Ameliorating food and income insecurity for vulnerable urban households: A case of community gardens in Gweru, Zimbabwe

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Abstract

Food and nutrition security is deteriorating among Zimbabwe's high and medium density urban households in the face of adverse economic fundamentals. As a way of addressing declining formal urban employment, food and nutrition insecurity and illegality of urban agriculture activities, community gardens were established through non-profit public initiatives in the city of Gweru. However, in the aftermath of the withdrawal of rendered assistance by the supporting institutions, some households discontinued membership of community gardens. Among farmers who are still members, utilisation of community gardens is either seasonal or all year round. The study therefore investigates the factors determining all-year use of the gardens and the extent to which the community gardens contribute to food and nutrition security. Results show that the majority of the households exposed to the community gardens are still continuing with the practice even after donor support withdrawal. Binary logistic regression was used and the odds ratio results show that gender of household head, age of head of household, years of schooling and urban agriculture outside community gardens significantly affect participation in gardening throughout the year. About 30% of the households in the community garden indicated that the gardens are now a major income source and that for the majority of participants, their nutrition had improved. The study advocates for community gardens as an effective way of improving food and security nutrition in urban areas and encourages their promotion by national and local authorities as well as multilateral institutions.

Keywords: Community Gardens; Food Security; Land Access; Nutrition Security; Urban Agriculture; Vegetables

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1. Introduction

Food insecurity remains a major challenge of developing countries (Gasana et al., 2011), including Zimbabwe. Vulnerability to food insecurity is compounded by a number of factors such as rising food prices, global economic downturns, household disruptions such as loss of employment, illness or death of a wage-earner (Faber et al., 2011). Urban households are highly vulnerable as they live in a highly monetized economy unlike in the rural areas where households may be able to meet most of their energy, water and food requirements from their own labour and production from land endowments (Gordon et al., 2000). In Zimbabwe, formal urban employment opportunities have declined with The Economist (2015) estimating urban unemployment rate in Zimbabwe to be at least 60%. In addition, even those households that have at least one of their members formally employed, realized incomes cannot sustain the largely extended families in such an under-performing economy.

Since 1998, Zimbabwe experienced a GDP decline spanning 12 years, resulting in sharp decline in national food production, the collapse of formal markets including markets for labour, and hyperinflation, culminating in increased food security vulnerabilities (Gasana et al., 2011). In response, poor households often cope with this vulnerability by adopting diets that are monotonous and based mainly on starchy staples, with little or no animal products and few vegetables and fruits (Faber et al., 2011). Another major factor which exacerbates food insecurity in urban areas is the continuous rural urban migration in search for employment. This creates more pressure on resources and amenities in urban areas, contributing to increased food insecurity vulnerabilities. Gordon et al. (2000) argued that urban populations in developing countries are growing very rapidly and the absolute urban poor numbers may well have overtaken that of the rural poor. As a result of economic hardships and failure to get anticipated jobs, households with access to land in urban areas have found an opportunity to embark on urban agriculture to augment livelihoods and improve food security (Mwakiwa, 2004). According to Kutiwa et al. (2010) factors linked to food crisis in Zimbabwe, such as land reform programme, worsening poverty, market failures and the political and economic decline since the year 2000 have led to increased urban agriculture activities in the country's metropolis.

For many years, the role of urban agriculture in enhancing livelihoods in developing economies has been underestimated (Arku et al., 2012). Urban agriculture has been considered to be a nuisance mostly by local government authorities, resulting in people who engage in the practise being unsupported and harassed even in periods of severe food shortages (Mbiba, 1995; Marongwe, 2003). Before the Economic Structural Adjustment Programme (ESAP) of 1990, urban agriculture was characterised by strict regulations because local authorities feared that urban practices would lead to soil erosion and siltation in dams and rivers. In some cases, city authorities would cut down the crops grown. However, many urban authorities and national governments have begun to realize the potential benefits of urban agriculture for food security, environmental management and economic development. This has resulted in urban agriculture becoming better understood in policy circles in some countries (Arku et al., 2012). According to the Urban Agriculture Magazine (2002), the City of Harare acknowledged the importance of urban agriculture and allowed maize cultivation on fallow land.

