

## 6. COVID-19 and food systems in Papua New Guinea



Photo: ACIAR / Conor Ashleigh

## 6.2 COVID-19 in Papua New Guinea

### 6.2.1 Country overview (July 2020)



#### Land use

Land area: 462,800 km<sup>2</sup>  
25.6% agricultural land  
17.7% GDP from agriculture  
and fish (2018)



#### Population

8.9 million people  
81% rural  
Adjusted income per capita  
US\$2,037



#### COVID-19 and health

First recorded case: 13 March 2020  
At 31 July 2020: 63 known cases;  
2 recorded deaths  
At July 2020:  
no spread; no hotspots



#### Local response to COVID-19

State of emergency:  
23 March 2020\*; National  
Pandemic Act: 12 June 2020  
Schools, markets and  
international border closures  
Restricted movement between  
provinces and communities  
Funding call for production  
and transport subsidies  
Medical systems supported  
by international agencies



#### Agriculture and fisheries

Top staples: sweetpotato,  
banana, yam, cassava, taro  
Top exports: palm oil,  
coffee, cocoa, copra  
Low farm productivity;  
limited access to markets  
Range of farming systems  
and land use intensity  
Extensive fisheries sector  
for export, local markets  
and subsistence



#### Key risk multipliers

Agricultural pests and diseases  
Problematic post-harvest storage  
Risk of COVID-19 outbreak  
for health system  
Existing gender and  
nutrition issues  
Occasional droughts and frost;  
changing weather patterns

\* The state of emergency was lifted in mid-August 2020.

## 6.2.2 Development context

An overview of PNG's agricultural, fisheries and nutrition context is shown in Table 6.1. The total land area of PNG is about 460,000 km<sup>2</sup>, of which about 60% is unoccupied (Allen & Bourke 2009:36, 47). Administratively, PNG is divided into 22 province-like bodies (20 provinces, National Capital District (Port Moresby) and the Autonomous Region of Bougainville), 86 districts (85 rural districts, some of which include small urban centres, and Lae Urban), 326 local government areas and 6,118 wards.

The population of PNG is not known with any precision. The United Nations estimates the mid-2020 population as 8.947 million (UN 2020). Bourke and Allen (in press) estimate the mid-2020 population to be between 8.5 and 9.6 million, most likely near the top of that range. The population is increasingly rapidly, with growth rate estimates from 2.7 to 3.1% per annum for recent intercensus periods (NSO 2002, 2013). The mean population density is about 20 people/km<sup>2</sup>. This figure disguises the large variation between locations in population density, with figures as low as 1–2 people/km<sup>2</sup> in much of Western Province and over 800 people/km<sup>2</sup> on some small islands. The highest densities are found in the most productive environments (Allen & Bourke 2009:103–105). Most people (approximately 81%) live in rural villages and produce much of their own food. A smaller proportion (approximately 13%) live in urban areas and the balance (6%) live in rural non-village areas, such as rural schools, plantations, mining camps and small missions or government stations (Allen & Bourke 2009:29). The proportion of the population living in urban areas is fairly constant, as new migrants replace those returning to rural areas. There is little international outmigration.

Agriculture is practised in environments with a large range in landforms, rainfall (1,000 to over 7,000 mm/year) and altitude (sea level to 2,800 m). These may be classed into 10 agroecological zones based on landform, altitude range, soil water deficits and long-term inundation (Table 6.2).

The largest agricultural component is subsistence food production, with sweetpotato, banana, yam, cassava, taro, coconuts and sago the most important food crops (Table 6.1). Other components include domestically marketed food (food sold in the informal and formal sectors in PNG); export cash crops of palm oil, Arabica coffee, cocoa and copra; minor export crops of rubber, tea and vanilla; livestock, particularly pigs and chickens; fish and other marine foods; betel nut, betel pepper, tobacco and firewood.

About 80% of the food energy consumed in PNG is produced in the nation, with the urban minority consuming a much higher proportion of imported food (Table 6.3). The most important imported foods are rice (just over 300,000 t/year) currently sourced from China, wheat (from Australia) and sheep and beef meat (from New Zealand and Australia).

Labour inputs for food and cash crop production are mostly done at a household or community level, with inputs gendered; that is, some tasks are mostly done by men and others are mostly done by women. Where land use intensity is low, the balance between women's and men's labour is about the same, but the proportion of labour done by women increases with increasing land use intensity.

**Table 6.1** Agricultural, fisheries and nutrition context of Papua New Guinea

Indicators		Unit	Value
Surface area <sup>a</sup>		'000 km <sup>2</sup>	462.8
Agricultural land <sup>b</sup>		percentage of land area	25.6
Age of population <sup>a</sup>	0–19 years	percentage of total population	46.2
	20–39 years	percentage of total population	30.9
	40–59 years	percentage of total population	17.1
	over 59 years	percentage of total population	5.6
Stunting rate <sup>c</sup>	under 5 years	percentage of age group	49.5
Wasting rate <sup>c</sup>	under 5 years	percentage of age group	14.1
Overweight <sup>c</sup>	under 5 years	percentage of age group	13.7
	male	percentage of total population	48
	female	percentage of total population	58
Obesity <sup>c</sup>	male	percentage of total population	17
	female	percentage of total population	26
Population distribution <sup>a</sup>	rural	percentage of total population	87
	urban	percentage of total population	13
Gross domestic product per capita <sup>a</sup>		US\$	2,730
Adjusted net national income per capita (2018) <sup>a</sup>		US\$	2,037
Agriculture and fisheries, value added <sup>a</sup>		percentage of gross domestic product	17.7
Government expenditure on agriculture <sup>c</sup>		percentage of total outlays	1.7
Top staples (ranked most to least) <sup>d</sup>		sweetpotato, banana, yam, cassava, <i>Colocasia</i> taro, <i>Xanthosoma</i> taro, coconut, sago, potato, rice	
UNDP Human Index ranking <sup>e</sup>		out of 189	155
2017 World Risk Index (mean value calculation 2012–2016) <sup>f</sup>		out of 171	11

a World Bank (2020)

b Allen & Bourke (2009)

c Global Nutrition Report (2020)

d Bourke & Vlassak (2004)

e UNDP (2020)

f Bündnis Entwicklung Hilft (2017)

Source: Data collated on 10 July 2020 by Alex van der Meer Simo.

**Table 6.2** Major agroecological zones in Papua New Guinea

No.	Name of zone	Altitude range (m)	Mean annual rainfall (mm)	Population density	Notes
1	Small and very small islands	0–100	2,000–4,000	High to very high	–
2	Larger islands	0–1,000	2,000–7,000	Low to very high	Including the islands of New Britain, Bougainville, Manus, Goodenough and Karkar
3	NG lowland (little LTI)	0–500	1,000–7,000	Low to very high	SWD occurs in southern Western Province, coastal Central Province, Markham Valley, Ramu Valley, Sepik Valley, parts of Milne Bay Province
4	NG lowland (LTI common)	0–150	1,500–3,000	Low	SWD in parts of Western, Gulf, Central, East Sepik, Madang
5	NG intermediate altitude	500–1,000	1,500–5,000	Low	SWD in Wau–Bulolo area, Morobe Province
6	NG lower highlands	1,000–1,500	2,000–4,000	Low to moderate	–
7	NG main highlands	1,500–2,000	1,800–5,000	High to very high	SWD in northern parts of Eastern Highlands province
8	NG high altitude	2,000–2,400	2,500–3,500	High	–
9	NG very high altitude	2,400–2,800	2,500–3,500	Moderate to high	–
10	Urban/peri-urban	0–2,100	1,000–3,500	High to very high	SWD common in Daru, Port Moresby, Kokopo, Kainantu, Goroka and Wau

Notes: NG = New Guinea mainland; LTI = long-term inundation; SWD = soil water deficit

**Table 6.3** Proportion of food energy consumed that was produced in Papua New Guinea (1976, 1983, 1996 & 2006)

Year	Proportion (%)	Source	Notes
1976	77	Shaw 1985:33	Prepared for Food Policy paper by the National Planning Office in 1978. (Shaw's data was for proportion of food, which is imported, thus the figure is reversed here.)
1983	73	Shaw 1985:33	An update of Shaw's 1976 estimate. He cautions that this is almost certainly a lower limit and the figure should probably be adjusted upwards.
1996	80	Gibson 2001:42	Consumption surveys found that people in rural areas obtain 85% of their food energy from PNG sources. In urban areas it was lower, at 50%.
2006	83	Bourke et al 2009:131	Estimates were that 83% of food energy and 76% of food protein consumed was produced in PNG.

The Global Burden of Disease study in 188 countries found that PNG was in the lowest quintile of the health-related United Nations Sustainable Development Goals index, together with Afghanistan, Yemen, Nepal and numerous nations in sub-Saharan Africa (GBD 2016). There are chronic high levels of tuberculosis and HIV/AIDS as well as outbreaks of diseases such as measles from time to time (DFAT 2018). The health service is already operating beyond its capacity to cope well (Mola 2020).

