COVID-19 and climate: Threat multipliers to Pacific food and nutrition security

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Pacific Island Countries (PICs) comprise more than 2000 islands and atolls in 28 countries and territories. While the region covers one third of the Earth's surface, the total land area is only approximately 550,000km^2, representing 2 per cent of the entire 30,000,000km^2 of the Pacific region (Barnett 2011). This land area is home to approximately 2.3 million people (excluding Papua New Guinea) of whom half live within 10km of the coast (Andrew et al. 2019). Population numbers are rapidly growing around major cities, and urbanisation in PICs is happening three times faster than the global average (UN Habitat 2015). By 2050, over half of the Pacific population is expected to live in urban areas (UNESCAP 2018).

Subsistence food production forms a significant part of household income, well over 60 per cent in some countries, but also varies greatly across the region. Variable inflation rates, poor economic growth, negative trade balances, global food price rises, and increasing household dependence on commercial markets affect almost all PICs and have added to food and nutrition insecurity (SPC 2016). Agricultural production in large parts of the Pacific is well below its inherent potential, with recent analysis by Farrell et al. (2020) finding that between 1980 and 2016 crop production in the region (excluding Fiji and PNG) declined from 1200 to 800 grams/per capita/per day.

Pacific food systems are diverse and complex, spanning different geographies and agro-ecological environments. To understand the impacts of the COVID-19 pandemic on Pacific food security, we selected seven PICs on the basis of a typology of island groupings (Table 1). This allowed the impacts of COVID-19 to be differentiated geographically and is consistent with other Pacific studies that have examined food systems shocks, and with regional development in food systems programing (Charlton et al. 2016, SPC 2020). The seven PICs selected include small islands (Kiribati and Tuvalu), medium islands (Samoa, Tonga) and larger islands (Solomon Islands, Vanuatu, Fiji). We conducted a separate parallel study in PNG, which is excluded from this list of countries, because of its size and geographical complexity (but covered in the following paper).

Table 1. Typology of Pacific islands

Grouping	Typical geologies	Nations in this assessment	Population (est. ,000)	Total island area (km2)
Group 1: Smaller islands	Small reef and composite islands	Kiribati	120	995
		Tuvalu	10	44
Group 2: Medium islands	Volcanic, limestone, and composite islands	Samoa	199	3,046
		Tonga	100	847
Group 3: Larger islands	A mix of composite, limestone and sand-based islands	Solomon Islands	667	29,675
		Vanuatu	305	13,526
		Fiji	895	20,857
Total			2,296	68,990

While the contributions that agriculture and fisheries make to livelihoods and the socio-economic profile vary between countries, primary food production remains core to the region's economies:

- The smaller Group 1 countries are more reliant on fisheries than agriculture. Both Tuvalu and Kiribati have approximately 40 per cent of the population living in rural areas. Agricultural land makes up 42 per cent of Kiribati and 60 per cent of Tuvalu, contributing approximately 24 per cent of GDP in Kiribati and 17 per cent in Tuvalu. Agriculture and fisheries contribute between 9.2 and 35 per cent of GDP depending on country.
- The Group 2 countries have lower capacity for food production, and much higher trade deficits given their reliance on imported food. In Tonga, over 77 per cent of the population lives in rural areas, and agriculture takes up 46 per cent of the land area and contributes 15–20 per cent of GDP. In Samoa, 82 per cent of the population live in rural and peri-urban areas, agriculture takes up 12 per cent of the land area and contributes 10–20 per cent of GDP (Sialaoa 2019).
- Group 3 countries have highly diverse food production systems and differentiated dependence on rural livelihoods. In Solomon Islands and Vanuatu, 70–80 per cent of the population living in rural areas are involved in agriculture and/or fishing. In Fiji less than half of the population lives in rural areas. The contribution of agriculture to GDP also varies in Group 3 countries, from approximately 35–40 per cent in Solomon Islands to 15–20 per cent in Vanuatu and less than 10 per cent in Fiji (FAO 2020a).

Data collected include a range of media and public policy responses from different PICs, as well as selected examples from interviews carried out with 21 key informants working in agriculture, fisheries and policy in the Pacific. Data were collected in June-July 2020 and analysed in August 2020. It builds from parallel emerging studies that either document the immediate impacts of COVID-19 on food systems (Eriksson et al. 2020, Piturara 2020), or projects the potential impacts.

Factors currently undermining Pacific food and nutrition security

Climate and water risk, associated loss of arable land and the adaptation gap

Climate change and associated increases in the frequency and intensity of extreme weather events have negatively impacted food and nutrition security in the Pacific region for over a decade (MacPherson 2017). In 2015, Cyclone Winston resulted in A$368 million in lost agricultural production (Sleet 2019). In the same year, Tropical Cyclone Pam resulted in the loss of 80 per cent of crop production in Vanuatu (Cvitanovic et al. 2016). In addition to the obvious impacts of extreme weather events on food production and food trading, climate change is also driving geographical spread of disease and pests, increasing food safety risks (Maggiore et al. 2020).

