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**AN ANALYSIS ON THE IMPACT OF THE COVID-19 PANDEMIC ON AGRICULTURAL SECTOR IN ACHIEVING FOOD PRODUCTIVITY AND SECURITY IN THE PHILIPPINES**

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**Abstract**— The COVID-19 pandemic threatens global political, economic, and food security. All efforts to stop the virus spread are likely to have a significant impact on the agricultural supply chain at all levels. Despite being the lowest contributor to the country's gross domestic product (GDP), the agricultural sector has been adversely affected, particularly the flow of agricultural commodity, supply and demand. There is still a food shortage, despite the government's efforts to stabilize the sector. In this paper, the researcher investigated the impact of COVID-19 on food security in the Philippines by responding to two main research questions: (1) What was the state of food security in the Philippines during the COVID-19 pandemic? and, (2) How will COVID-19 affect agriculture, food prices, and agricultural production and consumption in the Philippines? The findings of the study revealed that putting in place all precautionary and safety measures, such as strict restrictions, quarantine protocols, and mobility restrictions, has a potential negative impact on the country's food security. Despite the country's vast and fertile land, the agriculture sector in the Philippines appears to be faltering. Around one-third of the worker force is employed in agriculture. This paper argued that more sophisticated machinery should be developed to replace the numerous gaps in the Philippines' diminishing food supply, notably in agricultural commodities. Furthermore, because agricultural workers make up a small percentage of the workforce, increasing the sector's growth will result in inclusive growth. In addition, close collaboration with relevant in-country agencies helps in aligning commodity selection with research and development priorities, is very important.

**Keywords**— **Agricultural sector, COVID-19 pandemic, food security, supply chain, sustainability**

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## INTRODUCTION

The COVID-19 virus has infected nearly 300 million people and claimed the lives of over 4.3 million people worldwide, forcing many governments to implement a series of lockdowns to control the spread of the virus (Nicola et al., 2020). The pandemic causes the worst global economic downturn since the Great Depression, resulting in a loss of USD 12.5 trillion in cumulative output (Barua & Barua, 2021). These figures continue to rise, indicating that slowdowns and downturns in global economic stability have resulted in job and income losses and other disruptions. The pandemic almost certainly resulted in negative economic growth, shaky healthcare support, and a food system crisis. Furthermore, the impact of the COVID-19 pandemic extended beyond the health and economic sectors, including the food systems. These fears of unforeseeable consequences contribute to an increase in food insecurity among the most vulnerable populations, including women, low-wage earners, and informal workers, as well as youth, children, and people with disabilities (Boyac-Gündüz et al., 2021; Kansime et al., 2021).

COVID-19 cases and confirmed deaths in the Philippines increased during the pandemic in 2020, but have since decreased due to government immunization efforts towards the end of 2021 (WHO, 2021). Metro Manila, which has a population of approximately 13 million Filipinos, came in top place in the data ranking. As of this writing, it has nearly 900,000 cases out of a total of 3.67 million in the country. The first confirmed local transmission occurred on March 7, 2020. A week later, the national government imposed a community quarantine to stop the virus from spreading further (Salva et al., 2020). These include the two-month-long Luzon-wide enhanced community quarantine (ECQ). Many Filipinos, regardless of economic status, waited in long lines during the quarantine

period to buy and stockpile as much food as possible, fearing a food crisis. During the pandemic, the increasing demand for food, particularly agricultural products, was unable to keep up with the declining food supply. This situation reflects the rising cost of various commodities. The COVID-19 pandemic has had a significant impact on food systems and agriculture, threatening the food security of billions of people worldwide (FAO, 2020; Zurayk, 2020). Those with limited mobility, low purchasing power, and high vulnerability have a significant impact on food demand and food insecurity.

As a result, governments are taking more comprehensive and effective measures to meet local and global food demand (Fei et al., 2020). Because of the pandemic, health, economic and food security was a major concern due to food demand and agriculture supply shortage (Cho et al., 2021; Dancel, 2021). While much study has been conducted to assess the impacts of COVID-19 on the food system and agriculture, relatively few studies have been published to determine its impact on the food chain and food security (Siche, 2020). Thus, this is the main goal of this paper, to assess the impact of COVID-19 on food security in the Philippines. Furthermore, this paper investigated the state of food security in the country prior to COVID-19, with a focus on the impact of the pandemic on agricultural production and consumption. Finally, this paper makes some recommendations to improve food security in the Philippines. To achieve this goal, data from the Food and Agriculture Organization (FAO), the World Health Organization (WHO), Department of Agriculture (DA), and the Philippine Statistics Authority (PSA) were assessed and analyzed.

