Journal of Agricultural Science; Vol. 14, No. 6; 2022
ISSN 1916-9752 E-ISSN 1916-9760
Published by Canadian Center of Science and Education

The Impact of COVID-19 on the Agricultural System and Food Supply in Fiji

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Received: January 30, 2022 Accepted: April 28, 2022 Online Published: May 15, 2022

doi:10.5539/jas.v14n6p227 URL: https://doi.org/10.5539/jas.v14n6p227

Abstract

Pacific Island Countries (Kiribati, Fiji, Samoa, and many others) rely on fisheries and agricultural systems for their livelihood and economic development. However, the COVID-19 scenario has led to vast degradation in the agriculture supply, economy, and food security system, resulting in poverty, an increase of unemployment percentage, and a decrease in the tourism industry. The policies related to COVID-19 restrictions, such as lockdowns, access to markets and social distancing, has caused a high reduction in the income of many households. Food purchasing from vendor markets and supermarkets has decreased rapidly due to its prices. Several individuals cannot afford to buy the food items, leading to lower food supply within and outside the country. In addition, several people have been moving to rural areas due to Unemployment. They have started to perform backyard gardening small-scale farming, which again results in lower production of commercial farmers and loss of food supply to consumers. Not only Fiji, but the whole world is experiencing the same situations, which have led to the Government making innovative actions against this deadly virus to protect the citizens from this pandemic. FNPF withdrawals, farming packages, and other initiatives indulged by the Government of Fiji and other Pacific Countries are being discussed in this review. Countries have examined the effects of the Coronavirus on the agricultural system and food supply chain in Fiji and other Pacific nations.

Keywords: COVID-19, agricultural supply, Unemployment, food supply, FNPF (Fiji National Provident Fund), farming packages

1. Introduction

COVID-19 (Coronavirus) was avowed by the WHO (World Health Organization) as a pandemic on March 11, 2020. Aftermath, the first case was declared the next day in French Polynesia, whereas Fiji said its first case after eight days. The authorities of Pacific Island Countries are worried about the risk of COVID-19 spread to Pacific Island Countries (PICs) due to actual trading between partnered countries and the tourism sector (Filho et al., 2020). Therefore, governments of the Pacific Nations close the borders and put rules to restrain the introduction and spread of COVID-19 in PICs. On March 20, 2020, the Lautoka city was under lockdown in the Western Division in Fiji. In the Central Division, Suva went under lockdown from April 3, 2020, with curfew hours being implemented, and all schools were closed. This situation impacted Fiji in many ways, especially the tourism sector, with about 93% closing in late March. This led to the loss of jobs of approximately 115,000 individuals. In Fiji, other countries of the Pacific Region also adhered to safety measures such as border lockdown, restricting movements (only agricultural products were exchanged within borders and travelling of farming activities), social distancing, and many more even though they did not possess any COVID-19 cases. However, many individuals faced several consequences due to border lockdown.

From the last decade, agricultural production has been declining due to increased opportunities in tourism sectors, limitations on the land area available, climate change and many others. From all these, Fiji's agricultural sector is most vulnerable to climatic changes and sea-level rises due to small land mass, surrounded by the ocean (Igbal, 2022a). Climate change is a great impact on Fiji's ecosystem including animal (livestock and marine) and crop production from past decades and still possesses a large effect on their economy as well (Igbal, 2022b). Yet, it

remains and is regarded as an essential system that supports several livelihoods in Fiji, contributing to the economy and food security. In the Pacific Region, about 90 per cent of the farmers are smallholders—semi-commercial growers while the other 10 per cent are commercially producing farmers, who provide export income and employment (Iese et al., 2020; Sisifa et al., 2016). About 80 per cent of the households in Pacific Island Countries obtain food security and revenue from the agricultural system either directly or indirectly (Allen, 2015; Haynes et al., 2020; Iese et al., 2018, 2020). However, the food supply chain has also been affected due to degradation in agriculture investments and GDP. As mentioned before, the agricultural system has been declining due to climate changes, increased tourism sector etc., COVID-19 is now an additional factor to the degradation of this system (Sisifa et al., 2016).

The Food Management and Organization depends upon the supply chain, stakeholders, and consumers (FAO, 2020), and due to the crisis of this pandemic, it directly affects the food security sector such as dairy, poultry, meat, vegetables, and other food manufacturers since there is a shortage of labor, lockdown, quarantine, social distancing (causing citizens to stay home and not come to the workplace) and many others (Hobbs, 2020). This eventually causes food insecurities (Gundersen & Seligman, 2017). COVID-19 pandemic harms the whole food supply chain from the field and reaches the consumer when it comes (S. Aday & M. S. Aday, 2020). This degradation is ultimately due to the closing of food manufacturing, policies of trade, pressure on financial status, production, and processing, demands and lastly distribution (S. Aday & M. S. Aday, 2020).

This review will mainly discuss the challenges, pandemic issues, how it affects the agricultural system and food supply chain, and the possible ways to recover from this pandemic situation that is affecting Fiji and the whole world. From the first case in 2020 (in Fiji), several individuals have been facing challenges, mainly Unemployment; however, from the beginning, the Government of Fiji has been assisting the citizens in restraining from poverty. Thus, now it's a must to be vaccinated to have a job so that the spread of COVID-19 could be reduced, and the nation can operate as usual.

2. Discussion

2.1 Impact of COVID-19 on Agriculture Production, Market and Food Supply

Due to COVID-19, Fiji's agricultural and food supply sector has faced many challenges, which are being discussed below.

2.1.1 Effects of COVID-19 on Agriculture Production and its Market

Due to lockdowns in Fiji, the market access has been vastly reduced with disruption of produce transportation between urban and rural areas and islands. The latest survey and assessments done by McGregor and Sheehy (2020), and Wairiu et al. (2020) show market loss and decline in purchasing power. They also found that local farmers in Fiji are suffering from two disastrous impacts, that is, COVID-19 and TC Harold. Thereby, farmers have to decrease their product prices in response to reduced demands from several households. Many livelihoods have adapted to small scale farming or home gardening because they could not afford the costs of foods in the market due to loss of employment opportunities and lack of income.

According to McGregor and Sheehy (2020), and Sherzad (2020), there has been a high decrease in the agricultural products and food associated with a wide range of product waste in the Pacific Island countries. Due to the inadequacy of processing facilities and storage before the COVID-19 stroke, farmers have faced a lot of difficulties in coping with the supply of root crops, vegetables and fish that were excessively available. Responding to this, fishers and farmers are now restricting commercial production. This led to declined commercial production of vegetables, fish, and livestock, decreasing the income and food supply. In addition, the alleviation measurements for COVID-19 have increasingly affected the tourism sector and restrained the higher-end produce demands such as livestock, fruits, spices and many more. For instance, a farmer that supplies pineapples (around 50 tons) to hotels is now selling those pineapples in local markets at lower prices due to the closure of the demands of the tourism sector (McGregor & Sheehy, 2020). Moreover, loss of employment, which had led to less income, had affected citizens in purchasing agricultural products since they also had to meet other financial obligations like loans, bill payments, etc.

