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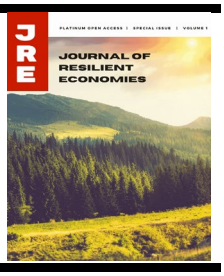

Urban Farming as a Resilient Strategy During COVID-19 Pandemic

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Abstract

Urban agriculture has been seen as an essential strategy for enhancing food availability and reducing stress levels for urban households. This paper aims to study the benefits of urban farming and its ability as a resilient strategy, especially during the COVID-19 pandemic. The research used primary and secondary sources to gather relevant data. Primary data was collected through interviews in June-July 2021 and analysed quantitatively and qualitatively. The analysis found that respondents' perception of urban farming was strongly positive. The paper finds that urban farming could be a resilient strategy since it could reduce stress and increase the community's income. Urban farming could also play a way in increasing people's immunity and health system in urban areas. Therefore, urban farming needs to be supported and assisted by the Government, specifically at the local level.

Keywords: COVID -19, Food Insecurity, Urban Farming, Resilience, Immunity

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1. Introduction

COVID-19 pandemic became a significant concern for all countries worldwide. COVID-19 was initially discovered in Wuhan City, China, at the end of 2019 (Sarni & Sidayat, 2020). COVID-19 quickly spread worldwide, including in Indonesia and devastated all aspects of human life (Andrianingsih & Laras Asih, 2021; Azamfirei, 2020). The first COVID-19 case in Indonesia was found in March 2020, and until March 29, 2022, there were 6.01 million cases. Our in Data and The Center for Systems Science and Engineering at Johns Hopkins University (JHU CSSE) (2022) noted that the highest daily cases of COVID-19 in Indonesia in 2021 occurred in mid-July, with as many as 56,757 cases, and in February 2022 there were 63,956 cases. The total number of deaths during the pandemic reached 155,000 cases.

The rapid spread of COVID-19 in Indonesia has forced the Government to set various policies, including social distancing, physical distancing, work from home, and even regional quarantine (Hadiwardoyo, 2020; Hirawan & Verselita, 2020; Kholis et al., 2020). As a result of these policies, various changes have occurred and impacted all sectors, including social, economic, and cultural (Andrianingsih & Asih, 2021; Yanuarita & Haryati, 2020). Community activities such as work, school and worship are carried out from home. Furthermore, the pandemic caused many people to lose their jobs. UNICEF, UNDP, PROSPERA, and The SMERU Research Institute (2022) found that one member of two families lost their job.

Yanuarita & Haryati (2020) stated that the COVID-19 pandemic had affected the economic situation of people in Indonesia, and this has brought critical concern to Government in Indonesia. Social distancing and physical distancing policy applied since March 2020 and followed by large-scale social restrictions implemented in April 2020 have drastically reduced the activity and mobility of many people in big cities, especially in Jakarta, Bogor, Depok, Tangerang, and Bekasi (Jabodetabek) (Hadiwardoyo, 2020). The social restrictions have impacted national, sectoral, individual and corporate loss, except for the food and agricultural sector and health sector (Hadiwardoyo, 2020). As a result, the Indonesian economy slowed to minus 5.3% in the second quarter of 2020, and the aggregate growth was minus 2.1% in 2020 (Muhyiddin & Nugroho, 2021). Therefore, as in other countries, the economic situation in Indonesia has also experienced a slump. This situation worsened as the investors were reluctant to invest because of the low investor sentiment towards the market and a difficult economic situation (Nasution et al., 2020).

The impact of the COVID-19 pandemic on the socio-cultural sector occurs at all levels of society (Yanuarita & Haryati, 2020). People must change their habits from social communities to individualistic communities living alone and only prioritising personal and family interests. In adults/elderly, economic problems increase community stress, resulting in increased cases of household divorce and criminalisation. (Yanuarita & Haryati, 2020)

In the health sector, increasing public concern about being infected with COVID-19 has changed the demand for medicines, vitamins, and supplements and "panic buying" (Lidia et al., 2020). This could be seen in the increasing sales of medicines, multivitamins, and supplements at pharmacies (Nurazizah, 2021). The Government must anticipate the increasing demand for those products since it will lead to criminal action and political insecurity.

Those negative consequences of COVID-19 have been the Government's primary concern since it could threaten food security and economic and political stability. A more extended period of large-scale social restrictions could expose individuals or communities to experience a prolonged stress condition. According to Tarantino et al. (2021), there was an association between perceived stress and the vulnerability of immune status. A person with a higher level of perceived stress will have a more vulnerable immune status (Tarantino et al. (2021). Additionally, Peters et al. (2021) explained that stress caused by socio-economic factors or psychosocial stress was related to the steadily increasing incidence of chronic, non-infectious, non-communicable diseases (NCD), and higher stress could be worse COVID-19 outcome. Therefore, a strategy to cope with stress or resilience is needed, specifically during the pandemic.

One of the resilience strategies mentioned by many researchers to cope with stress is the optimisation of land or space available around the house to plant vegetables and herbs or others (Kaplan & Kaplan, 1989; Wood et al., 2015; Soga et al., 2017; Ng et al., 2018; Sia et al., 2020). According to Kaplan and Kaplan (1989), people need nature (plants and vegetation) for faster recovery from hospitals and other purposes.

