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## COVID-19, Domestic Agricultural Supply Chains and Food Security: The Case of Fiji<sup>1</sup>

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### Abstract

In this paper the impact of COVID-19 on domestic agricultural supply chains in Fiji is studied using the Sigatoka Valley (the main vegetable production centre of Fiji) and the municipal market in Sigatoka town as a case study. A survey of farmers and markets vendors was carried out to collect data to map out key impacts (and challenges) faced by farmers and vendors in either producing or sourcing produce for sale to customers. Analysis of survey data reveals that the COVID-19 pandemic has delivered shocks to both the supply and the demand side of the agricultural supply chain. Policy implications are also discussed.

**Keywords:** Fiji; horticulture; supply chain; farmers; market vendors

### Introduction

Despite the gradual intersectoral move from agriculture to service, poverty remains high in many Pacific Island Countries (PICs) as relocation of the labour from agriculture to manufacturing has resulted in rural poverty being replaced by urban poverty. While there is increasing rural to urban migration, the majority of the population still live in rural areas and are connected to agriculture. The agriculture sector is thus important to all countries in the region but faces increasing threats from climate change and diseases impacting plants and livestock. Sustainable land use for agriculture will be necessary towards conservation and sustainable use of natural capital. The policy challenge is to be able to encourage the production of primary products and, where possible, export of niche commodities contributing to economic diversification.

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Similar to other PICs, agriculture in Fiji mostly relies on smallholder farms. The supply of locally grown perishable produce from farms to households is core to the overall food supply chain, which includes production, processing, distribution and consumption. Smallholder farms generally produce a mixture of root crops, vegetables, fruits and livestock for household consumption. The surplus is sold in local and export markets. Locally produced agricultural produce thus plays an essential role in the economy of PICs through income generation, food security and nutrition. Apart from imported product supply chains, the domestic supply chains for locally grown perishable produces such as vegetables, root crops and fruits have also been impacted in many countries due to COVID-19 related restrictions - health and safety restrictions such as lockdowns and overnight curfews (FAO, 2020a). The production disruptions and higher transport costs resulting from the pandemic have made supply chains more expensive. For instance, during the lockdown periods in Fiji, market vendors from rural areas were unable to sell directly to consumers in urban centers due to movement restrictions. Most of the agricultural produce sold in urban areas is sourced from a large number of small farmers and supply chain shocks can have tangible social and economic consequences on these farmers (Underhill and Kumar, 2015). Apart from the impact of COVID-19 related restrictions, agricultural supply chains have been impacted by the closure of the tourism industry as the growth of the agricultural sector is linked to growth in non-agricultural sectors such as tourism and manufacturing. For instance, tourism's backward linkages with agriculture create the possibility that any condition that impedes growth in the tourism industry will impede growth in the agricultural sector. COVID-19 has caused a cascade of supply chain disruptions and such impacts could be repeated from global pandemics and extreme weather in the future.

In this paper the impact of COVID-19 restrictions on domestic agricultural supply chains in Fiji is studied by using the Sigatoka Valley (the main vegetable production center of Fiji) and the municipal market in Sigatoka town as a case study. The results of this study will help policy makers better understand the risk exposure of agricultural supply chains from external shocks and determine short- and long-term strategies to strengthen supply chains to mitigate future shocks. While production risk in agriculture due to weather variability and natural disasters is well known, the shocks arising from pandemics are seemingly more complex. Notwithstanding the type of shock, agricultural household food consumption and poverty levels are affected through an impact on household farming profits. A survey of farmers and market vendors was carried out to collect data to map out key challenges faced by farmers and vendors in either producing or sourcing produce for forward flow or selling.

According to the World Health Organisation Representative Office in Fiji (<https://www.who.int/fiji/>), Fiji recorded its first positive case of COVID-19 on 19 March 2020 but the community transmission was contained within one month. After almost one year without any community transmission, a positive case of a security worker in a border quarantine facility, detected on 17 April 2021, led to a series of community transmissions. As at the time of writing this paper (19 July 2021), there were 14,247 active COVID-19 cases – from a total of 18,298 positive cases since the first case was reported in March 2020. There were 113 deaths from COVID-19, with 111 of these during the second wave of transmission that started in April 2021. As part of the suppression strategy to contain the spread of the virus, an overnight curfew remained in force in July 2021. As a result, movement of people, business operations and transportation of merchandise were disrupted. These restrictions on movement have impacted farmers' ability to access municipal markets or reach consumers to sell produce. While lockdowns and travel restrictions arising due to containment zones help to stop the transmission of the virus, they also impact the distribution of food and other necessities. Moreover, market vendors have been impacted by requirements where customers have to observe physical distancing while queuing and buying, stalls have to be spaced further apart and disruptions arising from constant monitoring by local authorities regarding overcrowding. While this paper is based on a case study in just one area, the policy discourse can be extended to the broader Fijian economy since the agriculture sector mainly consists of smallholder farmers and includes vegetables, fruits, root crops, livestock production, fisheries and forestry.