The economic depression changed the profile of the urban cultivators, previously it was largely the poorer people who used to cultivate open spaces for food production, but at present, there is competition among citizens from all income brackets (Arku et al., 2012). The number of vulnerable people has increased due to the economic meltdown in Zimbabwe since the late 1990s. In addition, the HIV/AIDS pandemic is wiping away the active generation leading to increased number of widows, widowers and orphans (Kajawu and Mwakiwa, 2006). Zimbabwe is one of the countries with a high HIV infection rate in the world (Hungwe, 2006). Urban agriculture has become a key coping strategy for poverty and food insecurity mitigation, not only in Zimbabwe but in the Southern Africa region as highlighted by Harare Declaration (2003). RUAF (2009) indicated that urban agriculture can be a source of direct or indirect employment in the cities.

The common places for urban agriculture practice in Zimbabwe are on-plot, i.e. farming within one's yard or stand, and off-plot farming along infrastructural servitues, roadsides and railway lines, undeveloped open spaces, river valleys and vleis around towns and cities. Given the controversy but importance of urban agriculture to combat food insecurity, some communities and donors approached city council authorities to designate land for the practice. In some instances, this has led to the establishment of community gardens which is a new concept in urban areas of Zimbabwe. Community gardens are a type of urban agriculture whereby residents of a particular community participate jointly in growing different types of crops on a given piece of land. The urban centres that have these community garden arrangements in Zimbabwe include Bulawayo, Gweru and Masvingo. In Gweru, there have been inconsistencies in terms of the number of household participating in these initiatives. A number of households have discontinued participation, raising the question of whether community gardens are an appropriate tool to mitigate households against food and income vulnerabilities. This study therefore investigates the factors determining the use of community gardens all year round against seasonal or summer use only. The study also analysed the extent to which the community gardens have contributed to food security for the vulnerable households.

2. Materials and methods

2.1. Study area

Gweru, with a population of 158,233 households is Zimbabwe's fourth largest urban settlement (ZimStat, 2012). It is situated at the centre of the country in the Midlands Province. Gweru has currently six low-income residential suburbs in namely Ascot, Mkoba, Senga, Nehosho, Mtapa and Mambo where the very poor live. Mkoba is the biggest suburb in Gweru which has got 20 residential sub-units locally called villages. Nashville and Riverside are medium density whilst Athlone is a low-density suburb. The city is characterised by declining economic activities, with a number of companies either downsizing or totally going under. Bata, a shoe manufacturing company, used to be the major employer for the people of Gweru. At its peak in the early 1990s, Bata employed more than 5,000 workers, but has currently cut down its workforce to just about 1,500 as a result of viability problems (Chadenga, 2013). Other companies which are also currently operating below capacity and have downsized include National Railways of Zimbabwe, Zim Alloys, and Zimglass, while

Zimcast closed down. This has forced a number of households, especially those in high and medium density to participate in urban agriculture initiatives to cushion themselves against such vulnerabilities.