Optimising land for planting or agricultural activities increases the interaction between humans and nature. The intensive interaction with nature could give many benefits, such as decreasing stress (Kaplan and Kaplan, 1989; Troy & Mauss, 2011), increasing spirituality (Bernardini & Irvine, 2007), growing relationships with nature and the community (Soga et al., 2017), fulfilling the nutritional food of the community and local food diversification and finally increasing people's income (Gulyas & Edmonson, 2021). Anindya et al. (2021) explained that urban farming would be able to meet the food and nutritional needs of the family by between 38-70%. Moreover, Ashari et al. (2016) stated that using yards could reduce family food consumption expenditures, increase household income and encourage productive economic growth.

In urban areas, agricultural or farming activities were initially used as one of the strategies initiated to reduce the negative impact of urbanisation (Orsini et al., 2013; Atmaja et al., 2020; Surya et al., 2020). However, the ability of urban farming to decrease stress and influence mental health could also become a solution for increasing the community's immune system and thus, preventing people from COVID-19. Andini et al. (2021) showed that urban farming in Jakarta could increase the level of happiness and life satisfaction and increase productivity. Thus it was also predicted to improve the health of residents in urban areas.

There are many studies on urban gardening or urban agriculture as a resilience strategy (Hou, 2018; Salleh et al., 2020; Gulyas & Edmonson, 2021; Langemeyer et al., 2021; Sia et al., 2022). Salleh et al. (2020) mentioned urban agriculture as a community resilience strategy for food insecurity in Malaysia, while in East Asia and Global North, Hou (2018) and Gulyas & Edmonson (2021) believed that urban agriculture could increase city resilience against various environmental and socio-economic disturbances. The opinion of Gulyas and Edmonson (2021), followed by Langemeyer et al. (2021), found similar results and the importance of incorporating food resilience and global food sustainability from urban agriculture into urban land-use planning. Sia et al. (2022) mentioned urban gardening as mental resilience during the COVID-19 pandemic in Singapore. None of the studies above mentioned the importance of urban gardening or urban agriculture as a resilient strategy in Central Java, specifically in urban and peri-urban areas of Semarang Regency. Therefore, this study aims to explore the potential of urban gardening as one of the resilient strategies during the pandemic in Semarang Regency, Central Java, Indonesia. Hopefully, this study could give another empirical evidence of the ability of urban farming to mental and economic resilience during the COVID-19 pandemic. In the subsequent section, we discussed the research methodology used in this study, followed by the results and discussions of the findings in section 3. The practices of urban and peri-urban farming in Semarang Regency and its ability to become a resilient strategy for the community are explained in detail in Section 4, and Section 5 provides the summary, conclusions, and recommendations.

2. Research Methods

Urban Farming in Indonesia

There are many definitions of urban farming. Atmaja et al. (2020:111) defined urban farming as:

> "registered practice of cultivating, growing, and distributing food and derivative products by urban farmer or community through utilising designated yard called plot within city boundary".

Andini et al. (2021) defined urban farming as growing food in the city to maintain a sustainable food system within urban areas. In the spatial context, urban farming is an agricultural activity conducted in urban areas (Sokra et al., 2021). Some researchers (Skar et al., 2020; Sroka et al., 2021) have seen urban farming as part of urban and peri-urban agriculture; thus, they differentiate between urban farming and urban gardening. Urban Farming is a commercial activity and cultivates considerably larger areas than Urban Gardening and occurs primarily at the fringe (peri-urban area) of urban agglomerations (Sroka et al., 2021:2). Chandra and Diehl (2019), who studied urban agriculture in Jakarta, differentiate urban farming according to its form (location, land title, tenure status, scale of production, production cycle for crops, and human resources). The explanation of its form and function is shown in Table 1.

Table 1- The Typologies of Urban Agriculture in Indonesia

No	Forms		Type	Definition
1	Location	a.	On-plot (within the home)	The farm plots are located within the house
		b.	Neighbourhood	The farmer's house is within a short distance from the farming location.
		c.	Off-plot	Farmer's house is located far away from the farming location.
2.	Land title	a.	Private land	The land is owned or leased.
		b.	Semi-public land	Yards of schools, hospitals, and prisons
		c.	Public land	Parks, roadside, riverside, railways
3.	Tenure Status	a.	Informal	Farming activities are not registered (non-registered)
		b.	In the process of registration	The farming activities have been registered but have not been approved (waiting for approval)
		c.	Formal	The farming activities have been registered.
4.	Scale of Production	a.	< 0.01 ha	Farmers with this size of farming plots usually are subsistence small scale/subsistence farming.
		b.	0.01-0.1 ha	Semi-commercialised small and medium scale
		c.	> 0.1 ha	Commercialised large scale
5.	The production cycle for crops	a.	Short cycle crops	The crops grow between 2 weeks – 1 month with lower-growing risk and less probability of failure.
		b.	Long cycle crops	The crops grow between 3 – 4 months.
		c.	Continous harvest	Farmers grow perennial crops (e.i. banana, papaya, mango)
6.	Manpower	a.	Single farmer	The farmer runs the farm alone without any involvement from other family members.
		b.	Domestic manpower	There is involvement from 1 or more family members in the farm activities.
		c.	Hired manpower	Farmers use external labour or non-family members

Source: adapted from Chandra and Diehl (2019:5)

Meanwhile, Atmaja et al. (2020) simplify the differentiation and divide urban farming in Indonesia according to the location of farm activities, production scale, ownership, and land size. Different from Chandra and Diehl (2019), Atmaja et al. (2020) classified the location of farming activities in urban areas as on the ground and rooftop, with the scale of production between micro and meso. While Chandra and Diehl (2019) divided the land title into three groups (private, semi-public, and public land), Atmaja et al. (2020) classified urban farming only into personal and urban community farming. Personal urban farming belongs to and is managed by a personal farmer, while urban community farming belongs to and is managed by the community. Considering its characteristics (level (ground or rooftop), scale (micro or meso), actor (private or community), and size, urban farming could be divided into five (5) forms such as nurseries, allotment, institutional, residential, and rooftop (Atmaja et al., 2020). Different forms and profiles of urban farming can be seen in Table 2.

