

Scoping The Urban Agriculture, Food And Nutritional Security Nexus: Empirical Evidence From Epworth, Zimbabwe

Leonard Itayi Chirenje¹, Chengetai Diana Manhanzva², Manasa Sibanda³

¹Department of Social Ecology, Faculty of Social Sciences, Great Zimbabwe University, P.O Box 1235,
Masvingo, Zimbabwe

² Agricultural Economics, University of Zimbabwe³ Department of Social Ecology, Faculty of Social Sciences,
Great Zimbabwe University

Abstract: *This article assesses the contribution of urban agriculture to food and nutritional security for local citizens in Epworth, Harare the capital city of Zimbabwe. The study is guided by the hypothesis that urban agriculture practices have a positive impact on households' food and nutrition security. Data employed in this study were drawn both from primary and secondary sources. The questionnaire was the major primary data collection tool. Secondary data were drawn from a comprehensive review of literature using reports, articles, books and conference papers. The study employs the Food Consumption Score (FCS) and the Household Dietary Diversity Index (HDDI) as proxy indicators of food consumption and they are also quantitative indicators of food insecurity. Using the FCS the study found that participation in urban agriculture significantly closes the gap between the poor and the more affluent citizens particularly increasing the quantities of beans, tubers, legumes and vegetables consumed. Factors that were found to influence overall urban food and nutrition status are urban agriculture, total cultivated land, income levels and the education level of the household head. The article recommends on aligning the council by-laws to increase the land designated while government can assist in the form of subsidies for urban agriculture.*

Keywords: *Urban Agriculture, Urban Livelihoods, Food Security, Nutritional Security*

I. Introduction

The importance of urban agriculture has grown rapidly over the past decade, both in the international development fora and in terms of recognition by national and city authorities (FAO, 2007). Urban agriculture is becoming a popular is a coping livelihood strategy for the urban poor in developing countries (Kutiwa et al., 2010; Tefera, 2010; Lawal, 2012). In Zimbabwe increasing urban poverty has led to a decrease in the household food and nutrition security. This has forced economically weaker urban households to resort to urban agriculture as a livelihood strategy. Urban agriculture is not formally recognised as a sustainable agro-ecological practice at policy levels in many developing countries' cities. It is usually discouraged due to little appreciation of its role particularly to the urban poor. Most environmental and city authorities focus only on the negative impacts of urban agriculture. Admittedly if urban agriculture is not properly regulated and practiced it can cause environmental problems. It takes up urban green spaces, farmers can practice environmentally unfriendly agriculture such as stream bank cultivation, crops can block road views, and the use of chemical fertilisers can contaminate underground water sources (Smit, 2001). However urban agriculture if properly planned and practiced has several advantages. It can help clear roads, destroy habitats for pests and dangerous animals especially mosquitoes and snakes. Most importantly, urban agriculture can provide a sustainable strategy in the global fight against food insecurity (Veenhuizen, 2006; FAO, 2007; Kutiwa 2010). This study assesses the contribution of urban agriculture to food and nutritional security of the urban poor in Epworth, Harare.

Besides rapid population growth, urban poverty increases in Zimbabwe have been caused by a two decade economic recession which began with the structural adjustment policies implemented in the 1990s that reduced government spending and decreased employment opportunities. This culminated to a deep social and economic crisis characterised by a hyperinflationary environment and low industry capacity utilisation, leading to the overall decline in Gross Domestic Product by 50 percent in 2008 (Hanke and Kwok, 2009). A decrease in employment opportunities is the major cause of high unemployment rates prevailing in Harare in which official unemployment statistics may understate the severity of unemployment because they are not gathered frequently and quickly become out of date in fast growing cities (Nugent, 2000). High unemployment has led to a huge decrease in household food and nutritional security especially among the urban poor. High unemployment prevailing in Harare has led to the surge of informal sectors in the economy. An estimated 56 percent of urban employment throughout Africa is based in the informal sector (Lawal, 2012). Urban agriculture is one of the informal activities that is playing an important role in providing food and nutritional security for poorer households and has since expanded rapidly (Veenhuizen, 2006).

