

**VEGETABLE CONSUMPTION PATTERNS OF URBAN FARMERS IN
COMMUNITY GARDENS IN EMFULENI LOCAL MUNICIPALITY,
GAUTENG PROVINCE OF SOUTH AFRICA**

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ABSTRACT

Lack of adequate vegetable consumption may contribute to micronutrient deficiency especially in developing countries where low intake of nutrient-dense animal products is common. Despite growing evidence that vegetable consumption is of great importance, only about 25.6% South Africans consume sufficient vegetables per day. This research was carried out to investigate the vegetable consumption patterns of urban farmers in Emfuleni Local Municipality, South Africa. The objectives were to determine reasons why urban farmers consume vegetables, vegetable intake patterns in a 24-hour recall, and factors influencing vegetable consumption patterns. The study was conducted in six (6) large townships of Emfuleni Local Municipality using a quantitative research approach and survey design. A sample of 254 urban farmers were randomly selected from 30 urban community gardens with a population of 418 farmers. Data were collected through face-to-face interviews using a semi-structured survey questionnaire. Quantitative data were analysed using Statistical Program for the Social Sciences Version 23. Descriptive statistics (frequencies and percentages) and ordered logistic regression model were explored to analyse the data. The results revealed that 96.1% and 93.3% of farmers in urban community gardens consumed vegetables as a relish and salad, respectively. Vegetables were mostly consumed during dinner because most respondents were physically present in the community gardens during the day. The results of the factors influencing vegetable consumption patterns showed that out of 10 independent variables chosen, only three (age group, level of education, and main source of income) were positive and statistically significant. The study, therefore, recommends that farmers should include vegetables in all three of their daily meals (breakfast, lunch, and dinner). Education in the form of training should be provided to the urban farmers to create awareness in the community about the importance of vegetable gardens and the consumption of vegetables across all age groups.

Key words: Urban farmers, community gardens, Gauteng province, vegetable consumption, intake patterns



INTRODUCTION

Urban agriculture could be instrumental in reducing food insecurity if it is geared towards increasing food production and creating employment opportunities [1, 2]. In most areas, urban agriculture appears in the form of community gardens that produce food and are typically situated in urban open spaces [3, 4]. As a result, community gardens in urban areas have gained popularity among urban dwellers. One of the reasons is that community gardens increase the availability of vegetables [5, 6]. In low-income areas with poor access to nutritious foods, community gardens increase the availability and also the consumption of fruit and vegetables, especially among urban dwellers [5, 7]. Community gardens increase gardeners' intake of fresh vegetables and it also increases access to culturally acceptable produce to the surrounding communities [8, 9]. It has been reported that people who participated in an urban community garden consumed more vegetables per day than those who did not [5, 7]. The intake of fruit and vegetables reduces the risk of chronic diseases [10, 11, 12, 13]. Fruits and vegetables are a source of fibre, vitamins, phytochemicals, electrolytes and minerals [14].

From a consumption perspective in an African context, vegetables are mostly regarded as a crucial relish [15, 16]. In South Africa, maize meal porridge (commonly known as *pap*) is generally eaten with vegetable relish amongst other things [17]. This is an indication that vegetable consumption in South Africa is likely to increase because it is consumed as a relish with maize meal porridge, which is a staple food. However, it was reported that *kg/capita* of vegetables consumed in South Africa declined from 44.4% to 38.7% in 1999 and 2012, respectively [18]. Vegetables as a relish is usually served on its own, with meat or it can be served as a supplement [19]. Even though the health benefits of consuming vegetables are commonly known, it has been reported that 25.6% of the people in South Africa consume two or a few portions per day; this intake is considered high [18]. However, in the formal urban areas it was slightly higher. On average, the older adults in the country consumed fruits and vegetables about four times per day. However, it has been reported that the intake rate of fruits and vegetables amongst older adults in South Africa is significantly low [20]. Although residents from Emfuleni Local Municipality have benefitted from household food security programmes initiated by the Gauteng Department of Agriculture and Rural Development (GDARD), such as community gardens, provision of gardening tools and others, the impact of community gardens on vegetable consumption pattern of the beneficiaries (urban farmers) has not been thoroughly evaluated. To fill this significant void, this research used a descriptive study to investigate the contribution of urban community gardens to vegetable consumption patterns of farmers (beneficiaries) in the Emfuleni Local Municipality.

