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ScienceDirect

Procedia - Social and Behavioral Sciences 216 (2016) 39 – 45

Procedia
Social and Behavioral Sciences

Urban Planning and Architecture Design for Sustainable Development, UPADSD 14- 16 October
2015

Urban Agriculture: A Way Forward to Food and Nutrition Security in Malaysia

Golnaz Rezai^{a*}, Mad Nasir Shamsudin^a, Zainalabidin Mohamed^a^aFaculty of Agribusiness and Information System, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia

Abstract

The practice of urban agriculture has gained importance due to the rising rate of urban poverty and population in the developing regions. In countries such as Malaysia, it also addresses food security by providing the urban dwellers with access to adequately nutritious, safe, acceptable and cost-effective food. While there are some skepticism toward urban agricultural activities in providing food for the urban markets, this study has nevertheless explored the existing evidence of its effectiveness in providing food security among urban dwellers and consequently reducing a large share of their food bills. Interviews of 360 households shown a positive statistical association between obtaining a sufficient quantity of food and adequate diet through engagement in urban agriculture.

The results from this study indicate that food security can be derived from urban agriculture since it provides sufficient quantities of food, appropriate nutrition, cost-effective food supplies and reduction in food bills. This highlights the need for the Malaysian urban authorities to give more appropriate recognition and contribution to city dwellers and encourage them to expand the practice of urban agriculture.

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Peer-review under responsibility of IEREK, International experts for Research Enrichment and Knowledge Exchange

Keywords: Urban Agriculture; Food security; Nutritional intake, Malaysia

1. Introduction

Considerable interest in urban agriculture is being manifested by policy makers, government agencies and academics due to its contribution to food security and poverty alleviation in Malaysia. Urban agriculture is defined as any agricultural activities which grows, raises, processes and distributes agricultural products regardless of land size and number of human resources within the cities and towns (FAO, 2000). Urban agriculture contributes to the improvement of sustainability in cities by increasing environmental quality of the buildings (Tsuchiya et al, 2015). It can also mitigates negative effects of urbanization on the environment by adding green spaces to the neighborhood

* Corresponding author. Tel.: +0-603- 8947-4899; fax: +0-603-8940-8213

E-mail address: rgolnaz@upm.edu.my

and landscape beautification (Shamsudin et al, 2014). A number of previous studies have reported the association between urban agriculture (UA); adequate nutritional status, and sufficient safe food access. According to the FAO definition, food security exists when the entire population can have at all times access to safe, sufficient and nutritious food to respond to their dietary needs and requirements (Pinstrup-Andersen, 2009). It tends to focus on food availability, safety and accessibility at individual, household, national, and global level (Kennedy et al, 2011). Studies from both developed and transitional (developing) countries claimed that urban agricultural activities can contribute to the availability of fresh and nutritious food items, reduction in food expenditure on food bills, having direct access to varieties of food products as well as urban waste recycling, pollution and sustainability (Martellozzo et al, 2014, Grewal & Grewal, 2012, Dubbeling & De Zeeuw, 2011, Kang'Ethe et al, 2007, Miura et al, 2003 and Koc, 1999). Study of 15 countries by Zezza & Tasciotti (2010) show that urban agricultural activities are closely related to food security, dietary diversity and nutritionally adequate diet.

In Malaysia, urban population is expected to grow to 75% by the year 2020. Urban residents are facing increasing living costs particularly due to rising cost of food production, processing and distribution. In 2014, the cost of imported processed food rise to RM 17 billion compared to RM 8.97 billion in 2012 (MITI, 2015). One of the goals of the National Agro-Food Policy (NAFP) is to ensure adequate supply of safe and quality food for the entire nation in Malaysia. In order to achieve these, urban agriculture is viewed as a way through which the livelihood strategies of urban households can be addressed. A number of government institutes and organizations have begun to encourage urban residents to participate in urban agricultural activities such as the department of agriculture (DOA) and Universiti Putra Malaysia (UPM). Given the impact of UA on urban food security and the expanded interest from many agencies in the country, exploring the contribution of UA to food security as a whole and in supply of adequate nutritional diet becomes crucial.