From the time COVID-19 cases developed, most of the individuals in Fiji have moved to rural areas that have adversely increased the pressure on water supplies that are already limited and local resources. It has also led to land disputes and stealing valuable crops, livestock, and fruits. Likewise, the new farmers started to perform an unsustainable copping system, which reduced production, food, and income. Furthermore, planting materials, fruit trees and non-seed crops becoming limited in supply has also reduced the production and revenue of

farmers. Not only this but increased individuals in rural areas also practising acute cultivation of land areas to increase productivity in a short period had caused soil fertility decline.

Similarly, an increased farming system led to the degradation of trees (deforestation), which later will affect the humans themselves due to climatic changes (Viliamu, 2020). However, in some cases adhered, individuals practising farming systems in rural areas with vast acres of land had been a beneficial outcome for the agriculture market and production since it is boosting the economic sector of the agriculture sector, which will, later, lead to higher GDP of Fiji's economy.

2.1.2 Effects of COVID-19 on Food Supply and Food Security

Due to the Coronavirus, a broad range of food products such as live animals, fresh fish, and fresh produce was highly affected in terms of interruption in the marketplace. The FAO assessment on the impact of COVID-19 in the food system depicted numerous vulnerabilities, involving insufficient infrastructure of storage, weak linkages of the market, inadequate diversity of the supplies and dislocations of the labour. This caused restrains in the food products from reaching the marketplace, which eventually creates imbalances in the supply and demand chain and adverse losses of food products associated with the supply chain (FAO, 2020).

Furthermore, individuals without jobs due to the pandemic went back from urbanization to their Koro or village and started to practice home gardening and small-scale farming. As a result, a survey and assessment were developed by the Community Food and Health Project1 (CFaH), whereby they provided the tools to survey on the impacts of Coronavirus on income, livelihood (education, health, and water), socio-economic, food and nutrition system (Haynes et al., 2020; Guell et al., 2020). This survey shows the sources of food supply within households are derived from backyard gardens and farms during the Coronavirus crisis. Below (Figure 1) shows the food supply sources and increased consumption of aquatic resources like shellfish, fish, and seaweeds. However, citizens still depend on the supermarkets for essential food items, such as canned fish, flour, rice, sugar, and noodles, even though the households depicted below show reduced quality and quantity of purchases.

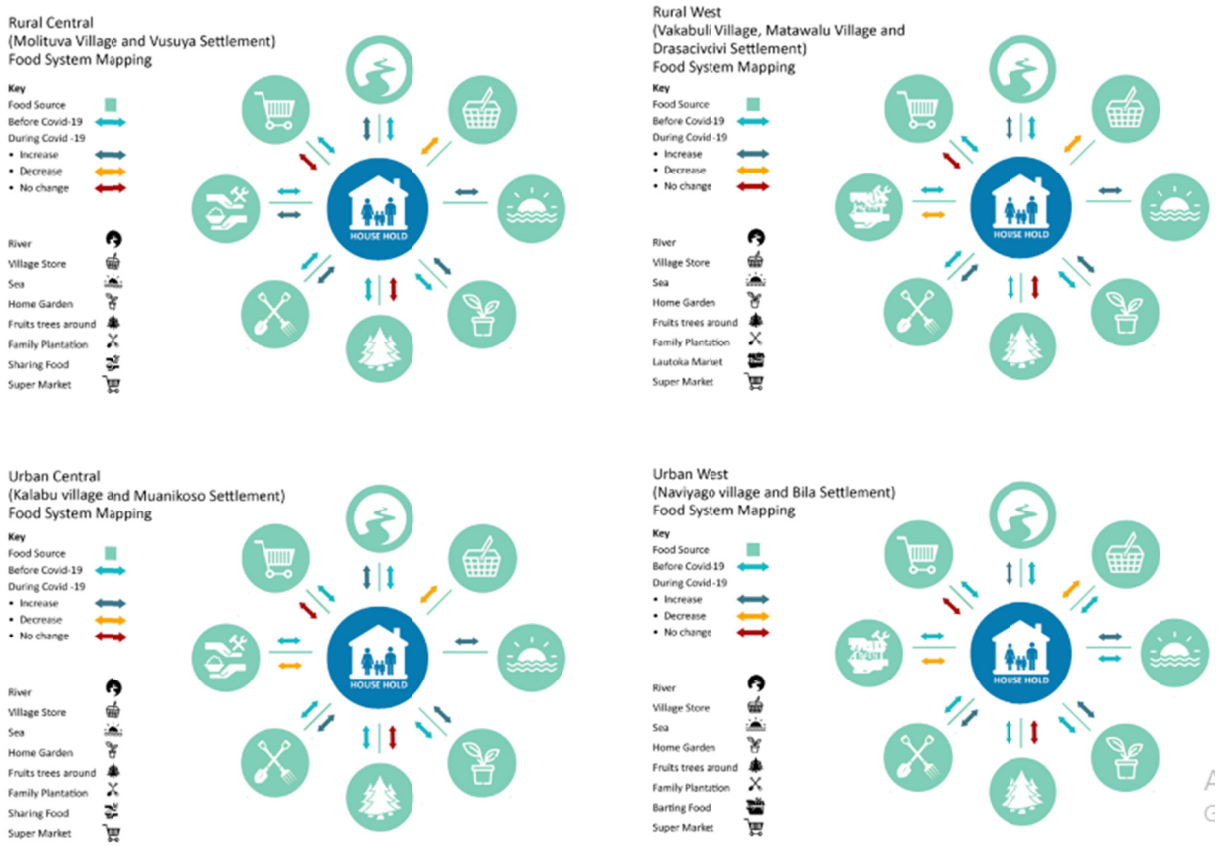

Figure 1. Map of food source and system in Fiji households

Source: Assessing Nutrition and Socio-Economic Impact of COVID-19 on Rural and Urban Communities in Fiji (2020).

Not only this, but some individuals have also started to engage themselves in the barter system. For example, some households exchange non-food items for pastries and pie or root crops for noodles and meat. However, some citizens still rely on market supply for their food products, specifically those with limited compound or backyard areas for farming. Thus, this contributes to the limited supply of food products, which eventually affects large commercial farmers that supply in large quantities. From FGDs, it is evident that some people have started engaging in the barter system. Figure 2 below depicts that most of the respondents questioned or interviewed during the survey either obtained their food produced on the farm or bought their food products/drinks to supplemental diets. It was observed that in Western Division, about 80 per cent of the livelihoods from all community areas depend on food from fishing, hunting, or gardening at home. In the Central Division, the communities (less than 75%), about 30% of livelihoods from Matawalu, Bila and Vakabuli barter borrow or share their foods with families and friends (Wairiu et al., 2020).