METHODOLOGY

The study was conducted in the Emfuleni Local Municipality (ELM) of Sedibeng District in Gauteng Province of the Republic of South Africa. The area of Sedibeng District consists of three (3) local municipalities, namely Midvaal, Lesedi and Emfuleni. Sedibeng District is located in the South of Gauteng Province and it shares



borders with Free State and Mpumalanga Provinces. Although Emfuleni is the smallest local municipality in Sedibeng District, about 79% of the population resides there [21], mainly because it is highly urbanised [22]. Furthermore, most of the community gardens, urban farms and townships (urban residential areas) in the district are found in Emfuleni compared to Lesedi and Midvaal. Because of the aforementioned reasons, Emfuleni was selected as the study area. According to the records obtained from the Provincial Ministry of Agriculture, there are about 43 community gardens with a population of 418 farmers in Emfuleni Local Municipality receiving support from government. All the community gardens are distributed across six (6) townships (Boipatong, Bophelong, Evation, Sebokeng, Sharpville and Tshepiso) in the municipality.

The study population consisted of farmers in urban community gardens in the area. In order to select a fair representative sample from the study population (N), 60% sampling fraction was chosen. The above sampling fraction propelled the researchers to randomly select a sample size of 251 urban farmers. However, the sample size increased to 254 because there were three (3) more farmers who volunteered to participate in the study. Data were collected through face-to-face interviews using a semi-structured survey questionnaire. The questionnaire contained closed questions aimed at capturing numeric data and open-ended questions that captured qualitative data or open responses. The study formed part of an MSc in Agriculture in the Department of Agriculture and Animal Health, University of South Africa. For purposes of this research objective, only quantitative data were used. Prior to the interviews, appointments were made telephonically with the liaison person of each community garden through government agricultural advisors. Data were collected during March and April 2017 at the premises of the various community gardens. On average, it took about 45 minutes to complete each survey questionnaire during face-to-face interviews. Interviews in a face-to-face setting were employed because some of the respondents were illiterate but showed a keen interest to participate in the study. The researcher was able to conduct interviews and complete the questionnaire according to the respondents' responses. However, some of the respondents preferred to complete the questionnaires by themselves because they could read and write. Every effort was made to ensure that respondents were comfortable during the interviews.

Quantitative data were analysed using the Statistical Package for the Social Sciences (SPSS) Version 23.0. Descriptive (frequencies and percentages) and inferential statistics formed part of the analysis. The inferential statistics method used to analyse data was the Ordered Logistic Regression Model (OLRM). The model was employed to determine factors influencing the consumption pattern of vegetables amongst urban farmers. The ordered logit model is regarded as a commonly known method for analysing ordinal outcome variables [23]. The ordinal scale used to collect data was adopted from other scholars where categories of never, 1-2 days, 3-4 days, 5-6 days and everyday were used to measure the consumption of weekly meals among adolescents in Minnesota [24]. However, it was adjusted accordingly to suit the current study whereby rarely, sometimes, very often and always were matched with the number of days. The vegetable consumption pattern was categorised as 1=Never; 2=Rarely (1-2 time(s) per week); 3=Sometimes (3-4 times per week); 4=Very often (5-6 times per week) and



5=Always (Daily or seven days per week). Ordered Logistic Regression Model predicted polychotomous ranked dependent variables as a function of explanatory variables that describe the characteristics of a unit, individual or economic agent [25]. To determine the factors influencing vegetable consumption pattern of the farmers in urban community gardens “Never”, “Once a week”, “Two to four times per week”, “Four to five times per week” and “Daily” were used. Vegetable consumption pattern of the farmers was used as dependent variable in the model using the aforementioned categorized responses. The categorical independent variables in the model were gender (0=Female; 1=Male); age group (1=18–35; 2=36–45; 3=46–55; 4=Above 55 years); education level (1=No formal education; 2=Primary education; 3=Secondary education; 4=Tertiary education) and main source of income (0=Non farming; 1=Farming). In addition, participation period in a community garden; family size; number of family members working; working hours/day in the garden, working days/month in the garden; and annual income from community garden were fitted in the model as continuous independent variables.