A total of 87 community gardens were established within these communities. Each community garden has a membership of thirty and is one hectare in size, with each member owning 0.03hectares. The gardens are grouped into clusters and each cluster consists of 2 to 4 community gardens bringing to 28 the number of clusters. A cluster shares a borehole, pump, tank and a generator. Figure 1 shows the distribution of the gardens in the Gweru suburbs.
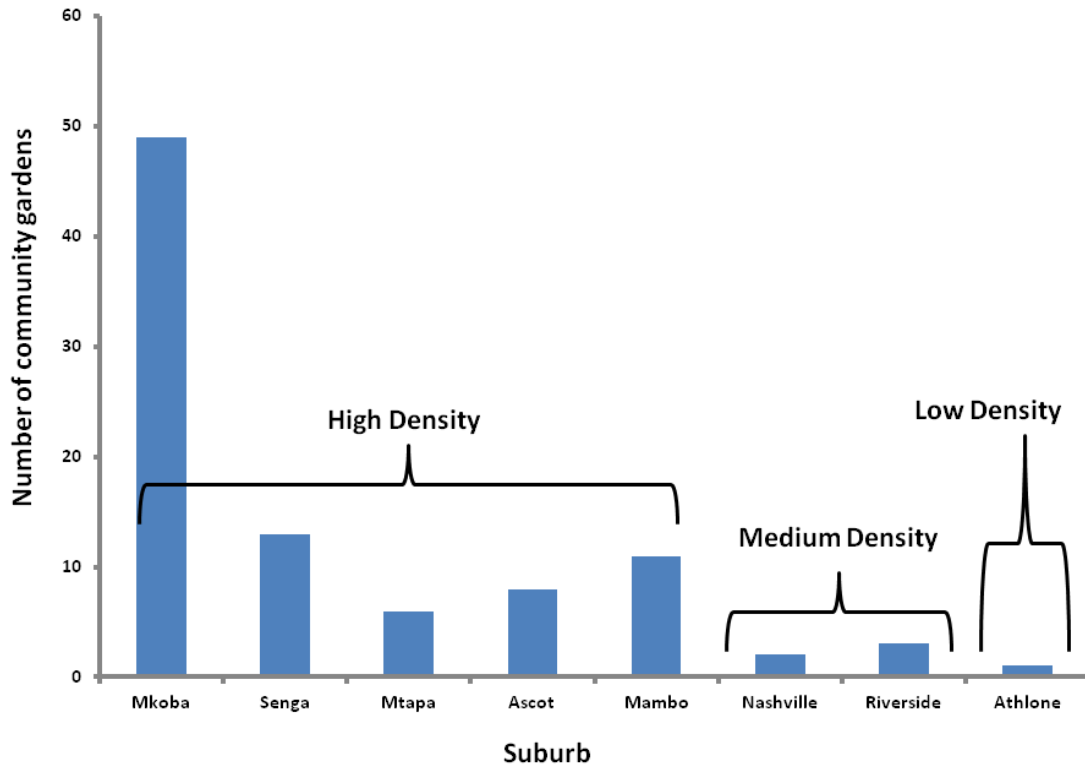

Figure 1. Community gardens distribution in Gweru

2.2. Data collection and analyses

The study randomly selected a sample of 14 clusters from the total 28 clusters. A cluster consists of two to four gardens, with each garden having about 30 households. Then from each of the selected clusters, 10 households were randomly selected bringing the total sample size to 140. Data was collected using a questionnaire and included household profiles, community gardening activities, urban agriculture activities, food security issues, community garden institutional settings, support to community gardening and challenges faced.

Descriptive analysis was carried out so as to have a general picture of community gardening activities in Gweru. Binary logistic model was used to assess factors that affect community garden participation all year round or seasonal/summer only. The model was used to analyse factors determining production all year round and in summer only. The model is represented by the Equation (1):

$$CGPeriod = \begin{bmatrix} \alpha_0 + \alpha_1 Hhldsex & + \alpha_2 Hhldage & + \alpha_3 Hhldmar & \\ + \alpha_4 Hhldorph & + \alpha_5 Hhldlab & + \alpha_6 Hhldeduc & + \alpha_7 Hhldempl \\ + \alpha_8 Hseownsp & + \alpha_9 Subyear & + \alpha_{10} Urbagric & + e \end{bmatrix} \quad (1)$$

Where; $CGPeriod$ is whether one is farming all-year round or during summer only in the community gardens (dummy dependent variable $CGPeriod = 1$, if all-year round, 0 summer only); α_1 to α_{11} are coefficients for the respective independent variables; and e is the error term. The symbols for the independent variables and their relationships to the dependent variables are shown in Table 1.