Table 2- Different forms and Profile of Farming in Urban Areas

Level	Scale	Actor	Size (m^2)	Form	Profile (intention)
Ground	micro	Private	6-25	Residential	Family's self-sufficient hobby
	meso	Community	36	Nurseries	A greenhouse area for cultivation purposes
			40-50	Allotment	Frequently used for commercial purposes, practice and social purposes.
			30-70	Institution	Used for education and hobby
rooftop	Micro/meso	Private/community	<1092	Rooftop	Intended for space utilisation and hobby

Source: adapted from Atmaja et al. (2020:111)

Chandra and Diehl (2019), as well as Atmaja et al. (2020), have divided urban farming according to its ownership, while Andini et al. (2021) have differentiated urban farming according to media or materials used in the plantation. Andini et al. (2021) mentioned the limited land space in urban areas as a problem for agricultural activities. Therefore, farmers or households interested in optimising their limited space must use various media or materials for plantation. While some urban households plant directly on the ground, others with limited space or no open ground have to use pot and polybag, verticulture, hydroponic, and aquaponic. The various types of urban farming in Indonesia are seen in Table 3.

Table 3- Various Types of Urban Farming Based on Space and Growing Media

Types	Space	Plant Containers used	Growing media
Rack and shelf	Limited space available	Pot & polybag	Soil, rice hulls, compost, manure or sand
Verticulture	Limited or no space available for plantation	Pot & polybag, PVC pipe, bamboo, wood or board that can be located using a multilevel system (standing verticulture, hanging or wall verticulture, or stick verticulture)	Soil or water
Hydroponic	Limited space available	PVC pipe, water pump	Water with a nutrient solution (nutrient film technique/NFT), cocopeat, rook wool
Aquaponic	Limited to small space available for plantation	Rack and fish ponds, tank	Combination of an interconnected vegetable and fish cultivation system
On the ground (conventional agriculture)	Space available for plantation	Directly plant on the ground or land area	Soil (fertile) as the growing media, fertiliser & pesticide to support the growth of the plantation

Source: adapted and modified from Andini et al. (2021)

The example of optimising the available space for a plantation in a building, for example, on the rooftop as mentioned by Atmaja et al. (2020) or verticulture as explained by Andini et al. (2021), could be seen in Suparwoko and Taufani (2017) through their research in Sleman Yogyakarta. People utilised the space on the rooftop by building layers with specific functions such as drainage, protection mat, growing substrate, and vegetation layer (Suparwoko and Taufani, 2017). The depth of the substrate will be adjusted according to the plant types. Table 4 illustrates the depth of substrate and the types of plants.

According to its function, while Sroka et al. (2021) mentioned the function of urban farming for commercial purposes, urban farming in Indonesia is targeted for commercial and other social functions. Chandra and Diehl (2019) explained that urban farmers in Jakarta tend to be informal and socially oriented, mainly subsistence and semi-commercialised farmers with small land areas. They allowed visitors or their neighbours to take small amounts of crops for free. Meanwhile, farmers with larger areas of plantation in the urban areas tend to be fully commercialised or fully utilised for profit.

Table 4- The Substrate Depth on a Green Roof in Sleman Yogyakarta

No.	The Substrate Depth	The Plant Types
1.	Shallow (50-150 mm)	Low growing succulents
2.	Deeper than 150 mm	Annual to biennial plants, herbaceous perennials
3.	Deeper than 250 mm	Small shrubs & turf
4.	Substrate deeper than 50 mm	Shrubs up to 2 m
5.	Best results in substrate deeper than 1 m	Small trees

Source: adapted and modified from Suparwoko and Taufani (2017)

Atmaja et al. (2020), who studied the potential urban farming in Malang Regency, Indonesia, found that urban farming is not only for income-generating purposes but also for provisioning food, recreational and community-building education and learning, as well as maintaining urban comfort. Those five functions applied especially for allotment. Meanwhile, residential and rooftop farming, which an individual manages, usually has subsistence-oriented, such as providing food or maintaining urban comfort. Sia et al. (2022:9), further from their studies on urban farming in Singapore, have found that one to four hours of gardening every day could significantly increase mental resilience through the pathway of fostering "emotional regulation", "relationship", "confidence",,, "positive thinking" and "spirituality", especially during COVID-19 pandemic. The relationships between urban gardening and mental resilience can be seen in Figure 1. Urban gardening will bring people to nature. By planting and taking care of the garden, the activity helps them in reducing their stress, enhance their identity with the garden, gain more knowledge, build relationships or network with other people as well as other institutions, increase self-esteem, and finally increase their Brain-derived Neurotrophic Factor (BDNF). BDNF is a critical protein that could help untreated patients reduce major depressive disorders (Sia et al., 2022). By having those benefits, some people will experience an increase in emotional regulation, spirituality, confidence, positive thinking, and relationships. Those experiences are factors influencing mental resilience (Sia et al., 2022). Therefore, urban gardening could be a way to form the mental resilience of a person or a community. Andini et al. (2021) mentioned that urban farming activities could benefit humans' physical and psychological aspects, specifically during the COVID-19 pandemic. Urban farming could benefit human health since gardening could bring happiness, satisfaction, and work productivity (Andini et al., 2021).