The results of OLRM fitting information showed that the model used can predict the threshold because $p < 0.001$, which is statistically significant. Furthermore, the Goodness-of-Fit indicated that the p-value is 0.618 for Pearson chi-square statistic from the significant level column, therefore not statistically significant ($p > 0.05$). This implies that the model used is appropriate for the data. The Deviance chi-square statistic was also not statistically significant ($p = 1.0$) at 5% confidence interval. Therefore, both goodness-of-fit measures used may not always produce the same results. The statistical outputs of three (3) pseudo-R-squared values depicted that Cox and Snell=0.127, Nagelkerke=0.136 and McFadden=0.051. Because there is no equivalent on logistic regression to the R-squared values in Ordered Logistic Regression (OLR), the values do not mean exactly what Ordinary Least Square (OLS) regression means because their analysis is of lesser importance.

RESULTS AND DISCUSSION

Socio-demographic characteristics of the respondents

All the respondents in the study area were Black Africans of which majority (71.3%) were females, whereas 28.7% were males. The age group of more than half (55.1%) of urban farmers was 46 years and above, while 44.9% were from 18 to 45 years old. However, only 23.2% from 44.9% were between 18 and 35 years old. Some of the respondents above the age of 55 indicated that they were participating in community gardens because they retired and were also keeping their body active. The low involvement of young people in urban farming is threatening the future of community gardens in urban areas. Concerning the level of education, the largest proportion (62.2%) attended secondary school, while only 4.3% had tertiary education. Amongst the respondents, 4.0% had no formal education. The low proportion of respondents who acquired tertiary education may be attributed by the fact that majority of the participants were above 35 years of age and grew up during the segregation system which had limited schooling opportunities for black people in South Africa. Concerning income, more than three quarter (78.7%) of the respondents were reliant on income from farming in the community gardens to sustain their livelihoods, while



21.3% earned income from non-farming activities. Income from non-farming activities was derived from social grant, business and remittances. On average, the respondents earned R4 080.28 per annum from farming in urban community gardens in the study area.

Reasons why urban farmers consume vegetables

The study found that on average, 69.3% of urban farmers in Emfuleni consumed vegetables for various reasons presented in figure 2. About 30.7% of the respondents had inadequate vegetable intake. The responses were observed in order to evaluate household decision-making on vegetable consumption as well as reasons behind the consumption of vegetables produced from the community gardens. The results in figure 2 present the reasons why urban farmers consumed vegetables from their own community gardens. Figure 2 indicates that the largest proportion of the respondents ate vegetables as a relish. This corroborates the findings by others [15, 16, 26] who reported that most people typically regard vegetables in an African diet as a relish. In addition, there were more than three quarters who consumed vegetables as a salad and for diversity of diet. This is in accordance with what has been reported by other scholars that vegetables may either be served alone or with meat as a supplement [19]. The fact that about more than three quarters of urban farmers ate vegetables because medical practitioners advised them to do so, is an indication that they received information about the health benefits of vegetable intake. The results in figure 2 also show that more than one third of the respondents ate vegetables produced in community gardens for pleasure. More than a quarter of the respondents also indicated that they ate vegetables for the purpose of getting nutrients (vitamins and minerals), health benefits (to be fit, boost the immune system, to lower high blood pressure, to strengthen the body), to snack, and for the love of vegetables. Some of the aforementioned reasons are in accordance with what was discovered in Fiji where urban dwellers consumed vegetables for health reasons such as preventing micronutrient deficiencies and diet-related, non-communicable diseases (anemia, high blood pressure, diabetes, heart attack, kidney failure and lung ailments) [27]. It shows some of the urban farmers in Emfuleni Local Municipality are informed about the health benefits of consuming vegetables.