Urban agriculture can be defined as the production of crops and or livestock within the administrative boundaries of the city and related activities such as the production and delivery of inputs, processing and marketing of products (Mbiba, 1998; FAO, 2007, Kutiwa, 2010). The practice can involve anything from small backyard vegetable gardens to farming activities on community lands by an association or a neighbourhood group (Veenhuizen, 2006, Lawal, 2012)

Urban agriculture brings with it great potentials for enhancing the situation of the urban citizens especially those with the lowest incomes who are dependent on the access to locally grown food (Lele and Candles, 1981, Veenhuizen, 2006; Kutiwa, 2010; Lawal, 2012). Urban agriculture can increase national food reserves in the sense that it reduces the demand for market food products and increase the stocks held by the official food marketing organisations (Todaro, 1977; Golden, 2013). The practice of urban agriculture is not confined to the poorer households inasmuch as they are more dependent on it for income and nutrition (Nugent, 2000). Studies have shown that even the high income households also take part in urban agriculture and they are more focused on gardening and cropping activity such as maize cropping and animal husbandry (Arku et al. 2012). For the urban poor urban agriculture has positive impacts on public health, mainly through increased food security and consequently improved health conditions (Nugent, 2000).

Urban agriculture is a global and growing pursuit that can contribute to economic development, job creation, food security and community building (Kutiwa, 2010). In Zimbabwe, about 10 percent of the land in Harare is used for urban agriculture. Urban agriculture practice is on the increase in Harare, hectares under cultivation in the city had increased from 9000ha in 2008 to 12000ha in 2009 and a yield increase from 5.5tons to 6.5tons per hectare.

1.1 Problem statement

Much as food insecurity and urban agriculture have been widely researched either as separate entities or in their nexus, a general understanding of these two important facets is still elusive due to a lack of reliable data (Zezza, Tasciotti, 2010). Many studies have been done on these two concepts. Food security is a well published area in social science where mostly qualitative research methodology is employed. In the field of agriculture food security has been researched through the use of quantitative methodology which however received some criticism for oversimplifying scenarios. There is need to shift from the 'over-simplistic' approach when tackling the issues of food security while providing hard data which is reliable. This study aims to fill in this knowledge gap.

Studies on urban agriculture typically focus on the impact of the practice on the environment and onland use conflicts between the local authorities and the poor urbanites engaging in urban agriculture (Mbiba, 1994; Arku et al, 2012; Taru, Basure, 2013). Other studies have focused on the environmental and social as well as the economic impact of urban agriculture. Some fewer studies have explored the diverse methods of production that are employed by the urbanites and the impacts of these on soil quality, rivers, and even underground water. Of the few studies that have been undertaken on urban agriculture, focus has been on plots that are located in peri-urban areas which were designated as commercial agriculture areas. Little has been done to explore urban agriculture in the context of food and nutrition security of poor households in cities and towns. This study attempts to fill in this a knowledge gap.

The few studies that have been pursued over the nexus of urban agriculture and food security have focused mainly on the economic impacts. That is to say, most studies are very specific in their attempts to measure food insecurity based on monetary values available to households. As such most studies do not employ quantitative methodologies. Or they employ quantitative tools which have no bearing on the nutrition aspects of food security. There is therefore a need to research on urban agriculture and food security and nutrition employing effective quantitative methodology which will provide reliable, replicable and useful data.

To add to this, consumers are rarely mentioned in publications on urban agriculture (Baumgartner and Belevi, 2001), as well as the vendors who are involved in trading the urban agricultural products. This study therefore seeks to explore the impact of urban agriculture to the consumers, in particular the urban poor who in most cases are also the producers. Furthermore this study explores how urban agriculture contributes not just to food insecurity but on food nutrition of households. This is a novelty which will add to the knowledge on urban agriculture and household food security.

1.2 General Objective

To assess the contribution of urban agriculture to urban households' food and nutritional security.

1.3 Hypothesis

Urban agriculture has a significant positive impact on households' food and nutrition security.

