Bio-fuel expansion and urban food supply in South Africa

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Introduction

Bio-fuels and the use and production thereof first became popular in the early 2000s when climate change became an important current issue.[1] Recent studies show that global bio-fuel production has tripled between 2000 and 2007 and that it is also projected that those numbers may have doubled again in the past year (2011).[2] Against the background of climate change and environmental degradation bio-fuels has been promoted as one of the most promising sources of alternative energy due to the fact that they are renewable sources of energy, the technology for the production of bio-fuels are available and because they can contribute to the mitigation of the effects of climate change through the reduction of carbon emissions.[3] Bio-fuels are gaseous fuels, liquids or solid fuels that are produced from raw natural materials and food crops such as plant matter, sewage, dry matter, cane sugar and wood pulp.[4] Bio-fuels that are developed through means of conventional technology are commonly referred to as first-generation bio-fuels such as, among others, vegetable oil, bioethanol, biodiesel and butanol.[5] A second group of bio-fuels called second-generation bio-fuels are then produced from what is referred to as cellulosic biomass feed stocks and uses more technical and technologically more advanced processes of production.[6] These second-generation bio-fuels and the processes through which they are developed suggests that faster growing, non-agricultural crops that includes grass, algae and even fast-growing trees could in the near future be used for liquid bio-fuels.

The debate around bio-fuel production and expansion on the African continent is a multi-dimensional debate. One of these dimensions that have received particular attention in literature around the topic is the link between the production of bio-fuels and food security.[7] This is colloquially referred to as the *food versus fuel* debate. This debate mainly stems from the possible vulnerability of the food security of households and individuals when staple food crops such as maize are used in the production of bio-fuels as well as the potential conflict that could arise in terms of the resource allocation between crops used for food and crops used for the production of bio-fuels.[8]

This paper will aim to interrogate the interplay between what I would like to call a triad of factors crucial to the *food versus fuel* debate in South Africa that can influence the food security of households and individuals in specifically cities of South Africa specifically in terms of food supply to urban centres of South Africa, which will form the basis of the argument (Figure 1). This triad of factors is first of all the fact that South Africa has a very well developed and technologically advanced large-scale commercial agricultural sector which would suggest that the country has the potential, expertise and facilities to also produce bio-fuels on a large scale. The land question in South Africa is however a very complex one. This dispossession of land and undermining of ownership of land based on racial grounds during the 20th century in South Africa has created the need for land reform to take place. A statement delivered by the South African Minister of Rural Development and Land Affairs, Gugile Nkwinti in March 2010 paints a concerning picture. The minister revealed that more than ninety per cent of farms that were bought up by the South African government post-1994 for restitution or redistribution to black farmers are unproductive and not functional.[9] The land reform process in South Africa will be discussed in more detail in the paper. The third and last factor is urbanisation. South Africa, as most other developing countries in the world and many African nations, is become urbanised at rates never experienced

before. As the urban populations of South Africa continue to grow, the need for fresh, nutritious and healthy foods at the lowest possible rate will only increase.