Other than mental resilience, urban gardening could also be another way of creating economic resilience. The production of vegetables from urban gardening could be used to reduce their expenses for buying vegetables. Some people with larger areas of a garden or higher production of vegetables could sell their remaining vegetables to the market. By practising urban gardening, urban households could have more money to buy other food or gain more income. Therefore, urban gardening could be a strategy, especially for people who got impacted by the COVID-19 pandemic, to achieve economic resilience (Figure 1).

By referring to those definitions of urban farming or urban agriculture mentioned and their function, this study will describe the occurrence of farming activities in the urban areas of Semarang Regency, which could be categorised as the satellite or peri-urban areas of Semarang City, Central Java, Indonesia. Therefore, this study defines urban farming as farming activities in the spatial context or conducted in urban or peri-urban areas, as Sroka et al. (2021). This study will focus only on farming activities conducted by individual households or residential farming as defined by Atmaja et al. (2020) or on-plot farming as mentioned by Chandra and Diehl (2019). This study will also explore the potential effect of farming activities in the Sub-district or peri-urban areas of Semarang Regency on mental health or the immunity system of people during the COVID-19 pandemic.

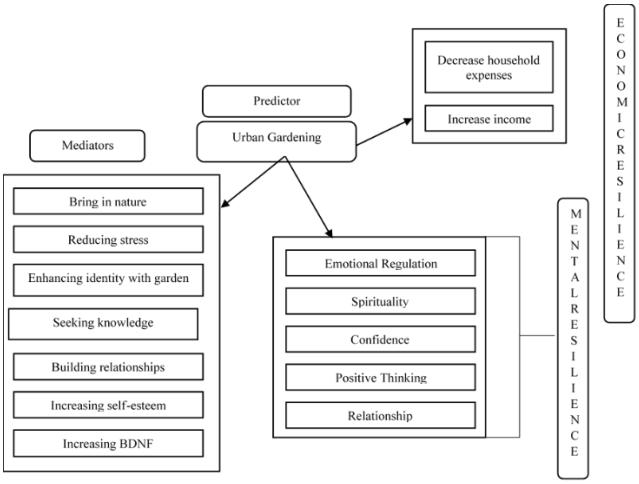


Figure 1- The relationships between urban gardening and mental resilience and economic resilience, source: adapted and modfied from Sia et al. (2022)

3. Study Site

The geographic scope of this study includes two sub-districts of East Ungaran and Pabelan Sub-district in Semarang District, Central Java Province. Both Ungaran Timur and Pabelan Sub-districts are situated in the satellite capital city of Semarang Regency. Ungaran Timur Sub-district is 294 m above sea level (asl) with an average temperature between 21o and 35o C. The total area of the East Ungaran District is around 3,799.1 ha. As in other peri-urban areas, some people in UngaranTimur Sub-district work as farmers in the agricultural sector. Therefore, 2,131.16 ha or 56,09% of the total area is used for agricultural activities. The map of Ungaran Timur can be seen in Figure 2.

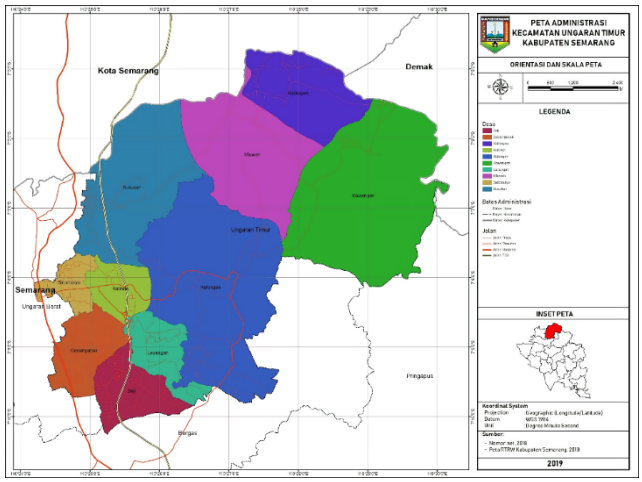


Figure 2- The map of Ungaran Timur Sub-district, Semarang Regency, Source: https://ungarantimur.semarangkab.go.id/

Respondents from Ungaran Timur Sub-district came from Susukan. The land area of Susukan is 8% of the total area and is the third most populated area in the Ungaran Timur Sub-district (BPS Kabupaten Semarang, 2021a). The population of Susukan is 9.662 people or 12,11% of the total population in the Ungaran Timur Sub-district. The population of Susukan Village consists of 4,784 males and 4,878 females (BPS Kabupaten Semarang, 2021a). Susan is located in the centre of the Ungaran Timur Sub-district.

The second research location is the Pabelan Sub-district which has a total area of 4,797.60 ha or 5.05% of the total area of Semarang Regency (BPS Kabupaten Semarang, 2021b). Babeland Sub-district is an area of plains, hills, and mountains with various slopes. Most areas of Pabelan are mountainous areas (1,533.28 ha), followed by flat areas (1,149.50 ha), undulating areas with a slope of 2 to 150 (1,294.57 ha), steep areas (830 ha). Most areas of the Pabelan Sub-district are covered by paddy fields (3,445.35 ha) consisting of 1,242.47 ha of irrigated agricultural land and 1,089.63 ha of rain-fed rice, and 1,113.25 ha of non-rice field agricultural land. The remaining areas are used for non-rice field agricultural land (2,000 ha) consisting of upland area (652.55 ha), plantation area (299.15 ha), community forest area (161.54 ha), and 'people's settlements in the form of houses or buildings are around 1,210.70 ha.

