

Rural areas are more resilient than urban areas to the COVID-19 pandemic. Is it true? (Lessons from Indonesia)

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Abstract: The COVID-19 pandemic affected the world's life systems and food security. To deal with the food crisis, the Indonesian government has provided directives to maintain the availability of food supply chains in areas that are regional and national food sources. Restrictions on activities not directly related to the food chain indirectly affect the region's food security sustainability. The purpose of this study is to analyse the effect of the level of regional food security on the conditions of the COVID-19 incident in Bogor Regency. The methodology used was quantitative at the level of food security figures and cases at the village level using Geographically Weighted Regression spatial analysis. The data used are food security indicators and the incidence of COVID-19 at the village level. The research findings show that urban areas with high food security tend to increase cases of COVID-19, but rural areas with high food security tend to be able to reduce them.

Key Words: regional development, food security, COVID-19 pandemic, rural resiliency.

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Introduction

The COVID-19 pandemic impacts all living systems in the world, including the food security system. The World Food Organisation (FAO) has warned that the coronavirus (COVID-19) could affect Indonesia's national food security in the short term. Therefore, an important function that all stakeholders must perform is to maintain the availability of the food supply chain. The government must compile a national food management plan by predicting the food supply to ensure no food shortage and affordable prices. Mistakes in anticipating food insecurity can disrupt supply chains on a global scale and generate similar calls for changes in food systems that are built on principles of food sovereignty and local market support

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(Altieri & Nicholls, 2020; Blay-Palmer et al., 2020; van der Ploeg, 2020; Worstell, 2020).

To support national food availability, we must ensure continuous production safety in the food industry. Prerequisite programs should support food industry practices, including good hygiene, hygiene and sanitation, designation of processing areas, supplier control, storage, distribution and transportation, hygiene, and personnel fitness for work. Health standards need to be improved so that food production and supply chain performance can continue to run safely because the risk of transmission to workers in the food industry is very high. There are now urgent requirements for industry to ensure compliance with measures to protect workers from contracting COVID-19, to prevent transmission of the virus, and to strengthen food hygiene and sanitation practices.

The COVID-19 pandemic affected food systems directly through its impact on food supply and demand and indirectly through decreasing purchasing power and capacity to produce and distribute food. In addition, a heavier impact occurred on the poor and vulnerable to poverty (Janssens et al., 2021; Adhikari et al., 2021; Ma et al., 2020). The potential risk of regional food availability and prices depends on the duration of the outbreak and the severity and containment measures taken by the government. Isolated country-level policies are likely to amplify the effects of the crisis on food security and nutrition at the global level, particularly for developing and food-insecure countries. Furthermore, the potential impact of a pandemic on food production in major food-producing countries (e.g. China, E.U., U.S.) could have severe implications for global food availability and prices. Several other countries imposed an economic halt to prevent a deadly public health crisis from becoming more powerful (Larue, 2020). This ultimately led to the disruption of global food supply chains, loss of income and livelihoods due to global economic recession, and uneven food prices (Clapp & Moseley, 2020; Wu et al., 2020; Moseley & Battersby, 2020; Power et al., 2020).

After implementing the Large-Scale Social Restriction (PSBB) policy in several cities that were the epicentre of the spread of COVID-19, the government tried to secure the national food supply. To meet national food needs, the President instructed the opening of new rice fields in all potential areas of Indonesia. This step is a response to FAO's warning that there will be a world food crisis due to the impact of the spread of COVID-19, which cannot predict the end of the pandemic. In addition, the President also asked his staff to continue monitoring prices' stability for necessities so as not to skyrocket. Clapp & Moseley (2020) state that a pandemic allows a complex interaction of the global economy and local market dynamics, which causes very uneven food price trends.

The Ministry of Agriculture, as an institution responsible for the agriculture and food sector, has also prepared various strategies to face the challenges of food security amid this coronavirus pandemic. The issue of food security is critical, as well as being prone to problems in disaster situations, including catastrophic disease outbreaks such as the COVID-19 pandemic. Food security indicates the availability of access to food sources to meet basic needs (Marston et al., 2020). The COVID-19 pandemic has resulted in the availability of access to food being exacerbated by the worsening of the pandemic itself and the following restrictions on population movement. This is also stated by Burgui (2020), who saw that an epidemic of a disease that occurs worldwide will increase the number of people experiencing hunger and malnutrition.

Law no. 18 of 2012 concerning food mandates that the state is obliged to realise the availability, affordability, and fulfilment of food consumption that is sufficient, safe, quality, and nutritionally balanced both at the national and regional levels to

individuals equally throughout Indonesia by utilising local resources, institutions, and culture. Reaching food security focuses on the availability of local food resources that contain diversity between regions and all sectors, both government and community participation.

Food security consists of 3 interrelated indicators: availability, access, and utilisation. Amid the COVID-19 pandemic, food availability is also constrained by limited food options on the market, reduced retail selling foodstuffs, and reduced food supply from the navel of food production as a result of the Large-Scale Social Restrictions (PSBB) policy. Meanwhile, from the perspective of the ability to access food, the COVID-19 pandemic has caused the affected middle and lower-class people to experience difficulties accessing food due to decreased income. Finally, reducing access to food consumption will affect families' and communities' health and nutritional status.

The COVID-19 pandemic occurred very massively in the Greater Jakarta area (Jakarta-Bogor-Tangerang-Depok-Bekasi), which has become the epicentre or centre of the spread of the virus. Bogor Regency, as one of the main buffer areas of the state capital Jakarta, has a strategic role as a supporter of food needs on a regional scale. The Large-Scale Social Restriction Policy (PSBB) excludes restrictions on activities for staple foods. However, the closure of various activities not directly related to the food chain will indirectly affect the sustainability of the food supply in the regions.

Mardones (2020) explains that the COVID-19 pandemic has disrupted the global economy and food system, causing far-reaching consequences regarding food security. Food insecurity due to the pandemic is likely to impact public health seriously. Other studies have also found an overview of the impact of COVID-19 on global food security (Azra, 2021). Unfortunately, no specific research results have been found in searches that directly discuss the relationship between food security and the incidence of COVID-19 cases. This research tries to answer the research gap between food security and the incidence of COVID-19 cases. This study attempts to analyse the influence of regional food security conditions on the incidence rate of positive cases of COVID-19 in Bogor Regency using Geographically Weighted Regression spatial analysis.

Materials and Methods

This study uses Bogor Regency data in 2021 figures from the Bogor Regency Central Statistics Agency to develop a regional food security model. Data on the distribution of COVID-19 is sourced from the Bogor Regency COVID-19 Task Force. The two data sources are used to analyse the effect of the spread of COVID-19 on regional food security.

