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Research Article

Impact of Covid-19 Outbreak and Lockdown Measures on Urban Agriculture and Food Security

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Abstract

The recent extension of the Movement Control Order (MCO) may be effective in containing the spread of the pandemic, but it is expected to have a devastating impact on food security. Whilst some countries have been successful in containing the spread of the pandemic, new information on the nature of the virus is constantly being released. Therefore, the overall impact is still unpredictable although lockdown efforts seem to have reduced infection rates substantially. In response to these challenges, this study proposes the implementation of urban farming towards a sustainable economy, establishing food security and creating the ability for the generation of household income for the B40 group. This study considers urban agriculture to be broadly progressive and capable of delivering a suite of environmental, economic, food security and social benefits. In addition, the econometrics modelling that investigate the impact of lockdown measures and COVID-19 on selected vegetables prices indicated not all vegetables react uniformly positive with lockdown measurement. The positive impact of both Covid-19 and lockdowns imply that households will purchase less of these vegetables due to increased price. With less or reduced income and higher prices, peoples will not be able to consume this type of vegetables. Thus, higher food prices deny peoples' access to food security. Nonetheless, since vegetables are substitutable the population will be able to consume on some other vegetables that are cheaper and affordable with their present income. Lower prices of food, in particular to cheaper vegetables, the population will not be denied food security during the Covid-19 pandemic. The outcomes of the study will provide a new policy that involved the relevant stakeholders on the development of urban agriculture systems as a sustainable means to alleviate poverty and augment national food security. In Malaysia, urban agriculture stimulates the income for B40 group and a local economy by circulating income throughout the region. Without a complicated distribution network, farmers are more connected to their market and able to adapt quickly to demand, and maximizing profit.

Keywords: Urban farming, Lockdown measurement, covid-19 ,environmental, food security

1. Introduction

In the next decades, the world will not only become more populous, but as income increases all over the world, nations become richer. It is projected that the world's population will reach more than 9 billion by 2050 (FAO, 2009). Economists have recognized the important role played by the agriculture sector to feed the nation's population. Thus, the daunting task for the agriculture sector is to produce the needed food, feed, fiber and bio-fuels for the growing population. Furthermore, it is expected that all this growth occur in the developing countries (0.9% p.a) with the biggest increase in the Sub-Saharan Africa (1.9% p.a), followed by North Africa (1.2% p.a), and the least in East Asia (0.3% p.a). FAO (2009) reported that the 34% increase in the world's population in 2050 to more than 9 billion requires a70% increase in total food production. Cereals production needs to be increased by more than 40% (from 2.1 billion tones today to 3 billion tones in 2050) while meat production need to rise by about 80% (from over 200 million tonnes to 470 million tonnes in 2050) in order to meet the demand in 2050. Soybean production on the other hand, will rise even faster about 140% increase from 215 million tones today to 515 million tonnes by 2050 (Schmidhuber, 2010). Thus, the main challenges face by the agricultural sector at present as well as in the future are the world's growing population.

Nevertheless, the agriculture sector plays a direct role for food security (Beddington, 2010; Stewart and Roberts, 2012; Alexandratos and Bruinsma, 2012).We have food security when we are certain that peoples have both physical and economic access to sufficient, stable supply of and nutritious food to pursue an active and healthy life (Grace et al., 2014). Food and agriculture are inseparable. The role of the agriculture sector in achieving food security is to ensure that the population has sufficient food to meet their dietary needs.

In Malaysia, food security is considered "good" according to the international standard. The 2019 Global Food Security Index (The Economist Intelligence Unit, 2019) reported that Malaysia ranked 28th out of 113 countries (Singapore ranked 1st). The strong performance showed by Malaysia is commendable compared to other ASEAN countries; with Thailand ranked 52nd, Vietnam ranked 54th, Indonesia 62nd, the Philippines 64th, Myanmar ranked 77th, Cambodia 90th, Laos ranked 92nd and of course Singapore ranked 1st. This "good performance" indicates the full commitment of the Malaysian government to ensure that affordable and healthy foods are on the table for the population. In fact, Sundaram and Gen (2019) reiterated that "food access is no longer an issue for most Malaysians, with better processing, transport and storage systems and distribution arrangements, for most major food items."