2. Analytical Framework

The effect of UA on food security can be seen through numerous factors such as nutritional stability, food accessibility and availability, cost-effective food supply and generation of income through sales (Warren et al, 2015, Lupia & Pulighe, 2015, Litt et al., 2011, USAID, 2005 and Mawoneke, 1998). While the benefits of UA is far broader than this paper’s objective, the framework for this study has been designed to examine the evidences of the association between UA and food availability, accessibility, safety, and nutritional status which result in food security in Malaysia (Figure 1).

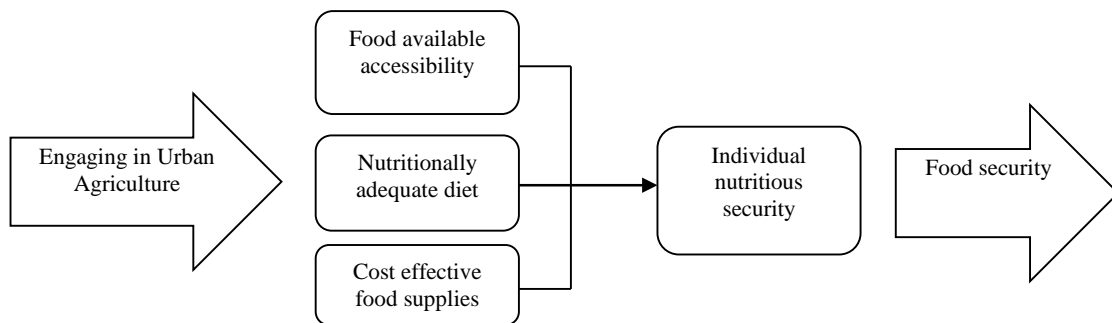


Figure 1. Association between UA and Food Security (Adopted from Warren et al, 2015; Lupia and Pulighe, 2015; Litt et al., 2011; USAID, 2005 & Mawoneke, 1998)

Questionnaire was administered to 360 households selected randomly and systematically at Putrajaya. Putrajaya is a federal administrative centre, and a planned city in which urban agriculture has been initiated. The list of

participants was obtained at Putrajaya department of agriculture, appointment was scheduled with respondents and each respondent is interviewed face to face during a 30mins time period via self-administered questionnaire. The data collection lasted for about 6-7 weeks from December 2014 to January 2015. The questionnaire was appropriately designed based on the research objectives and literature reviews with a total of 31 close-ended questions.

The first part of the questionnaire included statements regarding the association between UA and food security using a five-point Likert scale (ranging from 1-5) where 1= strongly disagree and 5= strongly agree. Food accessibility and availability were measured through statements such as “by practicing UA, I have more access to fresh vegetables”, “I have access to sufficient amount of food by practicing UA” and “UA enables me to meet my diet preferences”. Similarly, the measurement of nutritional value consisted of multiple items such as “UA ensures me of the nutritional values of my diet” and “My eating habits become healthier since I get involved in UA”. The share of UA on the food bills was measured by statements (ranging from 1-5) such as “I am able to spend on other expenses or foods since I produce my own fresh foods” and “there is considerable reduction in the household food bills since being involved in UA” which evaluated the impact of UA participation on economical aspect of food security. Finally, relevant socio-demographics such as age, gender, education level and household size were inquired.

In Malaysia, mainly basic daily vegetables and merely fruits are the primary products of UA and due to their freshness and high nutritional contents, they play a key role in diet diversity and therefore food security.

3. Statistical Analysis

In order to achieve the objectives of this study, internal reliability consistency of multi-items including food availability, accessibility, nutritional status and cost-effective food supply were assessed using Cronbach’s alpha. In addition, exploratory factor analysis (EFA) and logistic regression were performed to estimate the factors and determinants which explain the association between urban agriculture and food security.