In 1745, the forerunner of the Bogor community originally came from nine settlement groups combined by Governor Baron Van Inhof to become the core of the community of Bogor Regency. Bogor Regency is one of the West Java Province regencies in the Greater Jakarta metropolitan area (Jakarta, Bogor, Depok, Tangerang, and Bekasi). The area of Bogor Regency is 298,838,304 ha or 298.84 km². and the administrative work area is divided into 40 districts, 411 villages, and 17 sub-districts.

The total population of Bogor Regency in 2019 was 5,965,410 people, consisting of 3,045,174 men and 2,920,236 women. Based on the data above, the gender ratio in 2019 is 0,98. The population growth rate is high, namely 2.13% in 2019. Two thousand two hundred thirty-six residents inhabit the population density per 1 km²

of Bogor Regency. The population distribution per district is relatively uneven. The sub-district with a sparse population is Tanjungsari District, with an average of 396 inhabitants/km², while the most densely populated area is Bojonggede District, with 12,487 inhabitants/km².

Bogor Regency is a district with an economic structure supported by the processing, trade, and construction industries, proved by the distribution of the processing industry sector by 54%. Other relatively high sectors were the trade sector, by 13%, and the construction sector, by 10%. The agriculture, forestry, and fisheries sectors have a small distribution, namely 6%. Still, they have a high multiplier effect on the food processing industry and fresh food support for the Greater Jakarta area.

Bogor Regency is an area that has a complete and unique natural hue. The northern part is a fluvial-volcanic and anthropogenic plain area suitable for settlement. In contrast, the southern region consists of volcanic and structural mountains suitable for agricultural cultivation activities and tourism for environmental services. This unique natural support condition places Bogor as the primary choice of tourism destination based on environmental services for the community around Jabodetabek. The value of these services is also strengthened by the existence of the Mount Gede-Pangrango National Park Center and the Mount Halimun-Salak National Park Office as managers of protected biodiversity. Bogor Regency also has a Pongkor Geopark in Nanggung District, officially becoming a National Geopark in 2018.

Bogor Regency was chosen deliberately as a research location considering its role and position as a satellite area of the state capital, DKI Jakarta. The most critical role of Bogor Regency is as one of the leading food suppliers for Jakarta and its surroundings. In addition, Bogor Regency is also the district most affected by the COVID-19 pandemic because it is part of the epicentre of the spread of COVID-19 in Jabodetabek. As of December 29, 2021, 47,976 people were recorded as active positives, of which 47,354 had recovered successfully and 586 died (Bogor Regency COVID-19 Task Force, 2021).

Food Security Index

Composite indicators are mathematical combinations of individual indicators that represent different dimensions of the concept that describe the objectives of the analysis (Saisana & Tarantola, 2002; Freudenberg, 2003; Nardo et al., 2005; Saisana et al., 2015). The FAO indicator consists of three parameters: the average quantity of calories available for human consumption, the inequality in access to calories among the population, and the minimum average number of calories needed by the population (Haena et al., 2011). The Economist-Economic Intelligence Unit compiles the Global Food Security Index (GFSI), which consists of Affordability, Availability, and Quality and Safety (Economist Intelligence Unit [EIU], 2014; 2015; 2016; 2017). In compiling the food security index, this study uses food security indicators stipulated by Law No. 18, 2012, concerning food (Table 1).

The steps in the formulation of a regional food security composite index at the district level can be carried out in several stages, namely:

1. Ranking indicators for regional food security. Indicators in the data set are different units of measurement; normalisation is required to be in the same unit. One of the normalisation methods is ranking (Nardo et al., 2005; Mendola & Volo, 2017); ranking is the simplest normalisation method with the advantage of simplicity and independence from outliers.

Table 1. Food security index indicators

Indicator	Sub Indicator	Operational Definition
1. Food Availability	The ratio of paddy field area to total land area	The ratio of the rice field area in a village to the area of the village is the ratio between the raw area of rice fields and the village area.
	The ratio of the number of economic facilities and infrastructure to the number of households	The ratio of the number of facilities and infrastructure providing food to the number of households is the ratio between the number of facilities and infrastructure for delivering food in the village, which includes markets, minimarkets, shops, stalls, and restaurants, with the number of households in the village.
2. Food Accessibility	The ratio of the population with the lowest level of welfare to the total population	The ratio of the population with the lowest level of welfare to the total population is the ratio of the rural poor to the total population of the village.
	Villages with insufficient connecting access	A village with adequate connecting access is a village road condition that can be traversed by four-wheeled vehicles throughout the year.
3. Food Utilisation	The ratio of households without access to clean water to the number of households	The ratio of households represents food utilisation without access to clean water to the number of households and the ratio of villagers per health worker to population density.
	The ratio of the number of villagers per health worker to population density	The ratio of the number of villagers per health worker to population density looks at the ratio of health workers, including general practitioners/specialists, dentists, midwives, and other health workers with population density.

Source: Indonesian Ministry of Agriculture, 2015

- The weighting is carried out on the indicators and sub-indicators of regional food security, with each sub-indicator having a weighting of 0.17 to obtain the Weight to the total. The weighting method is carried out with the same weight composition for each regional food security indicator because all indicators are equally important, contributing to measuring regional food security.
- Determine the K (upper limit) value for each indicator with a value of 100 (Sukandar, 2017).

- The formula obtains standardisation of scores according to (Sukandar, 2017):

$$r = \frac{x}{K} * 100$$

Score = r if $r \leq 100$

Score = 100 if $r > 100$

Where: r = score
X = actual value
K = upper limit value

- The index value was obtained with the Sukandar formula (Sukandar, 2017):

$$I = B * r$$

Where: B = Weight to total
r = Score

6. Grouping villages into six priority groups based on composite cut-off points. The resulting composite scores in each region were grouped into six groups based on the composite cut-off point. The composite cut-off point results from the sum of each multiplication between the individual indicator weights and the individual indicator cut-off points resulting from the standardisation of the z-score and distance to scale (0-100).

$$K(j) = \sum_{i=1}^6 (a_i C_{ij})$$

Where:

Kj: cut off point of composite to-j

ai: Indicator weight to-i

Cij: The standardised value of the cut-off point indicator to-i composite to-j

i: indicator to 1,2,3,.....6

j : indicator to 1,2,3,.....6

The results of the composite score calculation are then classified into six priorities based on the composite cut-off point (threshold). The composite cut-off point is obtained from the calculation between individual indicators' weights and cut-off points. Priority 1 is the main priority, which describes the region's highest level of food security (very vulnerable). In contrast, priority 6 indicates the region with the best level of food security (very resilient). In other words, priority Area 1 has a higher risk of food insecurity than other areas. However, an area in priority one does not mean that all of its population is vulnerable to food insecurity; on the contrary, an area in priority six does not mean that all its population is food insecure.