Malaysia is expected to become a "developed" nation in the near future. Several policy initiatives have been put in place in order to propel Malaysia to become a high income nation. The Government of Malaysia has in 2010 launched the New Economic Model (NEM) comprising the four pillars namely; Economic Transformation Programme (ETP), Government Transformation Programme (GTP), "1Malaysia, People First, Performance Now" concept, and the 10th Malaysia Plan 2011-2015 (Habibullah, 2019a). It is expected that by 2020, Malaysia will have achieved a per capita Gross National Product (GNP) of more than US$17,000 (NEAC, 2010). Given the scenarios of an affluent Malaysian society in the coming years, it is expected that the demand for food and meat consumption will be high in the future.

Clearly the agriculture sector in Malaysia must play a very important role in securing food in order to feed the growing and affluent population in the next decades to come. However, agriculture sector in Malaysia only contribute about 7% of the total GDP in 2019 (Department of Statistics Malaysia, 2019). Nevertheless, urban agriculture provides a green environment that can reduced CO2 emission in the air and based on (Saudi et.al, 2019) a reduction in CO2 emissions can stimulate the GDP and economic growth for a country. Recognizing that the global demand for food is expected to increase rapidly with growing population and rising affluence, Malaysia has every reason to step up its food security. Under the ETP, the agriculture sector has been identified as one of the eleven sectors where growth will be given priority and focused. Under the programme, the Agriculture National Key Economic Area (NKEA) aims to double the agriculture sector's Gross National Income (GNI) contribution to RM49.1 billion by 2020 through 16 Entry Point Projects (EPP) and business opportunities. The targeted agriculture produce includes paddy, papaya, pineapples, vegetables, herbal products, livestock, aquaculture and bird's nests. Nevertheless, these achievements will involve capturing a higher value for Malaysia's produce and increasing productivity. Under the NKEA, the programme also targeted to increase average yields for paddy farming, seaweed farming and temperate vegetable farming by 60%, 46% and 40% respectively (Habibullah, 2019b). Urban agriculture makes up one aspect of a city's food system. Each of urban agriculture's components such as production, processing, distributing and the associated activities, is linked to a variety of community benefits. Successful community-based urban farming projects require considerable planning and commitment that grows out of the interests of a particular neighborhood or community. Similar to any other effective endeavor, when residents identify the goals, ideals and, with urban farming, the aesthetics, the potential benefits escalate. Urban farming projects that reflect and evolve from a community's cultural

values and future vision are much better positioned to have lasting impact and lead to more ecologically sustainable ways of providing food (Steve et al., 2016.)

The purpose of the present paper is to investigate the impact of the Covid-19 pandemic and the lockdown measures on urban farming and food security in Malaysia. COVID-19 virus is disrupting fundamental systems and industries, including agriculture and food systems, and endangering the livelihoods of workers. COVID-19 is a health crisis, but the lockdown order either in short or in a long run lead to a food security crisis if proper measures are not taken. If the COVID-19 pandemic continues into the critical spring planting period, the production of staple food crops such as wheat, rice and vegetables will be affected, as it is unclear if agricultural inputs can be distributed in a timely manner. If staple production is affected, the impact on food security could be grave (Fan, 2020).

2. Literature Review

Covid-19, a new strain of the coronavirus, has posed challenges to all economic sectors, especially agriculture. In Malaysia, the Movement Control Order (MCO) initially caused some panic buying. With people staying indoors, cooking at home has been on the rise. This has led to high demand for fresh food items at local markets and supermarkets. At the same time, the lockdown to contain the coronavirus outbreak has been hurting the supply of labour and disrupting supply chains in the agriculture industry (Vaghefi, 2020).While urban agriculture is not a viable solution to provide for all food needs of urban residents, shifting some food production within cities can help reduce pressure on current agricultural land and increase the access and availability of healthy foods, while also providing other benefits to the urban landscape (Clinton, 2018).

Urban agriculture is widespread in the developing world and has been shown to have a positive impact on food security, access, and nutrition, although data is sparse and more research in this area is desperately needed (Eriksen-Hamel, 2010). Improvements in personal nutrition, health, and wellbeing have also been documented for people involved in urban agriculture activities (Armstrong, 2000).

