Perceived benefits and constraints in urban farming practice during COVID-19

A Suryantini¹, H D Anjani¹, Z Fadhliani¹*, and Taryono²

¹ Department of Agricultural Socio-Economics, Faculty of Agriculture, Universitas Gadjah Mada, Indonesia
² Center of Innovation and Agro Technology, Universitas Gadjah Mada, Indonesia

Corresponding author: zaura.f@ugm.ac.id

Abstract. COVID-19 has a significant impact on supply chains and logistics, causing a severe threat in accessing fresh and nutritious food. Urban farming activities have the potency to contribute to fresh and nutritious food and reduce the cost of food consumption. This study objective is to emphasizing the critical role of urban farming during the COVID-19 pandemic. By utilizing a questionnaire, we descriptively present community members' characteristics practicing urban farming located in residential neighborhoods in the City of Yogyakarta. We also explore the perceived benefits and constraints of urban farming in the pandemic era. Most urban farmers favorably perceived the benefits of urban farming in the COVID-19 pandemic, primarily its psychological benefits. Another positive effect of urban farming perceived by the gardeners is its ability to enhance the accessibility of nutritional diets and food security. In general, most of the respondents find no barriers to obtaining inputs used to practice urban farming during the COVID-19 situation. Instead, the main constrain comes when the farmers need to host events and activities to engage the neighborhoods.

1. Introduction

COVID-19 has caused a massive impact on the global economy. In general, the economic downturn and recession hit people in various aspects, including rising food prices, declining purchasing power, increasing the risk of losing jobs, and needing more government assistance. On the other hand, COVID-19 also has a significant impact on supply chains and logistics, both for producers and consumers, due to the closure of regional borders, lockdowns, and traffic reductions, causing a severe threat in accessing fresh and nutritious food. This problem must be addressed with appropriate steps to maintain food access, mostly vegetables with complex supply chains. The complexity of vegetable supply chains is associated with the perishable nature of the product, the high level of uncertainty on demand and costs, and the large number of intermediary traders involved [1, 3]. Therefore, to adjust the new situation, more resilient food systems that strengthen local agricultural capabilities such as home gardening and urban farming are urgently needed.

Urban farming includes all agricultural production forms within or around cities [4]. Although not the solution to all economic and food security problems, urban farming activities do have the potency to contribute to fresh and nutritious food and reduce the cost of food consumption. A study
by Zezza and Tasciotti [5] confirmed that farming engagement could allow urban households to consume better and more nutritious diets. The contribution of urban farming to nutrition security is probably its main strength since it provides easier access to safe and nutritious food.

Numerous articles have drawn attention to the benefits attached in urban farming [6, 10]. However, only a few literature studies have explicitly highlighted benefits associated with urban farming during COVID-19 [11, 12]. The current study will contribute to the literature by adding more studies emphasizing urban farming's critical role during COVID-19. The specific objective of this article is to present: 1) the characteristics of community members practicing urban farming located in residential neighborhoods in the City of Yogyakarta, 2) the perceived benefits and constraints in practicing urban farming during the pandemic era.

2. Methods
This study employed a qualitative case study design to elicit urban farming benefits perceived by communities during COVID-19. Cases included six community farms located in residential neighborhoods in Yogyakarta: Ngudi Mulyo, Melati Green, Gemah Ripah, Winongo Asri, Kampung Markisa Blunyahrejo, and Ngremboko. To address the research questions, we interviewed 113 members of the community farm using a questionnaire. We analyzed the data by utilizing qualitative descriptive analysis. The data on urban agricultural farmer characteristics include gender, age, level of education, type of the main occupation, length of time joining urban farming groups, independent farming activities, and time allocation of running an urban agricultural business. We provide several statements related to the benefits and constraints to determine the perceived benefits and constraints in urban farming during the COVID-19 pandemic. Respondents were asked whether they are agreed, doubted or disagreed. Descriptive analysis is done by calculating the total value and the percentage of results in each data. The study results are presented in tabular form and explained in detail.

3. Result and Discussion
The City of Yogyakarta is the most populated area in the Special Province of Yogyakarta. The urban area is rapidly crowded with houses, offices, hotels, and shopping centers, leading to agricultural land's vanishing. Despite that, urban farming is increasingly being promoted by both the community and government. This study extensively discusses urban farming applied in Yogyakarta because agriculture applied in urban areas has different characteristics compared to rural agriculture, especially in terms of land used. People in the city are doing agricultural activities by utilizing narrow spaces; therefore, they cannot be categorized as general farmers.

