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**Does Urban Agriculture Enhance Dietary Diversity?  
Empirical Evidence from a Sample of Developing Countries**

**Alberto Zezza and Luca Tasciotti**



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# Does Urban Agriculture Enhance Dietary Diversity? Empirical Evidence from a Sample of Developing Countries

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**Abstract** – Urban agriculture (UA) is defined as the production of crop and livestock goods within city and town boundaries. According to some statistics, 200 million people are employed in UA, contributing to the food supply of 800 million urban dwellers [1]. In African countries, 40 per cent of urban dwellers are said to be engaged in some sort of agricultural activities and this percentage rises to 50 per cent in Latin American countries [2]. If such numbers are accurate UA may play a role in addressing urban food insecurity problems. This paper attempts to fill some of the key research gaps in this area using survey data for 15 developing or transition countries. The paper analyzes in a comparative perspective the importance of UA for the poor and food insecure households located in urban areas.

**Keyword** – urban agriculture, nutrition, micro data.

## I. INTRODUCTION

Ravallion (2007) [3] estimates that about one-quarter of the developing world's poor live in urban areas. Poverty is becoming an urban phenomenon and poor households are urbanizing faster than the population as a whole. UA might be seen as a way to reduce poverty and under nutrition in urban area. Our understanding of the importance, nature and food security implications of UA is however plagued by a lack of good quality and reliable data. While studies based on survey data do exist for several major cities, much of the evidence is still qualitative if not anecdotal. This paper analyzes in a comparative perspective the importance of UA for 15 developing or transition countries. The two basic research questions the paper addresses are:

1. What is the magnitude of UA in terms of households that are engaged in urban agricultural activities and what is the share of income they derive from it?
2. Is there a link between households' engagement in UA and household food security (as proxied by dietary diversity)?

After a brief review of the literature (section II), the paper quantifies the importance of UA in terms of the share of urban households engaged in agricultural activities and of the share of income generated by UA (Section III). In Section IV, we use multivariate analysis to gauge how participation in UA impacts dietary diversity. Dietary diversity indexes have been shown to be good proxies for calories intake and nutritional outcomes [4]. The key findings and policy conclusions are briefly outlined in Section V.

## II. THE IMPORTANCE AND ROLE OF URBAN AGRICULTURE: FACTS AND ARTEFACTS. A BRIEF REVIEW OF THE LITERATURE

In this paper we define UA as the production of agricultural goods by urban residents. Two of the main data problems regarding UA are represented by the comparability of the urban-rural definition across countries, and by the fact that we have information on where the household resides which might not correspond to where their agricultural activities is practiced. In that sense we should strictly speaking of 'agriculture practiced by urban households'. But having made those caveats, we will for simplicity stick to the standard expression 'urban agriculture'<sup>1</sup>.

One of the objectives of this paper is to rigorously quantify the magnitude of UA in a large cross-section of countries, in order to increase the existing literature [5], [6], [7]. Possibly the most widely cited claim concerning UA is the one referred by the United Nations Development Programme (UNDP) which estimates that "800 million people are engaged worldwide in UA", 200 million of them producing for the

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<sup>1</sup> We also cannot make any distinction between urban and peri-urban areas.

market [8], [9], [10]. A very different figure is quoted by FAO (1996) [11], which estimates that 100 million people earn some income directly from UA. Global figures therefore vary widely, and do not seem to be grounded in very hard evidence.

Rigorous quantifications are in fact available, but mostly for case studies [12] and [13]. An annotated bibliography of 170 pages compiled by Sida and ETC (2003) [14] also provides an interesting overview of the available figures as well as of the magnitude and directions in which the UA has expanded. Figures vary widely between and within countries and regions. Differences in definitions and methodologies compound the uncertainty.

One of the major topics regarding UA refers to how UA can contribute to food security and nutrition of cities, and of households which are engaged in farming within urban boundaries. One distinction that is often made in the literature refers to the extent to which urban households which are engaged in agriculture have some degree of market orientation or are purely producing for own consumption. There seems to be a consensus, based on case study reviews, that the direct food security purpose prevails, even though a substantial number of urban farmers also sell their products on the market. This happens more frequently in Latin America rather than in Africa [7].