Geographically Weighted Regression

Geographically Weighted Regression Modeling is a global regression model converted into a weighted regression model (Lu et al., 2014). The parameter value will be calculated at each geographic location point so that each geographic location point has a different regression parameter value. Geographically Weighted Regression also describes models with varying geographic space or nonstationary parametric (Fisher & Getis, 1997; Yudha et al., 2018; Yudha et al., 2020).

Y is the dependent variable, X_1 - X_n is the independent variable, β is the regression coefficient, and ε is the residual. Each location has different parameter values or regression coefficients. The location is $i = 1, 2, \dots, 428$ for villages in Bogor Regency. The regional food security indicator factors suspected of influencing the population positively infected with the COVID-19 pandemic were tested for significance in Geographically Weighted Regression modelling. GWR modelling was built in the following models.

$$RPC_i = \beta_0(u_i, v_i) + \beta_1(u_i, v_i)FSI_i + \varepsilon$$

RPC_i = The dependent variable, Residents positive for COVID-19 is active in the i-village

β_0 = Constant

β_1, \dots, β_5 = Independent variable coefficient

FSI_i = Food Security Index in Village i

(u_i, v_i) = the longitude coordinates of the village point i

ε = Error

Results

Regional food security in Bogor Regency includes three main indicators, namely: (a) food availability, (b) food accessibility, and (c) food utilisation. Food availability in the regions is a condition of the availability of food based on regional production, food reserves, and food input from outside the region if the two primary sources cannot be met.

A. Food availability

In aggregate, the area of wetland farming in 2021 is 59,117.93 ha, and the total area of Bogor Regency is 266,400 ha. The higher the ratio of rice field area to village area is assumed to have better food availability. Based on Table 1, the dominant status of food security from the distribution aspect of the ratio of the village's paddy field area to the village area, 88 villages (20%) are classified as a little vulnerable to food insecurity, and 87 villages (20%) are classified as little food resistant (Figure 1). Food availability is the most essential component of the supply chain, which now includes sufficient quantity and suitable quality food. Food availability is a crucial aspect of food security, according to consensus. Still, it must be considered in conjunction with other factors to ensure that a house has access to suitable, safe, and secure food.

The distribution of the ratio of the village's paddy field to the village's area is an important consideration when trying to understand the prevalence of rice in Indonesian cuisine (Agustian et al., 2022). However, other factors, including infrastructure, climate, and policies, are crucial in ensuring food security. The number of markets in Bogor Regency in 2021 is 30 units, 1,191 minimarkets, 2,493 units of restaurants/restaurants, and 90,440 shops/stalls. Meanwhile, the number of households in Bogor Regency in 2021 was 1,593,156.

Based on Table 2, the dominant status of food security from the aspect of the ratio of the number of village economic facilities and infrastructure to the number of village households, as many as 88 villages (20%) were classified as a little vulnerable to food insecurity. As many as 87 villages (20%) were classified as little food resistant (Figure 2). The ratio of village economic facilities and infrastructure to the number of village households is essential in determining the availability of food, goods, and other vital items in the marketplace that can worsen food's plight.

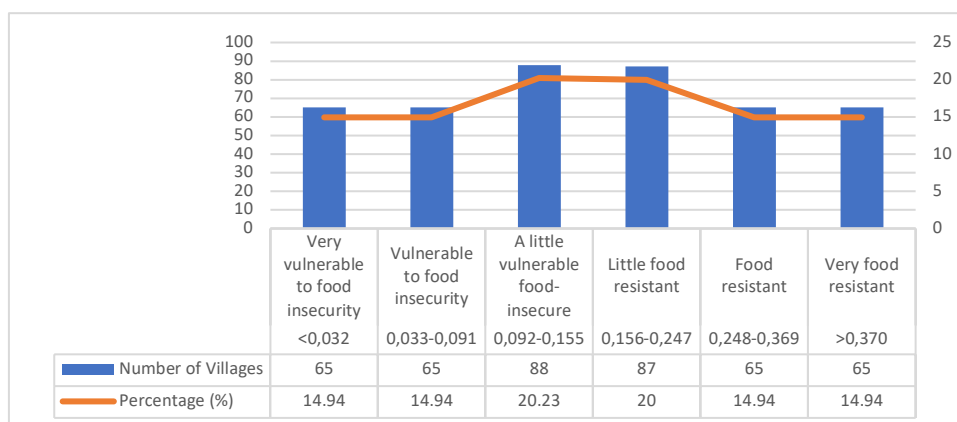


Figure 1. Distribution of the ratio of the village rice field area to the village area

Source: Central Bureau of Statistics, Bogor Regency (analysis) 2021

Improvements to the rural infrastructure can increase productivity and the income of rural homes, which, in turn, can raise people’s self-esteem (Sumaryanto et al., 2023).

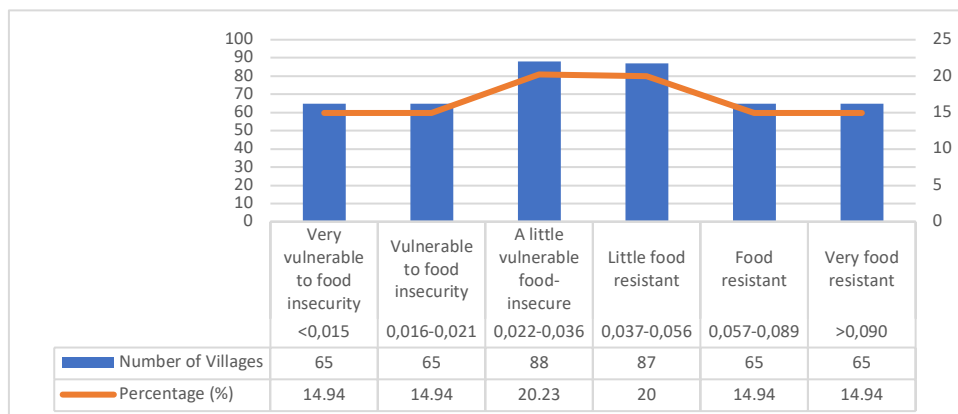


Figure 2. The ratio of the number of village economic facilities and infrastructure to the number of village households

Source: Central Bureau of Statistics, Bogor Regency (analysis) 2021

B. Food accessibility

The number of poor people in Bogor Regency has decreased significantly yearly. The number of poor people in 2014 was 479,100 people (8.91%), then decreased in 2019 to 415,020 people in 2019. Based on Table 3, the dominant status of food security from the aspect ratio of the population with the lowest level of welfare to the total number of villagers, as many as 88 villages (20%) were classified as a little vulnerable to food insecurity, as many as 87 villages (20%) were classified as moderately food resistant (Figure 3).