Although the agriculture industry was labelled by the federal government as critical during the MCO, allowing businesses to operate as usual, the limited supply of raw materials, labour and market access, along with logistical constraints, adversely affected the food supply system (Vaghefi, 2020). Various people engaged in urban agriculture may donate a portion of their harvests to charity organisations such as food banks in order to provide fresh produce to those in need (Blaine, 2010). Urban agriculture can provide an extra supply of produce in urban areas, increasing the availability of locally grown foods (Grewal and Grewal, 2012). Urban agriculture sites and markets can be preferentially located in food insecure and food desert areas to increase access to fresh produce (Mack, 2017).Urban agriculture has long been used for subsistence and as a mode to supplement household food security in developing countries, while in developed countries it most commonly serves recreational purposes, although is more recently being used as a tool to improve food access in marginalised communities (Pearson, 2010).

As the world's population becomes increasingly urbanised, with an estimated 68% of the global population living in urban areas by 2050, agricultural land will continue to be strained further to meet the nutritional needs of these densely populated areas (Eigenbrod, 2015.The ability to secure a stable and accessible supply of food for a global population of 9.7 billion by 2050, whilst limiting contributions to climate change and conserving the world's limited water, land, and energy resources, is one of the most pressing and complex challenges facing the world today (FAO, 2017).An unusual and temporary increase in demand during MCO, tends to have an inflationary effect, prices of healthy foods may rise, and this will change the dietary pattern of consumers (Vaghefi, 2020). Finding ways to empower and support regenerative, bio diverse smallholder farms and local food systems should be prioritized in any discourse on sustainable agriculture and food security (FAO 2017). Community gardens can improve access to wholesome, healthy foods for local citizens (Wakefield, 2007). Urban agriculture has emerged as one approach to contribute to local food security by increasing the availability and accessibility of fresh and healthy produce in food insecure areas in cities (FAO, 2007). Since a number of urban agriculture operations supply to vulnerable populations such as at food banks, schools, and hospitals, it is of vital importance that food provided by urban agriculture is both safe and nutritious (Siegner, 2018).

3 .The Benefits Of Urban Farming In Malaysia For B40 Group

B40 is a group of people that have their household monthly income of roughly around RM4,850 and below. B40 also represents Bottom 40%. The implementation of Urban Farming to B40 group, can assist this income group in generating income that expected to be worst and hit bottom during the Movement Control Order (MCO). Urban farming can increase the income of B40 group by using the idea of self-consume where what they planted can be consume and sell to the community, to raise some additional income. Urban Farming also can be traded in their own community by barter system. On the environmental aspect, urban farming can have

reduced the CO2 emission that caused global warming. A cleaner air provides a good habitat for green plant and green spaces in cities enhanced the aesthetics of a community, providing relaxation and reducing mental fatigue, and contributing to positive emotions and self-reflection. Additionally, gardening improves physical and mental health through increased levels of fruit and vegetable consumption, improved dietary diversity, increased physical activity, and by providing a source of stress-relief and relaxation for farmers (Ulrich et al.,2014).

4. Role Of Government And Stake Holder And The Challenges

The role of government in assisting urban farming is vital as urban agriculture is the concept of farming among the community. Federal Agriculture Marketing Authority (FAMA), Malaysian Agricultural Research and Development Institute (MARDI), Zakat centre and Land office are closely related stakeholders that are potentially connected on the success in the implementation of urban agriculture. The household that decided to involve in Urban Farming are essentially need farming skills, marketing skills and most importantly they should own a big land to plant the vegetables. In order to complement this, the involvement of the stakeholders like FAMA, will assist them to disseminate the knowledge about the plant and vegetables, provides market prices for planted vegetables, provides professional skills to grow plant (duration for the plant to harvest) and how to sell and position the products. MARDI is another stakeholder that expected to play a key role in increasing the productivity of agriculture by ensuring crops and livestock have disease resistant traits and high fertility

The involvement of Zakat centre is to identify household that under B40 categories in each identified research areas. While Land office is an authority body that played an important role in getting the approval from the government to start the farming on the unused lots and make use of all the soil and dirt to plant the vegetables. The most challenging part of Urban Farming is to open the mind for B40 community on the concept of urban farming and to provide the confident on how this vegetable can generate a sustainable income and resilience market. It is also difficult to convinced B40 to participate in farming as the income for planting is not immediately gain in a short term. The constraints of the time gap for the plants to grow before ready to be harvest and the method to establish an effective supply chain is crucial and a collective work and collaboration from strong stakeholder is needed. The selection types of vegetables are essential to ensure the marketability of certain types of vegetables and to meet the domestic demand (Joao, 2011).