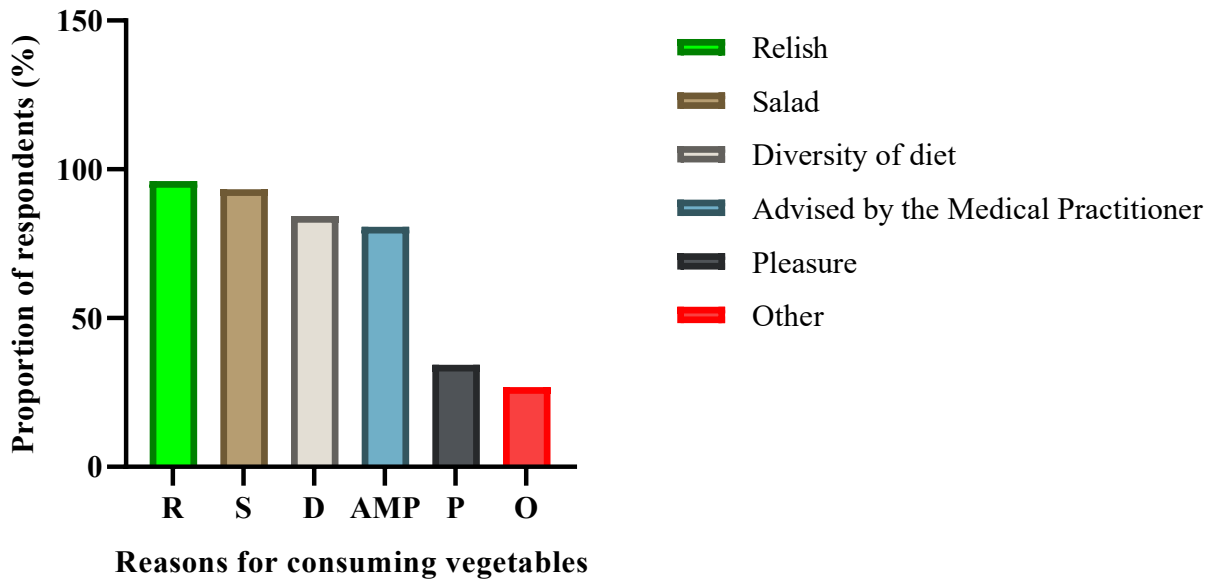


Figure 2: Reasons why farmers consumed vegetables from their community gardens (n=254)

Vegetable consumptions pattern among community gardeners (urban farmers)

The results in figure 3 present vegetable consumption patterns among community gardeners. The findings in figure 3 show that the highest proportion (44.5%) of respondents consume vegetables three to four times per week, followed by less than one third who ate vegetables once to twice a week or sometimes. Farmers who ate vegetables daily (always) and five to six times per week (very often) were about a quarter (25.2%) combined. Very few (3.5%) respondents preferred not to eat vegetables even though they are members of community gardens.

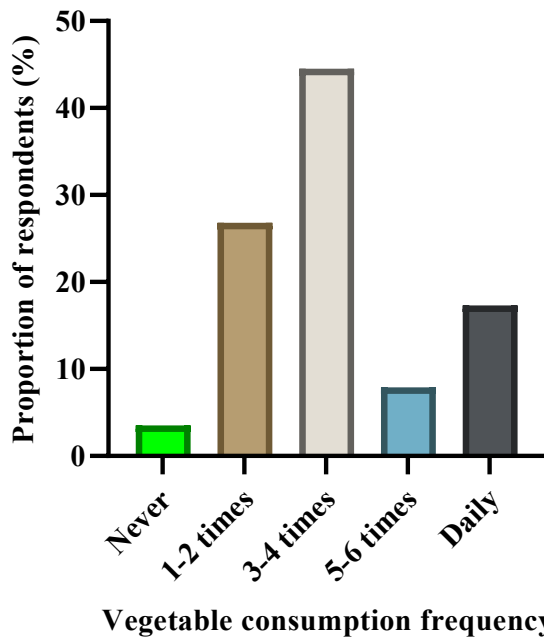


Figure 3: Vegetable consumption patterns among community gardeners (urban farmers) (n=254)

Vegetable intake patterns in a 24-hour day among urban farmers

The results in figure 4 depict that less than half of the respondents did not prefer to include vegetables in the first meal of the day (breakfast). On the other hand, less than a quarter of the respondents rarely and sometimes ate vegetables during breakfast. About a quarter of urban farmers ate vegetables regularly during their first meal as shown by the proportions of “very often” and “always” combined during the lunch period and the proportion of the respondents who never consumed vegetables decreased from 38.2% to 11.8%. Those who sometimes ate vegetables during lunch increased to 36.6% compared to 24.8% in the first meal of the day. The number of urban farmers who ate vegetables very often and always also increased by 17% (25.2 to 42.2%) during lunchtime. During the last meal of the day (dinner) more than two-thirds of the respondents regularly ate vegetables (very often and always). Overall, the results show that vegetables were mostly eaten during the last meal of the day (dinner) because most respondents were physically present in the community gardens during the day. In the evening, most respondents or their household members would prepare and cook vegetables to be eaten as the last meal of the day. These findings differ with what was discovered in the case of Genesee County in the United States of America (USA) where 26% of urban farmers consumed vegetables about 3.8 times per day [7]. Assuming that the respondents had three meals per day (breakfast, lunch and dinner), it means that farmers in urban community gardens in Genesee County consumed vegetables in all their daily (three) meals.