Compounding impacts of climate threats, COVID-19 control measures, and food insecurity were experienced in April 2020, during Tropical Cyclone Harold in Vanuatu. Measures to mitigate COVID-19 contagion in Vanuatu led to nation-wide lockdowns, limiting the normal movement of people. Category 5 Cyclone Harold severely impacted the northern provinces: 95 per cent of homes were destroyed in Pentecost, crop damage ranged from 50 per cent to 100 per cent, and an estimated 27 per cent of the population was displaced (Refugees International 2020). FAO's situational assessment in May 2020 estimated that 17,500 ha of cropland was affected (FAO 2020b). Relief measures from Australia and New Zealand were hampered when humanitarian aid workers were required to quarantine for 14 days before being able to aid local communities.

Freshwater availability and extreme climate events have and will continue to put pressure on agricultural production. The combination of sea level rise and thinning freshwater lenses due to lower rainfall and increased extraction drives salt water intrusion, which will amplify food systems insecurity (Leal Filho et al. 2020). This in turn depresses agricultural production and presents a geopolitical security risk in the region.

Persistent malnutrition

While persistent malnutrition in the region has generally declined, it still remains higher than the global average. Kiribati, Solomon Islands, and Vanuatu have over 35 per cent of their respective populations suffering from nutritional deficiency (IHME 2018). Malnutrition impacts are unevenly felt, with vulnerable households (including the elderly, people living with a disability, the socio-economically poor and other marginalised groups), with children and women being overrepresented (FAO 2020a). The top two risk factors causing the greatest burden of disease in the Pacific are malnutrition, including nutritional deficiencies and dietary risks including diabetes, kidney disease, and cardiovascular diseases. For instance, diabetes and kidney disease in the seven Pacific Island countries in this assessment have a much higher prevalence than the global average (IHME 2018).

One of the drivers of persistent malnutrition has been the changing international trade context of the region. Pacific trade liberalisation in the mid-1990s resulted in an increase in cheap imported processed foods such as noodles, rice, and wheat. The convenience, low price and ease of access of these products led to changed food consumption habits. Further trade and economic impacts of COVID-19, discussed later in this paper, may hamper a dietary transition, with people not being able to afford healthier foods or adequately feed children, thus lowering the consumption of nutrient rich foods.

Limited employment opportunities and reliance on remittances

Key informant responses indicate that the high proportion of low-paid, informal labour in agriculture, and other services using migrant labour, remains a significant vulnerability in the Pacific region. Poorly remunerated

agricultural workers contribute to decreased food access, utilisation, and stability over time. The International Labour Organization stressed that 'despite sustained job growth, decent work deficits and informality challenge prospects of further reduction in working poverty in Asia and the Pacific' (ILO 2018).

Tourism and associated services are major employers in the Pacific, notably in Vanuatu, Fiji, Tonga, and Samoa. Tourism makes a substantial contribution to the GDP of several of the Pacific countries (e.g., 30 per cent in Samoa, 38.9 per cent in Fiji, and 45 per cent in Vanuatu). Tourist related services provide between 30 per cent (Solomon Islands) and 80.2 per cent (Samoa) of total employment in the Pacific. Tourism also creates much of the domestic demand for fresh produce and thus farm incomes for those delivering to restaurants and resorts. For example, in 2017, hotels and resorts in Fiji's main tourism areas spent FJ$74.4 million (A$50 million) on procurement of fresh produce.

Remittances make significant contributions to social protection in the Pacific, although their aggregate flow varies widely across the region. In a recent analysis, the contributions of remittances to GDP in 2018 ranged from 40.7 per cent in Tonga to about 16.4 per cent in Samoa. The World Bank estimates that remittance flows across the Pacific will drop, compared to 2019 estimates, by approximately 20 per cent or US$100 billion dollars, by the end of 2020 due to restricted international employment opportunities (IMF 2020). It predicts that due to reductions in national GDP and remittances up to 60 million people will be pushed into extreme poverty as a result of the impacts of the COVID-19 pandemic. This substantial poverty increase can lead to substantial reduction in economic access to food, creating both an immediate and an ongoing food security risk for the region.