## METHODOLOGY

The researcher used a qualitative research methodology to assess the impact of COVID-19 on food security in

the Philippines by answering the two main research questions: (1) What was the state of food security in the Philippines prior to COVID-19, and (2) What effect did it have on food demand and agricultural production and consumption? This paper examined a time series of data on the state of the Philippine economy before the pandemic to answer the first research question. To help explain the information gathered, these data were supplemented with narrative analysis and a literature review. The researcher relied on the underlying framework that "food security exists when all people have physical and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life at all times." To answer the second research question, the researcher used a supply chain approach to collect data on the Philippine agricultural sector and agricultural production and consumption. To achieve the study's overall goal, data were analyzed and explained using existing literature such as published research, journals, and articles.

## RESULTS AND DISCUSSION

From 2010 to 2019, the Philippines saw consistent economic growth (World Bank, 2021). This upward trajectory in the country's economy positions is to become more food secure until COVID-19 occurs in 2020. As a result, all sectors of the economy incur significant negative consequences as a result of government regulations such as community quarantines and lockdowns. As a result, a consumption pattern was formed as the pandemic restrictions remain. Since the movement of the people is limited, it led to the decrease consumers, purchases and demand while closure of several business operations resulted to the increase of unemployment rate, decline of income and limited food access (Aday & Aday, 2020). In addition, there is a clear increase in the percentage of individuals and families who are suffering from intensive hunger and

malnourishment due to the decrease in the food supply, especially agricultural products (Joshi, 2020). The increase of food prices has a major impact on the living standards of low-income households. Unemployment status and rising food prices have increased the risk of food insecurity to many Filipinos. People prefer cheap basic foods like noodles and canned products over expensive fruits and vegetables.

The Philippine agricultural output dropped by 1.7% for the entire 2021. The agricultural production grew 0.6% during the fourth quarter, but this was not enough to offset the dismal figures recorded in the previous quarters. The first quarter registered -3.3%, while the second and third quarters posted -1.5% and -2.6%, respectively. However, the fourth quarter could have been better, if not for Typhoon Odette, which damaged P13.3 billion worth of goods (PSA, 2021). The 2021 full-year figure is lower than the -1.2% in 2020 which far from the 2% target set by the government (Villaronte et al., 2022)

During the pre-COVID-19 years, the world had made significant progress in eradicating poverty. However, years of progress against global poverty and income inequality have been undone by the pandemic (Olinto et al., 2013; Fenner & Cernev, 2021). In the Philippines, the country's economy grew steadily and made progress in delivering inclusive growth, as evidenced by a decrease in poverty rates from 24.9 percent to 16.7 percent and a decrease in food insecurity from 9.1 percent to 5.2 percent. When COVID-19 arrived, the government implemented lockdowns, impeding the Philippine economy's recovery. This increased unemployment, poverty, hunger, and food insecurity (World Bank, 2021). In the Philippines, economic growth has been slowed by the pandemic, which has pushed an additional 2.7 million Filipinos into extreme poverty, on top of the country's GDP falling to a record low (de Vera, 2021).The series of lockdowns

have left several industries paralyzed which significantly impacted the poverty level in the country. Before the pandemic, the Philippine unemployment rate was around 5%, but it has now risen due to lockdown measures. The country's unemployment rate increased slightly to 6.6 percent in December 2021 from 6.5 percent in November 2021. The overall number of unemployed persons was at 3.27 million in December 2021, up 113 thousand from the 3.16 million reported in November 2021 (PSA, 2022). Despite the country's decreasing poverty rate, farmers and rural residents have had the highest poverty rates.

During the fourth quarter of 2020, the Philippines' gross domestic product (GDP) grew by 8.3%, resulting in a full-year growth rate of -9.5 percent. The COVID-19 pandemic did indeed cripple the Philippine economy slowing the country's economic growth (PSA, 2021).