Table 1. Logistic model variables for participation in community gardening

Symbol	Variable Description	Apriori expectation	Explanation
Hhldsex	Gender of household head (1 male; 0 female)	Negative	Households headed by males are less likely to produce all-year round than female headed households.
Hhldage	Household head age	Positive	Households headed by older household heads are more likely to produce all-year round than those headed by younger household heads.
Hhldmar	Household head marital status (1 married; 0 otherwise)	Negative	Households headed by household heads that are married less likely to produce all-year round than those with household heads with single heads
Hhldorph	Household orphans	Positive	Households with more orphans are more likely to produce all-year round than those with fewer orphans
Hhldlab	Household labour	Positive	Households with more people involved in agricultural activities are more likely to produce all-year round than those with less labour.
Hldeduc	Years of schooling	Negative	Households that have heads with more years of schooling are less likely to produce all-year round than those with fewer years of schooling.
Hhldempl	Household head employment status (1 full time; 0 otherwise)	Negative	Household headed by household heads that are employed fulltime are less likely to produce all-year round than those that are headed by heads that are employed part-time.
Subyear	Period resident in suburb	Positive	Households that have spent more years in the suburb are more likely to produce all-year round than those that have spent less time in a suburb
Hseownsp	House ownership (1 if owner and 0 otherwise)	Negative	Households that own houses are less likely to produce all-year round than those that do not own houses.
Urbagric	Urban agriculture practice outside the garden (1 yes; 0 otherwise)	Negative	Households who practice urban agriculture outside gardens are less likely to produce all-year round than those that do not

To check whether community gardens contributed differently to the various vulnerable groups with suburbs as a proxy, interactive bar graphs were used to display the differences in income obtained from community gardens located among suburbs. In addition, a one-way ANOVA test was used to check whether there were any significance differences among suburbs. Where such differences existed, the Tukey post-hoc test was then used to check which suburbs significantly differed from the other(s). In addition, the study also verified the findings by analysing households that produce enough vegetables for own consumption all year round against those producing for specific periods of the year.

3. Results and discussion

From the sample of 136 households interviewed, 26.5% indicated that they were no longer participating in community gardening while 73.5% are still participating. However, for those who have discontinued, the land they left behind remains largely unutilized. Of the households who are continuing with community gardens, 48% are farming in summer only (seasonal) and 52% are farming all-year round. Further analysis of the households continuing with community gardening indicates that 50% of households headed by males and 50% households headed by females are practicing community gardening seasonally whereas 61.5% households headed by males and 38.5% headed by females practice community gardening all-year round.

Table 2 shows the results of the marginal effects and odds ratio for logistic regression model carried out to determine factors that affect seasonal (summer only) and all-year community gardening. For brevity, results for odds ratio are reported. LR chi2 (10) = 52.91 and Prob > chi2 = 0.0000 indicates that the model is statistically significant. Log likelihood = -52.144296 and Pseudo R2 = 0.3366 also support the significance of the model. Results showed that gender, age, years of formal schooling and urban agriculture outside the garden significantly impacted all-year production in community gardens. The odds value for gender of household head indicates that male headed households are 6.5% less likely to practice community gardening all year round. This could be attributed to the fact that most men have other sources of income (Sithole et al., 2012). For female headed households, community gardening acts as a source of income. Therefore, the chances of practising gardening all year round are higher than male headed households.

Odds ratio value for age of household head shows that, contrary to expectations, older household heads are 93% less likely to be involved community garden all year round. Jongwe (2014) also found an inverse relationship between urban agriculture and age. The life cycle hypothesis postulates that older households, after accumulating wealth, are better cushioned against vulnerability, as they have more assets than younger ones. Older household heads also have access to land outside the community gardens. Households practising urban agriculture on fields outside the community gardens are less likely to practice community gardening all-year round. The odds show that households who farm outside community gardens are 6.1% less likely to practice community gardening all year round. Farming outside community gardens include on-plot farming that is on the residential stands and off plot, that is on open spaces. Households that farm on-plot and off-plot have access to land hence are less vulnerable to food insecurity than their counterparts who do not cultivate

outside community gardens. On-plot and off-plot fields are more private than the community gardens therefore some household prefer farming on private land.

A greater number of years of schooling are inversely associated with gardening all year round. As the level of education increases the alternatives of earning income increase and households become less vulnerable to worsening economic conditions. This therefore reduces time committed to gardening and households become seasonal gardeners as compared to their counterparts with less years of schooling. For households with less years of schooling, community gardens become a source of direct and indirect employment and consequently income. RUAF (2009) also supports these findings that urban agriculture acts as a source of employment for the less educated. The following factors were found not to significantly affect whether one is involved in community gardens all year round or seasonal; household labour, household orphans, years of residence, house ownership, employment and marital status.