Significant dependence on food imports

Since the 1980s, there has been a marked acceleration of the globalisation of Pacific food systems. Food imports increased in parallel to a decline of total agricultural output. The dependence on international systems exposes communities to the price fluctuations of commodities in global markets. At this stage, international food prices have remained relatively stable during COVID-19; however, the dependence of the region makes it particularly sensitive to global price fluctuations if they occur during the northern hemisphere's winter. Despite relative price stability, import prices remain elevated compared to 2019 (AMIS 2020), and more volatile than in previous decades. Both market price and price volatility are important determinants of access to food and thus important determinants of Pacific food security.

Persistent gender inequality

In 2018, it was reported that while Asia and the Pacific had made progress in some areas of gender equality, available data against the Sustainable Development Goals indicators highlighted significant inequality for women and girls (ADB and UN Women 2018). For one, gender-based violence is endemic in the Pacific region; often during conflicts and natural disasters, social structures are further destabilised, leaving many women and girls vulnerable to increased sexual violence, exploitative labour, and trafficking (UNFPA 2020).

Women make important contributions to agriculture and rural livelihoods, and play a vital role in the care and reproduction of households and communities. However, persistent gender inequalities in the region, such as unequal access to productive resources (including land, services and inputs, finance, training and information), markets, and institutions, hamper the realisation of women's human and productive potential and undermine community food security. The COVID-19 pandemic has exacerbated already limited access to resources. The closure of fresh food markets has had a disproportionate impact on women, as the main participants in fresh market sales. These closures served to reduce household incomes and in turn hamper ongoing food production.

Rapid population growth, intergenerational inequity, and urbanisation

The demographic youth bulge, accompanied by intergenerational inequity that works against the young, and growing urbanisation are impacting agricultural and fisheries workforces and hence food security across the Pacific. Most public infrastructure and support are targeted at urban communities, exacerbating the urban-rural divide in much of the Pacific. Under-resourcing of rural development has left youth and rural communities more vulnerable to shocks and hence less resilient for food security.

Poverty is known to exacerbate food insecurity; in urban areas with limited capacity to grow food, loss of employment can rapidly amplify food insecurity. Urban and informal workers in the economy are core to keeping food systems functioning, especially in larger island countries like Fiji, Vanuatu and the Solomon Islands. In both Port Vila and Honiara, farmers often commute from rural areas to central markets, often staying overnight until produce is sold. COVID-19 related lockdowns have meant many urban markets have closed, or operate at reduced volumes, cutting income for street food vendors and limiting the influx of food from rural areas. Because many urban dwellers rely on income from informal food-related businesses, the pandemic has resulted in negative economic impacts for much of the urban population, reduced purchasing capacity for food, and therefore elevated food stress. This is compounded by less fresh produce entering urban areas, increasing food prices for staples.

Youth are also disproportionately exposed and vulnerable to socio-economic shocks associated with the COVID-19 pandemic. The Pacific has a very young population – more than half of the population of the 22 countries and territories in the Pacific is under the age of 25. Un- and under-employment is a major concern, with average youth unemployment at 23 per cent compared with the global average of 12.6 per cent (ILO 2018). Youth living in informal urban settlements have been hardest hit by the economic downturn and are less likely to find gainful employment, than those over the age of 25 once economic recovery is underway.

Persistent under-resourcing of biosecurity, animal and plant health

Pathogens and pests continue to threaten agricultural and aquatic production in the Pacific – the risk of pests and diseases increases as genetic diversity declines. Island environments have inherently limited biological resilience in the face of aggressive invasive species, due to limited natural predators, and relatively low genetic diversity. Multiple biosecurity breaches have resulted in substantial food insecurity and nutritional impacts, loss of farmer incomes, export earnings, and balance of payments (McGregor et al. 2011).

Fragmented value chains and food governance systems

In many countries across the Pacific, the governance of food security and food systems extends across multiple agencies managing agriculture and trade through to public health, including public, private and civil society actors. This fragmentation makes policies that work across sectors hard to facilitate. COVID-19 has placed extra stress on these governance arrangements and resulted in instances where the rollout of incentives has been slow, and ineffective. Contrastingly, knowledge and information sharing between agencies and between communities in the region has been collaborative during the COVID-19 pandemic. The diversity of studies looking at food and nutrition security have enabled the World Food Programme Regional Food Security Cluster to meet and share progress on work, allowing for strong alignment of interventions to support recovery.

Traditional farming practises and declines in agricultural productivity.

The Pacific region has the smallest land holdings in the world, with an average holding of 1 hectare, and an average of 3.2 parcels per holding (FAO-RAP 2020). For most of the Pacific, the total land cultivated by smallholders comprises a sizeable portion of the total agricultural land. Agricultural production in large parts of the Pacific is well below its potential with recent analysis by Farrell et al. (2020) finding that between 1980-2016 crop production in the region (excluding Fiji and PNG) declined from 1,200 to 800 grams/per capita/per day (includes foods relevant to food security, excluding cash crops and tuna).

