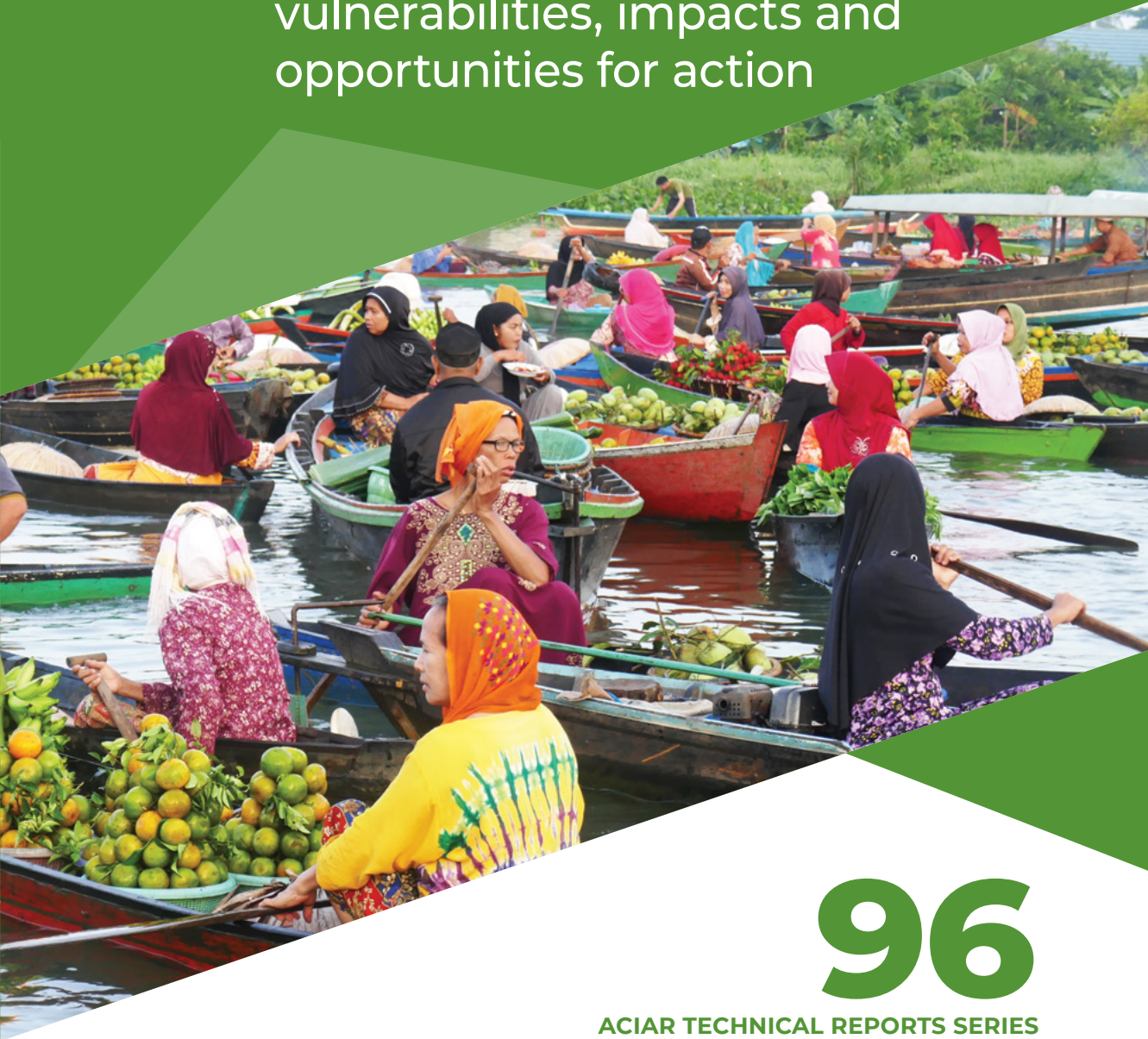




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Australian Centre for  
International Agricultural Research

# COVID-19 and food systems in the Indo-Pacific: An assessment of vulnerabilities, impacts and opportunities for action



# 96

ACIAR TECHNICAL REPORTS SERIES



# COVID-19 and food systems in the Indo-Pacific: An assessment of vulnerabilities, impacts and opportunities for action

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2020

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## Foreword

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The COVID-19 pandemic is a global health and economic crisis that will disrupt lives and livelihoods of diverse communities around the world for years to come. This includes almost 500 million smallholder farmers who produce food for half of the global population, many of whom are among the 2.7 billion people globally living on less than US\$2 per day.

The Australian Centre for International Agricultural Research (ACIAR) was mandated, as set out in the *Australian Centre for International Agricultural Research Act 1982*, to work with partners across the Indo-Pacific region to generate the knowledge and technologies that underpin improvements in agricultural productivity, sustainability and food system resilience. We do this by funding, brokering and managing research partnerships for the benefit of partner countries and Australia.

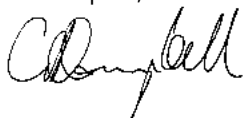
As with many other sectors and organisations, the pandemic is likely to change both what we seek to do and how we do it. ACIAR, like many of our partners, faces important decisions about how best to respond in the coming years. As an evidence-based organisation, one of our responses has been to assess the impacts of the COVID-19 pandemic, and the responses to it, on smallholders and food systems in our region. We are doing this so that we and our partners can better understand intervention opportunities and priorities.

In May 2020, we published a rapid assessment that had been conducted over the preceding few weeks. That report provided the foundation for the more systematic, integrated assessment presented here, focusing on impacts and response options in Pacific island countries, Papua New Guinea, Timor-Leste, Indonesia and the Philippines. This work was led by a joint team from the Australian National University and the CSIRO, who worked closely with people and partner agencies in focus countries. Applying a common analytical framework across diverse geographies provides insights into the multiple impacts on food systems of COVID-19, while revealing common issues and options across the region.

While the global health crisis caused by the pandemic has yet to precipitate a global food crisis, food systems are under significant pressure, often amplifying existing problems and weaknesses.

This analysis of COVID-19 impacts on food systems across a sample of ACIAR partner countries is a sobering reminder of the very human implications of this tragedy in the immediate and long term. However, it also spotlights many opportunities for governments, communities and private sector organisations throughout the food value chains to help build more effective, resilient and sustainable food systems.

At ACIAR we are deeply committed to playing our part on behalf of Australia and we are actively considering how best to do so in a COVID and post-COVID world. This timely report will help us, and will hopefully be of interest to our many partners across the region.



**Andrew Campbell**

Chief Executive Officer, ACIAR, October 2020



**The COVID-19 shock has reverberated through food systems since its onset in early 2020, exposing and amplifying existing vulnerabilities.**

Photo: ACIAR / Conor Ashleigh

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## Acronyms and abbreviations

Shortened term	Definition
ACFID	Australian Council for International Development
ACIAR	Australian Centre for International Agricultural Research
ADB	Asian Development Bank
AMIS	Agricultural Market Information System
ANU	Australian National University
ASEAN	Association of Southeast Asian Nations
BPS	Central Bureau of Statistics (Indonesia)
BULOG	Badan Urusan Logistik (Indonesia)
CGIAR	Consultative Group for International Agricultural Research
CHF	Commission for the Human Future
CHS	Indo-Pacific Centre for Health Security
COVID-19	Coronavirus disease (formerly 2019 novel coronavirus)
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DFAT	Department of Foreign Affairs and Trade (Australia)
DTKS	Data Terpadu Kesejahteraan Sosial (Indonesian unitary social welfare database)
FAO	Food and Agriculture Organization (of the United Nations)
FJ\$	Fijian dollar
FNRI	Food and Nutrition Research Institute (the Philippines)
GDS	General Directorate of Statistics (Timor-Leste)
ha	hectare
HIV/AIDS	human immunodeficiency virus/acquired immunodeficiency syndrome
HLPE	High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security
IATF	Inter-Agency Task Force for the Management of Emerging Infectious Diseases (the Philippines)
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
IHME	Institute for Health Metrics and Evaluation
IIED	International Institute for Environment and Development
IISD	International Institute for Sustainable Development
ILO	International Labour Organization
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
K	Papua New Guinea kina (currency)
LTI	long-term inundation

Shortened term	Definition
MAF	Ministry of Agriculture and Fisheries (Timor-Leste)
MDF	Market Development Facility
Mha	million hectares
Mt	million tonnes
NCR	National Capital Region (Metro Manila) (the Philippines)
PCAARRD	Philippine Council for Agriculture, Aquatic, and Natural Resources Research and Development
PHP	Philippine peso
PIFS	Pacific Islands Forum Secretariat
PNG	Papua New Guinea
PSA	Philippine Statistics Authority
PSBB	large-scale social restrictions (Indonesia)
Rp	Indonesian rupiah
SARS-CoV-2	Severe acute respiratory syndrome coronavirus 2 (which causes COVID-19)
SPC	Pacific Community (originally South Pacific Commission)
SPREP	Secretariat of the Pacific Regional Environment Programme
t	tonne
TOMAK	To'os ba Moris Di'ak (Farming for Prosperity) (Timor-Leste)
UK	United Kingdom
UN	United Nations
UNDP	United Nations Development Programme
UNFPA	United Nations Fund for Population Activities (formerly United Nations Fund for Population Activities)
USP	University of the South Pacific
WFP	World Food Programme (of the United Nations)
WHO	World Health Organization (of the United Nations)
WS\$	Samoan tala
WTO	World Trade Organization



**Women, girls and other vulnerable groups have been hardest hit by the COVID-19 shock to food systems in the Indo-Pacific region.**

Photo: ACIAR



## Executive summary

---

Emergency responses to the COVID-19 pandemic have had dramatic impacts in the Indo-Pacific region as state and non-state actors tackle the threat of a public health and economic crisis. The COVID-19 shock has reverberated through food systems since its onset in early 2020, exposing and amplifying existing vulnerabilities. Smallholder farmers and fishers have had to react deftly and creatively as the situation unfolds, responding within the constraints of their local circumstances. Women, girls and other vulnerable groups have been hardest hit.

This report examines the existing food system vulnerabilities being exposed or amplified by the COVID-19 shock, and looks at how this information can be used to inform future research and development to support food systems resilience in the Indo-Pacific. The COVID-19 crisis is examined through the lens of food and nutrition security, primarily from the perspective of smallholder farmers and fishers.

Five assessments were conducted, focusing on the first six months of the pandemic (January–July 2020):

- Indonesia
- seven Pacific island countries
- Papua New Guinea
- the Philippines
- Timor-Leste.

Each assessment applied the same analytical framework, while recognising the very different agrifood systems. The assessments have been analysed for common themes that resonate across the broader Indo-Pacific region. Special attention is paid to identifying opportunities for action through research

and development investments that might strengthen the resilience of food systems to future shocks, for each of the five assessments and the Indo-Pacific region more generally.

A suite of common pre-existing vulnerabilities currently undermining food security was identified across the five assessments. Most of these have strong applicability for the Indo-Pacific region. They include:

- dependence on food imports
- exposure to climate change and extreme weather events
- patchy biosecurity, animal and plant health services
- fragmented value chains and food system governance.

Collectively, the assessments revealed 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 and employment insecurity. More generally, food producers are concerned about the limited availability and/or access to agricultural supplies, including for upcoming growing seasons. These input constraints are likely to result in further reductions in food production, extending food insecurity in the region. Declining food demand and access, and increased gender-based discrimination, were also identified as concerning impacts in most but not all geographies studied.

Some features of Indo-Pacific food systems contribute positively to resilience and recovery. The price of rice has been largely stable across the Indo-Pacific region, as a result of market policy reforms



**After COVID-19, finding an optimal balance between local and foreign production will be paramount.**

Photo: Lisa Robins

instituted after the 2007–08 global food crisis. However, the potential remains for restrictions by rice-exporting countries to trigger international price increases. For local food systems, new ways of marketing through self-organising food distribution systems and the emergence of e-commerce systems were exemplars of resilience and nimbleness in all but one of the regions assessed. The reinforcement of agriculture, fisheries and food production as essential social protection activities was a pivotal measure in Indonesia, the Pacific island countries and the Philippines, and highlights the need for more formal policies and other incentives. After COVID-19, finding an optimal balance between local and foreign production will be paramount.

The report concludes with suggested opportunities for action across three timescales (up to 1, 5 and 10 years) for research and development investments to enhance the resilience of food systems for each of the five geographies and at the scale of the Indo-Pacific region. Shocks such as the COVID-19 pandemic may offer windows of opportunity for food system transformations, which should be sought and proactively grasped by state and non-state actors alike.

# 1. Introduction



Photo: Lisa Robins



**As food stocks, savings and other reserves are used, the COVID-19 crisis is expected to intensify across the Indo-Pacific region.**

Photo: Li Peng Monroe

# 1 Introduction

---

A mere six months has elapsed since the SARS-CoV-2 virus outbreak was declared a 'Public Health Emergency of International Concern' by the Director-General of the World Health Organization (WHO) on 30 January 2020 (WHO 2020a). With no reprieve in sight, the global tally of lives lost in the COVID-19 pandemic has so far surpassed 600,000 (WHO 2020b), and the disruption to billions of livelihoods is costing trillions of dollars (Naidoo & Fisher 2020). Uncertainty is high as the situation unfolds and continues to change rapidly (Swinnen & McDermott 2020).

This report focuses on the disruption to food systems in the Indo-Pacific region in the context of the COVID-19 pandemic. Dramatic impacts have occurred as a result of emergency responses enacted by state and non-state actors to tackle the public health imperative, coupled with measures for countering the twin threat of an economic crisis. The challenges are diverse, from food shortfalls in countries dependent on imports to a multitude of supply chain failures and the threat of soaring food prices with attendant risks of social unrest. Some rural villages have seen an influx of returnees from urban centres.

Many local markets have closed, next season's crops might not be sown, and the livelihoods of households dependent on remittances have suddenly become precarious. In the face of this pandemic-driven upheaval and the amplification of its effects by climate change, pests and diseases and other existing and overlapping stressors, it is the poorest and most

vulnerable groups who have the least scope for adjustment. As food stocks, savings and other reserves are utilised, the COVID-19-driven crisis is expected to deepen across the Indo-Pacific region (ADB 2020, Kim et al 2020).

A large body of work already exists regarding the determinants and drivers of food security, with most describing these causes as immediate, underlying and structural. External shocks such as the COVID-19 pandemic result in immediate impacts on dietary intake, nutrient needs and food utilisation at the individual level. Underlying issues can increase or lessen shocks and are often interactive. These operate more at the household or regional level. Examples include pre-existing household food and nutrition security status, care practices and access to health services and facilities. Finally, structural issues such as resource allocation at the societal level, resulting from policies, governance and societal attitudes, can also serve to increase or lessen specific shocks (FAO 2017ab).

In regions that depend on traditional agriculture, health shocks can be devastating for smallholder livelihoods. Food system impacts are also gendered and have particular implications for women and girls. These shocks often erode production capacity and the ability of affected communities to recover, making them more susceptible to underlying or structural issues.

This research assesses food system vulnerabilities, impacts and opportunities for action in the Indo-Pacific region in light of the COVID-19 crisis. The time frame of the assessments is the first six months of the pandemic: January–July 2020. The research addresses two key questions:

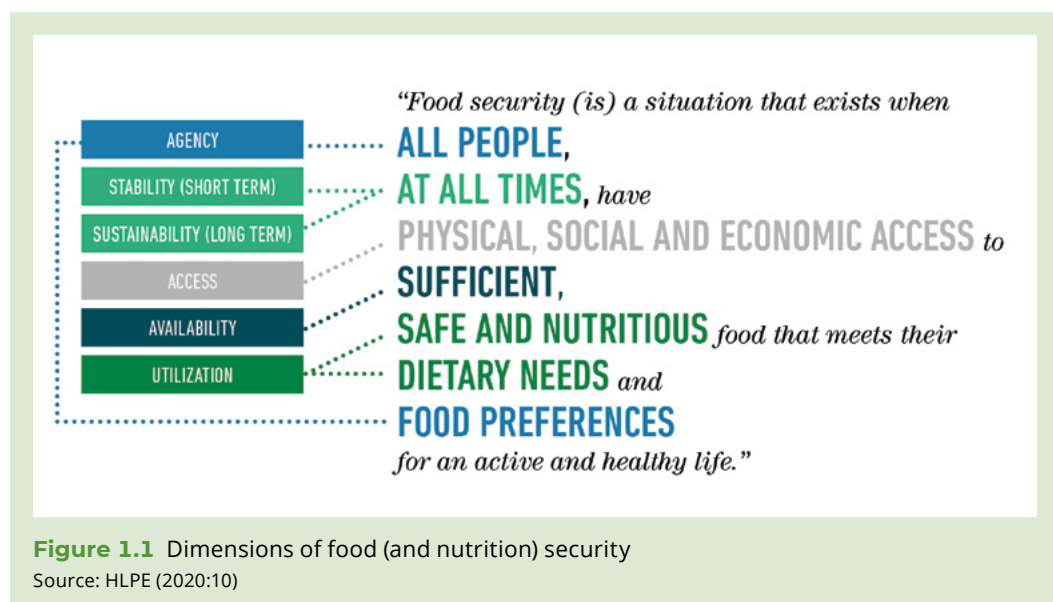
- What existing food system vulnerabilities are being exposed or amplified by the COVID-19 shock?
- How can this shock be used to inform future research and development to support food systems resilience in the Indo-Pacific?

The COVID-19 crisis is examined through the lens of food and nutrition security, primarily from the perspective of smallholder farmers. Consideration is given to the pillars of food and nutrition security (Figure 1.1) recommended by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security (HLPE 2020). Indonesia, seven Pacific island countries, Papua New Guinea, the Philippines and Timor-Leste comprise the five focal geographies assessed. The same analytical framework was applied for each

(Chapter 2), while recognising their very different agrifood systems.

These assessments were collectively analysed for common themes that have resonance for the broader Indo-Pacific region. Special attention was paid to identifying opportunities for action through research and development investments that might strengthen the resilience of food systems to future shocks for each focal geography and the Indo-Pacific region more generally. These opportunities and their respective investment time frames are described as short-term (up to 1 year), intermediate-term (up to 5 years) and longer-term (up to 10 years).

This work forms the second stage of the Assessment of Food Systems Security identified in the Australian Centre for International Agricultural Research (ACIAR) Business Continuity Plan as a high-priority activity for operationalising in response to the pandemic. Stage 1 was a rapid internal horizon scanning activity conducted by ACIAR across its Indo-Pacific network during the period 20 April–8 May 2020, which identified 10 high-level impact areas (Sanderson et al 2020).



**Figure 1.1** Dimensions of food (and nutrition) security

Source: HLPE (2020:10)

## Ten impact areas identified in Stage 1

1. Large-scale migration of displaced people is placing pressure on local food and resource systems.
2. Transport suspensions and movement restrictions are disrupting the delivery of food and essential agricultural inputs.
3. Government interventions in food markets are placing strain on domestic and international food markets.
4. Rising unemployment and underemployment is reducing incomes of low-income households and their ability to acquire nutritious food.
5. Movement restrictions are leading to labour shortages for production and marketing activities within food systems.
6. Existing threats to food systems are amplified by the COVID-19 disruption.
7. Impacts are not evenly distributed across social and economic strata.
8. Impacts on food systems are gendered and have particular implications for women and girls.
9. Accessing credit is becoming more difficult throughout food systems.
10. Human health implications of food systems remain prevalent and may be amplified amid COVID-19 disruptions.

Photo: ACIAR

## References

- ADB (Asian Development Bank) (2020). *An updated assessment of the economic impact of COVID-19*, ADB Briefs, No. 133, ADB, accessed 28 June 2020, [www.adb.org/sites/default/files/publication/604206/adb-brief-133-updated-economic-impact-covid-19.pdf](http://www.adb.org/sites/default/files/publication/604206/adb-brief-133-updated-economic-impact-covid-19.pdf).
- FAO (Food and Agriculture Organization of the United Nations) (2017a). *Asia and the Pacific regional overview of food security and nutrition: investing in food systems for better nutrition*, FAO, Bangkok, [www.fao.org/3/a-i7930e.pdf](http://www.fao.org/3/a-i7930e.pdf).
- FAO (Food and Agriculture Organization of the United Nations) (2017b). *The impact of disasters and crises on agriculture and food security*, FAO, Rome, [www.fao.org/3/a-i5128e.pdf](http://www.fao.org/3/a-i5128e.pdf).
- HLPE (High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security) (2020). *Food security and nutrition: building a global narrative towards 2030*, HLPE, Rome.
- Kim, K, Kim S & Park C-Y (2020). *Food security in Asia and the Pacific amid the COVID-19 pandemic*, ADB Briefs, No 139, Asian Development Bank, accessed 24 June 2020, [www.adb.org/sites/default/files/publication/611671/adb-brief-139-food-security-asia-pacific-covid-19.pdf](http://www.adb.org/sites/default/files/publication/611671/adb-brief-139-food-security-asia-pacific-covid-19.pdf).
- Naidoo R & Fisher B (2020). Reset sustainable development goals for a pandemic world. *Nature*, 6 July 2020, accessed 9 July 2020, [www.nature.com/articles/d41586-020-01999-x](http://www.nature.com/articles/d41586-020-01999-x).
- Sanderson T, Chapman G, Walker D & Horne P (2020). *Food systems security, resilience and emerging risks in the Indo-Pacific in the context of COVID-19: a rapid assessment*, Technical Reports Series, No. 95, ACIAR, Canberra.
- Swinnen J & McDermott J (eds) (2020). *COVID-19 and global food security*, International Food Policy Research Institute, Washington, DC, accessed 5 August 2020, [www.ifpri.org/publication/covid-19-and-global-food-security](http://www.ifpri.org/publication/covid-19-and-global-food-security).
- WHO (World Health Organization) (2020a). *Statement on the second meeting of the International Health Regulations (2005) Emergency Committee regarding the outbreak of novel coronavirus (2019-nCoV)*, WHO, Geneva, Switzerland, accessed 24 July 2020, [www.who.int/news-room/detail/30-01-2020-statement-on-the-second-meeting-of-the-international-health-regulations-\(2005\)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-\(2019-ncov\)](http://www.who.int/news-room/detail/30-01-2020-statement-on-the-second-meeting-of-the-international-health-regulations-(2005)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-(2019-ncov)) (tinyurl.com/rjdtx2k).
- WHO (World Health Organization) (2020b). *WHO Coronavirus Disease (COVID-19) Dashboard*, WHO, Geneva, Switzerland, accessed 24 July 2020, <https://covid19.who.int>.



## 2. Analytical framework



Photo: Jeffrey Maitem

# 2 Analytical framework

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**Dr James Butler**  
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## 2.1 Food systems as complex systems

For the purposes of this report, a food system is defined as ‘all the elements (environment, people, inputs, processes, infrastructures, institutions, etc.) and activities that relate to the production, processing, distribution, preparation and consumption of food, and the output of these activities, including socioeconomic and environmental outcomes’ (HLPE 2020:11).

Central to this definition are complex linkages and feedbacks between components of a food system (Figure 2.1), in which socioeconomic (for example, consumer demand, market prices, government policies) and biophysical drivers (for example, climate, ocean temperature, soil fertility, land-use change) interact to influence food system outcomes. These in turn affect driving forces external to the system (Ericksen et al 2009, Doherty et al 2019).

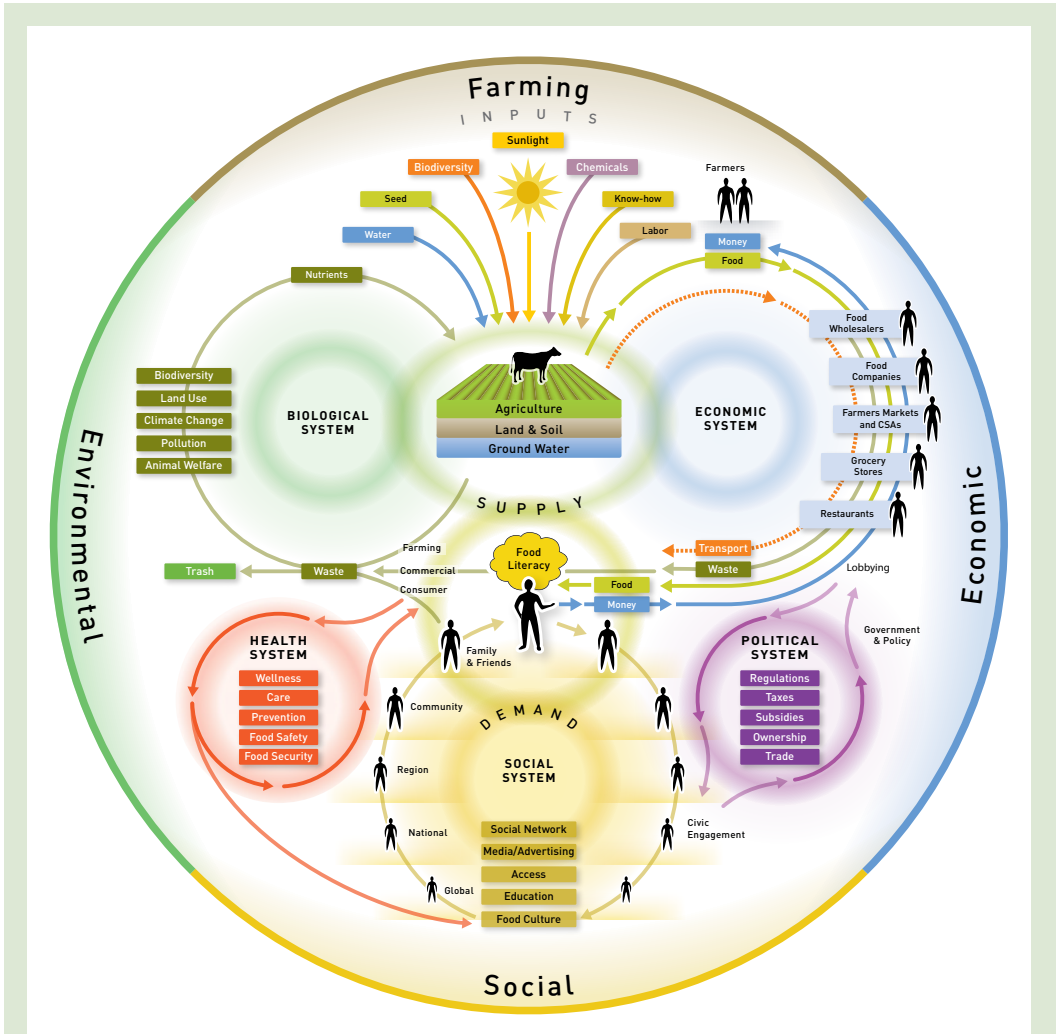
The resilience of the system is determined by its ability to cope with disturbance or change and retain its fundamental function and structure, and its capacity to self-organise, learn and adapt (Walker et al 2004, Doherty et al 2019). For smallholder livelihoods in the developing world, these attributes can be intentionally supported and invested in (Marschke & Berkes 2006) and should be the focus of food system interventions

(Béné 2020). However, purposeful non-incremental change (or transformation) may be required if a food system is trapped in an undesirable state (Walker et al 2010).

## 2.2 Analytical framework

The research adopts Allen and Prosperi’s (2016) conceptual approach, which assessed the vulnerability and sustainability of food production in the Mediterranean ‘Latin Arc’. Their framework analysed a food system as a complex social–ecological system and assessed its resilience to global environmental and socioeconomic drivers. The food system is geographically specified, usually at the national or subnational level, with a set of intrinsic endogenous features (exposure, sensitivity, recovery potential and resilience) that determine outcomes in terms of food and nutrition security. The system is impacted by exogenous variables or drivers of change, emanating from the broader regional or global scale. It is assumed to be a ‘driver-taker’, although there are feedbacks from food system outcomes to these higher-scale drivers. To execute the analysis, Allen and Prosperi (2016) outline a four-step process:

1. defining the scale of analysis
2. identifying drivers of change
3. identifying food system outcomes
4. examining exposure, sensitivity, impacts and recovery potential.



**Figure 2.1** The interacting elements of a food system  
 Source: WorldLink (2014)

The results inform a subsequent detailed analysis of emergent issues.

This analytical framework suited the assessment approach for this research for five reasons:

1. The national or subnational level of analysis provided a geographically bounded food system.
2. COVID-19 represented a clear exogenous, global shock to the system.
3. It was possible to investigate COVID-19's coincidental interactions with other drivers and shocks (for example, climate disasters, pest incursions) that created multiple hazards for the system.
4. The stepped process provided a clear and logical line of inquiry that could establish a research method for a rapid assessment.
5. The step assessing recovery potential lent itself to identifying priority opportunities to support future resilience.

To apply the framework, Allen and Proseri's four steps were expanded to 10 steps (Figure 2.2, Table 2.1). To incorporate a development perspective, explicit identification of pro-poor food system outcomes was included in Step 4, and analysis of vulnerable groups in Steps 6, 7 and 8. In addition, opportunities for transformation were identified in Step 9. These were defined after Colloff et al (in press) as generally irreversible and fundamentally changed structures and functions of a food system, including norms, goals, values, rules and practices. This step also enabled the assessment teams to screen suggested interventions for potentially maladaptive strategies, which were defined as actions which may increase vulnerability to future change over time, creating path-dependency and foreclosing future options (Barnett & O'Neill 2010, Wise et al 2014).

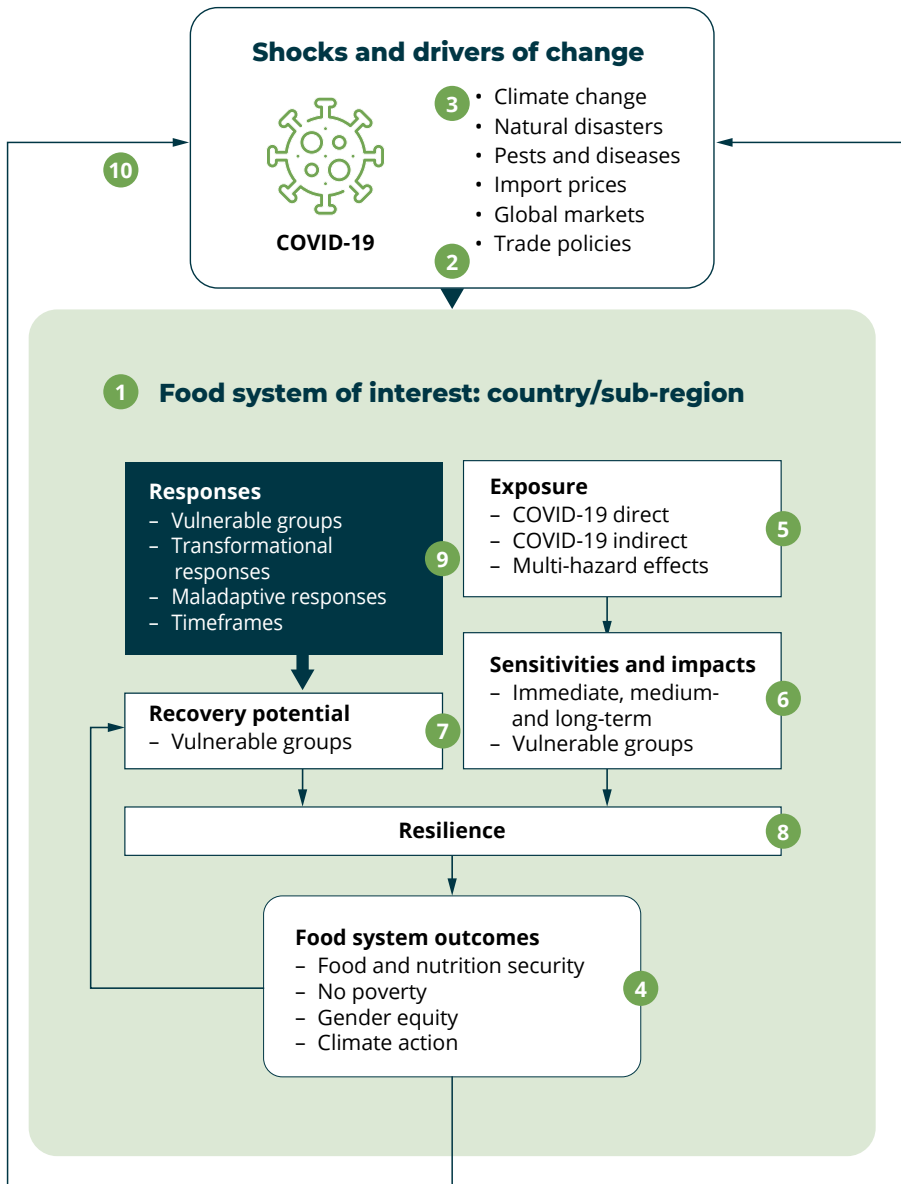
### Rapid assessment steps

- 1 What is the system of interest? What are its boundaries?
- 2 What are the characteristics of COVID-19 and the local response?
- 3 What are other drivers of change and their interactions with COVID-19?
- 4 What are the desired food system outcomes?
- 5 How exposed is the food system to COVID-19 and other drivers?
- 6 What are the sensitivities of and impacts on the system?
- 7 What is the current recovery potential of the system?
- 8 How resilient is the food system? Can the desired system outcomes be achieved?
- 9 What responses are needed to boost recovery potential?
- 10 What are the impacts on regional/global drivers of change?

**Figure 2.2** Analytical framework and 10 rapid assessment steps

Note: Pro-poor food system outcomes are examples only.

## Global/regional system



**Table 2.1** Ten steps and questions used to apply the analytical framework

Step	Question	Guiding notes
1	What is the system of interest and what are its boundaries?	Describe the food system, either at national or subnational scales if the national scale is too coarse to capture important socioeconomic, cultural and agroecological diversity.
2	What are the characteristics of COVID-19 and the local response?	Describe the nature of the COVID-19 shock, including the date and mode of entry into the country, its spread and the policy response to the outbreak (e.g. lockdown, social distancing, testing).
3	What are the other drivers of change and their interactions with COVID-19?	Identify other global and/or regional drivers of change that are occurring simultaneously and their interactions with the COVID-19 shock to generate multi-hazard effects. These drivers could be immediate and proximate shocks (e.g. cyclones, pest incursions) or incremental (e.g. sea level rise).
4	What are the desired food system outcomes?	Identify the desired pro-poor food system outcomes. These are probably food and nutrition security, but there could be other specific national or sub-regional policy targets and indicators (e.g. Sustainable Development Goals 1 No Poverty, 2 Zero Hunger, 5 Gender Equity and 13 Climate Action, or associated stunting and non-communicable disease and climate adaptation plans).
5	How exposed is the food system to COVID-19 and other drivers?	Exposure is the first point of contact between the shock and the food system. Following the IPCC (2012), exposure is defined as the elements of the system that are susceptible to adverse effects from the exogenous environmental or sociopolitical stress or shock. This step should consider aspects of the food system that are exposed to COVID-19, both directly and indirectly, and compounding global or regional drivers or shocks identified in Step 3 that create multiple hazards.
6	What are the sensitivities and impacts on the food system?	Sensitivity refers to the potential magnitude of the consequences of exposure to shocks and drivers, and hence impact on the food system (Prosperi et al 2014). This step examines the sensitivities and impacts on the system caused by its exposure to COVID-19, and any interactions with other shocks or drivers identified in Step 5. Impacts could be immediate (up to 12 months), medium-term (1–5 years) or long-term (more than 5 years). Sensitivities and impacts should be disaggregated to identify vulnerable social groups, defined as the characteristics of people and their social, political, economic and environmental context which renders them susceptible to hazards or shocks (Kelly & Adger 2000).