Nearly half of all children (49.5%) under five years old have stunted growth, which indicates long-term malnutrition (UNICEF 2020), and many are wasted (Table 6.1). A 2018 study in four lowland locations reported high levels of stunting and underweight in children (Benson et al 2019). Malnutrition is reported to directly cause or contribute to one-third (33%) of all children's deaths in hospitals (DoH 2015). Other demographic data compares unfavourably with most other nations outside of sub-Saharan Africa, including the rate of under-five child mortality (48 per 1,000 live births), infant mortality (38 per 1,000 live births) and the youth literacy rate for the 15–24 age group (68%) (NSO & ICF 2019, UNICEF 2020).

Other data on malnutrition and obesity in Melanesian countries is given in the Pacific island countries assessment (see Table 5.3).

### 6.2.3 Status of COVID-19 in Papua New Guinea

By 31 July 2020, 63 cases of COVID-19 were reported, with two deaths (Table 6.4). This was almost a fivefold increase of the reported cases only 11 days earlier (16 July 2020). In early July, the Department of Health reported that seven of the 11 cases had no travel history during the likely period of infection, indicating locally-acquired infections through community transmission. The danger of potential importation of the disease from Papua Province in Indonesia was highlighted (DoH & WHO 2020). About 10,000 people had been tested for COVID-19 by the end of July 2020.

The PNG Government declared a state of emergency in late March 2020, which was extended until mid-June when it was replaced on 16 June 2020 by the National Pandemic Act 2020. The state of emergency included restrictions on domestic and international air travel, closure of cross-province travel, closure of schools, closure



**Table 6.4** Timeline of the COVID-19 crisis in PNG

Month	Date	Milestones
Jan	27	Department of Health activates National Emergency Operations Centre
Feb		Department of Health develops the Emergency Preparedness and Response Plan
Mar	20	Prime Minister James Marape announces first confirmed case of COVID-19
	26	Government declares a state of emergency from 23 March to 6 April 2020 (a total of 13 emergency orders were made)
Apr	2	National Parliament extends state of emergency for two months; domestic air travel and inter-provincial travel restrictions to continue
	3	PNG 5.7 billion Kina (K) stimulus package announced by Treasurer Ian Ling-Stuckey
	6	Second confirmed case of COVID-19 in East New Britain; lockdown in East New Britain for 21 days
	8	Emergency Controller issues orders to stop public transport operations during Easter weekend
	16	Five new cases announced: three in Western Province; one in National Capital District; one in East New Britain
	21	Emergency Controller announces country's transition to 'new normal'
	22	Eighth case of COVID-19 announced in Eastern Highlands
May	4	Primary schools resume; in practice, the number of days that schools operated varied considerably between schools
	8	Fresh produce and vegetables freight subsidy announced; paid to a single shipping company to transport fresh food from Lae to Port Moresby
	18	K320 million announced (as part of a stimulus package) to support agriculture, households and business
Jun	16	State of emergency lifted; PNG borders still restricted; flights from Singapore and Australia only; state of emergency replaced by National Pandemic Act 2020; troops on Indonesian border maintained in an attempt to stop border crossing
	22	An Australian Defence Force officer in PNG reported to have tested positive
	25	Number of confirmed COVID-19 cases now 11
Jul	16	Number of confirmed COVID-19 cases remains at 11
	27	Number of confirmed COVID-19 cases now 62, a huge increase since 16 July; Prime Minister announced that Port Moresby would be shut down for a further 14 days, with a 10pm to 5am curfew and a ban on domestic flights from Port Moresby
	31	Number of confirmed COVID-19 cases now 63, with 2 deaths

Sources: DoH (2020); FAO (2020b); press reports in PNG; interviews with PNG residents.

of fresh food markets in urban centres and movement of troops to the land border with Indonesia. Lockdowns were imposed in the state of emergency in late March and then gradually relaxed. The lockdown lasted until late May, except in some locations where it was extended (Kiunga, Eastern Highlands, Enga and Bougainville). A further shutdown was imposed in Port Moresby in late July 2020 for 14 days, with a curfew and a ban on domestic flights from Port Moresby.

These restrictions were applied unevenly in the provinces, with the closures strongly enforced by police in the highland provinces, in the Momase Region and in the Autonomous Region of Bougainville. There were restrictions in the other New Guinea Island provinces, but these were less vigorously enforced. Other examples of local lockdowns included roadblocks set up between villages in Pomio District in East New Britain and people not able to travel from one island to another in Milne Bay Province.

In May 2020, the PNG Department of Health reported on the health response proposed in each province to deal with a possible pandemic (DoH 2020) (Table 6.5). A range of actions were undertaken at the provincial level, including construction of isolation wards; surveillance of travellers from outside the province; training medical and other staff; enhanced communication with the population; and provision of personal protective equipment. While the data are imperfect, they indicate large variation between provinces in their capacity to plan for and address an epidemic.

There are significant differences between provinces in the number of medical staff per 1,000 people. These figures, with the estimated provincial population in mid-2020, can be used to calculate the ratio of doctors and nurses per 1,000 residents in each province. For example, in Manus there are 17 doctors for an estimated

population of 80,000 people. At the other extreme, there is only one doctor in Jiwaka for a population of 453,000 and only seven doctors in Hela Province for a population of 328,000 people. There are similarly large differences between provinces in the ratio of health extension officers, nurses and community health workers per 1,000 people.

Funds were announced by the national government to support agricultural production during the state of emergency, but few details have been made public. A subsidy to facilitate movement of fresh food from the highlands to Port Moresby has been paid to a single shipping company for the transport of fresh food to Port Moresby from Lae.

## 6.3 Assessment approach

This study is national and covers all of PNG, with information sought on most sub-sectors of the agricultural economy and from most provinces. The assessment applies the analytical framework described in Chapter 2. Interviews were conducted with 30 key informants (10 female) in May–June 2020. The informants included researchers, agricultural development practitioners, public policy experts and people working for non-government organisations, farmers' groups and international development organisations. Interviews mostly targeted people in the provinces, which supplemented more urban-focused data and information sourced through participation in meetings of the PNG Food Security Cluster since late March. In this way, some information was obtained for 18 of the 22 provinces.

A broader spectrum of published and unpublished sources of information was assessed, not only related to food security, poverty and livelihoods in PNG, but also epidemiology and health, including



**Table 6.5** Number of reported actions to prepare for possible COVID-19 outbreak in each province and number of medical staff per province

Province	Reported actions	Medical staff available in province			
		Doctors	HEOs	Nurses	CHWs
Western	7	9	2	19	40
Gulf	3	6	8	48	88
Central	10	1	13	35	198
National Capital District	1	115	2	667	285
Milne Bay	13	20	29	264	493
Northern (Oro)	3	10	9	80	107
Southern Highlands	NR	18	10	152	195
Hela	1	7	8	51	39
Enga	NR	21	18	163	226
Western Highlands	8	22	13	217	293
Jiwaka	3	1	8	146	102
Simbu	2	31	9	139	142
Eastern Highlands	NR	28	15	222	371
Morobe	1	48	11	444	143
Madang	6	21	28	223	390
East Sepik	NR	17	21	158	243
West Sepik	25	10	19	119	332
Manus	7	17	13	89	74
New Ireland	5	17	28	160	124
East New Britain	9	19	23	254	257
West New Britain	12	14	23	170	245
Bougainville	9	10	3	94	71
<b>Total</b>		<b>462</b>	<b>313</b>	<b>3,914</b>	<b>4,458</b>

Sources: Responses and medical staff per province: DoH (2020); Population 2011: NSO (2013); Population 2020: calculated from 2011 population increased at 3.1% pa (NSO 2013), that is an increase of 31.62% over 11 years.

Abbreviations: NR = Not reported in DoH (2020) situation report; HEO = health extension officer; CHW = community health worker

Note: Most people in Central Province access health services in National Capital District (Port Moresby).

Population		Doctors (per 1,000 people)	Nurses (per 1,000 people)
2011	2020		
201,351	265,018	0.034	0.072
158,197	208,219	0.029	0.231
269,756	355,053	0.003	0.099
364,125	479,261	0.240	1.392
276,512	363,945	0.055	0.725
186,309	245,220	0.041	0.326
510,245	671,584	0.027	0.226
249,449	328,325	0.021	0.155
432,045	568,658	0.037	0.287
362,850	477,583	0.046	0.454
343,987	452,756	0.002	0.322
376,473	495,514	0.063	0.281
579,825	763,166	0.037	0.291
674,810	888,185	0.054	0.500
493,906	650,079	0.032	0.343
450,530	592,988	0.029	0.266
248,411	326,959	0.031	0.364
60,485	79,610	0.214	1.118
194,067	255,431	0.067	0.626
328,369	432,199	0.044	0.588
264,264	347,824	0.040	0.489
249,358	328,205	0.030	0.286
<b>7,275,324</b>	<b>9,575,781</b>	<b>0.048</b>	<b>0.409</b>

recent reports by the author (Bourke & Kanua 2020; Bourke & Sar 2020; Bourke & Allen, in press). An unpublished report by the Australian Department of Foreign Affairs and Trade (DFAT)–funded Market Development Facility was an important resource, with 22 telephone interviews conducted in 12 provinces in April 2020 to explore the impact of the lockdowns on marketing of fresh food by villagers and

intermediate traders, as well as on coffee, fish and other commodities. Social media and PNG press reports were also monitored from March to July 2020.

With the support of non-government organisations, case study stories were sought from 23 women and four men on their lived experience of the COVID-19 crisis.