The ratio of the population with the lowest level of welfare to the number of villagers is an essential indicator of inequality and poverty in rural communities. Rural areas in a developing nation often experience significant social, economic, and spiritual tensions, resulting in different community welfare levels.

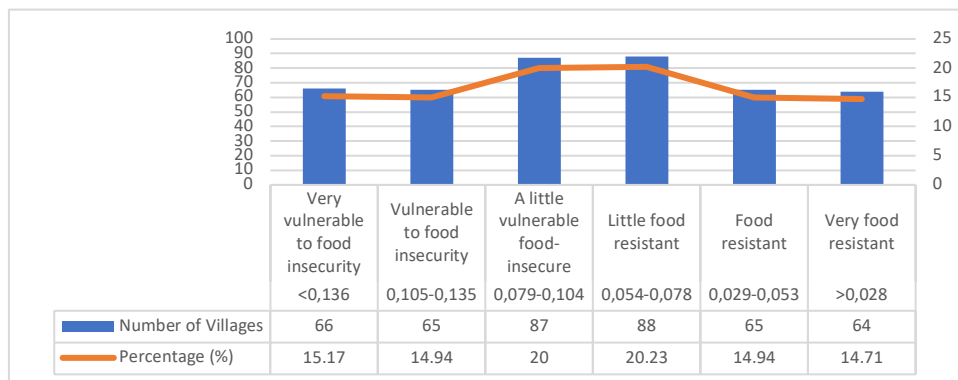


Figure 3. The ratio of the population with the lowest level of welfare to the total number of villagers

Source: Central Bureau of Statistics, Bogor Regency (analysis) 2021



Figure 4. Distribution of village accessibility conditions

Source: Central Bureau of Statistics, Bogor Regency (analysis) 2021

Increasing the efficiency and sustainability of rice farming can help improve rural welfare and food security. Improvements to rural infrastructure, increased productivity, and household incomes can also help.

The main road infrastructure that connects villages is the main factor determining the level of village accessibility. Transportation costs determine the level of progress of a village area and indirectly affect the price of agricultural commodities in the village. The low price of agricultural commodities at the farm level. Based on Table 4, the dominant status of food security from the distribution aspect of village accessibility conditions as little food resistant and 431 villages (99.3%) were categorised as food resistant villages (Figure 4). Rural communities' well-being and food security are significantly affected by the distribution of village accessibility conditions. Rural communities' welfare and food security can be improved by enhancing rural infrastructure, increasing the productivity and income of rural households, and establishing policies and recommendations for improving the efficiency and sustainability of rice cultivation. Studies have also shown that urban and rural households may differ regarding welfare and food security, highlighting the need for policies that address these discrepancies.

C. Food utilisation

Based on integrated data from the Bogor Regency poverty management program in 2021, the number of households without access to clean water in Bogor Regency is 186,270 families spread across almost 435 villages, while the total number of households in Bogor Regency is 842,930 families. Based on Table 5, the dominant status of food security from the aspect ratio of the number of households without access to clean water to the number of households, as many as 88 villages (20%) were classified as a little vulnerable to food insecurity, as many as 87 villages (20%) were classified as little food resistant (Figure 5). An important indication of inequality and poverty in rural communities is the proportion of families without access to clean water to all households. The welfare and health of rural inhabitants can be enhanced by increasing access to clean water resources and bettering water management.

The total number of health personnel in Bogor Regency is 12,958 health workers. Health workers play an important role in reducing population morbidity and increasing public knowledge of the importance of diverse, nutritious, balanced and safe foods. Based on Table 6, the dominant status of food security from the aspect of the ratio of the number of villagers per health worker to population

density, as many as 88 villages (20%) were classified as a little vulnerable to food insecurity and as many as 87 villages (20%) were classified as little food resistant (Figure 6). The ratio of village population per health worker to population density is an important metric that can provide insight into the accessibility of health services and the distribution of resources in a given area. This ratio often indicates the effectiveness and efficiency of health services in the community. A lower ratio of villagers per health worker indicates better access to health services. This suggests that more and more health workers are available to meet the needs of the local population. A higher ratio may indicate a potential problem with access to health services, such as a shortage of healthcare professionals or inadequate healthcare infrastructure.

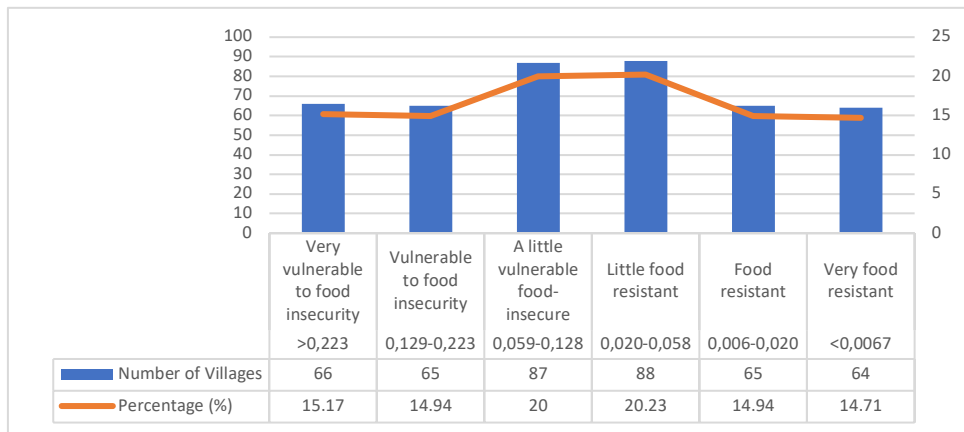


Figure 5. The ratio of the number of households without access to clean water to the number of households