The logistic regression is appealing for this study for three reasons. First, it can represent the multiple aspects of demographic and explanatory factors. Secondly it does not assume linear relationship between variables and lastly normal distribution is not required for analysis. In order to interpret the results, odd ratio was used which is the exponential coefficient in logistic regression. Since the main focus of the study is on the association between UA and food security, the dependent variable is “if UA can improve the household food security in Malaysia”. The variable was coded as 1 if the response was “Yes” and zero if otherwise. Meanwhile, the independent variables are the factors from EFA which explain the various dimensions of food security in relation to UA, and the household socioeconomic characteristics. A summary of the explanatory variables (independent) including their coding system are presented in Table 1.

Table 1. Explanatory Variables to Measure the Association between Food Security and Urban Agriculture

Variables	Value
Age	0 > 40 year old 1 <40 year old
Educational Level	0 without university degree 1 with a degree from university
Income level	0 > RM 6000 (USD 1700) 1 <RM 6000 (USD 1700)
Household size	0 > 5 members of the household 1 < 5 members of the household
Food availability and accessibility	Factor score (continues variable)
Adequate nutritional intake	Factor score (continues variable)
reduction in fresh food expenditure	Factor score (continues variable)
Household size	0 > 5 members of the household 1 < 5 members of the household
Food availability and accessibility	Factor score (continues variable)
Nutritionally adequate diet	Factor score (continues variable)
Cost effective food supplies	Factor score (continues variable)

4. Results

The Cronbach's alpha value for 31 statements in the questionnaire was 0.836 which shows the internal consistency among the statements.

4.1. Socioeconomic and demographic profiles of households

Table 2 shows the characteristics of the respondents with regards to their socioeconomic and demographic profiles. About two-third of the respondents were married (76.5%) and working in the government sector (84.5%). This was expected since the study area was Putrajaya where majority of residents are civil servants and work with government agencies and federal institutions. Most of the respondents interviewed were age between 26-45 years of age (69%) and educated at bachelor level (44.5%). In terms of their household income, this study found that 66% of households earning between RM5000- RM7000 per month with 4-6 persons per household (59%).

Table 2. Demographic profile of respondents.

Characteristic	Frequency	Percentage	Characteristic	Frequency	Percentage
Gender			Age		
Male	173	48.0	Below 25	18	5.0
Female	187	52.0	26-45	248	69.0
Marital Status			46-60	51	14.0
Single	85	23.5	Above 61	43	12.0
Married	275	76.5	Educational Level		
Working sector			Secondary	149	41.5
Government sector	304	84.5	Tertiary	160	44.5
Private sector	45	12.5	Higher Tertiary	51	14.0
Others	11	3.0	Household Size		
Income			Less than 3 persons	79	22.0
Less than 3,000	20	5.5	4 – 6 persons	212	59.0
3,001 – 5,000	34	9.5	More than 6 persons	69	19.0
5,001 – 7,000	238	66.0			
Above 7,001	68	19.0			

4.2. Food security dimension and urban agriculture

Next, exploratory factor analysis was performed in order to discover the different dimensions of food security in relation with UA. The factor analysis identifies three latent factors from 31 statements to which respondents indicated their level of agreement on a 5-point scale (Table 3). As it is shown in Table 3, the three factors are; food availability and accessibility, adequate nutritional intake and reduction in fresh food expenditure. The factor loading and contribution of each factor to the total variance is listed in Table 3.

Table 3. Food Security Dimension in Association with Urban Agriculture

Survey Item	Factor Score		
	Food Availability and Accessibility	Adequate Nutritional Intake	Reduction in Fresh Food Expenditure
My family and I have sufficient supply of fresh food by Practicing UA	0.633		
Practicing UA enables me access to fresh food anytime I want to.	0.754		
UA can respond to my diet preference.	0.778		
Variance	25.123		
Home grown foods generate more nutrients and fewer nitrates		0.667	
I am more confident with the nutritional value of the home grown food products.		0.714	
UA offers significant nutritional benefits to my family and I.		0.679	

Variance	24.291
Growing at home is one of the most effective ways to cut cost from the monthly bills on fresh food.	0.553
I am able to spend on other expenses or foods since involving in UA	0.538
Variance	20.195
Total variance	69.609

4.3. Enhancing household food security through urban agriculture in Malaysia

Logistic regression was employed to estimate the extent to which the selected socioeconomic/demographic characteristics and factors explaining food security's dimension were more likely to indicate the association between food security and UA. As stated earlier, the dependent variable (i.e. UA can improve the household food security in Malaysia) has two categories; "Yes" coded as one and "No" coded as zero. The results of the logistic regression model and the odd ratios are presented in Table 4.