5. Methodology

Several techniques could be used in conducting causal and exploratory research such as through literature review/document study, in-depth interviews and collecting data heading to using tool to analyze. Firstly, a qualitative approach combining the techniques of interviews, observations, focus group discussions and document analysis has been conducted. Subsequently, samples have been collected for areas in Hulu Langat District namely Kajang, Semenyih and Beranang. Firstly, this study employed ATLAS in interpreting the impact of urban farming on B40 socioeconomic. Secondly econometric analysis was employed on measuring the volatility of vegetables prices on the selected lockdown measurement. The case study is an approach to research that facilitates exploration of a phenomenon within its context using a variety of data sources. This ensures that the issue is not explored through one lens, but rather a variety of lenses which allows for multiple facets of the phenomenon to be revealed and understood (Stake, 1995; Yin, 2006). Information gathered from interviews and questionnaires are analyzed and used as a research finding.

According to Sundaram and Gen (2019) fruits and vegetables are important sources of good dietary for the Malaysian population. For the period between 1961 and 2013, the amount of vegetables supplied per capita has increased from 20 kg in 1961 to 72 kg in 2013; and most of this quantity is due to importation. Sundaram and Gen (2019) point out that for every tonne of vegetables produced in 1961, 0.59 tonnes of vegetables were imported, and this ratio has since increased to 0.82 tonnes of vegetables in 2013.Nevertheless, the Malaysia's self-sufficiency level for vegetables in 2018 is about 78.4% (Vaghefi, 2020). Furthermore, as reported by Sundaram and Gen (2019) the shares of vegetables in food at home expenditure for the B40 group is about 13% of their income. As income increases the share of household expenditure on vegetables decreases.

The impact of the Covid-19 outbreak does not spare the agriculture sector. According to Nicola et al. (2020) Covid-19 affects adversely on every sectors and industries of the economy, not only the agriculture, but also other sectors of the economy - petroleum and oil, manufacturing, education, finance, healthcare, pharmaceutical, hospitality, tourism, aviation, real estate and housing, sports, information technology, media, research and development, and food sectors. In Malaysia, Shaharudin (2020) notes that the agriculture sector has been hard hit due to the declining demand of agricultural produces from the hospitality and the tourism sector; and the disruption of the global supply chain that cause negative impact on the sector. The MCO in Malaysia also affected the activities of the agriculture sector by restricting the mobility of agriculture workers, and farmers in selling their produce.

According to Kim et al. (2020) on the supply side, the lockdowns prevented local and foreign workers from working in the farm and thus denying the farm needed inputs such as seeds, fertilizers, pesticides, watering and harvesting. On the demand side, the pandemic has significantly reduced food consumption due to loss in income and restricting mobility to groceries, restaurants and other retail food shops. The slow economic growth and the lockdown measures adopted by governments have led to job losses and reduced working hours. The lockdown measures which restrict the movements of peoples are also limiting the access to adequate and nutritious food. The increase in the price of food during the pandemic will also deny peoples access to food needed for healthy diet. In fact, studies have shown that the outbreak of severe infectious diseases is often accompanied by a food crisis due to abandonment of farming activities, breakdown of food supply chain and income reduction and unemployment (Kuwonu, 2014; FAO, 2020; Yu et al., 2020).

The shortage of agricultural produces needed by the population the raise the prices of these produces. For example, as a result of the disruptions to production and distribution due to the pandemic, the retail prices of rice raise about 10% - 20% between January to April 2020 in India, Laos, Mongolia, Pakistan, Sri Lanka and Thailand (Kim et al., 2020). Harris et al. (2020) found that majority of farmers in the states of Jharkand, Assam, Andhra Pradesh and Karnataka in India report negative impacts on production, sales, prices and incomes. On the other hand, a study on the impact of Covid-19 on food prices in China by Yu et al. (2020) show that Covid-19 have a relatively large impact on increasing the price of cabbage and pork.

During the pandemic, the reduction in productivity reduces the overall food availability and subsequently, increases food prices due to rising demand and diminished supply. Grace et al. (2014) further assert that the price of food can serve as an indication of fluctuations in food access, thus serves as one measure of access. As food prices go up peoples are able to purchase less food (Darnton-Hill and Cogill, 2010).