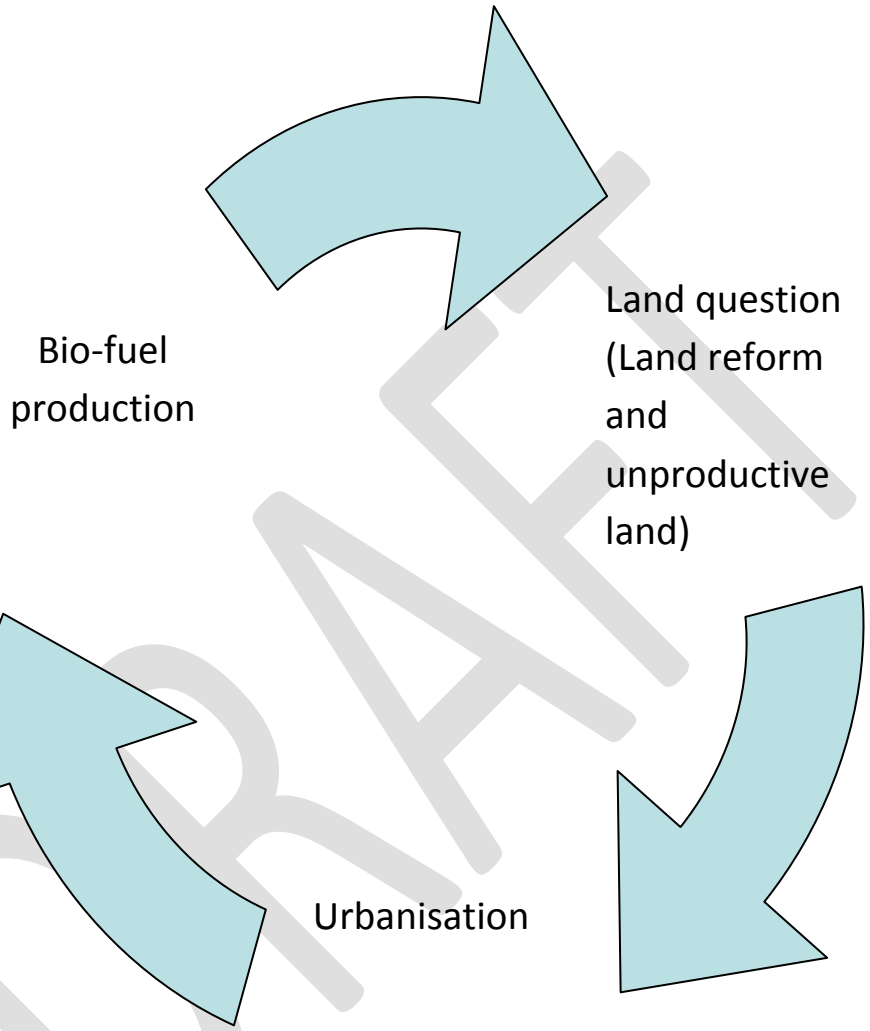

Figure 1: Interplay of aspects of the food versus fuel debate in South Africa that can influence urban food supply

A current overview of bio-fuels development in Africa with specific focus on South Africa

According to authors writing on the opportunities for bio-fuel production on the African continent, bio-fuels are a relatively new concept on the continent and it is only in the last few years that bio-fuel production on a large scale has been considered.[10] The demand for bio-fuels is rapidly increasing globally, in particular in industrialised countries such as Germany, Canada, Spain and the United States of America (USA) and in countries such as India and Brazil significant attention has been given to the issue publicly and through legislation.[11] Despite increases in prices of petroleum-based fuels, uncertainty about the longevity of current oil reserves in the future and concerns about climate change, relatively little effort on the African continent has gone into the promotion of bio-fuels and its potentials given the estimated large resource base for bio-fuel production.[12] This generally low level of awareness of the opportunities and potential benefits of bio-fuels is exacerbated in many cases by an absence of clear policy frameworks and instruments on bio-fuels.[13]

In this regard the South African government approved a bio-fuel strategy for South Africa in December 2007 called the Bio-fuels Industrial Strategy of the Republic of South Africa.[14] The strategy has as its aims the target to achieve an average bio-fuel market penetration of 2 % of all liquid fuels in the country by 2013. The original target of the strategy was 4, 5% but this has been decreased amidst concerns about food security in the country and as result maize, a staple food crop for a large bulk of the South African population, was banned from being used as bio-fuel crop.[15] The primary objective of this strategy is the promotion of farming in areas that were previously neglected by the system of racial segregation in South Africa and areas that previously did not have access to markets for their produce.[16] This strategy has however not been able to stimulate the development of a vibrant and effective bio-fuels strategy yet. Van Zyl and Prior notes that the only real activity to date has been an investment by the Industrial Development Corporation (IDC) of South Africa and the Energy Development Cooperation (EDC) to the value of 3.2 Billion Rand (€327 Million/ US$437 Million) in two bio-fuel projects that should be able to produce 190 ML of bio-ethanol from sugarcane and sugar beet crops.[17] South Africa today currently has more than 200 small entrepreneurs that produce biodiesel on a small scale, mostly using waste vegetable oils in the production thereof.[18]

Further apparent hurdles to bio-fuel production and expansion in Africa, especially southern Africa is the technologies necessary for bio-fuel production. The technology is new to some parts of the region and as such investment in research and development towards bio-fuels and the production thereof would be crucial.[19]