## 6.4 Assessment results

### 6.4.1 Snapshot of key findings



#### Smallholders

Limited availability of agri-inputs  
Increased transport costs, challenges with storage  
Persistent, underlying food and nutrition insecurity in rural areas



#### Supply chains

Supply chain disruption between rural and urban areas  
Border closures limit travel to sell produce  
Urban market closures affect food availability and pricing  
Innovative use of information and communications technology to help farmers sell produce



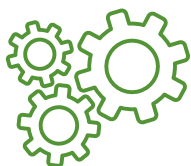
#### Governance

Official enforcements impede food transport and sales  
Agricultural institutions not part of COVID-19 response development



#### Community

Health impacts minimal; higher risk at borders  
Strong urban response overlooks vulnerable remote communities  
Increased risk for women from market closures and reduced income



#### Employment

Extensive job losses in informal and formal sector  
Recovery unclear even if COVID-19 caseload minimal  
Informal retailers lose trade because of formal job losses

## 6.4.2 Exposure and vulnerabilities

### *Vulnerable people and places*

In all communities, some groups of people are more vulnerable than others. They include:

- households with one or more disabled person
- households with elderly people (over 60 years old in the PNG context)
- households headed by a woman; those with particularly low cash incomes
- households where one or more person has migrated to or within the province.

There are also locations where most people suffer multiple disadvantages and are particularly vulnerable to external shocks, such as a pandemic, drought, earthquake or tsunami. Most (94%) of these people live in rural locations (Gibson et al 2005). Disadvantage manifests in different ways, including some or all of the following:

- high infant mortality
- high under-five child mortality
- high maternal or neo-maternal death rate
- short life expectancy for adults who survive childhood
- low proportion of children who attend school
- low proportion of children who complete high school
- very low proportion of young adults who complete tertiary education
- low literacy rates for all age groups
- poor access to health facilities
- low cash income
- poor market access
- limited political influence.

From the early-1970s to the mid-2000s, five studies have been conducted on relative disadvantage (poverty) in PNG, of which the 2004 study by National Economic and Fiscal

Commission on development indicators for least-developed districts was not formally published (Wilson 1975, de Albuquerque & D'Sa 1986, Hanson et al 2001, World Bank 2004). The 2004 World Bank poverty assessment was an update of an extensive 1996 poverty survey (Gibson & Rozelle 2003). Each of these studies has some limitations. However, when examined together there is significant consistency and, despite the different parameters considered and the different time periods, they identify the same broad pattern. Table 6.6 lists 20 districts identified as being particularly disadvantaged in 3–5 of these studies. If a district appears in most of the five studies, which were done independently and using different methods, it suggests that:

- it is highly likely that many (or even most) people in those districts suffer multiple disadvantages
- the position of most people in those districts has not changed much over 40 years relative to the situation of people in other districts.

The most disadvantaged districts in PNG are Telefomin, Vanimo-Green River, Middle Ramu, Rai Coast, Goilala, Koroba-Lake Kapiago and Jimi. These seven districts were identified in all five studies conducted over a 40-year period. Other districts that were identified in four of the five studies are Nuku, Aitape-Lumi, Menyamy, Obura-Wonenara, Usino-Bundi and Kandep. A further seven districts were identified in three of the five studies.

The most disadvantaged communities are located:

- between the coast and the main highland valleys (on the edge of the densely populated highland valleys)
- in the intermediate altitude zone
- in inland lowland locations.

The most disadvantaged places are on the New Guinea mainland, not on smaller

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**Table 6.6** The most disadvantaged districts in PNG, as identified in five studies of poverty

District <sup>a</sup>	Province	No. of studies <sup>b</sup>
Telefomin	West Sepik <sup>c</sup>	5
Vanimo-Green River	West Sepik	5
Middle Ramu	Madang	5
Rai Coast	Madang	5
Goilala	Central	5
Koroba-Lake Kapiago	Hela	5
Jimi	Jiwaka	5
Nuku	West Sepik	4
Aitape-Lumi	West Sepik	4
Menyamy	Morobe	4
Obura-Wonenara	Eastern Highlands	4
Usino-Bundi	Madang	4
Kandep	Enga	4
Ambunti-Dreikikir	East Sepik	3
Kerema	Gulf	3
Kabwum	Morobe	3
Pomio	East New Britain	3
Lagaip-Porgera	Enga	3
Nipa-Kububu	Southern Highlands	3
North Fly	Western	3

Notes:

- a The districts are ordered from most to least disadvantaged (from an unpublished 2004 study by National Economic and Fiscal Commission). There are currently 85 rural districts in PNG, plus Lae Urban district and National Capital District (Port Moresby). District names and boundaries have changed over time.
- b The column 'Number of studies' refers to the number of times that each district was identified as being in the bottom 20 districts in each study. For example, Telefomin was reported as being one of the most disadvantaged districts in all five studies, and North Fly was identified in three of the five studies.
- c West Sepik Province is also known as Sandaun.

islands, except for Pomio District in East New Britain province.

Three districts, Obura-Wonenara (Eastern Highlands Province), Kerema (Gulf province) and Karimui-Nomane (Simbu province) were found to be disadvantaged in some but not all of the five studies. This is because these districts contain areas of extreme disadvantage as well as more advantaged areas. This can be misleading because all three of these districts have significant pockets of extremely disadvantaged people.

A summary of the outcome of studies on rural poverty in PNG is given by Allen (2009:S6.10). Other analyses on rural poverty include Allen et al (2005), Gibson and Rozelle (2003) and Gibson et al (2005). A map in Hanson et al (2001:300) indicates where the most disadvantaged people live, with data presented in finer detail (land used for agricultural production) than using district boundaries.



### *Existing long-term issues*

There are a number of major issues impacting on food security, human nutrition and human health in PNG. While not especially amplified by the COVID-19 state of emergency and related lockdowns at this stage, these issues have significant implications for the lives of many Papua New Guineans now and in coming decades, particularly in rural locations.

#### *Rapid population growth*

The physical environment in much of PNG is not suitable for productive agriculture. Less than one-third of the land area is used for agricultural production because of environmental constraints (extremely low soil fertility, long-term inundation, steep slope and very high altitude) (Allen & Bourke 2009:Table 1.2.2). The high rate of population increase is putting pressure on farming land in certain environments (as well as on education and health resources). Pressure on land is greatest on small islands and in the central highlands (agroecological zones 1, 7, 8 and 9 in Table 6.2). On many small islands, even food crops that are more tolerant of low soil fertility, such as sweetpotato, triploid bananas and cassava, give low yields and the traditional staples of taro, yam and diploid bananas barely yield any food. The introduction and widespread adoption of sweetpotato in the highlands about 350 years ago resulted in the large gains in productivity. However, more intensive land use and declining soil fertility is placing pressure on food supply in the highlands in the absence of further novel species to introduce.

The adoption of novel food crops, mostly from the Americas, over the past 150 years in much of the lowlands and intermediate altitude zones (agroecological zones 2, 3, 5 and 6 in Table 6.2) has allowed the increased population to be fed, sometimes with reduced labour inputs as the novel species can be grown under more intensive land use

conditions. The change in the mix of food crop species continues in many of these locations, particularly with the increased cultivation of sweetpotato, cassava and triploid bananas, but increasing pressure on land will eventually negate those gains in the medium to long term.

#### *Climate change*

This issue was not highlighted by the COVID-19 crisis and is not addressed in detail here. It is sufficient to note that:

- the rate of temperature increase in the PNG highlands is occurring at a much higher rate than the global average (as it is in other tropical highland locations globally)
- rising sea levels are already impacting on agricultural production on some atolls and other small islands
- rainfall patterns are changing in many locations in the nation, with increased rainfall and more intensive rainfall events in many locations.

These changes have significant implications for agricultural production in coming decades.

#### *High rates of child undernourishment*

State-of-emergency conditions may impact upon children in rural areas who have less access to foods higher in protein and oils/fats, and children in urban and peri-urban settings who have less access to vegetables and food with a higher protein content. However, even in the absence of the state of emergency, child malnutrition remains a significant issue in PNG and needs greater attention, including greater efforts to educate the population on basic human nutrition needs.

### *Issues amplified by the COVID-19 state of emergency*

#### *Inadequate health services*

The health service in PNG is already operating beyond its capacity to cope well

(Mola 2020). Impressive preparations for the COVID-19 pandemic were made in some provincial hospitals. The planning done by the national Department of Health with technical support from the World Health Organization and financial support from overseas sources has almost certainly strengthened the health system. However, in the event of a large-scale outbreak, as has occurred in parts of North America, South America and Europe, PNG's health system would be totally overwhelmed. The assessment interviews and 27 case study stories collected by non-government organisations, together with social media posts, identified examples of COVID-19 response measures having adverse consequences for people's health through the closure of health facilities, roadblocks hindering access to health care and refusal of health staff to provide treatment. However, it is not possible to quantify these in the absence of adequate demographic and health baselines and recent surveys.