Figure 3- The Optimisation of Garden for Nurseries in Pabelan Sub-district, Source: Personal documentation

Respondents from Pabelan Subdistrict are located at the latitude of 7.2953o and a longitude of 110,5126o (BPS Kabupaten Semarang, 2021b). The topography of the site location is flat with a height of 471 asl. The population of the Pabelan area is 3,835 people or 8.63% of the total population in the Pabelan Sub-district. Babeland is the third most populated area compared to other locations in Pabelan Subdistrict.

4. Data Collection and Processing Methods

This research used primary and secondary data. Primary data was collected through a survey method using a questionnaire and interviews. Secondary data was collected from the Central Bureau of Statistics, other related institutions, and previous research articles. The primary data collection was conducted using land optimisation training in these two study sites. During the training session, the participants learned how to cultivate vegetables and orchids by optimising the space around their house or garden. Participants in Pabelan were specifically trained on how to cultivate using aquaponic type. The training was conducted in June and July 2021. The training participants were selected using the purposive sampling technique, and the selection criteria were based on:

1. the participants were target beneficiaries of land optimisation from the Office of Food Security of Central Java Province;
2. the participants were member of women farmer groups who were involved actively in urban farming until recently.

The respondents were given a questionnaire at the end of the training session; thus, they finished the questions in the same session. Before filling in the questionnaire, we explained every question in detail to ensure that all participants understood the questionnaire. As part of ethical consideration, we also explained to the respondents that all information about the respondents would be kept secret and used only for this study. The participation of respondents in filling in the questionnaire was voluntary. This means no incentives were offered, and participants could withdraw at any time or could refuse to fill in the questionnaire. Contact details for counselling after the data collection were provided. In addition, no coercion or persuasion was employed in the recruitment of the respondents. In other words, the study was not endorsed by the community groups, related agencies or others. There were 35 respondents from Ungaran Timur and 30 from Pabelan Village, and they all finished filling in the questionnaire. However, after data was processed and through the sortation process, there were only 52 respondents consisting of 31 from Ungaran Timur and 21 from Pabelan, who filled in the questionnaire as instructed.

Data collected were 'respondents' characteristics, the production scale, and the benefits of farming activities. The respondents were asked about the benefit of garden utilisation primarily related to mental and economic resilience, such as for entertaining/refreshing or a recreational hobby as indicators of generating income as described in Table 5. Data were then processed descriptively, quantitatively and quantitatively.

Table 5- List of Questions

No.	Question	Ranking
Indicators of mental or health resilient		
1.	Urban Agriculture (UA) as a recreational hobby and thus, decreasing stress	(1..... 2..... 3.....4.... 5)
2.	UA as an entertainment/refreshing	(1..... 2..... 3.....4.... 5)
3.	UA as a tool to utilise a spare time	(1..... 2..... 3.....4.... 5)
Indicators of economic resilient		
4.	The production of UA could decrease daily household expenses	(1..... 2..... 3.....4.... 5)
5.	UA could increase its income.	(1..... 2..... 3.....4.... 5)

Note: 1 = very disagree; 2 = diasgree; 3 = neutral; 4 = agree; 5 = strongly agree

Respondents' perception of the benefits of urban farming was used to study urban agriculture as a resilient strategy. This study measured respondents' perception of the benefits of urban farming using the methods previously used by Aditiawati et al. (2014). The perception of respondents was analysed by measuring:

1. Maximum score (Max) = the highest score multiplied by all items/indicators;
2. Minimum score (Min) = the lowest score multiplied by all items/indicators;
3. Medium value (Me) = the sum of maximum and minimum values divided by two;
4. First Quartile (K1) = the sum of maximum and median values divided by two;
5. Third Quartile (K3) = the sum of minimum and median values divided by two.
6. X = the sum score of every respondent's perception of the benefits of urban farming.

By measuring those score values, the perception of respondents to the benefits of urban farming could be categorised as follows:

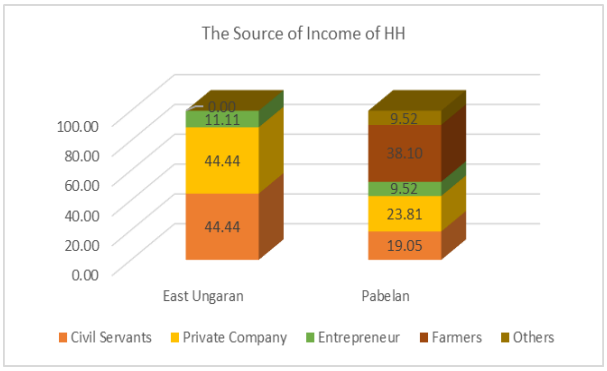
1. Very Positive: $K3 \leq X \leq Max$
2. Positive: $Me \leq X \leq K3$
3. Negative: $K1 \leq X \leq Me$
4. Very Negative: $Min \leq X \leq K1$

5. Results and Discussions

Characteristics of the respondents

Respondent's characteristics below constitute a set of potential factors affecting respondents' perception of urban farming. Most respondents in other sub-districts in the urban areas of Semarang

Regency work in various jobs aside from the agricultural sector. Men and women usually work in different kinds of jobs. According to the data collected, the head of households in East Unggaran mostly worked as civil servants (44.44%) and in a private company (44.44%), and none worked as farmers. Meanwhile, in Pabelan, the head of households worked mainly as farmers (38.10%), followed by working in private companies (23.81%) and civil servants (19.05%).