About 70% of the households indicated that they were producing enough vegetables for their own consumption throughout the year. Vegetables are a good source of nutrition for the households hence the basis for the establishment of these gardens. Sithole et al. (2012) also noted that gardens do increase access and household food security, diversity of diet and contribute immensely to poverty alleviation among urban households. Vegetables play a crucial role in addressing the problems of low income, malnutrition and poor health among resource poor households (Smith and Eyzaguirre, 2007). For example, 60% of the households indicated that their nutrition was improved because of the community gardens.

Figure 3 shows the average total income realized from growing of crops per household in the community gardens for different locations. Based on the one-way ANOVA and a Tukey post-hoc test of significance, the average income per household in the different locations can be grouped into four groups. Group 1 has the highest income level, followed by group 2, group 3 and lastly group 4. Some suburbs belong to multiple subgroups (Figure 3). Mkoba 5 is significantly different from all the other locations and is in group one as members realized the highest average income in the community gardens. On average, each household in Mkoba 5 managed to get US$570 per annum which translates to $48 per month, which could be an understatement given that most of the households indicated that they were able to remember what they sold but not what they consumed from the gardens. The community gardens are an important source of livelihoods and food security for this group of gardeners. The gardeners in this Mkoba 5 can be said to be innovators because they did not sit back and wait for the donor to come back or any other well-wishers to assist them. They used their own resources to see through the activities that needed to be implemented to ensure successful project operations. This suburb is among the few that indicated that they still receive extension services. Mkoba 5 is a cut above the rest with more contribution by the community garden members than the donor. This community has shown that instead of just relying on the donor's input, it can do more to achieve sustainability and development. Ostrom (1992) also highlighted that the success of common property management is largely attributable to the goodwill and hard work of the participants.

The suburbs that are in group two in terms of average income per household are as follows: Mkoba 17, Senga, Mkoba 11 and Mkoba 3. All these suburbs are located in the high density. Households in high density suburbs are more vulnerable to food insecurity given their low-income levels. So, community gardens

become a good source of food security and through producing crops for both consumption and the market. Riverside gardens cater for beneficiaries who reside in Athlone and Riverside. These gardens are in group 3 and 4 and are significantly different from Mkoba 5 and Mkoba 11, implying that households in these community gardens realize less income from their gardens. This basically means that since Athlone and Riverside are medium density suburbs, households have other better sources of income, hence their lower community garden activity. In addition, farming is mainly for consumption purposes for farmers in these groups.

Nashville and Nehosho belong to group 4 only, where households involved in community gardens realize far less income when compared to other suburbs. As for Nashville there is no income realized. Nashville is a medium density and as such the household income sources are secure, hence not much attempt by households to sell produce from community gardens. However, for Nehosho, a high-density suburb, the residents have other secure sources income hence lower activity in the community gardens. Nehosho suburb is located near a Midlands State University. Most of the households in this location indicated that their first source of income is rentals. This location has a high number of students from Midlands State University who are tenants. The students pay rentals ranging from US$50-70 per individual per month. A room is usually rented by two to four students, implying rentals are an important source of income in this suburb. This cement the results that have been presented earlier that house owners are more likely to discontinue gardening as they have other alternatives of earning income such as rentals. Another reason for less activity in Nehosho is lack of land tenure security. At the time when data collection was carried out the gardeners had nothing planned for the garden because they had heard that the land was now owned by another institution.