#### *Gender inequality*

A recent report concluded that:

Rural women play multiple roles simultaneously, including managing triple responsibilities in their workplaces, households and communities. They take on the primary responsibility to ensure that the nutritional, childcare and health needs of their families are fulfilled, in addition to the community, social, and cultural roles they are expected to perform. Given these multiple roles and duties, rural women lack the time to participate in other opportunities that could potentially help to enhance their knowledge, skills, and self-esteem. Women disproportionately bear the consequences of alcoholism and addiction of household members as compared to men, as well as facing higher rates of domestic violence (FAO 2019).

With the COVID-19 crisis, the lives of many PNG women, particularly in the highlands, have been made more difficult. Case studies of individual women, particularly those in Jiwaka Province, highlight the loss of cash income and heightened exposure to different forms of violence, exacerbated by the diversion of police resources to other COVID-19 crisis response tasks. State-of-emergency conditions have made an already difficult situation even worse.

#### *Dependence on informal food marketing*

Closure of food markets, provincial borders and inter-island travel highlighted a number of key issues on the role of marketed food in the informal economy:

- Marketing fresh food, fish, live animals and meat is a significant part of many rural people's livelihoods strategy, particularly women.
- The shift in production and marketing from export commodities to food and other items for the domestic market over the past 30 years is a significant change in many locations.
- There is significant long-distance trade in food, particular across ecological zones, for example from locations with contrasting temperature (altitude) and rainfall patterns.
- There are strong economic links between urban consumers and rural producers in many locations, with mutual dependence.

#### *Urban influence*

The needs of urban populations in PNG strongly influence aspects of food security and related policy areas. This is reflected in the emphasis given to the continuity of supply and the price of rice and vegetables in urban areas during the COVID-19 state of emergency, relative to issues affecting rural villagers like loss of cash incomes. Urban-based informants commonly stated that rural villagers were not impacted greatly or

at all by the lockdowns. Likewise, Inamara (2020) reported that lockdowns have not presented 'real issues with food security for rural farmers'. Conversely, a development non-government organisation-based informant in a remote location stated: 'We continue to see a huge divide created in PNG. COVID-19 is another example of this. All the effort and energy goes into the same places. And the remote places get pushed further back.'

### *Food security policy, development and research*

#### *Inadequate data*

There is a dearth of recent high-quality data on many aspects of agriculture, food consumption and marketing. This is particularly acute for many aspects of food production and marketing, but it is also the situation for many major and minor export crops. Comprehensive statistical data were gathered for the book *Food and Agriculture in Papua New Guinea* (Bourke & Harwood 2009) and those data are on the web as Excel tables. However, the data runs stop in 2006 and 2007 and there have been a number of significant changes in the agricultural economy since then.

Data on the prices of the staple food crops is a particularly important parameter. These are an excellent indicator of changes in supply as many rural producers start to purchase fresh food when their subsistence supply is inadequate and prices increase significantly. Prices of a number of key food crops are recorded in eight urban centres as part of the datasets used to calculate the Consumer Price Index. However, there are numerous gaps in these data and particularly high variation in the prices recorded because of inadequate sample size. The price data of fresh food is eventually published, albeit with many gaps, but this does not occur until well after price data can be used as an indicator of events in the economy, such as, in the case

of the COVID-19 pandemic, the closure of fresh food markets. It is possible to obtain price data from the National Statistical Office in Port Moresby, but this requires much dedication.

For fresh food, fish and live animals, data are need on location of production, volume being sold, most aspects of market chains, food distribution networks, demand in urban and rural locations for different commodities, market prices and the volumes being sold through fresh food markets and in other venues.

#### *Planting material shortages*

The lack of planting material of suitable food crop varieties was highlighted by many informants. Crops mentioned included sweetpotato, corn (maize), common bean, temperate climate vegetables and fruit trees.

#### *Institutional capacity*

Public sector agricultural institutions in PNG have limited capacity. Processes tend to be slow and can result in procedural shortcuts. Significant gaps in agricultural research were noted by some key informants, with an agricultural development expert remarking that research 'is not targeting the farming communities'.

A number of the universities provide training in aspects of agriculture, including University of Technology, Lae; University of Natural Resources and Environment, Vudal and Popondetta campuses; University of Goroka; and University of PNG. These institutions conduct only limited research on agricultural issues, partly due to lack of funds. Most students have no experience of field trips or work placements.

International and local non-government organisations have innovative programs supporting rural villagers with food production and marketing, as well as broader initiatives with particular emphasis

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International and local non-government organisations have innovative programs supporting rural villagers with food production and marketing, as well as broader initiatives with particular emphasis

on women. Examples in the case study stories from local non-government organisations include eDidiman in the Autonomous Region of Bougainville, HELP Resources, Wewak and Voice for Change, Jiwaka Province.

### *Potentially maladaptive responses to the COVID-19 crisis*

#### *Self-sufficiency in food production*

As Manning (2001) noted in a paper 20 years ago, food security is not the same as food self-sufficiency. He concluded:

There are benefits to be gained from trade and therefore we should not be aiming for self-sufficiency in food production. A well-managed economy and well-run government will allow the country to react to temporary setbacks while providing the framework for long-term development.

Access to imported food, mainly rice, enhances household food security, particularly when subsistence food supplies are scarce. This applies at the household and local level, but also at a regional and national level during major climatic extremes. This was illustrated most clearly in major food shortages in 1997–98 and again in 2015–16 (Allen & Bourke 2001, Whitecross & Franklin 2001, Kanua et al 2016).

The need for all or much of the rice consumed in PNG to be produced within the country is often stated as one way of increasing food security. It is more important for farmers to grow crops for domestic or overseas markets that grow well in the local environment and give high returns on their labour inputs. The latter is a key determinant of farm decision-making in PNG (Bourke & Harwood 2009:S5.20). The low returns on labour inputs in growing rice and other grains explain why there is a long history of failure to develop significant domestic rice production, despite the high

level of effort over the past 100 years, particularly from the early 1950s to the late 1970s (Bourke et al 2009:S2.5).

#### *Long-term storage of processed foods*

It is commonly stated that, if villagers processed and stored food, these could be consumed when subsistence food was inadequate. This proposition ignores several critical factors:

- Food shortages occur irregularly and often many years apart. For example, if villagers stored processed food after the 1997 drought and food shortages, they may not have experienced another significant food shortage until the 2015 drought.
- It is not possible to store food post-harvest for extended periods under village conditions, given the high temperatures and humidity and attacks from insects and rodents.
- Cultural norms mean that it is not possible to store food in many PNG societies. When others in the community are short of food, people are obliged to share their stored food.

### **6.4.3 Impacts**

The greatest impact of the COVID-19 crisis on food security has been on the sale of fresh food due to the closure of fresh food and fish markets, with particular implications for female sellers, urban consumers and others in the local communities. The impacts of the state of emergency on rural villagers and urban dwellers are now described.

#### *Disruptions to food markets*

During the state of emergency, fresh food could not be transported across provincial boundaries within the highlands, from the highlands to Lae and Madang, or from Gulf and Central provinces into Port Moresby. Police roadblocks stopped the transport

of food and the movement of people more generally across provincial borders, into towns and between islands. When the lockdown started in late March 2020, all urban and some rural fresh food markets were closed. There was a prohibition on the sale of cooked food, fish, meat and live chickens in some urban markets (FAO 2020c). Many villagers could not sell their food, with significant losses to women's incomes in particular.

The lockdown primarily focused on larger urban areas, and some smaller rural markets have continued to operate without significant disruption. For example, although the markets in Wewak town were closed, 35 other fresh food markets in the broader Wewak district continued to function. In West New Britain, social distancing of vendors was enforced in the main market that had reopened in Kimbe, the provincial capital, but not in numerous smaller rural markets.

Urban fresh food markets reopened at an uneven pace. Some reopened around mid-April 2020 (for example, Lae), but with

fewer vendors allowed in order to maintain social distancing between them. Others were still closed in early May (for example, Kokopo, Kiunga, Goroka, Taro, Mt Hagen, Buka) (FAO 2020a). Most but not all markets (for example, Mt Hagen) had reopened by early July, with social distancing enforced in only some.

Curfews applied to some markets dented vendor incomes, especially the loss of sales from after-work foot traffic. In the Wewak area, the lockdown significantly impacted about 2,500 vendors (Kabilo 2020). These findings concur with the income impacts on women selling in the Caltex Market in Wewak, East Sepik Province (Table 6.7), and more generally with the case study stories of women selling fresh food and fish during and post lockdown.

*Increased prices in fresh food markets and disruptions to long-distance movement of fresh food*

The price of fresh food rose in most urban centres in PNG due to fewer vendors and lower volumes of fresh food for sale. An

**Table 6.7** Impact of COVID-19 state of emergency on vendor’s daily takings at Caltex market, Wewak, East Sepik Province

Type of vendor	Daily takings before COVID-19 restrictions	Daily takings during COVID-19 restrictions	Predicted daily takings after COVID-19 restrictions are relaxed
Garden food producers/wholesalers	K200 plus	Nil-K30	K100-140
Garden food resellers	K150 plus	Nil	K50-60
Store goods resellers	K100 plus	Nil	K40-50
Betel nut wholesaler	K200 plus	Nil	K100-120
Betel nut reseller	K160 plus	Nil	K50-60
Fish sellers	K250 plus	Nil	K100-150
Cooked food sellers	K500 plus	Nil	K250-300
Home sewn clothes sellers	K300 plus	Nil	K70-90
Irregular sellers	K100 plus	Nil	K50-70

Source: Evangeline Kaima, Wewak



informant reported that, in early April: 'The price of fresh produce has increased quite steeply in Port Moresby due to lack of supply'. An informal survey of prices in Lae for 44 types of fresh food and stimulants (for example, betel nut) indicate that more than half increased in price during and post lockdown (Table 6.8). Most came from the highlands, but some were grown closer to Lae. People selling green vegetables at newly established roadside markets in Port Moresby sold them at K5 per bundle, up from the normal market price of K1–2 per bundle (FAO 2020a). Informants and the case study stories reported many other examples of price increases at other locations.