3.1. Characteristics of urban farmers
To find urban farmers' characteristics in Yogyakarta, we interviewed 113 respondents from six community farms (Table 1). The demographic details of the respondents are presented in Table 2.

| Table 1. Community farms in the City of Yogyakarta included in the study |
|-------------------------|-------------------------|
| **Name of Community Farms** | **Location** |
| KTD Ngremboko | Jatimulyo, Kricak, Tegalrejo |
| Kampung Markisa Blunyahrejo | Blunyahrejo, Karangwaru, Tegalrejo |
| Ngudi Mulyo | Pugeran, Suryodiningratan, Mantrijeron |
| Melati Green | Purbayan, Kotagede |
| KTD Gemah Ripah | Bausasran, Danurejan |
| Winongo Asri | Patangpuluhan, Wirobrajan |

Source: Primary Data, 2020.

Table 2 shows that women dominate urban farming in the City of Yogyakarta. However, the number of men engaging in farming also quite big (42.48%). This number indicates that both men
and women have comparable interest in practicing urban farming. The majority of urban farmers in the City of Yogyakarta are age 40 and above. This can be attributed to the fact that older adults gain physical benefits from gardening activities [13].

| Characteristic                         | N (%)  |
|---------------------------------------|--------|
| Sex                                   |        |
| Male                                  | 48 (42.5) |
| Female                                | 64 (57.5) |
| Age                                   |        |
| 20-29                                 | 3 (2.7)  |
| 30-39                                 | 10 (8.9) |
| 40-49                                 | 37 (32.7) |
| ≥ 50                                  | 63 (55.8) |
| Education                             |        |
| Primary school                        | 7 (6.2)  |
| Middle school                         | 16 (14.2) |
| High school                           | 52 (46.0) |
| College and University                | 38 (33.6) |
| Length of engaging in urban farms     |        |
| 0-12 month                            | 69 (61.1) |
| > 12 month                            | 44 (38.9) |
| Practicing home garden                |        |
| Yes                                   | 75 (66.4) |
| No                                    | 38 (33.6) |
| Employment status                     |        |
| Working                               | 57 (50.4) |
| Not working                           | 56 (49.6) |

Source: Primary Data Analysis, 2020.

The education level affects the ability to receive knowledge and apply new technologies [14]. Based on the study results, most urban farmers (70%) in Yogyakarta attended secondary education at the minimum, indicating that the urban farmers are moderately educated to accept new knowledge and technology. Thus, any technical guidance or counseling delivered by the relevant authority or academies could be more easily absorbed by the urban farmers.

Due to limited agricultural land, urban farming activities in the City of Yogyakarta are generally centered on groups. Many of the members joined the urban farming group for less than one year. This may be due to the appearance of new commodity gardens in the City of Yogyakarta. Interestingly, the COVID-19 pandemic has encouraged urban citizens to be more active in conducting agricultural activities. For example, Markisa community garden was recently formed in February 2020 when COVID-19 occurred in Indonesia. As the COVID-19 pandemic develops, residents have become enthusiastic about joining urban agricultural activities, attracting some new members. Besides doing activities in the community garden, most respondents (66.4%) are also growing plants independently at their homes. Respondents planted plants in pots or polybags placed around the house or used a narrow yard to plant several types of vegetables such as chili, tomatoes, eggplant, mustard greens, spinach and spinach.

Besides, approximately half of the urban farmers are employed, meaning that urban farming is not the main activity for most respondents. Those who are unemployed consist of housewives and retirees. However, both groups stated, from the interview, that they take farming as a hobby and leisure activity they are doing in free times. The average time allocation of urban farming activities is only 2.43 hours a day and five days a week (reported in table 3). The urban farmers allocated some time to take care of the plants in the morning before leaving for work or in the afternoon after returning home. However, the administrator of the community gardens allocates more time than other respondents whose status are members.
Table 3. Time Allocation to practice urban farming in the City of Yogyakarta

| Time Allocation for Urban Farming | Average | Unit |
|----------------------------------|---------|------|
| In a Day                         | 2.43    | Hour |
| In a Week                        | 5       | Day  |

Source: Primary Data Analysis, 2020.