Table 2. Logistic regression model results

Variable	Odds ratio						Marginal effects					
	Odds Ratio	Std.Err	Z	P>|Z|	95% Conf. Interval		Dy/dx	Std. Err	Z	P>|Z|	95% Conf.Interval	
Gender 1=male	0.065	0.078	-2.270	0.023**	0.061	0.691	-0.338	0.138	-2.450	0.014**	-0.609	-0.068
Age	0.923	0.036	-2.050	0.040**	0.855	0.996	-0.010	0.005	-2.180	0.029**	-0.019	-0.001
Years of schooling	0.681	0.074	-3.550	0.000***	0.551	0.842	-0.048	0.011	-4.440	0.000***	-0.068	-0.027

Table 2. *Cont.*

Household labour	1.445	0.338	1.570	0.116	0.913	2.287	0.045	0.028	1.620	0.106	-0.010	0.101
Household orphans	1.287	0.347	0.940	0.349	0.759	2.182	0.031	0.033	0.950	0.343	-0.033	0.096
Years of residence in suburb	0.999	0.032	-0.040	0.971	0.939	1.063	0.000	0.004	-0.040	0.971.	-0.008	0.008
House ownership status 1= owner	3.014	3.037	1.090	0.274	0.418	21.727	0.137	0.123	1.110	0.267	-0.104	0.378
Urban agriculture outside gardens 1=yes	0.061	0.082	-2.070	0.039**	0.004	0.864	-0.347	0.161	-2.15 -.	0.032**	-0.664	-0.031
Employment status of head 1= fulltime	1.816	1.817	0.600	0.551	0.256	12.906	0.073	0.123	0.600	0.549	-0.168	0.316
Marital status 1= married	0.492	0.548	-0.640	0.524	0.056	4.362	-0.087	0.137	-0.640	0.522	-0.357	0.181
Constant	1086703	4944970	3.050	0.002	145.471	8120000000						

