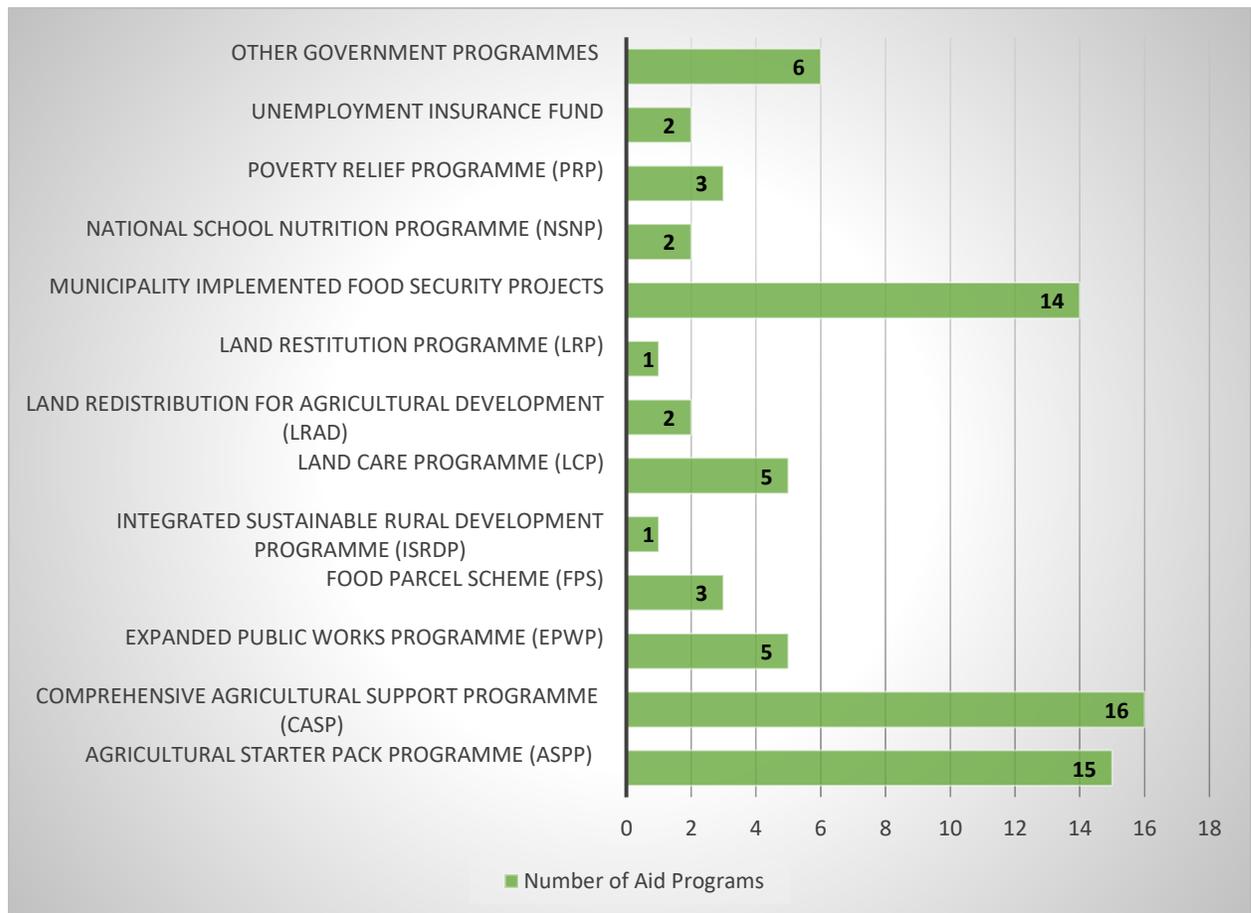
Figure 5-4 Aid programmes and Schemes provided to households in the Cape Town Metropole

The Agricultural Starter Pack Programme (ASPP) was implemented in six households in Gugulethu, two in Kraaifontein, four in Mitchelsplain and three in Bonteheuwel. CASP benefitted seven households in Gugulethu, two in Khayelitsha, one in Kraaifontein, 3 in Mitchelsplain, one in Bonteheuwel and two in Philippi. There are significant differences between the informal settlement areas of the Cape Town Metropole for both the ASPP and CASP programs. Gugulethu also received more aid through the Expanded Public Works Programme (EPWP) and Land Care Programme (LCP) programs. Gugulethu and

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Philippi areas were especially aided by the municipal implemented FS projects whereby six households in each area received aid and almost none of the other areas surveyed.

It is worthy to note that Gugulethu benefited in 42.7% of aid programs implemented in the Cape Town Metropole. Philippi and Mitchelsplain benefited from 18.7% and 16.0% respectively, while Khayelitsha, Kraaifontein and Bonteheuwel households were only aided by 8%, 8% and 6.7% of the reported aid projects respectively. From the data it was clear that females were assisted in 50% more cases than males.

5.6.4   Factor Analysis

Principal component analysis was carried out on 16 variables. In the Rotated Component Matrix, 16 of these variables satisfied the 0.4 cross-factor loading threshold in the Varimax rotated matrix (Table 5-21) with a Kaiser-Meyer-Olkin (KMO) test (Table 5-20), indicating a middling sampling adequacy so that they are easier to interpret. As seen in Table 5-20, the Bartlett's Test of Sphericity show that the results are statistically significant.

Table 5-20 KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0,584
Bartlett's Test of Sphericity	Approx. Chi-Square	1246,466
	Df	120
	Sig.	0,000***

∗Significant at the 10% level; ∗∗significant at the 5% level; ∗∗∗significant at the 1% level. Values in parenthesis are standard deviation

The assumption of independent sampling was met. The assumptions of normality, linear relationships between pairs of variables, and the variables being correlated at a moderate level were checked and mosaic pattern test did not meet the assumptions, in that it was correlated at a low level with each of the other variables. Six components were rotated, based on the eigenvalues over 1 criterion and the scree plot (Figure 5-5). After rotation,

- the first component accounted for 20.35% of the variance,
- the second component accounted for 15.15% of the variance,
- the third component accounted for 12.06% of the variance,

- the fourth component accounted for 7.80% of the variance,
- the fifth component accounted for 7.09% of the variance, and
- the sixth component accounted for 6.41% of the variance.
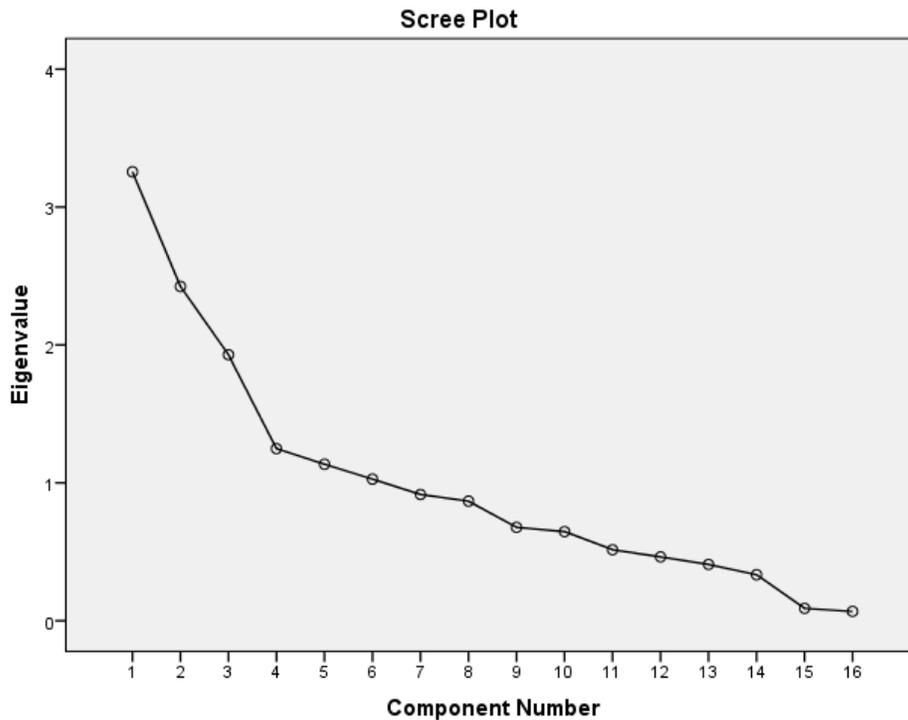
Figure 5-5 Scree plot of variables Eigen values

The Principal components analysis with Varimax rotation was conducted to assess how certain variables that influence urban household FS are clustered. Table 5-21 displays the items and component loadings for the rotated components, with loadings less than .30 omitted to improve clarity.

While keeping with zero-order correlations, the results suggest the following coherent components as identified in common themes (in red blocks) (Table 5-21):

1. Expenditure factors

   o Share of food expenditure on income;
   o Total value of food consumed; and
   o HDDS.

2. Household and Socio-economic Indicators

- o Total number of income earners;
- o Total number of income sources;
- o Total household size; and
- o Share of food expenditure on total expenditure.

3. Food security Indicators

- o Household food security access score; and
- o Total Hungry months.

4. Time Indicators

- o Years living in the area; and
- o Age of household head.

5. Urban Farming Indicators

- o Vegetable-index (Total number of vegetables cultivated); and
- o Crop-index (Total number of crops cultivated).

6. Geographical and Market Indicators

- o Distance to market;
- o Dependency ratio; and
- o Household monthly income equivalent.

The first component (Expenditure factors) accounts for 20.35% of variance and it is characterised by factors relating to expenditure on food. The factors that accounts for the highest variance within this component is the share of food expenditure on income. This is an indicator of household FS, since more vulnerable households spend a higher proportion of their disposable incomes on food. This factor goes hand in hand with the total value of food consumed, which indicates how much income is spent on food. The HDDS is included in this group, since the groups of food purchased (diversity) are

dependent on the amount of purchase power available. This is in accordance to Engel's Law on food expenditure in relation to income [440].