Source: Central Bureau of Statistics, Bogor Regency (analysis) 2021

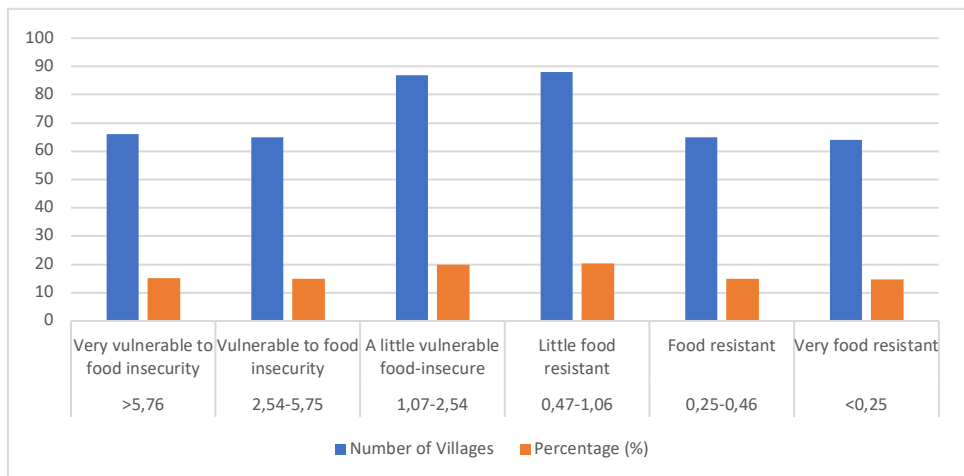


Figure 6. The ratio of the number of villagers per health worker to population density

Source: Central Bureau of Statistics, Bogor Regency (analysis) 2021

The condition of vulnerability to food insecurity is composite determined by six indicators relating to food availability, access to food and livelihoods, and utilisation of food and nutrition. Based on the results of a composite cumulative analysis, of the 435 villages in Bogor Regency, three villages were classified as very

vulnerable to food insecurity, 21 villages were categorised as vulnerable to food insecurity, 42 villages were classified as a little vulnerable to food insecurity, 133 villages are classified as little food resistant, 199 villages are classified as food resistant, and 37 villages are classified as very food resistant (Figure 7). Assessment of food availability, accessibility, utilisation and stability in a geographical and social context involves food security at a district and village level. This calls for evaluating various factors that reduce the population’s capacity to meet their own needs. Local food sustainability can be achieved by developing local food systems based on local knowledge and daily experiences. As a result of changes in people’s perceptions of convenience and practicality, the general public’s behaviour can worsen food security. Local expertise is critical to expand business in Indonesia.

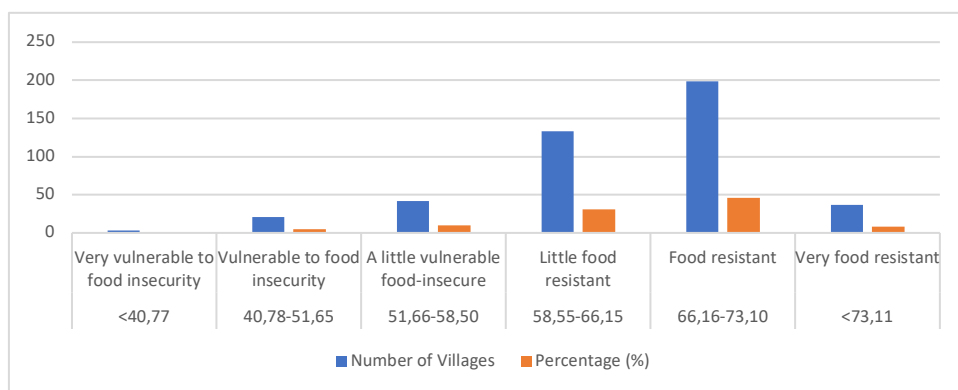


Figure 7. Village food security composite index range in Bogor Regency
 Source: Central Bureau of Statistics, Bogor Regency (analysis) 2021

Spreading of COVID-19 Cases in Bogor Regency

Based on the results of the analysis, provide recommendations for actions and interventions that can help increase the level of panhandling in a region with a high food safety composite index. It can improve the target areas for agriculture development, infrastructure building, nutrition programs and capacity building. It is essential to understand that the food security composite index range analysis must be contextual and consider specific local economic, social and religious factors. Additionally, it is crucial to involve the community, the local population, and the experts in the process to ensure that comprehensive knowledge about the challenges and opportunities for food security in the relevant region is provided (Figure 8).

The spreading of positive cases of COVID-19 in Bogor Regency experienced a reasonably high development in the range of July 2020 to January 2021. Cases decreased in October 2020 and then increased again in January. Implementing the social restriction policy from March 2020 to June 2020 is considered quite effective in reducing the number of disclosures and increasing positive cases of COVID-19. July 2020 saw an increase in the number of positive cases of Covid-19 because the social restriction policy had been suspended.

Year-end long holidays and community social activities such as wedding ceremonies and regional head elections that increase crowd activity are considered substantial factors that increase positive cases of COVID-19. In addition, many positive cases have developed in subdistricts and villages, which are densely populated and have links with economic activities at the epicentre of the COVID-19 pandemic in DKI Jakarta (Figure 9).