(a) & (b)

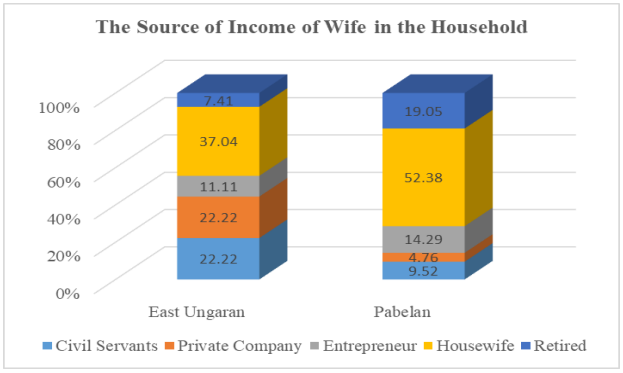


Figure 4- The Source of Income for Men (a) and Women (b) in the Site Study

Unlike the head of households, the women in East Ungaran and Pabelan are mostly housewives who care for their homes (Figure 4). There were more working women in East Ungaran compared to Babeland. While most women in East Ungaran worked as civil servants (22.22%) and in private companies (22.22%), women in Pabelan mostly worked as entrepreneurs and retirees, other than homemakers. Although some women worked, they still did urban farming activities. This supports the idea that Safitri et al. (2021) mentioned that urban farming activities are more related to women's empowerment since they bear the responsibility of managing their households. There were many households with both men and women working different jobs that could influence or shape the intention of the households to do urban farming in the first place. Women's high involvement in urban farming could be seen in that most respondents, or more than 80% of East Ungaran and Pabelan, were female, and less than 20% were male. Like other women in many countries, women in Indonesia also bear the responsibility of caring for their household. Women are responsible for providing healthy food and managing their houses.

Women can potentially be involved in urban farming activities because they could be carried out by utilising the space surrounding their houses, such as the backyard, rooftops, and abandoned land around houses (Safitri et al., 2021). Therefore, women in urban areas usually manage their urban agriculture and other household responsibilities.

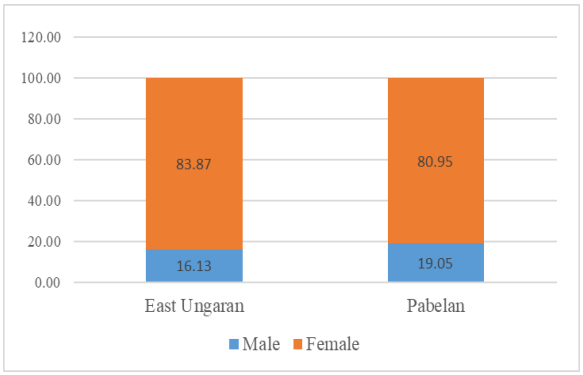


Figure 5- Gender Characteristics of Respondents in East Ungaran and Babeland

As mentioned previously, the potential of women involved in urban farming is because they use the land around their house. Figure 5 illustrates the location where respondents do their farming activities and the size of land used. According to Figure 5, most respondents (more than 50%) in both study sites usually conducted their farming activities by utilising the space in front of their house (front yard). In Pabelan, the respondents also conducted their farming activities on the side of their house, backyard, front and side yard, and surrounding their house. Meanwhile, respondents in East Ungaran used the backyard, side yard, front and side yard, and surrounding their house.

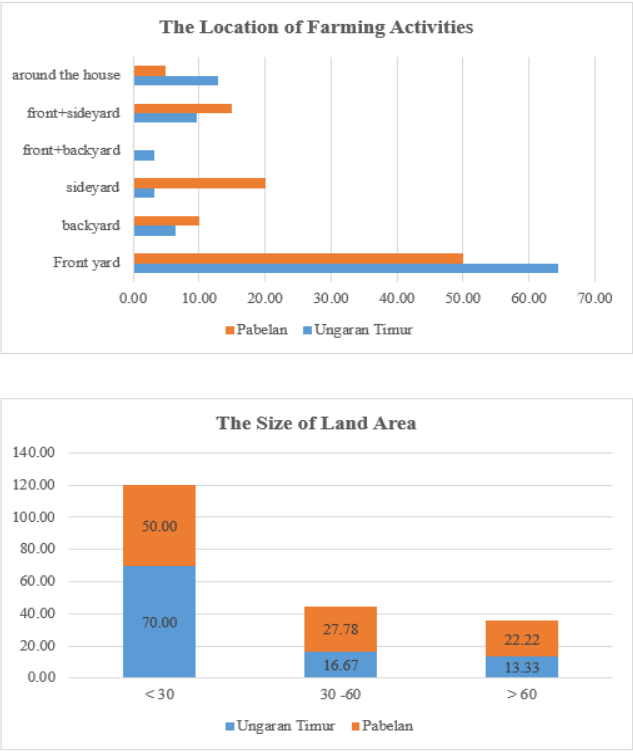


Figure 6- The location of Urban Farming and the Land Size

According to Figure 6, most respondents (70%) in East Ungaran had smaller land sizes (less than 30 meters square) than other respondents in Babeland. More respondents in Pabelan had a bigger land size. Respondents in Pabelan with a land size of more than 30 m2 were around 27.78%, while respondents with a more extensive land size (>60 m2) were 22.22%. The available space and ground could determine the media or materials used for planting.