**Table 2.1** Ten steps and questions used to apply the analytical framework (continued)

Step	Question	Guiding notes
7	What is the current recovery potential of the system?	This step assesses the potential of the system to respond to and absorb disturbances in order to continue to function. Because recovery potential may differ among social groups of interest, the analysis should be disaggregated.
8	How resilient is the system and can the desired food system outcomes be achieved?	Resilience is the net result of impact and recovery potential and should be disaggregated to highlight key issues/groups with major challenges emanating from the shock. This step should also consider whether the desired food system outcomes can be achieved.
9	What responses are needed to boost recovery potential?	This is the primary output of the analysis and identifies responses that will bolster recovery potential to COVID-19 and future shocks or drivers of change. It is informed by the impacts and recovery potential that different social groups exhibit (from Steps 6 and 7), and by food system outcomes (from Step 8) which influence options. Time frames for responses can be categorised as short term (up to 1 year), intermediate-term (up to 5 years) or longer-term (up to 10 years). Transformational actions should be identified and suggested interventions should be screened for potentially maladaptive responses.
10	What are the impacts on regional/global drivers of change?	Allen and Prospero (2016) consider that the potential economic, social and biophysical feedbacks from the food system to the global or regional drivers and shocks are secondary, since the food system is typically a 'driver-taker'. However, this step should consider if there are system outcomes that could influence regional drivers (e.g. refugee emigration to other countries or political unrest influencing geopolitics).

## 2.3 References

- Allen T & Prospero P (2016). Modelling sustainable food systems. *Environmental Management* 57:956–975.
- Barnett J & O'Neill S (2010). Maladaptation. *Global Environmental Change* 20:211–213.
- Béné C (2020). Resilience of local food systems and links to food security—a review of some important concepts in the context of COVID-19 and other shocks. *Food Security* 12:805–822, <https://doi.org/10.1007/s12571-020-01076-1>.
- Colloff MJ, Abel N, Gorddard R, Lavorel S, Butler JRA, van Kerkhoff L, Meharg S, Munera C, Bruley E, Fedele G, Wise RM & Dunlop M (in press). Adapting transformation and transforming adaptation to climate change using a pathways approach. *Environmental Science and Policy*.
- Doherty B, Ensor J, Heron T & Prado P (2019). Food systems resilience: towards an interdisciplinary research agenda. *Emerald Open Research* 1:4 <https://doi.org/10.12688/emeraldopenres.12850.1>.
- Ericksen P, Ingram J & Liverman D (2009). Food security and global environmental change: emerging challenges. *Environmental Science and Policy* 12:373–377.
- HLPE (High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security) (2020). *Food security and nutrition: building a global narrative towards 2030*, A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome.
- IPCC (Intergovernmental Panel on Climate Change) (2012). Summary for policymakers. In: *Managing the risks of extreme events and disasters to advance climate change adaptation*, A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge.
- Kelly PM & Adger WN (2000). Theory and practice in assessing vulnerability to climate change and assessing adaptation. *Climate Change* 47:325–352.
- Marschke MJ & Berkes F (2006). Exploring strategies that build livelihood resilience: A case from Cambodia. *Ecology and Society* 11(1):42, [www.ecologyandsociety.org/vol11/iss1/art42/](http://www.ecologyandsociety.org/vol11/iss1/art42/).
- Prospero P, Allen T, Padilla M, Peri I & Cogill B (2014). Sustainability and food and nutrition security: a vulnerability assessment framework for the Mediterranean region. *Sage Open* 4:1–15.
- Walker B, Holling CS, Carpenter SR & Kinzig AP (2004). Resilience, adaptability and transformability in social–ecological systems. *Ecology and Society* 9(2):5, [www.ecologyandsociety.org/vol9/iss2/art5/](http://www.ecologyandsociety.org/vol9/iss2/art5/).
- Walker B, Sayer J, Andrew NL & Campbell B (2010). Should enhanced resilience be an objective of natural resource management research for developing countries? *Crop Science* 50:5-10–5-19.
- Wise RM, Fazey I, Stafford Smith M, Park SE, Eakin HC, Archer van Garderen ERM & Campbell B (2014). Reconceptualising adaptation to climate change as part of pathways of change and response. *Global Environmental Change* 28: 325–336.
- WorldLink (2014). *Food system tools*. Map. Nourish, WorldLink, San Francisco, CA, accessed 25 June 2020, [www.nourishlife.org/teach/food-system-tools/](http://www.nourishlife.org/teach/food-system-tools/).



### 3. Synopsis of assessments



Photo: Rickdane Gomez

# 3 Synopsis of assessments

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## 3.1 Abstract

This synopsis of assessments draws from the five geographical assessments (Indonesia, seven Pacific island countries, Papua New Guinea, the Philippines and Timor-Leste) to identify common vulnerabilities, impacts and opportunities for action with applicability to the greater Indo-Pacific region. A suite of 10 pre-existing vulnerabilities were identified as undermining food security across these geographies, most having strong applicability for the Indo-Pacific region. These broad-ranging vulnerabilities include:

- dependence on food imports
- exposure to climate change and extreme weather events
- patchy biosecurity, animal and plant health services
- fragmented value chains and food system governance.

Loss of employment and income was the most significant impact of the COVID-19 pandemic. Several factors influencing recovery potential and resilience emerged, notably the availability of imported staple foods, local value chains contributing to food and nutrition security, and

evidence of local food system agility. Although the functionality of food system governance was found to be variable, the collective assessments revealed heightened recognition of the importance of food systems to national health and economies, and significant scope for social protection to build resilience.

Research and development opportunities to strengthen food system resilience in the Indo-Pacific region were identified according to the following timescales:

- short term (up to 1 year)—embed food production into social protection initiatives; monitor local prices for early warning for food access and availability; communicate COVID-19 risk more effectively by building on local knowledge and priorities
- intermediate term (up to 5 years)—future-proof value chains by facilitating local supply of nutritious food; support household livelihood portfolios instead of farm income alone; expand and invest in shock-resilient production systems; create strategic partnerships and innovative funding collaborations

- longer term (up to 10 years)—use agriculture and fisheries to deliver sustainable social protection outcomes; enhance agency of local and regional actors in decision-making forums related to food security; explore new partnerships to build coherence between food, nutrition and national security outcomes; invest in future farmers.

## 3.2 COVID-19 in the Indo-Pacific region

The COVID-19 pandemic, a 1 in 100-year crisis, has negatively affected the lives and livelihoods of millions of people across the Indo-Pacific region. This chapter asks how can investment in agriculture and food systems assist countries and communities in the Indo-Pacific region to ‘build back better’ (UN News 2020) in support of their economic and national security? In exploring this question at the scale of the Indo-Pacific region, the primary source of data and other information is the five assessments of Indonesia (Chapter 4), Pacific island countries (Chapter 5), Papua New Guinea (Chapter 6), the Philippines (Chapter 7) and Timor-Leste (Chapter 8), each of which applied the same analytical framework (Chapter 2) in the context of the first six months of the pandemic (January–July 2020).

This synopsis aims to:

- identify key themes where the COVID-19 pandemic has had effects or potential effects on food and nutrition security, smallholder livelihoods and other component social groups within food system value chains
- propose possible research-for-development opportunities that have the potential to protect food and nutrition security while simultaneously contributing positively to economic recovery during this pandemic and building resilience to future shocks.

The five geographical assessments highlight the diversity of populations, economies, agricultural trends, food and nutrition (in) security, and the direct and indirect impacts of COVID-19. In the context of agriculture, there are vast differences across the Indo-Pacific region, from areas where up to 90% of the population is engaged in some form of food production to areas where the agricultural labour force has declined due to mechanisation and reduction in the contribution of agriculture to the overall national economy.

The implications of COVID-19 for the agriculture sector and the food system across the Indo-Pacific are diverse. COVID-19 has directly and indirectly destroyed employment opportunities for large swathes of migrant workers across Asia (ADB 2020) and contributed to increased pressures on rural and urban household incomes and, by association, food security and physical security across the region, including crime and domestic violence.

Investment and improvements in international agricultural productivity had declined significantly prior to COVID-19 (UN 2015, Rampa et al 2019). In addition, growing recognition of the erosion of the world’s natural capital and increasing inequity resulted in United Nations (UN) member states committing to the 2030 Agenda for Sustainable Development (UN 2015), with global agreement on the 17 Sustainable Development Goals. Accordingly, how progress towards the Sustainable Development Goals has been affected by the COVID-19 pandemic, and what this implies for policy, practice and research, is discussed. Importantly, positive examples of and opportunities for enhancing food system resilience in the Indo-Pacific region are highlighted.

### 3.3 Synopsis approach

The Indo-Pacific refers to a geographical region ‘ranging from the eastern Indian Ocean to the Pacific Ocean connected by South-East Asia, including India, North Asia and the United States’ (DFAT 2017).

The data and other information presented in this synopsis are drawn from:

- the five assessments:
  - Indonesia
  - Pacific island countries, comprising smaller (Kiribati, Tuvalu), medium (Samoa, Tonga) and larger (Solomon Islands, Vanuatu, Fiji) island groupings
  - Papua New Guinea
  - the Philippines
  - Timor-Leste.
- the Australian Centre for International Agricultural Research (ACIAR) report *Food systems security, resilience and emerging risks in the Indo-Pacific in the context of COVID-19: a rapid assessment* (Sanderson et al 2020)
- regional and relevant global documentation relating to food systems with an emphasis on intersectoral and interdisciplinary actions required to enhance system resilience
- key informant interviews with senior representatives (8 women, 17 men) from relevant institutions in the Indo-Pacific region—Australian Council for International Development (ACFID), Asian Development Bank (ADB), Food and Agriculture Organization (FAO), International Fund for Agricultural Development (IFAD), International Food Policy Research Institute (IFPRI), International Union for Conservation of Nature, UN Office on Drugs and Crimes, UN Development Programme, World Health Organization (WHO) and four universities.

Desktop research was significantly supplemented with policy and research and development documents supplied through the key informant interview process. Where possible, the researchers sought to contextualise the findings from the specific geography assessments against an Indo-Pacific regional backdrop. These findings were examined using the analytical framework for food system shocks.

The common risks, impacts and opportunities for action identified in this chapter were compiled in consultation with the lead authors of the five assessments.

### 3.4 Exposure and vulnerabilities

It is impossible to predict the duration of the COVID-19 pandemic and its associated long-term impacts on livelihoods and food security. Despite reported progress on reducing hunger and malnutrition in the first decade of the 21st century, the absolute numbers of people experiencing hunger and malnutrition (for example, micronutrient deficiencies, stunting in children, overweight and obesity) have increased over the past four years (FAO 2020a). This increase is unequal across and within countries. A 2018 FAO-led report into food security and nutrition estimated that 486 million people were undernourished across the Asia-Pacific region. Paradoxically, the region was also home to the fastest growing prevalence of childhood obesity (FAO 2018a). This trend is being exacerbated by acute shocks such as the COVID-19 pandemic (World Vision International 2020) and natural disasters (Simpson et al 2008), which come on top of ongoing stresses related to extreme weather events (for example, droughts, floods and cyclones) (IPCC 2020), agricultural pests and diseases (for example, locusts, fall armyworm and African swine fever) (Alders 2020) and

chronic socioeconomic and health inequities experienced by much of the Indo-Pacific region's population (Grundy et al 2014).

### 3.4.1 Common vulnerabilities

Ten key pre-existing vulnerabilities were common to all five geographies studied. An additional one was related to risk communication, and had less relevance in Indonesia. A brief exploration of these pre-existing elements, which are experienced by a range of countries across the Indo-Pacific region, follows.



#### Common food system risks

- Significant dependence on food imports
- Climate change and extreme weather events
- Pre-existing and persistent nutritional challenges
- Growing informal labour and economic marginalisation
- Pre-existing and persistent gender inequity
- Baseline data gaps: agriculture, fisheries, ecosystem integrity, gender, health, nutrition
- Patchy biosecurity, animal and plant health services
- Fragmented value chains and food system governance
- Rapid population growth, inequity between generations and urbanisation
- Poorly adapted risk communication\*

\* Except Indonesia

### 3.4.2 Significant dependence on food imports

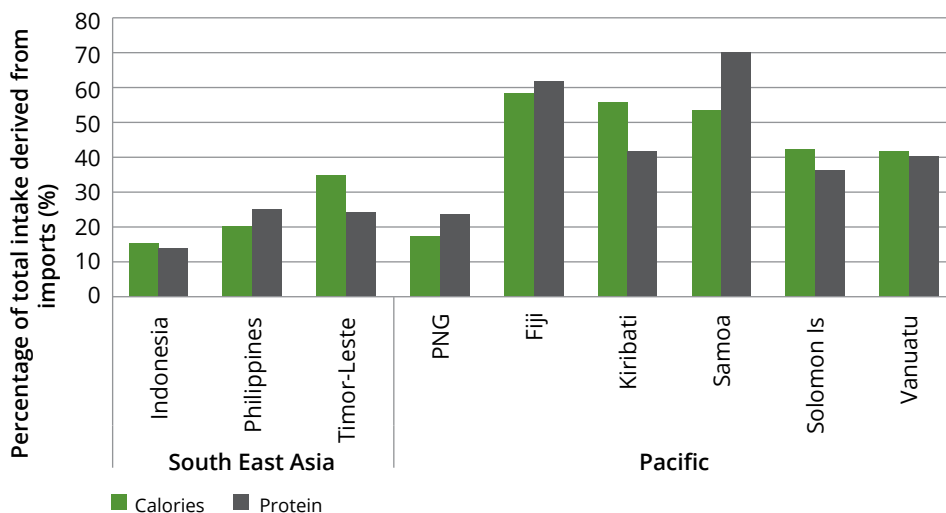
Indonesia, Pacific island countries, Papua New Guinea, the Philippines and Timor-Leste are all significant importers of food. They are dependent on imports for at least part of their food consumption (Figure 3.1). This makes them particularly vulnerable to surges in international food prices or supply chain failures.

In caloric terms, import dependence ranged from 15% (Indonesia) to 58% (Fiji). They were especially high for all the Pacific island countries. By comparison, the shares for India, China and Bangladesh were 5%, 8% and 12%, respectively. In most of the nine countries shown, the degree of import dependence was similar for calories and protein. Import dependence was higher for protein than calories in the Philippines, Papua New Guinea, Fiji and Samoa and the reverse was true for the other five countries.

International staple food prices have been relatively stable. Average rice prices weakened fractionally in June 2020, yet remain elevated compared to one year ago (AMIS 2020).

### 3.4.3 Climate change and extreme weather events

As reported in the five assessments, food systems are both contributing to climate change and impacted by it. Globally, food systems contribute 21–37% of total net human-caused emissions of greenhouse gases (IPCC 2020). Through land-use change, intensive agriculture, large-scale livestock production and other practices, food systems have led to agroecological degradation, destroyed habitats and contributed to climate change. Climate change and associated extreme weather events have been negatively impacting food and nutrition security in the Indo-Pacific region for over a decade (Chatterjee & Khadka 2011, MacPherson 2017).



**Figure 3.1** Percentage of total caloric and protein intake derived from imports (2017)

Source: Except for Papua New Guinea, calculated from FAO food balance sheets. The assistance of David Dawe, FAO RAP office, Bangkok, is gratefully acknowledged. Papua New Guinea estimates are from Bourke et al (2009).

In addition to the obvious impacts of extreme weather events on food production and trading, climate change is also driving geographical spread of disease and pests and increased food safety risks (Maggiore et al 2020). Dujardin et al (2018) reported that significant exposure to changing climate is being exacerbated by high levels of sensitivity of social and ecological systems coupled with limited capacity of low- and middle-income countries to respond to the effects.

### 3.4.4 Pre-existing and persistent nutritional challenges

The growing numbers of malnourished (underweight, overweight, obese and/or micronutrient deficient) individuals was emphasised in each of the detailed assessments. An FAO report (FAO 2018a) clearly demonstrated that food systems in the Asia-Pacific region were not efficiently supporting food and nutrition security prior to COVID-19. When people are close to the

margin of subsistence, this makes them especially vulnerable to shocks that threaten to reduce their food intake. Almost half a billion people in the region are suffering from the triple burden of micronutrient deficiency, undernutrition and obesity and other non-communicable and diet-related diseases such as diabetes (FAO 2020a).

These impacts are unevenly felt, with vulnerable households (including the elderly, people living with a disability, the socioeconomically poor and other marginalised groups), with children and women being overrepresented (FAO 2020a). In Indonesia, for example, stunting in children under five is estimated at 31% (TNP2K 2018) and is largely the result of limited protein and micronutrient intake. In the Pacific region, trade liberalisation in the mid-1990s resulted in an increase of cheap imported processed foods such as noodles, rice and wheat (Plahe et al 2013, Charlton et al 2016). This has contributed to a non-communicable disease crisis in the region. The prevalence of diabetes

and kidney disease in the seven Pacific island countries assessed is much higher than the global average. In Timor-Leste, the inability of many rural families to generate agricultural income significantly impacts nutrition, with infant stunting rates among the highest in the world (GDS 2015, Provo et al 2017). While these nutrition-related indicators are also prevalent in Papua New Guinea, the rates of population-level communicable diseases such as tuberculosis and human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) are also high (DFAT 2018). This is compounded by malnutrition and places additional pressures on health systems that are already overwhelmed and under-resourced (Mola 2020).

#### **3.4.5 Growing informal labour and economic marginalisation**

The detailed assessments indicate that the high proportion of low-paid, informal labour in agriculture and other services that use migrant labour remains a significant vulnerability in the Indo-Pacific region. Poorly remunerated agricultural workers contribute to decreased food availability, access, utilisation and stability over time (FAO 2012). 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).

#### **3.4.6 Pre-existing and persistent gender inequity**

Gender inequity and its consequences were stressed as significant vulnerabilities in each of five geographies studied. 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 Goal indicators highlighted significant inequality for women

and girls (ADB & UN Women 2018). Gender-based violence is endemic in the Asia-Pacific region (UNFPA 2020). There is a lack of adequate data to inform policy and program interventions, and insufficient monitoring to address impunity and provide protection. During conflicts and natural disasters, social structures are further destabilised, leaving many women and girls vulnerable to increased sexual violence, exploitative labour and trafficking.

Women make important contributions to agriculture and rural livelihoods and play a vital role in the care and reproduction of households and communities (Akter et al 2017, Doss et al 2017). 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 (FAO RAP 2020).

#### **3.4.7 Baseline data gaps: agriculture, fisheries, ecosystem integrity, gender, health, nutrition**

The impact of missing data was highlighted in the Papua New Guinea assessment in particular. However, recent high-quality data on many aspects of smallholder agriculture, food consumption and marketing are scarce across the Indo-Pacific region. While some improvements have occurred at national and subnational levels, significant gaps in location-specific data (i.e. nationwide district-level data) is a major, widespread constraint to effective decision-making (by politicians, bureaucrats, farmers, traders, donors, etc) and implementation across the region. Data comparability across the region is also problematic (ADB & UN Women 2018).

### 3.4.8 Patchy biosecurity, animal and plant health services

The detailed assessments document the ongoing impact of biosecurity and health services weaknesses. For example:

- African swine fever in the Philippines, Papua New Guinea and Timor-Leste
- the rhinoceros beetle threatening the coconut industry in Pacific island countries
- the brown planthopper in Indonesia.

Across the region, biosecurity threats remain a persistent challenge impacting human (MacIntyre 2019, CHS 2019), animal and plant health. Biosecurity regulations in many countries have been drafted within disciplinary silos with limited to no collaboration across public health, animal health and plant health and, indeed, with the security agencies managing borders and ports. Most countries have developed preparedness and response plans for health security threats, but few of these plans constitute an effective multi-hazard plan (CHS 2019). Biosecurity activities are inadequately resourced, meaning all agencies engaged in these issues are underfunded and undertrained (CHS 2019, Castriciones & Vijayan 2020). This results in substantial food security and nutrition impacts, and lower farmer incomes, export earnings and balance of payments (Waage & Mumford 2008).

In the Indo-Pacific region, a range of factors contribute to the spread of infectious diseases:

- increasingly dense urban populations (Hassell et al 2017)
- increasing ecological disturbances associated with land-use changes (McFarlane et al 2013)
- the persistence of unsanitary wet markets (Peiris & Yen 2014)

- the highly dynamic flow of people across the region through land, sea and air migrations (Tatem et al 2006)
- health system vulnerabilities, including accessibility and utilisation of screening (CHS 2019)
- diagnosis and treatment of infectious disease (De Guzman & Malik 2020).

Vaccination rates for many preventable human and animal diseases remain inadequate in the region (CHS 2019). Inadequate access to water and sanitation services and poor hygiene practices due to sustained underinvestment in these services heightens health vulnerability (CHS 2019, Lal et al 2019).

### 3.4.9 Fragmented value chains and food system governance

Food system value chains are fragmented, highly diverse and complicated across the region. There are local, short value chains among small landholders and communities that rely on the trading of fresh fruits, vegetables, meat and fish to much more complicated value chains, such as those between the highlands of Papua New Guinea and the urban markets involving large numbers of actors. In Papua New Guinea, there are significant data gaps across production, market chains and demand for the most-traded fresh foods. In the Philippines, conservative low-input farming practices continue to support short and low value chains that are prone to both production and consumption shocks, such as those resulting from African swine fever. The lack of private sector engagement in the food production systems of Timor-Leste limits the development of both markets and value chains.

The detailed assessments highlight the diversity of populations, economies, agricultural trends, food (in)security and problematic health and nutrition security,



especially in rural areas. In many countries in the region, the governance of food security and food systems is fragmented across multiple sectors from agriculture and trade through to public health, and from the public to the private and non-government organisation sectors, with each sector working to different performance indicators and priorities. There is no coherent governing body for food systems in the region, making policies that work across sectors hard to facilitate.

### **3.4.10 Rapid population growth, inequity between generations and urbanisation**

The youth bulge, accompanied by intergenerational inequity that works against the young, and growing urbanisation are impacting agricultural and fisheries workforces in each of the geographies studied. The urban-rural divide has been exacerbated in much of the Indo-Pacific region as a result of most countries focusing their planning on urban areas without adequately supporting resilient systems that enhance development in urban, peri-urban and rural areas. This has been shown by Lipton (1977) and subsequent literature (Perkins et al 2012). Some Pacific nations are an exception, where development and investment activities have tended to prioritise rural areas. Under-resourcing of rural development has left these populations more vulnerable to negative economic shocks than they would otherwise have been.

### **3.4.11 Poorly adapted risk communication**

Gaps in risk communication tools and practices across the region weaken the capacity of countries to effectively engage with at-risk populations and the wider public in the event of health 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 (Alders & Bagnol 2007). For example, the lack of an equivalent term to or different perceptions of the term 'virus' are contributing to communication difficulties in both Papua New Guinea (Kyeema 2020) and Timor-Leste (Barnes et al, in press) in relation to African swine fever control. A reduction in consumer demand for pork was reported in the Philippines this year, probably due to an erroneous fear that African swine fever is zoonotic.

## 3.5 Impacts

The impacts of the pandemic on lives and livelihoods in the Indo-Pacific region during its first six months have been diverse and far-reaching. COVID-19 has placed all levels of government across all sectors under enormous pressure as they grapple with the multitude of issues affecting health, the economy and cultural and societal norms.

### 3.5.1 Common impacts

Six significant impacts emerged as common to all or most geographies studied, each of which is briefly described in the sections that follow.



#### Common impacts of COVID-19 on food systems

- Loss of employment and incomes
- Growing food and employment insecurity
- Disrupted value chains, agricultural supply chains
- Declining food demand and access\*
- Reduced timely access to agricultural supplies
- Increased gender-based discrimination^

\* Except Indonesia

^ Except the Philippines

### 3.5.2 Loss of employment and incomes

Significant loss of employment and incomes was common to all five geographies assessed. By April 2020, in Indonesia alone, over 6 million people had lost formal employment and approximately one-quarter of Indonesians surveyed were relying on borrowed money to meet basic needs. More broadly, containment responses to COVID-19 in the region have contributed to widespread job losses, collapsing incomes, and falling remittances (FAO 2020a). ADB used the Global Trade Analysis Project global trade model to estimate the economic effects of the economic containment responses to COVID-19 (Table 3.1). Their estimates demonstrate that, the longer it takes to contain the COVID-19 pandemic, the greater the impact on regional and global economies (ADB 2020, Kim et al 2020).

### 3.5.3 Growing food and employment insecurity

To date, the impact of COVID-19 on food security and nutrition has primarily occurred on the demand side, reducing food intake through loss of income caused by unemployment and furloughs (Dawe 2020a, Kim et al 2020, Schmidhuber et al 2020, World Bank 2020). All studied geographies identified increasing insecurity with respect to food and employment. This finding is supported by a rapid assessment across 14,000 households in nine countries (India, Bangladesh, Nepal, Sri Lanka, Philippines, Indonesia, Myanmar, Cambodia and Mongolia) in the Asia-Pacific. This assessment highlighted that, while COVID-19 began as a health crisis, one of its most serious effects is now increased food insecurity and poverty for vulnerable children and their families (World Vision International 2020). As households struggle to cope with loss of income and livelihoods, meeting basic household needs is a growing

**Table 3.1** Projected economic impact of COVID-19

Geography	Gross domestic product (%)		Employment (million)	
	Short containment	Long containment	Short containment	Long containment
South-East Asia	-4.6	-7.2	-11.6	-18.4
Pacific	-4.6	-7.0	-0.1	-0.2
Asia	-6.2	-9.3	-109.1	-166.7
Global	-6.4	-9.7	-158.1	-242.1

Source: ADB (2020)

challenge. The assessment found that over two-thirds of the respondents said their livelihoods were fully or severely affected. Approximately one-quarter did not have any food on hand, with one-third only having one week's supply.

### 3.5.4 Disrupted value chains, agricultural supply chains

Food value chain disruptions were reported in all studied geographies except for Kiribati and Tuvalu. In Timor-Leste, exports of key crops such as coffee, copra, konjac and candlenut have been disrupted. Regional food supply chains have been disrupted through the closure of local markets, combined with the limited capacity of farmers to store harvested crops (Dawe 2020a). Processing factories have shut down in some instances and local labour shortages have been reported due to travel and international border restrictions. Widespread lack of refrigerated storage, combined with port restrictions and congestion, have led to increased wastage through spoilage of perishables.

### 3.5.5 Declining food demand and access

Lost income and unemployment are leading to some fall in food demand across the board. This has put downward pressure on both retail and farm-level prices (FAO 2020a). The inability to move

food across the region or nationally has left many subnational populations either with stockpiled fresh produce that cannot be sold, or limited access to fresh food and imported food (especially in the short term and in urban settings). This has highlighted the challenges to governance of implementing states of emergency enforced by police, military and customs that may not adequately consider the movement of essential items such as food.

### 3.5.6 Reduced timely access to agricultural supplies

Input supplies, including seeds, fertiliser and animal feed, have been variously disrupted in the geographies assessed, including for upcoming growing seasons. This will lead to later output effects. Disruptions to input supplies raise the cost of farm-level production, placing upward pressure on food prices through the entire value chain. Many countries in the region have experienced shortages in feed supply and labour, which are essential to intensive animal production systems (FAO 2020b). In Papua New Guinea, for example, a lack of poultry feed has impacted day-old chick producers. In some areas, farmers are moving from intensive commercial chicken production to extensive village chicken production (FAO-PG 2020).

### 3.5.7 Increased gender-based discrimination

Emerging data shows that violence against girls and women, particularly domestic violence, has intensified (PLAN International & Save the Children 2020). COVID-19 disruptions to women's safety and wellbeing impact on women through the loss of marketing opportunities for fresh food and various imported manufactured goods and local products in Papua New Guinea and other Pacific island countries. The Pacific and Timor-Leste assessments highlight instances where the increase in populations in rural areas means women have more household pressures to feed their families. Longer-term impacts due to increasing homelessness and decreased investment in education will continue to disproportionately affect women and girls.

## 3.6 Recovery and resilience

Although the COVID-19 pandemic is ongoing, the five detailed assessments, together with reports from the Indo-Pacific region, suggest that the potential for food systems to recover varies within and between countries. While the ability of food systems to anticipate, absorb and recover from the COVID-19 shock suggests that regional food systems are far from resilient, there are also indications of regional economic communities collectively envisioning and moving towards a transformation of their food systems.

### 3.6.1 Common factors influencing recovery and resilience

This research identified six factors of significance to recovery and resilience in all or most geographies studied, which are elaborated in the sections that follow.



#### Common recovery and resilience factors

- Availability of imported staple foods
- Variable functionality of food system governance
- Heightened recognition of the importance of food systems
- Significant scope for social protection to build resilience
- Local value chains contributing to food and nutrition security<sup>^</sup>
- Evidence of local food system agility<sup>†</sup>

<sup>^</sup> Except the Philippines

<sup>†</sup> Except Timor-Leste

### 3.6.2 Availability of imported staple foods

The constant availability (as at the end of July 2020) of key staple foods, such as rice, was a uniform finding across all studied geographies. In Timor-Leste, for example, the government worked effectively with major food importers to ensure continuity of supplies. It would appear that measures put in place to reduce surges in international prices and possible interruptions to international supply following the global food crisis in 2007–08 are operating effectively. Market policy reforms instituted

after the global food crisis of 2007–08 have contributed to the ongoing availability of rice at a largely affordable price in countries across the region (FAO 2020a). However, if international food prices rise, exporting countries may attempt to protect their domestic consumers by restricting exports, as occurred in 2007–08 (Dawe 2020b). It is important that this response be avoided.

### 3.6.3 Variable functionality of food system governance

Fragmented food governance, with inadequate involvement of women and youth in policymaking and implementation, is common across the region. After COVID-19, the national and regional COVID-19 pandemic crisis committees established to deal with the impact of the outbreak on food supply (including ministries of agriculture, livestock, fisheries, food, transport, economy, trade, health and social welfare) have an exceptional opportunity to support sustainable, healthy food systems.

There is a plethora of policies at national, regional and global levels that align with food system resilience. The problem is not always a lack of policies, but rather a lack of knowledge of their existence and limited resources for coordination and effective implementation. By employing an intersectoral systems approach, alignment can be sought across key national and international strategies and agreements, enabling more efficient outcomes of investments by the public and private sectors. Some notable examples are:

- Universal Health Coverage Political Declaration (UN 2019), which highlights the importance of food security
- Sendai disaster risk reduction framework (UNDRR 2015), which has helped improve disaster risk preparedness in the Indo-Pacific
- 2018 Boe Declaration, which articulates how Pacific island countries view national security
- Framework for Resilient Development in the Pacific (SPC et al 2016)
- Statement of Association of Southeast Asian Nations (ASEAN) Ministers on Agriculture and Forestry in Response to the Outbreak of COVID-19 to Ensure Food Security, Food Safety and Nutrition in ASEAN (ASEAN 2020)
- Convention on Biodiversity (UN 1992)
- 2030 Agenda for Sustainable Development (UN 2015), which has set 17 globally agreed Sustainable Development Goals.

Approaches that focus on only one crisis at a time may inadvertently worsen other crises. Pragmatic and equitable approaches to global health security, food security and food production, and justice in human, animal, and environmental health are being brought together under the One Health paradigm (Alders et al 2017, in press; Cleaveland et al 2017; Lysaght et al 2017; FAO 2020c; Garcia et al 2020). Active engagement by national governments and regional economic communities in these global debates are essential to ensure that the post-2030 development agenda align with their core values and aspirations.

### 3.6.4 Heightened recognition of the importance of food systems

The COVID-19 pandemic has heightened recognition among state and non-state actors across the Indo-Pacific region that agriculture, fisheries and food production are essential to life and livelihoods and cannot be taken for granted. This was particularly evident in the assessments for Indonesia and the Pacific island nations. Governments are encouraging household food production, and increasing numbers of urban migrants are returning to rural areas and contributing to agricultural endeavours.

In order to meet Sustainable Development Goal 2 'Zero Hunger' commitments, national government investments in the agriculture sector will need to increase significantly in most countries. In the medium to long term, governments must encourage diverse food and nutrition security activities in urban, peri-urban and rural settings (CHF 2020).

### **3.6.5 Significant scope for social protection to build resilience**

Social protection measures have been introduced in response to COVID-19 for all studied geographies. In Timor-Leste, the national budget allocated to social protection measures is equivalent to the combined funding for health and agriculture. However, the distribution process lacks gender sensitivity and potentially acts as a disincentive to engagement in agriculture. Regionally, income losses from COVID-19 have occurred among urban, rural non-farming and smallholder farming households that depend in part on incomes from off-farm sources, including remittances. In addition to cash transfers, civil society organisations have facilitated asset distribution programs. These programs include seeds for leafy green vegetables that can be grown in kitchen gardens and small livestock distribution programs (World Vision Australia 2020). Ensuring gender-sensitive animal and plant health extension services will be crucial to increasing the success of these programs. Social protection activities that contribute to smallholder livelihood agricultural and fisheries strategies will build resilience and reduce the need for emergency relief during subsequent crises.

### **3.6.6 Local value chains contributing to food and nutrition security**

International trade plays an important role in ensuring food supplies to food deficit countries. These supply lines will

remain important in the face of climate change adaptation (Janssens et al 2020). However, global food supply chains have largely focused on trade in staple foods and ultra-processed food, due to their longer shelf life and relative ease of storage. Food with higher nutrient quality tends to be perishable, and requires either short value chains or robust storage conditions. Assessments for Indonesia, Pacific island countries and the Philippines suggest that more localised food value chains may promote better food and nutrition security outcomes. Shorter value chains also increase agency and equity in food systems (Davila 2019) and enhance women's participation, as they are better able to engage in income-generating activities while also meeting their household care responsibilities (FAO 2018b).

After COVID-19, all countries will probably try to identify an optimal balance between local production that directly contributes to national and household food and nutrition security but also raises foreign exchange via the production and sale of cash crops, such as coffee, cocoa and gallup nut.