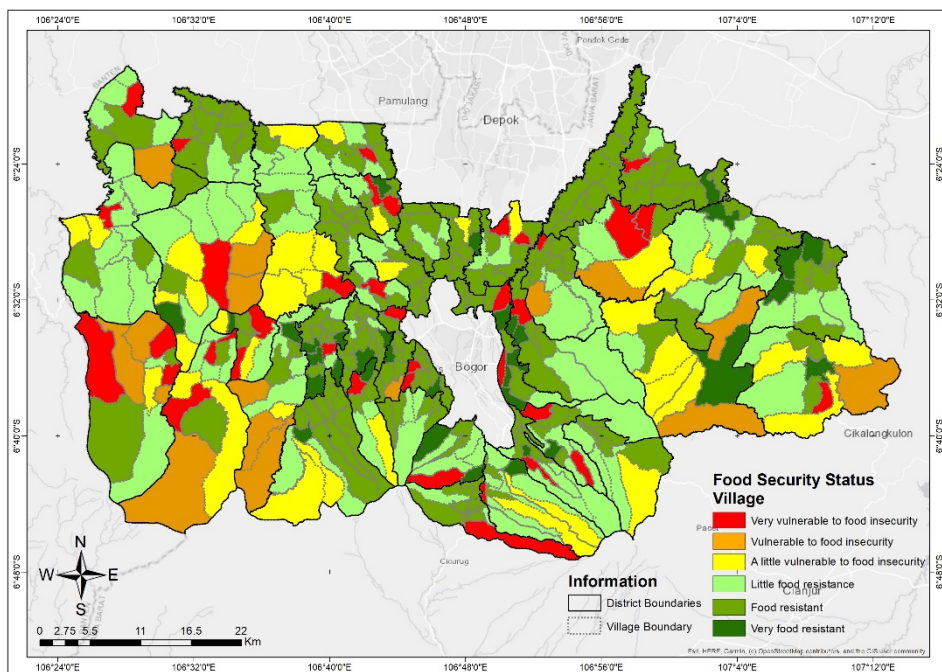


Figure 8. Bogor Regency Regional Food Security Map 2021

Source: Analysis Results 2022

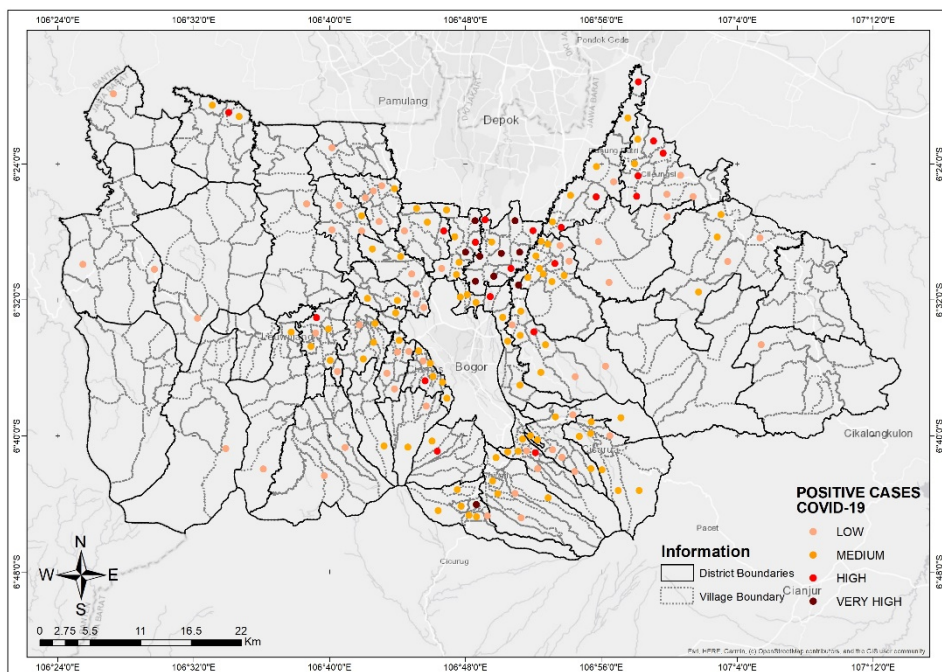


Figure 9. Map of The Distribution of Positif COVID-19 Cases in Bogor Regency

Source: Data Sharing COVID-19 Bogor Regency, 2021

Spreading of COVID-19 Cases in Bogor Regency

Based on the results of the GWR modelling analysis, it is known that the village scale analysis unit is relatively high in the model's goodness. The level of food security can affect positive cases of COVID-10 in every village. The number of COVID-19 cases in each village is significantly influenced by the level of the village's food security index, as seen from the elasticity value of -0.010. This shows that every per cent increase in the food security index for a village can reduce positive cases of COVID-19 by 0.010%.

From the results of the mapping of the GWR model in Figure 4, the status of the food security index at the village level has had various impacts on the addition of positive cases of COVID-19 in Bogor Regency. In the context of food security at the village level, it is necessary to know how this affects the systematic emergence of positive cases of COVID-19. Because every positive case of COVID-19 in a village can be affected by various village economic activities, for at least three days after a case is found, a village activity will be locked by limiting activities, cleaning the environment with disinfectant, and reducing service hours for each business and services (Brancati et al. 2020; Boughton et al. 2021; Rude 2020). This reduction in economic activity directly impacts business turnover, resulting in many cases of reduced working hours, wages, and layoffs during the pandemic in Bogor Regency. The causality of village food security due to the decreased ability of the community to access food sources due to reduced income will then indirectly have an impact on the emergence of positive cases of COVID-19 (McMillan, 2020; Vercammen, 2020; Kerr, 2020; Richards & Rickard, 2020; Larue, 2020).