The dimension of the potential conflict between bio-fuels and food security is a global concern in particular when high quality soils, that can be found in large parts of the African continent, is predominantly used for bio-fuel crop production and not for food crop production. As indicated maize is a major staple food in Africa. About 95 % of all maize that is produced in Africa is being used for human consumption and of the 22 countries in the world where maize is the major component of the populations' diet, 16 can be found on the African continent.[20] The reason why maize specifically is of worrying concern is the fact that the technology for bio-fuel, mainly bio-ethanol, which is produced from

maize, is highly developed, specifically in the USA which is a major supplier of grain to the world market.[21]

There are two schools of thought around the question whether bio-fuel production has in fact worsened food security globally, specifically around this use of maize for bio-ethanol production as maize is such a staple food crop in many parts of the world and the African continent. The first argument is that the USA use of maize for bio-ethanol production by also giving subsidies to farmers, who produces such bio-fuels, is a major concern of rising food prices that is worsening the food security situation of many households and individuals.[22] In 2007 for example, bio-ethanol production was responsible for using up 25% of the total stock of maize in the USA,[23] meaning that less maize could be exported to parts of the world that depend on such exports especially countries that was reliant on food aid at the time. The second school of thought is that rising food prices and oil prices together with increased bio-fuel production were only a coincident and that rising food prices globally may be a result of combination of other factors such as poor agricultural policies and a change in diets and eating habits of fast growing economies such as India and China.[24]

Literature however overwhelmingly suggests that the production of bio-fuels have played a very big role in rising food prices globally and subsequent food insecurity.[25] It is therefore crucial to remember that this interaction between the market for crops for bio-fuel production and crops for food is a very complex one and that the growth of the bio-fuel industry has the potential of influencing not only the price of crops only suitable for food, but also the price of crops suitable for both food and fuel.[26]

Land reform and the plight of unproductive land in South Africa

The 1991 South Africa White Paper on Land Reform estimated that between 1960 and 1980 3.5 million people were removed from land in South Africa thereby refusing them the right to own land.[27] Discriminative legislation such as the Natives Land Act of 1913, the 1936 Natives Trust and Land Act and the 1950 Group Areas Act also contributed to this. This dispossession of land and undermining of ownership of land based on racial grounds during the 20th century in South Africa has created the need for land reform to take place.

The South African government's policy for land reform has three components namely restitution, redistribution and tenure reform. Restitution has the objective of returning land or providing compensation to people who were dispossessed of land under apartheid legislation and policies, redistribution has got the objective of increasing black ownership of rural land in South Africa while tenure reform aims to improve the tenure of rural and peri-urban land dwellers in South Africa.[28] The present official national target for land reform is to redistribute 30% of commercial agricultural land to black landowners by 2014. However by December 2004 an area equal to only 4, 3% of this target of 30% was actually transferred to black landowners.[29] It is important to note that this target of 30% is a collective national target in terms of the transferral of land under all three components of the

government's land reform strategy i.e. restitution, redistribution and tenure reform. The December 2004 figure of 4, 3% of land that has been transferred amounts to 3, 5 million hectares of land.[30] The Department of Rural Development and Land Reform when it was still called the Department of Land Affairs (DLA) estimated that the government would, in order to meet the target of 30% set for 2014, need to redistribute an additional 20, 6 million hectares of commercial agricultural land between 2004 and 2014 i.e. an average of 1, 87 million hectares of land per year. At the end of 2004 the average figure was 0, 38 million hectares per year which means that if the current figures do not improve the target that the government set for themselves would only be reached in the year 2059.[31] Furthermore, a statement delivered by the South African Minister of Rural Development and Land Affairs, Gugile Nkwinti in March 2010 revealed that more than ninety per cent of farms that were bought up by the South African government post-1994 for restitution or redistribution to black farmers, are unproductive and not functional. [32] This is worrying statistics in a country where food security and lack of the means to secure food is one of the core developmental and societal challenges of its young democracy in the 21st century.