Table 5-21 Rotated Component Matrix

Variable	Components (Rotated matrix)					
	1	**2**	**3**	**4**	**5**	**6**
Share of food expenditure on income	0.941					
Total value of food consumption	0.935					
Household dietary diversity score	0.387					
Total number of income earners		0.842				
Total number of income sources		0.708				
Household size		0.523				
Share of expenditure in total expenditure		0.494				
Household food insecurity access score			0.883			
Total hungry months			0.804			
Years of living in the area				0.834		
Age of household head				0.808		
Crop index					0.864	
Vegetable index					0.849	
Distance to market						0.703
Dependence ratio						0.516
Household monthly income equivalent						0.465
Total variance explained %	20.35	15.15	12.06	7.80	7.09	6.41
Cumulative variance explained	20.35	35.50	47.55	55.35	62.45	68.86
Eigen values	3.25	2.42	1.93	1.23	1.14	1.03

A household and socio-economic indicators component was also identified since the grouping relates to the total number of individuals in the household earning an income, the number of income sources, size of the household and the share of food expenditure on total expenditure. Thus the more members of a family earning an income, and the more sources of income in relation to the number of people within the household the higher the possibility would be that the household would be food secure. The above

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440 (Perthel, 1975)

factors can also determine the proportion of total expenditure spent in relation to food expenditure. These factors are a good grouping for this component and accounts for 15.15% of variance.

The third component is comprised of FS indicators and accounts for 12.06% of the variance. The household food insecurity access scale and hunger index (total hungry months) are directly correlated with each other in this study and are determinants of the level of FS and covers accessibility, and relates to the availability of food and the household's ability to access it.

The number of years living in the area and the age of the household head at the time of conducting the data collection are grouped together in the rotated component matrix. Time indicators constitutes 7.80% of the variance. Long periods of residence may be an indication of stability due to good public policies.

The urban farming component accounts for 7.09% of the variance and contains the vegetable and crop index. The vegetable and crop indexes are determined by the number of different vegetables and crops produced by urban farmers.

Geographical and Market Indicators include the distance to market, dependency ratio and Household monthly income equivalent. This component demonstrates 6.41% of the total variance.

5.7   Discussion and Conclusions

The average household size for surveyed households in the Cape town Metropole, in the Western Cape, was 4.3 members per household. There are significant differences in household size between informal settlement areas with Khayelitsha having the highest average household size with 5.3 members per household and Philippi and Guguletu with 3.4 and 3.6 respectively. The average age of household heads was 49.8 years. This is similar to findings by Battersby (2011)[441], where household heads averaged 52 and 46 years respectively for Ocean view and Khayelitsha respectively. There are no significant differences in the average age of household heads between the areas.

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441 Battersby (2011)

There are significant differences between the farming and non-farming households in two informal settlement areas namely Khayelitsha and Bonteheuwel.

Of all households surveyed 99 were male headed and 121 were female headed households. There were more male heads than females involved in urban agriculture.

There is no significant difference for the levels of education between male and female-headed households. This is also the case for the ratio between the number of active adults towards household size. There is however a significant difference between the average ratio for number of people working compared to household size. In this instance, male-headed households have 46% working household members, while female-headed households only have 33% working members compared to household size.

40.1% of the household heads obtained some secondary level of education (grade 8 to grade 11). 4.5% of them had no schooling, while 9% obtained junior primary (grade 0 to grade 4) and 20.3% finished primary school (grade 5 to grade 7). Only 16.2% of respondents had completed school (matric), 5.4% did some courses or certificates for formal training and 3.6% attained diploma or degree. Similar results were reported by Philander (2015).[442] Kraaifontein household heads could only reach senior primary level or grade 7 on average, while all the other informal settlement areas had an average education level up to some secondary level or grade 11. There is also no difference between qualification level between males and females.

Significant differences exist in the number of active adults between the informal settlement areas of the Cape Town Metropole. Philippi reported 2.44 active adults per household size and Khayelitsha 3.66. Differences in the number of persons receiving an income per household size can also be seen between the informal settlement areas with 0.512 for Gugulethu and 0.294 for Bonteheuwel. Values below 0.3 indicates that there is a high responsibility on the household members that receive an income, as they have to support a high number of other family members.

Philippi and Kraaifontein had 100% African households, while Gugulethu, Khayelitsha and Mitchelsplain had 93.94%, 97.37% and 88.57% African households. Bonteheuwel

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442 Philander (2015)

however were predominantly Coloured households (80%). The majority of households have been living in the respective informal settlement areas of the Cape Town Metropole for an average of about 20 years. It was reported that the household heads had lived on average 14.4 years in Kraaifontein, which is the shortest period of all groups studied, and for an average of 29.5 years in Bonteheuwel, which is the longest time.

94.5% of respondents volunteered income information. The mean average total household income of the 209 respondent sharing income information reported an average income of R3543.22 per month. Battersby (2011) reported various incomes of R2197 for Philippi and R2126 for Khayelitsha in 2011.[443] There is no significant difference between the average total income per year for households involved in UA and those not involved in UA.

When considering the different types of agriculture, no significant difference was found between the average total household income for households not involved in agriculture and those who are. Guguletu has the highest average yearly income of all the groups with R69 506.25, while Kraaifontein and Bonteheuwel reported the lowest annual household income of R28 412.73 and R25 490.32 respectively. There are significant differences between the informal settlement areas in terms of household income.

Household farmers in Gugulethu, Khayelitsha, Kraaifontein, Gugulethu and Philippi have a larger average total yearly income, while non-farming households in Mitchelsplain have the larger average total yearly income. The excessive high average total yearly income from household farmers in Gugulethu might be due to the high maximum income of R420 000.

The main income source of respondents predominantly came from formal salaries or wages (46.4%), while 13.1% and 11.7% reported that child support grants and pension funds respectively are also main sources of income. 44.5% of households reported that they had no secondary source income. Other sources for a secondary income included child support or grant (16.8%), formal salary or wages (14.1%) and to a lesser extent farming activities combined contributed to 10% of the secondary income source. The

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443 Battersby (2011)

most important source of income for all the farming types is formal salary or wages. 48% of households not involved in agriculture have formal salary or wages as first income source. This was also the case with the urban farmers.

Child support grant was the first source of income for 21.9% of the non-farming households, and 9.6% of the urban farming households. Agriculture related activities are the first source of income for just over 10% of urban farming households.

The factor analysis showed the expenditure component accounts for 20.35% of variance and it is characterised by factors relating to expenditure on food. The expenditure component is comprised by the share of food expenditure on income, the total value of food consumed and the household diet diversity score. Since the groups of food purchased (diversity) are dependent on the size of purchase power available, this factor fits within this component group. The socio-economic indicators component forms the second largest component group (15.15%), which includes the total number of individuals in the household earning an income, the number of income sources, the size of the household and the share of food expenditure on total expenditure. The two most important components are mostly concerning income and expenditure factors, demonstrating that these factors are the biggest contributors towards food security. Other components with a lesser effect include a food security component, which include food security indicators, an urban farming component and a geographical and market component.

The above hypothesis is confirmed since the level of income per capita are related to expenditure factors, which is the most important component of factors influencing household FS.

5.8   Recommendations

It is evident that income and expenditure factors, and not the practice of urban agriculture, play a substantial role towards factors influencing food security, especially for households in the informal settlement areas of the Cape Town Metropole. It is vital to stimulate the economy in these areas for members of households to have more access to job opportunities and therefore income to improve food security,

CHAPTER 6

AN ANALYSIS OF THE CONTRIBUTION OF URBAN AGRICULTURE TO HOUSEHOLD FOOD SECURITY IN THE INFORMAL SETTLEMENT AREAS OF THE CAPE TOWN METROPOLE

6.1 Abstract

It is generally accepted that households, who are engaging in urban agriculture (UA) could experience improvement in nutritional status and health standards. It is therefore important to determine the actual contribution of UA to household food security (FS). To determine the contribution of UA, the determinants of participation in UA were identified, production levels were measured and comparative measures were done to compare urban household FS between farming and non-farming households. It was found that households engaged in UA are benefiting in terms of diet diversity, income and accessibility due to their involvement in this activity. However, there is no indication of a significant positive contribution of UA towards FS.

Key words: Urban agriculture, household food insecurity

6.2 Introduction

The twenty first century, characterised by rural to urban migration, led to rapid urban growth. According to United Nations Human Settlements Programme (UN-Habitat) (2011)[444] it is estimated that 60% of people will reside in urban areas by 2030. The result would be increased pressure on urban resources especially in cities of low and middle-income countries, thus leading to pressure on urban Food Security (FS). Battersby (2011)[445] mentioned that more holistic interventions are needed to address FS. De Cock (2013)[446] confirmed that these interventions need to include a better understanding of the scope of the problem and base line measurement should be applied in a particular locality. The improvement of both farm productivity and non-farm income are suggestions made by Lemba (2009).[447]

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444 (United Nations Human Settlements Programme (UN-Habitat), 2011)
445 (Battersby, 2011)
446 (De Cock *et al.*, 2013)
447 (Lemba, 2009)

Although it is expected that the numerous support systems implemented by the government will lead to an improvement in FS, D'Haese *et al.*, (2013b)[448] noted that food access insecurity levels are very high. Several researchers including Rogerson (1998)[449] suggested that UA should be encouraged and that more emphasis should be placed on UA. This statement was supported by Visser (2014)[450] by concluding that there is no more need to debate efficiency of UA in improving the livelihoods of the urban poor households. Visser further advised that the only thing left to do be for Government to put enabling policies in place to advance UA further.

Early studies by the likes of Rogerson (1998)[451] and Wayburn (1985)[452] supporting UA, were seen as generalisations and repeated in literature by Webb (2011).[453] Schmidt and Vorster (1995)[454] could not find a link between food gardens and nutritional security and that no significant difference could be found between farming and non-farming households with regards to nutritional status.

Van Averbeke (2007)[455] reported that the contribution of UA to total household income and FS in the informal settlements of Atteridgeville, were mostly modest. UA did however contribute to a better livelihood status in the study group.

This chapter will analyse and discuss the contribution of UA to the FS in the informal settlement areas of the Cape Town Metropole.

6.3   Objectives

To determine the significance of UA in addressing household food insecurity amongst lower income groups in selected informal settlement areas of the Cape Town Metropole.

6.4   Hypothesis

UA in lower income areas can significantly alleviate food insecurity, while good research, identification and implementation of the most suitable UA systems in the Cape Town Metropolitan area, has the ability to feed the ever increasing population in the future.