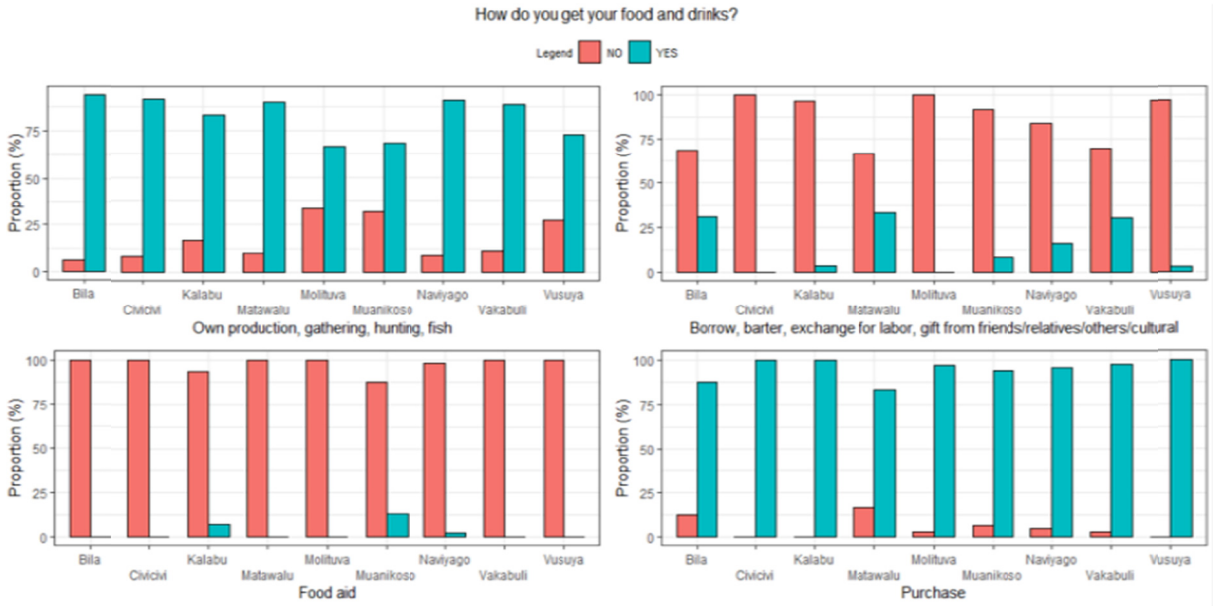

Figure 2. Respondents indicating the type of sources they obtain for food and drinks

Source: Assessing Nutrition and Socio-Economic Impact of COVID-19 on Rural and Urban Communities in Fiji (2020).

Co-relating to the above, Figure 3 below shows the significant foods produced by different community households such as tubers, root crops, cereals/grain-based products, and eggs from poultry. Root crops and vegetables were countered as the most common foods produced from this. All studied communities have 75% to 100% of tubers, root crops and plantains, except for the Civicivi community. In Civicivi, almost all livelihoods are Fijians of Indian descent that relies on rice and flour as their source of food. While, in Muanikoso households, there is limited access to lands; thus, they do not cultivate root crop type of farming system. For protein sources, Matawalu, Bila, Naviyago, and Vakabuli livelihoods about 30% indulge in fishing activities for their source of protein and carbohydrates. From all the households surveyed, very few of them possess poultry and cattle for eggs, milk and meat (Haynes, 2020). These graphs and figures clearly show that COVID-19 has adversely affected the supply chain of food products due to individuals doing their farming and less depending on the market products.

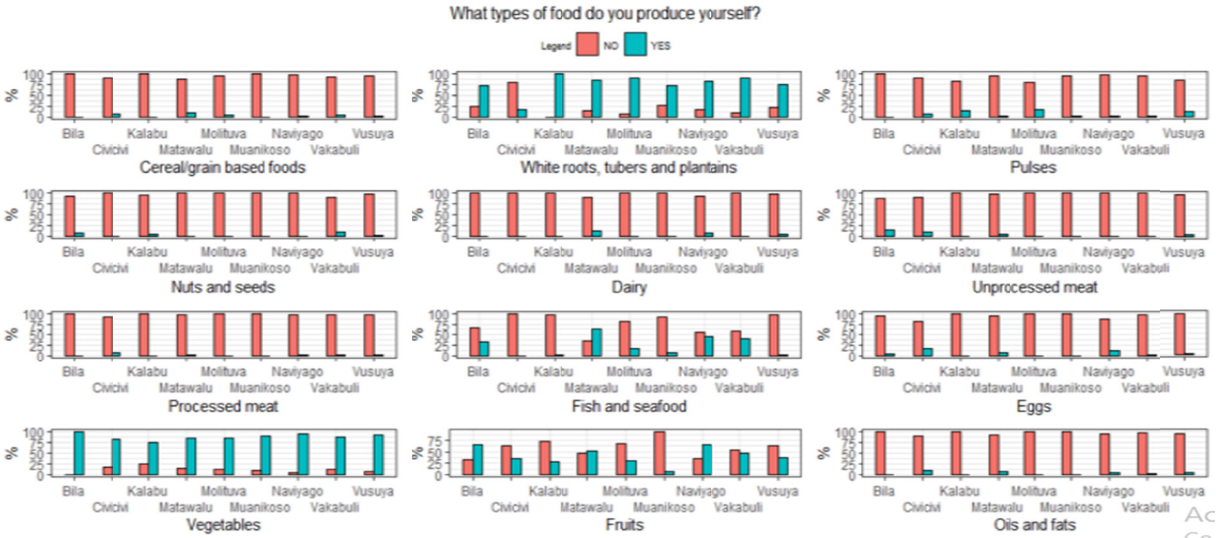

Figure 3. Respondents in different communities that produce food themselves

Source: Assessing Nutrition and Socio-Economic Impact of COVID-19 on Rural and Urban Communities in Fiji (2020).

2.2 Other Effects of COVID-19 Pandemic on the Nation

Below are some of the other significant impacts of the Coronavirus that has adversely affected the country and its people.

2.2.1 Impact on the Education System

The Government of Fiji declared nationwide closure of schools due to increased cases of COVID-19 so that the spread of the virus is limited and prevented among children who are very crucial and susceptible to the health issue. Yet, the Government supported all schools in preparing workbooks for home school education associated with formal learning performed remotely, which is the use of online platforms for education. Researchers mentioned an array of responses derived from parents that were affected by COVID-19 on the purpose of educating children from home as well as those students who are indulged in the vocational and tertiary education system. However, educating students from home had a significant impact on them; that is, several school students started to lose interest in their studying and spent plenty of time in other leisure activities that directly impacted their learning. Similarly, when bored staying home and studying, learners would go out to the streets and spend time with friends, increasing peer engagement. Most of the parents didn't even know where their children were. Parents engaged with younger children faced challenges in giving them extra attention, leaving behind their household chores and other essential activities. Around 75% of the parents from the Central Division didn't know about the support services that were available for learners with special needs. Figure 4 below clearly shows parents' unawareness about the support learning systems provided by the Government (Jowalesi, 2020).