### **3.6.7 Evidence of local food system agility**

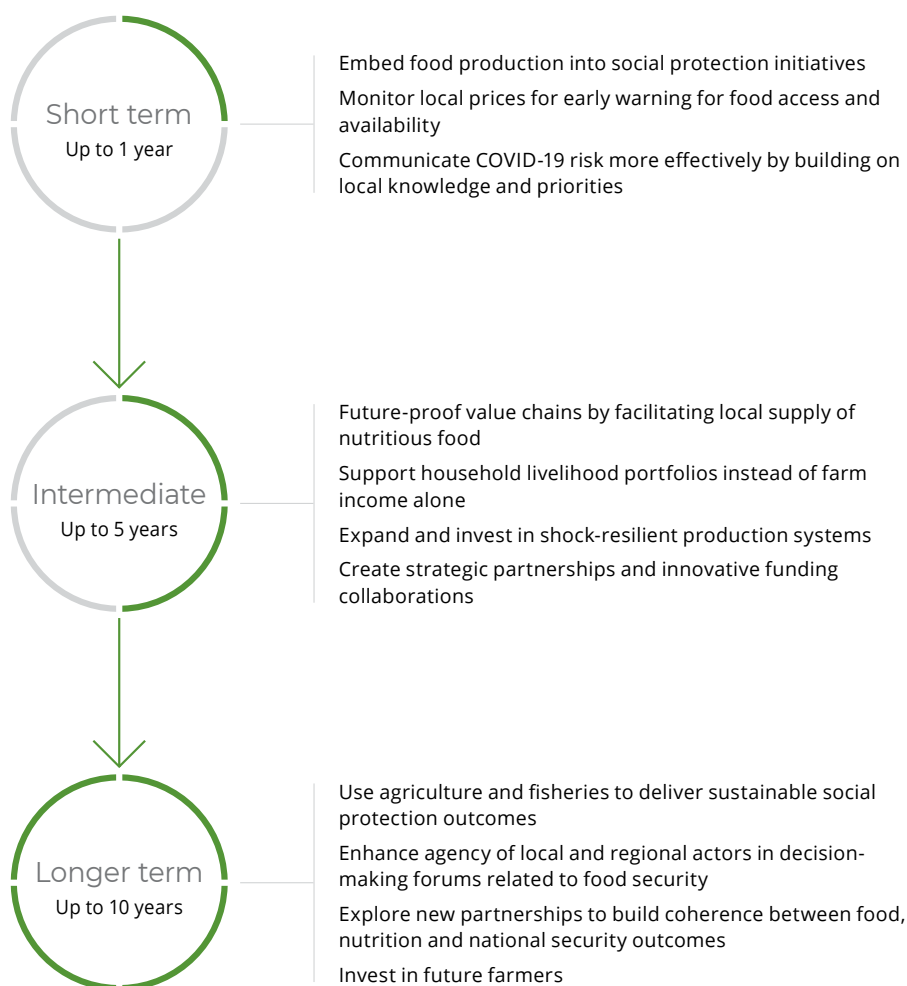
Local food systems in all but one of the geographies studied have highlighted examples of resilience and nimbleness in the face of the pandemic, including increased engagement of women. A good example from the Pacific island countries assessment is that of developing new ways of marketing through self-organising food distribution systems and emergence of e-commerce systems. However, several of the country studies note that the ability of local and national governments to identify blockages to supply chains is impeded by their incapacity to monitor local prices.

## 3.7 Opportunities for regional action

The COVID-19 pandemic has revealed shortcomings and, in some cases, created new fragilities in current food systems across the Indo-Pacific region. These food systems need strengthening in order to better navigate this shock and those that will inevitably occur in the future.

### 3.7.1 Snapshot of regional opportunities

Research and development opportunities with broad applicability to the region have been identified in the geographic assessments according to three investment timescales. These opportunities are outlined in the follow sections.



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

#### *Embed food production into social protection initiatives*

Given the finite resources available to countries, it is crucial to prioritise responses effectively. It is essential that a health crisis is not allowed to transform into an emergency economic and food crisis. The short-term intervention priorities are to:

- transfer money or appropriate assets (including seeds and smallstock for smallholder farmers) into vulnerable peoples' pockets so that they can afford to buy and/or produce the food they need, or acquire it through other means
- make sure that food keeps moving, by ensuring that food supply chains are considered essential services, enabling them to continue to function (Pangestu 2020), and seeking opportunities to purchase smallholder farmers' products for distribution via social protection programs
- identify options for sustaining food security in gender-sensitive (Hidrobo et al 2020) and culturally acceptable ways that support human, animal and environmental health (Alders et al 2018, in press)
- ensure timely access to essential health services.

Applied research that seeks to reduce gender-based discrimination and enhance smallholder household livelihoods as integral components of social protection should be prioritised.

#### *Monitor local prices for early warning for food access and availability*

Local bottlenecks in food supply are reflected in market prices. This varied widely in the five geographies assessed. However, in all of them, the capacity to monitor movements in local food prices is lacking, restricting the capacity of governments to

identify local food shortages and respond accordingly. Resilience to unanticipated shocks relies on the prompt flow of information among agents involved in food chains, including the identification of problem areas, to make rapid responses possible when circumstances change. Governments may be able to promote this process by facilitating communication among local government officials, private sector representatives and non-government organisations that have local expertise. The form this might take would depend on local circumstances, including existing institutions, customs and e-commerce practices.

#### *Communicate COVID-19 risk more effectively by building on local knowledge and priorities*

Risk communication must be an integral component of all activities while COVID-19 risks remain. Special attention is required in settings where communities are not necessarily familiar with the germ theory of disease, but instead associate illness with other causes. This hampers compliance with control recommendations. Participatory action research is recommended. This could include:

- involving smallholders in order to better understand knowledge landscapes when developing risk communication materials
- the use of culturally and gender-sensitive participatory epidemiology (Catley et al 2012)
- participatory biosecurity (Barnes et al 2020)
- participatory impact assessment (Catley et al 2013) in combination with conventional disease control techniques.

This approach is likely to yield more effective and efficient risk management practices by building on the knowledge and priorities of all key stakeholders.



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

#### *Future-proof value chains by facilitating local supply of nutritious food*

Overcoming the fragmentation of value chains and power imbalances with respect to input supply and marketing will require collaborative research and development with civil society on aspects of sustainable smallholder fisheries and agriculture and associated value chains. This includes creative education that improves literacy as well as appropriate agricultural, fishery and marketing knowledge.

Participatory action research presents an opportunity for active engagement of smallholders in data collection and analysis along value chains, while delivering more comprehensive and reliable data for all decision-makers. These range from individual smallholders to ministers of agriculture, fisheries and livestock.

Opportunities to link smallholder farmer associations with endeavours to improve regional food security is a vital research area. E-commerce platforms and expansion of current WhatsApp and Facebook pages to sell products and exchange goods and services are examples of technology that could support such approaches.

#### *Support household livelihood portfolios instead of farm income alone*

A combination of desktop research and targeted surveys could identify preliminary opportunities for increasing the value of off-farm incomes of households in ways that do not increase the burden on women and children. The opportunities might include seasonal or circular forms of labour migration and remittances. Priority areas for such research include the Pacific island countries and Timor-Leste.

#### *Expand and invest in shock-resilient production systems*

Excessive dependence on distant sources for low-cost, energy-rich and nutrient-poor food and distant export markets heighten vulnerabilities associated with COVID-19, climate change and malnutrition. Countries with high child stunting rates (for example, Papua New Guinea and Timor-Leste) and those already significantly impacted by climate change (for example, Pacific island countries) should be prioritised. Knowledge gaps include:

- nutritional profiles (de Bruyn et al 2016) and life-cycle analysis of locally available foods
- health promotion and behavioural change activities to improve utilisation of nutritious food
- cost-efficient, feasible options for storing, replicating and disseminating 'clean' planting materials, breeding stock and input supplies for livestock and fisheries
- identifying and trialling nutritious saline-tolerant, drought-tolerant and waterlogging-tolerant plants (i.e. halophytes) that are safe and nutritious to provide an agricultural opportunity in areas where freshwater is scarce, or where land is being infiltrated with saltwater due to rising sea levels (Bushnell 2020, CHF 2020)
- effective engagement of women and men smallholders in research is essential given the gendered impacts of climatic and non-climatic stressors (Gopalakrishnan et al 2019)
- economic and food and nutrition security benefits and opportunities associated with shorter and longer value chains for individual countries.

### *Create strategic partnerships and innovative funding collaborations*

International agencies are pivoting their development programs to respond to COVID-19-associated impacts on food and nutrition security. Available funding for these activities is well below the required level, so the importance of ensuring optimal outcomes for the funds invested is crucial. Complementary research activities are needed to increase the effectiveness of these programs. For example, in the Pacific, IFAD is supporting the design and implementation of smallholder models in remote atoll islands with limited resources to strengthen local food systems and self-reliance through the Small Islands Food and Water Project. In Asia, the FAO is initiating a range of COVID-19 and food system-related projects.

#### **3.7.4 Longer term (up to 10 years)**

### *Use agriculture and fisheries to deliver sustainable social protection outcomes*

Globally, of the 558 million farms with 20 ha or less land, 410 million (72%) farms are less than 1 ha (Woodhill et al 2020). The majority of the smallholder households farming these very small areas of land will probably be regular recipients of social protection, where such support is available. Redesigning the delivery of social protection provides an opportunity to build food system resilience and raise smallholders out of chronic poverty. There will probably be at least three streams to the research:

1. identification of viable options for smallholders to sell their produce into local and regional social protection food distribution programs
2. social protection mechanisms that provide options for improved farming and fishing production and marketing practices or transition pathways to other livelihood activities

3. tailored approaches to ensure gender sensitivity (Hidrobo et al 2020) and cultural acceptability (Alders et al, in press).

### *Enhance agency of local and regional actors in decision-making forums related to food security*

Transforming food systems to deliver nutritious, safe and affordable food is a global endeavour that will require policy and infrastructure alignment across all major sectors. This process is underway and will be boosted by the UN Food Summit in July 2021 and regional forums such as the proposed 2021 Pacific Week of Agriculture. Partner countries in the Indo-Pacific region must be fully engaged with and empowered to influence this transformation. Realising food systems that are climate-smart, gender- and nutrition-sensitive, economically viable and biodiverse will require long-term strategic alliances between regional economic communities, national governments and farmer and fisher associations. Food systems research and development will be vital in informing these partnerships, spearheading transformative policies and aligning infrastructure.

Food supply chains, including wet markets, require tailored investment in the development of culturally appropriate, safe and practical supply lines. Engaging with male and female farmers, fishers and producers, traders and consumers to build confidence in and reliability of local food value chains will be a key component. This would include a focus on food safety (i.e. prevention of and surveillance for physical and chemical contaminants and pathogens), reducing food loss and waste, and organic nutrient-recycling. Central to this process will be building and amplifying smallholder resilience (HLPE 2020). Collaborative research activities that allow male and female farmers and fishers to share and improve their knowledge and practices relating to climate-smart, sustainable

production and marketing systems will be key to long-term success.

### *Explore new partnerships to build coherence between food, nutrition and national security outcomes*

The centrality of food security to human security is increasingly acknowledged (Hodson 2017, CHF 2020). For example, in the Pacific region, the Boe Declaration (PIFS 2018) articulates how Pacific island countries view national security through its articulation of both traditional and non-traditional security threats. The impact of climate change and the need to secure food and water are key components of the declaration, which is shaping the development of national security strategies. Supporting key agencies at local and national levels to participate in shaping the centrality of food systems in processes of governance around national security would ensure the maintenance of the entire food system is supported by a whole-of-government approach, where all agencies understand their particular role (SPC et al 2016).

### *Invest in future farmers*

School and vocational training curricula must be better adapted to local circumstances. Priority areas include:

- improved understanding of local agroecological zones and opportunities for youth to become successful farmers, fishers and marketers
- enhanced capacity to embrace appropriate technological innovations
- functional knowledge of human health and nutrition
- understanding of how to meet nutrient requirements with locally available, nutritious food
- valuing of indigenous knowledge on how to sustain agroecosystems

- improved understanding of the germ theory of disease and associated hygiene and sanitation practices.

Research and development programs that facilitate the development and implementation of locally tailored curricula and feasible options for their effective delivery are vital for future food security.

## 3.8 Conclusions

The COVID-19 pandemic has brought into stark focus the vulnerabilities associated with food systems in the Indo-Pacific region, such as climate change, water availability, changing nutritional trends and inadequate human health services, rapid population growth and underinvestment in local agricultural production and value chains. With the COVID-19 shock leading to reductions in research and development and public investments, budgets to transform food systems and value chains will be limited. However, key elements of resilient food systems are already in place and provide a foundation on which to build. The focus must be on:

- how to produce more with less inputs
- how to develop more equitable, sustainable and resilient food systems in the face of climate change
- how to guarantee access to nutritious food with increasing demand and increasing scarcity of water and non-renewable energy.

Strategic intersectoral coordination and investments will be crucial in identifying, tailoring and implementing best-practice policies and practices.

By 2019, the likelihood of achieving the Sustainable Development Goal 2 of zero hunger by 2030 was already in doubt, due to persistent malnutrition and low smallholder productivity and income. This situation has been exacerbated by the COVID-19 crisis

(FAO et al 2020). Despite the pandemic and other concurrent threat multipliers, the quest to build resilient, nutritious food systems is not starting from zero. Examples of foundational food system frameworks, policies and practices are already in place at community, country, regional and global levels. To reach zero hunger, responses to the current crisis must contribute to building a transformed food system that is more inclusive, sustainable and resilient. The call by the UN for 'a shift that makes healthy diets affordable to all and contributes to the eradication of hunger, food insecurity and all forms of malnutrition in children and adults' (FAO et al 2020) will require effective interdisciplinary and intersectoral actions. Agriculture and resilient food systems will be critical in underpinning economic and social recovery from the COVID-19-induced food insecurity and economic recession crisis in the Indo-Pacific region.

Historically, agricultural research focused primarily on increasing production and marketing of commodities. However, the challenges discussed above reach well beyond the farm gate. This pandemic poses challenges around how to improve value chains, logistics and storage, how to identify blockages to supply chains arising from shocks like COVID-19, and questions of ecological sustainability, land-use change, nutrition, health, sociocultural diversity, social justice and social protection. An integrated, all-hazards systems approach that works with all partners in harmony with national and global commitments (such as the Sustainable Development Goals, the Universal Health Coverage Declaration and the Sendai Disaster Risk Reduction Framework) is in line with the Australian Government's Partnerships for Recovery response (DFAT 2020) and would enable countries to efficiently deliver on their current commitments. It is a huge endeavour, but one that will lead

to multiple benefits, including improved health outcomes, increased climate resilience and more diverse and resilient national economies.

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### 3.10 References

- ADB (Asian Development Bank) (2020). *An updated assessment of the economic impact of COVID-19*, ADB Briefs, No. 133, ADB, accessed 8 May 2020, [www.adb.org/sites/default/files/publication/604206/adb-brief-133-updated-economic-impact-covid-19.pdf](http://www.adb.org/sites/default/files/publication/604206/adb-brief-133-updated-economic-impact-covid-19.pdf).
- ADB & UN Women (Asian Development Bank & United Nations Entity for Gender Equality and the Empowerment of Women) (2018). *Gender equality and the Sustainable Development Goals in Asia and the Pacific: baseline and pathways for transformative change by 2030*, ADB & UN Women, accessed 1 June 2020, [www.adb.org/sites/default/files/publication/461211/gender-equality-sdgs-asia-pacific.pdf](http://www.adb.org/sites/default/files/publication/461211/gender-equality-sdgs-asia-pacific.pdf).
- Akter S, Rutsaert P, Luis J, Htwe NM, San SS, Raharjo B & Pustika A (2017). Women's empowerment and gender equity in agriculture: A different perspective from Southeast Asia. *Food Policy* 69:270–9.
- Alders R (2020). COVID-19: exposing shortfalls in support to human, animal and plant health in our region, *devpolicy@ANU blog*, 1 April 2020, <http://devpolicy.org/covid-19-exposing-shortfalls-in-support-to-human-animal-and-plant-health-in-our-region-20200401/>.
- Alders RG & Bagnol B (2007). Effective communication: the key to efficient HPAI prevention and control. *World's Poultry Science Journal* 63:139–147.
- Alders RG, Dar O, Kock R & Rampa F (in press, due to be launched 16 October 2020). *One Health, Zero Hunger*, Global Hunger Index Essay, [www.globalhungerindex.org/about.html](http://www.globalhungerindex.org/about.html).
- Alders R, de Bruyn J, Wingett K & Wong J (2017). One Health, veterinarians and the nexus between disease and food security. *Australian Veterinary Journal* 95(12):45–453, doi:10.1111/avj.12645.
- Alders RG, Ratanawongprasat N, Schönfeldt H & Stellmach D (2018). A planetary health approach to secure, safe, sustainable food systems: workshop report. *Food Security* 10(2):489–493, doi:10.1007/s12571-018-0780-9.
- AMIS (Agricultural Market Information System) (2020). Market monitor No. 80, AMIS, accessed 10 July 2020, [www.amis-outlook.org/fileadmin/user\\_upload/amis/docs/Market\\_monitor/AMIS\\_Market\\_Monitor\\_Issue\\_80.pdf](http://www.amis-outlook.org/fileadmin/user_upload/amis/docs/Market_monitor/AMIS_Market_Monitor_Issue_80.pdf).
- ASEAN (Association of Southeast Asian Nations) (2020). Declaration of the special ASEAN summit on coronavirus disease 2019 (COVID-19), ASEAN, Jakarta, accessed 1 June 2020, <https://asean.org/storage/2020/04/FINAL-Declaration-of-the-Special-ASEAN-Summit-on-COVID-19.pdf>.
- Barnes TS, Morais O, Cargill C, Parke CR & Urlings A (in press). First steps in managing the challenge of African swine fever in Timor-Leste. *One Health* 26 June 2020.
- Barnes TS, Alvaran PJJ, Lantican TLDC, Lapuz EL, Ignacio C, Baluyut AS, Parke CR, Palaniappan G, Cameron D, Ancog RC, Mananggit MR, de Castro R, Meers J, Palmieri C, Turni C, Villar EC & Blackall PJ (2020). Combining conventional and participatory approaches to identify and prioritise management and health-related constraints to smallholder pig production in San Simon, Pampanga, Philippines. *Preventive Veterinary Medicine* 178, 104987, doi:10.1016/j.prevetmed.2020.104987.
- Bourke RM, Gibson J, Quartermain A, Barclay K, Allen B & Kennedy J (2009). Part 2. Food production, consumption and imports. In: Bourke RM & Harwood T (eds) *Food and agriculture in Papua New Guinea*, ANU E Press, Canberra, 129–192, <http://press-files.anu.edu.au/downloads/press/p53311/pdf/part21.pdf>.
- Bushnell DM (2020). Financially advantageous approaches to sustain the ecosystem, AAI Foresight, accessed 5 June 2020, [www.aaiforesight.com/sites/default/files/FR\\_Bushnell\\_WS2020\\_FinanciallyAdvantageousApproaches.pdf](http://www.aaiforesight.com/sites/default/files/FR_Bushnell_WS2020_FinanciallyAdvantageousApproaches.pdf).

- Castriciones E & Vijayan V (2020). Biosecurity risk mapping and gap analysis in South East Asia. *Journal of Biosafety and Biosecurity* 2(1):36–43, doi:10.1016/j.jobb.2020.03.001.
- Catley A, Alders RG, Woods J (2012). Participatory epidemiology: approaches, methods, experiences. *Veterinary Journal* 191(2):151–160, doi:10.1016/j.tvjl.2011.03.010.
- Catley A, Burns J, Abebe D, Suji O (2013). Participatory impact assessment: A design guide, Feinstein International Center, Somerville, accessed 15 May 2020, [http://fic.tufts.edu/assets/PIA-guide\\_revised-2014-3.pdf](http://fic.tufts.edu/assets/PIA-guide_revised-2014-3.pdf).
- Charlton KEJ, Russell E, Gorman Q, Hanich A, Delisle B, Campbell & Bell J (2016). Fish, food security and health in Pacific island countries and territories: a systematic literature review. *BMC Public Health* 16(1):285.
- Chatterjee B & Khadka M (eds) (2011). *Climate Change and Food Security in South Asia*, CUTS International, Jaipur, India.
- CHF (Commission for the Human Future) (2020). Roundtable on global food security: food is at the heart of our future, CHF, Canberra, accessed 30 June 2020, [www.humanfuture.net/sites/default/files/Final%20Report%20on%20Food%20Security\\_0.pdf](http://www.humanfuture.net/sites/default/files/Final%20Report%20on%20Food%20Security_0.pdf).
- CHS (Indo-Pacific Centre for Health Security) (2019). Health security in the Indo-Pacific: state of the region 2019, CHS, DFAT, Canberra, accessed 6 July 2020, <https://indopacifichealthsecurity.dfat.gov.au/resources-hub#Policy,%20Strategy%20&%20Research>.
- Cleaveland S, Sharp J, Abela-Ridder B, Allan KJ, Buza J, Crump JA, Davis A, Del Rio Vilas VJ, de Glanville WA, Kazwala RR, Kibona T, Lankester FJ, Lugelo A, Mmbaga BT, Rubach MP, Swai ES, Waldman L, Haydon DT, Hampson K & Halliday JEB (2017). One Health contributions towards more effective and equitable approaches to health in low- and middle-income countries. *Philosophical Transactions of the Royal Society B*, 372(1725), doi:10.1098/rstb.2016.0168.
- Davila F (2019). Human ecology and food discourses in a smallholder agricultural system in Leyte, The Philippines. *Agriculture and human values* 37:719–741, doi:10.1007/s10460-019-10007-6
- Dawe D (2020a). Impacts of coronavirus on food security and nutrition in Asia and the Pacific: building more resilient food systems, Policy Brief. Food and Agriculture Organization of the United Nations (FAO), Bangkok, accessed 20 June 2020, [www.fao.org/documents/card/en/c/ca9473en](http://www.fao.org/documents/card/en/c/ca9473en).
- Dawe D (2020b). Why export restrictions should not be a response to COVID-19: Learning lessons from experience with rice in Asia and the Pacific, Food and Agriculture Organization of the United Nations (FAO), Bangkok, accessed 20 June 2020, [www.fao.org/documents/card/en/c/ca9362en](http://www.fao.org/documents/card/en/c/ca9362en).
- de Bruyn J, Ferguson E, Allmann-Farinelli M, Darnton-Hill I, Maulaga W, Msuya J & Alders R (2016). Food composition tables in resource-poor settings: exploring current limitations and opportunities, with a focus on animal-source foods in sub-Saharan Africa. *British Journal of Nutrition* 116:1709–1719.
- De Guzman R & Malik M (2020). Dual challenge of cancer and COVID-19: impact on health care and socioeconomic systems in Asia Pacific. *JCO Global Oncology* 6:906–912, doi:10.1200/GO.20.00227.
- DFAT (Department of Foreign Affairs and Trade) (2017). *Foreign policy white paper*, accessed 9 August 2020, [www.dfat.gov.au/sites/default/files/2017-foreign-policy-white-paper.pdf](http://www.dfat.gov.au/sites/default/files/2017-foreign-policy-white-paper.pdf).

- DFAT (Department of Foreign Affairs and Trade) (2018). Pacific Health Security Scoping Mission: Papua New Guinea Country Report following consultations in Port Moresby and Goroka, 9–14 April 2018, accessed 15 September 2020. <https://indopacifichealthsecurity.dfat.gov.au/Scoping%20Mission%20Report%20-%20Papua%20New%20Guinea>.
- DFAT (Department of Foreign Affairs and Trade) (2020). Partnerships for recovery: Australia's COVID-19 development response, Department of Foreign Affairs and Trade, Canberra, accessed 5 July 2020, [www.dfat.gov.au/publications/aid/partnerships-recovery-australias-covid-19-development-response](http://www.dfat.gov.au/publications/aid/partnerships-recovery-australias-covid-19-development-response).
- Doss C, Meinzen-Dick R, Quisumbing A & Theis S (2017). Women in agriculture: four myths. *Global Food Security* 16:69–74, doi:10.1016/j.gfs.2017.10.001.
- Dujardin S, Hermesse J & Dendoncker N (2018). Making space for experiential knowledge in climate change adaptation. Insights from municipal planning officers in Bohol, Philippines. *Journal of Disaster Risk Studies* 10(1):433, doi:10.4102/jamba.v10i1.433.
- FAO (Food and Agriculture Organization of the United Nations) (2012). Decent rural employment for food security: a case for action, Gender, equity and rural employment division, economic and social development department, FAO, Rome, accessed 15 May 2020, [www.fao.org/3/i2750e/i2750e00.pdf](http://www.fao.org/3/i2750e/i2750e00.pdf).
- FAO (Food and Agriculture Organization of the United Nations) (2018a). Asia and the Pacific regional overview of food security and nutrition 2018—accelerating progress towards the SDGs, FAO, Bangkok.
- FAO (Food and Agriculture Organization of the United Nations) (2018b). Developing gender-sensitive value chains—guidelines for practitioners, FAO, Rome, accessed 15 May 2020, [www.fao.org/3/i9212en/i9212EN.pdf](http://www.fao.org/3/i9212en/i9212EN.pdf).
- FAO (Food and Agriculture Organization of the United Nations) (2020a). Impacts of coronavirus on food security and nutrition in Asia and the Pacific: building more resilient food systems, 5 June 2020, FAO, accessed 30 June 2020, [www.fao.org/3/ca9473en/CA9473EN.pdf](http://www.fao.org/3/ca9473en/CA9473EN.pdf).
- FAO (Food and Agriculture Organization of the United Nations) (2020b). Mitigating the impacts of COVID-19 on the livestock sector, 23 April 2020, FAO, accessed 15 May 2020, [www.fao.org/3/ca8799en/CA8799EN.pdf](http://www.fao.org/3/ca8799en/CA8799EN.pdf).
- FAO (Food and Agriculture Organization of the United Nations) (2020c). *One Health*, accessed 23 July 2020, [www.fao.org/asiapacific/perspectives/one-health/en/](http://www.fao.org/asiapacific/perspectives/one-health/en/).
- FAO, IFAD, UNICEF, WFP & WHO (2020). The state of food security and nutrition in the world 2020: *transforming food systems for affordable healthy diets*, FAO, Rome, accessed 12 August 2020, doi:10.4060/ca9692en.
- FAO-PG (Food and Agriculture Organization of the United Nations, Papua New Guinea Offices) (2020). Food security situation report No. 03-2020, FAO-PG, reporting period: 26 May – 30 June 2020.
- FAO RAP (Food and Agriculture Organization of the United Nations Regional Office for Asia and the Pacific) (2020). Gender, FAO RAP, Bangkok, accessed 20 June 2020, [www.fao.org/asiapacific/programmes-and-projects/gender/en/](http://www.fao.org/asiapacific/programmes-and-projects/gender/en/).
- Garcia SN, Osburn BI & Jay-Russell MT (2020). One Health for food safety, food security, and sustainable food production. *Frontiers in Sustainable Food Systems* 4(28 January 2020), doi:10.3389/fsufs.2020.00001.
- GDS (General Directorate of Statistics) (2015). Timor Leste demographic and health survey, National Directorate for Statistics, Ministry of Finance, Dili, accessed 15 June 2020, <https://dhsprogram.com/pubs/pdf/FR329/FR329.pdf>.

- Gopalakrishnan T, Hasan MK, Haque ATMS, Jayasinghe SL & Kumar L (2019). Sustainability of coastal agriculture under climate change. *Sustainability* 11:7200. doi:10.3390/su11247200.
- Grundy J, Annear P, Chomat AM, Ahmed S & Biggs BA (2014). Improving average health and persisting health inequities—towards a justice and fairness platform for health policy making in Asia. *Health Policy and Planning* 29(7): 873–882, doi:10.1093/heapol/czt068.
- Hassell JM, Begon M, Ward MJ & Fèvre EM (2017). Urbanization and disease emergence: dynamics at the wildlife-livestock-human interface. *Trends in Ecology & Evolution* 32(1):55–67, doi:10.1016/j.tree.2016.09.012.
- Hidrobo M, Kumar N, Palmermo T, Peterman A & Roy S (28 April 2020). *Why gender-sensitive social protection is critical to the COVID-19 response in low- and middle-income countries*, International Food Policy Research Institute, accessed 15 June 2020, [www.ifpri.org/blog/why-gender-sensitive-social-protection-critical-covid-19-response-low-and-middle-income](http://www.ifpri.org/blog/why-gender-sensitive-social-protection-critical-covid-19-response-low-and-middle-income).
- HLPE (High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security) (2020). *Food security and nutrition: building a global narrative towards 2030*, A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome.
- Hodson R (2017). Food security. *Nature* 544(7651), S5, doi:10.1038/544S5a.
- ILO (International Labour Organization) (2018). *Employment in Asia-Pacific continues to grow but often remains of poor quality*, International Labour Organization in Asia and the Pacific, 22 January 2018, accessed 15 May 2020, [www.ilo.org/asia/media-centre/news/WCMS\\_615872/lang--en/index.htm](http://www.ilo.org/asia/media-centre/news/WCMS_615872/lang--en/index.htm).
- IPCC (Intergovernmental Panel on Climate Change) (2020). *Climate change and land: special report on climate change, desertification, land degradation, sustainable land management, food security, and green house gas fluxes in terrestrial ecosystems: summary for policymakers*, IPCC, accessed 25 May 2020, [www.ipcc.ch/site/assets/uploads/sites/4/2020/02/SPM\\_Updated-Jan20.pdf](http://www.ipcc.ch/site/assets/uploads/sites/4/2020/02/SPM_Updated-Jan20.pdf).
- Janssens C, Havlik P, Krisztin T, Baker J, Frank S, Hasegawa T, Leclère D, Ohrel S, Ragnauth S, Schmid E, Valin H, Van Lipzig N & Maertens M (2020). Global hunger and climate change adaptation through international trade. *Nature Climate Change* 10:829–835, doi:10.1038/s41558-020-0847-4.
- Kim, K, Kim S & Park C-Y (2020). *Food security in Asia and the Pacific amid the COVID-19 pandemic*, ADB Briefs, No 139, Asian Development Bank, accessed 24 June 2020, [www.adb.org/publications/food-security-asia-pacific-covid-19](http://www.adb.org/publications/food-security-asia-pacific-covid-19).
- Kyeema (2020). Rapid pre-testing of African swine fever communication material in Morobe Province, PNG, Kyeema Foundation report to the Burnet Institute, 26 June 2020, Kyeema Foundation, Brisbane, Australia.
- Lal A, Fearnley E & Wilford E (2019). Local weather, flooding history and childhood diarrhoea caused by the parasite *Cryptosporidium* spp.: a systematic review and meta-analysis. *Science of the Total Environment* 674:300–306.
- Lipton M (1977). *Why people stay poor: urban bias in world development*, Temple Smith, New York.
- Lysaght T, Capps B, Bailey M, Bickford D, Coker R, Lederman Z, Watson S & Tambyah PA (2017). Justice is the missing link in One Health: results of a mixed methods study in an urban city state. *PLoS ONE* 12(1):e0170967, doi:10.1371/journal.pone.0170967.
- MacIntyre R (2019). The risk of selective investment in downstream pandemic planning. *Global Biosecurity* 1(2):85–90, doi:10.31646/gbio.36.



- MacPherson G (2017). Regional security implications of climate change and natural disasters in the South Pacific. *Indo-Pacific Strategic Digest* 257–268, [www.defence.gov.au/ADC/Publications/documents/digest/Spring\\_2017/IPSD\\_MacPherson\\_spring2017.pdf](http://www.defence.gov.au/ADC/Publications/documents/digest/Spring_2017/IPSD_MacPherson_spring2017.pdf).
- Maggiore A, Afonso A, Barrucci F & de Sanctis G (2020). Climate change as a driver of emerging risks for food and feed safety, plant, animal health and nutritional quality. *Climate change and food safety*, European Food Safety Authority (EFSA), 146, doi:10.2903/sp.efsa.2020.EN-1881.
- McFarlane RA, Sleight AC & McMichael AJ (2013). Land-use change and emerging infectious disease on an island continent. *International Journal of Environmental Research and Public Health* 10(7):2699–2719, doi:10.3390/ijerph10072699.
- Mola G (1 May 2020). *Handling the corona virus epidemic in Papua New Guinea* [Facebook], [www.facebook.com/permalink.php?story\\_fbid=1481634785342506&id=100004879960218](https://www.facebook.com/permalink.php?story_fbid=1481634785342506&id=100004879960218).
- Pangestu M (1 May 2020). *Hunger amid plenty: How to reduce the impact of COVID-19 on the world's most vulnerable people*, accessed 28 June 2020, <https://blogs.worldbank.org/voices/hunger-amid-plenty-how-reduce-impact-covid-19-worlds-most-vulnerable-people>.
- Peiris M & Yen HL (2014). Animal and human influenzas. *Revue scientifique et technique* (International Office of Epizootics) 33(2):539–553.
- Perkins D, Radalet S, Lindauer D & Block S (2012). *Economics of development*, 7th edn., W.W. Norton, New York.
- PIFS (Pacific Islands Forum Secretariat) (2018). Boe declaration on regional security, PIFS, accessed 20 May 2020, [www.forumsec.org/2018/09/05/boe-declaration-on-regional-security/](http://www.forumsec.org/2018/09/05/boe-declaration-on-regional-security/).
- Plahe JK, Hawkes, S & Ponnampereuma S (2013). The corporate food regime and food sovereignty in the Pacific islands. *The Contemporary Pacific* 25(2):309–338.
- PLAN International & Save the Children (2020). *Because we matter: addressing COVID-19 and violence against girls in Asia-Pacific*, PLAN International, accessed 16 July 2020, [www.plan.org.au/-/media/plan/documents/learn/publications/becausewematter.pdf](http://www.plan.org.au/-/media/plan/documents/learn/publications/becausewematter.pdf).
- Provo A, Atwood S, Sullivan EB & Mbuya N (2017). *Malnutrition in Timor-Leste: A review of the burden, drivers, and potential response*, DFAT, The World Bank and the European Commission.
- Rampa F, Dekeyser K, Alders R & Dar O (2019). *The global institutional landscape of food and agriculture: how to achieve SDG 2*, Discussion paper No. 265, Maastricht, Netherlands, European Centre for Development Policy Management; London, accessed 12 June 2020, <https://ecdpm.org/wp-content/uploads/Global-Institutional-Landscape-Food-Agriculture-How-To-Achieve-SDG2-ECDPM-Discussion-Paper-265-With-Chatham-House.pdf>.
- Sanderson T, Chapman G, Walker D & Horne P (2020). *Food systems security, resilience and emerging risks in the Indo-Pacific in the context of COVID-19: a rapid assessment*, Technical Reports Series, No. 95, ACIAR, Canberra.
- Schmidhuber J, Pound J & Qiao B (2020). *COVID-19: Channels of transmission to food and agriculture*, policy brief, Food and Agriculture Organization of the United Nations (FAO), Rome, accessed 28 June 2020, [www.fao.org/documents/card/en/c/ca8430en/](http://www.fao.org/documents/card/en/c/ca8430en/).
- Simpson A, Cummins P, Dhu T, Griffin J & Schneider J (2008). *Assessing natural disaster risk in the Asia-Pacific Region*. *AusGeo News*, Issue 90, June 2008, Geoscience Australia. [www.ga.gov.au/webtemp/image\\_cache/GA11300.pdf](http://www.ga.gov.au/webtemp/image_cache/GA11300.pdf).