II. Methodology

2.1 The study area: Epworth, Harare

Harare is one of the major cities in Zimbabwe where urban agriculture is expanding rapidly and is becoming more common amongst many households. Harare is a suitable study site because it is large in area (392 757km²) and has a large population of 2 098 199 people (CSO,2012). It is occupied by approximately about 16percent of Zimbabwe's population (CSO, 2012). Epworth is located about 15km to the south east of Harare city centre and is a low-income peri-urban residential area. The area became largely an informal area after the sudden influx of people fleeing the war that had hit the rural areas in the 1970's. Since then, many migrants from the rural areas who cannot afford the rents paid in other formal suburbs tend to seek accommodation in the cheap area of Epworth. The area is thus mainly inhabited by poorer households. This study is essential as it provides an in-depth study of the poor people involved in urban agriculture, and the results produced can be inferred to a larger population in particular, Zimbabwe.

2.2 Sources of Data

This study uses primary and secondary sources of data. The study employs quantitative research which will focus on the outcomes of urban agriculture and will describe the phenomena as they exist. Quantitative research was selected for this study as it has neutral data from replicable procedures which can be verified.

2.2.1 Secondary Data Collection

Secondary data was collected through a comprehensive review of literature using publications from scientific articles, books, papers and reports.

2.2.2 Primary Data Collection

Quantitative data was essentially collected to establish the actual numbers of people involved in urban agriculture as in relation to other activities. Quantitative data was used to explore land owned, different agricultural products obtained from urban agriculture and household incomes obtained from the economic practice. Questionnaires were administered to sample households and key informants. Key informant/snowball sampling was the key sampling procedure that was applied in this study and it was used hand in glove with simple random sampling which as non-probability sampling strategy.

2.3 Food Security and Nutritional Indices

Determinants of agricultural food security and nutritional which were used in this study are the Food Consumption Score (FCS) and the Household Dietary Diversity Index (HDDI). Both HDDI and FCS are proxy indicators of food consumption and they are also effective indicators of food insecurity. These two measures are direct indicators of nutritional security of a particular group of people as they are related to the different food groups which have different nutrient contents and different functions in the human body.

2.3.1 Food consumption score

In this study, the food consumption score is an indicator based on a weighted frequency (number of days in a week eaten) of eight food groups. It is employed as a proxy indicator for the quantity and quality of the diet. The food consumption score is a composite score based on dietary diversity food frequency and relative nutritional importance of different food groups (UN, 2008). This is expressed in the following formula:

$$FCS = a_1x_1 + a_2x_2 + a_3x_3 + \dots + a_8x_8 \dots \dots \dots \text{equation 1}$$

Where: *FCS* -is the food consumption score

a₁ -is the frequencies of food consumption= number of days for which each food group was consumed during the past seven days

x₁ -weight of each food.

The FCS was adopted for this study because; it is very comprehensive; it enables prediction of changes in malnutrition rates; can be used for comparison of different zones; it does not require special software and is relatively easy to apply and interpret zones (Drescher, Mackel 2000; Dop, 2010; Mubvami, Manyati, 2007). FCS established the frequency in which specific food groups were consumed over one week prior to the survey.

2.3.2 Household dietary diversity index

The HDDI was selected as a measure of the number of different food groups consumed over a given reference period that is 24 hours. It is also a proxy for a household's socio-economic status.

HDDI (0-12) =Total number of food groups consumed by members of the household.

Values A through L will be either “0” or “1”.

$$\text{HDDI} = \sum (A+B+C+D+E+F+G+H+I+J+K+L) \dots\dots\dots\text{equation 2}$$

$$\text{Average HDDI} = \frac{\text{sum (HDDI)}}{\text{total number of households}} \dots\dots\dots\text{equation 3}$$

The HDDI was used in this study because; it is useful in comprehensive analysis of the food security situation at the individual, household or community level; it provides a good indication of availability of special foods/food groups in an area and helps to analyse nutritional vulnerability of the households/food insecurity; it is easy to apply and does not require special software (Ruel, 2003).

2.4 Methods of data analysis

Statistical Package for Social Sciences (SPSS) was used for data analysis. Descriptive statistics were used to describe the differences between the age, total income acquired by a household and all of the socioeconomic characteristics of the sample. Multiple linear regression (the enter method) was also used to determine the relationship between the total food consumption score (FCS_tot), the food consumption score of tubers, legumes and vegetables (FCS_tlv), household dietary diversity index(HDDI) and the different factors that affect urban agriculture. Statistical analysis was used in dividing the households’ total annual income into three different income terciles and those who fall below the 33percent level are termed the ‘poorest’, those between 33-66percent are the ‘middle class’ and those from 67 to 10percent are the ‘better-off’.