3.2. Perceived benefits in urban farming practice during the COVID-19 pandemic

To obtain the perceived benefit of urban farming in the City of Yogyakarta during the COVID-19 pandemic, the respondents were asked whether they agree, doubt, or disagree with the statement that appeared in the questionnaire. The findings are reported in Table 4.

Table 4. Perceived benefits of urban farming in the City of Yogyakarta during COVID-19 pandemic

| Perceived benefit                                      | Disagree | Unsure | Agree |
|--------------------------------------------------------|----------|--------|-------|
| Adding more happiness                                  | N (%)    | N (%)  | N (%) |
| Reducing stress                                        | 4 (3.5)  | 1 (0.9) | 108 (95.6) |
| Relieving boredom due to stay at home regulation      | 3 (2.7)  | 1 (0.9) | 109 (96.5) |
| Reducing the intensity of going out to buy vegetables  | 2 (1.8)  | 0 (0.0) | 111 (98.2) |
| Increasing consumption of nutritious food in the family| 9 (8.0)  | 12 (10.6) | 92 (81.4) |
| Improving family food security                         | 3 (2.7)  | 1 (0.9) | 109 (96.5) |
| Reducing family expenses for purchasing vegetable      | 3 (2.7)  | 12 (10.6) | 98 (86.7) |
| Increasing income in the family                        | 17 (15.0)| 16 (14.2) | 80 (70.8) |
|                                                        | 63 (55.8)| 3 (2.7) | 47 (41.6) |

Source: Primary Data Analysis, 2020.

Findings show that participants primarily perceived psychological benefits associated with urban farming activities (i.e., relieving boredom, reducing stress, adding happiness), followed by nutrition outcomes, food security, and preventive action against COVID-19 (i.e., reducing the intensity of going out to buy vegetables). The economic impact (i.e., reducing family expenses for purchasing vegetables and increasing income) ranks as the least.

One of the most critical impacts from the participants' perspective is not strictly speaking an element of community food security. Instead, it is the impact on the gardeners' well-being. Pandemic COVID-19 has forced people to stay at home in order to halt the viruses spread widely. Participants stated that staying at home, in the long run, could cause boredom, which led to the increasing stress level. Moreover, the gradually rising mortality rate caused by the virus and widespread panic situation has triggered stressful situations. The respondents agree that urban agricultural activities help them eliminate boredom and stress during this difficult time. Breathing fresh air, being active and stretching and bending while caring for a garden were all seen as leisure. This is in line with Litt et al [15], which explains that gardening activities contribute to the gardeners' well-being by reducing stress and improving mental health.

Urban farming can also maintain the availability of fresh and nutritious food [16, 18]. Participants felt that their garden increased their consumption of fresh produce and made it accessible for them to eat vegetables and fruits more often, especially during the COVID-19 pandemic, where they need to maintain good health. Also, respondents reported being food secure, saying that they always had sufficient food to feed the family, even though there were logistic disruptions due to the lockdown. Having produce in the garden also reduces the frequency of going to markets for grocery shopping, which helps preventing virus transmission.

A voluminous literature has shown that urban farming is reported as an activity that provides economic benefit to farmers [19, 21]. Nevertheless, the recent study does not seem to share the same conclusion since only a few farmers agree with the statement of urban farming increasing family income. This can be attributed to the focus of the community gardens developed in the City.
of Yogyakarta, where they do not have a strict market orientation, but rather use food production as a medium to deliver hobbies and to achieve social goals such as providing a space to engage the neighborhoods. Despite its little contribution to family income, however, the participants admitted that the gardens helped manage household expenditures by reducing the cost of food consumption. This would benefit the farmers since some of them experienced a cut on the incentive they received due to working from home brought about by the COVID-19 pandemic. From the previous information, it is understandable that urban farming can be a solution to the main challenges that occur as a result of the COVID-19 panic, as it improves psychological health and gives secure access to healthy, fresh and nutritious food at affordable prices for dense and growing urban communities [12, 15].

3.3. Perceived constraints in urban farming practice during the COVID-19 pandemic

Several constraints faced by urban farmers in the City of Yogyakarta during the COVID-19 pandemic have been identified, and the results are presented in Table 5. Generally, the respondents do not feel much difficulty practicing urban farming activities, except hosting events and activities to engage the neighborhoods.