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448 (D'Haese *et al.*, 2013b)

449 (Rogerson, 1998)

450(Visser, 2014)

451 (Rogerson, 1998)

452 (Wayburn, 1985)

453 (Webb, 2011)

454 (Schmidt and Vorster, 1995)

455 (Van Averbeke, 2007)

6.5 Materials and Methods

6.5.1 Study Area and Data Collection

The study was conducted in the informal settlement areas that form part of the Cape Town Metropole of the Western Cape in South Africa. Households in the study area included a combination of community and household farmers involved in project gardens funded by the Department of Agriculture in the Western Cape. Farmers comprised of those owning house gardens or those involved in community gardens. Randomly selected non-farming households of the same area served as the control group.

The informal settlement areas in the Cape Town Metropole selected to conduct the surveys in are:

- Guguletu;
- Khayelitsha;
- Kraaifontein;
- Mitchelsplain;
- Bonteheuwel; and
- Philippi.

These areas are known to house some of the poorer communities in the Cape Town Metropole.

Both quantitative and qualitative data was collected by means of questionnaires. The questions were constructed to include different social characteristics of the household, the FS situation based on different FS indicators, household income and expenditure, household food production, access to water, access to markets and access to governmental support programs. It thus contributed to an in-depth comprehension of the social and economic aspects of FS at household level and the identification of the factors influencing FS at household level by including the four major FS components i.e. food availability, food accessibility, food utilisation and food system stability.

223 Surveys were completed and three were eliminated due to outlying values, leaving 220 households that were analysed.

6.5.2   Data Analysis

6.5.2.1   Propensity Score Matching

Matched comparison evaluation techniques are the most researched methods of evaluation methodology.[456]   Baker (2000)[457] stated that it is one of the best quasi-experimental design techniques to use as an alternative towards experimental design. Rosenbaum and Rubin (1983)[458] defined the propensity score as the conditional probability of receiving a treatment given pre-treatment observable characteristics.

To determine the contribution of UA on household FS, the propensity score matching method was used. According to Randolph *et al.* (2014)[459] the attributing outcomes to programme interventions are often challenging since difficulties are experienced in observing outcome in counterfactual and treatment situations. The authors concluded that it is clear that propensity score matching is a useful tool for reducing selection bias and strengthening causal conclusions.

Another reason the propensity score matching method was used to determine the contribution of UA on household FS is due to the lack of historic data on the control group. Therefore, the econometric model was used to estimate the effect of urban farming on income and FS of the households experiencing food insecurity.   A statistical counterfactual group is thus created based on the probability of the group contributing to UA by using observed household characteristics.

The validity of this method, however, depends on the provisional independence and overlap in propensity scores across the treated and control group. Whilst propensity score matching is data dependent for both the number of variables required to estimate participation and outcomes as well as in the number of participants and non-participants entering the matching process.[460]   Therefor results based on small samples of non-participants should be cautiously interpreted. However, studies by Bryson *et al.* (2002)[461] showed that even though the propensity score matching method requires data to show

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456 (Baker, 2000)

457 (Baker, 2000)

458 (Rosenbaum and Rubin, 1983)

459 (Randolph *et al.*, 2014)

460 (Bryson *et al.*, 2002)

461 (Bryson *et al.*, 2002)

good matches, where single treatment is being evaluated efficient small samples can be sufficiently analysed.

6.5.2.2   Model Specification and Estimation

The first step in propensity score matching is to make an estimation regarding the probability of participation of urban farming. This is done by means of the Probit model, which in turn is required to estimate propensity scores. Heinrich *et al.* (2010)[462] identified the Probit model as follows:

$$P\{X \equiv \Pr(D = 1|X) = E(D|X)\}$$

The particular pre-treatment household characteristics influencing urban farming determines the conditional probability of participation.

D = (0, 1) indicator of participation in UA,

X = vector of pre-participation household characteristics

The most important household characteristics showing significance include:

- Access to land;
- gender of household head; and
- distance from selling markets.

Where D=1, a household would participate in urban farming, and where D=0, the household would not participate in urban farming. The smaller number of conditional variables provide more robust outcomes.

When propensity scores are measured, matching is done by using methods as suggested by Heinrich *et al.* (2010)[463] i.e. nearest neighbour matching, Kernel Matching, and Stratification Matching algorithms. The most likely outcomes are then defined by Y1 (D1) for the total population. The treatment effect on the total population is written as:

$$\tau = Y1 - Y0$$

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462 (Heinrich *et al.*, 2010)   463 (Heinrich *et al.*, 2010)

It is not possible to determine the effect of an individual treatment since it would produce only one possible outcome, thus the focus is on average impact.[464] The main purpose of this analysis is to determine the Average Treatment effect on the Treated (ATT) i.e. the display of the outcome of contribution of UA towards FS and income. This analysis therefor shows the difference in outcome between households involved in UA and households not involved in UA. Heinrich *et al.* (2010)[465] defined this analysis as:

$$ATT = E(Y1 - Y0|D = 1) = E(Y1|D = 1, P(X)) - E(Y0|D = 0, P(X))$$

Y1 = income per month or FS outcomes for households involved in UA

Y0 = the situation for households not involved in UA

E represents the average or expected value and D the treatment status.

6.6   Results

6.6.1   Determinants of Participation in Urban Farming

A variety of factors determines the decision for urban households to participate in UA. As seen in Figure 6-1, three main categories influence the decision-making process namely:

- Socio-economic characteristics;
- Limiting factors; and
- Perception of UA.

The socio-economic factors are influenced by demographic characteristics, livelihood characteristics and capability characteristics. Some limiting factors that may act as barriers for households to enter urban farming include access to finance, time, access to land and farming resources and knowledge of farming. Participation is also influenced by some perception factors, such as the nutritional and psychological benefits as well as income generation.

According to Adebisi (2012)[466], the main reasons for women in Nigeria to enter UA include FS, income supplement and accessibility to land. Admire (2014)[467] indicated that

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464 (Heinrich *et al.*, 2010)   466 (Adebisi, 2012)
465 (Heinrich *et al.*, 2010)   467 (Admire, 2014)

production for home consumption, to cover some food shortages and income enhancement are the main reasons for households to take up urban farming.
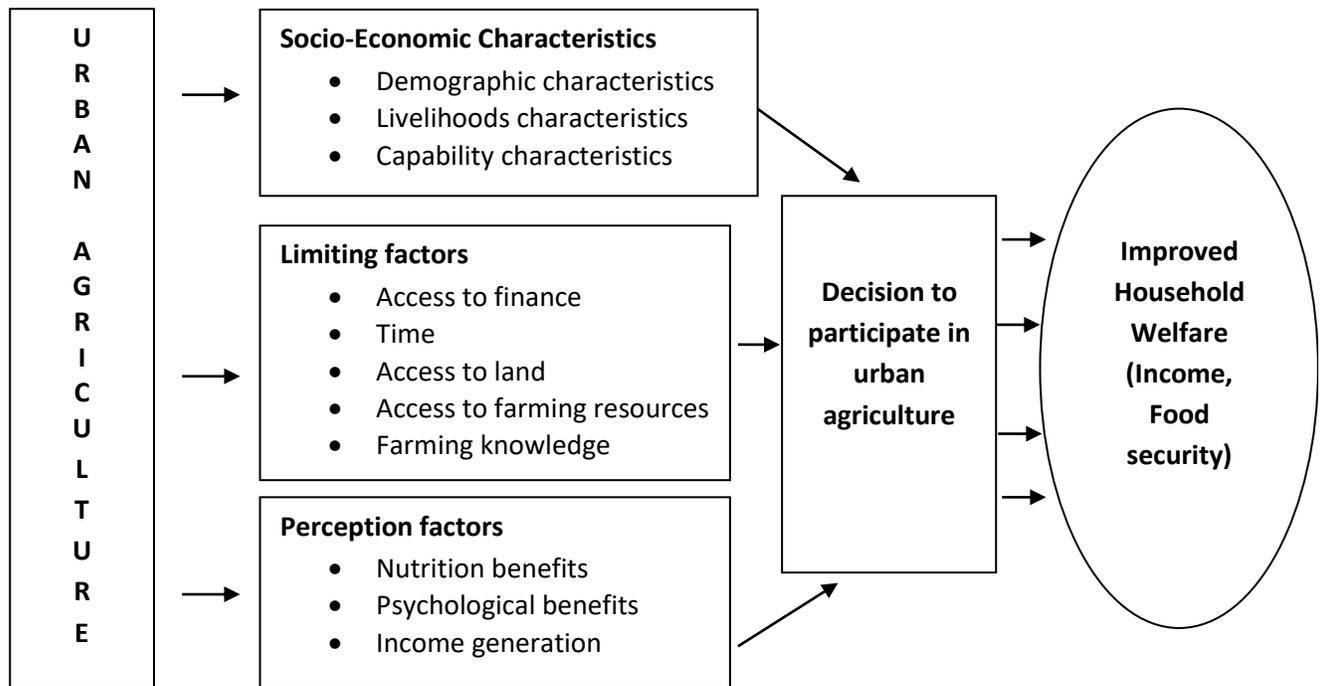
Figure 6-1 Conceptual framework for participation in UA (adapted from Gamhewage *et al.*, (2015)[468]

6.6.2   Urban Agriculture Production Levels

This study shows significant differences between male and female headed households for the production of maize, where mostly male headed farmers produce maize. Spinach, where mostly produced by female headed farmers produce, while other leafy vegetables where mostly produced by male headed farmers (Table 6-1). The reason for male headed households to produce more maize might be due to the effort of production thereof. From Table 6-1 it is clear that spinach are the most popular agricultural product produced by 29.3% and 39.7% of male and female headed households respectively. Cabbages, onions and carrots are other agricultural products produced by more than 20% of both male and female headed households. More than 10% of male and female headed

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468 (Gamhewage *et al.*, 2015)

households reported to farm with potatoes, beans and tomatoes. It is thus clear that the majority of households in the informal settlement area of the Cape Town Metropole produce vegetables, while 11% of male headed households also produce maize. Single households produce fruit, and breed with livestock and poultry.