- SPC, SPREP, PIFS, UNDP, UNISDR & USP (Pacific Community, Secretariat of the Pacific Regional Environment Programme, Pacific Islands Forum Secretariat, United Nations Development Programme, United Nations Office for Disaster Risk Reduction & University of the South Pacific) (2016). *Framework for resilient development in the Pacific: an integrated approach to address climate change and disaster risk management (FRDP) 2017–2030*, SPC, SPREP, PIFS, UNDP, UNISDR & USP, [http://tep-a.org/wp-content/uploads/2017/05/FRDP\\_2016\\_finalResilient\\_Dev\\_pacific.pdf](http://tep-a.org/wp-content/uploads/2017/05/FRDP_2016_finalResilient_Dev_pacific.pdf).
- Tatem AJ, Rogers DJ & Hay SI (2006). Global transport networks and infectious disease spread. *Advances in Parasitology* 62:293–343, doi:10.1016/S0065-308X(05)62009-X.
- TNP2K (The National Team for The Acceleration of Poverty Reduction) (2018). Government pushes for stunting prevention in 100 regency and cities, TNP2K, 22 November 2018, accessed 9 June 2020, [www.tnp2k.go.id/articles/government-pushes-for-stunting-prevention-in-100-regency-and-cities](http://www.tnp2k.go.id/articles/government-pushes-for-stunting-prevention-in-100-regency-and-cities).
- UN (United Nations) (1992). Convention on biological diversity, UN, New York, accessed 17 June 2020, [www.cbd.int/doc/legal/cbd-en.pdf](http://www.cbd.int/doc/legal/cbd-en.pdf).
- UN (United Nations) (2015). Transforming our world: the 2030 Agenda for Sustainable Development, UN, New York, accessed 17 June 2020, <https://sdgs.un.org/2030agenda>.
- UN (United Nations) (2019). Political declaration of the high-level meeting on universal health coverage, UN, New York, accessed 17 June 2020, [www.un.org/pga/73/wp-content/uploads/sites/53/2019/07/FINAL-draft-UHC-Political-Declaration.pdf](http://www.un.org/pga/73/wp-content/uploads/sites/53/2019/07/FINAL-draft-UHC-Political-Declaration.pdf).
- UNDRR (United Nations Office for Disaster Risk Reduction) (2015). *Sendai Framework for Disaster Risk Reduction 2015–2030*, UNDRR, New York, accessed 17 June 2020, [www.preventionweb.net/files/43291\\_sendaiframeworkfordrren.pdf](http://www.preventionweb.net/files/43291_sendaiframeworkfordrren.pdf).
- UNFPA (United Nations Fund for Population Activities) (2020). *Gender equality*, UNFPA Asia and the Pacific Office, accessed 15 July 2020, <https://asiapacific.unfpa.org/en/node/15206>.
- UN News (United Nations News) (2020). *What does 'build back better' really mean? One of the world's top CEOs give us his take*, UN News, 11 June 2020, <https://news.un.org/en/story/2020/06/1066152>.
- Waage JK & Mumford JD (2008). Agricultural biosecurity. *Philos. Trans. R. Soc. Lond B Biol Sci* 363(1492):863–876.
- Woodhill J, Hasnain S & Griffith A (2020). *Farmers and food systems: what future for small-scale agriculture?* Environmental Change Institute, University of Oxford, Oxford, accessed 18 July 2020, [www foresight4food.net/wp-content/uploads/2020/01/Farming-food-WEB.pdf](http://www foresight4food.net/wp-content/uploads/2020/01/Farming-food-WEB.pdf).
- World Bank (2020). *Food security and COVID-19*, World Bank, accessed 28 June 2020, [www.worldbank.org/en/topic/agriculture/brief/food-security-and-covid-19](http://www.worldbank.org/en/topic/agriculture/brief/food-security-and-covid-19).
- World Vision Australia (2020). *COVID-19 emergency response Asia Pacific regional situation*, report No. 15, 2 July 2020.
- World Vision International (2020). *Out of time: COVID-19 aftershocks*, World Vision International Publication, accessed 20 July 2020, [www.wvi.org/sites/default/files/2020-07/Out%20of%20Time\\_Covid19%20Aftershocks%20-%20FINAL.pdf](http://www.wvi.org/sites/default/files/2020-07/Out%20of%20Time_Covid19%20Aftershocks%20-%20FINAL.pdf).

## 4. COVID-19 and food systems in Indonesia



Photo: Lisa Robins

# 4

## COVID-19 and food systems in Indonesia

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### 4.1 Abstract

This assessment examines the emerging impact of the COVID-19 pandemic on food security and rural livelihoods in Indonesia. Focusing on five key production contexts across this highly diverse archipelago, the assessment finds that COVID-19 is having profound, variable and highly dynamic impacts on rural livelihoods. The impacts differ across geographical areas and production systems, depending upon how the effects of the pandemic articulate with local food systems, social relations and the livelihood strategies of individual households. While the Government of Indonesia has rolled out social protection and other programs to soften the impact, the fragmentation of value chains, falling producer prices, the contraction of the informal sector and the loss of jobs have dealt a blow to diversified livelihoods, severely affecting the welfare of rural households in many places. In response, smallholders are taking up localised survival strategies and turning back to agriculture. There is evidence of a fall in access to high-quality food as households move to higher energy carbohydrates,

suggesting that the pandemic will have detrimental effects on nutrition.

The crisis has revealed vulnerabilities in Indonesia's complex food systems. This provides an opportunity for designing research and policy strategies to address key problems. Short-term interventions can understand and respond to the nutritional and livelihood impacts of this shock. Research can analyse how the pandemic has led to the disruption of value chains and the emergence of e-commerce and support measures to address these issues. Over the medium term, research can map and analyse existing household coping strategies, learn from the history of livelihood projects, and support measures to enhance diverse livelihoods, heterogeneity in agroforestry systems and crop diversification. Over the longer term, interventions can support the integration of nutrition and health issues into agrifood policy, provide for regional responses that build on local institutions and knowledges, design social protection strategies that directly address vulnerabilities found in regional contexts, and enhance farmer learning and their capacity to adapt to climate change.

## 4.2 COVID-19 in Indonesia

### 4.2.1 Country overview (July 2020)



#### Land use

Land area: 1.9 million km<sup>2</sup>  
31.5% agricultural land  
9.7% GDP from agriculture and fish (2018)



#### Population

273 million people  
45% rural  
Adjusted income per capita US\$2,990



#### COVID-19 and health

First recorded case: 2 March 2020  
At 31 July 2020:  
106,336 acknowledged cases;  
5,058 recorded deaths\*  
Present in 34 provinces:  
hotspots in Jakarta, East Java,  
South Sulawesi, North Sumatra



#### Local response to COVID-19

Semi-lockdown; ban on large gatherings  
National government stabilising prices, providing social assistance and training  
Provincial governments implemented movement restrictions; later eased for food products  
Programs for ongoing access to agri-inputs and credit



#### Agriculture and fisheries

Top staples: rice, fish, livestock, poultry, bananas  
Highly diverse food and social systems  
Agriculture is the lead sector in 20 of 34 provinces  
One of the largest exporters of tree crops globally  
Fish critical for employment and food; many fisheries overexploited



#### Key risk multipliers

Agricultural pests and diseases  
Climate risks, including changing rainfall patterns  
Issues of nutrition insecurity and food access in many communities

\* The assessment reports 34,316 acknowledged cases and 1,959 recorded deaths at 11 June 2020, reflecting the situation at the time of core aspects of the research.

### 4.2.2 Development context

An overview of Indonesia's agricultural, fisheries and nutrition context is shown in Table 4.1. The diversity of food systems and the impacts to be studied here are highly variable and this presents particular challenges for this rapid assessment. As this study is finalised in early July 2020, Indonesia emerges as the epicentre of COVID-19 in South-East Asia, and the COVID-19 crisis is having profound impacts on livelihoods, but these effects are evolving and highly dynamic.

Indonesia is the largest archipelago in the world, stretching over 34 provinces with 270 million people. The total land area is around 190 Mha, and about 29% (some 55 Mha) is classified as agricultural land. Agriculture remains the leading sector in 20 provinces (Pradana et al 2019). The major food crops in terms of area harvested are rice, corn, cassava, soybeans and peanuts. Indonesia also is one of the largest global producers and exporters of tree crops, including rubber, copra, palm kernels, palm oil, coffee, cocoa and spices. Indonesia's gross domestic product has almost quadrupled over the past decade, even while the contribution of the agriculture sector to gross domestic product has shrunk to 12.81% by 2018 (Global Economy 2018, Statista 2020). Yet, in 2020, 30.26% of the workforce are active in the agriculture sector (falling from 55.1% in 1990), and agriculture is still the second-largest employer. A Bank of Indonesia official recently argued that the structural problem is that the productivity of Indonesia's agriculture has slowed amid fast-surgingly demand, pushing up food prices (Ribka 2017). An alternative argument is that import restrictions under Indonesia's food self-sufficiency policies have pushed up domestic rice prices, along with other food prices (Amanta & Wibisono 2020).

Indonesia's poverty rate has fallen by over half during the last two decades. In 2019, just under 10% of the population was considered to be living below the national poverty line. This is measured by the Indonesian statistics agency at around 425,250 Indonesian rupiah (Rp) per month or US\$0.76 per day. Income poverty remains high among smallholder farmers with almost one-fifth of household families practising farming living below the national poverty line (FAO 2018). Stunting rates have also fallen gradually, and the Government of Indonesia has prioritised nutrition programs in 100 districts where stunting is most severe. Nevertheless, stunting rates remain high, with around 31% of children under five considered stunted (TNP2K 2017). This means that large numbers of children were already undernourished prior to COVID-19, and research suggests that undernourishment is a risk factor when facing a pandemic of this kind.

### 4.2.3 Status of COVID-19 in Indonesia

While Indonesia is well connected to China, with large numbers of tourists visiting Bali and other parts of Indonesia, the first case of COVID-19 was not officially reported until 2 March 2020. By 11 June 2020, the country had reported 34,316 cases, and 1,959 deaths. In early June 2020, the number of cases was still increasing, with Indonesia recording up to 1,241 new cases a day, the highest number recorded to date (JHU 2020). A month later, Indonesia was reporting 2,657 cases a day, with an infection rate of more than 20% among those tested. This made Indonesia the hardest-hit country in Asia after India (Massola & Rosa 2020). By late July 2020, Indonesian authorities reported that positive COVID-19 cases had passed 100,000 (Jakarta Post 2020a).

**Table 4.1** Agricultural, fisheries and nutrition context of Indonesia

Indicators	Unit	Value	
Surface area <sup>a</sup>	'000 km <sup>2</sup>	1,913	
Agricultural land <sup>b</sup>	percentage of land area	31.5	
Age of population <sup>a</sup>	0–19 years	percentage of total population	35.3
	20–39 years	percentage of total population	31.4
	40–59 years	percentage of total population	24.0
	over 59 years	percentage of total population	9.1
Stunting rate <sup>c</sup>	under 5 years	percentage of age group	36.4
Wasting rate <sup>c</sup>	under 5 years	percentage of age group	13.5
Overweight <sup>c</sup>	under 5 years	percentage of age group	11.5
	male	percentage of total population	25
	female	percentage of total population	31
Obesity <sup>c</sup>	male	percentage of total population	5
	female	percentage of total population	9
Prevalence of undernourishment <sup>c</sup>		percentage of total population	8.3
Population distribution <sup>a</sup>	rural	percentage of total population	45
	urban	percentage of total population	55
Gross domestic product per capita <sup>a</sup>	US\$	3,893.6	
Adjusted net national income per capita (2018) <sup>a</sup>	US\$	2,990	
Agriculture and fisheries, value added <sup>a</sup>	percentage of gross domestic product (2018)	9.7	
Government expenditure on agriculture <sup>c</sup>	percentage of total outlays	1.1	
Top staples (ranked most to least) <sup>c</sup>	rice, fish, livestock, poultry, banana, coconut/copra, corn, sugarcane, mango, pineapple, cassava		
UNDP Human Index ranking <sup>d</sup>	out of 189	111	
2017 World Risk Index (mean value calculation 2012–2016) <sup>e</sup>	out of 171	33	

a World Bank (2020)

b FAO (2020)

c Global Nutrition Report (2020)

d UNDP (2020)

e Bündnis Entwicklung Hilft (2017)

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

The actual number of infected people is likely to be higher, due to limited testing. The death toll is also underestimated, due to problems with attribution of the cause of death. COVID-19 has now spread across 34 provinces.

While the Government of Indonesia is increasing testing, Indonesia has a comparatively low testing rate. In early June 2020, it was reported that around 10,000 people were being tested a day (Ritchie et al 2020). By 11 June 2020,

laboratories had tested 287,478 people from a total population of 270 million, amounting to 1.08 tests per thousand people, one of the lowest rates in South-East Asia. Testing occurs in major hospitals, initially in Jakarta, and gradually extending to cities in outlying provinces. Rural areas lack testing capacities and many districts are unable to test and/or can only test small numbers. They need to send swabs to hospitals in the major cities where labs are equipped to do polymerase chain reaction testing. Reporting of laboratory-confirmed results can take up to a week from the time of testing (WHO 2020a).

The impact of COVID-19 across Indonesia is highly varied, with epicentres in Jakarta, East Java, South Sulawesi and North Sumatra. Informants in the cities are highly concerned, while respondents in outlying provinces and rural areas note that the virus is less prevalent. Some village informants noted that migrants had brought the virus back to their villages, even while village administrations were quarantining returnees.

Indonesia has a complex and shifting tapestry of COVID-19 related policies. Central and provincial authorities have implemented different policies over time, with different areas moving into and out of large-scale social restrictions known as PSBB (a semi-lockdown/ban on large gatherings). During the early stage, large numbers of migrants from the cities and from overseas sought to return, even as the state gradually tightened policies to restrict movement back to villages, particularly during the run-up to the annual Ramadan migration (*Mudik*). During this period, most areas went through a tighter PSBB period. This greatly disrupted trade networks and employment and had deleterious impacts on logistics and the movement of food supplies. Interviews and news articles from this initial period suggest that restrictions

on movement had a highly detrimental impact on supply and value chains, or markets and livelihoods, affecting both the movement of staples around the country and food stocks. This policy was loosened, with a focus on restricting movement of people but not essential items, including food. Different provinces and cities intermittently continue to restrict the movement of people, with village authorities requiring returning migrants to quarantine and provinces requiring letters to move between islands or between provinces. In June 2020, Jakarta started moving to a 'new normal', loosening restrictions, much to the concern of epidemiologists who argued that the pandemic had not yet peaked and that restrictions should not be relaxed (Fachriansyah & Sapiie 2020).

The government response has been focused on social protection. Government of Indonesia policies have also sought to stabilise prices, ensure free flow of agricultural products as much as possible, and provide rural credit and support to small and medium sized-enterprises whose operations have been badly affected by the PSBB policies (Antara News 2020).

### 4.3 Assessment approach

This assessment is based on interviews using open-ended questions with more than 20 informants, seeking to achieve a gender balance among informants, including researchers, government officials and non-government organisation workers with national and regional expertise relevant to the study, including informants with specific information about the five case studies. In addition, a review was conducted of news articles and journal articles and a short survey of rural leaders and officials as circulated via email and WhatsApp. The assessment is also based on online data collection involving



more than 100 informants distributed across Indonesia. When reading this assessment, it is important to remember that Indonesia is very diverse, the trends are irregular and context dependent, and the situation is changing rapidly.

The focus of this assessment is shaped by an analysis of Indonesia's food security mapping exercises and recent stunting maps, which provide indicators for patterns of vulnerability and undernutrition across the nation. The World Food Programme of the United Nations notes that 58 of Indonesia's 398 rural districts are highly susceptible to food insecurity and malnutrition is widespread (WFP 2019).

Across this diverse archipelago, the following key issues and areas have been identified for further analysis:

- Rice and vegetable producing areas of Java: Java is home to two-thirds of Indonesia's population and over half of the country's poor and has the highest numbers of nutritionally insecure people (Badan Ketahanan Pangan 2018, NIHRD 2018).
- Coastal, fishing communities and trading networks: Fish remain a critical source of protein and micronutrients in archipelagic South-East Asia and there is a high degree of vulnerability among artisanal fishing communities.
- Oil palm producing areas: Research on stunting suggests that large numbers of undernourished people are found in areas outside Java, where estate crops, spices and dryland agriculture are the predominant practices (TNP2K 2017).
- East Nusa Tenggara: There are deep pockets of insecurity in dryland agriculture in eastern Indonesia.
- Papua: There are high levels of poverty and stunting in some areas of Papua, which is Indonesia's least-developed province.

The World Health Organization (WHO) defines stunting as occurring when height-for-age is more than two standard deviations below the WHO Child Growth Standards median. Stunting is, of course, a complex problem with multiple causes (WHO 2020b). The term 'stunting' is used here as it gives a direct physical indicator of degrees of undernutrition across Indonesia that incorporates various factors that lead to relative deprivation (for example, access to nutrition due to socioeconomic factors, food preparation and consumption practices, education of women, age of motherhood, breastfeeding practices, sanitation, hygiene and access to health care). Patterns of inadequate access to food are clearly an underlying cause of stunting (UNICEF 2018). Stunting rates tend to be highest in Indonesia's most deprived rural areas: 55.48% in Langat and 44.7% in Asahan (North Sumatra), 59.01% in Rokan Hulu (Riau) and 55.84% in Barito Timur (Central Kalimantan). Child stunting is clearly related to food insecurity (SMERU Research Institute 2015).

This is a rapid, qualitative study that aims to provide a snapshot of issues faced by Indonesia during and after the COVID-19 pandemic. The study relies on reading available reports and a limited number of interviews. Indonesia is a very diverse country and follow-up research will be required to identify processes and impacts to provide a more precise picture of many of the complex issues discussed here.

## 4.4 Assessment results

### 4.4.1 Snapshot of key findings



#### Smallholders

Horticulture, cash crops, informal workers, returning migrants, fishers and women highly vulnerable

Households with diversified livelihoods are less vulnerable than those with specialised livelihoods

Farmers unable to sell perishable products at market

Limited availability of agri-inputs

Coping strategies include village networks, traditional agriculture and selling assets



#### Supply chains

Low producer margins and high consumer prices from fragmented chains

Reduced demand for estate crops and fish products

Small and medium-sized enterprises (SMEs) lack access to finances and reserves

Advantages for e-platforms and some traders



#### Governance

Rice prices and supply stabilised in most areas

National social protection system already established

Supplementary programs established for local needs

Input subsidies, rural credit program and support for markets

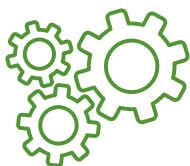


#### Community

Households losing on-farm and off-farm incomes

Impacts on women's workload, income and mobility

Changes in food consumption; cheaper, less nutritious foods



#### Employment

Informal and formal job losses

Distribution and agri-processing SMEs are vulnerable

Reduced remittances from overseas and urban workers

## 4.4.2 Exposure and vulnerabilities

### *Susceptibility of rice supply*

Indonesians have a cultural preference for rice. Indonesian diets are highly reliant on rice, with low levels of consumption of meat and fats (Hirschmann 2020). This exposes Indonesia to particular risks, given that Indonesia imports significant amounts of rice and other key staples such as soybeans, sugar and meat. Shocks that disrupt logistics and distribution, especially to rice imports, present significant challenges.

Anticipating this problem, Indonesian policies have focused on promoting self-sufficiency in food production in order to achieve food security. The 2012 Food Law emphasises that importing food products should be avoided unless local production is insufficient to meet Indonesian consumption needs (Limenta & Sianti 2017). The Indonesian parliament and government are currently deliberating over changing articles in Food Law regarding imports to bring them in line with World Trade Organization rules through Rancangan Undang-undang Cipta Kerja (Draft of Employment Creation Law/Omnibus Law). As rice imports have been restricted and rice production in Indonesia is comparatively expensive, rice prices in Indonesia have been above world prices<sup>1</sup>. For instance, prices for rice and sugar, as well as fruit and vegetables, are well above those found in global markets. Studies have suggested that raising rice prices to subsidise its production has increased poverty. As the poor spend an estimated 26% of their expenditure on rice and 65% on all foods, high food prices detrimentally impact the livelihoods of the poor (Booth et al 2019).

The COVID-19 pandemic has also led to a global rise in food prices for rice. The Thai rice market is used as a gauge for the global rice economy, and the price of rice hit a

seven-year high in April. India, Vietnam and China have restricted their exports in order to ensure supplies for their own consumers. The difference between rice production and consumption fluctuates each year. In 2018, this difference was about 2.85 Mt (Booth et al 2019). There is some concern that Indonesia may face a threat of shortages late in the year, when, according to one estimate, there may be a gap of around 700,000 t/month (Novika 2020).

### *Exposure to climate change*

Climate change exacerbates the risk of floods, droughts, storms, landslides and forest fires. Changing precipitation patterns are lengthening the dry season and leading to more intense rainy seasons, prolonged drought in the dry season, and more intense flooding in the wet season. Precipitation patterns are changing, increasing the number of dry days and reducing the number of wet days, and increasing the unpredictability of rain intensity, augmenting uncertainty and uncommon risks for farmers. The impacts of El Niño events include reduced average rainfall, which affects water storage and exposes extensive areas to drought and fire, and rising temperatures, which increase the incidence and range of pests.

Shifts in rainfall, evaporation, run-off water and soil moisture change combine with other risks that negatively impact smallholders. Reduced water availability will lower groundwater tables and empty wells, leading to a lack of drinking and irrigation water for farming. This, together with temperature increases, shorter growing seasons, unpredictable rainfall and saltwater intrusion, negatively affect production patterns and outputs and decrease food security. For instance, it is estimated that a 30-day delay in the onset of the wet season decreases rice yields by 6.5–11%, prolonging

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1 In 2019, El Niño was blamed for higher food prices, which accelerated to 5.4% year-on-year in the third quarter of 2019 compared to 3.8% growth in the previous quarter (Bappenas 2020).

the 'hunger season'. This can increase the risks of harvest failures in the second planting season and delay the consecutive rice crop. Some estimates suggest that, as general crop productivity falls, food deficits of up to 90 Mt of husked rice will be generated by 2050 (GFDRR 2011, Ministry of Foreign Affairs of the Netherlands 2018). The high dependence on the production of rice renders the country particularly vulnerable.

Water deficits linked to climate change have already been reported for Bali and East Nusa Tenggara, while food deficits resulting from climate change have been reported in the provinces of South Sumatra and Lampung, East Kalimantan, East Nusa Tenggara and Papua (Ministry of Foreign Affairs of the Netherlands 2018). Poor rural smallholders are among the most vulnerable to these impacts, due to the dependence of their livelihoods on land and water, their limited income (110–140 million people live on less than US\$2 per day), their poor adaptive capacity, and their limited ability to access improved technologies, inputs and alternative livelihood options.

Reports link harvest variability, particularly of rice, to exposure to climate change. Rice production is trending downwards with a 13% fall in harvests compared with the previous year, even though harvests were still sufficient for a 6.4 Mt surplus (WFP 2020). During the 2019/20 wet season, a prolonged dryness was linked to the Indian Ocean Dipole (Lerner 2020). East Nusa Tenggara, the driest province in Indonesia, has experienced severe drought. In other areas, rainfall and rice harvests were much delayed.

Indonesia's Meteorology, Climatology and Geophysics Agency has projected that more than 30% of the country's regions, including parts of Bali, Java, Sumatra and Sulawesi, might face an unusually harsh dry season this year. Regions hit by the worse-than-normal dry season include staple food

production centres (Jakarta Post 2020a). Other sources note that only 30% of areas are expected to have a long dry season, affecting the second rice harvest. This will lead to a deeper production deficit than normal, beginning from August (Novika 2020). Lower rainfall is also expected to impact other crops such as corn (Agenparl 2020). However, in some areas of Java, a wetter dry season is expected, which will be good for rice production. The Australian Bureau of Meteorology has also observed that some models predict an increased chance of a La Niña event in the Australian spring (September–November) (Bureau of Meteorology 2020).

### *Fragmented value chains*

Many commodities in rural Indonesia involve elongated, fragmented and geographically dispersed value chains (in the supply of inputs, production and marketing) where agrifood products pass through multiple processing and marketing stages that are managed by different actors (Gereffi & Lee 2009). The elongated nature of these chains means that they are not subject to market standards (for example, food quality and traceability) and are not well coordinated, so they are easily disrupted by market shocks such as that represented by COVID-19.

Fragmented value chains and poor logistics deliver additional costs (time and money) and lead to spoilage. This can mean inflate prices for consumers, as well as lower returns to producers who face higher costs for transporting to markets. For instance, research has pointed out that the high cost of basic staples in remote areas such as eastern Indonesia compounds poverty and nutrition issues (Sandee et al 2014).

### *Exposure to fluctuations in agricultural commodity prices*

Agricultural producers have become increasingly commercially oriented. Studies suggest that, in many cases,

farmers have transformed the land around their dwellings, previously used for food production, by planting commercial crops for sale. This is especially the case in the estate crop sector, where monocultures are pronounced. Households who purchase most of their food are vulnerable when the price of the commodities they grow drop by large margins (Abdoellah et al 2020).

Land ownership in Indonesia is also increasingly concentrated. Smallholders on average have less than half a hectare, or about an acre. Functionally landless farmers have much less capacity for providing their own food (McCarthy & Robinson 2016). Landless non-food-producing households may be poorer and more vulnerable to fluctuations in labour demand (Rosalina et al 2007, McCarthy 2019). While household food production can be an effective strategy for rural households to meet their food requirements, developing food crops needs time and requires access to suitable land.

Other studies suggest that communities still value the consumption of local staples, even as they have increasingly become net food purchasers. In some parts of Indonesia, the provision of rice for the poor has become a key factor shaping a change in consumption away from local staples towards rice (Utami et al 2018). Rural households consume more plant-sourced protein than animal-sourced protein.

While fish is the main animal-source food in diets in many parts of Indonesia, poor families often have insufficient incomes to access fish (Gibson et al 2020). Chicken (meat and eggs) is also one of the most-consumed forms of animal protein and micronutrients. The chicken value chain, which stretches from corn production, feed mill production, fodder consumption for chicken and chicken meat to demand for eggs, is critical to food security outcomes (Diansari & Nansiki 2015). Patterns of chicken and fish

consumption indicate shifting access to protein and bioavailable nutrients in diets.

### *Exposure to contracting labour market*

In rural Indonesia, households are increasingly diversified. On-farm activities contribute only 49% of farming income on average, with activities off farm and in other sectors contributing the remainder (FAO 2018). Income diversification strategies therefore provide a critical means to secure household livelihoods. However, incomes in rural communities remain low, and one in five farming household are below the national poverty line (FAO 2018). Diversified households who have modest livelihoods are vulnerable to reductions in farming income or income from off-farm work.

Rural communities have also embraced migration. Large numbers of people move overseas or into the cities, either as long-term migrants or as circular, seasonal labourers. The remittances they send home increase food expenditure, contributing to their family's food security, and potentially offering a buffer against vulnerability to food price shocks. However, it also makes the family's nutritional intake highly vulnerable to shocks that cause migrant family members to lose their jobs and return home (Hasanah et al 2017).

Rural people in many areas of Indonesia are net food buyers. In fact, two out of three farmers in the country are classified as net consumers, and the population in 34 provinces spend, on average, more than 50% of their incomes on food. According to Kompas (2020), the 10 provinces with the highest percentage expenditure of income on food per capita can be ranked from East Nusa Tenggara (57.21%) to Aceh, Papua, North Sumatra, West Sulawesi, West East Nusa Tenggara, Jambi, West Sumatra, Lampung and finally South Sumatra (52.04%). These are in outer island Indonesia, and include areas where dryland agricultural, rubber and oil palm cultivation

predominate (Pancawati 2020). Among poor citizens, food accounts for more than 60% of the monthly expenses (Kompas 2020). In fact, the World Bank (2019) estimated that 68% of Indonesia's population is vulnerable to an economic shock. Sustained drops in commodity prices or demand for labour will lead to problems accessing nutritious food. Smallholders lack access to finance and falling incomes impact on their ability to afford inputs.

### *Exposure of women to reduced agricultural prices and shrinking labour markets*

Women play a vital role in the agriculture sector. For instance, women are highly involved in the choice of seeds and the marketing of crops, and also take responsibility for family food practices (Rosalina et al 2007). Estimates suggest that women make up 37% of workers in the agriculture sector. Despite this, women tend to have limited control over land assets, and limited access to the financial resources, knowledge and technology required to increase crop yields and improve their livelihoods. While women often manage household finances in Indonesia, and have a degree of control over decision-making, they cannot access finances without their husband. In areas where large-scale rural-to-urban migration occurs, women take up work typically done by men. Female-headed households are more vulnerable to poverty due to their lower incomes, and estimates suggest that 20% of rural households are headed by women. Due to gender inequalities and income distribution, access to credit, and control over land and natural resources, rural women are more vulnerable to poverty. Further, previous studies have shown that women are vulnerable to gender-based violence during and after disasters (FAO 2019).

Nutritional security is also gendered. For instance, the age of lactating mothers

significantly effects average calorie intake at the household level because older mothers better understand food quality and family requirements (Srnita 2018). Moreover, women suffer from much higher rates of anaemia. Policies that increase women's access to and control over resources and participation in decision-making in agriculture management are important to reducing vulnerability (Rosalina et al 2007). These factors suggest that many women working in the informal and agricultural sectors are particularly exposed to the COVID-19 shock. The price and health shock that COVID-19 represents will adversely impact women's access to paid labour or agricultural income and is likely to impact household nutrition.

### *Agricultural pests and diseases*

Pest and disease infestations raise risks of crop damage and even failure. Avian influenza continues to circulate and African swine fever is increasingly affecting areas of eastern Indonesia. Crop damage in rice-producing areas continues, due to both the increase in humidity and incidence of drought, and also the persistent, excessive and injudicious use of pesticides. These pesticides increase the fecundity of brown planthopper (the most devastating pest in rice), kill pest predators, damage rice in one planting season and lead to outbreaks of viruses in the following planting season. Fungi such as rice blast also significantly reduce yields with increased humidity (Fox & Winarto 2016). The fall armyworm is impacting corn yields in some areas, and is expected to decrease corn production in some areas by 30–50% (Detik News 2020).

### *Nutrition issues*

The triple burden of undernutrition (underweight, stunting and wasting) remains a significant challenge. When shocks to the food system occur, it is a threat multiplier. If not well handled with respect to prices (for example, diversification,

marketing, regulation), these shocks worsen the problem. Indonesian diets and food expenditure patterns are changing (for example, high use of instant foods and snacks with poor nutritional quality). A senior health ministry official interviewed during this research noted that Indonesian children were caught in a vicious circle of malnutrition and anaemia that increased their vulnerability to the COVID-19. Previous crises have suggested these trends can have detrimental impacts on stunting, obesity and micronutrient deficiencies. At the same time malnourished children are more susceptible to the virus. The ageing of the farming population is also an issue. Most farmers in Indonesia are around 56 years old, and are therefore vulnerable to the COVID-19 pandemic (Ridhoi 2020).

#### *Public investments in agriculture*

The Government of Indonesia makes extensive public investments in input and credit subsidies, trade restrictions, state enterprises food market interventions, and storage. As a World Bank report notes, a large proportion of public funding is spent subsidising fertiliser and other inputs, while there has been a long-term underinvestment in public goods that are vital for agricultural productivity and competitiveness (World Bank Indonesia 2016). As the Food and Agriculture Organization (FAO) (2018) notes, smallholders often farm without the benefit of modern tools and improved seed varieties. With the COVID-19 shock leading to reductions in research and development and public investment, budgets to modernise production systems and value chains will be limited.

Longer-term challenges are:

- how to produce more with less inputs
- how to develop more sustainable and resilient food systems in the face of climate change

- how to guarantee access to nutritious food with increasing demand and increasing water and energy scarcities.

#### *Durability of Indonesia's social protection system*

Indonesia has developed a social protection system since the 1998 east Asian economic crisis. This system places Indonesia in a better situation than other neighbouring countries, who are yet to develop social assistance policies. A recent World Bank (2019) report estimated that around 115 million Indonesians were vulnerable to falling back into absolute poverty if there were a shock to the economic system. Faced with the COVID-19 pandemic, the state is rolling out a series of social protection programs aimed at helping various cohorts of people. Nonetheless, this system will experience enormous challenges in identifying and transferring assistance to its poorest citizens, and a crisis such as this will undoubtedly test Indonesia's system (Antara News 2020).

#### **4.4.3 Impacts of COVID-19**

The way COVID-19-related dynamics intersect with these underlying vulnerabilities varies across production systems, landscapes, sectors, periods of time and locations. In this section, we examine the five contexts identified earlier to discuss how this works, before summing up the major impacts in the following section.

#### *Rice and vegetable production in Java*

The value chains connecting producers to supermarkets, inter-island, inter-city markets or local consumption are very diverse. The short value chains tend to be still functioning, while the most elongated chains (for export) have not functioned for some time. There are transportation problems and wet markets are intermittently closed in some areas, leading to delays or bottlenecks

in getting products to markets. Perishable products that need to be marketed quickly, particularly vegetables, are especially vulnerable to value-chain disruptions. Vegetables may not be sold into some value chains, or only sold intermittently. In many cases, as they are being used for livestock or local consumption, this has led to a decline in farmer income. Product prices, especially for perishable products such as fruits and vegetables, have dropped. Some small-scale distributors (*lapak*) have totally closed their businesses, as they cannot sell their products or buy from farmers. Women are highly involved in some of these value chains, for instance, as sellers in vegetable markets, and apparently are highly impacted. The price of cattle has fallen by 50% in some areas, and some households who need cash urgently have sold their cows at half price, indicating a significant level of desperation in some households (Woodward 2020).

In Java, e-commerce and social media (for example, WhatsApp) have emerged to keep value chains working to some extent. This is a fast-growing phenomenon. Some reports note that e-commerce platforms have experienced a fivefold increase in patronage. In many areas, this is a new way of governing value chains. While the amount may be still limited and only done by certain actors, this phenomenon can be considered as a new response. However, as food (retail consumer) prices have risen while product (farm-gate) prices have dropped, marketing margins may have increased greatly for those actors able to successfully work across these disrupted value chains.

The COVID-19 pandemic has not significantly affected rice production. However, climate variability (a prolonged dry season due to El Niño in 2018–19 and the Indian Ocean Dipole during 2019–early 2020) led to a late start of the planting season and a short wet season, impacting rice production.