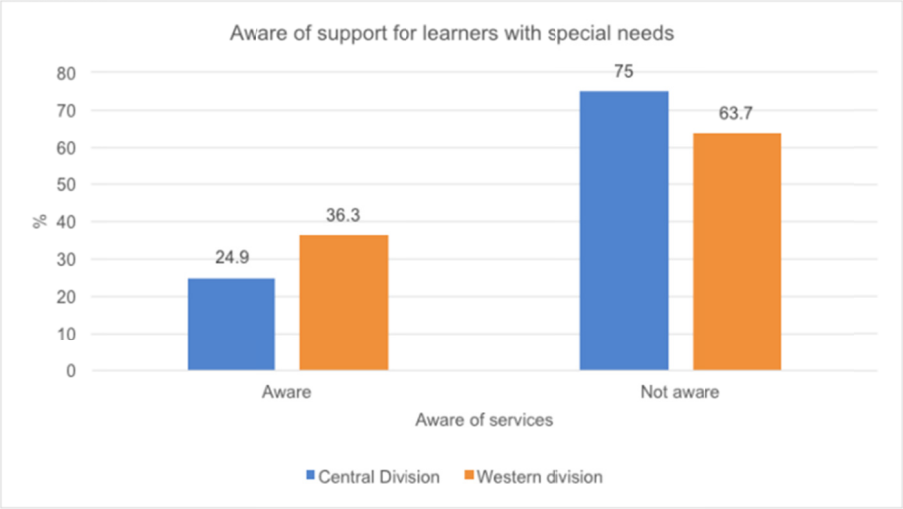

Figure 4. Parents awareness about the support services

Source: Assessing Nutrition and Socio-Economic Impact of COVID-19 on Rural and Urban Communities in Fiji (2020).

Parents also found challenges on the home-schooling packages, adversely bulky and hard to understand. Likewise, they also mention that they encountered difficulties in the curriculum compared to the previous one, which was better and more valuable, making it hard to educate their children. Thus, this has led to many students lacking knowledge about their studies, which will, later on, affect their careers.

2.2.2 Impact on Communities and Families

COVID-19 has also affected almost all the communities and families in Fiji. The Government of Fiji implemented social gatherings and communication (staying within the bubble) to restrain the spread of COVID-19. In the i-taukei traditions, "Na Soqo" (Gathering/Function) is an important part and is mainly associated with financial obligations. During the survey in communities, families have responded that they can continue with some contributions but not more than before the corona-virus pandemic. Some respondents also said they could also give money for funerals to help the family in which the member died. Not only this, but some churches in Fiji also had to close these obligations, for example, Vakabuli village, where the church cancelled all contributions from the time lockdown started so that i-taukei families won't have to feel sad about not giving any donations. They can eventually utilize their money for their own needs.

Likewise, the Indian families also had to cancel wedding occasions or any big occasions they planned before the COVID-19 strike, which led to many losses since many started preparing and purchasing food items needed for the events. However, after some months, the Government allowed gathering but not more than 10-20 people to prevent the spread of COVID-19. As a result, community meetings and crowds were restricted, such as feasts, grog sessions, etc. Yet, this led to individuals spending more time with their families and gardening or farming, which eventually increased the importance of knowing agriculture (Jowalesi, 2020).

2.2.3 Impact on Tourism Sector and Other Business (Formal, Small, and Informal) Leading to Unemployment, Loss of Economy and Poverty

In March 2020, there was an announcement made by the Fiji Hotel and Tourism Association (FHTA) saying that from the 279 members, about 93 per cent of it had closed due to adverse losses and a decline in the arrivals of tourists. The tourism industry mainly contributes about 40 per cent of the total GDP to Fiji's economy, and around 40,000 Fijians are directly employed under the tourism sector. At the same time, 100,000 are indirectly used both in informal and formal sectors. From the financial records in 2019, Fiji's total revenue derived from the tourism sector was 2,080 FJD in total. This depicts the amount of contribution our tourism sector was providing and helping many individuals by giving job opportunities. However, this pandemic leading to the closure of the tourism industry led to devastating impacts on many households and businesses like hotels, commercial farming businesses, dairy and many more. In June, the minister of Australian Tourism reported that Australians will not be able to travel until the year 2021 and considered more local travelling. This also affected the tourism sector in Fiji since Australia and New Zealand make up almost 60% of arrivals of tourists in Fiji.

However, to keep the business moving, a campaign was conducted named "Love Our Locals", and the FHTA's CEO mentioned that 20 per cent of 400 resorts in Fiji would reopen in association with the campaign (Fijivillage, 2020).

As discussed before, the tourism sector plays a vital role in Fiji's economy, but the pandemic has made huge losses in its business and the employment sector. Until now, many individuals have been jobless and struggled to find any job. Some who had lands have already started cultivating and performing farming methods to get the minimum income for their families, which has eventually affected the food supply chains from commercial farmers to markets and then to households and hotels. This unemployment crisis also led the Government to provide COVID-19 assistance through FNPF so that every individual in Fiji can buy groceries for their home. However, this has also affected the government budget since their primary source of income was only from the agriculture sector, whereas losses were deprived of tourism and unemployment impacts. This has also led to poverty cases since many individuals could not feed their families. Yet the Government of Fiji tried their best and supported thousands of families so that every individual could fight against this pandemic (Maiden, 2020; Fijivillage, 2020).

As reported by Ma (2020), the GDP of Fiji will decline to 5.8% as tourism and export demand declines. According to Gounder and Xing (2012), those in the modest income quartile benefit from formal education; however, they cannot prevent or restrain people that obtained primary education from falling into poverty. The crisis of COVID-19 in Fiji has uplifted these issues.

2.2.4 Impacts on Fishery Sector

The fisheries sector has also faced complete shutdowns due to government social distancing restrictions if these sectors are not regarded as vital in providing the national food supply (*e.g.*, Namibia (Immanuel, 2020)). The economic effects due to market disruptions have also impacted small-scale fishers and their abilities to retain their livelihoods from disasters like COVID-19, leading to reduced demand and prices on fish products. Exporting has also been affected by port closures, loss of cold storage access, and reduced freight (Orlowski, 2020). Not only this, but fishers selling in local markets were also highly affected due to fewer people coming and purchasing the fish since social distancing and sanitation became critical components in fighting against this pandemic virus.

In Fiji, the temporary enclosure of ferry transport between inter-islands has minimized the disease's spread. However, this has lowered access to urban and semi-urban markets. Due to this, fishers had to make challenging decisions between feeding their family or fighting against the risk of COVID-19 because fishing ports and communities can cause rapid infections due to the anglers having migratory nature and international visitors' frequencies (FAO, 2020a). Likewise, access to rural fishing is also tricky due to health issues, even in normal circumstances (Orlowski, 2020). Thus, this will eventually lead to loss of income for the fishermen, which will make it harder for the families to survive in this kind of time.

