

Extended Abstract

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Paper Title A spatial analysis of Yogyakarta urban farming

Abstract prepared for presentation at the 97th Annual Conference of the Agricultural Economics Society, The University of Warwick, United Kingdom

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Abstract	200 words max
<p>Southeast Asian cities' urban farming can significantly contribute to low-income households' food security (Orsini et al., 2013). In Indonesia, there is still high incidence of malnutrition and stunting among women and children. Local authorities are promoting urban farming as means to increase supply of key macro and micro nutrients to vulnerable segments of the population. However, there is limited information on where, what and how much production is available to households. This research aims to characterize the current urban farming system of the metropolitan area of Yogyakarta in Indonesia, identifying by sub-district.</p> <p>We developed a survey instrument in Qualtrics that was administered to a random sample of 450 urban farms segmented by sub-district of the city using farmers and enumerators to collect the data and collect location using What3Words geocode system.</p> <p>We find there is a geographical specialization of types of production, with the north of the city producing vegetables and the south animal products, namely fish. Our data identified a specialized system where larger and productive urban farms in the north and south of the city may be able to provide for more vulnerable groups in the city centre.</p>	
Keywords	Urban farming, food security, GIS
JEL Code	Q13, Q15, R58 see: www.aeaweb.org/jel/guide/jel.php?class=Q)
Introduction	100 – 250 words
<p>In Africa and Southeast Asia, urbanization is quickly expanding (World Bank, 2021). Though this creates both challenges and opportunities, one of the main issues is to assure food security, particularly to vulnerable segments of the population. However, in the last decade, there emerged a debate on whether urban farming could play a role in reducing food insecurity. Several North American (namely San Francisco and Seattle), European (Barcelona, Copenhagen and Milan) and East Asian cities (Singapore and Hong Kong) even have ambitious plans to increase the urban food production to increase resilience and food security (Diehl et al., 2020).</p> <p>Southeast Asian cities' urban farming can significantly contribute to low-income households' food security (Orsini et al., 2013). In Indonesia, there is still high incidence of malnutrition and stunting among children in low-income urban</p>	

households. Local authorities are promoting urban farming as means to increase supply of key macro and micro nutrients to vulnerable segments of the population.

To understand the role urban farming can play in reducing food insecurity, it is imperative to know what the production capacity is, where it is located, what is produced, how much is available and who is producing. This research aims to characterize the current urban farming system of the metropolitan area of Yogyakarta in Indonesia, identifying by sub-district. This is a first step to the development of a digital geographic information system of urban farming to aid private and public decision makers.

Methodology

100 – 250 words

Mapping a city's urban farming system requires both geographical location of production sites and information on production and supply of what is produced. One of the challenges of this project was to access local data on the location of urban farms, however the city of Yogyakarta's City Agriculture and Food Service has a group of extension officers supporting urban farming and groups of farmers are organized in WhatsApp groups.

Thus, we use recent developments on digital and information technologies and citizen science to collect information on the location of farms (using the What3Words geocode system) and an online survey to gather location, production and socio-economic information of a sample of farms distributed across the sub-districts of the city.

Specifically, we developed a survey instrument in Qualtrics and administered to a random sample of 450 urban farms segmented by sub-district of the city between May and June 2021. The data was collected by the Indonesian team with the support of extension officers and the urban farm groups in the city.

The survey enabled us to collect information on farm location as well as production, farming technologies, marketing strategies and socio-economic information. This allows us to combine geographical information systems (GIS) with survey data on farm and farmers' characteristics to characterize the Yogyakarta urban farming system.

Results

100 – 250 words

In 2019, the number of urban farmers in the city of Yogyakarta was 3,056. Most of these were affiliates to a WhatsApp group and were in contact with a city extension officer (Yogyakarta City Agriculture and Food Service, 2021). Of this population, we collected a sample of 450 farmers from which we obtained 213 usable responses.

We found a wide range of farm sizes across the sub-districts, ranging from 223 to 1843 m². As it might be expected, farms in the outskirts of the city are larger. While some urban farms are small plots in a garden without much impact on households' food supply, others use modern technologies and integrated animal (namely fish) and vegetable production systems.

Regarding the types of vegetable products, peppers, mustard, aubergine, and cabbages are the dominant vegetables produced. Chicken, ducks, and rabbits are the dominant animal products, whereas catfish and tilapia are the dominant fish.

In terms geographic distribution of farms, sub-districts in the vicinity of the city centre depend on the farm as a main source of income and food security. In these areas of the city, vegetables are the main produce. Large-sized farms are located in sub-districts south of the city and specialize in fish production. The largest vegetable production farms are located north of the city centre and mainly produce leafy greens, tomato and chilli pepper.

Discussion and Conclusion

100 – 250 words

This research enabled us to start characterizing the urban system of Yogyakarta metropolitan area. Our results show that in most sub-districts, urban farming contributes but is not sufficient for household food security. This is consistent with data collected by the Yogyakarta City Agriculture and Food Service.

What we were able to find, and show is a geographical specialization of types of production, with the north of the city producing vegetables and the south animal products, namely fish.

Edmondson et al. (2002) mapped urban farming production in Sheffield and, using a household food deprivation index, identified the potential use of urban farming production to reduce food insecurity. Similarly we were able to identify the potential of urban farms to mitigate food insecurity through household own production or donations of surpluses from urban farms. Also, we identified larger and more productive urban farms north and south of the city that may be able to provide for more vulnerable populations in the city centre.

Our research has shown the feasibility and usefulness of combining production, social-demographic and geographic data to better understand the role urban farming systems can play in the mitigation of food insecurity in vulnerable segments of metropolitan areas in Southeast Asia. Future extensions would allow urban planners to decide which areas of the city they should target to support and encourage urban farming. Similarly, using modern data science methods and practices can be applied to develop marketing and policy decision information systems.