This combines with outbreaks of pests and diseases due to the overuse of chemical pesticides and fertilisers. In some parts of Java, there are significant water availability problems for farmers dependent on rainfed agriculture, or those who have limited streams or irrigated water supply.

Rice farmers in East Java and Central Java (Jogjakarta) keep some of their yields for self-consumption and hold off selling some of their rice in the latter period to meet cash needs. Rice farmers in West Java used to sell their yields immediately due to the need for cash (as capital for the second planting), to pay debts and to cover daily household expenses. To meet those expenses, farmers had to sell their unhusked rice at lower prices than usual, because big traders from outside the village failed to arrive to buy the unhusked rice. There are reports that, due to a fear of shortages later on, or following practices of keeping rice for self-consumption, villagers are retaining rice stocks. This has possible impacts on markets and the attempts of the state logistics agency, BULOG (Badan Urusan Logistik), to purchase rice.

Farmers need capital to start planting for the second rice production season. Disturbances to rice value chains, lower grain prices at the point of sale and delays in payments to farmers from mills and middle-agents have reduced their capital. This has delayed planting or led to reduced use of inputs, especially because of the unavailability of particular fertilisers in the market. Despite the central government's policy to release farmers from their financial burdens, banks still require monthly payments from traders and farmers who have accessed agricultural credit.

While some fertilisers are missing from the market or are in short supply, the main chemical fertilisers and seeds remain available. Vegetable growers in Pangalengan, West Java, are late applying





**Perishable products that need to be marketed quickly, particularly vegetables, are especially vulnerable to value-chain disruptions.**

Photo: Lisa Robins

fertiliser or are applying 'fake' fertilisers, leading to late and poor growth of plants and affecting yields. Yield reductions could be up to 20–30%.

Village leaders in some areas have imposed localised lockdowns, discouraging outsiders from entering villages. Restrictions on the use of labour due to social/physical distancing restrictions imposed by local leaders have led farmers to rotate labourers, leading to additional costs for labour. Returning migrants who have lost jobs in the cities and towns remain unemployed and often cannot find work in the farming sectors. Those badly affected include those finding casual work on construction sites, driving pedicabs (*becak*) or working in the informal sector. Households have lost remittance income, which used to be shared with families, and also face the extra burden of more mouths to feed.

Women who earn secondary income from the sale of homemade products (for example, snacks, bamboo handicrafts) are experiencing drastic impacts in survey areas (Indramayu, Sumedang and Pangalengan in West Java; Trenggalek in East Java; Bantul, Sleman and Gunung Kidul in Jogjakarta; and Klaten, Magelang and Purworejo in Central Java). A fall in demand from outside villages and kiosks, the lack of traffic and the closure of some stalls along the main road have led to declining income. Women continue to produce snacks only for local markets. The price of eggs, flour and sugar has increased, adversely affecting household budgets and also reducing the margins earned by women selling food in the informal sector. For the most part, the prices of staples have remained quite stable. The price of tofu, a major source of protein in Java, is increasing due to the rising price of imported soy. One tofu trader noted that the price of soy has risen from Rp600 per piece to Rp700 per piece in rural areas (Murdaningsih 2020).

The official list of recipients for social assistance has a high rate of inclusion and exclusion errors. This may be due to local leaders incorporating their own relatives or failing to exclude influential villagers. There are also issues with the updating process. Many local governments have claimed that they have received outdated beneficiary lists from the central government. For its part, the central government pointed out that many local governments have failed to regularly update their unitary social welfare (Data Terpadu Kesejahteraan Sosial) (DTKS) database, which contains a registry of the poorest 40% of the population. However, this database is clearly unable to capture poverty dynamics prior to and during the COVID-19 pandemic. Significant numbers of people are not receiving benefits to which they are entitled. New programs, such as the unconditional cash transfers (Bantuan Langsung Tunai) program, now provide new cash assistance (Rp600,000 per month). The dispersal of these funds depends upon the diligence of the village authorities in reaching out to cover newly poor residents who do not receive other assistance.

When the economy moves towards a 'new normal', informants expect the return of distribution and transportation. This may support the return of income generation from horticultural and homemade products, as well as off-farm services related to local trading, food distribution and tourism. However, if COVID-19 impacts increase, this return may be delayed, and the detrimental effects discussed above may become even deeper.

The most vulnerable include horticultural farmers, returning migrants, women and informal workers. Landless labourers may have lost work in the informal sector work (such as sand mining and rock quarrying) (Woodward 2020). Income from agriculture has become more important, and many can still find work in rice and horticultural

production as long as cultivation practices continue, earning wages as usual. Where labourers from other areas have left, villagers can find new work opportunities. In contrast, farmers employing workers experience the extra burdens of the shock. Rice growers will continue with their second planting season. However, vegetable farmers must weigh up whether to keep growing vegetables for market. Given the uncertainty, farmers need to gamble on what the future might bring. Failure could mean loss of working capital and a downward livelihood trajectory.

The impact of the COVID-19 crisis on farmers is differentiated. Wealthier farmer who engage in the commercial production of chicken and vegetables have difficulty selling their produce and are badly hit. However, small farmers who produce very little, tend to be less affected as they continue to produce to meet household needs. In general, secondary income generation from off-farm and homemade products has dried up. Villagers must wait for the end of the pandemic and the recovery of value chains, markets and distribution networks. In the meantime, they are planting all available land with vegetables. In general, household expenditure has dropped dramatically. In the short term, impacts on household food consumption will be ameliorated as long as rice, government social support and local food resources remain available. However, falling food consumption is likely to deepen as the crisis continues.

### *Estate crops in Sumatra and Kalimantan*

In 2018, there were approximately 14.3 Mha of oil palm plantation land in Indonesia (Kompas 2018). It is estimated that around 2.67 million smallholders manage around 40% of this land, extending to approximately 5.8 Mha (Jong 2020). According to one calculation, there are 10.5 million workers

within the oil palm sector, of whom 70% are casual day labourers (Sinaga 2013).

With the onset of the COVID-19 pandemic, global demand for estate crops fell. This led to congestion in storage facilities. Mobility restrictions meant the transportation of oil palm slowed, while demand for biodiesel dropped. This led to the closure of some independent mills (Info Sawit 2020). As company mills prefer to process fresh fruit bunches from their own estates, or from farmers who have partnership contracts with palm oil companies, the demand for fresh fruit bunches produced by independent smallholders has fallen dramatically.

In May 2020, the price for fresh fruit bunches had dropped by around 40% in many villages in North Sumatra, affecting the income of farming households. Rubber farmers were hurt even more, with already-low prices dropping by as much as 40%. Some responded by converting their rubber gardens into oil palm, using income from the sale of the timber to pay for replanting. Sharecropping rubber tappers were the most vulnerable, as they provide half their harvested rubber to the landowner.

While oil palm farmers continue their farming activities as before, they have the same operational expenses, even though the prices for fresh fruit bunches has fallen. Larger farmers, who continue to produce, retain their purchasing power. However, given the fall in fresh fruit bunches prices, those who borrowed from banks experience difficulties meeting repayments. With the relaxation of the loan repayment requirements from banks, households avoid repaying loans and some use their savings to make up the income lost from falling oil prices. Given the fall in labour demand and falling income due to declining demand for oil palm, marginal farmers with low oil palm production and a dependence on casual paid labour are acutely affected.

These include those with three hectares or less of inadequately maintained oil palms, typically trees that are from low-quality planting stock, over age or poorly maintained.

Many labourers continue to work as normal for the oil palm companies and receive the same salary. With the temporary closure of mill operations, demand for casual workers (*buruh harian lepas*) falls and workers face wages cut and the livelihood of casual workers becomes more precarious (Darto 2020). If there are confirmed cases (COVID-19 positive), workers face dismissal. In some locations, casual work opportunities for labourers on smallholder plots have disappeared, as farming households can no longer afford to pay them and instead turn to family labour. Where many palm oil mills have closed, outsourced workers, especially casual workers, such as those harvesting, loading and transporting fresh fruit bunches, face unemployment. Opportunities to work as drivers in public transport or on building sites have disappeared. Unemployed casual labourers lose their capability to purchase food.

Women living close to oil palm estates form a large part of the informal workforce, with many working to harvest loose fruit. This group has been identified as vulnerable and at risk, given their precarious employment, lack of social security and poor access to healthcare, insurance or fair wages (Zein 2018). Women who work casually in the oil palm sector are particularly exposed because they are more likely to lose their jobs.

The price of fertilisers has increased and there is difficulty accessing it, due to mobility restrictions. In some villages, fuel, fertiliser and other inputs remain available. However, they are not easily found in other oil palm villages, particularly in the more remote areas due to transport difficulties,

or because subsidised fertilisers have been allocated to rice farming. Poorer households face difficulties buying fertiliser and instead divert their resources to buying food.

While in the past farmers used to practice dryland rice cultivation (*padi ladang*), in Sumatra this tradition disappeared after farmers converted their land to oil palm. Very few households grow vegetables and other food crops in their compounds. Farmers rely on sales of fresh fruit bunches to meet their daily needs, including food, and they are vulnerable to food insecurity if their income falls. For many households, there are limited work or farming opportunities outside the oil palm industry. These areas are especially vulnerable to food insecurity, and stunting rates tend to be high, especially among casual labourers and marginal smallholders. Field surveys suggest that daily wage labourers and marginal oil palm farmers have poor-quality diets and cut back on their protein. This is especially true during periods of low labour demand and low production, such as the dry season, which is known as a scarcity period (*paceklik*) (Sitorus & McCarthy 2019). Villages in remote areas closed their gates and forbade entry to non-residents, including traders who sell food. With the onset of panic buying, those with cash stocked up, which raised food prices. Small businesses that sold food experienced a sudden drop in sales and shops were instructed to close for periods of time. When stocks were low and prices high, shops lacked buyers.

While some migrants retain their work in the city or overseas and avoid returning, many others have lost their jobs overseas or in urban centres and no longer send remittances. In one study village, 130 'children of the village' have returned home. As migrants return, there are more mouths to feed, and a higher risk of spreading COVID-19. Returning migrants face the prospect of being unemployed, with more

people chasing the limited casual work available, adding burdens to household budgets. Some people also have to send assistance to unemployed relatives in affected urban areas. These landless casual workers become the most vulnerable group due to their poverty and the reduction of work opportunities, especially in remote villages. This problem is especially acute while they wait for social assistance to be distributed.

Informal social protection from neighbours, local social organisations and local companies help. However, they cannot cover all villagers and are often unable to reach remote areas. There are several social protection programs, principally:

- Bansos (food supplies purchased from community production by local governments for distribution as food assistance)
- Bantuan Langsung Tunai (unconditional cash transfer)
- conditional cash transfer program
- staples card (*kartu sembako*)
- Bantuan Kemensos (social affairs assistance).

Each program involves a different set of recipients and provides different amounts or forms of assistance. Provincial governments are rolling out social assistance (for example, the North Sumatra provincial government provides assistance of Rp225,000 per family). Villagers believe that, since COVID-19 can infect anyone irrespective of their wealth, the distribution of assistance should be equal. Therefore, district government assistance is divided equally, with recipients receiving 2.5 kg rice and 15 eggs from each allocation. However, the central government, through the Social Affairs Ministry, distributes Rp600,000 to a limited number of casual day labourer beneficiaries. The conditional cash transfer program and the staples card continue to

be distributed using centralised data lists. In remote villages, the benefits from national, province and district safety nets arrive late. At the time of writing, the social safety nets have not yet effectively addressed vulnerabilities in remote areas. In some cases, there are protests from community members who fail to receive cash transfers in time or who deem themselves to be treated unfairly.

Vulnerable households respond by decreasing the consumption of high-quality foods and the variety of foods consumed, turning to cheap carbohydrates, and selling productive assets such as jewellery, and even their houses and land. In oil palm villages, the seasonal scarcity begins in the dry season when, with falling oil palm production and less work available, marginal farmers and landless labourers tend to cut back on protein. Village governments are encouraging households to open home vegetable gardens. While social assistance will help households to some extent, careful management will be required over the dry season.

In the past, farmers traditionally valued diversity. With the enclosure of such large areas of land for plantations during the oil palm boom, many find themselves working small areas of land and are overly dependent on a single crop. In the future, farmers growing estate crops need to find ways to grow food crops, with strategic support for growing multi-crops or the reallocation of village, social forestry, housing compounds or plantation land for rice, corn and vegetable cultivation. As the shock most adversely affects casual labourers, social assistance needs to target this group. Palm oil price insurance could be explored to maintain stable prices of fresh fruit bunches. Program support could be extended to develop community-based, self or participatory targeting for food assistance; combine social protection

with supporting productive farming among most affected households; provide financial support for multi-cropping; and rejuvenation of old trees.

### *Papuan provinces*

Indonesian Papua is divided into the two provincial administrations of Papua and West Papua (the Papuan provinces). By early June 2020, Papua had the third-highest proportion of individuals in its population infected with COVID-19, and West Papua was the fifth (Sucahyo 2020). Both provinces have low capacity for polymerase chain reaction testing, lack health facilities and have limited health workers. They also have high malnutrition rates among children under five years old and high levels of infectious diseases such as tuberculosis, HIV/AIDS and malaria. The populations of the Papuan provinces are considered high risk (Ramadhan 2020).

Due to their vast size, lack of medical facilities and health workers, and security issues, handling COVID-19 in the Papua provinces is challenging. Many health workers have tested positive (34 as at 26 May 2020). The supply and distribution of medicine relies on air transportation and faces shortages. Distributing medicine and developing testing capacity will take time. Given these constraints, regional governments have made extra efforts to try to reduce the mobility of people across the region. Papua Province was the first to close its border, shutting its airport and ports on 24 March 2020, especially links to and from Sulawesi, another COVID-19 hotspot.

Over recent decades, the population of both Papua provinces have changed their food consumption patterns and this has generated a high dependence on imports. Large numbers of migrants, especially Javanese, have moved into the Papua provinces and are primarily rice consumers. These groups are vulnerable to fluctuations in rice prices and availability.

Conditions in some areas of the Papua provinces are broadly similar to other parts of the region. While remote areas have limited access to food markets and rely on their own production, in some areas, factors such as climate conditions, land suitability, drought and flood lead to seasonal deficits in food supplies (Ichi & Tamimi 2020). Areas of the Papua provinces have significant potential to grow local foods such as sago, banana and sweetpotato. However, Indigenous Papuans have also changed their consumption patterns (Elisabeth 2020ab). While Papuans traditionally relied on local food, the introduction of the Raskin (Rice for the Poor) program gave them ready access to cheap rice. They prefer to buy inexpensive rice than grow their own food. Only 25% are fully self-sufficient food producers who do not primarily consume rice. These are Indigenous Papuans (*Orang Asli Papua*) who still have home gardens (Sumule 2020). The Indonesian Food Security Index 2019 notes that approximately 90% of districts in Papua rely on food supplies from outside their area.

In 2019, Papua produced 133,684 t of rice, 91% of this in Marauke. However, this only met 10.7% of the total needs (Papua Province 2020). West Papua can only produce 10.8% (9,045 t) of its total needs (Sumule 2020). With unstable climate patterns, last year's harvest in Marauke failed to meet its target, and average rainfall fell in February 2020. Furthermore, the provinces lack the capacity to speed up post-harvest management of rice (Wiyanto 2020). Consequently, it is estimated that 51% of people in Papua and 75% of people in West Papua depend upon imported rice supplies. The government has predicted that drought this year will affect rice production (Amanda 2020). During the COVID-19 pandemic, local governments are encouraging communities to produce more local food.

As in other areas of Indonesia, large-scale changes in land uses over recent years have affected prospects for food production. Forty-seven new permits were issued providing for 6.1–7.3 Mha of oil palm concessions since 2014 (Costa 2020b). In West Papua, oil palm permits have been allocated over 436,955 ha of land (Costa 2020b). Land conversion is reducing the land available for growing sago gardens or foraging from forests as areas are transformed into estates that produce non-food commodities, such as oil palm, increasing the dependence on rice imports.

Communities are returning to indigenous land practices during the COVID-19 crisis. In Asmat, Indigenous people are leaving villages and returning to their forest lands because they are afraid of COVID-19 and they can access food in forest areas (Costa 2020a). However, following deforestation, this option is no longer available for some. Deforestation increased threefold in Papua, moving from 60,300 to 189,300 ha per year from 2009 to 2017 (Elisabeth 2020b).

As most food is imported from elsewhere, food prices in the Papua provinces have always been higher than in other areas of Indonesia, especially close to festivals. According to official data (Tinal 2020), the prices of food staples increased after the onset of the COVID-19 pandemic. Food prices also vary significantly between the capital city of Jayapura and highland districts, such as Paniai, or isolated districts, such as Asmat. The 2018 Food Security and Vulnerability Atlas gave Papua and West Papua the lowest food security score. This atlas uses indicators such as the prevalence of stunting for children under five, the education level of women 15 years old and above, food consumption per food production, access to water and sanitation, and household spending on food. While specific areas of the Papuan provinces are known for high malnutrition

among children, according to the 2018 Basic Health Research, the stunting rate for Papua is 32.8%, which is close to the national average, and the atlas suggests that food security is acute in all areas.

However, some areas are more vulnerable. The two Papua provinces have the highest number of vulnerable districts, with 17 out of 29 districts in Papua and six out of 13 districts in West Papua listed as 'priority one'. In neighbouring Papua New Guinea, one of the main causes of stunting among children under five is a lack of protein intake (Schmidt 2019). In Indonesia, the national average consumption of protein is 57 g per capita per day, but in Papua it is 46.03 g and in West Papua it is 53.02 g. These are the lowest below the national average. A measles and malnutrition crisis occurred in Asmat in February 2018 (BBC 2018), which caused 72 people (mostly children) to die. In February 2020, just before the pandemic, Jaya Wijaya district in Papua reported malnutrition cases in 40 subdistricts (KabarPapua 2020).

Cultural changes in food consumption may contribute to this issue. Indigenous people in Asmat used to spend months in the forest cultivating sago and finding enough food to live. However, large-scale cultural changes began in the 1950s with the arrival of Christian missionaries. This, together with the influence of migrants from other part of Indonesia, dramatically changed the diet of the Indigenous people in Asmat (BBC 2018).

With the outbreak of the pandemic, movement restriction led to problems in the distribution of food. In April 2020, the government closed ports in Papua Province (Costa 2020a). This disrupted distribution and increased the price of food commodities imported from Java and Sulawesi. Informants in the Asmat government noted that passenger ships bringing supplies from Marauke to Asmat only came twice per month after the onset

of the COVID-19 pandemic (from the end of March to June). Similarly, the road to the Meepago highlands closed from the end of March 2020, stopping the movement for goods and people, and generating shortages and price spikes in the Paniai traditional market in mid-May (Yogi 2020). The cost of chicken increased by 30% due to shortages. Despite these disruptions, the impact is minimal for communities who rely on community gardens to produce vegetables and sweetpotato while fishing in the lake.

The impact is greater on migrants who rely on cash work or produce cash crops for sale in the local cities, as well as those whose jobs have been affected by the economic slowdown. In May 2020, reports suggested that people were afraid of going back to the market or had less cash to spend, and therefore the incomes of the market sellers had dropped. However, in early June 2020, markets in Jayapura started to reopen and people returned. Farmers groups have also complained that their sales have decreased since COVID-19.

Some reports suggested that, without actions to minimise risks, 1.75–2 million people in Papua face the risk of hunger (*kelaparan berat*) due to the impact of the COVID-19 crisis, especially because of the disturbances in logistics from outside the regions, especially for rice (Sumule 2020). The main concern is that, if rice supplies in Java run short later in the year, the Papuan provinces will be most affected. However, both provincial governments moved quickly to assure people that their food stocks are secured. In early June 2020, BULOG noted that the stock of rice in storage for the next 3–4 months was more than 1.4 Mt.

To date, policies have focused on three key actions. First, state policies quickly focused on the smooth distribution of goods (including food) imported from other regions. During May 2020, the

government agencies moved to fix logistics and ensure the movement of food supplies. Government initiatives to stabilise the food prices are focused in the major cities, such as Jayapura, but there are no reports regarding how provincial governments or BULOG are helping to stabilise food price in more isolated districts such as the highlands or Asmat. The BULOG initiative to stabilise the price of sugar in Jayapura may have succeeded: the market price of sugar is around Rp18,000–20,000, higher than the maximum price set by government. BULOG sugar is sold at Rp12,500.

Second, the government is encouraging citizens to grow their own food for food security purposes. Regional governments have focused on increasing local production of sweetpotato, cassava, taro, talas, banana, pumpkin and other crops that can replace rice. Local government and civil society movements are calling for people to return to local food and for communities to cultivate their food gardens (Triharyanto 2020). Local governments argue that people cannot always rely on state social assistance and imported food from Java. To stimulate demand and reduce dependence on imports, local governments are buying food supplies from community production for distribution as food assistance. For example, on 5 May 2020, the Governor of Papua purchased 5 t of sweetpotato and distributed it to vulnerable groups (Sucahyo 2020).

Third, Papua's provincial and district governments are rolling out social assistance programs, allocating Rp325 billion. The provincial government's plan for social assistance aims to complement national government programs, targeting communities who are opening land for farming and also fishers, small businesses and cash-for-work programs. The ability of local governments to implement and distribute social



assistance and reach vulnerable groups will determine whether these programs are effective in addressing food security in the region.

Future research could focus on whether the central government's Raskin (Rice for the Poor) program creates disincentives for communities to grow their own traditional food. Future research can look at how to increase the productivity of local food in Papua regions. Research can also study initiatives to increase Papua's ability to produce food and how policy can uphold the Indigenous people's rights to access land for food production.

### Fisheries

While Indonesia's fishing grounds extend over 5.8 million km<sup>2</sup>, many fisheries are overexploited. One estimate suggests that 72.44% of fish resources of Indonesia, comprising 92 of 127 fish species and groups of species, are fully exploited or subject to overfishing (Adhuri et al 2015, BPS 2016). About 97% of Indonesian fishers are artisanal, with boats below 10 gross ton. This means that many fishers access coastal waters that are already overexploited and often do not fully cover their production costs (fisheries researcher, pers. comms, June 2020). While there are approximately 2.7 million fishers, they constitute around 25% of those below the poverty line. These communities are especially vulnerable to the shocks caused by COVID-19 (DPP KNTI 2020).

Movement restrictions and implementation of the physical distancing policy led to transport restrictions and bottlenecks, reduced access to export markets and the closure of restaurants. Fish markets (*tempat pelelangan ikan*) became quiet. This affected fish processing and distribution systems, and the cost of logistics reportedly increased by 40%. As consumers lost purchasing power, the demand for capture and aquaculture fish fell. Fish collectors

limited their purchase of fish from fishers and aquaculture farmers (DPP KNTI 2020, Samudranesia 2020). Fish stocks piled up and fish were even thrown away. Fishpond varieties, such as milkfish, were harvested in large quantities and sold at very cheap prices to prevent greater losses.

Since the onset of the COVID-19 pandemic, fish prices dropped dramatically, from 50% to as much as 75%. Prices for low-grade small fish (*ikan kering* or *ikan teri*), popular with poorer people, have also fallen from a normal price of Rp5,000–8,000 per kg to Rp1,500–3,000 per kg (CNN Indonesia 2020). One report noted that fishers' incomes from each time at sea fell from Rp3.5 million to Rp1–1.5 million (Samudranesia 2020). A fisher in North Sumatra reported that his daily income had fallen from Rp350,000 per trip to only Rp30,000–50,000, enough for the most basic needs (CNN Indonesia 2020).

Fishers are caught between rising operational costs and falling incomes. Operational costs, including the price of fuel, remain high and supplies are scarce in some areas. For aquaculture, the price of feed and medicines, especially those containing imported materials, has increased. The prices of some staple foods have increased, while households have to meet additional costs such as buying disinfectants.

Fish workers, particularly women who work in the trading networks, post-harvest sector and in informal stalls, face the biggest challenges with loss of income, lower wages and the risk of contagion (Orlowski 2020).

As most artisanal fishers lack collateral, they do not have access to formal credit, and remain dependent on fisher collectors and intermediate traders (*tengkulak*) for loans. While some *tengkulak* were badly impacted, others emerged even stronger. As fish auction locations (*tempat pelelangan ikan*) are considered risky, they are quieter. Fishers are unable to sell much of their fish

in the open market. They are forced to sell cheaply to *tengkulak*. Some intermediate traders have manipulated the situation to extract greater profits and control more of the high-quality value chains. The pandemic increases the fishers' dependence on *tengkulak* for working capital. Fishers who receive loans take risks. If they lose due to fluctuating prices or lack of market access, they must repay loans, even while the profits are with the *tengkulak*. One report noted that the government should be alert to the emergence of a 'mafia' in regions, who stack and lift the price of supplies and then resell for their own benefit (Sibuea 2020).

Poor access to cold chain infrastructure has particularly affected small-scale fishers, especially in remoter cities and fishing villages. This has degraded fish quality and has led to fish catches being wasted (CNN Indonesia 2020). However, new value chains are emerging: according to one account, online retail marketing jumped fivefold (Grahadyarini 2020). However, many areas are not yet connected, and these new value chains are still limited.

While fishers can attempt to adjust to ecological or climate factors by changing fishing grounds, practices and gear, the COVID-19 crisis presents a completely new set of dilemmas. Fishers cope by using savings, borrowing, selling and pawning assets. Some also barter with farmers, exchanging fish for rice. Fishing households change to cheap foods, and try shifting to work in agriculture as casual day labourers to generate some cash income. As fishers' livelihoods are not diversified and they need to buy rice, they are more vulnerable, especially to loss of working assets and capital. Reports note the emergence of self-help organisations, and assistance from religious organisations, neighbourhoods and relatives. However, if their livelihood crisis is deep, and if the pandemic continues, it will have a significant impact and the recovery process will be slow.

If the economic hardship continues, there is some discussion of whether this will lead to significant industry consolidation. Meanwhile, there have been calls for government agencies to step in to buy stock, offer minimum prices, assist with logistics and provide special cash-for-work programs for fishers.

Fishing activities have fallen quickly from April to June 2020 (Ambari 2020). While many fishers continue to go to sea to feed their families, in some areas they choose not to, as they lack working capital. In East Nusa Tenggara, one estimate suggested that fish production would decline by 50% in 2020, from 157,691 t to 78,845 t (Amnifu 2020).

An estimated 65% of Indonesia's population lives in coastal and marine areas (BPS 2016), and in many parts of the archipelago fish is the main source of protein. The large drop in demand suggests that the poor are consuming much less fish protein (CNN Indonesia 2020).

In conclusion, the crisis has severely affected the marine and fisheries sector, impacting an estimated 8 million fishers, fish farmers, those working in the supply chain and their families. The problem is a contraction in demand leading to oversupply, as well as reduced market access due to disrupted value chains, possibly generating a vicious cycle of dropping fishing effort, falling incomes and declining nutrition.

### *East Nusa Tenggara*

East Nusa Tenggara is the driest province of Indonesia and has the highest stunting rate among underage children in Indonesia (43.6% in 2020). Most farmers grow food crops such as corn, beans and tubers that require little water. As well as the pandemic, farmers have faced a long dry season and extensive harvest failures, making 2020 a very difficult year. Although few cases of COVID-19 were reported in East Nusa Tenggara, from March to June villages shut

markets and banned outsiders from visiting (de Rosary 2020).

In Kupang, the lack of rainfall in April 2020 caused crop failures for the forthcoming harvests in some coastal areas (Pos Kupang 2020). At the start of May 2020, farmers began to anticipate water shortages as the dry season approached and were advised to shift to crops that require little water (Okenews 2020).

On the island of Lembata, while corn harvests were sufficient, as usual they had a rice deficit. Farmers could no longer sell cattle, usually used as a form of savings that can be sold for income during difficult periods (EkoraNTT 2020). In Timor, the livestock agency (Dinas Peternakan) noted in April 2020 that households had lost 7,000 head of pigs due to an infestation of African swine fever, losing a source of income used to support household economic needs during periods of scarcity (Detik.com 2020).

In East Sumba, rice harvests had fallen by half, with pest infestations compounding the impacts of droughts. Sudden unseasonal downpours in May 2020 affected some rice crops still in the field. Villagers usually consume meat during ceremonial events, but these events were cancelled and the pig market collapsed as travelling traders could not buy pigs from local markets. Similarly, the market for chicken folded as people conserved their resources to buy food staples rather than the luxury of meat. Mobile fish traders, who feared spreading the virus, ceased trading for some time. To make do during periods of crisis, people sell their jewellery to pawnshops (Vel & Makambombu 2020).

Reports estimate 1.1 million farmers in East Nusa Tenggara have experienced a reduction in farming incomes during the pandemic. One survey across 17 districts found that the majority had experienced a fall in yields compared to the previous year, with declines of up to 50% in some areas.

The main factors included late rains during the planting season at the end of 2019, pest infestations, declines in prices of up to 50% and difficulties accessing markets. The drop in demand and distribution bottlenecks made farmers vulnerable. All the farmers interviewed were uncertain about whether or not they would be able to sell their products for cash in order to buy food (de Rosary 2020).

The media discussed how harvest surpluses might be moved to deficit areas to protect prices and avoid farmers wasting perishable food products. Local governments were also buying a proportion of harvests at half price and promising to pay the remainder once products were sold. The government planned to continue programs to assist households to grow crops on available land (*Kawasan Ramah Pangan Lestari*) and develop village food barns (*lumbung pangan*). Regional governments also supported efforts to develop food sources that are suitable for the area, including local cereals, such as sorghum, barley, tubers, sago (*sago gewang*) and palm sugar, along with local legumes and vegetables (de Rosary 2020). District governments received social assistance funds from Jakarta to support farmers, particularly horticultural farmers affected by the crisis. Meanwhile the provincial government is arranging the delivery of cheap rice through the Bantuan Sosial Beras Sejahtera (Bansos Rastra) (replacing the Raskin (Rice for the Poor) program) and the provision of cash transfers under the Bantuan Sosial Tunai program. As in other areas of East Nusa Tenggara, farmers are highly diversified. Exchanges between extended kinship networks stretch across rural and urban areas and between areas with different harvesting periods, spreading the risk and helping people to get by (Vel & Makambombu 2020).

In summary, climate change has already disturbed the precarious balance of farming livelihoods in East Nusa Tenggara. Yields have declined as farmers find it difficult to predict the right time to plant, and their crops are infested by pests (such as the brown planthopper, rice ear bug (*walang sangit*) and fall armyworm). Alongside extended droughts, farmers face periods of high rainfall intensity and catastrophic floods. Now the COVID-19 pandemic has affected markets for crops and livestock, afflicting households with a threefold burden (climate change, pandemic and economic shock). This is a crisis in both production and exchange entitlements. If the crisis persists for too long, local forms of resilience and state social assistance will become overstretched.

### Summary of impacts

As noted earlier, before the crisis, significant issues of food access existed in many communities, along with the burdens of nutrition insecurity and obesity. An increasingly changeable climate is affecting production, and there are pest and disease infestations across some areas. Now a pandemic and a severe supply and demand shock has upset the delicate balance that existed prior to the crisis.

Informants recognised two main drivers of disruption. First, the partial shutdown and requirements for social distancing restricted movement of labour, disrupting transportation and logistics and closing wet markets, negatively affecting the storage and distribution of fresh food products. This has led to an increasing gap, with farmers and fishers obtaining low prices for their produce while consumers continue to pay high prices. Second, according to one estimate more than 6 million Indonesians lost their formal jobs by April 2020, with large numbers of people working in the informal sector also losing income. By mid-April 2020, one-quarter of Indonesians

surveyed said that 'they could no longer fulfil their basic needs without borrowing money' (Economist 2020).

Economic scenarios for this contraction vary. One scenario suggests a 3.5% contraction in gross domestic product will increase the poverty rate from the previous rate of around 9% to 16%. However, a 5% contraction would drive poverty rates up to 18%. More modest predictions suggest zero growth in gross domestic product, pushing poverty rates up to 14%. The trajectory very much depends on how the pandemic works out (Dr A Suryahadi, interview, June 2020).

The most significant impact has occurred in value chains. In much of rural Indonesia, there are several vertical layers sequentially linking production to distribution to consumption. As each layer extracts a margin, these fragmented value chains are often seen to be playing a part in low farm-gate prices and low margins earned by rural producers. Following the implementation of the partial shutdown and falling demand, these value chains were disrupted. While the situation varies across commodities and locations, the impacts have been profound. Many farmers struggled to get their products (especially horticultural products and fish) to market before they spoiled. Rice farmers in Java faced delays in being paid and had less access to the capital they needed for the next planting season. Disruptions to logistics due to late imports and disrupted supply chains led to short-term food shortages and price spikes in some parts of the country. The same dynamics disturbed the distribution of inputs (for example, chemical fertilisers and imported inputs) which slowed, became more costly or in some cases were no longer available.

Farmer incomes also dropped, as producers had difficulty selling their products. With falling demand, there were reports of producer prices for some commodities

falling precipitously, creating welfare crises in food-producing communities. For example, fish, rubber and coffee prices all fell by up to 50% and oil palm fell by up to 40%. In many cases, at least in the short term, vegetables and fish that had previously sold into long-distance value chains or for export could only be sold locally. Local oversupply meant that, initially, products were cheaper. As poultry producers released cheap stock, producers faced losses and reduced production. As fishers and cash crop-producing small farmers faced falling prices and difficulties selling their products, the incentives for going to sea or planting vegetables for sale were reduced, with some informants envisaging that this will impact on supply and prices over the medium term.

Indonesia has quite a strong agriprocessing sector for local consumption and export involving small and medium-sized enterprises. This part of the food system is vulnerable to COVID-19 impacts with falling access to produce for processing, labour issues, workers having COVID-19, the closing of facilities during the pandemic, and resultant upstream impacts on farmers and agents.

At the same time, well-positioned traders or those able to move to e-platforms are highly advantaged. There were reports that the use of specialised online platforms grew fivefold, even while producers and traders excluded from these platforms attempted to use WhatsApp and Facebook groups to coordinate sales to their clients. Some intermediate traders were able to extract higher margins, transferring the risk to producers. In the medium term, this may lead to shorter value chains as consolidation takes place. However, powerful actors may be able to squeeze less well positioned producers who are forced to sell at low prices unless protections are put in place.

The impacts of the crisis are highly differentiated. Vulnerabilities and risks are often specific to production contexts, so the impacts of the crisis vary across geographical and production contexts, manifesting in different ways. The impact very much depends upon how the crisis articulates with existing production systems and social relations. Households who are specialised or whose livelihoods are overly dependent on a single commodity, those dependent on precarious wage labour, those without land and with low subsistence capacities, and those integrated into value chains on less positive terms tend to be more vulnerable. Farmers suffered significant losses. The terms of trade (the ratio of farmers' incomes to their household expenses) fell 0.85% in May 2020 to 99.47 (a value below 100 means that expenses are higher than incomes). Farmers producing estate crops experienced the highest drop (down by 2.3%) while horticultural farmers faced a drop of 0.58%, with the agriculture sector already contracting in the first quarter of 2020 (BPS 2020). This represents a substantial welfare shock for marginal smallholders. With markets shut or with shorter trading hours, and much less interest in food and other products sold from roadside kiosks, women who work, who sell homemade food products, or who are members of cooperatives marketing agricultural products, faced significant falls in income. Migrants with precarious work in the city returned to their villages to avoid the threat of destitution and to access the safety net provided by their families and villages of origin.