2.3 Immediate Government Assistance

The Government of Fiji was also affected by the pandemic since their whole national budget changed; plans for the betterment of Fiji were also haltered since most of the cash was used in helping citizens recover from COVID-19. Nevertheless, they could obtain assistance from overseas countries like vaccination, dollars, and sanitation products to help all the Fijians survive this crisis. Below are some of the immediate helps provided by the Government to the citizens of Fiji.

2.3.1 FNPF Withdrawals

The Fiji National Provident Fund confirmed that there were 86,854 applications lodged by June 15, from which 77,507 applications were further processed and paid out around $49.1FJD. The Government and FNPF indulged different phases, and in each step, additional employees fitted in for obtaining relevant assistance. By June 30, FJD 54.2m was received by a total of 85,959 members in phase one. Whereas, in phase 2, which lasted about ten weeks, 15,920 members were given a total of $17.5mFJD. However, the withdrawal of money in terms of assistance had been less than the withdrawal from TC Winston scenario; that is, TC Winston assisted around 180,000 people with $276mFJD. This shows better Management of FNPF in providing the funds and working with different methodologies and employers to make efficient criteria's in paying out to all the wanted Fijians. In the early days of July 2020, the second round of FNPF withdrawals began, and the third cycle of payment was commenced on July 21, 2020 (FNPF, 2020).

The FNPF assistance policies helped thousands of households and farmers by allowing cash withdrawals from their FNPF accounts and those who had less money in their general funds; the Government of Fiji provided cash

directly to their bank or through mpaisa. Obtaining this assistance made many individuals buy agricultural materials to cultivate crops if they had enough land. This assistance also helped many commercial farmers (crop, livestock, dairy) and fishers to overcome their cost of production and the price for wasted products due to the pandemic. In addition, households could buy food supplies from supermarkets now, reducing the risk of degradation in the food supply chain. Therefore, the FNPF associated with government assistance helped many individuals in severe need of cash to make their payments and provide food for their families.

2.3.2 Agriculture Assistance

The second wave of COVID-19 made it harder for the citizens of Fiji to survive in this pandemic situation. Commercial farmers, fishermen's, livestock farmers and many more were adversely affected by the pandemic, which started in 2020; however, they began to recover from the crisis due to government assistance through FNPF withdrawals plus by the end of 2020, markets were reopened for quite many people; thus, farmer commenced selling their products again. But the second wave devastated the farming system even more than before; thereby, the farmers were still struggling to find a way to overcome this scenario.

Apart from providing support and help to the supply chain from smallholders to the market, the Ministry of Agriculture in Fiji also supported many areas of agricultural inputs that were extremely important through the following implementations.

- We provide planting materials and seeds to the rural communities with most farming opportunities in Fiji.
- He indulged in new projects like "Home Gardening Programs" to provide seed packages to households living in peri-urban and urban environments. The purpose of this initiative was to give foods rich in nutrition.
- Repackaging of seeds for further distribution among the households who had become redundant. This was called the Corporate Employee Seed Package.
- Packages for farm support involved the usage of 1mFJD to the allocated areas for boosting the production of crops that could be harvested in short term periods. (Ropate S Ligairi and Ravindra C Joshi, 2020).

2.3.3 Business Assistance

The Government of Fiji invented a series of initiatives to support our Businesses with their employees as a section of the Budget Package in response to the COVID-19 crisis. In this context, several programs were introduced by the FNPF from which the aim of reducing the contribution of the employer from 10% to 5% mainly was used among the businesses. Likewise, the employee contribution to FNPF was also reduced from 8% to 5%, which eventually helped many employees in agriculture, exporting and other sectors to gain more wages to buy groceries for their families. However, larger businesses could not derive the opportunity of this context due to the type of business and location for 2 of the four initiatives being supported. Figure 5 below clearly shows the business access to FNPF programs (Jessie et al., 2020).

Figure 5. Business access to FNPF initiatives

Source: Fiji COVID-19 Business Survey: Tourism Focus (2020).

The responses for the above-discussed initiative varied between tourism and non-tourism businesses. The overall objective was for the companies to obtain the support to reopen the business safely under complete restrictions of COVID-19 measures. On the other hand, non-tourism businesses like agricultural businesses were more often to gain certification standards and support to improve the safety and health of the citizens. Thus, this would run the business as usual and help the employers recover from the damages that occurred due to the pandemic.

2.4 Lessons Learned From the COVID-19 Pandemic in the Agricultural Sector and Food Chain

Due to the pandemic, thousands of individuals and the Government have learned the importance of agriculture and the food supply chain and how to retain them.

2.4.1 Boosting Local Food Production and Supply by the Implementation of National Policies

The Government helped many Fijians who have their nurseries by increasing the nursery skills in cultivating seedlings and boosting home gardens. The COVID-19 scenario led to agriculture being the most critical aspect of Fiji's GDP. The Ministry of Agriculture in Fiji developed a Home Gardening Program that delivers seed gardening packages to all households in peri-urban and urban areas to help them cultivate home garden vegetables to obtain at least some fruits and vegetables for their families. Likewise, the CESP (The Corporate Employee Seed Package) delivers numerous planting materials for corporate employees who have lost their jobs due to the pandemic. The Farm Support Package Program provides open-pollinated seeds and other planting materials to Fiji farmers without any cost. The Government of Fiji provided around one million dollars (US$ 452,000) which were allocated to several households to boost fast-maturing crop production (FAO, 2020; Ministry of Agriculture, 2020). Thus, this will increase the food production system in Fiji whereby the food products could be locally supplied within households and markets. Citizens will tend to buy these food products that were cultivated locally.

Furthermore, 1,100 farmers and villages cultivating rice in Western, Central and Northern Divisions were delivered with rice seeds, about 30 kg for one acre of land. This was developed to encourage farmers to continue growing rice consumption within households. The AMA (Fiji Agricultural Marketing Authority), falling under MOA, bought fresh products, which were about 50 tons containing root crops and vegetables, for the small-scale farmers to supply their products in local markets across the nation. The MOA has also supported the livestock industry by providing 6-12-day old chicks to the exciting villages and households (FAO, 2020b).

During the second wave, the Ministry of Agriculture also indulged a new program on June 28, 2021, and named it "Back to Rural Agriculture Program". Minister Dr. Mahendra Reddy announced that this program would be

implemented between households in rural areas from July 1, 2021. The program aimed to assist those Fijians who have been unemployed due to COVID-19 and have returned to their villages for farming. The Ministry of Agriculture will provide these Fijians with an initial farm support kit to help them commence their farming activities. This will eventually boost agricultural entrepreneurship in Fiji. Thou, COVID-19 has affected the agricultural sector in vast ways. The farming practice in rural areas is one of the beneficial results of this pandemic leading to citizens knowing the importance of agriculture. This program has been indulged for a long-term purpose of increasing vitality in rural areas, that is, continuing the corporation between the returned farmers from urban areas, the rural communities, and the Ministry of Agriculture. The program's startup involved $400.00 of the total package to everyone, including $250 for farming tools, which was directly provided to the farmers.