The Centre for Development and Enterprise (CDE), a South African independent policy research and advocacy organisation focusing on critical national development issues and their relationship to economic growth and democratic consolidation, in their 2005 research report on land reform in South Africa made a few very important observations about what is according to them "neglected realities" in the government's approach to land reform. Firstly it is mentioned that the dominant perspective on land reform in South Africa tends to focus too much on the question of rural land and that the demand for land by black South Africans is a phenomenon that is mostly found in urban and peri-urban areas.[33] Secondly South Africa has become a predominantly urban society and will become increasingly more urbanised.[34] This will inevitably lead to a need for urban land reform and urban land redistribution that will need much more attention in the near future. Thirdly it is important to take cognisance of the fact that for previously disadvantaged groups of people, participation in government programmes such as land reform is not the only way to gain access to land or use land to its maximum potential.[35]

A 2008 research report, also undertaken by the CDE, has listed a number of key challenges to land reform South Africa is currently facing. The fact that South Africa is so rapidly becoming an urban society means that people are most concerned about land, homes and jobs in urban areas of settlement. Furthermore, only a small minority of people interested in obtaining land in urban areas want to farm on it and would be able to indeed do so.[36] This means that any successful land reform programme must include the identification and release of urban and peri-urban land for purposes of settlement, housing and job creation as well as production.[37] There is also no one land reform strategy that is a "one size fits all" approach. There are too many differences in appropriate land usage between different sectors and regions.[38] As such financing models will also differ significantly between different sectors and regions. Effective land reform thus requires a high degree of specialisation, experience and local knowledge. The participation of black farmers in the production cycle at more profitable points is very important. Just providing land to a new beneficiary of land reform will not be enough and therefore it is important to

pay more attention to equitable black economic empowerment (BEE) programmes with regards to land reform in South Africa.[39] New black farmers should be able to see themselves as in a better position than before they were given land through land reform processes. Support to new farmers after their settlement is therefore of utmost importance so that black farmers can be fully integrated into the established farming community.[40] Land reform policy must further be compatible with the economic dynamics of the land and agricultural sectors in South Africa. In South Africa large-scale commercial farming contribute to a much larger proportion of agricultural output than small-scale and more traditional farming on smallholdings or communal farming areas. Farmers in general however are under enormous pressure in South Africa. In 1996 there were 60 000 commercial farming units. By 2007 however this number has declined to 40 000.[41] Of this number of commercial farming units, 20% produces 80% of total food production.[42] There is thus an increasing consolidation of land into larger units of ownership and production. The next big challenge is the pace of processing and settling land claims in South Africa as indicated earlier. These delays large seem to be a result of inexperienced and too little staff at the various offices of the South African Department of Land Affairs and the Land Claims Commission of South Africa.[43] The South African state has furthermore only had mixed success in acquiring land at reasonable prices and as result in some cases the prices of land has been driven up when the state purchase land from farmers who sell their farms to re-enter the land market.[44] Lastly, the commercial banking sector in South Africa is playing an increasingly important role in financing land purchases.[45]

It is clear that the land reform programme in South Africa must gain more momentum. The biggest concern is that most South Africans regard land reform to be an area that is continuously failing and this is a perception that needs to be changed with more confidence in the programme and a more realistic optimism that land reform can indeed make a difference in the lives of those who are beneficiaries to the programme and to the state of the South African society and economy in general.

Urbanisation in South Africa

South Africa, as most other developing countries in the world and many African nations, is become urbanised at rates never experienced before. According to the United Nations Human Settlements Programme (UN-HABITAT) 61, 7% of the South African population currently resides in urban areas.[46] Their predictions are that this figure will rise to 66, 6% of the population in 2020 and 71, 3% of the total South African population in 2030.[47] With regard to urbanisation in South Africa, the CDE states that it is the “most important but also most neglected social dynamic” in South Africa.[48] Cities in South Africa are indeed among the fastest growing cities on the African continent. South African cities are growing at an average rate of almost 2% annually.[49] Urbanisation in South Africa is underpinned by large-scale rural-urban migration both from rural areas to urban areas within South Africa as well as migration from across the African continent to cities and urban conglomerations in South Africa. Such migration is fuelled by South Africa’s status and image as the largest, most developed and most stable economy in Africa. According to Peberdy cities in South Africa are the places that are at the interface of South Africa

and the rest of the southern African region and continent as well as the rest of the world.[50] 21 key urban areas that have been identified in South Africa as urban areas of high importance economically and socially, account for almost 70% of the total output of the South African economy.[51] Despite being the places where wealth is being created South African cities are also places of great inequality and poverty. The official unemployment rate in for South African cities averages around 25%. [52] South African cities are also facing social crises particularly with regard to healthcare, crime and violence. Some of the general problems faced by municipalities and city managers are as a result of high rates of internal migration as well as migration from nationals of other African countries into South African cities. Statistics show that about 35% of the population of Johannesburg that are South African citizens were born outside of the Gauteng province, of which Johannesburg forms the centre.[53] In Cape Town almost 60% of the population growth of the city for example between 1996 and 2001 was due to migration from other parts of South Africa into the city by South Africans.[54] The South African Press Association (SAPA) reported in 2008 based on a study that was done on government level, that 5, 5 million people in total migrated to urban areas of South Africa between 1996 and 2001 which is a rate of more than one million per annum.[55]