The rest of the paper is organised as follows. The role and importance of agricultural supply chains is discussed next followed by a description of data collection methods. Then the impact of COVID-19 on locally grown agricultural supply chains is discussed. Policy implications are provided followed by conclusions.

### **Agricultural Supply Chains in Fiji**

A supply chain is regarded as an exchange arrangement that provides a forward flow of goods and services and a backward flow of money and information. It consists of a network of good or service suppliers, providers, consumers and other supporting units (Palang and Tippayawong, 2017). Large and complicated supply chains function by coordinating hundreds of contact points spread around a region and the world. While chain risks can vary across various types of supply chains, the focus of this paper is on macro risk. A macro risk is a broad external force that affects the entire supply chain such as natural disasters, political turmoil, health pandemics or regional economic crises.

Agricultural supply chains play a central role in feeding the world population as it involves connected steps to deliver food from the farm to the consumer. An agricultural supply chain thus incorporates input supply, production, postharvest storage, processing, marketing and distribution, food service, and consumption functions along the producer-to-consumer continuum for a given product, including the external enabling environment (Jaffee, Siegel and Andrews, 2010). Over the years, agricultural supply chains have been subjected to many demands and challenges and are consistently evolving to address the needs of distributors and consumers. These challenges include ethical and environmental issues such as climate change (Porter and Reay, 2016; Haverkort and Verhagen, 2008) and natural disasters (Reddy, Singh and Anbumozhi, 2016; Todo, Nakajima and Matous, 2015), and consumers' needs for natural and healthy food (De Fazio, 2016), traceability (Thakur and Hurburgh, 2009; Bosona and Gebresenbet, 2013), and food safety (Stringer and Hall, 2007; Hammoudi, Hoffmann and Surry, 2009). Furthermore, consumers increasingly demand complex sets of differentiated products. The dimensions of a food product's characteristics and its quality are significantly broader today compared to only a few years ago (Saitone and Sexton, 2017).

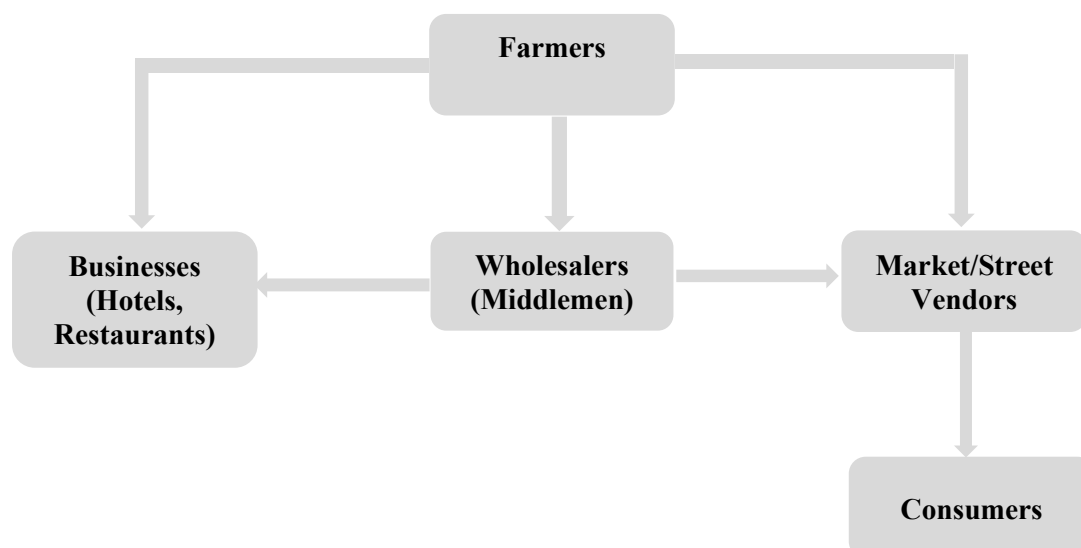
Given the importance of agricultural supply chains, the sustainability of supply chains is vital for food security. While short-run supply chains may be successful, long-term sustainability is much to be desired. Compared to other supply chains, an agricultural supply chain is more complex and difficult to manage because of the perishable nature of the produce flowing through it (Aung and Chang, 2014). The main reasons for a lack of sustainability include location, transport linkages and high costs, poor economies of scale, natural disasters, plant disease and market access barriers (McGregor and Stice, 2014). While some of the micro risk factors can usually be mitigated by the supply chain actors, macro risks need government interventions. One such macro risk to domestic supply chains has been the current COVID 19 pandemic. This type of health-related exogenous shock is not new. The world has witnessed several health epidemics such as the Spanish Flu, SARS (Severe Acute Respiratory Syndrome), MERS (Middle East Respiratory Syndrome), and Ebola. While COVID-19 is fundamentally a health pandemic, the transmission channels through which it impacts economies and households are multidimensional. The key impacts on supply chains have come from public health emergency measures including lockdowns, curfews, physical distancing, travel restrictions, and international border closures to prevent imported cases of the virus. In relation to agricultural supply chains, the shock from COVID-19 is being felt on two critical aspects: demand for, and supply of, food (FAO, 2020b).