Figure 7 describes various media and materials used for planting in the site study. Since respondents in Pabelan had many lands available for planting around their house, they used only two media for planting: on the ground and using pot/polybag. 65.22% of respondents in Pabelan plant directly on the ground, and only 34.78% of respondents used pot/polybag for farming activities. Meanwhile, respondents in East Ungaran with more limited space used various types of media and materials for planting, such as on the ground, pot/polybag, verticulture, hydroponic and aquaponic, similar to materials mentioned by Andini et al. (2021). With limited land available for planting, most respondents, or 60.94% of respondents in East Ungaran, prefer to use pot/polybag as materials for planting, followed by planting on the ground (28.13%), and the remaining used verticulture, hydroponic and aquaponic.

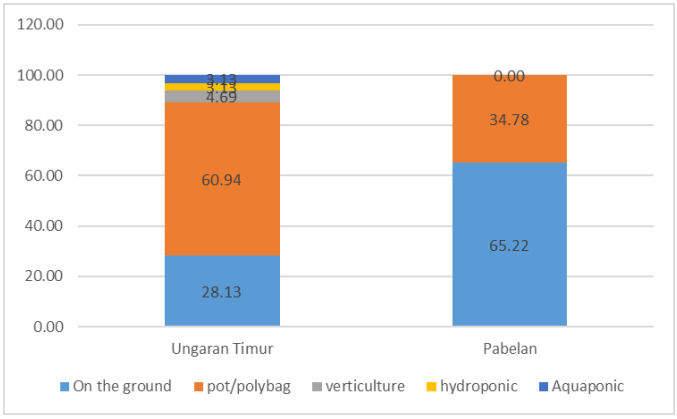


Figure 7- Different Types of Media and Materials in the Study Site

The availability of space and land for planting could also determine the types of crops planted and animals to rear. In Ungaran Timur, with limited land available for planting, respondents are more likely to plant vegetables, fruits, and herbal plants. Vegetables planted were also more varied compared to those planted in Babeland. Respondents in East Ungaran plant chilli, tomato, spring onion, broccoli, cabbage, mustard, and other vegetables. Meanwhile, respondents in Pabelan only grow some vegetable plants such as spinach, eggplant, chilli, tomato, and others.

On the other hand, respondents in Pabelan grow more various types of fruits than in East Ungaran. Respondents in Pabelan grow a minimum of five fruit trees, while the average respondents in East Ungaran grow between one to three. Other than vegetables and fruits, respondents in both locations plant tubers and medicinal plants. Other than plantations, respondents mentioned that they also had livestock such as poultry, cattle, goat, and fish.

The Benefits of Urban Farming

When examining the benefit of urban farming, respondents were asked perception of respondents to five benefits of urban farming such as (1) decreasing daily expenses, especially on vegetables; (2) utilising leisure time; (3) increasing income; (4) entertaining/refreshing; and (5) as a recreational hobby for decreasing stress. By calculating the minimum, maximum, median, first quartile, and third quartile of data collected, we could analyse respondents' perceptions of urban farming. The results of the data analysis are presented in Table 6.

Table 6- The Perception of Respondents to Urban Farming

The Perception Category	Score Category	East Ungaran (%)	Pabelan (%)
Very Positive	$20 \leq X \leq 25$	80.65	90.48
Positive	$15 \leq X \leq 20$	0	9.52
Negative	$10 \leq X \leq 15$	9.68	
Very Negative	$5 \leq X \leq 10$	9.68	

According to Table 6, more than 80% of respondents in East Ungaran or Pabelan had a very positive perception of urban farming. Only 9.68% of respondents thought of urban farming negatively and very harmfully. The positive perception toward urban farming happened because respondents had already experienced the benefit of urban farming before and during the COVID-19 pandemic.

During the COVID-19 pandemic, most people were forced to stay at home and Work from Home (WFH). By staying at home all the time, leisure time of people, especially working women, has increased, and home has become the centre of daily activities. Being at home always results in people suffering from stressful daily lives. By gardening and optimising the limited space available around their house, people who suffer from stressful daily lives could find their happiness and self-satisfaction. Figure 8 presents various benefits experienced by farmers before and during the pandemic. According to Figure 8, all respondents (100%) believed urban gardening had decreased their stress of staying at home all the time. They felt entertained or refreshed by taking care and looking at the crops they had grown. 90.48% of respondents in Pabelan also mentioned that they did urban gardening because they wanted to use their leisure time for doing something worthwhile.