Growing input costs, more variable seasonal conditions, incentives to grow specific cash or food crops, and the pressure to reduce the complexity of crop rotations have all resulted in much lower crop diversity than ever before, in turn predisposing the region to system wide shocks, notably for very subsistence-dependent countries like Solomon Islands. Cash crop production has continued in Fiji, and increased in Solomon Islands and Vanuatu. Copra, sugar cane and kava have seen increased focus as an engine of economic development in rural areas, across Group 2 and 3 islands.

Marine production plays a critical role in some Pacific economies. National fisheries in Vanuatu, Solomon Islands and Kiribati are highly lucrative foreign-owned enterprises (Barclay and Cartwright 2007). For example, in Kiribati which has one of the largest commercial tuna fisheries in the region (Gillett and Tuati 2018), up to 75 per cent of government revenue comes from oceanic fisheries access fees. Conversely, of the fish consumed in rural areas in the Pacific, 60–90 per cent comes from subsistence fishing activities (Bell et al. 2009). The contribution of coastal fisheries to communities is often understated, and the pressures on marine ecosystems creates economic and food security risks for these dependent communities.

While important for both local and commercial economic benefits, these marine systems are exposed to global economic and climate change pressures. Warming oceans will create further risk to the food security of communities reliant on fishing, for protein and micronutrients. COVID-19 further exacerbates these threats through movement restrictions that have resulted in declines in subsistence fishing activities and income from temporary closure of commercial enterprises.

Increasing logistical costs and the future implications of greenhouse gas targets for shipping food to and from Pacific nations

In 2018, the International Maritime Organization (IMO) adopted mandatory measures under the pollution prevention treaty (MARPOL) to reduce emissions of greenhouse gases from international shipping. The IMO has executed global technical cooperation projects to support the capacity of states, particularly developing states, to implement and support energy efficiency in the shipping sector (IMO 2018). Despite these support plans, the emissions reduction strategy is impacting the Pacific in a number of ways. The first is a slowdown in the speed of existing vessels in order to reduce fuel usage. This is slowing the delivery of food products to Pacific islands and potentially disrupting existing transport schedules. A second, longer-term impact, will be an increase in logistics costs as fleets are required to replace older vessels with more energy efficient ships.

Both added logistics costs and more volatile scheduling will have significant impacts on food availability and food prices across the Pacific. We currently see the potential impacts of added logistics costs and more volatile scheduling resulting from COVID-19 disruptions with localised food stress in Group 1 islands, as well as more volatile food prices in Group 2 and 3 islands (Table 1).

Poorly adapted and underfunded education and risk communication

Across the Pacific region, child and adult education is insufficiently adapted to local conditions, which contributes to a lack of practical understanding of sustainable agriculture, human nutrition, and sustainable food systems. Some recent examples focusing on education for environmental sustainability and green growth provide guidance on how education needs to transform in order to encourage climate change adapted agricultural practices (UNESCO 2016).

School curricula are often poorly adapted to local settings, including local agroecological zones and marketing systems (Epstein and Yuthas 2012) and inadequate

resources devoted to teaching human nutrition and how to meet nutrient requirements with locally available, nutritious food. The limited investment in education further perpetuates gender inequalities. These matters are vital to ensuring good outcomes for human wellbeing, food and nutrition security, and natural resource utilisation.

Gaps in risk communication tools and practices across the region weaken the capacity of countries to effectively engage with populations at risk and the wider public in the event of health security or food security threats, particularly in the Pacific (CHS 2019). Limited formal education in relation to the origin and control of infectious disease complicates effective risk communication.

Conclusions

We have examined key threat multipliers and how they are contributing to factors that exacerbate food insecurity in the Pacific. The current COVID-19 pandemic has highlighted exposures in Pacific security, with this shock resulting in significant loss of employment and incomes, disrupted value chains due to both local and international restrictions on logistics, and resultant increases in food prices and growing food insecurity. In some Group 1 countries, food producers are concerned about the limited availability and/or access to agricultural supplies for the next growing seasons. These input constraints are likely to result in further reductions in food production, extending food insecurity in the region.

Declining food access in urban areas and worsening gender-based discrimination were identified as concerning impacts, but not necessarily across the entire Pacific region. Despite no recorded cases in some countries, the impacts of the COVID-19 pandemic on economies, jobs, food production, education, and health systems have been widespread, with loss of livelihoods and increased levels of poverty. This is occurring against the backdrop of declining agricultural productivity over much of the Pacific region and in concert with a range of pre-existing regional and country-specific threat multipliers, highlighting the fragile state of food security in the Pacific. This convergence of threats highlights the importance of taking a comprehensive, all-hazards, multi-sectoral approach to achieving resilient food systems in the Pacific.

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