Agriculture in Fiji has been largely dominated by sugarcane farming. Beyond sugarcane, the commercial agriculture sector mainly consists of smallholder farmers and the subsector includes crops (vegetables, fruits and root crops), livestock production, fisheries and forestry. The major crop

commodities include assorted vegetables, cassava, taro, rice, ginger, yaqona and coconut. In 2019, the agriculture sector (inclusive of sugarcane) accounted for 6.8 per cent of GDP with non-sugarcane agriculture contributing 5.9 per cent to total GDP. Compared to 2019, the total gross volume and value of agriculture production of crops and livestock increased by 5.6 per cent and 2.9 per cent, respectively, in 2020. Apart from meeting domestic demand, agriculture creates export opportunities. In 2020, while a decrease was recorded for total agricultural exports (inclusive of fisheries and forestry), the export of crops and livestock increased by 7.1 per cent (Ministry of Agriculture, 2020). Compared to 2019, export of fresh/chilled produce increased by 25.8 per cent by value in 2020. Key export markets for fresh/chilled produce include the United States, New Zealand, Australia and Pacific Island countries. In terms of imports, wheat, rice and potatoes were the leading crop import commodities. Wheat and rice are largely imported from Australia and Vietnam, respectively.

A depiction of the domestic agricultural supply chain in Fiji is shown in Figure 1. The supply chain consists of all parties involved directly. The municipal markets continue to be the primary location for consumers to buy fresh fruits and vegetables. Market vendors operating in municipal markets are a crucial link in domestic food systems in Fiji. They expand the supply chain of the food system to urban and suburban households. The markets thus also contribute to income generation and employment (Baxter, 2017). The produce arrives at the municipal markets through different supply chains. One value chain involves farmers, wholesalers (middlemen) and market vendors and the other value chain is exclusively a farmer who sells produce directly to consumers from the municipal markets (Kumar, Chand and Prasad, 2020). In addition, street vendors also play a role in the supply chain, especially in larger urban areas such as Suva and Nausori. Importantly, street vendors serve consumers who may not otherwise be willing or able to travel to the municipal markets. Policy regulating street vendors has been a challenge during the pandemic. Street vendors in many suburbs were cleared from the street and many would have been forced to shut down. This is problematic since, for many (particularly low-income) households, this is a major source of food supply. The main vegetable season in Fiji is from April to October, peaking in August to September. This season also overlaps with the cyclone and flooding in Fiji (November to April).

**Figure 1. Domestic Agricultural Supply Chain in Fiji**



### Survey Site and Data Collection

This survey was undertaken in Sigatoka municipal market and Sigatoka Valley - on the island of Viti Levu. Sigatoka Valley is the main vegetable growing area in Fiji. Given the importance of Sigatoka

Valley to the agricultural sector, the government has previously supported farmers in this area through project funding to improve drainage, roads and building new seedling facilities. Sigatoka is also one of Fiji's main destinations for foreign tourists. The hotels in Sigatoka, usually referred to as located in the Coral Coast, receive about 20 per cent of all expenditure by tourists in hotels in Fiji (Fiji Bureau of Statistics, 2020). Tourism activity is thus important to the economy of Sigatoka and contributes to the demand for local vegetables, fruits and root crops. A report by IFC (2018) found that hotels in Coral Coast spent around F\$10 million to purchase local agricultural produce.