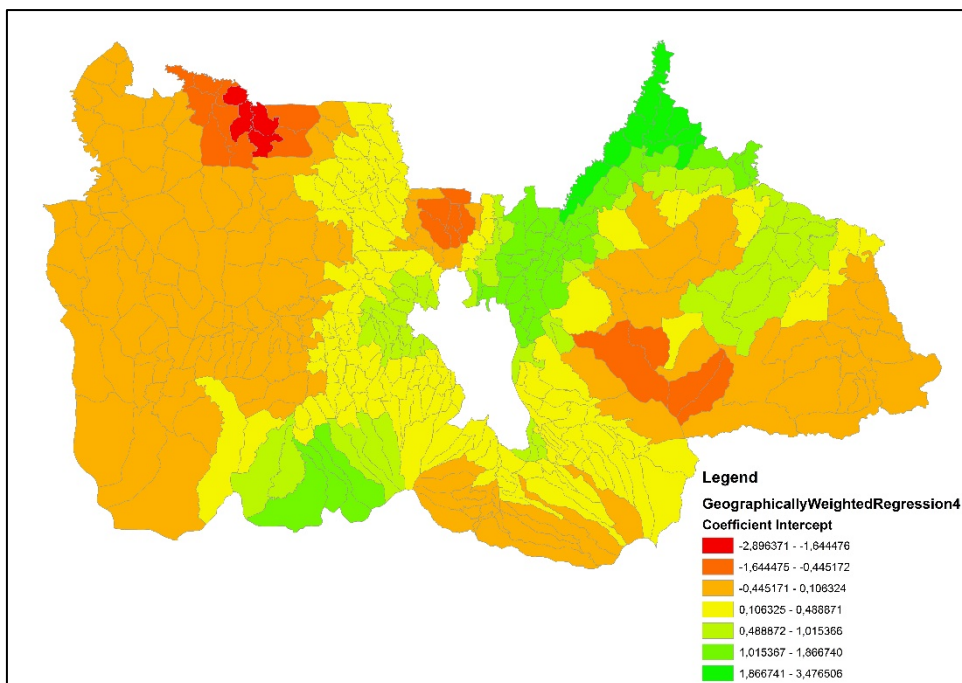


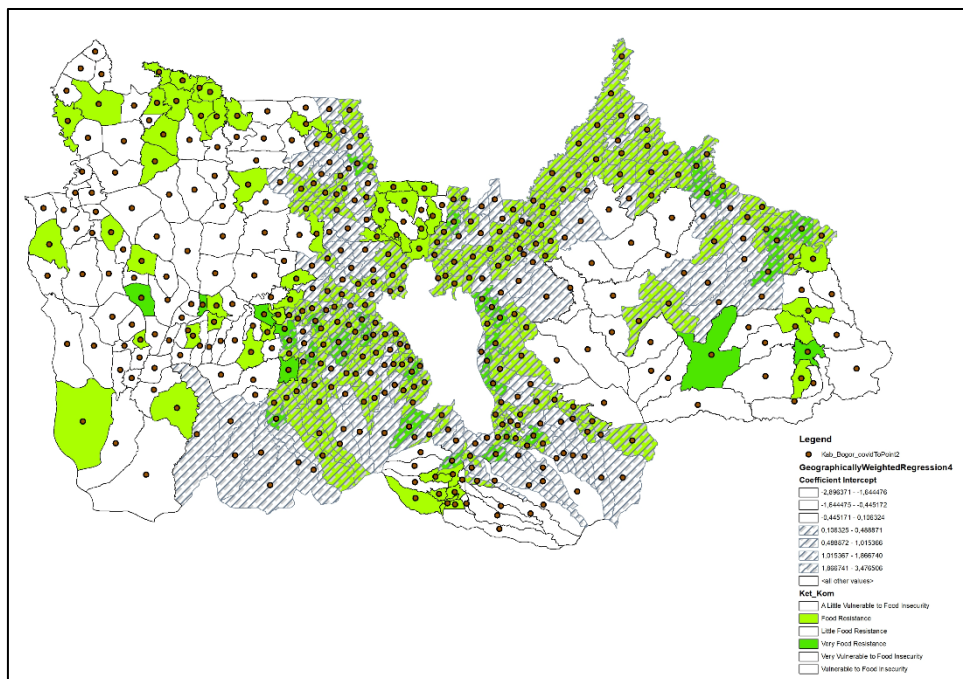
Figure 10. The Effect of Food Security on COVID-19 Cases in Bogor Regency

Source: Analysis Results 2022

Table 1. Food security index indicators

Variable	Elasticity	GWR Model		
		Min.	Average	Max
Intercept	-	57,731	58,315	59,935
Food Security Index (X_1)	-0,010	0,722	0,861	0,957
N				428
R ²				95,83
AIC				85,57
SSE				19,71
P Value Leung test				0,01

Source: Analysis Results 2022

**Figure 11.** Overlay of Food Security Villages in Urban Areas with Increased Village COVID-19 Positive Cases

Source: Analysis Results 2022

Medium-density urban, trade infrastructure, business centers, and universal facilities in Bogor Regency. Numerous economic activities, safe transportation, the development of horizontal habitation, and small-scale office construction are present. Urban areas are prone to virus transmission due to high population density, dense transportation, and intense social interactions. Interactions and contributions from workers are driven by inadequate health infrastructure, limited access to public spaces, and economic needs. Space constraints and slow access to health services also exacerbate the condition. Community resilience to the pandemic is also undermined by the unequal distribution of daily necessities and health services. Overcrowding, economic diversity and reduced social capital are the reasons why cities are less resilient to pandemics (Glaeser, 2022).

Systematic efforts are needed to build cities that are more resilient to future pandemics with various policy instruments and programs, such as food supply systems and warehousing management (Amirzadeh et al, 2023). However, there are positive things from the Covid-19 pandemic phenomenon, where the emergence of the Urban Community Resilience Initiative is able to help each other in facing the pandemic (Zang & Wan, 2023).

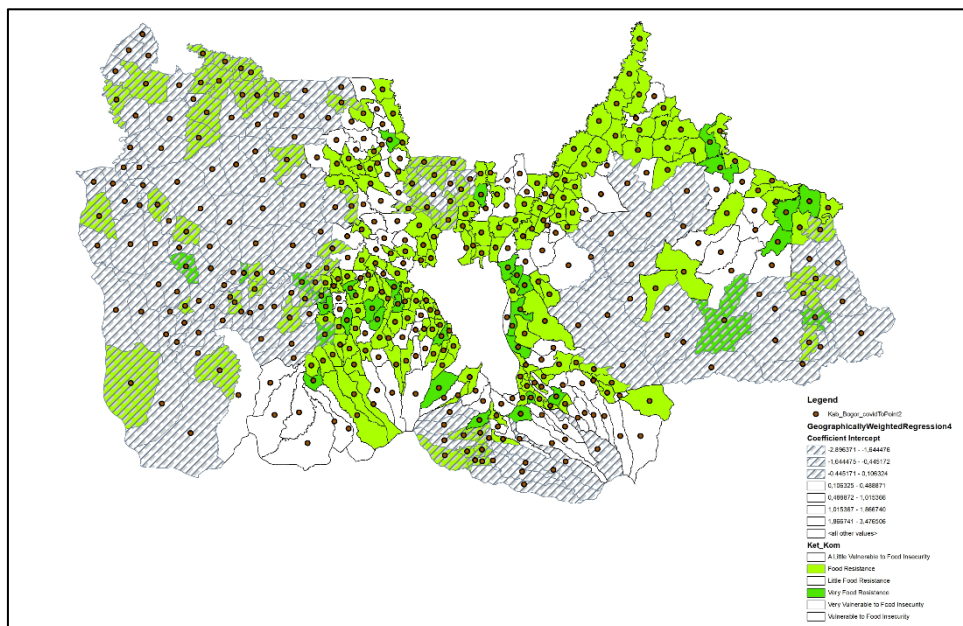


Figure 12. Overlay of Food Security Villages in Rural Areas with Increased Village COVID-19 Positive Cases

Source: Analysis Results 2022

There are interesting findings from this study, namely the paradox of the effect of food security on the spread of positive cases of COVID-19. The urban area of Bogor Regency, which is located in the central part and extends from south to north, mostly has a very food insecure status, which has a positive impact on increasing cases of COVID-19. Due to several factors, Urban Areas are becoming more rent-avid concerning positive COVID-19 results. In comparison to rural areas, urban areas have a more robust population density. This makes spreading viruses more straightforward due to more robust social interactions. Compared to the area where the countryside is located, the population of the urban region is becoming more active and mobile. This causes viruses to spread more easily from one location to another. People tend to gather in public places, such as city parks or shopping centres, as urban areas lack green open space. Although there are more health facilities in urban areas than rural areas, access to these facilities is not always difficult. Some rural areas may have more restricted access to healthy facilities, especially for the less capable population. A few of the urban population, who may not be very happy, will likely engage in social dialogue and adhere to necessary health-related protocols. This could hinder the spread of viruses.