There was a marked decline in the volume of fresh food shipped from the highlands to Port Moresby. The most common foods that are moved from the highlands to Port Moresby and other lowland centres are sweetpotato and potato. Others include cabbage, carrots and onions. In January and February 2020, prior to the COVID-19 lockdown, about 1,200 t was being shipped each week. This declined steeply in March. By April and May, the volume was down to 120–150 t per week (Table 6.9).

### Betel nut ban

A ban was placed on the transport and sale of betel nut during the state of emergency and lockdown. Betel nut is the most commonly consumed stimulant (psychoactive) substance in PNG. Its sale, transport and marketing is a major part of the rural and informal economy. Hundreds of thousands of rural and urban people earn cash income from this trade (Sharp 2016). The palm grows in the lowlands and up to 1,100 m altitude, but not in the densely populated highlands (agroecological zones 7, 8 and 9, Table 6.2) (Bourke 2010:488). The large market in the highlands and all urban centres involves many actors in complex value chains.

The ban on transport and sale of betel nut resulted in a large reduction in its availability and an increase in the price. Lowland betel nut was both scarce and particularly expensive in the highlands. The ban reduced the income of many producers, intermediate traders and retailers of betel nut, as well as loss of enjoyment for the many consumers. In Jiwaka Province, some people climbed the mountains above the Wahgi Valley to collect self-sown highland betel nut (*Areca macrocalyx*), known as *kavivi* in Tok Pisin, and sold it as a betel nut substitute.

### Impacts on women, particularly market sellers

Most market vendors are women (and girls), and many lost much or all of their income from growing and selling food and other items in markets. This income loss has a knock-on effect for family welfare, including the ability to pay children's school fees, purchase foods with a higher content of protein, oil and fat than garden food, and buy phone credit. This is reflected in many of the women's case study stories from Jiwaka and elsewhere.

Many vendors were forced to sell their produce at newly established markets (for example, outside Lae and Goroka), sometimes in unsanitary conditions besides drains. Women reported that curfews meant that it took much longer to sell their produce (for example, in Goroka, four days compared to two days before the curfew to sell 60 kg of sweetpotato tubers) (FAO 2020b).

Some intermediate traders went to a lot of effort and expense to purchase produce, avoid the police roadblocks and sell their produce in other smaller and informal markets. Drivers of public motor vehicles also risked arrest and fines to deliver food to urban markets in some locations.

**Table 6.8** Price of fresh produce in Lae before and since COVID-19 lockdowns (January–June 2020)

Crop <sup>a</sup>	Price before lockdown <sup>b</sup>	Price since lockdown	Notes
<b>Staples</b>			
Banana, cooking	K2 for 12	K2 for 6	less volume
Cassava ( <i>tapiok</i> )	50 toea – K1 each	no change	
Sweetpotato	K5 for 5–6 large	K5 for 3–4 large	less volume
Taro tru ( <i>Colocasia</i> )	K10 for 10 corms	K10 for 6 corms	less volume
Taro kongkong ( <i>Xanthosoma</i> )	K1 for 3 cormels	no change	
Yam, African	K1 for 3 tubers	no change	
Sugarcane	K1 for a long one	no change	
Sago	K5 for large container	K7 for large container	less volume
<b>Vegetables</b>			
<i>Aibika</i>	K1 for 5–6 leaves	K1 for 3–4 leaves	less volume
Amaranthus spp ( <i>aupa</i> )	K1 for large bunch	no change	
Bean, long (snake)	K1 for 10 beans	K1 for 5–6 beans	less volume
Broccoli	K3 for large one	K5 for large one	less volume
Cabbage, round	K3 for large one	K4 for large one	less volume
Capsicum	K1 for 5–6	K1 for 3–4	less volume
Carrot	K1 for 5–6	K1 for 3–4	less volume
Choko tips	K1 for large bundle	K1 for small bundle	less volume
Corn	K2 for 5–6	no change	
Cucumber	K1 for 5–6	K1 for three	less volume
Eggplant	K1 for large bundle	no change	no supply issue
Ferns	K1 for large bundle	K1 for small bundle	less volume
Garlic	K1 per clove	no change	
Ginger	K1 for large root	no change	
Highland <i>pitpit</i>	K2 for large bundle	K2 for small bundle	less volume
Lettuce	K1 for one	no change	
Onion	K1 for large bulb	no change	
Onion, spring; shallots	K1 for bundle	no change	
Peanuts	K1 for bundle	no change	
Potato	K2 for 6–8 tubers	K2 for 4 tubers	less volume
Pumpkin, fruit	K1 for small pumpkin	K2 for small pumpkin	less volume
Pumpkin, tips	K1 for large bundle	K1 for small bundle	less volume
Tomato	K1 for 3–4	K1 for one	less volume
Watercress	K1 for large bundle	K1 for small bundle	less volume

**Table 6.8** Price of fresh produce in Lae before and since COVID-19 lockdowns (January–June 2020) (continued)

Crop <sup>a</sup>	Price before lockdown <sup>b</sup>	Price since lockdown	Notes
<b>Fruit and nuts</b>			
Avocado	K1 for one	no change	
Banana, ripe	K2 for small bundle	no change	
Guava	K1 for bundle	no change	
Lemon	K1 for bundle	no change	
Mandarin	50 toea for one	K1 for one	less volume
Orange	K1 for large one	no change	
Pawpaw	K4 for large one	no change	less volume
Passionfruit	K1 for five	K1 for three	less volume
Pineapple	K2 for small one	K3 for small fruit	less volume
Karuka nuts	K1 for bunch	no change	
<b>Narcotics</b>			
Betel nut, highlands ( <i>kavivi</i> )	50 toea for small one	K1 for small one	less volume
Tobacco	K1 for large leaf	no change	

Notes:

a Bourke &amp; Harwood (2009:xiv–xviii)

b K = PNG kina (currency); 100 toea = K1.

Source: Lae resident and regular market goer

**Table 6.9** Shipments of fresh food from Lae to Port Moresby (January–May 2020)

Month	Volume shipped (t/week)
January	1,220
February	1,208
March	406
April	120
May	150

Source: Fresh Produce Development Company, Goroka

In some locations, buyers from the towns went to the newly established markets outside the town boundary (for example, Goroka). In other places, urban people drove to police roadblocks in order to purchase fresh food from nearby vendors (for example, in Simbu province where the two fresh food markets in Kundiawa were closed).

There were people who benefited from market closures and lockdowns by charging higher prices when there were far fewer fresh food sellers (for example, near Buka township). Similarly, fresh food purchased in rural locations was sometimes sold at a high price in urban areas by those with travel passes, vehicle access and adequate resources.

The case study stories highlight the increased risk of gender-based domestic violence, decreased mobility, reduced access to police and the justice system, and an increased burden of care for family members locked down at home.

### *Purchasing, processing and selling agricultural commodities*

This section outlines the impacts of the lockdown and decline in economic activity with respect to purchasing, processing and selling agricultural commodities that are exported or sold in distant markets in PNG. Impacts were uneven between commodities, between locations and over time. The greatest impact was on those selling fresh food and betel nut (as described earlier), with a significant impact on those selling vanilla and rubber (minor cash crops). People selling fish, chickens and meat suffered from loss of income during the state of emergency, but it is not possible to determine how great this was. Processors and exporters of Arabica coffee report that the volume being offered for sale is down in 2020, but this is not related to the COVID-19 crisis. Impacts on cocoa, copra and palm oil production and sales were both limited and short-lived.

The following short summary is organised by the economic value to rural people, as distinct from the value to the national economy (Bourke & Harwood 2009:Table 5.1.1).

#### *Fresh food*

Sale of fresh food, including root crops, banana and vegetables, is now the most important source of cash income, at least by total value. There are very many households engaged with selling fresh food, and income per person is generally less than for some of the export crops, betel nut and some animal products. Closure of fresh food markets in most urban centres had a huge impact on the income of many vendors,

most of whom are female (Tables 6.7 and 6.8). This impacted on sales made close to the producing location, as well as the long-distance movement of fresh food from the highlands to Port Moresby (Table 6.9). Most of the larger intermediate traders contacted said that they continued to purchase and sell large volumes of fresh food to catering groups at mining and petroleum extraction sites. One company, which buys fresh food from farmers in one province and sells to catering groups in mining camps, reported buying less as some mines were operating with reduced staff numbers. For a short period, some vegetable growers in the highlands could not obtain vegetable seed.