Table 5. Perceived constraints in urban farming practice in the City of Yogyakarta during the COVID-19 pandemic

| Perceived constraints                                    | Disagree | Unsure | Agree |
|---------------------------------------------------------|----------|--------|-------|
| Difficulty in obtaining planting media (soil or water)  | 88 (77.9)| 5 (4.4)| 20 (17.7)|
| Difficulty in purchasing seeds                         | 91 (80.5)| 4 (3.5)| 18 (15.9)|
| Difficulty in getting fertilizer                       | 90 (79.7)| 4 (3.5)| 19 (16.8)|
| Difficulty in getting planting equipment                | 82 (72.6)| 5 (4.4)| 26 (23.0)|
| Difficulty in selling the produces                     | 76 (67.3)| 18 (15.9)| 19 (16.8)|
| Difficulty in getting capital to replant                | 66 (58.4)| 12 (10.9)| 35 (30.7)|
| Difficulty in gathering people for group activities     | 69 (61.1)| 4 (3.5)| 40 (35.4)|

Source: Primary Data Analysis, 2020.

The majority of respondents stated that they do not have difficulties accessing the inputs used in urban farming activities, though COVID-19 pandemic force many stores to close their business, including the stores that sell agricultural inputs. Most farmers frequently received government assistance such as soil, fertilizer, plants, and seeds. Some farmers even have been able to produce organic fertilizer independently made from plants and animal waste.

Most of the respondents also found no constraints regarding the produce's sale since the farmers did not tend to grow entrepreneurial food production. The produce is limited, and it is grown to sustain themselves and their families. Even if there were excessive produce, it would be shared with the surrounding community to increase community cohesion. Besides, obtaining capital to replant the gardens is not the main difficulty for some farmers, although it is self-funded. This is attributed to the fact that merely caring for plants and watching the plants grow can increase happiness.

The main barrier perceived by the community garden members during the COVID-19 pandemic cannot host events and activities to engage the neighborhoods. This is because there is a social distancing and stay at home regulation that suggests people avoid the activity that can cause a crowded. As a result of this regulation, many scheduled activities assigned by the community member have been canceled. Anticipated actions have been made, such as providing handwashing equipment and hand soap in the garden, yet still, the crowd is forbidden to prevent virus transmission.
4. Conclusion
This research aims first to portray the characteristics of community garden members in the City of Yogyakarta, and second, to assess the perceived benefit and constraints in doing agricultural activities in the COVID-19 era. Urban farmers in Yogyakarta are predominantly females, aged 50 years or more, with a relatively high education level. Urban farming activities focus on groups or community gardens, and it is carried out as part-time activities. Overall, despite the challenging situation of the COVID-19 pandemic, most of the urban farmers positively perceived the benefits of urban farming, primarily its psychological benefits. The physical benefits are also attached in gardening activities [22]. However, during the COVID-19 situation, the mental rather than the physical benefit of gardening to health was the more significant contribution from the participants' perspective. The gardeners saw their gardens as a source of relaxation and a way to let go of stress. Another significant positive effect of urban farming perceived by the gardeners is its ability to enhance the accessibility of nutritional diets and food security. Urban farming activities in the city of Yogyakarta initially have been carried out before the COVID-19 pandemic. However, this pandemic's existence resulted in the logistic disruption, making urban farming practice getting sporadic as it maintains secure access to food. In terms of constraints in practicing urban farming, most respondents find no barriers to obtaining inputs used to practice urban farming during COVID-19 situation. Instead, the main constrain comes when the farmers need to do group activities that engage many people.

Urban farming can contribute to community food security not only by helping to address issues of accessing nutritious food, but also by improving the well-being of individuals and families. Hence, it is hoped that urban farming's sustainability can be maintained through programs and policies that support urban farming producers. Many urban gardeners are unskilled because they start practicing agricultural activities as a hobby. Therefore, urban farmers would benefit from support, particularly in terms of developing ecological gardening skills. In addition, more resources need to be allocated to provide community garden space and learning opportunities to all gardeners [23]. This way, the sustainability of urban farming in the City of Yogyakarta might be preserved.

This study has revealed that the gardeners perceived benefits through performing urban farming in the COVID-19 situation. However, the analysis in this study presents only in descriptive manner. Future studies such as conducting numerical analysis of urban farming benefit, are highly recommended in order to highlight the importance of urban farming to community food security.

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