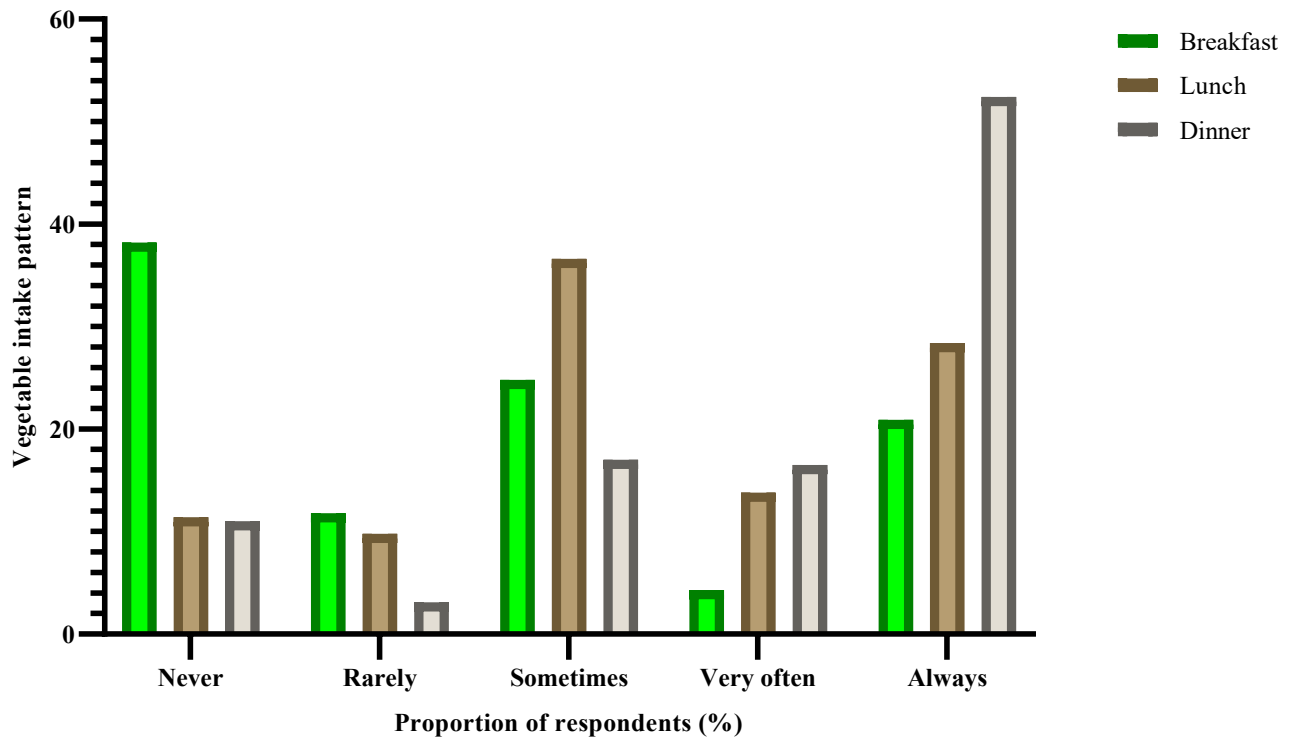


Figure 4: Vegetable intake pattern in a 24-hour day among community gardeners (n=254)