Moreover, $100 was provided for planting materials, while $50 cash was given to help the farmers purchase any other essentials. Dr Reddy also said that the program was indulged for those who wished to venture into the agriculture system after losing their jobs. However, this program will be only provided to those who meet the full application criteria (The Fijian Government, Ministry of Agriculture, 2021).

2.4.2 Managing Food Supply Arrangement

There are no national public reserves for food products in Fiji due to the high costs. During this pandemic, the food industries have given assurance to the Government that they possess enough raw materials like; wheat for flour production over the next 3 to 4 months. Even though the pandemic was disastrous, there were no shortages of food products in the supermarkets. The Government implemented previous price control mechanism through the Fijian Competition and Consumer Commission (FCCC) for items that were considered as essential need products, such as vegetable oil, split peas, rice, blue peas, salt, sardines, canned tuna, baby milk, powdered milk, tea leaves, canned beef and tuna, powdered milk, sugar and margarine. However, no fresh produce was listed in the FCCC implementation. The Ministry of Agriculture monitored the food market prices carefully during the lockdown period so that none of the supermarkets could raise the fees for their benefit. The MOA mainly focused on municipal markets for fruits, root crops and vegetables, whereas the FCCC looks after the foods sold in retail shops and markets. During the announcement of the first case in Fiji, many individuals were seen in the supermarkets doing panic buying; thus, the Government thoroughly imposed limitations on the quantity of buying essential food items by one customer. This charged method was highly effective. Therefore, the food was evenly supplied to everyone, which also helped many supermarkets avoid the shortage of essential food items. Not only this, but the Fiji Development Bank also announced packages in terms of COVID-19 relief for their customers, who were the farmers affected by the pandemic. The relief packages were for three months only which included repayment of interests, repayment holiday and waiver of bank and fees charges (FAO, 2020b).

After the first case was confirmed in Fiji, the Lautoka area went under lockdown and later Suva. Thus, the Ministry of Agriculture decided to supply fresh produce and foods to the local food vendors and markets in lockdown areas. These include.

- AMA (The Agriculture Marketing Authority) bought all the food products from the suppliers and delivered them to the Lautoka and Suva markets. In addition, they made buying booths at the two ends of the lockdown area for easier access.
- Cash payment was made to the suppliers at the booths in return for their sales. Therefore, the purchasing was basically for the requested fresh food and fruit varieties sold at any market.
- Farmers were requested to restrain from harvesting massive amounts of produce as AMA won't buy more than the required quantity. Thus, this helped the successful supply of food to the households in lockdown areas (Shukrullah, 2020).

2.4.3 Using Traditional Food Handling and Storing Strategies

Handling and storing food products during the pandemic became very important. There were higher food losses and low demand since several household's farm, leading to a more insufficient food supply. Essential food handling techniques were required to reduce the loss or wastage of food products. Storing and handling food during crises are very important. Food losses could be high if there is low demand. Thereby, the producers or farmers were encouraged to practice customary and traditional handling techniques of foods, such as drying root crops, drying fish, breadfruit preservation and coconut storage. The local chiefs and communities were also requested to organize and maintain community-based rationing and stockpiling. Not only this but the farmers were also encouraged to stop overharvesting of the products as they will be wasted after all (Sherzad, 2018).

2.4.4 Facilitating Finance to Farmers and Households in Fiji

To reduce financial burdens on Micro, small and medium enterprises (MSME), the Government's assistance and support were essential. In the Pacific Island Countries, the governments, including the Government of Fiji, distributed various financial assistances such as subsidies for exported crops, cancelling of domestic taxes, duty concession on imported equipment, and facilitating access to low credit costs with lower interest rates. Through this, the agricultural, fisheries and forestry sectors have received beneficial assistant packages (Fijian Government, 2020).

Some banks have also shown interest in providing initiatives in terms of capital base. The RBF provided around FJD100 million to raise the imports substitution and export facility to support credit for large-commercial farmers, credit to exporters, public transportation, and businesses for renewable energy. The 2019-2020 budget was expected to double so that highly targeted loans would ease until the economy could recover from the pandemic (Ministry of Economy, 2020). Likewise, from the COVID-19 response budget, the Government of Fiji will support and strengthen the balance sheets of Fiji Sugar Corporation, Food Processors Limited, Viti-Corp Company, and Pacific Fishing Company through converting their loans into the equity side.

2.4.5 Supply Measurement and Marketing of Fresh Food

Although this pandemic had a significant impact on the food system, there are rooms with great offers to boost the food production and substitution for imports and increase the exportation of foods to the neighboring countries. Citizens of Fiji need encouragement to alter diets towards their flavour for local foods to restrain from unhealthy and ultra-processed foods. Usually, the consumers do not change their purchasing style on processed foods even though the supermarkets increase the prices. Thus, increased costs could be joined with other practices and plans such as nutritional education campaigns, food displays, and labelling foods, which will let the consumers make better choices. The governments also have to work with private sectors since COVID-19 has commenced; many individuals have turned to informal businesses for food by selling them in the streets without understanding hygiene or practising food safety rules (FAO, 2020b).

The Pacific region has approved economic stimulus packages from which Fiji announced about US$400 million for these packages to reduce the impacts of COVID-19. These packages come from the current budget announced by the Government, concession loans from overseas, government bonds and donors that can support direct funding, and relevant ministries. Some stimulus packages include improving food security, successful supply of local or imported foods and export subsidies for some crops such as; cocoa and coconuts. Likewise, these packages will reduce the impacts of Coronavirus on food systems produced locally and will assure access to nutritious and safer foods (Shukrullah, 2020).

The FAO advised countries on the COVID-19 health measure incorporation within the supply chains so that the businesses' continuous functioning continues. There hasn't been any proof that food and its packaging could be a transmitter of COVID-19. Therefore, farmers, processors, transporters, storage operators, vendors, and consumers can operate without food processing and selling captivities. The advice was provided to implement farm measurements in transportation, supply, labour working in farming fields, and processing units. These measurements involve using masks, social distancing, sanitizing, and frequent hand washing and temperature check-ups, which have been implemented in the Pacific and Asian Regions. Thus, this provides better Management of regular food supply within and outside the country (FAO & WHO, 2020).

3. Way Forward

In the upper content, it depicts some significant lessons and improvements that have been innovated by the Government of Fiji and other organizations to fight against the deadly virus (COVID-19); however, the points and descriptions illustrated below provide more solutions and recommendations to overcome and improve from this pandemic in Fiji and other Pacific Countries.

3.1 Strategies—Food Supply Chain

According to Aldaco et al. (2020), the overall food waste and loss were less affected by COVID-19, yet it increased to 12 per cent higher in wastage of foods at a household level. Many valuable bioactive components such as pectin's, flavonoids, carotenoids, essential oils and phenols can be obtained from the food wastes reutilized in the food chain and supply. These components can be utilized as nutritional substitutes, food, preservatives, and gelling agents when made into compounds (Deng et al., 2015; Galanakis, 2012; Galanakis, 2013). Suggested that innovative techniques could be invented in the extraction, fraction and isolating stages of the bioactive compounds obtained from the food wastes. However, this process requires different collection and processing centers to recover from food wastes.