Farming households producing vegetables and rice on a small scale and for their own use were hardly affected. However, relying on their own production is only possible for some. While the impact on households who have diversified livelihoods may be less than those with specialised livelihoods, many face the simultaneous loss of farming

income and off-farm incomes. While some landless labourers in rice landscapes may be less severely affected, in oil palm estates, West Nusa Tenggara and elsewhere, casual workers are badly impacted.

The loss of income led households to embrace a range of strategies. With less available income and restrictions on movement, at first the price of protein (chicken and fish) fell and stocks were still available. In many places, the last harvest had been enough, and households still had savings and could access these commodities. The Government of Indonesia's social packages, such as cash and staples, will help households with low incomes to survive. However, over time, households who have lost remittances, have less income and have more mouths to feed may gradually face a build-up of nutrition impacts. As previous research into consumption shocks has shown, families may protect the caloric intake of children but the falling consumption of high-quality foods (such as fruit and vegetables) leads to maternal wasting and micronutrient deficiencies in mothers and children. This crisis is also likely to affect the balance of diets. The quality of food declines as households cut back on protein, vegetables or even the number of meals consumed or move to instant foods and higher energy carbohydrates. This suggests that the triple burden of undernutrition may increase over the medium term.

COVID-19 is particularly impacting women, increasing the burden of childcare, decreasing mobility and access to information, closing access to markets and leading to loss of incomes. Women who face declining nutrition and decreased immunity may also face increased exposure to the virus if they leave the house to buy food. Women also face increased risk of gender-based domestic violence.

Vegetable farmers, unsure about the future, found it difficult to plan. There were reports of farmers hesitating over when to plant their next crop. In the medium term, as the crisis continues, changing consumption patterns will continue to affect nutritional quality, reinforcing the transition to unhealthy foods and accentuating micronutrient deficiencies and stunting. The most vulnerable include children under five years of age and pregnant women. The impact on poor families will persist long after this crisis, because of the effects on human capital development and the potential of the next generation. For some households, the crisis clearly affects the sustainability of their livelihoods. By June 2020, there were reports of those most badly affected selling liquid assets (such as cattle) at low prices as a coping strategy. This indicates that, even with state assistance for some households, the crisis was already very difficult.

Climate change plays into these supply and demand shocks. However, for the most part, the issue is not one of supply. The problem lies in reduced access to nutritious food among poor and newly poor households. According to informants, the prospects for later in 2020 is 'not too bright'. The predictions are for the dry season to peak in August, and a more arid dry season in areas of Sumatra, Kalimantan and Java, with a delayed harvest and a hunger season (*paceklik*) persisting up to February 2021 (BMKG 2020). This places pressure on the rice supply. Some reports suggest the possibility of problems of rice availability during the last quarter of this year. Indonesia usually fills this gap with imports from the Mekong region. International rice prices have been spiking, and there are reports of limitations of availability in the international rice market. Dealing with this problem will require care. While BULOG has stabilised prices and supplies in many areas (such as Java), there were reports

from remoter villages in Central Kalimantan that prices have gone up 30% for basic needs due to restrictions on movements. Informants from eastern Indonesia, where many households depend on the supply of rice from the west of Indonesia, are concerned that they will face shortages later in the year if rice stocks in Java run low.

#### 4.4.4 Recovery and resilience

##### *Coping strategies and social protection*

This section begins by considering coping strategies. Rural communities are tightly knit, and there are many reports of neighbourhood and village-level responses, including various forms of mutual assistance, such as bartering between fishers and rice producers, and the growing of traditional crops and substitute foods. Many of these strategies work in the short term but they have limitations in the medium to long term. For instance, producers taking on debt from *tengkulak* can be subject to exploitative trade arrangements.

Village institutions and networks work as sources of resilience. Villagers rely on family and neighbourhood networks in times of need, and village governments try to funnel help to those who fall through the cracks in state social protection systems. However, there are limits to these processes. Networks of mutual assistance are not necessarily available to the extremely poor, who have little capacity to reciprocate or rarely participate in village affairs. Moreover, the poor can only borrow for a limited period before their credit runs out. Those with higher degrees of capacity to rely on subsistence practices will be more resilient, while those with more specialised livelihoods or who are dependent on selling products or labour may well be more susceptible, especially if they lack productive assets such as land.

As the crisis deepens and savings are depleted, we are likely to see a gradual shift by more vulnerable households into strategies that are detrimental to sustainable livelihoods over the long term, such as selling productive assets at low prices. There is already evidence of this happening. These problems are exacerbated by the structural problem of urban labourers returning to their villages. A long period of jobless growth and low demand for rural labour will present a critical challenge for rural policy.

The balance of diet will change as the proportion of meals derived from the market decreases and households turn to self-production and traditional 'crisis' foods more often. In the past, many rural households moved out of poverty but kept agriculture as a component of their diversified livelihood portfolios. However, as the cash-producing aspects of these portfolios contract and farm incomes are curtailed, many rural households may well fall into deeper income poverty, leading to poorer diets. For these newly poor households, there may be no rapid recovery until their diversified incomes are reinstated.

Ongoing pest and disease infestations, and the impacts of climate change, will affect both the resilience of smallholders and their capacity to recover. In some cases, the persistent overuse of chemical inputs (pesticides and fertilisers) is exacerbating vulnerabilities and undermining community coping capacities. Research and assistance for farmers is critically important in order to improve their literacy on weather and climate issues so they can better understand the impacts of rainfall patterns on their fields' ecosystem, have access to climate scenarios over longer periods, and become able to better manage their fields' ecosystems to avoid pest infestations and diseases.

### Value chains

The crisis has revealed vulnerabilities in the way complex value chains are organised. Disruptions affect smallholders and lead to falling producer prices in key commodities. The problem of improving the governance of value chains during this crisis must be addressed to support recovery. In response, in response to broken value chains, e-platforms have emerged, leading to a rapid uptake of e-commerce. In addition to these sophisticated e-platforms, WhatsApp and Facebook groups have also been set up to inform and organise people and link them to markets in areas where there are no specialised e-platforms. This represents a potential transformation of food systems and raises a series of issues.

Shorter value chains could provide opportunities for smallholders by reducing the margins extracted across fragmented value chains. Encouraging digitisation of fisheries value chains, both downstream and upstream, could secure or even expand market access of fishery products to national or international markets (assuming a shorter chain will be less detrimental to fish farmers). Policy could aim to find ways to support the development of cold storage and help manage supply and demand fluctuations in the market and preserve fish products until the market improves, increasing frozen and tinned products. Policy could also help strengthen logistics to ensure that the supply of goods needed for fishing runs smoothly. Research may be needed to help identify ways to support the inclusion of marginal smallholders on positive terms, modernise value chains and facilitate investments in cold storage to ensure greater value is added to fishery products.

Small and medium-sized agribusinesses play an important role in agricultural value chains, but they are often vulnerable, lack access to finances and have a low skills base. Small and medium-sized agribusinesses have been hard hit due to decreased mobility, cuts in supply chains, limited savings and their poor internal resources to allow them to withstand long periods without incomes.

Those small and medium-sized enterprises and intermediate traders who are able to adjust may earn significant margins. However, many enterprises are badly affected and are unable to move effectively into e-commerce. Producers living in telecommunication shadows are also disadvantaged. There are discussions about whether these changes are long-term and if they will lead to industry integration and consolidation. Informants also discussed the digital divide that is emerging between those who are able to adjust and those who are excluded, or included on less positive terms. While enterprises may be considered inefficient in economic terms, they play important distributional functions and provide extensive employment.

These long-term impacts may be profound. Although patron–client relations are often exploitative, they are shaped by moral economies and provide safety nets for the poor. In contrast, online market relations might be governed by purely economic logics and replace value chains based on patron–client relations. The danger is that, unless carefully managed, these changes could marginalise smaller traders and potentially exclude women who work in food processing and distribution systems.





**Migrants with precarious work in the city returned to their villages to avoid the threat of destitution and to access the safety net provided by their families and villages of origin.**

Photo: ACIAR

### Return to agriculture

In many parts of Indonesia, there has been a movement back to agriculture. Villagers have returned to older subsistence practices to ameliorate shortages. In rural areas of Java and Bali, workers have been forced to return from the cities. Unfortunately, in Java, not all of these workers are ready to work in the agriculture sector, especially the younger generation who have no farming experience. The unemployment rate in rural areas will increase unless programs are created to provide off-farm work opportunities for these badly affected people.

In remoter areas of Kalimantan and Papua, informants noted that farmers were staying longer in their swidden fields (*ladang*), aiming where possible to produce their own vegetables and forage, hunt for meat or fish in forest areas, and avoid the pandemic. Articles in regional newspapers support this return to old subsistence practices with discussions of the virtues of traditions of dryland rice production (*padi ladang*), which has been neglected with the emphasis on wet rice cultivation (*sawah*). However, there are limitations to this shift. The majority of rural households are net consumers and need to buy food in the market. They have to earn cash income from casual labour, seasonal migration or off-farm work. These coping strategies are no longer possible in landscapes that have been transformed into estate crops such as oil palm or in areas with high degrees of landlessness. In forested areas of Kalimantan, traditional *padi ladang* practices that involve the use of fire are now illegal. In these landscapes, the limited ability of Indigenous Dayak communities to buy rice, their reduced ability to forage in degraded forest, and rising prices, poses critical questions for their livelihoods. It also has potential impacts for conservation and forest policy. At the time of writing, it was unclear to what extent social assistance

programs were functioning in remote areas of the country, to what extent they can protect people in these remote landscapes from becoming more vulnerable or how increasing vulnerability may play out during the forthcoming fire season. In July 2020, the Central Kalimantan provincial administration had already declared a state of emergency, with over 700 hotspots and wildfires reported across the province (Muthiariny 2020).

### State intervention

State interventions are critical to both recovery and resilience. Regional government policies encourage household food production, building on previous initiatives. Some programs encourage people to grow vegetables in polybags. The Sustainable Home-Yard Food Garden program supported women's farming groups to grow vegetables. In this case, the crisis has provided new opportunities to develop more-resilient food crop systems and diversify diets and cropping systems away from rice, helping to deal with the broader problems that loom over the future of Indonesia's food security. Initiatives in this area could also help farmers find alternative inputs if supply chains are disrupted. The crisis could provide important learning opportunities for policymakers searching for new approaches for sustaining food security. However, to ensure that new approaches are suitable for many diverse economic, social and cultural contexts, they must build on the most viable local practices and avoid top-down, one-size-fits-all approaches.

The Government of Indonesia's processes seem to have ameliorated the threat of food shortages in major staples for the most part. State institutions have functioned well and were able to forestall a major food crisis. Anticipating deeper scarcity due to a more arid dry season and possible import problems, the Government

of Indonesia moved rapidly to loosen import restrictions, increase production and fix prices by releasing reserve stocks and supporting inputs. Efforts to make sure that logistics effectively moved food around the country stabilised prices of key food staples. This seems to be working in all but remote locations. According to informants, since the disruptions in the first weeks of the large-scale social restrictions, prices and availability of rice and other key staples have been stabilised in key areas. There is confidence that there will not be food shortages of key commodities for several months.

The Ministry of Agriculture has prioritised policies to support the availability of food staples (principally rice and corn) to accelerate the export of strategic export commodities, support the development of farmers markets and roll out work labour intensive programs (*kegiatan padat karya*) and other social assistance for the farming sector (Ministry of Agriculture Republic of Indonesia 2020ab). New policies are being rolled out to increase the terms of trade for grain growers, building buffer stocks for 11 key food commodities, and maintaining price stability at the farm level (Warta Ekonomi 2020).

In response to the structural problem of rice deficits, the Government of Indonesia has returned to the idea of converting marginal wetlands in Kalimantan or intensifying rice production in other underutilised landscapes. In the past, such policies have proved costly, have not reduced the rice deficit substantially and have involved significant environmental costs (McCarthy & Obidzinski 2017). It remains to be seen whether developing more intensive rice agriculture in marginal Kalimantan and Sumatran wetlands can address Indonesia's structural rice deficit. The long-term challenge remains that of how to produce more higher-quality food with less inputs

and in more sustainable ways in existing production systems while building resilience to external shocks like climate change.

In view of the impacts of curtailed income and employment on the ability of rural communities to access working capital for next season, the state is rolling out subsidised inputs and credit programs. The central government has developed policies for the relaxation of debt repayments and is providing access to financing, including credit and microfinance programs with low interest rates, flexible loan repayments and options for restructuring loans to small-scale fishers and aquaculture enterprises. However, the problem lies in implementation at the local level. Until these policies are working effectively, the burdens on local villagers may continue. The ability of these programs to address these issues remains to be seen.

Social protection policies provide the main means of responding to the crisis. Fortunately, since the last major shock in 1998, Indonesia has invested significantly in building its social safety nets and is in a much better position to assist the poor. As at 16 June 2020, Indonesia's total COVID-19 response budget was A\$69 billion, of which A\$20.3 billion is to be spent on 'social safety nets' (Ministry of Finance Republic of Indonesia 2020).

Significant amounts of the state budget have also been diverted from other budgetary areas to support social protection. Indonesia has at least seven social protection measures. The core programs remain the narrowly targeted conditional cash transfer program and the staples card, which provides monthly cash assistance for basic family consumption. The cash transfer program aims to help the poorest pregnant women and women with young children, as well as the elderly and people with disabilities, by protecting their buying capacity. This makes a significant

contribution to nutrition. However, the new poor are largely found outside this category, or the category of people covered by the staples card, many were not considered poor before the crisis.

In order to cover the ‘new poor’ and those who are not in the bottom 20–25% of the social welfare DTKS database, the government also introduced temporary programs, including a temporary unconditional cash transfer. These programs use the existing DTKS database. Many people have pointed out that this database has not been updated and contains many exclusion and inclusion errors. As this mechanism uses a proxy means test and ranking to determine who the poor are, it is unable to capture recent shocks.

Provincial, district and village governments have developed programs to support those not covered by the two flagship programs and those left out because they are not registered in the DTKS database. The Village Fund (*Dana Desa*) is being reallocated to provide cash transfers to those left out of the flagship programs. It uses community-based targeting that let villages play a key role in selecting beneficiaries. While village governments can use their own discretion to decide who is entitled to receive social assistance from the Village Fund, they need to avoid any overlap with the other programs. However, some villages have already used this fund this year. In addition, President Joko Widodo has set out to ensure that 3.8 million farmers and fishers receive social assistance. The Ministry of Agriculture is also providing social assistance to 2.7 million poor famers of Rp600,000 for three months. This is made up of Rp300,000 cash transfers and fertiliser, seeds and other production resources worth Rp300,000.

It remains to be seen if these different mechanisms will provide an effective response. Unreliable data has been a common issue in Indonesia’s social assistance programs well before the COVID-19 crisis. Many studies have discussed the large exclusion and inclusion errors found in Indonesia’s social protection policies (McCarthy & Sumarto 2018, Booth 2019). There are reports of difficulties around including the new poor in these policies. On 18 May 2020, President Joko Widodo acknowledged that ‘just a quarter of urbanites whose livelihoods have been damaged by the crisis have received social aid’ (Economist 2020). Anecdotal accounts tell of a similar phenomenon in villages. While many people who missed out on these schemes felt entitled to assistance, attempts to avoid overlap between schemes has the potential to delay the roll out of social assistance. The capacity of local government to implement these programs remains critical.

Further research is needed to understand how these programs help the poor and vulnerable and to what extent they deal with the food security problems posed by the COVID-19 crisis. How will food-for-work programs (*Program Padat Karya*) provide for fishing communities? Will social assistance compensate for temporary or permanent loss of fishing income for the estimated 8 million households who depend on fishing for a livelihood? Can these complicated programs be implemented effectively and on time? What are the nutritional impacts on pregnant mothers and children? Are men more likely to be able to access these benefits? Are women being marginalised? Cross-sectoral approaches (involving the health sector) are needed to understand the issues and ensure that social assistance is used to purchase nutritious food.

Further mistargeting remains a longstanding problem, with the complex proxy means testing methodology and the social welfare DTKS database continuing to omit significant numbers of poor people. The COVID-19 period could offer an opportunity to develop and trial simple and more robust targeting methodologies.

In addition to questions of how well the social protection system works, there are questions of whether it can be sustained over the longer term. The unconditional cash transfers payments will be dropped from Rp600,000 to Rp300,000 after three months (from July to December). Further broad-based allocations of social assistance programs limit the amounts that can be distributed. Dr Asep Suryahadi from the Research Institute SMERU has calculated that the poor require Rp2 million a month if they have no salary at all. Although cash transfers offer some help, they only cover an estimated 30% of the needs of those who have totally lost their livelihoods. The crisis offers opportunities for experimenting with new approaches and possibly transforming Indonesia's somewhat cumbersome and weakly targeted system of social protection.

State agencies have reallocated budgets. For instance, the fisheries ministry reduced its budget by Rp1.8 trillion (US\$119 million), or more than one-quarter, to provide funding to tackle the COVID-19 outbreak in the country. Provincial budgets are similarly affected. East Nusa Tenggara reallocated Rp957 billion from of the Rp3 trillion village funds to help low-income citizens affected by COVID-19 (Jakarta Post 2020b). Research and development budgets have been slashed to support the emergency response, raising the question of whether donors will be able to support strategic policy interventions and research during and after the crisis. Research and development programs are required to address Indonesia's pressing food systems problems.

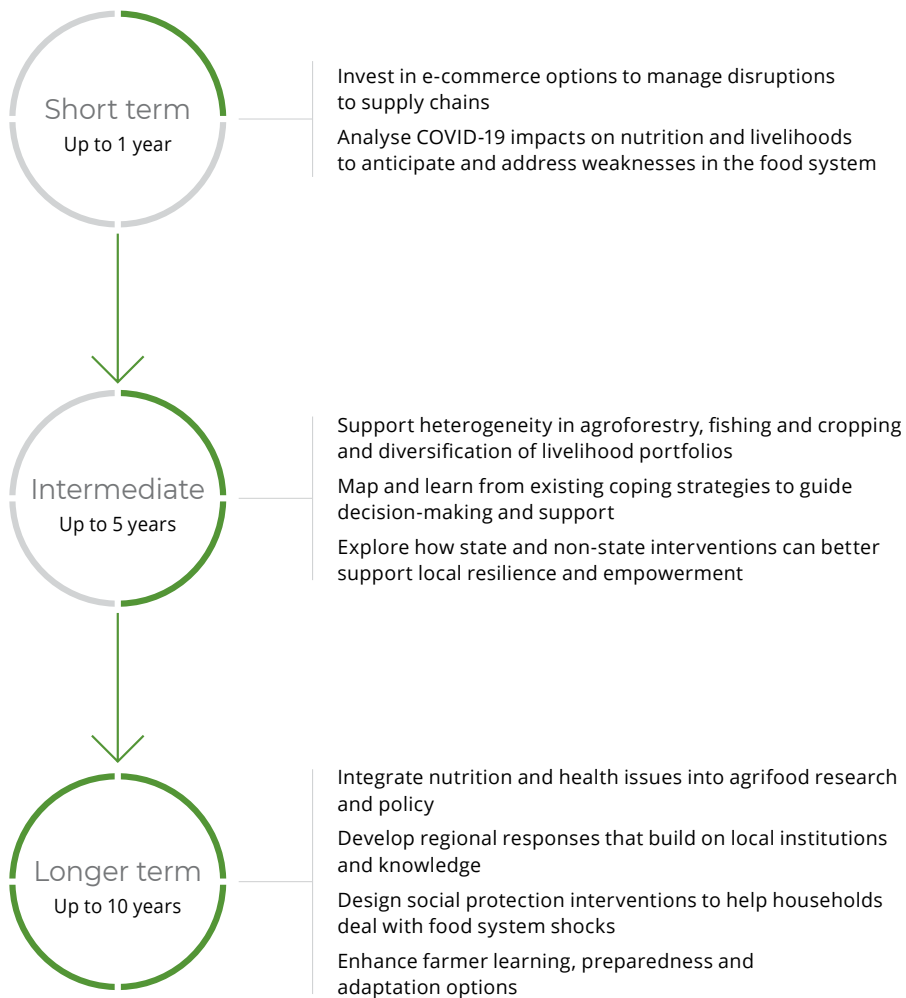
The socioeconomic situation and level of education in households has also been linked to their food security status. Households with access to safe water and better sanitation facilities tend to be more food secure. This points to the socially differentiated nature of food security, with better-off households more able to afford a nutritious diet (Srinita 2018).

Due to falling incomes, disrupted supply chains and limited social protection allocations, people use their income to buy carbohydrates, reducing consumption of fresh vegetables and fruit. It is likely that children, pregnant women and female-headed households from low-income groups (as well as the other most affected groups discussed above) will be most affected, due to their limited access to nutritious food. Women in locations where food consumption practices are gendered may also be badly affected. This will have long-term impacts on their health and the human capital of future generations. The decline in the quality of food in these groups requires policy and research attention if Indonesia is to avoid increasing the triple burden of malnutrition.

When considering resilience and the prospects for recovery, sources of resilience and adaptive capacity that provide households with the ability to absorb shock and to innovate are clearly co-emergent and not easily disentangled. Further research into these issues is required to identify particular points of intervention and also to consider how differently situated households fare over time.

## 4.5 Opportunities for action

### 4.5.1 Snapshot of potential investment options



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

##### *Invest in e-commerce options to manage disruptions to supply chains*

Vulnerability in food systems existed before COVID-19, with fluctuations in yields, price variations and involvement of middle-agents. Studies are needed to understand how the situation is changing, what the underlying vulnerabilities in value chains are, and what makes these value chains function better. Marginal smallholders were already price-takers and are often relatively powerless. It is important to understand how changes in value chains during the pandemic make these vulnerabilities more acute. For instance, the impacts seem to be highest with estate crops, followed by vegetables and, least of all, grains. Understanding how value-chain vulnerabilities play out is crucial to designing effective tactical interventions to ameliorate these problems.

The current rapid uptake in e-commerce points to the need for research into repairing broken supply chains. Indonesia needs a policy map for managing fragmented value chains and understanding the obstacles and opportunities for reform. This research must consider the political economy, social and economic aspects of marketing systems in order to anticipate the challenges of supply-chain reforms. As e-commerce becomes institutionalised, policy-relevant research needs to ensure the inclusion of marginal smallholders and women on positive terms, mapping how the e-commerce revolution is shaping who is included/excluded and why, and anticipating what policies will be needed to support inclusion. For example:

- price controls
- nutritional and safety standards
- affordability of nutritional food for the poor

- food safety standards and food traceability to support nutritional outcomes.

Other critical topics include:

- developing the technology to support supply-chain logistics
- interventions to make agricultural inputs more available
- developing cold storage and improve processing facilities to minimise waste and provide more stable markets for producers
- interventions that best support affected small and medium-sized agribusinesses.

There is also a special need for research into marketing chains in the fishing sector to consider how digitalisation might work best for marginal fishing communities.

##### *Analyse COVID-19 impacts on nutrition and livelihoods to anticipate and address weaknesses in the food system*

Based on previous studies of the impact of shocks on food security and considering the emerging evidence discussed above, it is clear that the COVID-19 crisis has serious implications for dietary practices and nutritional outcomes, including stunting. It is important to precisely analyse the effects on vulnerable people. Using community-based vulnerability and capacity assessment methods, research can analyse how rural households face these shocks. This can support the design of tactical interventions. It can deepen understandings of the weaknesses in Indonesia's food system and help policymakers anticipate the impacts of future problems. Finally, research can provide the basis for designing measures to support the coping strategies used by vulnerable people before future crises.

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

#### *Support heterogeneity in agroforestry, fishing and cropping and diversification of livelihood portfolios*

The discussion above suggests that households with diverse livelihood portfolios, more heterogenous food systems and greater control over local resources, including more secure land tenure, are better able to withstand risks. In contrast, those dependent on monocultures or single commodities, and those who have lost their land during land enclosures (where small landholdings are replaced by plantations and access to land becomes restricted as formerly common land is privatised) are more vulnerable. Researchers need to help map out pathways back to more heterogenous food systems and landscapes, enhancing local control over the resources vital to rural livelihoods, including the on-farm and off-farm components. Rural smallholder livelihoods who have more diverse livelihood strategies are more resilient if one component of a household's income stream falls over, as they have other choices.

Access to forest resources and the development of agroforestry can enhance resilience, avoiding reliance on single commodities, and making the livelihoods of rural households more robust.

Increasing tree coverage and finding ways of integrating crops into social forestry schemes can reduce temperatures and evaporation rates and help with humidity. Access to forest resources or annual trees, and the development of agroforestry, can provide resilience in the future, and reduce overdependencies on rice. However, agronomic strategies and institutional development is required to achieve this.

For example:

- how to provide windbreaks to reduce air convection
- how to combine vegetables and annual trees with forestry, providing protection from infestations of pests and disease
- how to improve soil texture to avoid evaporation
- how to improve water-holding capacity and soil humidity.

To address food security needs, forests, social forestry and agroforestry (or silviculture) can play a key role. Access to food, cash crops and small livestock (for example, small-scale poultry, goats, bees, rabbits and guinea pigs) may be integrated with social forestry schemes. Monocultures and reliance on single commodities create vulnerability, so interventions are required to support the heterogeneity of cropping patterns and the diversity of on-farm and off-farm livelihoods. When a shock leads to a failure in one livelihood strategy, it will not jeopardise the farmer's entire suite of entitlements.

Strategic research is needed for revitalising crops diversification to include the intercropping of food crops within the areas of monoculture-estate crops. This will bring back not only food crops, which have disappeared in many rural areas due to transformation to cash crops such as palm oil, but also the sustainability of diverse cropping patterns. Future research could focus on the identification of potential food diversification strategies in oil palm areas, considering suitable strategies for promoting mixed crops within oil palm landscapes to avoid monoculture. This could be done revitalising and/or returning the traditional *tembawang*—the Dayak tradition of multiple cropping patterns.



### *Map and learn from existing coping strategies to guide decision-making and support*

In rural contexts, yields, prices and ecosystems are fluctuating. The impacts of the pandemic point to deeper questions: how may smallholders be helped to be better able withstand challenges; and how to alleviate their vulnerability and improve the sustainability of the ecosystems they depend upon so that they may face risks in a more resilient way?

Research could enhance our understanding of the local trees, plants and local foods that rural people turn to, and how local food systems might be supported to make rural communities more resilient to climate change and other future shocks.

Research could map how local communities use local resources to face food security challenges, in order to understand how these can be enhanced. The research could help us better understand scarcity seasons, when and why they occur, who is affected and how households deal with shortages. For instance, in eastern Indonesia (West Nusa Tenggara and Papua), households replace rice with corn, cassava, banana, mungbean, taro and tubers, yet it is unclear how research and policy have supported the resilience of these practices.

Vulnerability and capacity assessments can facilitate better decision-making and support household adaptation strategies. Research and policy development over the intermediate term can support the design of interventions to enhance community capacity to resist, absorb and recover from the effects of both climate variability and other shocks such as those triggered by the pandemic.

### *Explore how state and non-state interventions can better support local resilience and empowerment*

Researchers could analyse existing government strategies and programs that aim to support local resilience (for example, *lumbung pangan*, food gardens and other programs), to determine how well they work and how they might be improved or better adapted for the varied contexts of rural Indonesia. The aim could be to improve interventions that build the adaptive capacity of local farmers and vulnerable people and reduce exposure and sensitivity.

Research could also analyse existing diverse empowerment and facilitation programs carried out by non-state agencies who have helped local people to sustain and/or diversify their livelihood strategies. The objective would be to understand what supports local resilience and builds social and institutional capacity.

Research could also consider opportunities for marginal groups (such as artisanal fishers and farmers) to work collectively to articulate their interests and develop policy initiatives that incorporate their knowledge, understandings and aspirations. Collective action to pursue sustainable fisheries and agriculture needs to accommodate civil society experiences and the creativity of local communities. Over the intermediate term, this could lead to new interventions to support smallholder and fishing households.

#### **4.5.4 Longer term (up to 10 years)**

##### *Integrate nutrition and health issues into agrifood research and policy*

Rural Indonesia is undergoing a nutritional transition. Diets increasingly include higher amounts of fast foods, ultra-processed foods and sweets, including *jajan* snack and instant noodles. Poverty and the cost of food, dietary habits, health factors

and time and food availability also drive these food choices, generating a range of health problems (UNICEF 2018). Research to support the development of better food choices might consider how to:

- help people improve their diets
- put together existing food elements in rural landscapes to create nutritious diets if rice access and cash incomes fall
- address cultural issues where local foods are not accorded the respect they deserve.

This could build on understanding of what types of crops or livestock smallholders can use to hedge against shocks, and how households can improve food preparation to make traditional foods more attractive. This research would aim to support interventions to enhance farmer resilience in facing external shocks and the role of government in empowering them to be more resilient. As an alternative to top-down diversification strategies, food systems research could look for diversification strategies that emerge from within communities.

If rural people are to have access to diverse food resources and support bottom-up diversification strategies, they need to understand the nutritional impacts of poor diet on health and wellbeing, especially for mothers and women. This will help address stunting, but if value chains are disrupted, and communities cannot rely on the outside, they may also be able to make use of local food production.

### *Develop regional responses that build on local institutions and knowledge*

One of the questions posed by several informants is how can more robust regional food systems be developed to support resilience at the regional level? Provinces and districts need to improve their capacity to identify areas in need and move food from areas with surplus production to

deficit areas during crisis. Food systems need to be less dependent on imports from Java, so that local foods are available and less expensive, and local food economies are stabilised.

Technologies need to be 'fit for use'. For example, technology should support increased water efficiency in East Nusa Tenggara and better management of local crops, including production and marketing. To support self-sufficiency at the regional level, districts and provinces could analyse how food produced and distributed between local communities within the same region could support subsistence needs.

As this assessment suggests, vulnerability is differentiated and contextual, and a regionally nuanced approach is needed to address it. In other words, research that understands the social and gendered mechanisms that create vulnerability in particular contexts can help regional policymakers determine how these vulnerabilities might be addressed.

For example, interventions could build on existing social institutions and make them more efficient, accommodating locally available knowledge and social institutions to improve resilience and strengthening the capacity of local institutions to manage shocks. For example, village institutions are highly engaged in managing responses both to COVID-19 and the food shock. What shapes how this works? What might be done to sustain such capacities in the future?

Research may need to identify existing gaps in the capacity of regional government agencies to develop approaches to addressing vulnerabilities specific to their regional contexts. Agriculture-related local government agencies need to integrate capacity and vulnerability assessments in order to enhance their decision-making and provide better services to the most vulnerable farmers and agriculture stakeholders and build their resilience.

Analysis of contextual vulnerability might help regional governments develop approaches to addressing vulnerabilities that are specific to their regional contexts. For instance, rural households dependent on day labour (*buruh harian lepas*) may need assistance during periods of the agricultural calendar when there is very little demand for work. During such periods, social assistance such as food-for-work programs could be rolled out. Social protection programs could also be more integrated, or target directly seasonal aspects of vulnerability. For example, rural households could be helped during scarcity seasons at specific times of the year (typically before the harvest). There is also a need to support or make use of existing research and develop outreach to assist smallholders facing pest and/or disease infestations that are increasingly linked to climate change and that arise from farmers' use of chemical inputs. Improving farmers' sustainable cultivation strategies could increase production as much as or more than opening new paddy rice (*sawah*) in marginal landscapes.

#### *Design social protection interventions to help households deal with food system shocks*

COVID-19 is severely testing the social assistance system and highlighting the longstanding problem that the existing targeting methodology does not reach all vulnerable households. While village-based community practices of mutual assistance and non-government systems are stepping in to assist (Wilson 2020), the COVID-19 crisis provides an opportunity to experiment with ways to move towards simpler and more robust methods for assisting the poor.

Social protection is usually seen as separate from agricultural questions. However, livelihood research could contribute to the design of social protection interventions that help households deal with food

system shocks, including local climate or pest-linked crop failures. For example, social assistance could be designed for scarcity periods, social assistance could be provided from locally purchased food, and village budgets could be used to support food security outcomes rather than focus on infrastructure.

#### *Enhance farmer learning, preparedness and adaptation options*

Informants noted that, before difficult seasons, farmers need to be well-prepared. Farmers who have improved their agro-meteorological knowledge can better anticipate the probable seasonal scenarios based on their regular understanding of the impacts of rainfall patterns on their own fields and food production, and their access to seasonal climate scenarios. While on-time provision of seasonal, three-month climate scenarios is crucial, further work is required to support farmers to gain the literacy to anticipate climate conditions and manage uncertainties and risks. This involves enhancing the technical skills and education of farmers and fishers, and supporting knowledge gains among farmers and youth to improve climate change literacy and understanding of virus-related risks. Research is required to further understand farmer learning and how it can be enhanced. Research could also support adaptation in fishing communities, looking at how fishers may deal with emergent forms of vulnerability in fishing communities facing climate change.

As women have differential vulnerabilities, coping mechanisms and adaptation capacities, these studies need to apply a gender-sensitive approach. This will help ensure these programs achieve gender equity and social inclusion. Studies could also look at gender-based consumption of food and whether women and girls have been more affected. Research could also explore what strategies would enhance

resilience without detrimentally increasing women's labour.

Several of these recommendations align with the principles of conservation agriculture. According to the FAO, conservation agriculture emphasises the maintenance of permanent soil cover, minimum soil disturbance and the diversification of plant species, while enhancing biodiversity and natural

biological processes to support increased water and nutrient use efficiency to promote and sustain crop production (FAO 2018). Indonesia's new law regarding sustainable agriculture systems holds that agriculture needs to follow an agroecosystem approach based on the principles of conservation agriculture to improve and sustain agricultural productivity.

## Potential research questions

- How is COVID-19 impacting livelihoods and nutrition?
- How do smallholders face food shocks and vulnerabilities and how can these strategies be enhanced?
- Which existing state and non-government organisation interventions work well and how can they be improved?
- How well do empowerment and facilitation processes work and what can be done to enhance them?
- How can the technical skills and climate literacy of smallholders be enhanced in order to support their resilience?
- How might research respond to the needs of marginal smallholders and fishers and help develop policy initiatives that build on their understandings and needs?
- How can agroforestry or social forestry initiatives that support diversity and enhance community food security outcomes be developed?
- How might crop diversification strategies assist smallholders and landless labourers in oil palm landscapes?
- How can better food choices among the rural poor be supported?
- How can locally appropriate social protection systems be designed to better address entitlement failures among smallholder communities?
- How can more robust regional food systems be developed to support resilience at the regional level?
- How can regional governments be helped build the capacity to develop approaches for addressing vulnerabilities specific to their regional contexts?
- What is causing vulnerabilities in value chains during the COVID-19 pandemic?
- How can fragmented value chains be restructured to build more robust and inclusive value chains for the future?
- How can smallholders benefit from improvements in these chains (including a gender-sensitive approach to ensure women and girls are not further marginalised)?