### **The Philippine Agricultural Consumption and Production**

Food is a fundamental human right. Despite this, one in every nine people, or 805 million people, goes hungry daily (FAO, 2014). To live a healthy and active life, everyone must have constant access to sufficient, safe, and nutritious food (Pinstrup-Andersen, 2009). Food insecurity, on the other hand, can be brought on by a change in employment status, conflict, or an increase in food prices. Because they spend more on food, the poor are the most vulnerable during price increases. (Hendrix & Brinkman, 2013). In contrast, the COVID-19 pandemic increased global food insecurity. Income declines and the inability of millions of people, particularly the poor, to afford healthy diets aggravates the problem (Barrett, 2021). Food shortages caused by disruptions in marketing, logistics, and trading systems, as well as labor shortages, have the potential to increase hunger and malnutrition. Between 83 and 132 million people will be added to the world's

undernourished population of 690 million. As a result of the pandemic, acute malnutrition has risen by 14.3%, or 6.7 million children, in the world (Ntambara & Chu, 2021). These food insecurity statistics are undoing many countries' year-long development gains. COVID-19 exacerbated global food insecurity and harmed the vulnerable agricultural sector. Since January 2020, maize and rice prices have risen by 43% and 10%, respectively. The high demand for these two agricultural commodities is linked to supply disruptions caused by COVID-19. To put it another way, rising retail prices and declining incomes force more families, particularly low and middle-income families, to reduce their food consumption. In addition to perishable food losses, consumers are switching to cheaper food items. Farmers who are hungry may prefer to eat seeds rather than plant seeds because of current food insecurity caused by shortages, supply disruptions, inflation, and labor shortages, which increase the risk of food shortages.

### **The COVID-19 and the Issue of Food Security in the Local Economy and Agricultural Sector**

The series of lockdowns in the country had a significant and direct impact on the local economy. The government's quarantine measures forced the closure of the country's busiest shopping malls, dealing a significant blow to the country's 330 billion economies (Venzon 2020). Because of the pandemic's effects, regional economic growth in developing Asia is expected to fall sharply from 5.1 percent in 2019 to 0.4 percent in 2020. Despite this, regional economic growth is expected to rebound by 6.8 percent in 2021 (World Bank, 2020; ADB, 2020; Shinozaki & Rao, 2021). And, if the pandemic continues, the country's economic damage will grow exponentially, costing at least P150 billion due to a drop in household consumption. The pandemic, on the other hand, could cost the Philippines between P276.3 billion and P2.5 trillion

in economic losses (Abrigo et al., 2020). Manufacturing could lose between P82.1 billion and P855.2 billion; wholesale and retail trade could lose between P93.2 billion and P724.8 billion; and transportation/communication could lose between P11.7 billion and P124.3 billion. These can be attributed to the market’s additional closing floor trading measures, which have hampered commodity exchangeability. Overall, the food supply chain shows the linkage between supply and demand in an agricultural food system (Nicola et al., 2020; Gregorio & Ancog, 2020).

Agriculture continues to play a significant role in boosting economic growth. It remains a major driver of development, particularly in terms of poverty reduction and food security. The Philippines is undeniably an agricultural country, with rice serving as the country’s staple food. It’s no surprise that Filipinos rely heavily on the domestic agri-food system. Filipinos consume a greater proportion of lowland crops than highland crops. Cassava is the main crop in Basilan, while vegetables and bananas are grown and mostly consumed in Mindanao (Boquet, 2017). 2020 was a difficult year for Filipino farmers. Before COVID-19, the country was plagued by typhoons, pests, and the Taal volcano eruption (DA, 2020). Agriculture contributes little to the Philippine GDP (Madayag, 2021). It was 12.9% in 2012 and 9.2% in 2019. Agriculture’s annual growth rate is negligible compared to overall GDP growth, at 1.7 percent. True, agriculture accounts for a small portion of the Philippine economy, but it has a higher poverty rate than other sectors (PSA, 2020).

Agriculture is the primary means of subsistence in the majority of Southeast Asia’s countries (Hossain, 2020). Agricultural production has increased in general in the region. However, the COVID-19 pandemic forced the Southeast Asian region to prioritize keeping food supply lines open (domestic and imported), ensuring farmers have access to inputs and services needed

to prepare for the next harvest, and preventing primary producers and workers from losing income due to protective measures (Gregorio & Ancog, 2020). The government’s emergency response to improve food movement, trucking, and marketing has benefited both farmers and consumers, allowing potential food supply chain disruptions to be effectively managed. Because the country is rich in natural resources, it is critical to the economy.