The survey was conducted in December, 2020. A total of 63 market vendors and 30 farmers were randomly selected and interviewed. The market vendor survey was conducted in Sigatoka municipal market while the farmer survey was carried out in Sigatoka Valley. For the market vendor survey, prior approval was sought from the Sigatoka municipal market master who accordingly informed the market vendors. The vendor survey was conducted during operating hours. All precautions were taken to ensure that the market vendors had served their customers before approaching them for interview. According to Sigatoka Town Council, there are around 238 permanent vendors that operate from the market. Our sample of vendors thus equates to around one quarter of the total permanent vendors. One third of the sample were female.

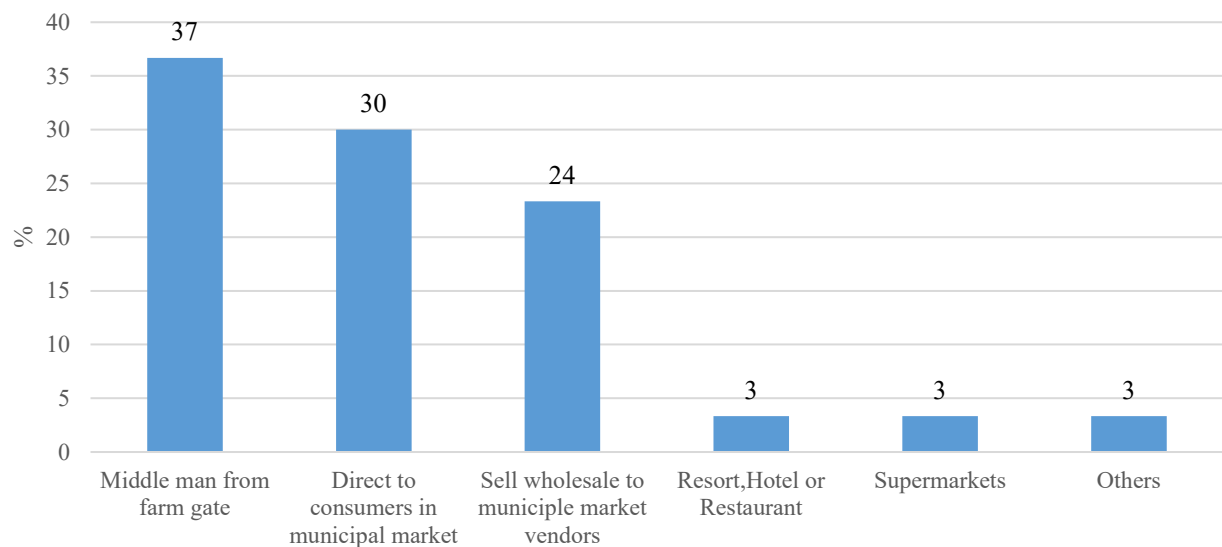
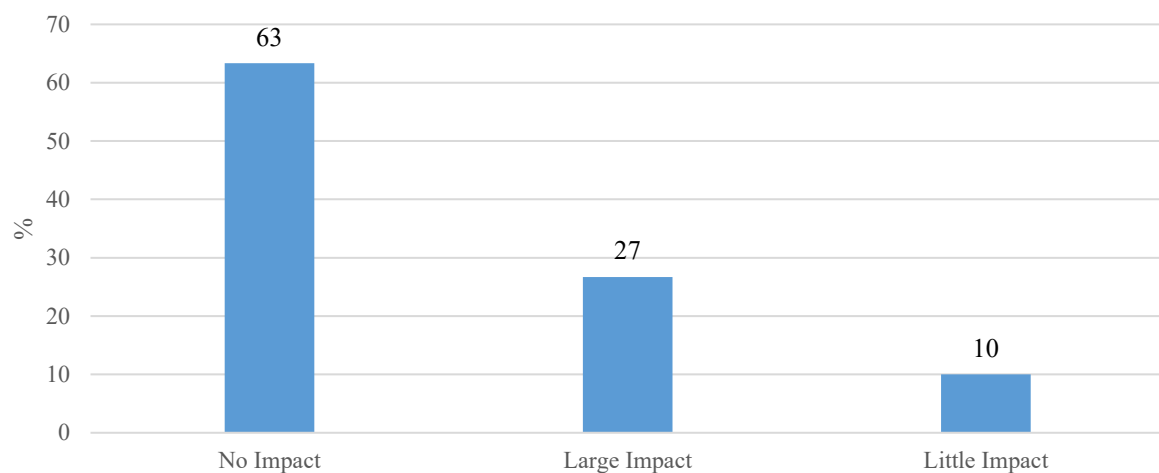
Similarly, farmers were randomly selected and were informed of the purpose of the survey prior to the actual survey. The 30 farmers surveyed would consist of around 5 per cent of the total active farmers. The farmer survey was conducted at the house of farmers in the evenings to avoid disturbance to farm activities. Participation was voluntary. All interviewed were aged 18 years and above. Trained enumerators were used for the survey and the responses were recorded in tablets with the use of KoboToolBox® survey software. Some 37 per cent of the farmer sample were female.