Table 6-1 Urban agriculture production levels

	Percentage of farming households		
	Male	Female	Chi-squared
Maize	11.11	1.65	5.45**
Sweet potatoes	5.05	6.61	1.62
Potatoes	15.15	14.88	1.87
Beans	17.17	13.22	.312
Cattle	1.01	0.83	.600
Goats	1.01		/
Pigs	1.01		/
Poultry	3.03	0.83	2.28.
Peaches	1.01	0.83	.18
Grapes		1.65	/
Bananas	1.01	0.83	.18
Avocadoes	1.01	0.83	.18
Carrots	24.24	22.31	.36
Spinach	29.29	39.67	7.07***
Cabbages	21.21	28.10	1.93
Tomatoes	11.11	17.36	1.89
Onions	25.25	29.75	.72
Other leafy vegetables	14.14	7.44	3.41*
Beet root	4.04	1.65	/

∗Significant at the 10% level; ∗∗significant at the 5% level; ∗∗∗significant at the 1% level. Values in parenthesis are standard deviation

6.6.3   T-tests

Table 6-2 shows the household farming status for the FS indicators. As seen in the table, the analyses show no significant difference between farming and non-farming households for any of the FS indicators. However, the non-farming households were more food secure than the farming households, due to the higher value on the household food

insecurity access scale (HFIAS) where the two groups scored 14.05 and 13.52 respectively on the scale. Thus, the analysis on the FS status of farming and non-farming households shows that in both cases, more than 75% of the households experience severe food insecurity, with a higher percentage of farming households experiencing severe food insecurity.

There is almost no difference in the household diet diversity score (HDDS) for the different farm types in the Cape Town Metropole, although the urban farming households showed a slightly higher (10.4) level of diet diversity than the non-farming households (10.3). In a study conducted by The Western Cape Department of Agriculture (2015), it was reported that the households that participated in food production have a generally higher HDDS.[469]

On the other hand, non-farming households spent R286.35 per month, while farming households spent R359.35 on food consumed. Although non-farming households spend about R70.00 per month less on food consumed than farming households, there is no significant difference between the two. This is also the case for the share of household income spent on food by non-farming (47%) and farming households (51%). According to Table 6-2, one can see that the average income per household for non-farmers (R3690.00) is higher than that of urban farmers (R3486.47).

Table 6-2 Household farming status by food security indicators

Variable	Non-farming households	Farming households	T-test
HFIAS	14.05 (6.48)	13.52 (6.83)	0.54
HDDS	10.30 (3.15)	10.42 (2.86)	-0.26
Total value consumed (Rand)	286.35 (196.14)	359.50 (349.29)	0.071
Income	3690.00 (4193.48)	3486.47 (4233.18)	-0.14
Share of food expenditure	0.47(0.21)	0.51(0.21)	0.646

∗Significant at the 10% level; ∗∗significant at the 5% level; ∗∗∗significant at the 1% level. Values in parenthesis are standard deviation

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469 (Western Cape Department of Agriculture, 2015)

As seen in Table 6-3, 45.5% of non-farmers earn more than US$ 2 per capita per day, while this is the case for only 35.7% of urban farmers. The values are more or less the same for the US$ 1.25 level for non- and urban farmers. No significant difference could be found for farm type.

Table 6-3 Levels of per capita income per day in US$ in the different informal settlement areas of the Cape Town Metropole

	More than US$ 2 per day	Less than US$ 2 per day	More than US$ 1,25 per day	Less than US$ 1,25 per day
Non-Farmers	45.50%	54.50%	63.60%	36.40%
Urban Farmers	35.70%	64.30%	66.20%	33.80%
Pearson Chi-Square	1.849		0.247	
Likelihood Ratio	1.831		0.239	

∗Significant at the 10% level; ∗∗significant at the 5% level; ∗∗∗significant at the 1% level. Values in parenthesis are standard deviation

6.6.4 Propensity Score Matching

Three variables were identified to estimate propensity scores to include in the analysis, i.e. the gender of the household head, access to land and distance to markets. These variables were selected based on selections from previous research, information gathered, and understanding of the informal settlement areas' and urban farming in the city Cape Town metropole.

Even though household income may influence the household's decision to include urban farming as alternative means for contributing to the household's diet, income or food security situation, the variable not included in the Propensity Score Matching analysis due its independent nature. By means of the Probit regression analysis, the factors that would have an influence on the likelihood for households to be participating in agriculture were identified.

The results from the Probit regression analysis are presented in Table 6-4. Consequently, the gender of the household head, distance from the markets and access

to land proof to be significant determinants for households to participate in agricultural production.

Table 6-4 Likelihood of participating in UA (Probit Model)

Dependent Variable: UA: yes =1		
	Coef.	Z
Gender of household head: Female =1	-.448(.214)	-2.10**
Access to land	1.996(.224)	8.91***
Distance to markets	.466(.016)	2.93***
Constant	-.542(.222)	-2.45***
Number of observation	220	
Pseudo R^2	.387	
Wald Chi^2(5)	85.61***	

∗Significant at the 10% level; ∗∗significant at the 5% level; ∗∗∗significant at the 1% level. Values in parenthesis are standard deviation

6.6.5 Average Treatment of Participating in Urban Agriculture

Table 6-5 reports the average treatment effects on the untreated (ATT) of participating in UA on income and FS outcomes by using the propensity scores and identification of indicators of UA impact. The ATT analysis was done in STATA 11 based on a number of matching techniques. Since access to land, gender of household head and distance to markets were found to significantly affect the likelihood to participating in UA in the Probit model, these three factors were therefor used as conditional variables. The common support region and balancing property was satisfied.

From the results in Table 6-5 it is clear that participating in urban farming has a significant positive effect on total value of food consumption (TVC) in all estimations. Significance was found, especially on TVC ranging from R78.00 to R88.06 per capita per month. From this result it can be concluded that urban farming does improve food availability and food access amongst households. It is nonetheless important to note that the TVC does not involve the diet diversity or nutritional value of the food consumed by the household. More

so, the size of effect is very low given the high food prices in South Africa (NAMC, 2015).[470]

As seen in Table 6-5, UA had a negative effect on HFIAS, and consequently there was no significance as well for the Kernel, Stratification and Near Neighbour techniques. The analysis of the effect of UA on the HDDS showed a positive effect, but had no significant influence on the three estimations as well. From the above results, it can be concluded that UA does not contribute significantly to the accessibility and nutritional diversity of household FS in the informal settlement areas of the Cape Town Metropole.

Although some researchers[471,472,473] encouraged UA as a means to contribute meaningfully to FS, findings in this study show otherwise. The fact that this study shows that UA does not yet significantly improve household FS and / or diet diversity in the informal settlement areas of the Cape Town Metropole are supported by researchers in the likes of Schmidt and Vorster (1995)[474] (Slough, North West province), Van Averbeke (2007)[475] (in the informal settlements of Atteridgeville, Gauteng Province), Aliber and Hart (2009)[476] (Limpopo Province) and Battersby (2011)[477] (informal settlements of the Cape Town Metropole).

Table 6-5 Average Treatment Effect on the Treated (participating in UA) using Nearest Neighbours, Stratification and Radius matching methods

Outcome Variable	Stratification	Kernel	Nearest Neighbour
Income (R/capita/month)	61.036 (182.83)	52.910 (198.85)	182.175 (210.00)
HFIAS	-0.590 (0.983)	-0.612 (0.971)	-1.173 (1.217)
HDDS	0.154 (0.467)	0.229 (0.613)	0.154 (0.496)
TVC (R)	78.001 (35.740)**	73.518 (32.274)***	88.064 (37.388)**
SHARE	0.078 (0.029)***	0.081 (0.029)***	0 .078 (0.042)***

∗Significant at the 10% level; ∗∗significant at the 5% level; ∗∗∗significant at the 1% level. Values in parenthesis are bootstrap standard errors with 100 replications

470 (NAMC, 2015)

471 (FAO *et al.*, 2015)

472 (Zezza and Tasciotti, 2010)

473 (Maxwell *et al.*, 1998)

474 (Schmidt and Vorster, 1995)

475 (Van Averbeke, 2007)

476 (Aliber and Hart, 2009)

477 (Battersby, 2011)

The effect of UA on monthly household income per capita was positive but not significant for all three tests. For the three matching techniques monthly household income per capita ranged from R61.00, R52.91 and R182.18 for the Stratification, Kernel and Nearest Neighbour techniques respectively. These values are very low in relation to other studies. This finding is inconsistent from the views accorded to UA in most large cities of Africa.[478] This concludes that the impact of UA is still very low on income for the poor.

It is also noteworthy that UA has a positive effect on the total share of expenditure. This means that UA negatively affected the share of expenditure on total expenditure. Significance was found with all three matching techniques. The results of these analyses are a clear indication that UA do not significantly contribute to income. According to research by Frayne *et al.* (2014)[479], it was found that in 2008 77% of households engaged in UA in 11 cities in Southern Africa reported conditions of food insecurity. However, given the high food price and inflation in South Africa (NAMC, 2015)[480], it could be that the marginal effect on income has been outstripped by price changes. Nevertheless, this argument can be verified with further investigation on income and food prices.

6.7   Discussion and Conclusions

Even though literature show contradicting results regarding the contribution of UA on household FS, it is important to keep in mind that methods of measurement differ, cities differ with regards to their UA characteristics, different policy approaches are adapted and assistance towards UA also differs.

The results presented in this study show that households engaged in UA are benefiting in terms of diet diversity, income and accessibility due to their involvement in this activity. However, there is no indication of a significant positive contribution of UA towards FS.

UA does however have a significantly low positive impact on total value of food consumed, which is an indication for energy availability (EA), but showed no significant contribution towards the HFIA, dietary diversity and income of the households residing in the informal settlement areas of the Cape Town Metropole.

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478 (Zezza and Tasciotti, 2010)   480 (NAMC, 2015)
479 (Frayne *et al.*, 2014)

Policy and support towards UA in South Africa and the Western Cape province were thoroughly discussed in the past, but further discussions and research are necessary towards land distribution, land utilisation, optimisation of land, analysis of urban farming constraints, measurement of FS and educating urban farmers.[481,482]

The researcher further negates the current hypothesis that households involved in UA are significantly more food secure than non-farming households, but agrees that good research, identification and implementation of the most suitable UA systems in the Cape Town Metropolitan area, has the ability to feed the ever increasing population in the future.