Using decentralization methods can also help in avoiding the risks and threats associated with COVID-19, such as; facilities with lower scale placed near the consumers will decline the cost of storage and transportation and reduce environmental impacts as well as, it will shorten the supply chain and minimize the consumption of emission and energy at transportation and storage period. The flexibility of the supply chain comes from decentralization and allows the customers to receive natural and fresh products. Likewise, it also assists in simplifying the procedures of administration work to reach people that are poor or has a disadvantage in getting the supply area (Almena et al., 2019a, 2019b; FAO, 2005). Not only this, but the inputs of agricultural products should also be regarded as necessary so that there is high food production and supply of the products. The selection of the collection centers should be well planned in consideration of their distance to the manufacturer. Mobility will also decline if small producers are integrated into collection centers with large capacities (Galanakis, 2020). Hygiene is also an important aspect that can prevent the spread of many diseases and viruses (Igbal, 2021). Thus, following proper hygienic instructions can help in supplying the food products without transferring the virus from one person to another.

Governments and other private sectors could use the "(SCM) Supply Chain Management, Data Science" to resolve the supply chain problems and facilitate solutions by doing qualitative and quantitative measurements, keeping in mind the variations of data availability and data quality (Waller and Fawcett, 2013). Accessing the correct data when the time is right is essential for the efficient function of the supply chain. Having reliable information will decline market uncertainties and allow the organizations and private sectors to depict sources of risks and disruptions. Moreover, given correct data, the agencies (private industries and organizations) make better decisions and increase their profit (FAO, 2020c).

3.2 Recommendations and Suggestions for Small-Scale Farmers

Fiji and other Pacific Countries should allow measurements to assure agricultural workers safety and health. Healthcare professionals must take track of employees for illness determination and status. Likewise, as mentioned above, countries should build and locate collection centres for agricultural products that could be easily reached by farmers producing in small-scale farms, relating to the decline in mobility (FAO, 2020d). According to Tetteh et al. (2015), the storage sectors with improved structure can help in reducing food wastage throughout the food value chain. Yet, modern, or improved facilities require higher production costs. Thus, agricultural enterprises with small-scaled or medium-scaled farmers can use the donors or the Government's capital.

While considering vertical and horizontal mechanisms, the food banks can play a vital role in it, with the farmers' association that makes contractual arrangements in the agricultural sector. This could be a solution to assist farmers in making new markets by selling unsold products to the food banks, thus creating connections between farmers and people facing vulnerabilities during the pandemic (Jackson & Yurkevich, 2020). The Pacific countries can also plot receipt systems in the warehouse to allow small-scale farmers and producers to improve their access points for financial loans and receive the best prices for their products. This receipt will eventually help farmers safely store crops in the modern storage facility and allow them to market their products later when there are higher prices (Miranda et al., 2019). Khanal and Mishra (2016) suggested that countries can develop and grow e-commerce for smaller shareholders. They also indicated that internet communications ensure the commercialization of products to many consumers and allow the farmers to look for cheaper inputs.

3.3 Suggestions and Recommendations for Government and Business

Firstly, the Government should build a crisis committee for focusing on the effects of COVID-19 on the food supply chain and agricultural production. These committees should determine and observe the progress impacts and suggest measurements to decline the impact of COVID-29 on farm products and the food supply chain. Furthermore, the committees should coordinate with the private sector to ensure the full implementation of methods and strategies (FAO, 2020e).

The governments should also allow and operate provisioning methods to support the production level. For example, according to FAO (2020f), the regions highly affected by the pandemic should be prevented by programs involving temporary input subsidies. In addition, programs for migrants involving data collection and assessment should be utilized to determine where and when the migrants are needed (Martin, 2016). This will help in knowing the movement restrictions since border closures substantially affect the labour supply in agriculture.

Furthermore, the European Union (EU) once introduced the "green lanes" for transporting agricultural food products to assure fast and free movements on borders. The European Union measurements had illustrated free movement of farm products and seasonal workers to reach their workplace on time and start their activities.

According to Rossi (2020), approval was given for a temporary framework (state-aid measures) to support growers and businesses associated with agricultural foods ensuring liquidity. However, it has become necessary to empower the local households to work as agricultural labourers since many in the local population are now unemployed or jobless. These unemployed individuals should be given wages when requiring them to be agrarian labourers because these local workers do not wish to work on the farm (Martin, 2016).

Not only this, predictions and determinations should be made on the yield of national food stocks to define the surpluses and shortages of the production that might occur during pandemic like COVID-19. Food stock management should indulge better practices considering food stocks in different regions and reducing no-food uses like bio-fuel (FAO, 2020e). Models for crop yield should be made, which will assist the governments in decision-making on food security or marketing. The local models can be regarded as data-intensive models appropriate for small land areas. In contrast, models covering the whole region can be defined as extensive data techniques which will cover larger land areas. Thus, selecting proper models is critical to understanding and reacting to the impacts of policy decisions (Donohue et al., 2018).

Recently, a Table 1 was projected as a summary of the impacts of COVID-19 on the food system in the Pacific Region, which has helped several organizations and governments of the Pacific Regime to make corrective decisions on how to overcome the pandemic.

Table 1. Summary showing key-potential impacts of COVID-19 on the food system in the pacific region

	Global analysis of potential COVID-19 related impacts on food systems	**Pacific-specific food system context**	**The potential food system, food security and nutrition impacts in Pacific**
Production	Access to inputs may be limited by restrictions on travel, reducing agricultural production, yields and income; access to services may be reduced (*e.g.*, veterinary, extension services). Decreased demand and purchasing power will reduce investment and technology, further reducing availability. Seasonal impact needs to be considered.	There are existing challenges in access to inputs, services, labour and finance; relatively long production cycles for root crops; data gaps in domestic production potential.	Increased demand for locally grown staples (*e.g.*, root crops) if prices of imported commodities rise. Potential for increased participation in home gardening/own account production; even if production increases still variability incapacity, especially by geography and access to technologies; challenges to access inputs, services, labour, and finance exacerbated
	Little global commentary on fisheries to date.	Fish are the dominant animal-source food; *Beche de mer* is an essential source of income for many rural communities.	Demand and domestic fish catch may increase; significant disruptions to the regionally important tuna industry will impact national access to tuna and economies.
	Restrictions on the movement of people impact the seasonal agricultural workforce especially relevant for labour-intensive crops, such as fruits and vegetables. Higher vulnerability to COVID-19 for elderly farmers. Decreased ability for companies to care for workers health and wellbeing (across the global supply chain).	Many Pacific Island Countries and Territories (PICTs) are remittance-dependent; seasonal agricultural labour to Australia and New Zealand is significant.	Reduction in labour force mobility may contribute to declines in income, which can directly affect people's access to food; disease and limited health services will impair agricultural output in the instance of high disease rates. In addition, population flows from urban to rural areas, *e.g.*, people returning to home villages, may influence the availability of local rural labour for agriculture.
	Increased levels of post-harvest losses due to reduced workforce	Regionally produced foods subject to high losses	Existing post-harvest losses are exacerbated due to supply chain disruptions; potential for investment in primary processing and local distribution.
Processing	Food companies (domestic and external) facing increased demand for processed staples may experience input shortages due to production and transport being affected—small and Medium Enterprises (SMEs) at risk of bankruptcy.	Limited domestic processing in PICTs and high dependence on imported inputs; village processing is essential for short distance/domestic distribution.	Reduced availability/increased prices for domestically produced staples and food usually processed in-country; local processing of tuna disrupted; shortages of imported processed and packaged foods possible—essential, *e.g.*, milk powder, tinned foods, and highly processed foods (unhealthy discretionary foods). SMEs are particularly affected.