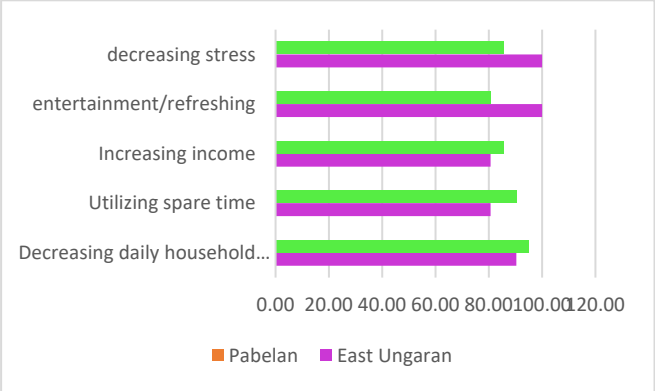


Figure 8- Expressed benefits experienced by farmers

By optimising the available space around their house, people could produce crops, vegetables, and others for their consumption. As a result, the household expenses would decrease, and income would increase. According to Figure 8, most respondents in Pabelan strongly agreed that urban farming could decrease their household expenses and increase income than respondents in East Ungaran. Differences in the preferences towards the benefits of urban farming seem to be related to the availability of land space and the orientation of respondents. Respondents in Pabelan had ample land to plant than those in East Ungaran. Therefore, they could harvest many crops and vegetables and be commercialised or semi-commercialised. This idea is supported by Chandra and Diehl (2019), who mentioned that urban farming with less than 0.01 ha tended to be subsistence, while Atmaja et al. (2020) explained that urban farming with an area between 40-50 m2 was categorised as allotment and usually used for commercial purposes. Referring to all the facts previously mentioned, it is clear that urban farming in the study is not only intended for commercial purposes but also for refreshing and reducing stress, especially during a pandemic.

Urban Farming as a Resilient Strategy

Resilience is "the process that allows individuals to adapt to adverse conditions and recover from them" (Dantzer et al., 2018:28). Resilience also has many forms. Resilience related to the psychological aspect refers to the ability of a person to adapt well to trauma, tragedy, adverse effect, threats, and other stress. In contrast, physical resilience is related to the ability "to recover or optimise function in the face of a disease or an acquired disability" (Dantzer et al., 2018: 29). resilience could also be in the form of economic resilience and health resilience.

Health resilience is related to the immunity of humans. Stress usually reduces the ability of the immune system of our body to respond to external threats. The decreasing immune system could put us at risk of developing an illness or psychological disorder. Therefore, increasing the immune system has become very important, specifically during the pandemic COVID-19.

Coronavirus disease 2019 (COVID-19) is a highly contagious infection caused by SARS-CoV-2. The virus, directly and indirectly, affects the immune system. The immune system is critical in virus suppression, as in all infectious diseases. Therefore, when there was suppression in our immune system, the illness would worsen and result in severe damage such as multi-organ failure. Although to some extent, the immune system could harm COVID-19 patients when developing high levels of inflammatory cytokines (CRS), the immune system could also have an essential role in fighting COVID-19 (Yazdanpanah et al., 2020). Therefore, increasing our immune system is essential.

The immune system can be improved with a suitable resilience strategy (Matzner et al., 2013; Dantzer et al., 2018; Peters et al., 2021; Zapater-Fajari, 2021; Sia et al., 2022). According to Dantzer et al. (2018), four factors could potentially affect the ability to increase resilience and eventually immunity. Those four factors are (1) high personal or perceived control or beliefs in one's ability to cope with many stressful events, adverse effects, and or an illness ; (2) positive affect (PA) or the feelings of pleasure with the environment such as happiness, joy, excitement, enthusiasm, and contentment; (3) social support in the form of instrumental, informational, and emotional support; (4) optimism or generalised favourable expectancies of the future hold by an individual (Dantzer et al., 2018).

Referring to the benefits of urban farming to respondents, as previously mentioned above, urban farming could reduce stress and entertain or refresh the mood. By reducing stress and refreshing our mood, we can feel happy. According to Andini et al. (2021), allocating time to delve into natural space could create a more calming and balanced mood, positive mood, and emotion, increasing happiness and reducing stress. Meanwhile, increasing happiness and reducing stress could create positive affectivity (PA) or pleasure in engaging with the environment (Dantzer et al., 2016). PA is one of the factors influencing resilience and the immunity system (Kun, 2013). Therefore, by being happy from implementing agricultural activities, a person's immunity system could increase (Wood et al., 2015). Increasing the immunity system could influence the ability of one's body to fight or prevent COVID-19 disease; thus, urban farming as a resilient strategy could indirectly influence the ability of a person to fight COVID-19 (Peters et al., 2021).

Aside from health resilience, urban farming could also bring economic resilience. The economic resilience came from the ability of urban farming to generate income for the households and decrease household expenses on vegetables and crops. According to the results, more than 90% (90.32% of respondents in East Ungaran and 95.24% in Pabelan) believed they could decrease their daily household expenses for vegetables from their garden. Meanwhile, 80.65% of respondents in East Ungaran and 85.71% in Pabelan had increased their income from selling their vegetables. The results were supported by Legesse et al. (2016), Mupeta et al. (2020), and Irham et al. (2021), who found the potential of urban gardening as another source of income for the households in Mekelle City-Ethiopia, Zambia, and Yogyakarta-Indonesia. Therefore, although COVID-19 has prevented people from going out of their homes, they could still generate income while fulfilling their needs for some food. Therefore, urban farming could be a resilient strategy during the COVID-19 pandemic.

6. Conclusion

Urban farming is one of the resilient strategies to fight COVID-19. According to this study, respondents perceived urban farming very positively. The positive perception of respondents to urban farming is caused by the benefits that respondents have felt from gardening activities. The benefits of urban gardening are decreasing household expenses, increasing income, and reducing stress and entertainment. Therefore, urban farming could be a strategy to increase mental and economic resilience. Further study on the impact of urban farming on health and economic resilience is still needed to support the results of this study. As a resilient strategy, urban farming is strongly recommended to be promoted and assisted by the Government since urban farming could affect mental health and the resilience ability and help to fulfil domestic needs or household food security during shortages.

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