III. Results and Discussions

3.1The food consumption score

A comparison between the poor participants and the poor non-participants shows that the poor participants have a higher total FCS as compared to their poor counterparts. This shows that urban agriculture gives the lower income participants a wide variety of food groups to choose from which to consume unlike their counterparts who rely heavily on purchasing all the food groups they consume in a given week.

3.2 Household dietary diversity index

The study revealed that the average HDDI for the urban agriculture participants is higher than that of the non-participants in all income terciles indicating that those who venture into urban agriculture are more likely to have a variety of nutrients in the diets that they consume. Amongst the three groups, it is common that those who are into urban agriculture have a higher HDDI, except for those in the better-off category. This might be due to the fact that higher income groups are able to purchase some of the foods required.

A comparison between the poor participators and the better-off non-participants shows that the difference is not as high (comparing to the difference between the poor non-participators and the better-off non-participators), because the poor participants supplemented some of the nutrients from their own production. This shows urban agriculture reduces the gap between the rich and the poor in terms of household diets

3.3The contribution of urban agriculture to household food security

The study revealed that low income households are reliant on informal food production methods such as urban agriculture. In this instance, the poor participants are mainly dependant on the food they harvest from urban agriculture. This is shown in Table 1 below:

Table 1: Weekly proportion consumed from UA

Food crop	Poor Participants (N=34)		Better-off Participants (N=41)	
	Mean	Std	Mean	Std
Cabbage	0.54**	1.03	0.05	0.22
Vegetables	0.98	0.1	1	0
Tomatoes	0.66	0.47	0.91	1.52
Onions	0.75	0.41	0.76	0.43
Carrots	0.76	0.4	0.84	0.36
Cucumbers	0.87	0.37	0.7	0.45
Pumpkins	1**	0.24	0.84	0.35
Beans	0.87	0.29	0.85	0.34
Pea	0.88	0.31	0.86	0.33
Maize (months of own supply) ^a	4.35***	4.10	2.84	4.31

^aNotes: For maize the statistics are for the number of months a household lasted with own maize harvest and not proportion of weekly consumption. Asterisks indicate the level of significance ***-1% level, **-5% level, *-10% level

For maize, the staple crop the poor participants last longer with their harvest (approximately 4.4 months), which shows that unlike the better-off participants who are able to purchase mealie meal, lower income residents tend to ration their maize so that it stretches crop to the next harvest. The reduction in the number of months spent utilising urban agriculture maize is low for the better-off participants. Cabbages and pumpkins are statistically significant between the poor participants and the better-off participants.

3.4 The impact of urban agriculture on food and nutritional security.

Food must not only be available and accessible, but also be of the right quality and diversity (in terms of energy and micronutrients), the use of the Food Consumption Score and the Household Dietary Diversity Index give a clear picture of the quality and diversity respectively (UN 2008).

Table 2: Consumption score by income terciles

	Poorest (33%)		Better-off (33%)
	Non Participant N=25	UA Participant N=25	Non Participant N=25
FCS_tlv (mean)	12.0 ^b	14.6 ^w	15.6
FCS_tot (mean)	16.3	17.6	18.9
HDDI _{average}	5.4 ^b	6.6 ^w	7.3

Notes: ^b-significance between the groups, ^w-significance within the group, FCS_tlv is the consumption score for vegetables, legumes and tubers. FCS-tot is the total food consumption score

3.5 Comparison of the average days that different foods are consumed

The study revealed that urban agriculture participants consume more legumes, vegetables and fruits as compared to the non-participants. Urban agriculture participants also consume more of fruits and milk. This is shown in the table below:

Table 3: Average number of days a food type is consumed

Type of food	Poor (33%)		Better-off (33%)	
	Participants	Non-participants	Participants	Non-participants
Cereals	7	7	7	7
Tubers and roots	1.6	1.9	1.8	2.7
Legumes, nuts and seeds	1.6 ^{bw}	0.7	1.6 ^b	1.4
Vegetables	6.6 ^{bw}	6.1	6.6 ^b	6.2
Fruits	4.6 ^b	3.9	4.6	5.1
Meat, fish and eggs	2.6	3.2	3.2	3.6
Milk and milk products	2.3 ^b	2.0	3.7	4.1
Sugar and sugar products	6.2	6.8	6.4	7
Oil and oil products	6.1	6.8	6.8	7

Note: ^b-significance between the groups, ^w-significance within the group.