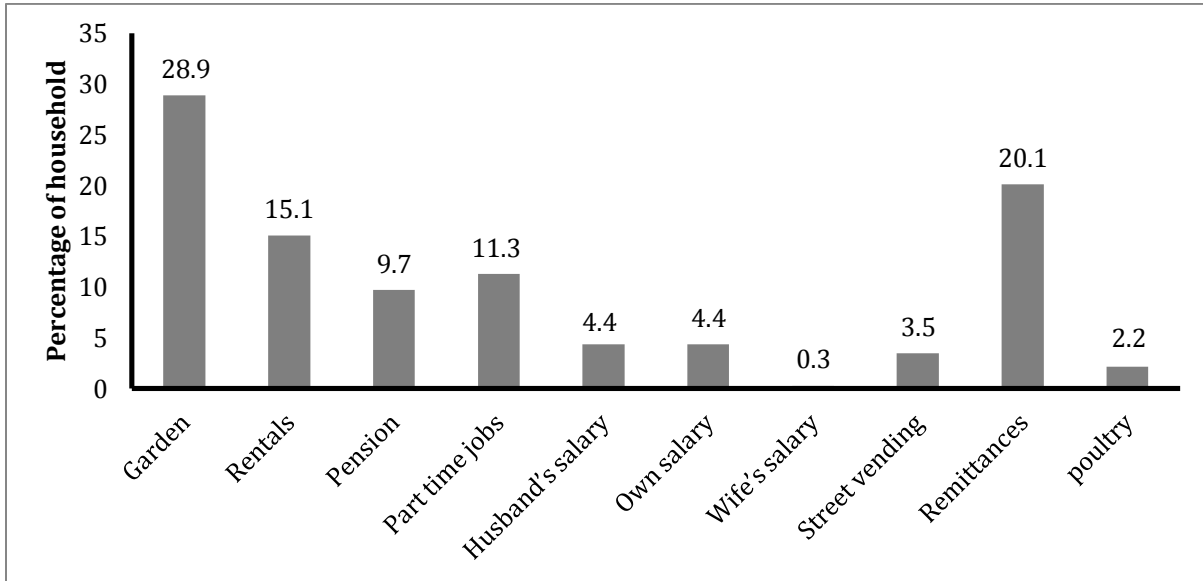****Significant at 1%; **Significant at 5%*
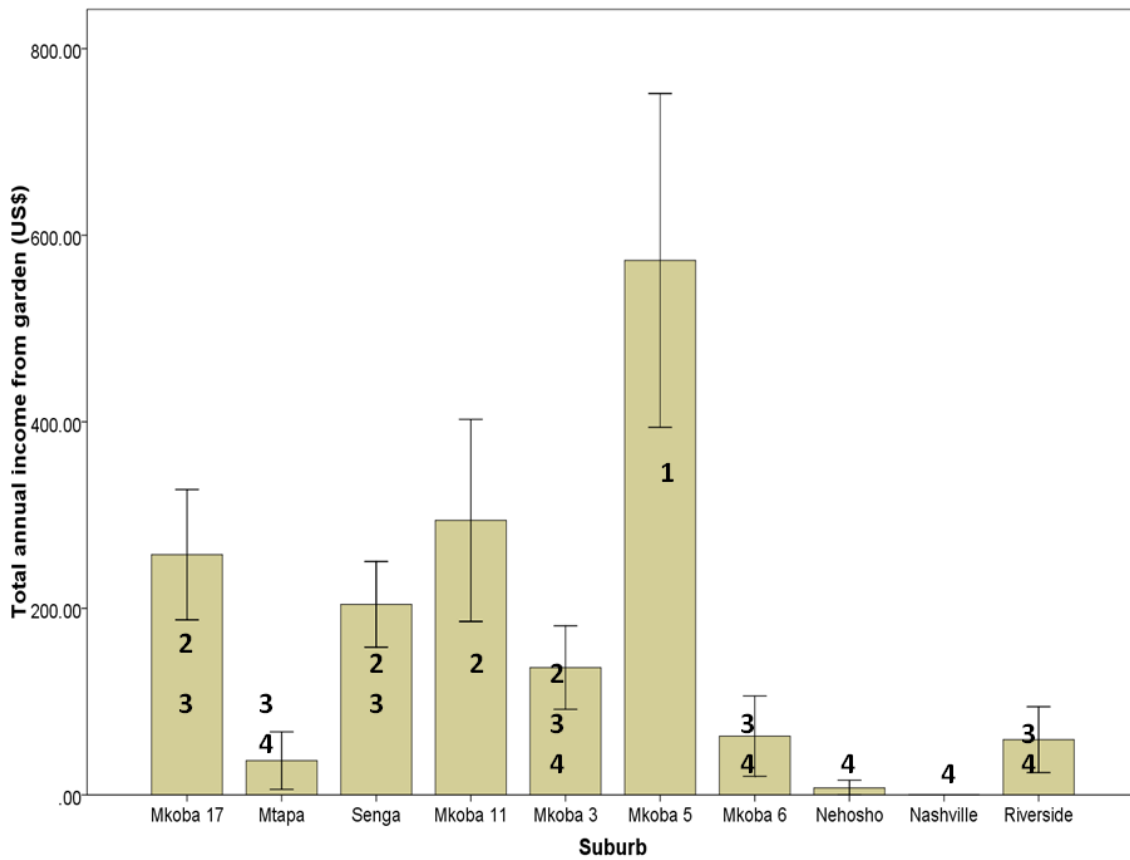
Figure 2. Household's major sources of income

Figure 3. Mean ((±95% CL) annual income (US$) per household from gardens in the different suburbs. **(**Number in bars are subgroups based on multiple comparison tests)

4. Conclusions

Community gardens provide an opportunity for vulnerable urban households in Gweru to meet their food and income needs. Gender, age, years of schooling of household head and urban agriculture practise outside community gardens are factors that significantly determined all-year community garden production. This points to possibilities of vulnerable households being more likely to practise community gardening throughout the year. Community gardens offer these vulnerable households opportunity to generate income in addition to food security. The study has shown that income generated from the community gardens, although still very low, is significant enough to motivate households to continue practising. Community gardens present one of the effective ways of alleviating poverty food and nutrition in urban areas. Promotion of the practice to the wider community requires that implementing agents pay particular attention to household characteristics shown to significantly influence all year participation. This enables proper targeting of beneficiaries to realise highest impact. In addition, local authorities and development agencies should promote community gardens instead of concentrating on humanitarian assistance which is not effective and strains the fiscus. Security of tenure for the community gardens should be ensured by the city authorities by recognizing urban agriculture as a legal urban land use.

Ethical approval

"All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards."

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