There is consensus that the face of the South African population is now an urban face and that urbanisation will for the next years to come be one of the most defining current issues the country will have to learn to deal with and understand especially on a policy-making level. It will remain to be seen exactly how it will shape South African society in years to come and sufficient and ongoing research is needed this impact of urbanisation on the South African society closely.

The potential impact of this triad of factors on the food security of urban households in South Africa

What will now be discussed is what can be interpreted as a triad of factors that the paper has talked about so far that are all very closely interrelated and that can potentially have a negative impact on the food security of urban households and individuals residing in urban areas of South Africa. The combination of a land reform programme that is not reaching its projected targets, land that is unproductive and the move towards the production of bio-fuels using food crops could have a defining impact on the food security of urban households and individuals in South Africa and this paper argues that the main area where this impact will be the most evident is in the area of the supply of food to cities in South Africa.

Food is being supplied to any urban or metropolitan area through various different food supply and distribution systems (FSDSs). FSDSs are complex systems whereby a range of activities, functions and relations such as production, handling, storage, transport, processing, packaging, wholesaling and retailing are combined with each other in order to enable cities to meet their food needs.[56] These activities are performed by different agents in any particular food system that includes food producers, assemblers, importers, transporters, wholesalers, retailers, processors, shopkeepers, street vendors, service providers, packaging suppliers, public institutions and private associations of e.g. traders, shopkeepers and consumers.[57]

According to Argenti and Marocchino, three levels exists within any system of urban food supply namely the regional level, the metropolitan level and the urban level.[58] Understanding these three levels and how they fit into the overall supply of food to a city is of utmost importance for governments and city planners.

Food supply at the *regional level* includes rural food production; facilities for assembling, handling and packaging of food; processing of food; storage and transportation of food.[59] At this level it is important to create conditions where adequate amounts of food can be produced and where this food can be transported to cities at the lowest possible cost and the most hygienic conditions possible. This means that there needs to be assembly markets where food from all producers in a particular region can be concentrated, warehouses where food can be stored to reduce the amounts of food that gets spoiled, adequate transport services and infrastructure for transport, an efficient communications systems between rural and urban areas and adequate sanitation and hygiene in all of these facilities.[60]

At the *metropolitan level*, food supply mainly concerns food production in peri-urban areas; facilities for assembling, packaging and handling food; food processing and what Argenti and Maracchino calls slaughterhouses and transportation of food.[61] In relation to the production of food in peri-urban areas, peri-urban farming not only plays an important role in the supply of food, but it also provides employment and supplementary income to low-income families. It can further create a situation where the costs of transporting food to urban areas with high levels of consumption are lowered. Lastly peri-urban farming can play a role in the disposal of organic waste through the re-use of such materials as fertilizer.[62] Slaughterhouses are facilities where livestock are slaughtered and processed. Although slaughterhouses are part of the food supply system in the sense that they provide facilities where livestock on the hoof can be processed in order to produce meat, they can also be unhygienic and can therefore pose health risks. It is furthermore one of the principal causes of air, water and soil pollution.[63] In order to maximise food supply at the *metropolitan level* the following measures could be taken: protecting the land resources, creating conditions where food in sufficient quantities can be produced and transported to cities at the lowest possible cost, create conditions that will ensure that all activities in slaughterhouses take place under hygienic conditions, public and private investments that will contribute to meeting the growing urban demand for food needs to be encouraged and increasing efforts to minimise the negative environmental impact of food supply activities.[64]