There are a number of ways through which UA can theoretically have an impact on urban food security. At the household level, UA can be a source of income, provide direct access to a larger number of nutritionally richer foods (vegetables, fruit, and meat) and hence increase diet diversity. In addition, UA can increase the stability of household food consumption against seasonality or other temporary shortages, and can increase the time mothers spend looking after their children, as opposed to non-agricultural activities which are more likely to be located further away from home [15], [9], [6]. At more aggregate level, that is to say in terms of urban food security at large, UA can provide an important share of vegetables and dairy products, which are the more perishable foods.

Despite the relatively large number of studies that have looked at the link between UA and food security, the amount of quantitative work that has been published is astonishingly limited. We could only identify one paper [15] that attempts to explore this

link using a multivariate framework. Their findings, based on data from Kampala, Uganda, indicate that there is indeed an impact of UA on children nutritional status.

### **III. OPENING THE URBAN AGRICULTURE BLACK BOX: WHAT THE DATA SAY**

In this section we measure the magnitude of the UA phenomena in a cross section of countries. The current study is fundamentally different from any other study we are aware of since it uses:

1. nationally representative data,
2. a comparable definition of agricultural activities,
3. a comparative international perspective.

The choice of countries to be included in the dataset was guided by the desire to ensure geographic coverage across the four principal development regions – Asia, Africa, Eastern Europe and Latin America<sup>2</sup>. Furthermore, an effort was made to include a number of IDA (International Development Association) countries as these represent developing countries with higher levels of poverty and are therefore of particular interest for the poverty reduction debate<sup>3</sup>. To quantify the magnitude of UA in those countries, we first look at the rates of participation and the shares of income coming from UA. The nature of the data also allows us to separate agricultural activities into crop and livestock activities. The picture that emerges from these data is an extremely varied one (Figure 1). The share of urban households which make money out of agricultural activities varies from around 10 to almost 70 percent.

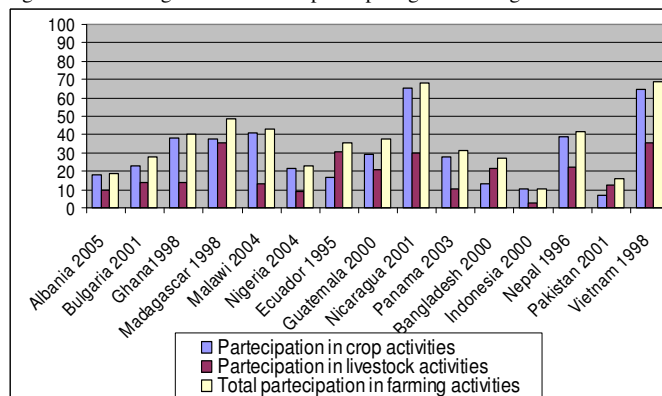
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<sup>2</sup> Our analysis is based on the Rural Income generating Activities (RIGA) database, which is constructed from a pool of several dozen Living Standards Measurement Study (LSMS) and other multi-purpose household surveys made available by the World Bank and other national and international institutions.

<sup>3</sup> Using these criteria, survey data from the following countries were utilized (survey years in parentheses): Ghana (1998), Madagascar (1993), Malawi (2004), Nigeria (2004); Bangladesh (2000), Indonesia (2000), Nepal (1996), Pakistan (2001), Vietnam (1998); Albania (2005), Bulgaria (2001); Ecuador (1995), Guatemala (2000), Nicaragua (2001), Panama (2003). While clearly not representative of all developing countries, the list does represent a significant range of countries and regions and has proved useful in providing insights into the fundamental aspects of livelihood strategies of households in the developing world.

In nine out of the 15 countries, the share of households participating is over 30 percent. In general livestock activities are less common than cropping ones, but there are cases, Ecuador and Madagascar, in which livestock activities are as important as crop activities.

Figure 1: Percentage of households participating in urban agriculture



The income shares coming from UA are smaller than the participation rates (Table 1).