Table 4. Estimated Logistic regression for the association between Food Security and UA

		B	S.E.	Sig.	Exp(B)
Step 1 ^a	Food availability and accessibility	1.257	.391	.001	3.514
	Nutritionally adequate diet	1.685	.339	.000	5.394
	Cost effective food supplies	1.125	.293	.000	3.079
	Education Level	3.401	1.072	.002	29.985
	Age	-1.481	.551	.007	.227
	Income	2.228	.735	.002	9.282
	Household Size	1.986	.472	.000	7.289
	Marital Status	-.223	.465	.632	.800
	Constant	-3.387	1.178	.004	.034
	-2 Log likelihood	137.775	Nagelkerke R Square		0.577
	Cox & Snell R Square	0.302	Hosmer and Lemeshow Test		0.979
	p-value of goodness fit	0.000			

To assess how well the model fits for the data, the "Goodness of fit" test was run and as shown in Table 4, the probability value is significant at 0.01 confirming that the model is fit for this study. The logistic regression model included the factors from EFA and some selected socio-demographic factors such as income, age and educational level. Six variables were positively and statistically significant suggesting that the association between food security and UA was significantly predicted by the variables. Based on the statistically significant coefficients, all three factors from EFA are important determinants in the association between food security and UA. This finding indicates that, the households who believe that fresh food products will be more available and accessible by practicing UA, were 3.51 times more likely to agree that food security can be enhanced through UA. Similarly, adequate nutritional intake results in an increase of 5.39 times of stronger association between food security and UA. Reductions in fresh food expenditure also 3.07 positively influence the probability of improving food security by practicing urban agriculture. On the aspect of socio-demographic factors, respondents with higher education (holding degree from universities) are 29.98 more likely to agree with improving food security by being involved in

UA. The estimated coefficient for household size is positive and significant at 99% level of confidence, suggesting a higher positive association as the household increases. Thus, the respondents with the bigger size of household (6 and above) are 7.28 more likely to believe in enhancing food security through urban agricultural activities. Income levels of the households also play an important role in their understanding of the association between food security and UA. Respondents with household income more than RM 6000 (~ USD 1700) tend to be 9.28 more likely to agree with improving food security by UA participation. However the estimated coefficient for age is negatively significant. It is generally believed that younger generation are more exposed to the changes and their ability to accept changes is higher than the older ones as they are more cautious in dealing with the new phenomenon.

5. Conclusion

The purpose of this paper was to estimate the potential contribution of UA to food security. The results from factor analysis reveal the contribution of the growing daily basic vegetable intake to improving fresh food availability, accessibility and nutritional intake status which resulted in individuals' food security. Also reduction in food bills and being able to spend on other products also appeared as one of the benefits of UA. However, the households with higher income are more likely to see the association between UA and food security. The findings from this study indicate that younger urban dwellers with higher level of education are more likely to relate the UA to food security (Table 4).

While in high-income-countries, food security through UA includes providing nutritious food to the most needy, productive use of excess land, greening of the cities and social benefits to the communities, UA can precisely benefit low-income-countries by providing sufficient food, adequate nutrients, and income generation (Dubbeling & Zeeuw, 2011; Zasada, 2011; Lee-Smith, 2010; Seto & Satterthwaite, 2010 and Longley et al, 2006). Despite the fact that UA is a phenomenon that has received attention recently in Malaysia, few government agencies and institutions engaged in the program and the participants are mainly from middle or high income groups and the rate of participation varies considerably by the incentives provided by the agencies and institutions. The issue here is whether and how food security could be achieved for the large number of urban poor. UA has the potential to improve nutritional security through direct availability of food in a cost-effective way. However, greater attention needs to be paid in order to design and evaluate UA programs for different income group of households who perceived food security from different perspectives.

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