



Covid-19 and Its Effect on Home Gardening Behaviour in Indonesia

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Abstract. Home gardening offers one approach to improving the Indonesian diet, which is known to contain inadequate vegetables and fruit. It is also a suitable response to the COVID-19 pandemic, particularly to improve food security but also to promote secondary benefits. We report on a household online survey (n = 1201) explored both the level of interest in household gardening and the impact of COVID-19 on this interest. The sample extended to all the country's main islands, across income levels, employment status, education, and age. The popularity of home gardening was found to vary with most of these variables, but universally to increase as a consequence of the pandemic. Insights are offered for promotion of vegetable consumption and its role in nutrition and food security. Recommendation for future research are made.

Keywords: Covid-19 · Home gardening · Vegetable consumption · Nutrition Indonesia

1 Introduction

As at August 2021, 3.76 million COVID-19 cases had been recorded in Indonesia (<http://www.covid19.go.id>), and the number is still rising. Policies adopted by the Government of Indonesia (GoI) to control the disease's spread include travel restrictions between provinces, and inter-personal distancing. Economic and social impacts on households have included loss of employment, reduced in purchasing power, restricted product distribution and closed and disrupted business.

Disrupted food supply chains, increased prices, and nutrition shortfalls due to COVID-19 have been widely projected [1]. Vegetables are of special interest due to their nutritional importance and their reliance on the distribution system: they are produced throughout Indonesia and traded extensively between regions.

There are recognised health benefits from vegetable consumption to the individual [2] and community [3], including enhanced immunity [4]. National consumption of vegetables and fruits at 128.34 g/capita/day [5]. This falls short of the WHO recommendation of 400 g, including 250 g of vegetables and 150 g of fruit. That report refers

to conditions before the COVID-19 pandemic. Vegetable consumption also declined in 2020 relative to 2019 [5].

Vegetables are a household food source that are relatively easy to cultivate, and can be harvested after a short cropping cycle. They can supply household needs as well as offering a source of income, and the small land areas required mean that the opportunity is available to urban, as well as rural residents. A small area of vegetable garden covering (36 m² in the setting examined at East Java) can provide vegetables sufficient for intakes as recommended by FAO [6]. Nutritional analysis has shown that a family vegetable garden can provide more than 100% of vitamins A and C for daily life, as well as additional iron and protein [7]. According to Abdoellah et al., [8] there are several reasons expressed for growing vegetables in the family gardens namely fulfilling the nutritional needs, as a hobby, concerns over chemicals' use in foods, and family participation in nature. In addition, home gardening can reduce exposure to the COVID-19 virus, due to reduced numbers of journeys from the house for food purchases.

This study is one of the first to report on trend on home gardening on vegetables' supply from home gardens in Indonesia during COVID-19. It is presented in the context of national vegetable supply, and strategy to increase vegetable consumption. It also addresses food diversification is a household strategic adaptation during pandemic, and the roles of locally produced foods in supply chain performance.

Although the share of the population eating vegetables is 94.8% and fruits 33.2% [9], but Indonesia Health Research and Development Agency [10] found that volumes consumed are low: 4.6% of the population consume a minimum 5 servings of fruits and vegetables per week. Consumption is low for toddlers (0 month to 5 years of age) but higher in adults (19–55 years). Genders are approximately the same in vegetable consumption. Indonesian consumers have a high awareness of the value of eating vegetables, expressed during the pandemic. It also confirmed that vegetable purchase levels and supply have been little affected by the pandemic [11].

In Indonesia, a large number of reports (online webinars, social media, community news) featured activities promoting healthy lifestyle, and home gardening. The current study addresses home gardening during the pandemic within the broader national agenda of increasing consumption of fruit and vegetables. It also reports gender, culture and employment status as influences on home gardening activities, and their interactions with the pandemic.