6.8   Recommendations

The rapid rate of migration of households into the Cape Town Metropole necessitates further research and development in designing and implementation UA systems that would have the ability to feed the ever increasing population of the Cape Town Metropolitan area in the future.

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481 (Drimie, 2016)   482 (Webb, 2011)

CHAPTER 7

OPTIONS FOR ADDRESSING URBAN HOUSEHOLD FOOD INSECURITY - A CLUSTER ANALYSIS

7.1   Abstract

The cluster analysis of different food security (FS) indicators and those affecting FS resulted in three homogenous clusters according to level of FS status. Households in the first cluster are severely food insecure and is characterised by female headed households, big household sizes, high dependency ratios, old household heads, low income levels, a lack in land availability, far from the nearest markets and a high number of household heads with no schooling.

The second cluster households experience moderate food insecurity since they have slightly more male than female heads, smaller household sizes than in cluster one, this group also has the youngest household heads, more than half of households earn less than US$ 2.00 per capita per day, they with an average dependency ratio, the distance to markets are reasonable and average sized land is available for production.

Households in cluster three, the food secure cluster, have mostly males as household heads, with the least number of members in the household, a very low dependency ratio, high income levels per capita, close to the markets with larger areas of land available for food production and better qualified than households in the other clusters.

*Key words***:** Cluster analysis, Food security, Food insecurity, Food security indicators

7.2   Introduction

A thorough understanding of the causes, levels, factors and consequences of food insecurity is important in order to better determine where the households are situated that are adversely affected, and to what extent or the severity they are affected by food

insecurity.[483,484,485,486,487] The classification of households according to relevant indicators would allow for adapting policy making to respond to specific needs.[488]

After the different factors influencing urban household food security are identified, it is advisable to find an optimal grouping of these factors in different clusters or levels of FS. The main FS indicators that were used to measure the different dimensions of FS formed the basis of the clusters formed. Increased urban food insecurity is the direct result of rapid urbanisation.[489]

This chapter introduces a cluster analysis with the purpose of grouping households into homogenous groups according to FS measurement indicators, indicators relating to income, demographic indicators, production factors and education level in the analysis. An optimal grouping of observations of FS may give a clearer understanding of the household situation and give policy makers an opportunity to improve the welfare of specific groups of the population.

7.3   Objectives
To find an optimal grouping of observations by utilising the identified critical factors that address household food insecurity.

7.4   Hypothesis
Smaller households with multiple income resources, headed by men and having land available for production carry less risk to experience household food insecurity.

7.5   Materials and Methods

7.5.1   Study Area and Data Collection
The study was conducted in the informal settlement areas that form part of the Cape Town Metropole of the Western Cape in South Africa. Households in the study area included a combination of community and household farmers involved in project gardens

483 (Hendriks, 2005)

484 (D'Haese *et al.*, 2016)

485 (De Cock *et al.*, 2013)

486 (Nie *et al.*, 2010)

487 (Charlton and Rose, 2002)

488 (Rose and Charlton, 2002)

489 (Leaning, 2015)

funded by the Department of Agriculture in the Western Cape. Farmers comprised of those owning house gardens or those involved in community gardens. Randomly selected non-farming households of the same area thus served as the control group.

The informal settlement areas in the Cape Town Metropole selected to conduct the surveys in were:

- Guguletu;
- Khayelitsha;
- Kraaifontein;
- Mitchelsplain;
- Bonteheuwel; and
- Philippi.

These areas are known to house some of the poorer community in the Cape Town Metropole.

Quantitative and qualitative data was collected by using questionnaires that included questions constructed to include different social characteristics of the household, the FS situation based on different FS indicators, household income and expenditure, household food production, access to water and to markets and access to governmental support programs. It thus contributed to an in-depth comprehension of the social and economic aspects of FS at household level and the identification of the factors influencing FS at household level by including the four major FS components i.e. food availability, food accessibility, food utilisation and food system stability.

223 Surveys were completed and three were eliminated due to outlying values, leaving 220 households that were analysed.

7.5.2   Data Analysis

From previous calculations, indicators of FS that were felt most useful for differentiating between urban household FS levels, were selected for a cluster analysis in order to try to identify groupings of the indicators of FS within the same cluster that were relatively homogeneous.

The aim was to identify clusters that could be usefully characterised as severely food insecure, moderately food insecure and food secure, in order to investigate the differences among the clusters for key characteristics in order to describe features of the three clusters. The variables or indicators included the weights of different FS measurement indicators, demographic indicators, livelihood indicators relating to income, production factors and the level of education. The cluster analysis suggested that grouping FS into three groups was sensible.

A cluster analysis was done to sub-divide urban farmers in different groups based on certain characteristics that are different from each other. With this analysis, the purpose is to classify data in such a way that the objects in one cluster are similar and different from the objects in the other clusters.

7.6   Results

A cluster analysis was performed to categorise the households based on their level of FS. Owing to the fact that the lower the value in the household food insecurity access scale (HFIAS), the lower the value on the household diet diversity score (HDDS) and the higher the total amount of hungry months experienced, the more severe the level of food insecurity. The contradiction of the above statement i.e. more food secure, is true when the HFIAS have a lower value, HDDS is higher and the total number of hungry months are lower. Thus in accordance to the above statements, it can be seen in Table 7-1 that households falling in cluster one are severely food insecure since a high HFIAS score (16.58), a low HDDS (9.43) and high total number of hungry months (6.14) can be seen. The households in cluster two would be seen as less food insecure than those in cluster one because of a lower value of 14.06 for HFIAS, 10.32 on the HDDS, which means this group has a more diverse diet, and a much lower frequency of total hungry months experienced (3.62). Contrary to clusters one and two, households in cluster three could be seen as food secure. These households have a low HFIAS score of 6.5, 12.67 on the HDDS and a total of 1.5 hungry months. There are high significant differences for all of the three FS indicators between the three clusters.

206 households were classified into these three clusters, where 42.2% are households that experience severe food insecurity, 37.4% are moderately food insecure and 20.4% of the households are the most food secure are identified.

The demographic indicators of the most severely food insecure households (cluster 1) are characterised by the following:

- Households have almost five members (4.97). This makes sense since there are more resources needed and thus more pressure to feed bigger households.
- The age of the household head is 55.95.
- This group has the highest dependency ratio. The dependency ratio of 0.81 is calculated upon members contributing to the household income to the total number of household members. In this case threshold of higher than 0.5, indicates that there are less people working for an income than members of the household that do not earn an income. Therefor the responsibility and pressure on the household members that receive an income are very high, since they have to support a high number of other family members.
- This group has a significant higher household size to be fed per month (4.9 members).
- The households in this group are more than twice as far (10.85 minutes) from the nearest markets than households in the other clusters.
- These households in this cluster are predominantly female headed with 64.4% of households headed by females, and only 35.6% headed by males. Women typically have less schooling, usually farm (subsistence) instead of having a formal job.

In a study by De Cock, *et al.* (2012)[490], the cluster analysis showed similar results towards the most food secure group in a rural area of Limpopo, South Africa. The FS indicators were consistent to high FS levels. Moreover, this group also had mostly (55%) male headed households, the highest incomes per capita and fewer people per household

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490 (De Cock, 2012)

relying on the income earners. Food secure households in the Ekhurhuleni area in Gauteng were predominantly male headed households (D'Haese, *et al.*, 2013a).[491]

The demographic indicators of the moderately food insecure households (cluster 2) are characterised by the following:

- Households in this group have 3.86 members per household, which is more than one member less than severely food insecure households.

- The average age of the household heads in this group is 38.64, which is much younger than household heads from both households from clusters one and two.

- The dependency ratio for this group is 0.5. This number indicates that the responsibility and pressure on the household members that receive an income are moderate.

- The household size of this group is 3.8 members to be fed per month and this is lower than household size of cluster 1 households.

- The households in this group are 5.13 minutes from the nearest markets, which is twice as close as the most severely food insecure households.

- Households in this cluster are mostly headed by males (53.2%).

The demographic indicators of the food secure households (cluster 3) are characterised by the following:

- The number of persons per household in this group (3.85) is the lowest of all the groups. Smaller households are more easy to take care of. Although this number is almost the same as in cluster 2, there is still a high significant difference between the three clusters.

- Household heads in this group are older (57.93) than the other two groups but similar to the severely food insecure group. An explanation might be that the household heads in cluster 3 are in a more stable in a long term job environment.

- This group has a very low dependency ratio of 0.33. Thus, the members of the household receiving towards the number of household members are favourable.

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491 (D'Haese *et al.*, 2013a)

- This group has the smallest household size, with 3.73 members to be fed per month.
- The households in this group are closer to the nearest markets than the households in the other clusters.
- There are more males (52.4%), that head households in this cluster, than females (47.6%).

Frayne, *et al.* (2010)[492] concluded that there is a direct relationship between poverty and food insecurity. They also reported that female headed households are more food insecure. D'Haese, *et al.* (2013a)[493] found that household income had a significant influence on the level of FS, where high income relates to food secure households and low income relates to food insecure households, in the Ekurhuleni area in the Gauteng province.

When looking at the production factors of the most severely food insecure households (cluster 1) only the size of land shows a significant difference between the three clusters. The households in the most severely food insecure cluster (1) have the smallest area of land available (310.4m^2).

There are no significant differences between the clusters for the crop-index (Total number of crops cultivated), Vegetable-index (Total number of vegetables cultivated) and the Fruit-index (Total number of fruit cultivated). According to Frayne, *et al.* (2010)[494], urban agriculture (UA) is an important source of food amongst poor households. De Cock, *et al.* (2012)[495] agreed that a bigger available land for food production is correlated to FS.

As seen in Table 7-1 high significant differences can be seen between the clusters for both the US$ 1.25 and US$ 2.00 per capita per day groups above and below food poverty lines. This means that the level of FS is directly linked to daily income per capita. 55.2% and 32.5% of households have an income of less than US$ 1.25 per capita per day for severely (cluster 1) and moderate food insecure (cluster 2) households respectively. Only 2.4% of households in the food secure group (cluster 3) have an income of less than US$ 1.25 per capita per day, meaning 97.6% earn more. The same trend can be seen with

492 (Frayne *et al.*, 2010)   494 (Frayne *et al.*, 2010)

493 (D'Haese *et al.*, 2013a)   495 (De Cock, 2012)

the US$ 2.00 poverty line, where 87% of households in the severely food insecure group (cluster 1) have an income of less than US$ 2.00 per capita per day, while only 12.6% earn more than US$ 2.00 per capita per day.