#### *Arabica coffee*

The main harvesting period for Arabica coffee in the highlands is May to August. Information from four coffee processors in the highlands indicated that production was lower than normal in mid-2020. They do not attribute this to the curfews or lockdowns in the highlands, as these occurred in April–May, prior to the main harvesting season. Three reasons are offered for the low production:

- The Internal Revenue Commission has not refunded the goods and services tax collected earlier by processors and buyers. As a result, many buyers do not have sufficient operating capital to purchase parchment coffee.
- The Coffee Industry Corporation has not paid the freight subsidy to transport coffee by road from more remote locations such as Okapa or Menyamya or by air from locations with only air access. (Villagers in most locations near the Highlands Highway now invest more effort in growing and selling fresh food than coffee, so much of the coffee now comes from locations that are further away from the highway).

- Third-level airlines were impacted by the lockdown in March–June 2020, so coffee was not transported as back-load from remote locations such as Karimui, Marawaka, Simberi and Kaintiba. As well, many small airstrips have closed due to inadequate maintenance in the past decade or more.

The impact on coffee sales and processing in the first half of 2020 from the lockdown and state of emergency has therefore been minor.

#### *Cocoa*

Cocoa sales were reportedly impacted by the state of emergency for only a limited time in Madang and Milne Bay provinces. Cocoa exporters in Kokopo and Bougainville reported little or no impact on exports. Some concern was expressed that shipping issues could cause delays in the export of cocoa due to reduced shipping. This would cause beans to be held in storage at wharfs, which would in turn lead to loss of storage at buying depots and result in cocoa accumulating in villagers, which may impact on cocoa quality. However, storage issues have not arisen to date.

#### *Betel nut and betel pepper*

The ban on sales of betel nut in most urban centres and travel restrictions had a significant impact on the sale of betel nut and hence on the income of growers, intermediate traders and those selling to the public (see above).

#### *Copra*

People could not sell copra during the state of emergency and lockdown on Karkar Island (Madang province) and from islands in Milne Bay Province. There were no reports of copra shipping problems arising elsewhere.

#### *Palm oil*

The state of emergency did not have a major direct impact on production or processing of palm oil. Some initial issues arose in getting ships to transport palm oil for export, but these were resolved.

#### *Fish and other marine foods*

The case study stories reported adverse impacts on the sale of fish from the Sepik River and the sea in Wewak, as was the case in Alotau for the sale of smoked fish. Sales were likely impacted in some other coastal towns, but no information was available at the time of this assessment.

#### *Livestock*

Farmers growing poultry, pigs and fish for sale could access the respective animal feed in a number of highland and lowland locations (FAO 2020c). In markets where sale of meat and live animals was banned, people were not able to sell live chickens. It is not known how many people were able to sell them in informal markets or through other means. It was reported, but not confirmed, that a major producer of processed chickens in Lae stopped buying birds from village producers in Morobe Province.

#### *Tobacco*

The ban on inter-province travel during the state of emergency means that tobacco sales from highland to lowland locations were disrupted. Tobacco is commonly grown in mountainous locations and carried to coastal towns for sale, for example, from inland New Britain, the mountains in Central Province and inland East Sepik Province (Bourke & Harwood 2009:Figure 5.17.4). The impact of the lockdown on sales of village tobacco in these diverse locations is unknown.

### *Rubber*

Most smallholder rubber is produced and processed in Western Province, with a small amount at Cape Rodney in Central Province. In Western Province, rubber continued to be harvested during the state of emergency. However, the MV Kuku could not travel to Lake Murray and Balimo to purchase cup lump rubber from villagers and transport it to Kiunga for processing. North Fly Rubber was forced to sell eight containers of processed rubber at a low price so that there was storage space for the cup lump that was purchased when the state of emergency was lifted. Thus, the state of emergency had a significant impact on the cash income of rubber producers in Western Province.

### *Vanilla*

Producers and traders in East Sepik and Sandaun (West Sepik) provinces who normally sell vanilla in Jayapura (West Papua) were unable to travel there, so their incomes were impacted. It was reported that vanilla could not be exported from Madang when the port was closed for a period in March–April 2020 and vanilla growers could not sell their produce at this time.

### *Honey*

The main honey producing period is around November–December, so the state of emergency and related lockdown and border closures had a limited impact on sales, according to the largest buyer, New Guinea Fruit. Nevertheless, some suggested that less honey was sold in April, while others reported the sale of honey ‘by going around the lockdown restrictions’.

### *Other parts of the formal and informal economy*

Beyond marketing fresh food and betel nut, there were impacts felt in other parts of the formal and informal economy. Interviewees and case study stories (for example, Lae, Bougainville, West New Britain) reported the loss of income by many who derived cash income in the informal sector and in casual wage employment. A high proportion of people living in or near towns derive income from reselling fresh food (which they purchase from growers), cigarettes, betel nut and manufactured goods purchased from larger Chinese-owned stores. Reports from many towns indicated that men and women who operate small stores and sell processed food lost much of their trade because of reduced activity in the local economy.

Many people who depend on wage employment in urban centres and some rural locations became unemployed due to the state of emergency, making their lives more precarious. This was particularly the case for those engaged in road, sea and air transport, hospitality (cafes, restaurants, hotels), accommodation and tourism. Many expatriates, including Australians, left PNG at the start of the COVID-19 state of emergency, resulting in the loss of income for businesses that cater for expatriates, particularly in Port Moresby.

There are no quantitative data on the number of people affected by loss of employment, but anecdotes received from many urban centres suggest large numbers. This created particular hardship for those without access to food gardens or other sources of cash income. As of late July 2020, indications are that many in this situation have not yet found wage employment again. This is supported by some of the case study stories.



The impact on those in urban and peri-urban settings who had lost their wage employment has not been documented. It is highly likely that their consumption of fresh foods decreased because of the increase in prices of fresh food, particularly in the cities of Port Moresby and Lae. This is likely to have resulted in a less nutritious diets with implications for their health.

Sales of other commodities were also impacted. The demand for sugar from Ramu Agri-Industries was reported to have decreased by 20–30% in April–May 2020 and demand increased somewhat after the lockdown ceased. There was a reduction in demand for sugar to manufacture ice cream as consumption dropped.

Larger companies which produced and sold processed or imported food, including rice, flour, baked products such as biscuits, noodles, canned soft drinks and tinned fish, were initially impacted by the closure of provincial borders in early April 2020. For a short period, they were unable to move produce from Lae and Madang into the highlands. However, they responded quickly to obtain travel permits for their trucks and these goods commenced to flow again. Villagers selling fresh food in urban areas were not in a position to do this, so the impact on them was much greater.

Despite concerns by many based in urban centres, there were no shortages of rice, which is the staple food of most people in Port Moresby and many other urban centres. Trukai Industries reported that they had more than adequate stocks of imported rice stocks in March–May 2020 and there were no supply issues beyond this period. The sale of rice by Trukai contracted by up to 15% in April, with a slight recovery up to mid-June. Since mid-June, sales have been 3–5% lower than normal. This is a useful index of overall economic activity for both rural and urban people. A large company that manufactures biscuits reported an

initial boost of 20% in sales of biscuits in late March as many urban residents stocked up on provisions.

Those in well-paid employment in urban centres were not impacted as much as those in the informal sector or those who lost their jobs. This was reported from Port Moresby and some other urban centres.

The limited number of passengers who could enter PNG from Australia or Singapore had to stay in quarantine in hotels in Port Moresby for two weeks. This inhibited some foreign workers, including those from the Philippines, from leaving PNG to go home on leave. Postal services into and out of PNG were disrupted by the change to international air transport.

### *Transport availability and costs*

Closure of provincial borders meant that many men and women could not travel to sell produce, purchase agricultural inputs and, importantly in some locations, access medical assistance.

There were restrictions on the number of passengers that public transport operators were allowed to carry, and many increased their fares for both short trips within urban centres and inter-town travel. Goro (2020) gave many examples of such increases, with some inter-town fares doubling and others trebling. A Lae resident reported:

Social distancing was enforced on PMVs [public motor vehicles] which were only allowed to fill them to half of their capacity. To compensate PMV owners, bus fares in Lae doubled and this was a directive from the Department of Transport. This had a major impact on people, especially those supporting school children and paying for their bus fares. There is now little to no enforcement of social distancing on PMVs but people are still paying double.

In Alotau it was reported that: ‘PMVs were forced to carry half as many passengers because of social distancing, but they could not increase their price. Many have stopped running’. In East New Britain, public motor vehicle fares increased during the state of emergency, for example, from K3 to K5 from Kokopo to Rabaul. As elsewhere, fares had not returned to normal by the end of June (FAO 2020c). The state of emergency and lockdown also impacted those travelling by sea in some locations. In Milne Bay, many dinghy operators had less business as fewer people were travelling between islands.

Loss of cargo capacity by air transport made it more difficult for farmers to transport fresh food from the highlands to Port Moresby (FAO 2020b). The cessation of air transport also impacted the supply of food to schools, with some children having to return to their villages (for example, boarders at Mougulu High School in the Strickland-Bosavi sub-region of Western Province).