In the present study, we endeavor to examine the impact of Covid-19 outbreak and lockdown measures adopted by the Malaysian government on selected vegetable prices, in particular brinjal, cabbage, carrot, cucumber and ladyfinger prices. Thus, we specify the following model,

$$\text{vegprice}_{jt} = \alpha_0 + \alpha_1 \text{covid}_t + \beta_k \text{lockdown}_{kt} + \varepsilon_{jkt} \qquad (1)$$

where vegprice_{jt} is vegetable price with j equals brinjal, cabbage, carrot, cucumber and ladyfinger prices; covid_t measures the number of Covid-19 new cases; while lockdown_{kt} is lockdown measures with k equals to school closing, workplace closing, cancel public events, restriction on gatherings, close public transport, stay at home requirements, restrictions on internal movement, and international travel controls. The error term ε_{jkt} is assume to has zero mean and constant variance. It is expected a priori that $\alpha_1, \beta_k > 0$ or $\alpha_1, \beta_k < 0$ depending whether the sources of impact is from supply disruption or demand reduction respectively (Yu et al., 2020).

To determine the long-run relationship between vegprice_{jt} and its predictors, covid_t and lockdown_{kt} we conduct cointegration test on Equation (1). First, by using the Ordinary Least Square (OLS) with robust standard error, corrected for both autocorrelation and heteroskedasticity due to Newey and West (1987) approach. The residual from the estimated regression is then tested for unit root by using the conventional augmented Dickey and Fuller (1979, 1981) unit root test. This is what we called the Engle and Granger two-step procedure proposed by Engle and Granger (1987). Rejection of the null hypothesis of unit root implies cointegration, thus, exhibiting long-run relationship between vegprice_{jt} and its predictors, covid_t and lockdown_{kt}. A cointegrated regression is a valid long-run equation or model, in other words, it is non-spurious (Granger and Newbold, 1974).

In this study, weekly daily data on vegetable prices for the period week one in January 2020 to week one in October 2020 were collected from the Federal Agricultural Marketing Authority (FAMA) Malaysia. On the other hand, weekly data for the number of Covid-19 confirmed new cases; lockdown measures such as restriction on domestic travelling, restriction on mass gathering, restriction on international travelling, school closure, stay at home requirement and workplace closure were taken from the Covid-19 Government Response Tracker (OxCGRT) database compiled by Hale et al. (2020) (which is available at https://covidtracker.bsg.ox.ac.uk/). All variables used in the analysis were in logarithm.

6. Empirical Results

i.Pearson correlation

Pearson correlation was tested to see the relationship between the variables. The model design to explore the relationship between the implementation of urban farming (Y) and other variables that closely related with urban farming namely Generate Income (X_1), Household Food Supply (X_2) and Greenhouse Effect (X_3). The

correlation and estimates of coefficients of the three Factor multiple linear regression Model of the variables displayed in Table 1 and Table 2.

	Urban Farming		
	Significant Relationships	**Correlation Coefficient (r)**	**P-value**
Generates Income(X_1)	Strong	0.825	0.000
Household Food Supply(X_2)	Strong	0.716	0.820
Reduced Greenhouse Effect(X_3)	Medium	0.814	0.000

Table 1 Correlation coefficient.

Urban Farming (Y)	**B (Unstandardized Coefficient)**	**Std. Error**	**Beta (Standardized Coefficients)**	***T***	***p-value***
Constant	1.660	.147		11.259	.000
Generate Income (X_1)	.295	.069	.482	4.264	.000
Household Food Supply (X_2)	.013	.056	.023	.228	.000
Greenhouse Effect (X_3)	.320	.044	.469	7.227	.000

Table 2 Coefficients of the Three Factor Multiple Linear Regression Model ** Correlation become significant at the 0.01 level; Bonferroni adjusted alpha ($\alpha_{adjusted}$) = 0.0125 (0.05/4).

*Notes: $R = 0.892^a$; $R^2 = 0.796$; *Adj.* $R^2 = 0.790$; F (4, 97) = 121.252, $P = 0.000$.