Table 7-1 Cluster Analysis of food security indicators

	Cluster 1	Cluster 2	Cluster 3		
N	**87**	**77**	**42**		
Food Security Indicators				**F Statistic**	
FIAS	16.58 (5.77)	14.06 (5.12)	6.5 (4.94)	50.395***	
HDDS	9.43 (2.65)	10.32 (2.94)	12.67 (2.18)	20.807***	
Total Hungry Months	6.14 (4.13)	3.62 (3.36)	1.5 (1.57)	27.563***	
Demographic characteristics				**F Statistic**	
Number of persons per household	4.97 (1.85)	3.86 (2.13)	3.85 (2.09)	7.666***	
Age of household head	55.95 (11.90)	38.64 (10.96)	57.93 (11.77)	58.931***	
Dependence ratio	0.81 (0.18))	0.50 (0.30)	0.33 (0.28)	61.406***	
Ave household size fed per month	4.90 (1.84)	3.80 (2.10)	3.73 (2.07)	8.084***	
Distance from nearest shop (min)	10.85 (11.70)	5.13 (3.31)	4.24 (2.92)	14.501***	
Demographic characteristics				**Likelihood**	**Chi-Square**
Gender: Male (%)	35.6	53.2	52.4	6.132*	6.077*
Gender: Female (%)	64.4	46.8	47.6		
Production Factors				**F Statistic**	
Crop-index (No crops cultivated)	0.26 (0.67)	0.30 (0.67)	0.50 (1.02)	1.458	
Vegi-index (No veg cultivated)	3.29 (1.51)	2.97 (1.47)	3.65 (1.97)	1.189	
Fruit-index (No fruit cultivated)	0.09 (0.39)	0.06 (0.47)	0.02 (0.15)	0.436	
Land Size (square meters)	310.4 (1226.1)	971.9 (3697.0)	3861.5 (9562.4)	7.617***	
Livelihoods characteristics				**Likelihood**	**Chi-Square**
Income less than US$ 1.25 (%)	55.2	32.5	2.4	42.824 ***	34.933***
Income more than US$ 1.25 (%)	44.8	67.5	97.6		
Income less than US$ 2.00 (%)	87.4	58.4	28.6	44.797***	47.008***
Income more than US$ 2.00 (%)	12.6	41.6	71.4		
Educational level				**Likelihood**	**Chi-Square**
Education %: No school	9.2	1.3	2.4		
Completed Junior primary only	11.5	7.8	9.5		
Completed Senior primary	23.0	11.7	31.0		
Completed Secondary	36.8	51.9	23.8	26.64*	26.6*
Completed High school	13.8	16.9	19.0		
Completed Courses and certificates	1.1	5.2	11.9		
Up to Diploma and degree level	3.4	3.9	2.4		

∗Significant at the 10% level; ∗∗significant at the 5% level; ∗∗∗significant at the 1% level. Values in parenthesis are standard deviation

Of the moderately food insecure households 58.4% earn less than US$ 2.00 per capita per day, while 41.6% earn more. 71.4% of the food secure group (cluster 3) earn more than US$ 2.00 per capita per day. This is in accordance to studies by Abu and Soom (2016)[496], De Cock, *et al.* (2012)[497] and Battersby (2011)[498] reporting that income per capita per day have a positive impact on household FS.

Although there are significant differences for the level of education between the clusters, a diverse distribution education levels can be seen in Table 7-1. However, it can be determined that the severely food insecure households have the highest frequency of household members with no schooling (9.2%). Most of the food secure group (19%) completed school and obtained a post school qualification (14.3%) compared to the moderately food insecure group (16.9% and 9.1% respectively) and the severely food insecure group (13.8% and 4.5% respectively). De Cock, *et al.* (2012)[499] reported that the food secure households in the rural areas of Limpopo had a decent level of education, while the moderately food insecure households are characterised by female headed households with much lower levels of education. Similar results were obtained by D'Haese, *et al.* (2013a)[500] in the Ekurhuleni area in the Gauteng province.

7.7 Discussion and Conclusions

Groupings of the indicators of FS that were relatively homogeneous were identified and sorted into three clusters. These clusters were characterised into a severely food insecure cluster, a moderately food insecure cluster and food secure cluster. Different FS measurement indicators, demographic indicators, livelihood indicators relating to income, production factors and the level of education were included in the analysis.

Thus, the first cluster included the most severely food insecure households. Households within this cluster are most headed by females, have a big household size, have a high dependency ratio, household heads are old, they have the lowest income where almost half of the households fall below the US$ 1.25 level and almost 90% below the US$ 2.00

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496 (Abu and Soom, 2016)
497 (De Cock, 2012)
498 (Battersby, 2011)

499 (De Cock, 2012)
500 (D'Haese *et al.*, 2013a)

mark, are far from the nearest markets, do not have much land available to produce food and have the highest number of household heads with no schooling.

The households in cluster 2 which are labelled moderately food insecure have slightly more male heads, households are smaller than those in cluster 1, household heads are much younger than clusters 1 and 3, they have an average dependency ratio, more than half of households earn less than US$ 2.00 per capita per day, they are closer to the markets than households in cluster 1, and have an average sized piece of land available for production.

The food secure households in cluster 3 have are mostly male headed households with the least number of members in the household. Since there are less members, the dependency ratio the lowest of the three groups, more than 70% of these households earn more than US$ 2.00 per capita per day, they are the closest to the markets and have a much bigger area of land available to produce food. Most of the food secure group (19%) completed school and obtained a post school qualification (14.3%) compared to the moderately food insecure group.

This hypothesis stated in this chapter is thus confirmed.

7.8   Recommendations

When doing a food security analysis, it is advisable to do an additional analysis to cluster the population into different groups based on certain characteristics that are different from each other. By doing this, homogenous groups are formed with similar proportions for different characteristics. Data resulting from cluster analysis can be instrumental for decision makers to pinpoint vital deprived areas, make focused decisions and take specific action.

CHAPTER 8

POLICY RECOMMENDATIONS ON THE ALLEVIATION OF URBAN FOOD SECURITY BY USING THE OUTCOMES OF THE ABOVE ANALYSIS

8.1   Introduction

Poverty and food insecurity manifests themselves differently in rural and urban areas. According to the United Nations' (2016b)[501] World Cities Report of 2016, South Africa experiences an upward trend in urbanisation. By 2030, urban areas are projected to house 60 per cent of people globally and one in every three people will live in cities with at least half a million inhabitants. In Africa, more than half of the population lived in rural areas in 2016, but that share is declining.

According to Koch (2011)[502] indications exist that rural annual population growth rate is negative at -0.92 per cent, compared to positive growth of 1.17 per cent in the urban areas. Labadarios (2011)[503] reported statistically significant differences for the presence of hunger by area of residence (urban or rural) as well as province.

Food insecurity in South Africa has been confirmed by several studies.[504,505,506,507] Food insecurity in South Africa is mainly related to a lack of food purchasing power or due to poverty.[508] This is confirmed by results elsewhere in this study.

Food and nutrition security is part of the Section 27 Constitutional Rights in South Africa.[509] The constitution states that every citizen has the right to access sufficient food and water, and that the state must by legislation and other measures, within its available resources, avail to progressive realisation of the right to sufficient food.

After the new democracy was established in 1994, South Africa adopted one of the most liberal constitutions in the world by developing a constitution aimed at the rights to ensure the physical well-being and health of all South Africans, including the right to food.[510]

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501 (United Nations, 2016b)
502 (Koch, 2011)
503 (Labadarios *et al.*, 2011)
504 (Faber *et al.*, 2011)
505 (Labadarios *et al.*, 2011)

506 (D'Haese *et al.*, 2016)
507 (De Cock, 2012)
508 (Koch, 2011)
509 (Greer-Love, 2003)
510 (Greer-Love, 2003)

Thus, high emphasis was placed on developing a comprehensive food-security strategy and because of the country's poverty and food insecurity situation. The Integrated Food Security Strategy (IFSS) adopted a broad developmental approach to food security (FS), with household FS as its main goal. Consequently, South Africa recognised the vision statement of the Integrated Food Security Strategy (IFSS), which is *"to attain universal physical, social and economic access to sufficient, safe and nutritious food by all South Africans at all times to meet their dietary and food preferences for an active and healthy life"*.[511]

The Government of South Africa approved the National Policy on Food and Nutrition Security and the Household Food and Nutrition Security Strategy in 2013 to continue responding to the hunger challenges in the country.

The Millennium Development Goals (MDG) of the Food and Agriculture Organisation (FAO) are correspond to the goals of the IFSS. MDG number one reads: "*to eradicate hunger, malnutrition and food insecurity by half by 2015*".[512]

This strategy has identified five objectives:[513]

- To increase household production and trading;
- To improve income generation and job creation;
- To improve nutrition and food safety;
- To increase safety nets and food emergency management system; and
- To improve the analysis and information system management.

This corresponds with the five pillars, which constitute the foundation of the current policy.[514] These pillars include:

- Availability of improved safety nets;
- Improved nutrition education;
- Alignment of investment in agriculture;
- Improved market participation; and
- Risk management.

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511 (NDA, 2002)
512 (FAO *et al.*, 2015)
513 (FAO *et al.*, 2015)
514 (Republic of South Africa, 2014)

The National Household Food and Nutrition Strategy of South Africa (2014)[515] recognises the following measures to address household-level food and nutrition insecurity, this include:

- Social grants;
- Feeding schemes;
- Fortification of staples;
- Moderation of food prices; and
- Subsistence farming supports.

However, some limitations exist in this strategy of interventions and therefore policies need to be expanded, enhanced or better focused, used in more effective combinations, and/or complemented by additional interventions. A more conducive agriculture policy supporting urban agriculture (UA) has the potential to contribute to urban food security in the informal settlement areas. In the light of the above, as well as the findings in this study, this chapter would highlight some recommendations made towards policy for more affective interventions in the quest to alleviate food insecurity in the informal settlement areas of the Cape Town Metropole, as well as South African urban areas as a whole.