2 Methods

A survey was conducted in October and November 2020. The survey as online, due to movement restrictions prevailing at that time in Indonesia. The questionnaire designed in survey monkey template. It was advertised through WhatsApp Group and E-mail blast. The respondents answered the questions online through questionnaire link provided. In addition, online interview also conducted to get more respondents. Sampling targeted variation across demographic variables in 14 provinces (South Sumatera, North Sumatera, Aceh, West Java, Central Java, East Java, Southeast Sulawesi, North Sulawesi, East Kalimantan, West Kalimantan, Yogyakarta, Bali, East Nusa Tenggara, and Papua). These provinces are known to populate the range of low, medium and high levels of

vegetable consumption [12]. Responses were also received from non-target provinces due to unrestricted access to the online survey.

The survey addresses 18 individual fruit and vegetable products, grouped into four types:

1. Leafy: spinach, kangkong, cabbage, caiseum, lettuce
2. Fruit: cucumber, pumpkin, honeydew, bitter gourd, watermelon, eggplant, and tomato.
3. Spices: shallots, hot pepper, and cayenne pepper
4. Other: bean, broccoli, and carrot.

3 Results and Discussion

3.1 Respondent Profile

A total of 1201 usable responses were received. Table 1 presents respondent characteristics. The large number of female respondents reflects the allocation of household food purchase responsibilities in households. There is a uniform distribution of ages and education levels, but incomes' representation is generally low. The sample's configuration of employment status reflects pandemic conditions.

Table 1. Respondent characteristics

Classification	Description	Respondent* (%)
Gender	Male	32.2
	Female	67.8
Age (years old)	<25	20.4
	25–35	31.2
	36–45	25.9
	>45	22.4
Education	Highschool	38.6
	Undergraduate	40.5
	Postgraduate	6.5
	Other	14.5
Income (Rp. million/month)**	<4	65.8
	4–10	27.7
	>10	6.6
Employment status	Active	60.1
	Not active	39.0

Note: * N = 1201; ** 1US\$ = Rp. 14.500

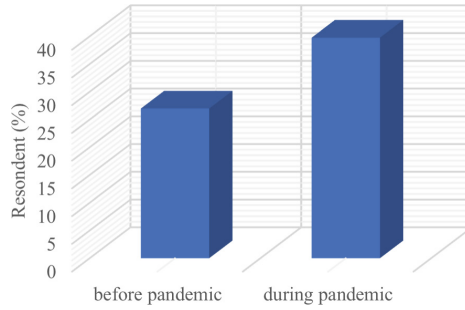


Fig. 1. Home gardening activity.

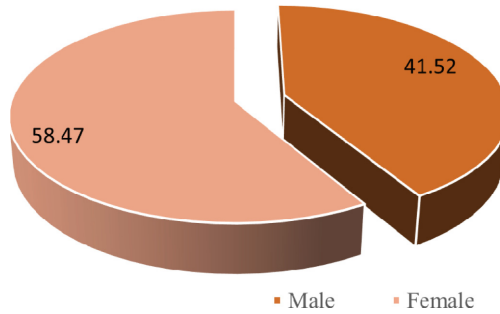


Fig. 2. Home gardening by Gender (%).

3.2 Home Gardening as a Popular Behaviour During Pandemic

Some 40% of respondents report an interest in home gardening during the pandemic, a significant increase on reported pre-pandemic interest (Fig. 1). This result probably reflects the time available to households, given pandemic-related requirements to stay home.

3.3 Gender Influence in Home Gardening

Figure 2 shows that 58.47% of home gardeners are female. This confirms Indonesian women's dominant place daily food provision, and in agriculturally related income generation [13].

3.4 Home Gardening and the Region

Home gardening activity increased significantly (p -value < 0.05) across the provinces. Notwithstanding the geographic, economic and culturally diverse (Table 2). There was an average 12.61% increase over pre-pandemic conditions. The highest increasing trend shows at several provinces in Java, Papua, Southeast Sulawesi (Fig. 3).