## Results and Discussion

### Survey of farmers

To begin with, 93 per cent of farmers indicated that incomes from the sale of farm produce have been impacted because of the pandemic. In Figure 2 information is provided regarding from where the farmer normally sold the produce and to whom. This is important to recognise the various chains through which the farm produce is sold, which will be important in identifying the source of shocks to demand. Thirty-seven per cent of the farmers sold their produce to middlemen (wholesale) from the farm. After buying from the farmers, the middleman would sell the produce either at the municipal markets or to hotels, restaurants and supermarkets. Thirty per cent of the farmers sold directly to customers at the municipal market while 23 per cent sold directly to market vendors at the municipal market. Many smallholder farmers have unwritten contracts with middlemen and exchange produce when available. If there is surplus after selling to the middleman at the farm gate, the produce is sold to market vendors at the Sigatoka municipal market. There are also some farmers who sell directly to consumers through the municipal market, mostly on Fridays and Saturdays. These farmers would, on other days, sell surplus produce to market vendors. Only a small proportion of farmers wholesale their produce.

In Figure 3 an indication is provided of the impact of travel restrictions and curfews on farming and the supply of produce. The majority of the farmers (64 per cent) indicated that the restrictions and curfew had no impact on their farming and related activities.

**Figure 2. To whom and from where do you normally sell your produce?****Figure 3. Impact of Curfew/Travel Restrictions**

In terms of restrictions, many farmers have their farm and home on the same piece of land. As a result, the restriction of movements or curfew hours did not impact on them in terms of movement related to farming activities or supplying to consumers. Moreover, farmers who indicated no impact included farmers who sold their produce either at the farm gate or through wholesalers at the Sigatoka municipal market. A smaller proportion of farmers (26 per cent) indicated that they have been impacted in a large way. These are farmers who wholesale to municipal market vendors and those farmers who sell direct to resorts, hotels and restaurants. Also, these are farmers who would normally wholesale at other municipal markets (such as those in Suva and Lautoka) but had to sell/exchange at the containment borders. Moreover, the municipal market opening time was delayed from the usual 6am to 8am and this could have impacted some farmers.

Factors affecting the farming activities and incomes from supplying the farm produce were also analysed. Low demand was indicated as the factor that most impacted farmers (farming activities and incomes from supplying the farm produce). As mentioned earlier, the tourism industry (hotels and resorts located in the Coral Coast) is an important contributor to demand for vegetables and fruits. Moreover, the people of Sigatoka rely to a large extent on the tourism industry for jobs and incomes, which also contributes to demand for fresh produce from the municipal market. Since the majority of the farmers (67 per cent) sold their produce either to middlemen or directly to consumers, the



decrease in demand has filtered through two sources. First, the middlemen reduced the quantity bought from farmers due to zero demand from hotels and resorts. Second, with the closure of the tourism industry, household incomes have been negatively impacted resulting in reduced demand for fresh produce purchased from the municipal market. The latter is discussed further below.