**Table 1.** Philippine Annual Production of Selected Major Crops, Metric Tons (2016-2020).

Crops	2016	2017	2018	2019	2020
Palay	17,627,245	19,276,347	19,066,094	18,814,827	19,294,855
Corn	7,218,817	7,914,908	7,771,919	7,978,845	8,118,545
Banana	8,903,684	9,166,334	9,358,785	9,157,676	9,056,149
Camote	529,472	537,303	525,634	525,862	546,891

Source: Philippine Statistics Authority

Among the four crops examined, palay continues to be the most widely grown in the Philippines. Despite the increase in crop production, COVID-19 affects the delivery of crops—primarily fruits and vegetables—to the market due to the country’s lockdown. Based on the volume of selected major crops produced for the entire year of 2020 in the Philippines, palay ranked first with an amount of 19,294.86, the amount of corn produced was 8,118.55, the amount of banana produced was 9,056.15, and the amount of camote produced was 546.89. Except for the banana, which fell 101.53 thousand metric tons short of the previous year’s output, all the selected crops exceeded the volume of the previous year.

In 2020, the Philippines produced approximately 19.29 million metric tons of palay. Rice (which comes from palay) is a staple food in the Philippines. Palay (which has shown a positive trend over the last five years, from 2016 to 2020). In 2019, however, palay production fell. Palay production increased at an average annual rate of 2.4 percent over the last five years (2016–2020), from 17.63 million metric tons

in 2016 to 19.29 million metric tons in 2020. The palay output in 2020 was higher than the previous year's level of 18.81 million metric tons. In 2020, 75% of total palay output came from irrigated areas, with the remainder coming from rain-soaked areas.

With 3.64 million metric tons, or 18.8 percent of the country's palay production output in 2020, Central Luzon remained the country's leading palay producer. Cagayan Valley (13.7 percent), Western Visayas (11.9 percent), Ilocos Region (9.9 percent), and Bicol Region (6.7 percent) were the other top producers of palay (PSA, 2021). In 2007, the Philippines, which was previously self-sufficient in rice, was the world's largest importer. Rapid urbanization has resulted in the loss of approximately half of all irrigated land in the country. Imports from neighboring Southeast Asian countries, primarily Thailand and Vietnam, have aided in resolving the country's rice shortage (Tibao, 2009).

Corn output increased at a 3.1 percent annual rate from 2016 to 2020, rising from 7.22 million metric tons in 2016 to 8.12 million metric tons in 2020. Harvested area increased at 0.7 percent annual rate, rising from 2.48 million hectares in 2016 to 2.55 million hectares in 2020. Corn output increased by 1.8 percent in 2020, rising from 7.98 million metric tons in 2016. Yellow corn accounted for 74.0 percent of total corn production, with white corn accounting for the remaining 26.0 percent. In 2020, the Cagayan Valley produced the most corn, accounting for 1.86 million metric tons, or 22.9 percent of total production. Northern Mindanao came in second with 16.5 percent, followed by the Autonomous Region of Muslim Mindanao (ARMM) with 14.0 percent, SOCCSKSARGEN with 13.7 percent, and the Ilocos Region with 6.9 percent. These regions produced 74.0 percent of the country's total corn production.

Corn has a 1.8 percent growth rate from

2019 to 2020, bananas have a -1.1 percent growth rate, and camote has a 4.0 percent growth rate. Corn production is increasing steadily, with a 2.7 percent increase in 2019 over the previous year. Valley remains the country's leading corn-producing region. Corn is primarily grown in the ARMM, Northern Mindanao, SOCCSKSARGEN, and Cagayan Valley.

Farmers continue to harvest and plant crops to feed the Filipino people despite the pandemic. Following the devastation caused by numerous typhoons in the country, the banana industry is on the mend. It fell in 2013 due to Typhoon Pablo and fell again in 2016 due to other typhoons that caused flooding, affecting banana production. Banana output increased to 9.06 million metric tons in 2020, up from 8.90 million metric tons in 2016. It has increased at an average annual rate of 0.4 percent over the last five years. Similarly, the planted area and the area of banana bearing hills grew at annual rates of 0.5 percent and 0.1 percent, respectively.