## 4.6 Conclusions

In the early days of the crisis, it was thought that the COVID-19 pandemic would have little impact on agriculture. However, the impacts of COVID-19 are both significant and highly differentiated. They vary between upland and lowland areas, between different production systems and along lines of class, gender and age.

The crisis has undermined elements of diversified livelihoods. Those pursuing diversified livelihoods still retain elements of their diversified portfolios to fall back on, even if their incomes have fallen. In rice-growing landscapes, production has continued much as before, and rice farmers and those who work for them have experienced relatively less impact. Although income from vegetable production may have fallen, they have harvested rice or there may be new labour opportunities where migrant labourers have been displaced. However, many of those depending on a cash crop or a commodity or a single income-earning strategy are facing a more intensive welfare crisis.

Over time, the problem of hidden hunger is likely to become deeper due to this crisis. For a while, households may make do with savings, borrowing or selling assets, or finding small cash-earning activities. However, prolonged hits to income are likely to generate considerable impacts on nutrition over the medium term, particularly among those moving back to their villages without effective livelihoods.

The state response has been considerable, and state agencies have stabilised prices of key commodities. However, budgets are limited, and these responses need to be maintained for an unknown period. Moreover, the structural rice deficit remains a challenge that requires careful management.

Agricultural research necessarily focuses on increasing production. However, the problems discussed in this assessment involve issues beyond production questions. The crisis poses problems about how to improve value chains, logistics and storage, as well as questions of ecological sustainability, land-use change, nutrition, health and social protection. This will require an integrated approach. UNICEF (2018) noted that policies related to food and nutrition security need to 'take a multi-sectoral approach to improving nutrition and ensuring that nutrition-specific interventions that tackle the immediate causes of malnutrition are in place, as well as nutrition-sensitive programmes that address the underlying causes' (UNICEF 2018:9). To avoid increasing perils from multiple sources of risk that face the food system, policy strategies need to address several sources of risk simultaneously (OECD 2015). This suggests that research to support Indonesia as it faces food and nutrition security dilemmas should be sharply focused but also broad enough to lead to cross-sectoral approaches to the problem of food and nutrition security. Research and policy also need to consider issues of scale, ensuring that policies address food and nutrition security issues at national, regional and household levels. The current shock offers the opportunity to address policy learning that can support Indonesian rural communities before they face systemic crises linked to climate change.

Finally, the crisis has revealed the varied, multiple and intersecting vulnerabilities that Indonesia's smallholders face. The proposed opportunities for action support efforts to find new ways of sustaining rural livelihoods, enhancing existing coping strategies and promoting local control over the rural resources that are vital to livelihoods. Suggested actions for research and development investments

also support building policy on established local institutions and knowledges while avoiding one-size-fits-all approaches, supporting heterogeneity in agroforestry systems and crop diversification, providing for new and fairer ways of organising value chains, and finding better forms of social protection to address entitlement failures more directly. Such actions can support non-incremental transformations towards improved nutritional outcomes. However, further research is needed to identify more clearly the active processes of vulnerability production, single out more sharply how they might be amenable to policy redress and identify other transformational reforms that more clearly focus on the systemic causes of these vulnerabilities.

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## 4.8 References

- Abdoellah OS, Schneider M, Nugraha LM, Suparman Y, Voletta CT, Withaningsih S & Hakim L (2020). Homegarden commercialization: extent, household characteristics, and effect on food security and food sovereignty in rural Indonesia. *Sustainability Science* 15:797–815, doi:10.1007/s11625-020-00788-9.
- Adhuri DS, Rachmawati L, Sofyanto H & Hamilton-Hart N (2015). Green market for small people: markets and opportunities for upgrading in small-scale fisheries in Indonesia. *Marine Policy* 63:198–205, doi:10.1016/j.marpol.2015.03.021.
- Agenparl (2020). *Indonesia: grain and feed annual*, Agenparl, 13 April 2020, accessed 12 June 2020, <https://agenparl.eu/indonesia-grain-and-feed-update/>.
- Amanda G (2020). *Antisipasi puncak kemarau, kementan gerak cepat* [Anticipating the peak of dry season, agricultural ministry acts fast], Republika, 15 May 2020, accessed 11 June 2020, <https://republika.co.id/berita/qad8nx423/antisipasi-puncak-kemarau-kementan-gerak-cepat>.
- Amanta, FA & Wibisono ID (2020). *Effect of non-tariff measures on food price, poverty and consumption*, Food security and poverty in Indonesia [seminar], 2 July 2020, Forum Kajian Pembangunan, [www.fkpindonesia.org/past-seminars/20200702](http://www.fkpindonesia.org/past-seminars/20200702).
- Ambari M (2020). *Memetakan dampak positif dan negatif pandemic covid19 pada ikan* [Mapping the positive and negative impacts of covid19 pandemic on fish], Mongabay, 21 May 2020, accessed 15 June 2020, [www.mongabay.co.id/2020/05/21/memetakan-dampak-positif-dan-negatif-pandemi-covid-19-pada-kapal-ikan/](http://www.mongabay.co.id/2020/05/21/memetakan-dampak-positif-dan-negatif-pandemi-covid-19-pada-kapal-ikan/).
- Amnifu D (2020). Distribution disruption hurts thousands of NTT fishermen. *Jakarta Post*, 8 May 2020, accessed June 15 2020, [www.thejakartapost.com/news/2020/05/08/distribution-disruption-hurts-thousands-of-ntt-fishermen.html](http://www.thejakartapost.com/news/2020/05/08/distribution-disruption-hurts-thousands-of-ntt-fishermen.html).
- Antara News (2020). *President's incentives for fishermen, farmers for food availability*, Antara News, 28 May 2020, accessed 30 June 2020, <https://en.antaranews.com/news/149595/presidents-incentives-for-fishermen-farmers-for-food-availability>.
- Badan Ketahanan Pangan (Bureau of Food Security). (2018). *Peta ketahanan dan kerentanan pangan* [Food security and vulnerability atlas 2018], <http://bkp.pertanian.go.id/storage/app/media/Pusat%20Ketersediaan/Bidang%20Ketersediaan/peta-ketahanan-kerentanan-pangan-2018.pdf>.
- Bappenas (2020). *Kilas Balik Ekonomi 2019 dan Outlook 2020* [Review of the 2019 economy and 2020 outlook], Direktorat Perencanaan Makro dan Analisis Statistik, [www.bappenas.go.id/id/data-dan-informasi-utama/publikasi/policy-paper/](http://www.bappenas.go.id/id/data-dan-informasi-utama/publikasi/policy-paper/).
- BBC (British Broadcasting Commission) (2018). *Indonesia's Papua Province children starving in a land of gold*, BBC, 13 February 2018, accessed 11 June 2020, [www.bbc.com/news/world-asia-42985439](http://www.bbc.com/news/world-asia-42985439).
- BMKG (Bureau of Meteorology, Climatology and Geophysics, Indonesia) (2020). *Prakiraan musim kemarau tahun 2020 di Indonesia* [Dry season forecast in Indonesia 2020], BMKG, 23 March 2020, accessed 2 July 2020, [www.bmkg.go.id/iklim/prakiraan-musim.bmkg](http://www.bmkg.go.id/iklim/prakiraan-musim.bmkg).
- Booth A, Purnagunawan RM & Satriawan E (2019). Towards a healthy Indonesia? *Bulletin of Indonesian Economic Studies* 55:133-155, doi:10.1080/00074918.2019.1639509.
- BPS (Central Bureau of Statistics, Indonesia) (2016). *Statistics of Marine and Coastal Resources*, BPS, accessed 12 June 2020, <https://media.neliti.com/media/publications/48274-ID-statistik-sumber-daya-laut-dan-pesisir-2016.pdf>.
- BPS (Central Bureau of Statistics, Indonesia) (2020). *Berita resmi statistik* [Official report of statistics], BPS, 5 May 2020, accessed 2 July 2020, [www.bps.go.id/website/materi\\_ind/materiBrsInd-20200505115439.pdf](http://www.bps.go.id/website/materi_ind/materiBrsInd-20200505115439.pdf).

- Bündnis Entwicklung Hilft (2017). *WorldRiskReport*, Bündnis Entwicklung Hilft, Berlin, accessed 10 July 2020, [http://weltrisikobericht.de/wp-content/uploads/2017/11/WRR\\_2017\\_E2.pdf](http://weltrisikobericht.de/wp-content/uploads/2017/11/WRR_2017_E2.pdf).
- Bureau of Meteorology Australian Government (2020). *Climate model summary for July to November 2020*, Bureau of Meteorology Australian Government, 12 June 2020, accessed 7 July 2020, [www.bom.gov.au/climate/model-summary/#region=NINO34](http://www.bom.gov.au/climate/model-summary/#region=NINO34).
- CNN Indonesia (2020). *Derita nelayan saat pandemi: ikan murah hingga berutang* [Fishers suffering: from cheap price of fish to owe money], CNN Indonesia, 4 May 2020, accessed 15 June 2020, [www.cnnindonesia.com/nasional/20200504120440-20-499772/derita-nelayan-saat-pandemi-ikan-murah-hingga-berutang](http://www.cnnindonesia.com/nasional/20200504120440-20-499772/derita-nelayan-saat-pandemi-ikan-murah-hingga-berutang).
- Costa F (2020a). *Harga bahan pokok di Papua melambung* [The prices of staple in Papua have soared], Kompas, 1 April 2020, accessed 11 June 2020, <https://kompas.id/baca/nusantara/2020/04/01/harga-bahan-pokok-di-papua-melambung/>.
- Costa F (2020b). *Menjaga pangan lokal Papua dari halaman rumah* [Maintain Papuan local food from home yard], Kompas, 6 May 2020, accessed 11 June 2020, [https://kompas.id/baca/nusantara/2020/05/06/menjaga-pangan-lokal-papua-dari-halaman-rumah/?utm\\_source=kompasid](https://kompas.id/baca/nusantara/2020/05/06/menjaga-pangan-lokal-papua-dari-halaman-rumah/?utm_source=kompasid).
- Darto M (2020). *Covid19: tantangan bagi kabupaten bersawit* [Covid19: challenges for districts that depend on palm oil sector], SPKS, April 2020, accessed 13 June 2020, [www.spks.or.id/wp-content/uploads/2020/04/presentasi-dalam-webinar-madani.pdf](http://www.spks.or.id/wp-content/uploads/2020/04/presentasi-dalam-webinar-madani.pdf).
- de Rosary E (2020). *COVID-19 berdampak pada petani dan ketahanan pangan di NTT. Apa solusinya?* [COVID-19 affects farmers and food security in NTT. What is the solution?], Mongabay, 27 May 2020, accessed 15 June 2020, [www.mongabay.co.id/2020/05/27/covid-19-berdampak-pada-petani-dan-ketahanan-pangan-di-ntt-apa-solusinya/](http://www.mongabay.co.id/2020/05/27/covid-19-berdampak-pada-petani-dan-ketahanan-pangan-di-ntt-apa-solusinya/).
- Detik.com (2020). *Ancaman flu babi Afrika bikin peternak rugi di kala pandemi* [African swine flu threat makes farmers loss at pandemic time], Detik.com, 29 April 2020, accessed June 15 2020, <https://news.detik.com/berita/d-4996634/ancaman-flu-babi-afrika-bikin-peternak-rugi-di-kala-pandemi>.
- Detik News (2020) *Tanaman Jagung Diserang Ulat Grayak, Petani Garut Rugi Miliaran Rupiah* [Corn plants attacked by armyworms, Garut farmers lost billions of rupiah], detikNews, 10 Jan 2020, <https://news.detik.com/berita-jawa-barat/d-4854013/tanaman-jagung-diserang-ulat-grayak-petani-garut-rugi-miliaran-rupiah>.
- Diansari P & Nanseki T (2015). Perceived food security status—a case study of households in North Luwu, Indonesia. *Nutrition and Food Science* 45:83–96, doi:10.1108/NFS-01-2014-0007.
- DPP KNTI (Indonesian Traditional Fisherfolk Union) (2020). *COVID-19 outbreak: socio-economic impact on small-scale fisher and aquaculture in Indonesia*, Focus on the Global South, 17 April 2020, accessed 12 June 2020, <https://focusweb.org/covid-19-outbreak-socio-economic-impact-on-small-scale-fisher-and-aquaculture-in-indonesia/>.
- Economist (2020). As covid-19 spreads, Indonesia's president has an unhappy Eid. *Economist*, 24 April 2020, accessed 5 September 2020, [www.economist.com/asia/2020/05/24/as-covid-19-spreads-indonesias-president-has-an-unhappy-eid](http://www.economist.com/asia/2020/05/24/as-covid-19-spreads-indonesias-president-has-an-unhappy-eid).
- EkoraNTT (2020). *Efek COVID-19, peternak sapi di Lembata merana* [The effects of COVID-19, cattle breeders in Lembata suffer], EkoraNTT, 20 April 2020, accessed 15 June 2020, <https://ekorantt.com/2020/04/26/efek-covid-19-peternak-sapi-di-lembata-merana/>.



- Elisabeth A (2020a). *Masa pandemi corona pemerintah mesti serius serap sago Papua* [During the coronavirus pandemic, government must seriously absorb Papuan sago], Mongabay, 15 May 2020, accessed 11 June 2020, [www.mongabay.co.id/2020/05/16/masa-pandemi-corona-pemerintah-mesti-serius-serap-sagu-papua/](http://www.mongabay.co.id/2020/05/16/masa-pandemi-corona-pemerintah-mesti-serius-serap-sagu-papua/)
- Elisabeth A (2020b). *Revisi UU otonomi khusus, bagaimana posisi masyarakat adat dan alam Papua?* [Revision of special autonomy law, how is the position of indigenous group and nature in Papua], Mongabay, 7 May 2020, accessed 11 June 2020, [www.mongabay.co.id/2020/05/07/revisi-uu-otonomi-khusus-bagaimana-posisi-masyarakat-adat-dan-alam-papua/](http://www.mongabay.co.id/2020/05/07/revisi-uu-otonomi-khusus-bagaimana-posisi-masyarakat-adat-dan-alam-papua/).
- FAO (Food and Agriculture Organization of the United Nations) (2018). *Small family farms country factsheet*, FAO, accessed 5 September 2020, [www.fao.org/3/i8881en/i8881EN.pdf](http://www.fao.org/3/i8881en/i8881EN.pdf).
- FAO (Food and Agriculture Organization of the United Nations) (2019) *Country gender assessment of agriculture and the rural sector in Indonesia*, FAO, Jakarta.
- FAO (Food and Agriculture Organization of the United Nations) (2020). FAO data, accessed 10 July 2020, [www.fao.org/faostat/en/](http://www.fao.org/faostat/en/).
- Fachriansyah R & Sapiie MA. (2020). Indonesia's COVID-19 cases top 100,000 as Jakarta logs new daily record. *Jakarta Post*, 27 July 2020, accessed 30 July 2020, [www.thejakartapost.com/news/2020/07/27/indonesias-covid-19-cases-top-100000-as-jakarta-logs-new-daily-record.html](http://www.thejakartapost.com/news/2020/07/27/indonesias-covid-19-cases-top-100000-as-jakarta-logs-new-daily-record.html).
- Fox JJ & Winarto YT (2016). Farmers' use of pesticides in an intensive rice-growing village in Indramayu on Java. In: Winarto YT, Stigter CJ & Fox JJ (eds), *Krisis Pangan dan 'Sesat Pikir': Mengapa Masih Berlanjut?*, 63–95.
- Gereffi G & Lee J (2009). *A global value-chain approach to food safety and quality standards*, Global Health Diplomacy for Chronic Disease Prevention, accessed 5 September 2020, [www.researchgate.net/publication/237280872\\_A\\_GLOBAL\\_VALUE\\_CHAIN\\_APPROACH\\_TO\\_FOOD\\_SAFETY\\_AND\\_QUALITY\\_STANDARDS](http://www.researchgate.net/publication/237280872_A_GLOBAL_VALUE_CHAIN_APPROACH_TO_FOOD_SAFETY_AND_QUALITY_STANDARDS).
- GFDRR (Global Facility for Disaster Reduction and Recovery) (2011). *Climate risk and adaptation country profile: Indonesia*, GFDRR, accessed 5 September 2020, [www.gfdr.org/sites/default/files/publication/climate-change-country-profile-2011-indonesia.pdf](http://www.gfdr.org/sites/default/files/publication/climate-change-country-profile-2011-indonesia.pdf).
- Gibson E, Stacey N, Sunderland TCH & Adhuri DS (2020). Dietary diversity and fish consumption of mothers and their children in fisher households in Komodo District, eastern Indonesia. *PLoS ONE* 15:1–22, doi:10.1371/journal.pone.0230777.
- Global Economy (2018). *Indonesia: GDP share of agriculture*, Global Economy, accessed 9 June 2020, [www.theglobaleconomy.com/Indonesia/share\\_of\\_agriculture/](http://www.theglobaleconomy.com/Indonesia/share_of_agriculture/).
- Global Nutrition Report (2020). *Country nutrition profiles*, Global Nutrition Report, accessed 10 July 2020, <https://globalnutritionreport.org/resources/nutrition-profiles/>.
- Grahadyarini BL (2020). *Ikan nelayan sulit diserap* [Fish from fishers are difficult to be absorbed], Kompas, 18 April 2020, accessed 15 June 2020, <https://kompas.id/baca/ekonomi/2020/04/18/ikan-nelayan-sulit-diserap/>.
- Hasanah A, Mendolia S & Yerokhin O (2017). Labour migration, food expenditure, and household food security in Eastern Indonesia. *The Economic Record* 93:122–143, doi:10.1111/1475-4932.12344.
- Hirschmann R (2020). *Per capita meat consumption in Indonesia 2020, by type*, Statista, 18 February 2020, accessed 5 July 2020, [www.statista.com/statistics/756883/indonesia-meat-consumption-per-capita-by-type/](http://www.statista.com/statistics/756883/indonesia-meat-consumption-per-capita-by-type/).

- Ichi M & Tamimi M (2020). *Walau bukan sentra beras, Maluku Utara kaya sumber pangan lokal* [Not a centre of rice production, North Maluku is rich with local staple food sources], Mongabay, 5 May 2020, accessed 11 June 2020, [www.mongabay.co.id/2020/05/05/walau-bukan-sentra-beras-maluku-utara-kaya-sumber-pangan-lokal/](http://www.mongabay.co.id/2020/05/05/walau-bukan-sentra-beras-maluku-utara-kaya-sumber-pangan-lokal/).
- Info Sawit (2020). *Gawat, harga TBS sawit petani saat pandemic covid-19 terus melorot* [Critical, the price of palm oil fresh fruit bunches keep decreasing], Info Sawit, 20 May 2020, accessed June 13 2020, [www.infosawit.com/news/9922/gawat-harga-tbs-sawit-petani-saat-pandemi-covid-19-terus-melorot](http://www.infosawit.com/news/9922/gawat-harga-tbs-sawit-petani-saat-pandemi-covid-19-terus-melorot).
- Jakarta Post (2020a). Business groups embrace 'new normal'. Epidemiologists skeptical. *Jakarta Post*, 28 May 2020, accessed June 12 2020, [www.thejakartapost.com/news/2020/05/28/business-groups-embrace-new-normal-epidemiologists-skeptical.html](http://www.thejakartapost.com/news/2020/05/28/business-groups-embrace-new-normal-epidemiologists-skeptical.html).
- Jakarta Post (2020b). Distribution disruption hurts thousands of NTT fishermen. *Jakarta Post*, 8 May 2020, accessed 12 June 2020, [www.thejakartapost.com/news/2020/05/08/distribution-disruption-hurts-thousands-of-ntt-fishermen.html](http://www.thejakartapost.com/news/2020/05/08/distribution-disruption-hurts-thousands-of-ntt-fishermen.html).
- JHU (John Hopkins University & Medicine) (2020). *New cases of COVID-19 in world countries*, JHU, 10 June 2020, accessed 11 June 2020, <https://coronavirus.jhu.edu/data/new-cases>.
- Jong HN (2020). *Indonesia aims for sustainability certification for oil palm smallholders*, Mongabay, 29 April 2020, accessed 1 July 2020, <https://news.mongabay.com/2020/04/indonesia-aims-for-sustainability-certification-for-oil-palm-smallholders/>.
- KabarPapua (2020). *Terkait gejala gizi buruk, Dinkes Jayawijaya akan intervensi 40 distrik* [Related to the symptoms of malnutrition, Jayawijaya health department will intervene 40 districts], KabarPapua, 15 February 2020, accessed 11 June 2020, <https://kabarpapua.co/terkait-gejala-gizi-buruk-dinkes-jayawijaya-akan-intervensi-40-distrik/>.
- Kompas (2018). *Kementerian Pertanian: Lahan Sawit Indonesia Capai 14,03 Juta Hektare* [Ministry of Agriculture: Indonesian palm oil lands reach 14.03 million hectares], Kompas, 28 February 2018, accessed 9 July 2020, <https://ekonomi.kompas.com/read/2018/02/26/203000426/kementerian-pertanian--lahan-sawit-indonesia-capai-14-03-juta-hektare>.
- Kompas (2020). *Multiple constrains in Papua*, Kompas, 29 May 2020, accessed June 13 2020, <https://kompas.id/baca/english/2020/05/29/multiple-constraints-in-papua/>.
- Lerner D (2020). *Indonesia seeing more rainfall*, World-Grain, 24 January 2020, accessed 12 June 2020, [www.world-grain.com/articles/13193-indonesia-seeing-more-rainfall](http://www.world-grain.com/articles/13193-indonesia-seeing-more-rainfall).
- Limenta ME & Siant C (2017). Indonesian food security policy. *Indonesian Law Review* 7:245–265, doi:10.15742/ilrev.v7n2.198.
- Massola J & Rosa A (2020). Indonesia surges past 2000 daily cases as coronavirus takes hold. *Sydney Morning Herald*, 9 July 2020, accessed 10 July 2020, [www.smh.com.au/world/asia/indonesia-surges-past-2000-daily-cases-as-coronavirus-takes-hold-20200709-p55apu.html](http://www.smh.com.au/world/asia/indonesia-surges-past-2000-daily-cases-as-coronavirus-takes-hold-20200709-p55apu.html).
- McCarthy JF (2019). The paradox of progressing sideways: food poverty and livelihood change in the rice lands of outer island Indonesia. *The Journal of Peasant Studies* 47(5):1077–1097, doi:10.1080/03066150.2019.1628021.
- McCarthy JF & Obidzinski K (2017). Framing the food poverty question: policy choices and livelihood consequences in Indonesia. *Journal of Rural Studies* 54:344–354, doi:10.1016/j.jrurstud.2017.06.004.
- McCarthy JF & Robinson K (2016). *Land and development in Indonesia: Searching for the people's sovereignty*, ISEAS, Singapore, 1–34.
- McCarthy JF & Sumarto M (2018). Distributional politics and social protection in Indonesia. *Journal of Southeast Asian Economies* 35(2):223–236, doi:10.2307/26539215.

- Ministry of Agriculture Republic of Indonesia (2020a). *Informasi terkini mengenai kebijakan Kementerian Pertanian dalam merespon COVID-19 serta tetap menjaga ketersediaan Pangan bagi seluruh rakyat Indonesia* [latest information on the Ministry policy in responding COVID-19 and to maintain food availability for all Indonesians], Ministry of Agriculture Republic of Indonesia, accessed 12 July 2020, [www.pertanian.go.id/home/?show=page&act=view&id=99](http://www.pertanian.go.id/home/?show=page&act=view&id=99).
- Ministry of Agriculture Republic of Indonesia (2020b). *Mentan SYL: prospek pertanian menjanjikan* [Minister SYL: agricultural sector in Indonesia has promising prospect], Ministry of Agriculture Republic of Indonesia, accessed 12 July 2020, <http://bkp.pertanian.go.id/blog/post/produk-pekarangan-terserap-pasar-mentan-syl-prospek-pertanian-menjanjikan>.
- Ministry of Finance Republic of Indonesia (2020). *Kinerja dan fakta* [performance and facts]. Ministry of Finance, accessed 12 July 2020, [www.kemenkeu.go.id/media/15459/apbn-kita-juni-2020.pdf](http://www.kemenkeu.go.id/media/15459/apbn-kita-juni-2020.pdf).
- Ministry of Foreign Affairs Government of the Netherlands (2018). *Climate change profile: Indonesia*, Government of the Netherlands, April 2018, accessed 12 July 2020, [www.government.nl/binaries/government/documents/publications/2019/02/05/climate-change-profiles/Indonesia.pdf](http://www.government.nl/binaries/government/documents/publications/2019/02/05/climate-change-profiles/Indonesia.pdf).
- Murdaningsih D (2020). *Harga kedelai impor melonjak* [The price of imported soy bean jumps up], *Republika*, 14 April 2020, accessed 13 June 2020, <https://republika.co.id/berita/q8s68g368/harga-kedelai-impor-melonjak>.
- Muthiariny DE (2020). *Central Kalimantan declares state of emergency over land, forest fires*, *Tempo.co*, 30 June 2020, accessed 2 July 2020, <https://en.tempo.co/read/1359724/c-kalimantan-declares-state-of-emergency-over-land-forest-fires>.
- NIHRD (National Institute of Health Research and Development) (2018). *Hasil utama RISKESDAS 2018* [Main findings of basic health research 2018] [slide presentation], NIHRD, accessed 1 July 2020, [www.kemkes.go.id/resources/download/info-terkini/hasil-risikesdas-2018.pdf](http://www.kemkes.go.id/resources/download/info-terkini/hasil-risikesdas-2018.pdf).
- Novika S (2020). *Begini dampak musim kemarau di tengah corona* [This is the impact of dry season during corona], *Detik.com*, 8 May 2020, accessed 12 June 2020, <https://finance.detik.com/berita-ekonomi-bisnis/d-5006638/begini-dampak-musim-kemarau-di-tengah-corona>.
- OECD (2015). *Managing food insecurity risk: Analytical framework and application to Indonesia*, OECD Publishing, Paris, doi:10.1787/9789264233874-en.
- Okenews (2020). *Petani dan penyuluh Manggarai Timur rayakan puncak panen raya di tengah pandemi* [Farmers and instructor in East Manggarai celebrate the peak of harvest season during pandemic], *Okenews*, 9 May 2020, accessed 15 June 2020, <https://news.okezone.com/read/2020/05/09/1/2211551/petani-dan-penyuluh-manggarai-timur-rayakan-puncak-panen-raya-di-tengah-pandemi>.
- Orlowski A (2020). *Small-scale fishermen suffering significantly from COVID-19 pandemic*, *Seafood Source*, 27 April 2020, accessed 15 June 2020, [www.seafoodsource.com/news/supply-trade/small-scale-fishermen-suffering-significantly-from-covid-19-pandemic](http://www.seafoodsource.com/news/supply-trade/small-scale-fishermen-suffering-significantly-from-covid-19-pandemic).
- Pancawati, MBD (2020). *Produk Pangan dalam Pusaran Pandemi COVID-19* [Food products in COVID-19 vortex], *Kompas*, 6 May 2020, accessed 10 June 2020, <https://kompas.id/baca/riset/2020/05/06/produk-pangan-dalam-pusaran-pandemi-covid-19/>.
- Papua Province (2020). *Draft awal: rencana aksi pencegahan dan penanggulangan COVID-19 di provinsi Papua* [Action plan for Covid19 mitigation and management in Papua Province], unpublished draft.

- Pos Kupang (2020). *Para petani di Kabupaten Kupang terancam gagal tanam, sumber air lahan pertanian mulai kering* [Farmers in Kupang District are threatened with crop failure, the source of agricultural water has begun to dry], Pos Kupang, 28 April 2020, accessed 15 June 2020, <https://kupang.tribunnews.com/2020/04/28/para-petani-di-kabupaten-kupang-terancam-gagal-tanam-sumber-air-lahan-pertanian-mulai-kering>.
- Pradana A, Pujiastuti I & Paramita P (2019). Regionalization of agricultural based leading sectors and food security in Indonesia. IOP Conference Series: Earth and Environmental Science 338(1):1–8, <https://iopscience.iop.org/article/10.1088/1755-1315/338/1/012015>.
- Ramadhan (2020). *Nasib masyarakat adat ditengah pandemic COVID-19* [The condition of indigenous groups in COVID-19 pandemic], Asumsi, 18 May 2020, accessed 13 June 2020, [www.asumsi.co/post/nasib-masyarakat-adat-di-tengah-pandemi-covid-19](http://www.asumsi.co/post/nasib-masyarakat-adat-di-tengah-pandemi-covid-19).
- Ribka S (2017). Plunging agriculture share to GDP major concern for policymakers. *Jakarta Post*, 31 March 2017, accessed 9 June 2020, [www.thejakartapost.com/news/2017/03/31/plunging-agriculture-share-to-gdp-major-concern-for-policymakers.html](http://www.thejakartapost.com/news/2017/03/31/plunging-agriculture-share-to-gdp-major-concern-for-policymakers.html).
- Ridhoi MA (2020). *Hari buruh, mentan minta buruh tani produktif jaga ketahanan pangan* [Labour day, minister of agriculture encourages farmers to stay productive in maintaining food security], Katadata, 1 May 2020, accessed 12 June 2020, <https://katadata.co.id/berita/2020/05/01/hari-buruh-mentan-minta-buruh-tani-produktif-jaga-ketahanan-pangan>.
- Ritchie H, Roser M & Hasell J (2020). *Daily COVID-19 tests per thousand people*, Our World in Data, 12 June 2020, accessed 13 June 2020, <https://ourworldindata.org/coronavirus/country/indonesia?country=-IDN#testing-for-covid-19>.
- Rosalina T, Wibowo L, Kielmann AA & Usfar AA (2007). Food-poverty status and food insecurity in rural West Lombok based on mothers' food expenditure equivalency. *Food and Nutrition Bulletin* 28:135–148. doi:10.1177/156482650702800202.
- Samudranesia (2020). *Selamatkan sector kelautan dan perikanan ditengah covid-19, ini strategi pemerintah* [Salvaging fisheries and marine sector during covid-19, this is government strategy], Samudranesia, 17 April 2020, accessed 12 June 2020, <http://samudranesia.id/selamatkan-sektor-kelautan-dan-perikanan-di-tengah-covid-19-ini-strategi-pemerintah/>.
- Sandee H, Nurridzki N & Dipo MAP (2014). Challenges of implementing logistics reform in Indonesia. In: Hill H (ed), *Regional dynamics in a decentralized Indonesia*, Institute of Southeast Asian Studies, Singapore, 387–405.
- Schmidt E (2019). *Rural poverty and undernutrition widespread in Papua New Guinea*, devpolicy@ANU blog, 23 May 2020, accessed 11 June 2020, <https://devpolicy.org/rural-poverty-and-undernutrition-widespread-in-papua-new-guinea-20190523/>.
- Sibuea P (2020). *Darurat pangan saat pandemi COVID-19* [Food emergency during COVID-19 pandemic], Kontan, 21 April 2020, accessed 2 July 2020, <https://analisis.kontan.co.id/news/darurat-pangan-saat-pandemi-covid-19>.
- Sitorus H & McCarthy JF (2019). Agrarian change and oil palm: Poverty dynamics and food security over the generations, paper presented at EUROSEAS Conference, Berlin, 13 September 2019.
- Sinaga H (2013). Employment and income of workers on Indonesian oil palm plantations: Food crisis at the micro level. *Future of Food: Journal on Food, Agriculture and Society* 1(2):64–78.

- SMERU Research Institute (2015). *Food and nutrition security in Indonesia: a strategic review improving good and nutrition security to reduce stunting*, SMERU Research Institute, accessed 12 June 2020, <https://docs.wfp.org/api/documents/WFP-0000005506/download/>.
- Srinita S (2018). Relationship between maternal, household, and socio-economic characteristics and household food security in Aceh, Indonesia. *International Journal of Human Rights in Healthcare* 11, 192-203, doi:10.1108/IJHRH-10-2017-0065.
- Statista (2020). *Indonesia: distribution of employment by economic sector from 2009 to 2019*, Statista, accessed 9 June 2020, [www.statista.com/statistics/320160/employment-by-economic-sector-in-indonesia/](http://www.statista.com/statistics/320160/employment-by-economic-sector-in-indonesia/).
- Sucahyo N (2020). *Beda strategi, papua tekan penyebaran virus corona* [Different strategy, Papua stems the spread of coronavirus], VOA, 9 June 2020, accessed 13 June 2020, [www.voaindonesia.com/a/beda-strategi-papua-tekan-penyebaran-virus-corona/5455460.html](http://www.voaindonesia.com/a/beda-strategi-papua-tekan-penyebaran-virus-corona/5455460.html).
- Sumule A (2020, May 14). *Membangun ketahanan masyarakat Papua: apa yang bisa kita pelajari dari pelaksanaan otsus dan penanganan Covid19* [Building Papuan community resilience: what can we learn from Otsus implementation and management of Covid19], Presented at National Dialogue on Papua Development Reflections, 14 May 2020, KOMPAK BAPPENAS.
- Tinal K (2020). *Kebijakan pembangunan provinsi Papua memasuki era new normal kontekstual Papua* [Development policy of Papua Province entering new normal], Presented by Vice Governor of Papua Province, <https://fisipol.ugm.ac.id/forum-ppkk-mengulas-kebijakan-new-normal-di-papua/>.
- TNP2K (Tim Nasional Percepatan Penanggulangan Kemiskinan) (2017). *100 Kabupaten/Kota prioritas untuk intervensi anak kerdil/stunting* [100 regencies/cities as priorities for intervention on stunting issue], TNP2K, 22 August 2017, accessed 5 July 2020 [www.tnp2k.go.id/images/uploads/downloads/Binder\\_Volume1.pdf](http://www.tnp2k.go.id/images/uploads/downloads/Binder_Volume1.pdf).
- Triharyanto B (2020). *Antisipasi krisis pangan di masa pandemi, orang Papua kembali ke pangan lokal* [Anticipating food crisis during pandemic, Papuans are back to local food], Mongabay, 1 June 2020, accessed 11 June 2020, [www.mongabay.co.id/2020/06/01/antisipasi-krisis-pangan-di-masa-pandemi-orang-papua-kembali-ke-pangan-lokal/](http://www.mongabay.co.id/2020/06/01/antisipasi-krisis-pangan-di-masa-pandemi-orang-papua-kembali-ke-pangan-lokal/).
- UNDP (United Nations Development Programme) (2020). *Human development reports*, UNDP, accessed 10 July 2020, <http://hdr.undp.org/en/content/2019-human-development-index-ranking>.
- UNICEF (2018). *Nutrition capacity assessment in Indonesia*, UNICEF, August 2018, accessed 12 June 2020, [www.unicef.org/indonesia/media/1816/file/Nutrition%20Assessment%202018.pdf](http://www.unicef.org/indonesia/media/1816/file/Nutrition%20Assessment%202018.pdf).
- Utami AW, Cramer LA & Rosenberger N (2018). Food diversification versus raskin: developing climate change resilience in rural Indonesia. *Human Organization* 77:359–370, doi:10.17730/0018-7259.77.4.359.
- Vel J & Makambombu S (2020). *COVID-19 mitigation measures compound an economic crisis in Sumba*, New Mandala, 11 June 2020, accessed 15 June 2020, [www.newmandala.org/covid-19-mitigation-measures-compound-an-economic-crisis-in-sumba/](http://www.newmandala.org/covid-19-mitigation-measures-compound-an-economic-crisis-in-sumba/).
- Warta Ekonomi (2020). *Ini strategi Kementan hadapi masalah pangan saat new normal* [This is Ministry of Agriculture strategy to deal with food issues], Warta Ekonomi, 5 June 2020, accessed 5 July 2020, [www.wartaekonomi.co.id/read288655/ini-strategi-kementan-hadapi-masalah-pangan-saat-new-normal](http://www.wartaekonomi.co.id/read288655/ini-strategi-kementan-hadapi-masalah-pangan-saat-new-normal).