Discussions

On the other hand, rural areas with food security status, which cluster in the eastern and southwest regions, have an impact in the form of holding back or even reducing the risk of a positive case of COVID-19. This condition is known because most areas in the southwest cluster of economic activity are dominated by primary agricultural cultivation. The agricultural sector in production centres is a sector that has high resilience to the COVID-19 pandemic (Clapp, 2017; Clapp & Isakson, 2018; Clapp & Moseley, 2020). This phenomenon is reinforced by Hobbs (2020), who states that initially the food supply chain was quite disrupted due to social restrictions, but quickly adjusted and became the backbone of the global economy during a pandemic. Food system resilience in primary food producing areas is relatively only disturbed in the short term, but the systemic damage to food supply is very small (Orden, 2020; Brewin, 2020; Weersink et al., 2020; Hailu, 2020).

The COVID-19 pandemic is already a dramatic event that most people have never imagined today. The pandemic has tremendously affected the business cycle and various community habits, including food security at the village level. Deaton & Deaton (2020) identify the emergence of food insecurity caused by the effects of COVID-19 on income and health. Long-term food availability will depend on the impacts of COVID-19 on health, trade, transport and financial stability in the agricultural sector. Cranfield (2020) provides consumer responses to COVID-19 around preferences, household budgets, prices, individual and household characteristics, and where and how people shop. In times of pandemics, bylaws demonstrate the importance of understanding the effects of income and costs and the opportunities for times when routine routines are disrupted by working from home, closing schools and closing non-essential services.

Economic activities, which are dominated mainly by crowd activity, such as tourism services, trade services, shopping centres, and manufacturing plants in the central, northern and eastern clusters, have been severely affected by the COVID-19 pandemic. The policy of limiting social and economic activities has led to a decline in turnover in the trade and services sector, particularly secondary products. Countries worldwide have implemented several protective measures to contain the increasing spread. These include shunning social activities, avoiding unnecessary travel, and church restrictions (Ishiwatari et al., 2020). Most people prefer to hold back their choice of consuming secondary goods and prefer to spend on essential goods. As a result, the industry producing secondary goods has become a regional economic sector struck by the COVID-19 pandemic. There have been many adjustments in working hours, resulting in reduced working hours and reduced labour in the secondary goods industry sectors. The central, northern and eastern cluster areas are the areas most affected by food security conditions at the village level due to the emergence of the COVID-19 pandemic. Even until the new normal conditions are achieved, it will still be unable to rise from the downturn in the region's real economy.

The slow ability of the manufacturing sector certainly requires innovation in the form of a migration of the marketing system that was previously face-to-face-oriented, shifting to online purchases (Goddard, 2020; Lawley, 2020). In the nearly one year since the first COVID-19 case was discovered in Wuhan, there has been a change in the structure of demand for preferences for goods as a result of the implications of income and time constraints, as well as the effect of changing prices. This condition is different from the trade in agricultural products, which will not be significantly affected because it is isolated by a low relative value to income elasticity (Barichello, 2020; Cranfield, 2020; Deaton & Deaton, 2020; Ker & Cardwell, 2020). Future regional economic policies need to encourage economic

recovery with a collaborative spirit that is labour-intensive in nature, required by humankind to defeat the threat of this pandemic. Regarding food security, regional financial incentives need to be concentrated on areas with groups that are vulnerable and affected by food insecurity.

In its journey, food security from the pillar of food affordability has affected the village-scale COVID-19 pandemic. Several villages in Bogor Regency, whose economic activities are dominated by secondary services and processing industries, have experienced an increase in positive cases of COVID-19. The increase in the positive number of COVID-19 has also increased the unemployment rate in Bogor Regency. It was recorded that the unemployment rate in Bogor Regency increased quite significantly during the pandemic, where in 2019, there were as many as 9.06% to 14.29% in 2020. There was a wave of layoffs in industrial areas spread across the central, northern and western regions of Bogor Regency. McKibbin & Fernando (2020) state that this pandemic has severely impacted people in the poorest and most vulnerable segments. The poorest and most vulnerable populations have fewer resources to cope with lost jobs and incomes, rising food prices, and instability in food availability; therefore, they have a lower ability to adapt to the crisis caused by the global COVID-19 pandemic. Omer & Hassen (2020) also mentioned that the COVID-19 pandemic affects the socio-economy of the community and especially threatens agriculture and food security for people in developing countries.

The key to solving the problem of increasing positive cases of COVID-19 in villages is how the Indonesian government responds to anticipating the COVID-19 pandemic by taking several preventive steps such as limiting social mobility at the pandemic's epicentre, regional quarantine, creating awareness, social protection to minimise the dangers of a pandemic, and ensuring availability, affordability, and utilisation of quality healthy food. On the one hand, this policy is considered capable of suppressing the spread of positive cases of COVID-19. Still, on the other hand, it creates deep economic problems such as increased unemployment, decreased trade and business turnover, and the emergence of criminal issues. Finally, a relaxation policy was implemented to provide space to re-run the business by reopening trade and previously closed services. Trade services for meeting basic needs are still open to support the community's survival. The government must ensure a food supply chain, a complex network of interactions involving farmers, agricultural inputs, processing plants, shipping, retailers and more for rural communities. Second, the support of small farmers is needed to increase the productivity and market for the food they produce, also through e-commerce channels. Third, introduce a stimulus package that does not have incentives for farmers in the village.

Fourth, ensuring the safety of workers in the agricultural sector and its derivative industries. Finally, medium and long-term planning is needed to rebalance and energise the regional economy after this crisis. A broad socio-economic development plan, including a multi-sector and ecosystem plan encourages entrepreneurship, is also needed so that communities at the village level become more resilient and the development of sustainable business models in the new normal era can develop (Bartik et al., 2020; Nicola et al., 2020; Smith & Wesselbaum, 2020; Mottaleb et al., 2020; Fernandes, 2020).

Conclusion

The issue of food security rolled like a snowball during the emergence of the global COVID-19 pandemic. Many parties are worried that food insecurity and a

food crisis will occur at the end of 2020. The agricultural sector has adaptive resilience to changes due to the pandemic and can quickly rise to become the primary support for the economies of various countries, including Indonesia. Food security from the aspect of food availability is relatively less negatively affected by the COVID-19 pandemic, but the elements of food affordability and food utilisation are some of the issues that have recently emerged, and the impact is relatively heavier. Social restrictions and a reduction in working hours are among the triggers that lead to wage adjustments, and the worst is the reduction in the number of workers in the non-food and secondary sectors. The village-scale area of the central-north-east Bogor Regency, which has a non-food and secondary service economic cluster, is an area that the prolonged pandemic has hard hit. Much unemployment appears in this region, which further threatens the status of village food security from the affordability and utilisation of food. Further food development policies need to pay attention to the context of the emergence of food insecurity clusters at the village level due to the COVID-19 pandemic.

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