Factors influencing vegetable consumption patterns

The results in table 1 illustrate that nine (9) variables were positive out of 10 chosen ones (gender, age group, level of education, participation period in community garden, family size, number of family members working, number of working hours in the community garden per day, number of days working in the community garden per month and annual income from community garden). However, only three (3) variables (age group, level of education and main source of income) were statistically significant. Age group and main source of income were statistically significant at 5% significance level ($p < 0.05$). The result implies that vegetable intake increased significantly with increasing age with all other factors held constant. Therefore, older farmers were consuming vegetables from gardens more often than young farmers. It might be because older farmers are well informed about the nutritional deficiencies and poor health associated with low vegetable intake amongst ageing people. It also implies that young farmers prefer selling most of the vegetables they produce rather than consume them. In support to the current findings, it was also discovered that on average, older farmers (65 years and older) in Genesee County in the United States of America (USA) consumed vegetables about four times per day compared to younger farmers with an average of 3.1 times per day; the difference was statistically significant [7]. However, the findings also corroborate what was found in Kenya [28]. Their findings also showed that age positively influenced vegetable consumption intensity of urban dwellers. However, the influence in their findings was not statistically significant compared to the current findings.

Education level was positive and statistically significant at 1%, which means that an increase in the level of education increases vegetable consumption patterns of respondents with all things being equal. This implies that people with high levels of education ate vegetables regularly than those with lower levels of education. It might be because highly educated people are well informed about human nutrition and the importance of vegetables in providing nutrients. The findings of the study corroborate what was found in another study where an increase in education level translated to increased vegetable consumption amongst farmers in urban areas [7]. Concerning gender, males consumed vegetables more often than women did, although the difference was not statistically significant ($p=0.743$). This finding is inconsistent with several studies that have found that women consume more vegetables than men [29, 30]. It comes as little of a surprise that older people tend to consume more vegetables, because it is completely nutritionally essential owing to the metabolic processes that happen during old age [31].

In the current study, it was found that household (family) size positively influenced the vegetable consumption patterns of the respondents; however, it was not statistically significant. Therefore, bigger families did not significantly consume vegetables regularly than their counterparts. The findings contradict what was found in Kenya where household size had a negative and significant influence on the consumption intensity of African indigenous vegetables [28]. This implies that in Kenya, families with more household members consumed less vegetables than those families with fewer household members.

As seen in table 5, the Logit coefficient estimate of the main source of income of the respondents is negative and statistically significant at 5% level of significance ($p=0.024$). The result implies that vegetable consumption patterns do not increase with an increase in the main source of income with all other factors held constant. This means the respondents whose main source of income was farming were not consuming vegetables from the community gardens more often than those with non-farming as their main source of income. It shows that being a vegetable farmer does not necessarily guarantee that one would eat more vegetables; this may be attributed to the fact that most of the respondents perceived farming as a source of income rather than a source of food for themselves and their households.

CONCLUSION

The study found that the majority of urban farmers consumed vegetables as a relish, salad, for the diversity of diet and because they followed advice from medical practitioners. In the same manner, the consumption pattern showed that most community gardeners consumed vegetables three to four times per week, mostly during dinner. The vegetable consumption pattern of the farmers was positively and significantly influenced by age and level of education. However, main source of income negatively and significantly influenced farmers's vegetable consumption pattern. The study, therefore, recommends that youth and people with low education level, should be educated about the importance of consuming vegetables. By so doing, it



would help young farmers consume more vegetables and improve production. In addition, farmers should also be encouraged to include vegetables in all three of their daily meals (breakfast, lunch and dinner).

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Table 1: Parameter estimates of the Ordered Logit Model (n=254)

Variable		Estimate	Std. Error	Wald Chi-square	df	P value
Frequency	Never	-0.689	1.356	0.258	1	0.612
	One to two times per week	1.945	1.330	2.137	1	0.144
	Three to four times per week	4.056	1.351	9.020	1	0.003
	Five to six times per week	4.565	1.357	11.315	1	0.001
Characteristic	Gender	0.086	0.263	0.107	1	0.743
	Age group	0.310	0.124	6.265	1	0.012
	Level of education	0.624	0.204	9.384	1	0.002
	Participation period in garden	0.033	0.043	0.589	1	0.443
	Family size	0.085	0.060	2.039	1	0.153
	Number of family members working	0.070	0.136	0.266	1	0.606



Working hours/day in the garden	0.013	0.087	0.021	1	0.885
Working days/month in the garden	0.010	0.050	0.040	1	0.842
Main source of income	-0.699	0.310	5.082	1	0.024
Annual income from garden	3.256E-5	2.672E-5	1.486	1	0.223
Average	0.071	0.037	3.814	1	0.051

Source: field data (2017)



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