At the *urban* level the supply of food mainly concerns urban food production; food processing which at this level also includes slaughterhouses and the transportation of food.[65] Agricultural activities in urban areas are much more difficult and much more under threat than in metropolitan areas due to the population density being much higher in urban areas than in metropolitan or more peri-urban areas. A high risk of pollution is also possible in densely populated areas for reasons such as the improper use of chemical products and liquid and solid waste.[66] Farming activities are therefore much more under threat in urban areas than in peri-urban and other areas that form part of the larger metropolitan area. In order to increase food supply at the *urban level* attention needs to be given to the following: supporting and promoting urban agriculture, protecting the land resource, promoting kitchen gardens on suitable

land, creating conditions for the production of sufficient quantities of food and creating conditions where all food processing activities can be carried out in hygienic conditions.[67]

The statement by the Minister of Rural Development and Land Affairs that 90% of farms that were bought up by the South African government for redistribution after 1994 are now unproductive, has a direct link to urban food supply, particularly at the regional level. As mentioned earlier in this paper, in South Africa large-scale commercial farming contribute to a much larger proportion of agricultural output than small-scale and more traditional farming on smallholdings or communal farming areas. Farmers in general however are under enormous pressure in South Africa. In 1996 there were 60 000 commercial farming units. By 2007 however this number has declined to 40 000.[68] Of this number of commercial farming units, 20% produces 80% of total food production.[69] The share of the Gross Domestic Product (GDP) that the agriculture sector accounts for has also decreased from 4% in 1994 to 2, 9% today.[70] According to Vink and Van Rooyen this does however not mean that the sector as a whole is declining, but rather that the services sector in South Africa is growing at a faster rate.[71] Small-scale farming has been in decline for the past 10 years and the divide that does exist between the level of output of commercial farming and the level of output of small-scale subsistence farming appears to be growing.[72] What is very important to however take note of is that both types of farming contribute to national and household food security in South Africa and therefore support from the public and private sectors is needed for both these types of farming in the South African agriculture system.

Conclusion and Recommendations

Bio-fuels and the use and production thereof are not all negative. It is indeed true that literature in most cases suggest that there are risks with regards to food security in particular prices of staple food crops. The fact that food prices are however one of the biggest determinants of urban food security, cannot be understated. Urban residents mainly get access to food in a city by purchasing it. Food purchasing is therefore critical in urban areas and household agriculture is becoming less significant as primary source of food, as opposed to rural areas where agriculture, livestock and small-scale farming to a large extent is still the main source of food for a household.[73] It is in light of the above discussion that it will be important to understand how food systems as a whole function. Oxfam International in a report just published by the organisation, stated the same concern namely that the current global food system is struggling with the challenges of climate change, ecological degradation, population growth, rising energy prices, rising demand for meat and dairy products, and competition for land from bio-fuels, industry and urbanization.[74] There is a need to better understand how the food systems of South Africa operate so that government and policymakers can understand how food comes into the cities; where that food comes from; and where in the system points of high vulnerability exists.

It is therefore recommended that more attention is given to the following:

- Increased research on food systems of cities in South Africa and Sub-Saharan Africa. A city like Johannesburg has a very dysfunctional food system in terms of the sources of food, the areas of food production and the distribution of food. It would be imperative to conduct comprehensive studies and analysis on the structure of food systems of cities in order to gain a clear understanding and comprehension of how food moves to and from and within a city. It is also important to pay attention to the roles of various actors in the food system within a city and how those roles can be governed and regulated more effectively. No comprehensive studies have been done on the food systems of South Africa's major cities. The national and local government should have a clear and informed understanding of food in their cities.

- The South African government and the governments of Sub-Saharan African countries at large need to come together to work unified towards improving food supply and distribution systems on a larger regional level.

- Food security, particularly *urban* food security, must become part of the development strategy of every urban and metropolitan area in South Africa as urbanisation is a demographic trend that will be part of the South African society at large for the next decades to come.

- Food production in cities. More attention should be given to the role of small farmers in increasing food security in cities. Sufficient support should be given to small farmers both in terms of subsidies and other financial support and in terms of building and investing in the capacity of small farmers to contribute to food supply to cities. Small farmers should have better access to resources that will enable them to be even more productive in terms of amount of food that they produce. Investment in the small farming sector of South Africa, especially in urban, peri-urban and metropolitan areas at large can contribute very substantially to urban food security.

- Increased research on new forms of income generation for urban residents. Together with effective food supply and distribution systems, sufficient levels of food production and increased agricultural activities in urban and metropolitan areas, income generation is one of the key determinants in ensuring food security in individual and household level in cities in South Africa.

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