#### 6.4.4 Recovery and resilience

It is too early to assess how well people have recovered from the impact of the state of emergency and lockdown from late March to late June 2020. Given the impact on the PNG economy, it is likely that many people will take a long time to recover from these events, if at all. In an analysis of poverty and the pandemic in the Pacific, Hoy (2020) concluded that the number of people living in extreme poverty in PNG (as well as Timor-Leste, Solomon Islands and Vanuatu) may increase rapidly due to the economic impact of COVID-19. Prior to COVID-19, around a quarter of PNG’s population lived in extreme poverty (i.e. below A\$1.90 a day) (Hoy 2020). The qualitative information recorded in this assessment is consistent with this conclusion.

The case study stories and interviewees indicate that most people anticipate relying

mostly on their own networks for assistance and information. Many gave examples of how people in villages and urban and peri-urban centres responded to the lockdowns, including:

- setting up new roadside markets outside urban centres
- moving food, betel nut and other goods around (or through) roadblocks
- risking fines and confrontations with the police
- driving from towns to the new food markets or closer to where producers live.

A number of informants commented on the need to give greater support to production of vegetables and fruit in home gardens, particularly in urban and peri-urban areas. There has also been greater interest in raising chickens (FAO 2020c).

In some locations, authorities and non-government organisations devised innovative ways to help villagers sell their fresh produce under the state of emergency. In East New Britain, the Market Authority worked with local government authorities to designate locations where food could be sold close to where it was produced, and from where it could be transported to a central location. The Market Authority plans to introduce ‘bulk selling’ where fresh food is bought and then sold to others who operate from roadside markets (FAO 2020c).

In the Autonomous Region of Bougainville, Bougainville Youth in Agriculture, an initiative of the non-government organisation eDidiman, used their own technology to help farmers sell their fresh food, particularly those in more remote areas. Purchasers were encouraged to send a thank you text directly to growers as a psychological boost in light of the potential for the state of emergency to amplify traumas associated with the region’s past conflict.



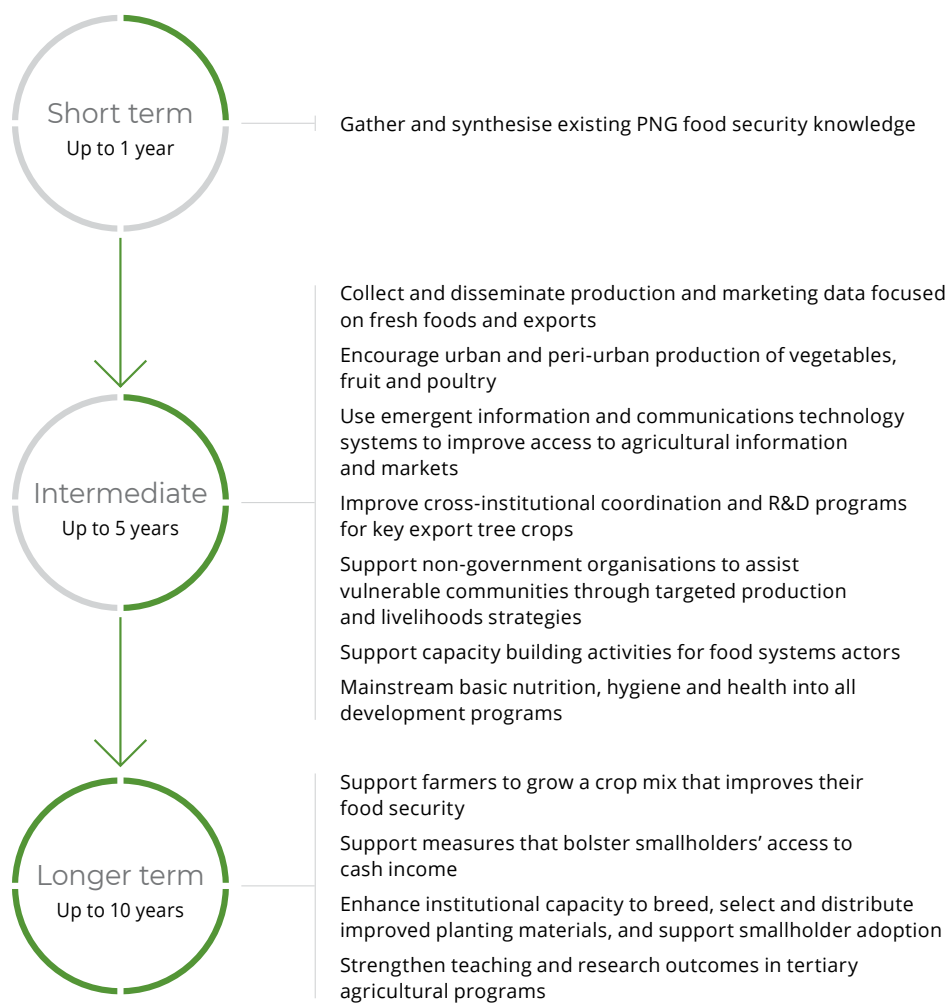


**The greatest impact  
of COVID-19 in PNG  
has been on people  
who sell fresh food  
and betel nut.**

Photo: Li Peng Monroe

# 6.5 Opportunities for action

## 6.5.1 Snapshot of potential investment options





### 6.5.2 Short term (up to 1 year)

#### *Gather and synthesise existing PNG food security knowledge*

##### *Develop ready-reckoners of vulnerable locations*

Information on locations where people are vulnerable to different stresses is known from the experience, literature and reports over the past 80 years (and sometimes earlier). This includes where people are most vulnerable to drought and frost as well as those with limited access to markets, education and health services. This information could be brought together and presented in an accessible manner in a series of maps and tables, which included estimates of the population in each location. Similarly, the classification of agroecological zones could be presented in map form, together with estimates of the area population, population density in each zone and proportion of all rural villagers in PNG.

##### *Improve access to and utilisation of the knowledge base on PNG food security*

A significant body of development and research knowledge on PNG agriculture has been generated, much of which has been documented in reports, 'grey literature' and other published form. Ascertaining the extent of the existing knowledge on the broader arena of food security needs further exploration. A summary of some of the major sources of information on PNG agriculture is given by Bourke & Harwood (2009:xxv–xxvii). Many publications on PNG agriculture have been placed on the Pacific Agriculture Information System and on PapuaWeb. However, these are rarely accessed in PNG. It is not clear whether this is because of lack of knowledge of the databases or difficulty in using them.

#### *Support the Food and Nutrition Conference*

The PNG 2020 Food and Nutrition Conference was scheduled to be held at the University of Technology in Lae in mid-August 2020, but this has been deferred until mid-2021 or later in light of the COVID-19 pandemic. There have been four such conferences held in PNG (1975, 1980, 1983, 2000). There is strong support for the conference including the PNG Science and Technology Council, Market Development Facility, DFAT, Australian Centre for International Agricultural Research and commercial companies in PNG. The conference would serve multiple purposes, particularly recording development and research experience in permanent published and electronic forms; enhancing networking; and formulating priorities for research and development activities.

### 6.5.3 Intermediate term (up to 5 years)

#### *Collect and disseminate production and marketing data focused on fresh foods and exports*

Quantitative data on many aspects of agricultural production, marketing and demand is required so that evidence-based decisions can be made on development priorities. Recording the price of fresh food is relatively easy to do and, provided that the sample size is adequate, the data has a low error component. Much of the price data recorded for the past decade is based on an inadequate sample size.

Reliable production data is particularly needed for fresh foods and other goods sold in the informal sector, including fish, meat, live animals, firewood, tobacco and betel nut. Recent data for the major export crops of coffee and cocoa can be difficult to access, particularly for subnational data. It is much more difficult to access reliable information on some of the minor cash crops, including that on vanilla, eaglewood and sandalwood.

As well as price, data is required on the following aspects:

- location of production; production volumes
- most aspects of market chains
- demand in urban and rural locations for different types of fresh food and animal products (particularly Port Moresby)
- volumes being sold through fresh food markets and in other venues.

Other types of data needed for effective planning include:

- reliable national census information
- other demographic data
- estimates of poverty
- updated information on child nutrition.

The International Food Policy Research Institute commissioned preliminary nutrition surveys in four lowland locations in 2018 (Benson et al 2019, Schmidt et al 2019) and planned more comprehensive surveys in 2020 before the onset of the COVID-19 crisis.

#### *Encourage urban and peri-urban production of vegetables, fruit and poultry*

The renewed interest in home gardening and household-level poultry presents an opportunity to support this sector, particularly in Port Moresby and Lae, but also in other urban areas. More support through publications, demonstrations and field days could be provided to those wishing to raise chickens for meat and eggs in village, peri-urban and urban locations. A literature review and some preliminary surveys are required prior to project design. These could be commissioned for a relatively small cost and within months.

#### *Use emergent information and communication technology systems to improve access to agricultural information and markets*

COVID-19 has amplified the use of information and communication technology globally, which is evident to some extent in PNG. For example, the Fresh Produce Development Agency used mobile phones to exchange information with fresh food sellers during lockdown. Lessons from the innovative use of information and communication technology in Bougainville, termed eDidiman, are already being extended by staff to other parts of PNG. Opportunities for digital technology to support agriculture in PNG are outlined in a recent paper commissioned by the Global Systems for Mobile Communication Association (Loukos et al 2019).