### **Survey of market vendors**

Ninety-five percent of the market vendors indicated that their incomes have decreased as a result of the impact of the pandemic. This is not surprising given the impact of the pandemic on the Fijian economy as a whole – especially due to the closure of the tourism industry. More specific results from the survey provide a clear picture of the channels through which vendors have been impacted. Three main ways through which market vendors are likely to have been impacted were also analysed. In terms of the impact of travel restrictions and curfew, the type of impacts were almost evenly distributed with 33 per cent of vendors indicating a large impact. Beginning from 30 March 2020 (soon after the first wave of COVID-19 in Fiji), curfew restrictions were in place from 11.00 pm to 4.00 am daily. However, this is unlikely to impact all vendors, especially related to travelling to and from the market. It was noted that the market vendors have diverse characteristics: some vendors reside within the vicinity of town while others reside in villages and settlements; some vendors walk to the market, some travel by public transport while others use their own transport. The travel restrictions and curfew has impacted public transport service delivery affecting the mobility of market vendors. According to the Sigatoka Town Council administrator, the opening of the municipal market was delayed from the usual 6 am to 8 am. This was a direct response to facilitate vendors affected by COVID-19 related restrictions.

The impact of reduced market hours showed that around 80 per cent of the vendors interviewed responded that they have been impacted by reduced market hours. Reduced hours meant vendors were unable to open for longer periods of time. The majority of these vendors are full time vendors and have stalls inside the market. These vendors retail differently from vendors located outside the main market.

The impact of the closure of the tourism industry was also studied. Not surprisingly, 67 per cent of the vendors indicated that they have been impacted in a large way. As mentioned previously, hotels and the broader tourism industry are a significant contributor to demand for vegetables and fruits, directly and indirectly. Another large consumer base for these vendors is people working in restaurants, hotels and resorts. The loss of jobs and incomes resulting from the halt of the tourism industry and lockdowns would have reduced purchasing power of consumers, reducing demand and negatively impacting market vendor sales. As a result, those middlemen and farmers who were supplying to hotels and restaurants ended up supplying and retailing through municipal markets. Market vendors responding to being impacted as ‘large impacts’ have consistently indicated that they are also losing income due to more competition from additional vendors allowed to sell from outside the municipal market.

The results from this study provide important insights and policy implications for other small island developing states (SIDS). This is because SIDS share a number of economic and social characteristics that contribute to vulnerabilities impacting their development progress. Some key characteristics of their common vulnerabilities include small domestic markets, a narrow natural resource base, high trade costs, reduced scope for private sector expansion and exposure to natural disasters (ESCAP, 2019; UNCTAD, 2018).

### **Policy Implications**

The fundamental lesson arising from the COVID-19 exogenous shock is the need for restructuring and strengthening supply chains to be more resilient to unexpected disruptions. The performance of the agricultural sector, especially in the area of fruits, vegetables and root crops, is critical for food security. Strengthening the domestic agricultural supply chain would also serve as an adaptation measure to offset disruptions that can arise from food production and distribution caused by a future crisis. Moreover, the impacts of COVID-19 on smallholder farms are likely to be on different time scales: short-term shocks to production creating long-term consequences for the sustainability of supply.

The key message from this paper is clear – disruptions emerging from COVID-19 related restrictions have impacted both demand and supply, and subsequently led to loss of incomes. As a result, two areas of policy emphasis are clear.

First, given the adverse shocks on incomes arising from COVID-19 disruptions, policymakers should ensure timely support to farmers and market vendors. Smallholder farmers and the majority of market vendors have a strong dependence on farming incomes for their livelihoods. Farmers and market vendors are no strangers to shocks to their livelihoods since natural disasters, droughts and floods are recurring features of their lives. The impact of COVID-19, however, is very different from other shocks as it has been ongoing for 18 months. With decreased revenues and inability to diversify, it could lead to food insecurity for the economy as a whole in the long run. So, as a medium- to long-term strategy, policy makers should ensure that farmer support is enhanced regarding key agricultural inputs such as seeds, fertiliser and machinery. This is especially important for low-income smallholder farmers who typically lack capital to invest as well as collateral to secure loans. Moreover, farmers must have easy access to information and guidelines on the choice of crop varieties, marketing opportunities and soil and water management solutions to build resilience in subsistence agriculture. Our survey of farmers reveals that 97 per cent did not receive any assistance with marketing during this pandemic. Sustainable policies such as investments in rural infrastructure and market access, farm- level support, smart agriculture, research, development and extension will help smallholder farmers to expand production. Policy should also focus on evaluating value addition of agricultural produce to enhance food security. Such capacity building should target both traditional and commercial methods. Traditional methods would ensure food security while commercial methods could contribute to livelihoods. Much agricultural produce is seasonal and available in abundance during this time. Increased supply means lower prices and low returns to farmers. While consumers are able to enjoy low prices for a short period of time, many would require these products all year around. Value addition could help ensure that produce is available most or all year around. This promotes wider selection with the view that consumers will eventually prefer local produce. Apart from food security, the sustainability of domestic agricultural supply chains is important for their capacity to generate rural enterprise and develop rural communities. Research from this paper suggests that growth of the agricultural sector is linked to growth in non-agricultural sectors, especially tourism. Thus, any condition that impedes growth in non-agricultural sectors also impedes growth in the agricultural sector.