3.6 Regression analysis

The multiple regression model revealed that urban agriculture is statistically a significant positive factor to urban household food and nutrition security at 10% for the total food consumption score. An increase in the area cultivated by participants will significantly increase the quantity as well as the diversity of the food that a household will consume in a given time period. The education level (number of years spent in school) of the household head is a statistically significant factor (10%) contributing to the total food consumption score. Household size is a negative factor significant at 5% level contributing to the consumption score of tubers, legumes and vegetables and the household dietary diversity index. Total income acquired by a household in a year is a positive significant factor contributing to the three indices and this was as expected in the apriori expectations. For the total food consumption score, total annual income is significant at 1% and this shows that as the level of income earned by a household in a year increases, the quantity and quality of food also improves, that is the purchasing power of a household increases with an increase in income as some of the food types are purchased. This is illustrated in the Table 4 below:

Table 4: Factors affecting FCS_tot, FCS_tlv and HDDI

Factor	Model 1 FCS_tot		Model 2 FCS_tlv		Model 3 HDDI	
	B(Std err)	p-value	B(Std err)	p-value	B(Std err)	p-value
CONS	53.764(13.061)	0.000	5.166(4.329)	0.235	5.013(1.041)	0.000
UA	0.001(0.001)	0.022**	0.001(0.000)	0.014**	7.479(0.000)	0.084*
GENDER	1.411(4.420)	0.750	2.328(1.465)	0.114	0.012(0.352)	0.973
AGE	-0.059(0.188)	0.755	-0.047(0.062)	0.447	0.013(0.015)	0.375
MARITAL	2.081(3.507)	0.554	3.259(1.162)	0.006***	0.589(0.280)	0.037**
EDUC	7.497(3.955)	0.060*	0.709(1.311)	0.589	0.043(0.315)	0.891
HHSIZE	-1.005(0.786)	0.203	-0.510(0.261)	0.053*	-0.110(0.063)	0.081*
CHRNIC	2.058(2.845)	0.471	1.291(0.943)	0.173	-0.090(0.227)	0.692
INC	0.003(0.007)	0.002***	0.001(0.000)	0.018**	0.000(0.000)	0.016**
F	2.568	-	2.979	-	2.238	-
Sign(P-value)	0.007	-	0.002	-	0.019	-
R_{adj}	0.095	-	0.117	-	0.077	-
n	150	-	150	-	150	-

Source: Primary Data. FCS_tot is the total food consumption score, FCS_tlv-food consumption score for legumes, vegetables and tubers, hddi is the household dietary diversity index. Astericks indicate the level of significance ***-1% level, **-.5%level, *-10% level

IV. Conclusion

This study revealed using urban agriculture has significant positive impact on household food security and nutrition. It was shown that participation in urban agriculture significantly closes the gap between the poor and the more affluent citizens particularly increasing the quantities of beans, tubers, legumes and vegetables consumed. Urban agriculture was shown to contribute significantly to the different types of food consumed by households. The article also found that, total cultivated land, income levels and the education level of the household head significantly influence overall urban food and nutrition. Therefore, this study concludes that urban agriculture has significant positive impact on household food and nutritional security.

V. Recommendations

- i. Policy makers should strive towards formalising urban agriculture to make it a legally accepted activity. City authorities in there urban planning process should take into account urban agriculture, as land shortage leading to conflicts is a critical institutional constraint in Epworth. Urban agriculture policy considerations should be both at city level and at national level.
- ii. Public Private Partnerships should be encouraged where non-governmental organisations and some financial institutions partner with government, church organisations and individuals who are leaders of some of the co-operative gardens so as to improve the funding of projects/ gardens.
- iii. Training and capacity building is essential to equip urbanites engaged in urban farming on the best farming practices, best crops for increased yield. Extension services should also be offered to capacitate urban farmers. Government can chip in by offering loan seeds, fertilisers and bolster the urban farmers countrywide.

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