Banana production in the country in 2020 was 9.06 million metric tons, a -1.1 percent decrease from 9.16 million metric tons in 2019. In contrast, the planted area increased by 0.5 percent during this time period to 451.18 thousand hectares, up from 449.03 thousand hectares in 2019. The Davao Region continued to be the leading banana producer in 2020, producing 3.35 million metric tons, or 37.0 percent of total output. Northern Mindanao and SOCCSKSARGEN came in second with 3.13 million metric tons, accounting for 34.5 percent of total output.

Finally, camote (sweet potato) consistently produces over 500,000 pounds per year. Sweet potato production increased at a 0.8 percent annual rate from 2016 to 2020, while harvested area decreased at a -0.3 percent annual rate. Sweet potato production is expected to reach 546.89 million metric tons in 2020. This represented

a 4.0 percent increase over the 525,862 thousand metric tons produced in 2019. Harvested area increased by 0.4 percent to 83.69 thousand hectares, up from 83.34 thousand hectares in 2019. Eastern Visayas remained the country's leading producer of camote with 101.37 thousand metric tons, contributing 18.5 percent of the country's total output in 2020. The other major producing regions were the Bicol Region (16.7%) and Central Luzon (10.1%).

The pandemic has put the agricultural sector to the test. The closure of shopping malls resulted in a 20% drop in agricultural commodities (Mouloudj et al., 2020). According to the UN World Food Program, an estimated 265 million people will face severe food insecurity by the end of 2020. As a result, food producers will suffer massive losses on perishable and nutritious food as buyers become more selective and traders stop dealing with farmers (Vandevijvere et al., 2021). The Covid-19 has undoubtedly had a significant impact on agricultural production levels and labor shortages. Because of the massive human labor required in agriculture in these countries, developing economies, such as the Philippines, are particularly vulnerable to the pandemic's adverse effects (Mouloudj et al., 2020). Though the agriculture sector in the Philippines contributes less to the country's GDP than its counterparts, the manufacturing and services sectors, agriculture, without a doubt, can cripple the economy. On the other hand, the agriculture sector makes a significant contribution to the Philippine economy's survival during the pandemic. During the Covid-19 pandemic, agriculture ranked fourth (5.5%), behind manufacturing (31.9%), wholesale and retail trade, including motor vehicle and motorcycle repair (24.9%), and accommodation and food service activities (24.9%). When compared to pre-pandemic data on the importance of the identified sectors, agriculture ranked last (ranked 13) with a 0.9 percent share of the economy

(ADB, 2021; PSA, 2021).

### **Growing Threats to Food Security Due to the COVID-19 Pandemic**

While the COVID-19 health crisis has not resulted in a full-fledged food crisis, disruptions in upstream food supply chains (planting, crop management, harvesting, and marketing) have been widely reported in the Philippines. This effect is especially severe in supply chains for perishable foods such as fresh fruits and vegetables, meat, and fish, putting diet quality at risk. In other words, the pandemic has increased the Filipinos' food security risks.

Furthermore, disruptions in domestic and international food supply chains caused by rising health risks that resulted in major travel restrictions have harmed food availability and accessibility. Upstream food supply chain disruptions have resulted from mobility restrictions and worker illnesses during planting and harvesting, as well as hampered operations in processing, trucking, logistics, and trading. Job and income losses are also reducing food consumption, putting vulnerable groups at risk of hunger and malnutrition. Basic food handouts are frequently insufficient to meet the nutritional needs of children and pregnant women (ADB, 2020). As the number of confirmed cases in the country grew rapidly, the government imposed a strict lockdown and community quarantine, preventing local and migrant workers from entering farms, processing plants, and packaging plants, many of which were already closed due to quarantine and sick workers. As a result, access to farm inputs became more difficult, potentially affecting labor-intensive food crops like fruits, vegetables, dairy products, and meat processing. Ports are also congested due to a lack of workers and transportation to clear cargo, making refrigerated storage for fresh foods unavailable. On the other hand, land transportation to and from ports is insufficient, causing perishable food to

spoil and thus increasing food waste. Food prices have risen significantly because of pandemic-related production and distribution issues, as well as panic buying (ADB, 2021).