Table 1: Share of income from urban agriculture

Country and Year	On farm
Albania 2005	2.9
Bulgaria 2001	2.4
Ghana 1998	18.4
Madagascar 1998	17.9
Malawi 2004	9.5
Nigeria 2004	18.2
Ecuador 1995	4.0
Guatemala 2000	2.7
Nicaragua 2001	5.5
Panama 2003	1.7
Bangladesh 2000	3.0
Indonesia 2000	3.0
Nepal 1996	10.7
Pakistan 2001	3.7
Vietnam 1998	6.2
<b>Mean</b>	<b>7.3</b>
<b>Max</b>	<b>18.4</b>
<b>Min</b>	<b>1.7</b>

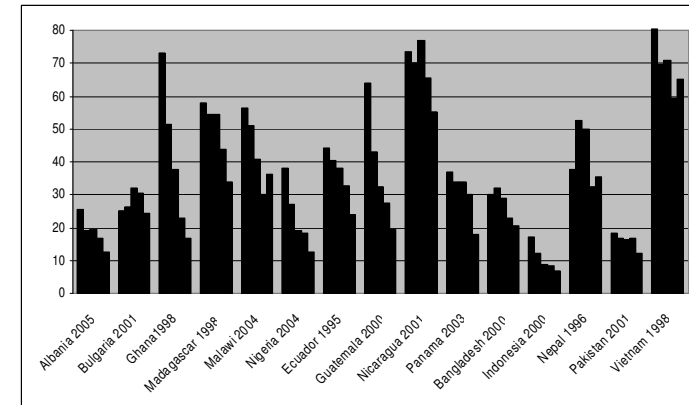
They range from 1.7 to 18.4 percent but they are higher than 10 percent in just four cases.

Looking at regional patterns, no clear regularity can be found in terms of participation rates, while it is interesting to note how the three African countries display the three largest income shares, around 18 percent, meaning that UA is a significant source of

livelihoods for urban households in that continent. Outside of Africa, the highest share of income is in Nepal, 10.7 percent, with most of the other countries displaying shares of 5 percent or less. Given these results, UA – although not negligible- does not appear to be a major economic activity.

When we decompose the participation rates and income shares by quintile of expenditure levels, we do find confirmation that UA is eminently an activity practised by the poor (Figure 2).

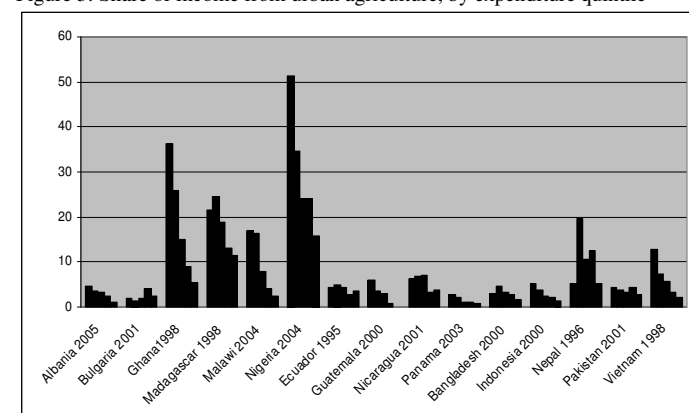
Figure 2: percentage of households participating in urban farming, by expenditure quintile



Note: The bars represent expenditure quintiles, from poorest (left) to richest (right).

With very few exceptions, mainly Bulgaria, there is a clear negative relationship between participation in agricultural activities and level of welfare. Participation rates for the poor can be extremely high, over 50 percent, in seven out of 15 countries for the poorest quintile.

Figure 3: Share of income from urban agriculture, by expenditure quintile



The magnitude of UA can be gauged somewhat more precisely by looking at the shares of income coming from agricultural activities (Figure 3).

The picture that emerges points to a stark contrast between African countries and other regions. Nigeria stands out with over 50 percent of the income of the poorest quintile originated by agricultural activities, but rates higher than 20 percent are also found in the poorer strata in Ghana and Madagascar. Outside of Africa only a few of the Nepal and Vietnam quintiles display shares higher than 10 percent, with all the others well below that mark.

#### IV. URBAN AGRICULTURE AND FOOD SECURITY

As explained in section II, UA can in principle have a positive impact on the food security situation of the households which are engaged in this activity through the income it generates, and the direct access to the food which is produced. Households which are engaged in farming may have access to relatively cheaper food and to a wider variety of particularly nutritious foods, such as vegetables or those with an animal origin (milk, eggs, meat).