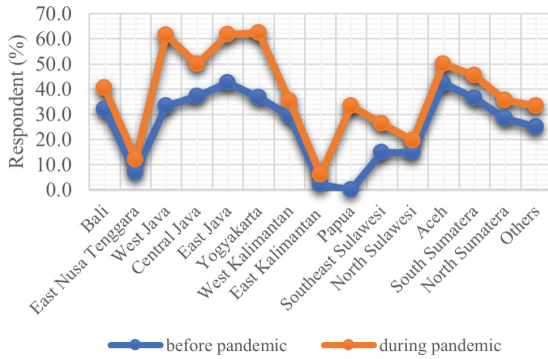


Fig. 3. Increasing of home gardening among province (%).

Table 2. Paired t-test on home gardening interest among provinces

Paired Samples Test								
	Paired Differences				t	df	Sig. (2-tailed)	
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower				Upper
Before-during pandemic	-12.788	9.315	2.405	-17.946	-7.629	-5.317	14	.000

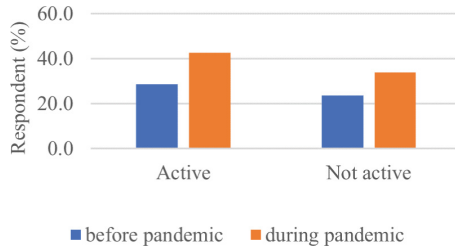


Fig. 4. Home gardening based on employment status.

3.5 Home Gardening and Employment Status

Figure 4 shows home gardening activity to be more common amongst those actively working, both before and during the pandemic. The proportional increases (48% for those in active employment; 43% for those not actively employed), were also larger for those employed (Table 3).

Table 3. Descriptive statistics on home gardening based on employment status

	N	Minimum	Maximum	Mean		p-statistic
	Statistic	Statistic	Statistic	Statistic	Std. Error	
Active	2	23.57	28.63	26.100	2.530	3.57796
Not active	2	33.76	42.60	38.180	4.420	6.25082

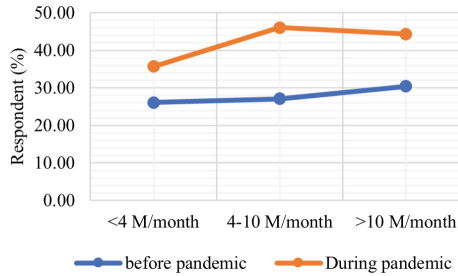


Fig. 5. Home gardening based on income.

Table 4. Identifies the statistical significance of income level on changes to level of interest in home gardening (p value < 0.05)

Paired Samples Test								
	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Before-during pandemic	-14.17	4.680	2.702	-25.795	-2.544	-5.244	2	.034

3.6 Influence of Income Level on Home Gardening

Figure 5 reports the level of interest in home gardening, disaggregated by income level. Respondents were asked about their willingness to buy seeds, planting media and gardening equipment. First, interest is seen to rise to some extent with income. Second, interest increased for all income levels in association with the pandemic. The largest increase (of 18.9%) is seen for the income level 4–10 million per month (Table 4).

3.7 Age and Home Gardening

With regard to age as an influence on interest in home gardening, Fig. 6 shows that the young and the elderly exhibit the most interest. As a response to the pandemic, the

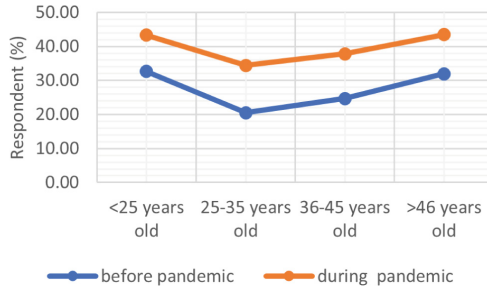


Fig. 6. Home gardening based on age.