8.2   Objective

The main goal of the National Food and Nutrition Security Policy is to ensure that all the dimensions of FS are met. This include the availability, accessibility and affordability of safe and nutritional food at national and household levels. Thus the purpose of this chapter is to make policy recommendations to enhance the effectivity of the current policy.

8.3   Challenges or Constraints

According to Statistics South Africa (STATSSA) (2013)[516] 13.4% of households experience hunger while 11.4% are vulnerable to hunger in South Africa with 13.8 million South Africans experience food insecurity.

Similarly to the findings in this study other research found that food insecure households are typically households that are socio-economically and or geographically

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disadvantaged.[517,518,519]   They are economically influenced by the high unemployment rate and inadequate social welfare systems. Often other factors like high fuel and food prices, the lack of productive assets (financial, human, physical, social and natural), geographical location and high HIV / AIDS infection rate contribute to poverty, food insecurity and malnutrition in South Africa. For those involved in urban farming, climate change, unstable household food production and the lack of finances for input and production costs are contributing to their dire FS situation.

Poor institutional arrangements also contribute to food insecurity and malnutrition. Crush *et al.* (2012)[520] indicated that poorly executed institutional arrangement, uncoordinated and disintegrated strategies and interventions all pose major constraints to improved food and nutrition security in South Africa.

Some of the weaknesses identified in the Food and Nutrition Security Policy document (2014)[521] are the following:

South Africa is facing FS problems and this is summarised below:

- There are not enough food emergency management systems to provide for all those who are unable to meet their immediate food needs. There is no ability to decrease the influence of natural and non-natural disasters on FS;

- There are not enough resources to provide citizens with the knowledge to make the right dietary choices;

- Productive land is not always optimally utilised for food production, often for want of inputs (including finance, equipment and water), or skills; at the same time, there is the risk that over- production may cause lower prices to such an extent that the farming practice loses profitability;

- There is poor access to facilities and/or markets for small-scale primary producers, including farmers, fishers and foresters;

- Domestic production is threatened by climate change and altered patterns of land use; and

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517 (Statistics South Africa, 2015a)

518 (De Cock, 2012)

519 (Koch, 2011)

520 (Crush *et al.*, 2012)

521 (Republic of South Africa, 2014)

- A lack of information on FS.

A recent policy review supports the argument about the lack of coherence, and found that South African agricultural policies do not actively promote FS and that it is difficult to coordinate existing policies.[522]

8.4　Policy Recommendations

According to Drimie (2016)[523] it is important to determine whether existing and emerging agriculture and food policies are guided by a clear vision and a defined set of measures to achieve this vision.

The right to food is a constitutional right within South Africa, as established in Section 27.1.b and 28.1.b.[524]　Three main focus areas exist in terms of policies implemented, since 1994 regarding agriculture namely:

- Improving the competiveness of commercial agriculture in a free market dispensation;
- Improving participation by disadvantaged communities; and
- Protecting the natural resource base.

The National Development Plan (NDP)[525] of 2012 identified agriculture as a primary economic activity with the purpose to create one million new jobs by 2030.　The NDP clearly states that ensuring quality access to basic services, health care, education and FS are key issues for building an integrated and inclusive rural economy.[526]　The NDP's central analysis regarding FS is that the ability to access food determines household FS. From this analysis it is implied that job creation, agricultural productivity, and providing aid to poor households to cope with increases in food prices are important.　In terms of safety nets, access to social grants for eligible households should be maintained and public works programmes utilised and expanded to develop rural infrastructure.

Based on the findings in this study, this following section aims to provide recommendations for policy makers.　The recommendations provided are derived from a

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522 (Hendriks, 2015)

523 (Drimie, 2016)

524 (Republic of South Africa, 1996)

525 (Hendriks, 2012)

526 (National Planning Commission, 2011)

critical consideration of food insecurity and vulnerability identified in the informal settlement areas of the Cape Town Metropole, and is further motivated by the lack of a proper food policy for the area. To summarise the above suggestions:

- There is a need to streamline data collection and analysis;
- There is a need to strengthen existing strategies and policies related to FS;
- Steps to improve access to markets for smallholder farmers must be taken; and
- An emphasis must be put on agro-ecological approaches to farming.

8.4.1   Policy Recommendations Linked to Clusters

In order to recommend policy adapting, it is important to classify households according to relevant indicators that would allow to respond to specific needs.[527]   The most food insecure households are households that are headed by females, have a high dependency ratio, with most of the households reporting income levels lower than US$ 2.00 per capita per day.   Bigger household sizes, older household heads, a higher distance to the nearest markets, not much land available to produce food and a high number of household heads with no schooling are other characteristics of the severely food insecure cluster.   These households also experience a low diet diversity.

8.4.1.1   Poverty Reduction

Within the aim of poverty reduction, which is the main reason for food insecurity, a major national policy strategy must link urban growth and other economic issues. Interventions, such as improving the capacity of the urban poor to earn a living should contribute to alleviate poverty. Households that experience food insecurity the most, are those that are low on most indicators. For them it is important to enhance their purchasing power, and these households should be the priority for the allocation of resources.

This study emphasised some factors like the reliance on cash incomes through wages and salaries and the dependence on purchased foods, among many others. Urban population growth increases the demand for many goods and services, thus the following macro and micro economic suggestions are hereby made:

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527 (Rose and Charlton, 2002)

8.4.1.1.1 International investment stimulation

According to the Trade Economics (2017)[528], the South African economy constricted with an annual 0.3 percent in the first quarter of 2017, compared to an upwardly revised 0.4 percent growth in the previous quarter. Moreover, South Africa has been downgraded to 'junk status' by two prominent rating agencies due to recent political events that includes a major cabinet reshuffle. They stated that this should result in weaken standards of governance and public finances.[529] Thus the result of the above means that investment levels in South Africa are quite low by international standards with the outcome that South Africa will not grow faster and generate more jobs without higher investment. Therefore, the Government should create and maintain an 'investor friendly' climate.

Foreign investment in South Africa should stimulate the economy and industries that would result in job creation. It is critically important for the South African Government to maintain credible and consistent macroeconomic policies.

8.4.1.1.2 Small, Medium and Micro Enterprises (SMME's)

Since SMME's can significantly contribute to job creation, it is important to address some of the challenges that these businesses face. Many barriers to entry into the market exist. These barriers include access to finance and credit, poor infrastructure, burdensome labour laws, high crime levels, lack of market access, etc. Therefor government should make it easier for entrepreneurs to start successful SMME's in South Africa. Technical assistance makes a significant difference to the success or failure of SMEs. Access to finance for SMME's in developing countries is regarded as the number one challenge.[530]

South Africa will have to meaningfully gauge and improve the efficiency of funding strategies for SMME's. They need to ensure that an efficient process is in place to allow easy access and timely funding to SMEs.

8.4.1.1.3 Expanding Labour Demand

With an ever growing labour force, the current unemployment rate of 26.5%, and an annual average annual GDP growth of 0.7% it is would be very difficult to absorb new

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528 (Trade Economics, 2017)

529 (Business Day Online, 2017)

530 (Bureau for Economic Research, 2016)

entrants, let alone to reduce the large numbers of already unemployed individuals. Considerable rapid economic growth is essential for improving the nation's employment situation and for alleviating poverty. However, apart from this, the lack of labour market flexibility further accounts for South Africa's pervasive joblessness. South Africa's labour market institutions and regulations have constrained more rapid growth in employment.[531] Labour unions have a lot of power and may also serve as a constraint for businesses to appoint. It is therefore advisable that by introducing minimal changes to the labour policies towards the goal of achieving a major increase in market 'flexibility'.

Another recommendation towards job stimulation and counteracting the expanding labour demand is that the government can implement employment subsidising schemes by paying a part of the wage or salary costs. This can be done by providing tax breaks based on the number of employees or new jobs created. It can be targeted towards unskilled, young and unemployed people. Because employment subsidies increase employment without reducing average wage income, they can form part of a strategy of redistribution as well as job creation.

The learnership system should be streamlined to be more transparent, accessible and executable.

8.4.1.1.4 Rural Development

Further development of rural areas in South Africa should be a high priority for government. Due to high poverty levels and unemployment in rural areas, urbanisation is excelling rapidly. According to Lewis (2009)[532], even though it was a priority for government to address rural needs, progress in terms of investments in rural infrastructure and service delivery were slow, and the pace of the land reform program has been disappointing.

Agriculture activities in rural areas present promising opportunities for growth. The establishment of agricultural processing facilities in rural areas, as well as strengthening and expanding markets would contribute to the economic growth and job creation of rural areas and possibly reduce urbanisation.

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531 (Lewis, 2001)   532 (Lewis, 2001)

8.4.1.2   Social Recommendations

Improved access to food through social protection and development programs and schemes are important.

8.4.1.2.1   Safety nets

Many households depend only on government grants, old age pensions, disability grants, foster care grants and child support grants.[533] From the study it was clear that different types of grants, including pensions, child support grants, other social grants (such as Foster Care, Disability, etc.), food assistance and other assistance (such as begging, gifts, etc.) represented the second main source of income among the households. Both Altman, *et al.* (2010)[534] and Frayne, *et al.*, (2009)[535] reported that social grants are the most important contributor to reducing hunger, poverty and food insecurity in poor households. The severely food insecure households are mostly households that are more dependent on grants, since not many of them are unemployed and earn no wages or salaries. Two of the most severely food insecure areas i.e. Mitchelsplain and Bonteheuwel households reported grants and gifts as main source of income.

The strengthening of safety nets is thus a vital component for poverty reduction in urban areas. According to this study, it is clear that a poverty reduction strategy should address the needs of the vulnerable groups as identified in the cluster analysis i.e. female-headed households, bigger sized households as well as areas identified to be most severely food insecure like Bonteheuwel and Mitchelsplain.