To identify the extent to which Generate Income, Household Food Supply and Greenhouse Effect to explain variations on Urban Farming, regression analysis methods were used. As stated in Table 3, the Generate Income variable with t value = 4.264 and Beta value = 0.482 is the most significant while Household Food Supply variable with t value = 0.228 and Beta value = 0.023 is the least significant. Thus, Generate Income is the most influential variables that support the proposed framework of urban farming. As shown in Table 3, the estimated value of the coefficient of the three factors (B) for bo is 1.660, b1 is 0.295, b2 is 0.013, and for b3 is 0.320. Below is the coefficients obtained, for the linear regression model.

$Y = 1.660 + 0.293(X_1) + 0. .295(X_2) + 0. 013(X_3) + 0. 320(X4) + e$

ii. Econometrics Analysis

Before estimating Equation (1) it is a standard practice that we test all variables for unit root by using the conventional augmented Dickey-Fuller (Dickey and Fuller, 1981) unit root test. This procedure is to ensure that the variables are stationary or non-stationary at levels or in first-differences. Estimating non-stationary variables in a model will subject to spurious regression result, unless the variables are cointegrated. Our unit root test results clearly suggest that the null hypothesis of a unit root in level of the vegetable prices, Covid-19 confirmed new cases; the six lockdown measures cannot be rejected at the 5% significant level. However, in their first-differences, the null hypothesis of a unit root can be rejected at that 5% significant level for all variables involved. This implies that all the variables are I(1) in levels, and are I(0) in their first-differences, meaning that the series achieved stationarity after differencing once.

Since all variables are I(1) series, we can therefore proceed with the cointegration test using the conventional Engle and Granger two step procedure. Table 3 presents the results of the long-run model (Equation 1) for the impact of Covid-19 and lockdown measures on five vegetable prices in Malaysia for the period January 2020 to October 2020. Generally, we observed that in all the estimated equations for all six lockdown measures and for all five vegetable prices are cointegrated. The Dickey-Fuller unit root test on the residuals, DF t-statistics in all cases are statistically significant at least at the 10% level. This implies that there is cointegration, that is, long-run relationships were exhibited between vegetable prices and its regressors Covid-19 confirmed new cases and all six lockdown measures – restriction on domestic and international travelling, banning on mass gathering, stay at home requirements, school and workplace closures. The cointegration test signifies the validity of the long-run model as per Equation (1).

Nevertheless, the impacts of Covid-19 new cases on vegetable prices are not uniform in terms of significance and the signs; and similarly the impact of lockdown varies with the type of lockdown measures in both

significance and signs. For example, the result for brinjal price indicate that Covid-19 confirmed new cases has negative impact on the price of brinjal, when domestic travel, school closure and stay at home requirement were use as lockdown measures. However, the lockdown measure restriction in international travel is significant and show negative effects on brinjal price. This result implies that during the Covid-19 pandemic and lockdowns the price of brinjal has decreased, probably due to the decreased in consumption. However, with lower price of brinjal, people with stable income will be able to purchase brinjal for consumption. Similarly the number of Covid-19 new cases and lockdowns impacted negatively on the prices of cabbage and ladyfingers. Lower prices of cabbage and ladyfingers during the Covid-19 pandemic and lockdowns will not deny peoples to access and purchase these vegetables with their available income.

On the other hand, in contrast to brinjal, cabbage and ladyfinger prices, results for carrot and cucumber prices indicate otherwise. For example, Covid-19 has positive effects on carrot and cucumber prices. For carrot price, variable covid_t is significant when restriction on international travel, school closure and stay at home requirement was used as lockdown measures; while for cucumber price, covid-19 is significant in model with restriction on domestic travel as lockdown measure. On the other hand, the positive impact of lockdown measures are shown by the significant of domestic travel and restriction on mass gathering on carrot price; while restriction on mass gathering on cucumber price. The positive impact of both Covid-19 and lockdowns imply that households will purchase less of these vegetables due to increased price. With less or reduced income and higher prices, peoples will not be able to consume this types of vegetables. Thus, higher food prices deny peoples' access to food security. Nonetheless, since vegetables are substitutable the population will be able to consume on some other vegetables that are cheaper and affordable with their present income. Lower prices of food, in particular to cheaper vegetables, the population will not be denied food security during the Covid-19 pandemic.