#### *Improve cross-institutional coordination and R&D programs for key export tree crops*

Several interviewees suggested the need for greater cross-institutional coordination and effort in research and development to better support export tree crops like oil palm, coffee, cocoa and copra. Arrangements exist in the case of the oil palm industry, with researchers from the Oil Palm Research Association and Curtin University. Innovative practices introduced to enhance the food security of settlers and villagers growing oil palm include changing the clearing and replanting regime for palms from 2 ha to 1 ha (so that farmers can grow sufficient food between the palms without having gaps in food supply) and using more fuel-efficient stoves (which reduces the work of women and girls to collect firewood) (Koczberski et al 2018, 2019).



*Support non-government organisations to assist vulnerable communities through targeted production and livelihoods strategies*

The locations where people suffer the greatest disadvantage is well documented (Table 6.6) as are the locations where food supply suffers the most from climatic extremes. The non-government organisations assisting villagers in those locations are often poorly funded and need much greater long-term support to help reduce vulnerability and increase living standards through targeted production and livelihood strategies in these locations.

A number of local and international non-government organisations are providing excellent support for rural villagers to enhance food security and increase cash income. Many have innovative programs, and this is apparent in some of the case study stories from eDidiman (Bougainville), Voice for Change (Jiwaka), HELP Resources (Wewak) as well as from interviewees, including Strickland-Bosavi Foundation, Rotary International, Oxfam, CARE International, World Vision and Save the Children.

*Support capacity building activities for food systems actors*

There is significant scope to support targeted activities that build deeper understanding among different actors about food systems, whether with farming and fishing communities, industry, local non-government organisations or government agencies. While such activities could be framed and delivered in the short term, achieving sustained benefit at scale require a design and implementation time frame of at least five years.

Some suggestions identified by informants include:

- remote assistance with writing and editing in English
- mentoring arrangements for scientific, technical and field staff
- placements in agricultural institutions, including universities and government agencies
- overseas exchanges (reciprocally), including for early career researchers
- twinning arrangements between PNG and overseas universities, research bodies and government departments.

*Mainstream basic nutrition, hygiene and health into all development programs*

Capacity building on basic human nutrition, hygiene and health should be incorporated in every project and program as well at all educational institutions, as suggested in a recent gender assessment of agriculture and the rural sector (FAO 2019). There were strong programs on human nutrition, hygiene and health in the 1970s and 1980s, but much less emphasis is given to development and outreach about this now. A related issue is the need for further research and outreach on processing food for sale in a hygienic manner, using locally produced and some imported ingredients.

#### 6.5.4 Longer term (up to 10 years)

*Support farmers to grow a crop mix that improves their food security*

It is important for farmers to grow crops for domestic or overseas markets that grow well in the local environment and give high returns on their labour inputs. For example, investing in production and sale of fruit and nuts that grow well in PNG, like rambutan, mangosteen, durian, mandarin and oranges, has a higher chance of increasing self-sufficiency in fruit production than investing in temperate climate fruit crops like grapes and apples.

When subsistence food sources are threatened, growing some crops that are more tolerant to extreme climatic events, such as some triploid bananas, 'African' yam (*Dioscorea rotundata*) and cassava, can enhance food security. Provision of planting material of food crops that produce high-quality food relatively quickly is another important way of helping villagers improve their food security after disruption to their food supply, with corn (maize) and beans being the two most important food crops.

#### *Support measures that bolster smallholders' access to cash income*

It is critical for villagers to have access to cash income whether from their agricultural endeavours, sale of items (bilums, vegetables, etc) and/or urban-based family (*wantoks*) who support them. When subsistence supplies are inadequate, smallholders need access to cash income so they can directly purchase locally produced or imported food. Those who have access to cash will have much greater scope to buy their way out of hardship than those who do not.

#### *Enhance institutional capacity to breed, select and distribute improved planting materials, and support smallholder adoption*

The poor availability of planting material of suitable cultivars of food crops was reported by many of the 30 interviewees. These include maize, sweetpotato, beans, temperate climate vegetables and fruit trees. Support is needed for much more cultivar evaluation, as well as propagation and distribution of large volumes of suitable planting material. As well, some farmers should be supported to produce suitable planting material for sale.

For some crops, such as maize, this would involve both introduction of suitable planting material (for example, cv Suwan) as well as breeding new cultivars using

germplasm from international research centres. In the case of the most important food crop, sweetpotato, one major issue is to assess yield gains from use of pathogen-tested planting material, evaluate how frequently farmers need to obtain clean seed, and assess factors limiting the adoption of pathogen-tested sweetpotato planting material.

Widespread distribution of planting material of key food crops, together with measures to help villagers increase their cash income, will enhance their food security, particularly after food shortages caused by drought, excessive rainfall, frost or other natural causes. The key food plants in this context are maize and common bean (and English potato and broad beans at very high altitude locations).

#### *Strengthen teaching and research outcomes in tertiary agricultural programs*

PNG universities are charged with training the next generation of agriculturalists. With limited resources, course quality is highly variable and the engagement of staff in agricultural R&D and professional training is generally low. Students have little or no opportunity to participate in fieldwork or work placements. An evaluation is needed to ascertain how best to build on existing agricultural programs at the PNG University of Technology, University of Natural Resources and Environment (Vudal, Popondetta and Kavieng campuses), University of Goroka and University of PNG to strengthen staff and student outcomes in both teaching and research, including how Australian institutions might effectively contribute. Some suggestions for supporting agriculture at PNG universities were made a decade ago by Garnaut and Namaliu (2010).

## 6.6 Conclusions

PNG is physically and socially diverse. Its population of about 9.5 million coupled with a high rate of growth places increasing pressure on agricultural land, particularly on small islands and in the central highlands. Most people (approximately 81%) are rural villagers who produce much of their own food on a subsistence basis from home gardens, sago, domestic animals, fishing and hunting. More than 80% of the food energy consumed is produced within PNG. Cash income is derived from the sale of fresh food at local or distant markets in PNG, notably Arabica coffee, betel nut, cocoa, oil palm, copra, firewood, fish, tobacco, chickens, pigs, marijuana, rubber, vanilla, pelts/plumes, crocodiles and honey.

Health facilities strained under the nation's high disease burden became further stressed with the first detection of COVID-19 in late March 2020. With 63 recorded cases by 31 July 2020, the Prime Minister warned that there were likely many more undetected ones. A state of emergency was declared and restrictions were placed on domestic and international air travel, cross-border travel and some inter-island travel, and fresh food markets in urban centres. These restrictions had a significant impact on the lives of most of the population, with significant loss of cash income for many rural villagers and urban people, particularly those engaged in the informal economy.

One of the largest impacts of the state of emergency and related lockdown was caused by the closure of fresh food markets and roadblocks. This reduced the cash income of many villagers, particularly women. The transport and sale of betel nut was banned, although no ban was made on the consumption of tobacco. Many people working in travel, hospitality and accommodation lost their employment. The loss of income by rural villagers and some urban-based people had a large

negative impact on small businesses selling cooked food, rice and other food items, cigarettes and other items.

The reduced number of vendors and volume of fresh food offered for sale in urban areas resulted in sharp price increases for many fresh foods. Most of the rural population suffered from loss of cash income. Women, the majority of fresh food vendors, were impacted most. People selling fish, chickens and meat also lost income during the state of emergency. It is likely that many people will take a long time to recover from the decline in economic activity and some will be pushed into long-term poverty.

There was some impact on the sale of export commodities, mainly rubber in Western Province and vanilla in East Sepik, West Sepik and Madang. The impact on sale of coffee, cocoa and copra was very limited. The price of travel within urban centres and between urban centres increased steeply in most centres.

A number of important long-term development issues were not particularly exposed by the COVID-19 state of emergency including the rapid population growth rate and consequent pressure on agricultural land, education and health facilities, and ongoing climate change.

The COVID-19 state of emergency highlighted some broader issues within the PNG society, including:

- inadequate health care facilities
- the difficult lives of many women who are subject to domestic violence, sexual violence and economic hardship
- high rates of child malnutrition and vulnerability of children to lack of adequate health care
- the importance of the sale of fresh food and animal products on the domestic market

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- the difficult lives of many women who are subject to domestic violence, sexual violence and economic hardship
- high rates of child malnutrition and vulnerability of children to lack of adequate health care
- the importance of the sale of fresh food and animal products on the domestic market

- the needs of urban populations having a strong influence on aspects of food security and related policy.

A number of issues highlighted by the state of emergency are of particular relevance to those engaged in food security policy, development and research. These include:

- the absence of recent data on many aspects of agriculture, food consumption and marketing, particularly the price of fresh food
- the lack of availability of planting material of improved or superior cultivars of many food crops
- limited institutional capacity, including government agencies, universities, industry and non-government organisations.

Precautions are needed against maladaptive responses with respect to national-level food production self-sufficiency and long-term storage of processed foods.

The assessment identified the need to support measures that bolster smallholders' access to cash income so that they may purchase food when their subsistence supplies are inadequate. At the same time, effort is needed to gather and synthesise existing PNG food security knowledge. Investments that need a longer time frame are those with respect to critical data, urban and peri-urban food production, information and communication technology systems development, cross-institutional effort for export tree crops and capacity development to improve food systems. Longer-term strategies focus on more transformational investments targeting crop mixes that bolster smallholders' food security, better planting materials and higher smallholder adoption, and improved teaching and research outcomes in tertiary agricultural programs.

## 6.7 Acknowledgments

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