The pandemic has had a significant impact on household food consumption through changes in household income and mobility to grocery stores, restaurants, and other retail food stores. As a result of job losses and reduced working hours, household incomes have fallen. Lockdowns and restrictive stay-at-home policies also limit access to a variety of adequate and nutritious food sources, particularly in Metro Manila, which has been hit particularly hard. As a result of the pandemic's impact on food, citizens panic bought and hoarded, driving up the prices of certain staple foods. Agriculture supply chain disruptions, on the other hand, disproportionately affect vulnerable households, such as smallholder farmers and small businesses in the food service industries, as well as informal workers who are more likely to be laid off.

The effects of the COVID-19 Pandemic on the Philippine food supply chain were comparable to those observed by the ADB in 2020. According to the Asian Development Bank, the series of lockdowns had an impact on the food supply chain. These effects are visible in both supply and demand. Lockdowns resulted in labor shortages due to mobility, closure of manufacturing facilities, increased food waste due to limited or no refrigerated storage, and capital investment delays. As a result, job losses, panic buying and hoarding, limited access to food, and undernutrition among the most vulnerable and marginalized groups have occurred (ADB, 2020).

### **CONCLUSIONS AND RECOMMENDATIONS**

The global food system has survived the COVID-19 pandemic. The supply-chain approach used in the assessment allowed

us to look at production constraints and vulnerabilities, as well as critical disruptions in food demand and consumption. The Philippine economy has been growing steadily over the last decade. This indicates the country was gaining food security at the time. People's mobility became limited as a result of the pandemic's severe restrictions and lockdowns. It is assumed that a labor shortage will occur, even if only for a short time, and in the case of COVID-19, there is clear evidence of its negative impact on the workforce. Approximately 2 million workers in over 83,000 businesses were impacted by temporary business closures in August 2020, whereas 1.2 million were impacted by flexible work arrangements in over 28,000 businesses while around 171,000 people lost their jobs in 9,000 businesses nationwide (ILO 2020; Bertulfo, 2020). As a result, the productivity and security of the food and service industries have been shown to be significantly impacted. The study also found that rising food prices have a significant impact on the living standards of low-income households. Many Filipinos are at risk of food insecurity because of their unemployment status and rising food prices. People would rather buy cheap staple foods than expensive agriculture products. People's demands continue to shift to the right and rise as supply suffers from higher costs and waste. As the poor lose work due to the coronavirus outbreak, soaring prices destroy them. Inflation for the lower 30% of families was greater at the start of the pandemic in 2020, while in October of the same year, it was 2.9 percent. This analysis implies the threats regarding food productivity and sustainability and food security in the country

As an agricultural country, the Philippines needs to develop innovative machinery to replace the gaps in the dwindling food supply, notably crops. Engagement with appropriate in-country agencies could also help connect commodity choices with R&D priorities and national nutrition aims. This



**Table 2.** Food Prices in Metro Manila (January - October 2020).

Food Prices in Metro Manila (Jan. - Oct. 2020)				
	RICE	MEAT	FISH	VEGETABLES
January	-4.1	1.5	11.2	2.4
February	-4.1	1.3	9.6	7.9
March	-3.4	0.5	11.6	5.6
April	-2.4	0.5	9.9	4.3
May	-1.4	0.7	6.8	2.5
June	-0.9	5.8	4	-0.6
July	-0.1	8.8	2.6	-5.1
August	0.6	6.7	2	-2.4
September	1.6	6.5	1.7	-7.5
October	1.9	16.3	4.1	-1.8

Source: *Philippine Statistics Authority*

paper also suggests developing innovative technology to address gaps created by the lack of labor during the pandemic and a more flexible regulatory framework among trading partners to maintain market and public safety and provides a multi-functional dispatching model for the agricultural market based on economic and supply issues. In the current severe situation, government must examine and promote faster and better agricultural development and improve the overall strength and quality of the agricultural product industry chain. Finally, the food production should follow the 21st century generational trend of building an ecological economy in a new field and improving complete integration of agriculture and digital technology. Finally, future scholars may try using quantitative methods and data analysis to assess the influence of the COVID-19 pandemic on food security before and after the epidemic pandemic in the Philippines which might help them compare and contrast variables and create outcomes that may contribute to their study's overall findings.

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