Second, given that supply was disrupted due to containment zones and health-related restrictions, it would be useful to have an agricultural supply system that is set up to serve a broad range of consumers in urban areas. One of the ways this can be achieved is through spatially located municipal markets so that there are few or no retail nodes that become overwhelmed. Alongside this, supporting infrastructure should be in place to create efficient rural-urban connectivity to improve mobility of agricultural produce throughout the supply chain. During a health crisis, specifically targeted agricultural supply chains can be given 'green channels' to ensure supply chains remain open and functional. In addition, these green channels could be harnessed with cold storage systems. While a cold chain is available for imported fruits and vegetables, it is lacking in local fresh produce supply



chains. Keeping produce at lower temperatures ensures increased shelf life as well as maintaining quality. Longer shelf life would remediate prolonged delays encountered during this health crisis. The government has allowed movement of goods (including vegetables and root crops) across containment zones. While supply will not be significantly affected, it still creates a bottleneck causing delays, increasing postharvest losses and raising costs. Additional checks at containment zone borders can lead to delays that are damaging to perishable goods. Food security and agricultural supply chains are interlinked, especially for vulnerable households in urban areas. At the national level, per household average food consumption accounted for 39 per cent of the total consumption, with vegetables making up the largest component of food consumption (Fiji Bureau of Statistics, 2021). Moreover, average consumption of vegetables and fruits per household in urban areas make up around 22 per cent of total food expenditure. With around 20 per cent of the total urban population living in poverty (based on Household Income and Expenditure Survey 2019-2020), policy measures will have to support farmers and middlemen to get vegetables to markets at low cost, especially making agricultural supply chains work for low-income households in urban areas.

### **Concluding Remarks**

Fiji and other PICs have implemented a number of measures to support workers, smallholder farmers and small businesses impacted by the pandemic.

The supply of locally grown perishable produce from farms to households is core to the overall food supply chain, which includes production, processing, distribution and consumption. COVID-19 restrictions impacted both supply and prices of fresh produce in municipal markets. The performance of the agricultural sector, especially in the area of traditional crops, is thus critical for food security in the region. Strengthening the domestic supply chain could also serve as an adaptation measure to offset disruptions that can arise from global food production and distribution caused by any future crisis.

While the short-term strategies have attempted to address the immediate impacts of the crisis, such as reduced household incomes, unemployment, reduced working hours and business closures, the long-term recovery responses will be crucial also for sustainability of production and distribution. Strategies for recovery and rebuilding should focus on resilience-building strategies to prevent future shocks and responding to ongoing risks such as climate change and natural disasters. At the time of this writing, Fiji was battling a second wave of the COVID-19 pandemic, clearly posing a serious threat to household incomes and food security.

The results of this study reveal that the COVID-19 pandemic has delivered shocks to both the supply and the demand side of the agricultural supply chain. Policy emphasis thus needs to ensure agricultural food systems continue to provide vegetables, fruits and root crops to households in rural and urban areas. This is also in line with the Sustainable Development Goal (SDG) Targets 2.1 and 2.2 which recognise ensuring access to safe, nutritious and sufficient food for all people all year round, and of eradicating all forms of malnutrition. SDG 2 also seeks to double the incomes of smallholder farmers through SDG 2.3. The agriculture sector is important to Fiji but faces increasing threats from climate change, environmental degradation and diseases impacting plants and livestock. In this regard, policy support and fundamental structural changes are needed for the agriculture sector, where the majority of the poor are concentrated (Gounder, 2020). Sustainable land use for agriculture will be necessary towards conservation and sustainable use of natural capital. The policy challenge is to be able to encourage production and value addition of primary products and where possible export of niche commodities contributing to economic diversification. Given the particular challenges in agricultural supply chains, policy makers also need to engage local stakeholders to inform policy design and implementation that is rooted in local realities.

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