Distribution	Regional international trade, including exports from some countries; air freight and shipping likely to be reduced; price increase in export (non-PICT) countries raising affordability concerns for PICTs; potential backlog at ports and airports during and post-crisis.	All PICTs net-food-importers of staple (energy) foods.	Possible reductions in staple foods; shortages of imported processed and packaged foods possible (unhealthy discretionary foods); possibly shortening supply chains including intra-regional trade.
	Due to reduced travel and quarantine measures, including local internal borders, impact internal trade and distribution.	Expected to have food transported between and within islands domestically; some reliance on public transport for food; kin networks important for sharing food. Pacific is import-dependent for fuel	Domestically produced food supply to urban centres reduced (*e.g.*, root crops, fruit, vegetables); potential reductions in the distribution of imported food to rural areas; likely differential impacts for producers (*e.g.*, based on geographical location, own transport); home gardening won't be affected. Any disruptions to fuel imports could impact stove fuels for cooking.
Food market	Fresh food markets are reduced due to food safety (hygiene) restrictions on gatherings. Closure of farmers' markets and stalls for selling fresh fruit and vegetables increase food waste and reduce farmers' ability to sell food and thus have a stable livelihood; lessening the ability of consumers to access fresh fruit and vegetables	Open markets primary source fresh fruit and vegetables, meat etc.; hygiene and food safety may be an issue.	Access to and consumption of fresh food may be reduced in urban areas; If livelihoods are affected, food security and ability to purchase different food may be affected; non-cash food economies are likely to become more critical in village economies; gendered impacts are evident from the restriction in informal marketing, with women and youths most commonly taking up economic activities for the sale of subsistence produce in the margins of the formal economy.
	Potential supply concerns for supermarkets may be price gouging; commodity prices could also fall due to a lack of demand. In addition, the types of foods consumed could change in response to changes in prices.	Small stores are a significant source of food in the region; supermarkets are an essential source of food in urban areas	Stores and supermarkets may be unable to source some stocks, and prices may increase for goods in short supply. Differential impacts rural/urban and differences between PICTs; price gouging may impact food security.
	Declines in food eaten away from home with physical/social isolation public health measures	Informal food service is significant in the economy.	The informal sector may be unable to access (physical/financial) food ingredients; SMEs are likely to be particularly affected. As a result, dietary changes are positive (reduced 'fast' food) and negative (reduced dietary diversity).
	Probable shift to long-shelf-life and staple foods with changed shopping behaviour due to physical distancing efforts; reduced consumption of fresh vegetables and other perishable products.	Limited storage capacities for fresh foods, particularly in low-income areas.	Greater consumption of staple and processed foods may exacerbate diet transition, mediated by availability, accessibility, affordability of the substitute food and dietary habits
	Food substitution and access issues will differentially impact women and children.	Intra-household power dynamics are very influential to food distribution in the Pacific region.	An increase in domestic violence and conflict within households could increase food insecurity for vulnerable groups

Source: COVID-19 and Pacific Food System Resilience: Opportunities to Build a Robust Response (2020).

The above table was obtained from the Global Alliance for Improved Nutrition's 'The COVID-19 Crisis and Food Systems: Probable Impacts and Potential Mitigation and Adaptation Responses' (Haddad et al., 2020b) and justified by Eriksson et al. (2020), Aqorau (2020), Food and Agriculture Organization of the United Nations (2020g), Haddad et al. (2020a); Husain et al. (2020), Wood (2020), and High-Level Panel of Experts on Food Security and Nutrition (2020).

3.4 Measurements on Global Trade

Measurements to facilitate the farming input trades are vital, such as fertilizers and equipment should be derived in the short run since these are crucial for the continuation of planting activities (FAO, 2020c). It's essential to understand the restricted policies determined due to COVID-19 impacts since the availability of food products

are very high, and the critical staple production forecasting is good. Though these favourable conditions are available, the governments in the Pacific Region are working to assure the security of food products due to high demands by the consumer and preventing vulnerable citizens from higher prices. However, the past experienced lessons show that eluding restriction policies of trade can be very effective in avoiding farm and consumer incomes as supporting activities directly (Martin & Glauber, 2020). Thereby, options and strategies for agriculture trade should be detailed to reduce the medium-term outbreak effects. Each country must determine its policies identifying the importance and consequences of altering some aspects of trade strategy such as import taxes for inputs in farming.

The national production capacity of agriculture should be limited, and the prices depict raised trends for some food products. This outbreak has allowed optimizing the options for trade and tax policies to keep the global trade open (FAO, 2020c).

4. Conclusion

COVID-19 has been affecting Fiji since 2020. The Government is still trying its best to recover from this pandemic by implementing new policies and rules among the citizens of Fiji, such as social distancing, restrictions in social gathering and so on. This makes the citizens being at risk of the spread of COVID-19. However, many people haven't followed the regulations with priority; there have been so many cases in Fiji (2021). As discussed in this review, this pandemic has a vast impact on agricultural and food supply within and outside the country, depicting and teaching the importance of agriculture in every country worldwide. Although COVID-19 has reduced and affected the food supply chain and commercial farmer's production in Fiji and other Pacific nations, it has shown the vital role of agriculture in an individual's life since several households without jobs started to perform farming practices to feed their family. Therefore, the Government recommended and launched some initiatives, programs and packages to help small-scale village farmers and households to cultivate better food production.

Similarly, many villages and households have started barter systems, farming and other activities to obtain some cash or food for their family. This pandemic has affected all individuals employed in the tourism industry and the student because, at the time this pandemic started, the school was closed. Thus, the Government and other organizations have also bought solutions for the students, such as online classes and workbooks. This has, though, been challenging but has helped students to at least learn something about their subjects.

Acknowledgements

The author extends their profound gratitude to Dr. Jahangeer Akbar Bhat, Mamere Jnr Alefaio Poasa, Mohammed Ayub Khan and Mohammed Safiq for their outstanding contribution.

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