In order to increase diet diversity and boost nutrition of children, a portion of social grants should be spent on school feeding schemes. A well-established system should be put in place to expand school feeding programmes. This will contribute in the provision of nutritious food to vulnerable children and make the burden of food provisioning lighter for household heads. As reported in this study, households experience alleviated levels of hunger during the months of July and December. These are the months when scholars are on extended holiday, and school feeding schemes are not operational. Children have to be fed at their residences during these times, placing more strain on the household

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533 (Labadarios *et al.*, 2011)   535 (Frayne *et al.*, 2009)
534 (Altman *et al.*, 2010)

heads and/or income earners to provide for the whole household during these times. It is advisable that that these feeding schemes continue during school holidays, or an alternative way of providing food for children during this time needs to be put in place. Therefore, the readily availability and accessibility of improved nutritional safety nets, including government run and supported nutrition and feeding programmes, emergency food relief, as well as private sector interventions are crucial to alleviate the current situation.

8.4.1.2.2 Education

In a study by Modisaotsile (2012)[536] it was stated that an educated population is an essential platform for meeting most of the other Millennium Developmental Goals (MDGs). It is thus important to have a smooth-running education system. Without secure foundations of literacy and numeracy, our learners will never obtain the high-level skills needed by a nation to address poverty and inequality for development and growth.[537]

School education is more than children being in classrooms to obtain knowledge from books. Inputs should be on a much deeper level to enhance life skills, teach discipline and emotional intelligence. Some recommendations include the following:

- The teaching capacity at schools should be researched to determine whether an optimal teacher student ration is being met;
- Discipline at schools should be increased with the help and involvement of parents;
- Participation in sports, cultural and other extra mural activities should be motivated. The above two recommendations should constrain learners' involvement in activities that may get them into trouble e.g. gangs;
- Drug awareness campaigns and educational programs to curb substance abuse as well as unplanned pregnancies should be considered;
- Teachers should be provided with better incentives and thus be recognised and rewarded sufficiently. As a result, their commitment to their profession and job satisfaction would be enhanced;
- Teachers should also be sufficiently trained; and

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536 (Modisaotsile, 2012)   537 (Bloch, 2011)

- A better system should be set in place to identify and assist learners that struggle with school work in order to retain learners to progress to a high as possible grade.

Life skills programmes and awareness campaigns for households in the community should be focussed on the attitudes and beliefs about alcohol and substance misuse. The perceptions of adolescents must be changed. An introduction of less risky activities could lead to a more positive outcome.

Life-orientation education should be conveyed to especially the severely food insecure households. The focus should be on messages regarding family planning, to control the rapidly growing population to reduce the number of children to that which the household can adequately cater for, childcare and child welfare, in particular, messages related to the importance of breastfeeding. These educational messages need to be conveyed throughout the health sector in general. Vitamin and nutrient deficiencies should be addressed through increased implementation of vitamin supplementation distribution programs to severely food insecure and undernourished individuals. These programs may be linked to other safety nets or other support systems.

Improved nutritional education, by providing households assistance in better food management and improved meal planning should improve diet diversity and reduce wastage.

8.4.2   Urban Agriculture

Even though this study found that UA has no significant effect on the alleviation of food insecurity there is still some social as well as economic advantages. If urban farmers should receive more support from their municipalities and government, and urban farming itself is perceived as a means of social, economic and environmental benefit, it should lead to suitable policies and guidelines to make UA more sustainable.

Based on the findings of the study, the following recommendations are made in an attempt to improve the FS status of households:

- Informal education through extension services should be delivered to urban farmers on nutritional awareness and non-farm income earning opportunities.

- Government should give credit to farming households' consumption and production at minimum interest rates. This will reduce the constraint of lack of access to credit faced by households in the study area.

- Farmer access to land should be promoted and resulting from this the current land use policy should be updated in order to enable farmers to produce effectively on his or her assigned land and the optimal utilisation and development of underutilised land.

- As suggested by Abu and Soom (2016)[538] underused and unused communal land should be better utilised in order to be brought into commercial production.

- Crops should be selected according to the highest value, production and growth potential within an area. The growth potential would include the potential to enable job creation.

- A very careful selection process should be applied when the selection of land reform beneficiaries takes place. It is advised that settled farmers, or people that are qualified and or have vast experience in farming to be appointed as beneficiaries since they would provide job opportunities and play a mentorship role for the new entrants.

- A thorough selection process should also be applied when selection of land takes place. Land with high production potential and good established infrastructure, like irrigation, fencing, etc., should contribute to the success of the distribution process.

- Agricultural inputs, including mechanisation packages, working capital together with ongoing extension support services should be provided.

- Improved access to market participation of urban farmers should be created through linkage with public-private partnerships, well-established government purchase programmes for produce and transportation programmes of produce to the market.

In the context of the above chapters, it is clear that UA initiatives should be capable of providing fresh food in an effective manner and in addition to this survive financially. A few strategies that can be applied is to:

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538 (Abu and Soom, 2016)

- Specialise on a few types of commodities in order to reduce production costs;

- Produce high value produce that; and

- Add value to produce by incorporating alternative steps within the supply chain like processing, packaging and distribution.

8.4.3   Monitoring, Evaluation and Research

8.4.3.1   Monitoring and Evaluation of Agricultural projects

Even though many exertions were executed to improve FS and nutrition through agricultural and other projects throughout the years, the issue started to receive high level international policy attention.

Agricultural initiatives are frequently vindicated on the grounds that due to the fact that foods are produced some definite improvement of either or household FS and nutrition will be experienced. However, it is very rare for agricultural projects to actually measure these effects. According to a study by USAID (2011)[539] it was reported that it is seldom clear whether a given project had a positive or negative effect on FS and nutrition levels of food-insecure households and undernourished individuals.

Continuous monitoring and evaluation of agricultural projects to determine their impact on household food insecurity and nutrition is imperative given the scarcity of data documenting successes and failures in such projects. This will enable government and other stakeholders to rapidly address possible adverse effects identified in such projects.[540]

An increased investment in food and nutrition security research and technology is considered vital to answer to the production challenges and poor level of household FS the Western Cape population is currently facing. Consequently, improved FS information management systems should give decision makers real time data regarding the state of FS in the country.

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539 (USAID, 2011)   540 (Herforth and Ballard, 2016)

8.4.3.2   Monitoring and Evaluation of Food Security

For the broader population it is important to have an integrated multi-sectoral food and nutrition security early warning and monitoring information system in place on household, municipal, provincial and national levels. Thus, it is important to institutionalise inclusive, efficient and effective national and provincial structures and/or forums for FS analysis at national and provincial levels in order to improve the monitoring and evaluation of FS.

Government has satisfactory policies on FS, and if the implementation thereof is thoroughly monitored and results thereof evaluated food insecure households and areas affected would be identified promptly enough to take action and alleviate the situation. Some of these policies include the following suggestions:

- A central database should be created to align various information systems and analysis of existing indicators. This database should be maintained and operated at national and provincial level.

- The generated baseline for food and nutrition security should be monitored and updated regularly with geo-referenced national and provincial maps for transitory food and nutrition security.

- Better linkages should be established with academic institutions, private companies as well as experts in the field FS and nutrition.

- Better data collection methods, analysis and dissemination tools should be identified and further developed to measure and address all dimensions of FS on all levels.

8.5   Discussion and Conclusions

In conclusion, the researcher suggested several hypotheses towards the study.   In general, it would seem obvious that urban farmers would be more food secure than non-farming households due to the production of food. This study found that both of these groups are very poor and severely food insecure with no significant difference between the groups. There are however significant differences between the different informal settlement areas.

The next objective was to identify the factors and the level these factors affect urban household FS. It was hypothesised that income per capita plays the most important role

of all factors influencing household FS. This hypothesis was shown to be true since buying power and the expenditure on food determines the quantity and types of food that the household is able to purchase.

Since there is an ongoing debate regarding the contribution of UA towards FS, the researcher hypothesised that households involved in UA are significantly more food secure than non-farming households and that proper research in and implementation of UA systems could feed the Cape Town Metropole in the future. This study however proved the hypothesis to be incorrect regarding the contribution of UA, but the researcher believes that good research, identification and implementation of the most suitable UA systems in the Cape Town Metropolitan area, has the ability to feed the ever increasing population in the future.

The hypothesis regarding the composition of a typical food secure household was accurate. Food secure households are mostly headed by a male with a household comprised of a few members and thus a low dependency ration. These households are close to the markets and have ample land available to produce food. The most severe food insecure cluster or group is the opposite of this group. It is thus important to be able to identify these households to focus on their needs.

Food insecurity is a reality in the informal settlement areas of the Cape Town Metropole. While considering all dimensions of food insecurity, it is evident that households are severely affected by this phenomenon.

When looking analytically at the food and agriculture policies arising from the post-apartheid era, little progress was made due to various factors, especially urbanisation, unemployment and high living costs. As stated by Drimie (2016)[541], :*"Food security is not a technical issue that can be addressed by departmental programmes, nor an economic question dealt with in an skewed market. It requires a coordinated approach that has both political will and resourcing, including elements of immediate and direct relief, and structural and institutional change to address distribution problems"*. It is hence

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541 (Drimie, 2016)

challenging for government to solely develop food system policies and apply governance due to its societal nature.

Another challenge is for the role players in FS policy making to be inter-reliant when referring to activities and problems. This interdependent state of actors, activities and problems may be the main reason why the policy environment has struggled to achieve the intended outcomes.

It is advisable for government to acknowledge the importance of a wide range of participants in both the formal and informal food system and include institutions that may contribute to the FS situation, in terms of research or expertise, in developing policy and implementing thereof.

If all role players are able to get together in synergy, and have one purpose at task i.e. to alleviate the state of households' food insecurity situation and address poverty in the country, progress towards the sustainable development goals set by government will be made.

RECOMMENDATIONS FOR FURTHER STUDY

This study touched on the contribution of UA towards FS. In this study, it was evident that UA does not contribute to FS significantly. There were however indications of a positive impact on income and expenditure factors, diet diversity and some social factors. One must keep in mind that this conclusion was made on urban farming households in the informal settlement areas of the Cape Town Metropole, households that are generally very poor, farming on a small scale and their social situation is very depraved.

It is thus recommended to further this study to include small and commercial farming households, and do a thorough typology study of UA systems. In relation to this, it would be imperative to do a comprehensive investigation of successful urban farming systems, locally as well as in developed countries.

Further research and development in the designing and implementation of sustainable UA systems may have the ability to feed the ever-increasing population of the Cape Town Metropole of the future.

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