In this section we look at the relationship between dietary diversity and participation in agricultural activities, within urban areas. Dietary diversity is often used as a food security proxy in nutrition surveys and has been generally found to be closely correlated to both caloric adequacy and anthropometric outcomes (for a review see [4]). Our measure of dietary diversity is based on 14 food groups<sup>4</sup>. As we mentioned earlier we could only find one study (Maxwell et al., 1998) that investigates the link between UA and food security in a multivariate framework, using child nutritional status as the dependent variable. Our dependent variable, the dietary diversity index, is the product of the food access, food availability, and food stability. In the way it is specified, the dietary diversity indicator does not reflect aspects regarding the food use, food preparation nor sanitation practices.

<sup>4</sup> The construction of the dietary diversity indicator follows the methodology developed by USAID's FANTA project, as adapted by FAO's nutrition division [16]. The 14<sup>th</sup> food group accounts for prepared foods which cannot be classified in the other 13 groups.

Our analytical model is specified as follows:

$$dd = \alpha_0 + \alpha_1 p\_onfarm + \alpha_2 \log(pc\ exp) + 1) + \alpha_3 landown + \alpha_4 hhsiz e + \alpha_5 educ\_ave + \alpha_6 agehead + \alpha_7 flaborshare$$

where *dd* is the dietary diversity index (simple count of food groups), *p\_onfarm* is a dummy variable indicating whether the household is engaged in agricultural activities, *pcexp* denotes the per capita consumption expenditure, *landown* is a dummy variable identifying households which own lands, *hhsiz e* expresses the number of household members, *educ\_ave* is the average years of education of the household members, *agehead* is the age of the household head, and *flaborshare* is the female share of the working age adults. The regressions also include a set of geographic dummy variables, and square terms for the age and education variables<sup>5</sup>.

The model is run separately for the full urban sample for each country, so that we have 15 regressions in total. Results regarding the main explanatory variable are summarised in Table 2.

Table 2: Regression results

Country and year	<i>p_onfarm</i>
Albania 2001	0.05
Bulgaria 2001	0.29***
Ghana 1998	0.33***
Madagascar 1998	-0.09
Malawi 2004	-0.11
Nigeria 2004	0.23***
Ecuador 1995	0.39***
Guatemala 2000	0.19***
Nicaragua 2001	0.16**
Panama 2003	0.60***
Bangladesh 2000	0.14**
Indonesia 2000	0.19*
Nepal 1996	0.20**
Pakistan 2001	0.01
Vietnam 1998	0.06
<b>Positive on total</b>	<b>10/15</b>

Note: \*\*\*, \*\*, and \* indicate significance at the 1, 5, and 10 percent level.

<sup>5</sup> Household level identifiers and the independently, identically distributed error term are omitted from the notation for simplicity.

After introducing the set of controls specified above, we do find evidence that engagement in urban farming is associated with greater dietary diversity in 10 out of 15 countries<sup>6</sup>. This is true in all the Latin American countries, 3 out of the 5 Asian ones, Nigeria and Ghana in Africa, and in Bulgaria. The sign on the coefficient is not significantly different from zero in the other five cases. These results provide a fairly robust confirmation of earlier suggestions that engagement in urban farming allow households to consume more and more diversified diets.

## V. CONCLUSIONS

This paper set out to tackle two very specific research questions concerning the importance and magnitude of agricultural activities for urban households and the relationship between being engaged in UA and household food security. Our findings indicate that agriculture is indeed a not negligible reality of the urban economy, involving anywhere between about 10 to 70 percent of urban households. In terms of income generation, though, its role appears to be much more limited, with the important exception of the African countries and of the poorer strata in Nepal and Vietnam. Our data also confirm that UA is an activity in which the poor are disproportionately represented, and this trend seems to occur in the entire sample.

We then focused on the dietary diversity index. The econometric analysis evidences that being active in agriculture does increase the dietary diversity of urban households.

In terms of policy implications, the message this paper wants to deliver is twofold. On one hand, the potentiality of UA in terms of urban poverty and food insecurity reduction should not be overemphasised. The figures showing the share of income generated by UA go into that direction. On the other hand, though, the importance of UA should not be too easily dismissed particularly in Africa and in those countries where UA provides a substantial share of income and appears to have an impact on dietary diversity.

<sup>6</sup> As it would be cumbersome to report the complete results for all the regressions, here we report just a summary table. The full regression results are available upon requests.

Urban planners and policymakers should therefore think twice before taking drastic action against UA, as it has often been the case in the past, and consider the poverty and food security implications that UA might have on the households' nutrition.

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