Table 5. Paired t-test of influence of age in home gardening

Paired Samples Test								
	Paired Differences				t	df	Sig. (2-tailed)	
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower				Upper
Before-during pandemic	-12.287	1.4833	.74166	-14.647	-9.927	-16.568	3	.000

largest increase was seen in millennials (25–35) years of age, (13.87%), but a statistically significant ($p < 0.05$, see Table 5) general increase in interest across all age groups.

Paired t-test (Table 5) on the increasing of home gardening based on age shows statistically significant (p -value < 0.05). The interest are in any age stages but the interest more on millennials.

3.8 Education Levels and Home Gardening

The extent of increase in interest in home gardening is found to be significantly larger at higher levels of education (Fig. 7 and Table 6).

3.9 Types of Vegetables Planted

Figure 8 shows the types of vegetables respondents reported planting during the pandemic. Tomato and cayenne pepper were most commonly planted. Amongst leafy vegetables kangkong, spinach and caisim were the most commonly reported.

4 Conclusion

This study reports on the increased interest in home gardening amongst Indonesian households during the COVID-19 pandemic. This is the first study, to the authors’ knowledge, to examine interest in home gardening during the pandemic and the influences on it.

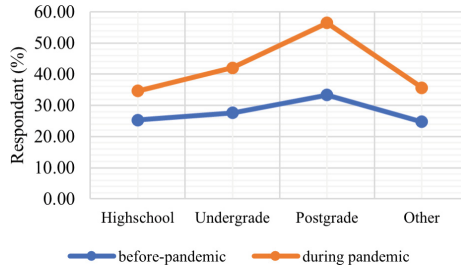


Fig. 7. Home gardening based on education.

Table 6. Paired t-test on home gardening based on education

Paired Samples Test								
	Paired Differences				t	df	Sig. (2-tailed)	
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower				Upper
Before-during pandemic	-14.425	6.1525	3.076	-24.2151	-4.634	-4.689	3	.018

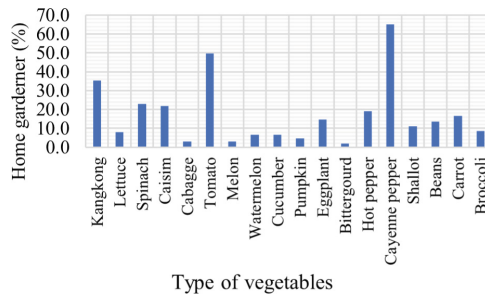


Fig. 8. Type of vegetable mostly planted during pandemic.

The findings are important to Indonesia because of comparatively low national consumption levels of vegetables, and scope for health improvement due to diets’ diversification and inclusion of specific vegetables.

We find that home gardening gained popularity during the pandemic. The shift was statistically significant across all provinces, all ages, all income levels, and regardless of employment status. We also find that initial levels of interest in home gardening vary across these demographic and economic variables. Leafy vegetables were found to be amongst the most popular for planting during the pandemic. This may be due to their potential for harvest within 30 days. We also identify other vegetables which were

popular for planting: these may offer income sources or reflect dietary popularity, but a deeper investigation is recommended for future research.

Previous Indonesian research suggests that young people receive information and more easily accept changes in behaviour [14] and our results reflect this. Further, we find an interaction between age and employment status: during the pandemic, respondents who were actively working aged over 46 years reported the greatest shift in interest in home gardening (a shift of 44.44%), while respondents that were not actively working had the greatest shift amongst respondents aged under 25. These results may well represent the effects of variables not measured in this survey, associated with allocation of household time. These offer interesting research opportunities for the future.

Level of education is known to affect nutrition behavior in Indonesia [15, 16]. Our results confirm this effect and highlight the important role for education in promoting vegetable consumption. Our study also yet offers insight into priorities: millennials could be a high priority group given their current low level of interest and their likelihood having young children in their care. Design of promotional approach could also benefit from targeting: the young are most likely to be reached by social media, for example.

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