7. Conclusion

This study proposed the urban agriculture on establishing food security and creating the ability for the generation of household income for the B40 group. This study considers urban agriculture to be broadly progressive and capable of delivering a suite of environmental, economic, food security and social benefits. The empirical findings on the correlation between generate income, household food supply and greenhouse depicted a strong connection of urban agriculture to generate income for B40 group. Thus, generate Income is the most influential variables that support the proposed framework of urban farming. The outcomes of the study will provide a new policy that involved the relevant stakeholders on the development of urban agriculture systems as a sustainable means to alleviate poverty and augment national food security. In Malaysia, urban agriculture stimulates the income for B40 group and a local economy by circulating income throughout the region. Hence the involvement from the stakeholders on the implementation of urban farming is vital to ensure the sustainability of urban agriculture in Malaysia. Considering that urban agriculture is still an infant industry, the government should allocate more budget allocation on developing the knowledge, facilities and funding to facilitate urban agriculture farmer as it is proven that this industry is potentially capable delivering a suite of environmental, economic, food security and social benefits especially to B40 groups. Without a complicated distribution network, farmers are more connected to their market and able to adapt quickly to demand, and maximizing profit.

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Dependent variable	Independent variables/ Diagnostic	Domestic travel	Restrictions on gathering	International travel	Cancel public events	School closure	Stay at home
Brinjals	$constant$	2.7109	2.7245	2.7704	2.7295	2.7112	2.7149
		-85.2030	-82.1563	-93.6343	-82.2789	-79.2170	(89.2668)
	$covid-19$	-0.0216	-0.0095	-0.0106	-0.0068	-0.0183	-0.0245
		(-2.2333)	-0.1785	(-1.6528)	(-0.9772)	(-2.5443)	(-3.1004)
	$lockdown$	0.0102	-0.0405	-0.0539	-0.0529	-0.0029	0.0497
		-0.5526	(-1.6441)	(-3.0552)	(-2.0155)	(-0.2321)	-1.6369
Cabbage	$constant$	2.1923	2.1870	2.2109	2.1879	2.1920	2.2035
		-92.6243	-134.2401	-198.6971	-152.3350	-97.2543	-72.4081
	$covid-19$	0.0046	-0.0255	-0.0159	-0.0246	-0.0206	-0.0217
		-0.3968	(-1.8964)	(-1.7514)	(-1.5763)	(-2.4079)	(-3.2309)

	$lockdown$	-0.0790	0.0353	-0.0099	0.0318	0.0184	0.0379
		(-1.9997)	-0.8002	(-0.3306)	-0.5856	-0.7763	-0.9543
Carrot	$constant$	1.9094	1.8751	1.8611	1.8750	1.8935	1.9013
		-82.2938	-148.4336	-92.9045	-168.3832	-94.5414	-83.9310
	$covid-19$	0.0006	0.0035	0.0154	0.0042	0.0172	0.0224
		-0.0592	-0.3451	-1.8365	-0.3693	-1.9372	-2.6893
	$lockdown$	0.0734	0.0763	0.0369	0.0742	0.0215	-0.0121
		-2.8387	-2.7510	-1.9841	-2.3372	-1.0122	(-0.1884)
Cucumber	$constant$	1.6504	1.5615	1.4717	1.5530	1.6063	1.6718
		-16.7189	-32.0470	-17.290	-39.326	-22.089	-14.8307
	$covid-19$	0.0676	0.0345	0.0042	-0.0372	0.0062	0.0202
		-2.2084	(-1.0876)	-0.1322	(-1.2785)	-0.2613	-0.8734
	$lockdown$	-0.1344	0.2824	0.1707	0.2975	0.1352	0.0874
		(-1.3265)	-2.3085	-1.5843	-2.6248	-1.6788	-0.6113
Ladyfinger	$constant$	2.7036	2.7610	2.8073	2.7800	2.7265	2.7037
		-37.2209	-52.5308	-146.6617	-63.9065	-40.9515	-35.5861
	$covid-19$	-0.0514	0.0077	-0.0180	0.0178	-0.0206	-0.0402
		(-2.3819)	-0.3618	(-0.7801)	-0.9682	(-1.6298)	(-1.6452)
	$lockdown$	0.0667	-0.1772	-0.0982	-0.2235	-0.0696	0.0639
		-1.0634	-2.2228	(-1.6537)	(-3.1684)	(-2.0998)	-0.6409

Table 3 Econometrics analysis on the impact of vegetable prices with lockdown measurements..

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