- WFP (World Food Programme) (2019). *WFP Indonesia country brief*, WFP, accessed 12 June 2020, <https://reliefweb.int/sites/reliefweb.int/files/resources/WFP-0000107473.pdf>.
- WFP (World Food Programme) (2020). *Indonesia—COVID-19: economic and food security implications*, WFP, accessed 5 July 2020, [www.wfp.org/publications/indonesia-covid-19-economic-and-food-security-implications](http://www.wfp.org/publications/indonesia-covid-19-economic-and-food-security-implications).
- WHO (World Health Organization) (2020a). *COVID-19 situation report: Indonesia*, WHO, accessed 12 June 2020, [www.who.int/docs/default-source/searo/indonesia/covid19/who-situation-report-11.pdf?sfvrsn=a5ee6cc2\\_2](http://www.who.int/docs/default-source/searo/indonesia/covid19/who-situation-report-11.pdf?sfvrsn=a5ee6cc2_2).
- WHO (World Health Organization) (2020b). *Nutrition: Stunting in a nutshell*, WHO, accessed 12 June 2020, [www.who.int/nutrition/healthygrowthproj\\_stunted\\_videos/en/](http://www.who.int/nutrition/healthygrowthproj_stunted_videos/en/).
- Wilson I (2020). *COVID-19, inequality and Jakarta's urban poor: resilient, but at great risk*, Indonesia at Melbourne, 11 June 2020, accessed 5 July 2020, <https://indonesiaatmelbourne.unimelb.edu.au/covid-19-inequality-and-jakartas-urban-poor-resilient-but-at-great-risk/>.
- Wiyanto (2020). *Merauke lumbung pangan, papua kejar tanam padi* [Food barn in Merauke, Papua rushes rice planting], Industry, 20 May 2020, accessed 11 June 2020, [www.industry.co.id/read/66772/merauke-lumbung-pangan-papua-kejar-tanam-padi](http://www.industry.co.id/read/66772/merauke-lumbung-pangan-papua-kejar-tanam-padi).
- Woodward L (2020). *Coping with the economic fallout of COVID-19 in upland Java*, New Mandala, 18 June 2020, accessed 18 June 2020, [www.newmandala.org/coping-with-the-economic-fallout-of-covid-19-in-upland-java/](http://www.newmandala.org/coping-with-the-economic-fallout-of-covid-19-in-upland-java/).
- World Bank (2019). *Aspiring Indonesia—expanding the middle class*, World Bank, Washington DC, accessed 1 July 2020, [www.worldbank.org/en/news/infographic/2020/01/30/aspiring-indonesia-expanding-the-middle-class](http://www.worldbank.org/en/news/infographic/2020/01/30/aspiring-indonesia-expanding-the-middle-class).
- World Bank (2020). The World Bank Databank for Health, Nutrition and Population Statistics, accessed 10 July 2020, <https://databank.worldbank.org/home.aspx>.
- World Bank Indonesia (2016). *Indonesia economic quarterly: pressures easing*, World Bank Indonesia accessed 12 June 2020, <http://pubdocs.worldbank.org/en/202891477357946101/IEQ-OCT-2016-ENG-web.pdf>.
- Yogi S (2020). *Barang dagangan di Paniai terjual habis* [Merchandise in Paniai sold out], Suara Papua, 19 May 2020, accessed 11 June 2020, <https://suarapapua.com/2020/05/19/barang-dagangan-di-paniai-terjual-habis/>.
- Zein Z (2018). Women in palm oil: invisible no more? *Eco-Business*, 3 December 2018, accessed 1 July 2020, [www.eco-business.com/news/women-in-palm-oil-invisible-no-more/](http://www.eco-business.com/news/women-in-palm-oil-invisible-no-more/).

## 5. COVID-19 and food systems in Pacific island countries



Photo: ACIAR

# 5 COVID-19 and food systems in Pacific island countries

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## 5.1 Abstract

Pacific island countries continue to rely on agriculture and fisheries for economic development and livelihoods. In the seven focal countries comprising this assessment (Kiribati, Tuvalu, Samoa, Tonga, Solomon Islands, Vanuatu, Fiji), COVID-19 has had limited health impacts to date, due to the rapid interventions of governments. However, COVID-19 has had major economic impacts, and these have intersected with existing social vulnerabilities and environmental exposures. These impacts can increase poverty and food insecurity.

The region has seen a series of recovery strategies centred on supporting agricultural production, continuation of markets, enabling local supply chains and learning from disaster preparedness strategies. Demonstrated characteristics of food systems resilience identified include the interaction of livelihood strategies with immediate shocks, such as COVID-19, and the underlying potential of future shocks, such as cyclones. Opportunities for livelihoods based on food systems activities to withstand shock are dependent on the ability of agricultural and fishery systems to adapt to change.

Future food systems can be supported through investments at different timescales. Short-term measures can leverage the current interest in agriculture to support food security, and build immediate strategies to support farming and fishing adaptive capacity in light of upcoming cyclones. There are intermediate-term opportunities to evaluate the outcomes of recovery measures and support existing business and environmental development needs. Longer-term opportunities address the underlying determinants of future food systems exposures, notably enabling future employment opportunities in food sectors, creating food-based social protection systems and addressing gender structural inequalities.



## 5.2 COVID-19 in Pacific island countries

### 5.2.1 Focal countries overview (July 2020)



#### Land use

Small islands average 1,336 km<sup>2</sup>  
(51% agriculture)  
Medium islands average 3,893 km<sup>2</sup>  
(29% agriculture)  
Large islands average 64,058 km<sup>2</sup>  
(14% agriculture)  
20.6% GDP from agriculture  
and fish (average)



#### Population

Small islands 130,000 people  
Medium islands 299,000 people  
Large islands 1,867,945 people  
62% rural (average)  
Adjusted income per capita  
US\$3,343 (average)



#### COVID-19 and health

First recorded cases:  
18 March (Samoa); 19 March (Fiji)  
At 3 August: 509 known cases;  
8 deaths\*  
Cases in 6 out of 21 countries  
(excluding PNG)



#### Local response to COVID-19

State of emergency: March 2020  
(all 7 countries)  
Rapid closure of national borders  
Quarantine established,  
from 14 to 28 days  
Suspension of schools, mass  
gatherings; changes to working  
arrangements



#### Agriculture and fisheries

Top staples: coconut,  
taro, cassava, bananas,  
sweetpotato, yams  
Low farm productivity; traditional  
farming and fishing practices  
Primary production focuses  
on domestic markets



#### Key risk multipliers

Climate impacts, declining fresh  
water resources  
Agricultural and biosecurity risks  
Persistent malnutrition  
and dietary issues

\* Of the seven focal countries, all but Fiji were COVID-19 free at the conclusion of the assessment. Fiji reported 21 confirmed cases as of 9 July 2020.

### 5.2.2 Development context

Pacific food systems are diverse and complex, spanning various different geographies and agroecological environments (McGregor et al 2009, Taylor et al 2016). For this assessment, seven Pacific island countries have been selected on the basis of a typology of island groupings (Table 5.1):

- smaller (Kiribati, Tuvalu)
- medium (Samoa, Tonga)
- larger (Solomon Islands, Vanuatu, Fiji).

This allows the impacts of COVID-19 to be differentiated geographically and is consistent with other Pacific studies that have examined food systems shocks (Taylor et al 2016) and with regional development in food systems programming (Bell & Taylor 2015, Bell et al 2016, SPC 2016, SPC 2020b).

Pacific island countries comprise more than 2,000 islands and atolls in 22 countries and territories. While the region covers one-third of the Earth's surface, the total land area is only approximately 550,000 km<sup>2</sup>, representing 2% of the entire 30,000,000 km<sup>2</sup> of the Pacific region (Barnett 2011). This land area is home to approximately 2.3 million people (excluding Papua New Guinea), of

which half live within 1 km of coastal areas (Andrew et al 2019), and a rapidly growing number around major cities. Urbanisation in Pacific island countries is happening three times faster than the global average (UN Habitat 2015), and by 2050 over 50% of the Pacific population is expected to live in urban areas (UNESCAP 2018).

Pacific island countries have a rich history of traditional land and marine systems management that continues to influence how communities manage their natural resources (Campbell 2015, Wairiu 2017). Pre-colonial food systems were characterised by diverse activities surrounding food production and exchange, which included a mix of subsistence farming and hunter-gatherer food harvesting systems, bartering and regional trade between islands. Nutrient-rich diets with leafy vegetables and complex carbohydrates were the norm, with plant foods constituting 83% of the diet and poultry, fish, and pigs making up the protein and micronutrient requirements of many Pacific island people (Connell 2015, Charlton et al 2016, Gneccchi-Ruscione & Paini 2017). With the surge of trade liberalisation in the mid-1990s, the region experienced a rapid increase of cheap imported processed foods such as noodles, rice and wheat (Plahe et al 2013,

**Table 5.1** Typology of Pacific food systems

Group	Typical geologies	Nations in this assessment	Population (est. '000)	Total island area ('000 km <sup>2</sup> )
Group 1: smaller islands	small reef and composite islands	Kiribati	120	0.81
		Tuvalu	10	0.03
Group 2: medium islands	volcanic, limestone and composite islands	Samoa	199	2.84
		Tonga	100	0.75
Group 3: larger islands	mix of composite, limestone and sand-based islands	Solomon Islands	667	28.4
		Vanuatu	305	12.2
		Fiji	895	18.3
<b>Total</b>			<b>2,296</b>	<b>63.3</b>

Charlton et al 2016). These imports have slowly shifted eating habits, and have been accompanied by increasingly sedentary lifestyles, both of which contribute to the substantial burden of non-communicable diseases in the region, including stunting, micronutrient deficiencies, obesity and diabetes.

### *Variations between countries*

The contribution of agriculture and fisheries to livelihoods varies between countries (Table 5.2), but primary food production remains core to the region's economies.

Group 3 countries have highly diverse food production and differentiated dependence on rural livelihoods. For example, in Solomon Islands and Vanuatu, rural livelihoods are crucial for development, with 70–80% of the population living in rural areas in both countries and involved to some degree in agriculture and/or fishing. In Fiji, less than half of the population lives in rural areas. The contribution of agriculture to gross domestic product also varies, from approximately 35–40% in Solomon Islands to 15–20% in Vanuatu and less than 10% in Fiji, reflecting the higher reliance on tourism in Fiji and Vanuatu than Solomon Islands. The scale of agriculture is most pronounced in Vanuatu, with over 1.5 Mha under some agricultural use, to 800,000 ha in the Solomon Islands and 400,000 ha in Fiji (FAO 2020b).

The medium-sized Group 2 countries have lower capacity for food production, and much higher trade deficits given their reliance on imported foods (McGregor et al 2009). In Tonga, over 77% of the population lives in rural areas and agriculture takes up 45.8% of land and contributes to 15–20% of gross domestic product. In Samoa, 82% of the population live in rural and peri-urban areas, and agriculture occupies 12.4% of land and contributes to 10–20% of gross domestic product (Sialoa 2019). In Samoa, the rate

of participation in subsistence agriculture is 60%, indicating strong dependence on farming for immediate food security.

The smaller Group 1 atoll countries are more reliant on fisheries than agriculture, given the land resource and freshwater constraints. Approximately 40% of the populations of both Tuvalu and Kiribati live in rural areas. Agricultural land makes up 42% of Kiribati and 60% of Tuvalu, contributing to approximately 24% of gross domestic product in Kiribati and 17% in Tuvalu.

### *Agriculture*

The economic contribution of agriculture is derived from two major sources: commodity and non-commodity exports. Commodity exports are most pronounced for the larger countries. Solomon Islands, for example, has approximately 40,000 households growing coconuts and 20,000 growing cocoa as export cash crops. Cash crops for export are also common in Fiji (notably sugar and coconuts) and in Vanuatu (kava). Non-commodity horticultural exports are also very important for the region, contributing approximately A\$66 million of agricultural export value (McGregor 2007). These horticultural products include a variety of root crops, vegetables and fruits frequently consumed by diaspora communities in Australia, New Zealand and the United States.

### *Fisheries*

Fisheries resources of the Pacific provide a major source of food and income for multiple countries, and offer substantial economic prospects for the region, especially for countries with limited land (Gillett & Tuati 2018). Fisheries in the region fall under two main categories: oceanic, with tuna being the region's primary catch, and coastal, which includes multiple fish species as well as cephalopods, crustaceans, shellfish and eels.

**Table 5.2** Agricultural, fisheries and nutrition context of Pacific island countries

Indicators		Unit
Surface area <sup>a</sup>		'000 km <sup>2</sup>
Agricultural land <sup>b</sup>		percentage of land area
Age of population <sup>a</sup>	0–19 years	percentage of total population
	20–39 years	percentage of total population
	40–59 years	percentage of total population
	over 59 years	percentage of total population
Stunting rate <sup>c</sup>	under 5 years	percentage of age group
Wasting rate <sup>c</sup>	under 5 years	percentage of age group
Overweight <sup>c</sup>	under 5 years	percentage of age group
	male	percentage of total population
	female	percentage of total population
Obesity <sup>c</sup>	male	percentage of total population
	female	percentage of total population
Prevalence of undernourishment <sup>c</sup>		percentage of total population
Population distribution <sup>a</sup>	rural	percentage of total population
	urban	percentage of total population
Gross domestic product per capita <sup>a</sup>		US\$
Adjusted net national income per capita (2018) <sup>a</sup>		US\$
Agriculture and fisheries, value added <sup>f</sup>		percentage of gross domestic product (2018)
Government expenditure on agriculture	FAOSTAT	percentage of total outlays
	National statistics	percentage of total outlays
Top staples		ranked most to least
UNDP Human Index ranking (2019) <sup>d</sup>		out of 189
2017 World Risk Index (mean value calculation 2012–2016) <sup>e</sup>		out of 171

a World Bank (2020)

b FAO (2020a)

c Global Nutrition Report (2020)

d UNDP (2020)

e Bündnis Entwicklung Hilft (2017)

f Samoa Bureau of Statistics (2016)

g CBSI (2007)

h FAO (2011)

i Government of Tuvalu (2016)

j Government of Samoa (2016)

k Government of Solomon Islands (2015)

l Government of Vanuatu (2015)

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

Group 1		Group 2		Group 3		
Kiribati	Tuvalu	Samoa	Tonga	Fiji	Solomon Islands	Vanuatu
0.81	0.03	2.84	0.75	18.3	28.4	12.2
42	60	12.4	45.8	23.26	3.9	15.3
45	no data	48	46.1	37.8	50.5	48
32	no data	27	27.4	31.3	28.5	30
18	no data	18	17.8	21.9	15.5	16
6	no data	7	8.4	8.7	5.4	6
no data	10	4.9	8.1	7.5	31.6	28.5
no data	3.3	3.9	5.2	6.3	8.5	4.4
no data	6.3	5.3	17.3	5.1	4.5	4.6
77	80	74	75	60	50	52
81	84	82	82	68	60	62
42	47	40	41	35	18	20
50	56	55	54	25	27	30
3.2	3.3	2.7	no data	3.7	8.9	7.2
46	38	82	77	44	76	75
54	62	18	23	56	24	25
3,894	3,701	4,183	4,364	6,267	2,138	3,214
2,980	no data	3,574	4,040	5,137	1,469	2,859
30.8	16.5	9.8	17.2	9.2 (2012)	35	25.8
no data	no data	7	no data	4.4	no data	3.9
no data	no data	3.3 <sup>f</sup>	no data	no data	>2% <sup>g</sup>	no data
coconut, banana, taro, copra, breadfruit <sup>h</sup>	coconut, pulaka, banana, breadfruit, taro, cassava, sweetpotato, pawpaw, pumpkin <sup>i</sup>	taro, chicken, fish, canned mackerel, rice, banana, brown sugar, coconut, bread, instant noodles <sup>j</sup>	coconut, cassava, sweetpotato, yam, taro, banana <sup>h</sup>	coconut, taro, cassava, sweetpotato, rice, cereals, banana, yam, maize <sup>h</sup>	rice, sweetpotato, cassava, yam, taro, banana, pumpkin, vegetables, coconut, livestock <sup>k</sup>	taro, yam, cassava, sweetpotato <sup>l</sup>
132	not listed	111	105	98	153	141
165	not listed	not listed	2	15	6	1

Coastal fisheries provide the primary or secondary source of income for up to 50% of households, and 50–90% of the animal-sourced protein consumed (SPC 2015). The dependence on fisheries for household food security and incomes, as well as government revenue, is pronounced in Kiribati and Tuvalu, where 8–10% of their gross domestic product is obtained from fisheries. Group 2 and 3 countries have lower proportions of gross domestic product from fisheries: 1% for Vanuatu and 3% for Samoa (Gillett 2016). Aquaculture has been introduced in some countries as a way of reducing pressure on fisheries; however, this has not been upscaled.

### 5.2.3 Status of COVID-19 in Pacific island countries

As of 7 July 2020, six out of 21 Pacific island countries (excluding Papua New Guinea) have reported a total of 449 cases of COVID-19 and seven deaths (WHO 2020). The limited spread of COVID-19 has been largely due to individual governments taking rapid action to shut down borders, limit domestic travel, establish curfews and put in place physical distancing measures. Of the nations assessed, all but Fiji remain COVID-19 free. Fiji reported 21 confirmed cases as of 9 July 2020.

States of emergency were established in all seven countries assessed, and Vanuatu has extended this until 31 December 2020. Pacific island responses to managing the COVID-19 outbreak and subsequent livelihood and economic implications have been varied. During the early stages of the pandemic in the region (March 2020), there was a rapid closure of national borders and various quarantine periods were enforced for people entering the country: from 14 days in Solomon Islands, Samoa and Tonga to up to 28 days in Fiji. Sea freight has continued, albeit with lesser frequency.

The region has limited health services and social protection programs, most notably in Group 1 and 2 countries. A number of government stimulus packages have started to emerge in the region. A comprehensive overview of nation-specific responses to the crisis is provided at the Australian National University's Australia Pacific Security College website ([psc.crawford.anu.edu.au](http://psc.crawford.anu.edu.au)).

## 5.3 Assessment approach

This assessment is based on interviews with 21 key informants (7 women) who were working in agriculture or fisheries, and/or supporting rural communities and development activities related to food security and agrifood production. A list of potential key informants was generated by collating contacts from a range of sources including the research team, the Australian Council for International Development (ACIAR) Country Manager and author networks in the region. Interview questions were designed to provide key information related to the resilience and food systems analytical framework (Chapter 2).

Interview data was triangulated with rapidly emerging published material. This included regional documents on impacts on agriculture and fisheries (FAO 2020de, PIFON 2020), social vulnerability indicator data (SPC 2020a) emerging empirical research findings (Eriksson et al 2020, Piturara 2020), and peer-reviewed literature (Béné 2020, Farrell et al 2020). Triangulation also took place through active participation during the World Food Programme Regional Pacific Food Security Cluster Meetings held on 13 May and 30 June 2020. Informal discussions also took place to understand the alignment of this work with ongoing assessments by International Fund for Agricultural Development and the Pacific Island Farmer Organisations Network as well as the World Food Programme's Mobile Vulnerability Analysis.

## 5.4 Assessment results

### 5.4.1 Snapshot of key findings



#### Smallholders

Farmers, fishers impacted by movement restriction and input availability  
Tropical Cyclone Harold increased production challenges in affected countries  
Return to rural areas increased food demand and agricultural pressure



#### Supply chains

Disruption to limited distribution services problematic on small and medium islands  
Reduced demand for exports from large islands  
Tourism decline has ongoing impacts for farm incomes  
Local market closures; reduced availability of fresh produce



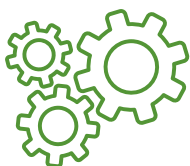
#### Governance

Domestic travel restrictions eased in July  
Some governments enacted price stabilisation for staples  
Limited formal social protection; support activities include distribution of planting material, support for fishing



#### Community

Increased tension over 'idle' and disputed land  
Changes in food consumption; cheaper, less nutritious foods  
Impacts on women include exclusion from workforce, particularly food markets



#### Employment

Reduced income from tourism a major concern  
Reduction in remittances across the Pacific  
Poverty likely to increase as economies contract  
Pandemic worsens existing challenge of high youth unemployment

### 5.4.2 Exposure and vulnerabilities

This section is organised around two major categories of food systems' exposure and vulnerabilities: biophysical and socioeconomic. The main exposures discussed are:

- climate and water risk, and associated loss of arable land
- pests, diseases and biosecurity
- farming practices, coastal fisheries and specific atoll exposures
- globalisation of food systems
- health and nutritional constraints
- services and remittances
- vulnerable populations.

The section draws from analysis of food systems vulnerability already conducted for the Pacific region and integration of findings from key informant interviews.

#### *Biophysical*

##### *Climate and water risk and associated loss of arable land*

Agricultural production has been and will continue to be pressured by freshwater availability and extreme climate events. Key informants from all three island groups identified the loss of arable land and reduction of continuity of food production from extreme events and sea level rise exposures as factors that will multiply the impacts of the COVID-19 pandemic on food systems. Tonga and Vanuatu have already experienced the multiplier effect through the combined impacts of Tropical Cyclone Harold and the COVID-19 crisis. Group 1 and 2 food production systems are exposed to anthropogenic sea level rise, which since 1994 has been 3–10 mm per year and resulted in coastal erosion and loss of land. The combination of loss of land and extreme weather events will continue to create risks for food systems. In prioritising actions, key informants from Samoa and Tonga noted this by stating that

'natural disasters must be on the list of our top risks', and that 'the major ongoing threat to our root crops is climate change'. There is evidence of the cost of cyclones to food production. In the immediate aftermath of Tropical Cyclone Winston in Fiji in 2015, agriculture was the worst hit part of the economy, with losses of A\$368 million (Sleet 2019). In Vanuatu, Tropical Cyclone Pam in 2015 destroyed up to 80% of crops (Cvitanovic et al 2016).

Water-related exposures and risks also amplify food systems insecurity. The combination of sea level rise with limited fresh surface water and groundwater creates another exposure through saltwater intrusion (Leal Filho et al 2020). This depresses agricultural production and represents a geopolitical security risk in the region. Fast-growing populations place pressure on very limited freshwater resources, and the inability to manage this in the context of high dependence on agriculture for livelihoods (notably in Solomon Islands) creates risks for political stability and food security.

##### *Pests, diseases and biosecurity*

Pathogens and pests continue to threaten agricultural and aquatic production in the Pacific. Island environments have inherently limited biological resilience in the face of aggressive invasive species, due to limited natural predators and relatively low genetic diversity. The risk of pests and diseases increases as genetic diversity declines. Multiple biosecurity risks have resulted in substantial food insecurity as well as negative impacts on nutrition, farmer incomes, export earnings and balance of payments (McGregor et al 2011). Biosecurity remains a major risk to traditional food consumption, with pathogens like taro leaf blight responsible for a 55% reduction in Samoan gross domestic product in 1994 and estimated annual losses of A\$11 million between 1994 and 1999 (Singh et al 2012,



Alexandra et al 2020). The current emergence of the coconut rhinoceros beetle, coupled with an emerging disease—Bogia coconut syndrome (a Solomon Island local variant of coconut lethal yellowing), predisposes these agricultural systems to shocks like the COVID-19 pandemic. The risk of African swine fever and fall armyworm (both of which are now in Papua New Guinea) spreading east also threatens food systems.

#### *Farming practices, coastal fisheries and specific atoll exposures*

Farming in the Pacific uses very limited land, coastal fisheries are under substantial pressure and agroecological diversity has declined. The Pacific region has the smallest landholdings in the world, with an average holding of 1 ha, and an average of 3.2 parcels per holding (FAO 2000). For most of the Pacific, the total land cultivated by smallholders comprises a sizeable portion of total agricultural land (Taylor et al 2016). Agricultural production in large parts of the Pacific is well below its inherent potential (FAO 2010), with recent analysis by Farrell et al (2020) finding that between 1980 and 2016, crop production in the region (excluding Fiji and Papua New Guinea) declined from 1,200 to 800 g/capita/day.

This reduction in production creates high exposure to food insecurity, notably for highly subsistence-dependent countries like Solomon Islands. Cash commodity production has continued in Fiji and increased in Solomon Islands and Vanuatu. Copra, sugarcane and kava have seen increased attention because they drive economic development in rural areas. Furthermore, 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, predisposing the region to system-wide shocks. In Solomon

Islands, one key informant said, 'Farmers have noticed low crop yields and declining soil fertility, notably because of intensive cultivation. They no longer practice the shifting cultivation, and the land pressure is there in high population areas.' Group 3 countries have historically had greater capacity to produce food and meet national vegetable and fruit requirements based on domestic production, while Group 1 and Group 2 countries face greater deficits in fresh food production (McGregor et al 2009).

Marine production systems play a critical economic role, but they are exposed to a variety of pressures. Kiribati, for example, has one of the largest commercial tuna fisheries in the region (Gillett & Tuati 2018), with up to 75% of government revenue coming from oceanic fisheries' access fees (Gillett 2016). National fisheries in Vanuatu, Solomon Islands and Kiribati are highly lucrative foreign-owned enterprises (Barclay & Cartwright 2007). Of the fish consumed in rural areas in the Pacific, 60–90% comes from subsistence fishing activities (Bell et al 2009). The contribution of coastal fisheries to communities is often understated, and pressure on marine ecosystems creates risks for these dependent communities (SPC 2015). Warming oceans will create further risks to food security for communities who rely on fishing.

Group 1 countries face additional exposures because of their geological composition. Nutrient-deficient soils with low water-holding capacity make agriculture very hard in these nations (Halavatau 2018). A key Tuvalu informant noted that 'the ongoing challenges in making and sourcing compost for agriculture make it hard for us to grow staple foods'. These land limitations mean that fisheries are a major food production sector in Group 1 countries, contributing 8.6% of gross domestic product in Kiribati and 9.4% in Tuvalu (Gillett & Tuati 2018). The

inability to meet consumer demand due to limited land makes Group 1 and Group 2 countries highly dependent on a globalised food system (Taylor et al 2016).

### *Socioeconomic*

#### *Globalisation of food systems*

Since the 1980s, there has been a marked acceleration of the globalisation of Pacific food systems. Food imports increased in parallel with a decline in total agricultural output (Farrell et al 2020). Globalisation of food systems has also allowed substantial access to international markets for fish exports, notably tuna (Gillett 2016). It has also increased the availability of imported food, including sugary and high-energy food and beverages. Diverse diets and food staples have been increasingly substituted for more affordable, high-calorie foods, contributing to an increase in non-communicable diseases (Charlton et al 2016). Imported foods, however, are essential for Pacific islands that have limited fresh food production capacity (for example, Kiribati and Tuvalu). Dependence on these international systems exposes communities to price fluctuations of commodities in global markets. At this stage of the COVID-19 pandemic, international food prices have remained relatively stable, but the region is particularly sensitive to fluctuations in global prices, which may occur in the upcoming Northern Hemisphere winter.

#### *Health and nutritional constraints*

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) (IHME 2018). The six countries in this assessment for which data are available (which excludes Tuvalu) all have a higher prevalence of diabetes and kidney disease than the global average, which is increasing (Figure 5.1). While the prevalence of

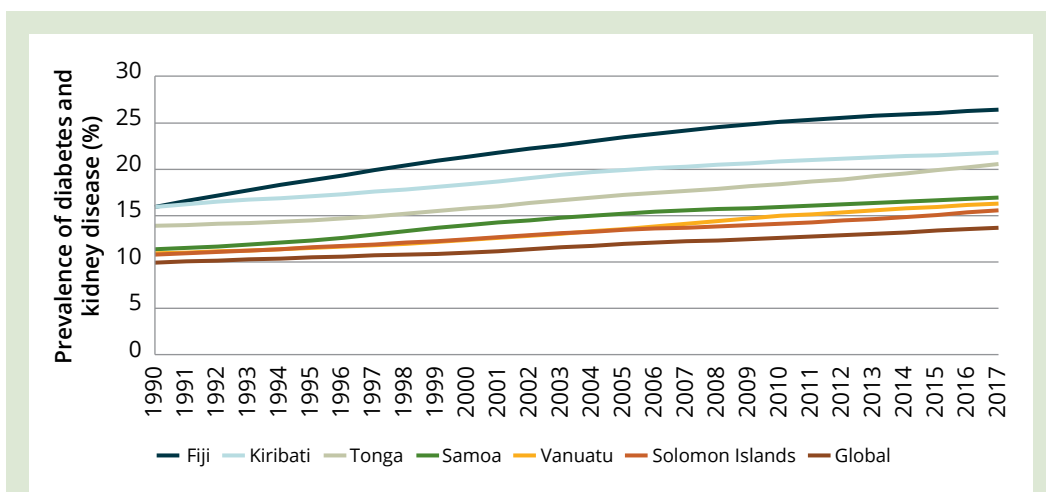
nutritional deficiencies in the region has been generally decreasing over the last decade, in four of these six countries they remain higher than the global average. In Kiribati, Solomon Islands and Vanuatu, over 35% of the population suffers from nutritional deficiency (IHME 2018).

A summary of nutritional conditions in three Pacific regions compared to global averages is presented in Table 5.3. These pre-existing conditions may be exacerbated by the COVID-19 pandemic as a result of potential changes in diet because of reduced income (Tin et al 2020).

#### *Services and remittances*

Tourism and associated services are major employers in the Pacific, notably in Vanuatu, Fiji, Tonga and Samoa. Tourism makes a substantial contribution to the gross domestic product of several Pacific countries in this assessment (30% in Samoa, 38.9% in Fiji and 45% in Vanuatu). Tourist-related services provide 80.2% of total employment in Samoa, 47.8% in Fiji, 39.9% in Tonga, 32.5% in Vanuatu and 29.7% in Solomon Islands (FAO 2020d). Tourism also creates much of the domestic demand for produce, boosting farm incomes for those delivering to restaurants and resorts. In 2017, hotels and resorts in Fiji's main tourism areas spent 74.4 million Fijian dollars (FJ\$) (A\$50 million) on fresh produce.

Remittances make significant contributions to social protection in the Pacific, although their aggregate flow varies widely across the region. Remittances respond to needs (personal shocks and natural disasters) and enable customary obligations to be met or increased. Evidence from Fiji and Tonga reveals that remittances have a greater impact on poor households than wealthier households. Tonga and Samoa rely heavily on remittances. According to recent analysis (SPC 2020a), the contributions of remittances to gross domestic product in 2018 was 40.7% in Tonga and 16.4%



**Figure 5.1** Prevalence of diabetes and kidney disease in six Pacific island countries (1990–2017)

Source: IHME (2018)

**Table 5.3** Malnutrition and obesity in the Pacific region

Nutritional condition	Melanesia (%)	Polynesia (%)	Micronesia (%)	Global average (%)
Anaemia (women of reproductive age)	35.9	27.9	25.1	32.8
Stunting (children under 5 years)	49.5	4.9	no data	21.9
Wasting (children under 5 years)	13.3	3.9	no data	7.3
Overweight (children under 5 years)	13.7	5.3	no data	5.9
Diabetes (men)	15.3	22.4	21.7	9
Diabetes (women)	14.8	26.4	22.8	7.9
Obesity (men)	17.5	54.9	43.6	10.5
Obesity (women)	26.8	40.7	53.1	14.7

Notes: Melanesia = Fiji, Papua New Guinea, Solomon Islands, Vanuatu; Polynesia = Samoa, Tonga, Tuvalu; Micronesia = Kiribati, Marshall Islands, Federated States of Micronesia, Nauru, Palau.

Source: Based on data from the Global Nutrition Report (2020)

in Samoa. Remittances are important for cushioning economic shocks. They play a critical role in household income, given the limited capacity of many Pacific governments to provide cash-based social protection (Edwards 2020).

#### *Vulnerable populations*

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 vital for keeping food systems functioning, especially in Group 3 countries. For example, in Port Vila (Vanuatu) and Honiara (Solomon Islands), farmers often commute from rural areas to central markets, staying overnight until produce is sold. Income earned by food stallholders

and street vendors is used to buy food. This can stop quickly if markets are shut down. In Fiji, 140,000 people live in informal settlements, while in the Solomon Islands, 17,000 of the 50,000 people in Honiara are estimated to live in informal settlements (Chand & Yala 2008, ADB 2017). Key informants noted that ‘it is the urban poor that will be very affected by [the COVID-19 pandemic] in the long term’.

Women are also expected to be significantly more disadvantaged than men by the COVID-19 health and economic impacts (FAO 2020c). Women in the Pacific are potentially more exposed to extreme food system shocks, given their often hidden and under-recognised role in the economy. For example, the number of women in Fiji in formal employment is 106,680, compared with 234,059 men (COVID-19 Gender Working Group 2020). However, these figures do not include women who are the majority of market food vendors, acting as middle-agents between producers and consumers (UN Women 2016). Furthermore, the crisis has exposed women throughout the region to heightened domestic violence, the burden of extra home and caring roles, and economic disadvantages (CARE 2020).

Youth are also exposed and vulnerable to socioeconomic shocks. The Pacific has a very young population. More than 50% of the population of the 22 Pacific nations (including Papua New Guinea) is under the age of 25 (SPC 2014). Unemployment is a major concern, with average youth unemployment at 23% compared with the global average of 12%. Consideration of the region’s demography is critical to long-term food systems planning, especially with respect to labour.

### 5.4.3 Impacts of COVID-19

The COVID-19 crisis has had different impacts on the seven countries, and these impacts have interacted with pre-existing

exposures. Many of the findings presented here confirm the potential impacts identified by Farrell et al (2020). The impacts reported for June and July 2020 are:

- The combination of reduced tourism and remittances has affected incomes.
- Reduced income has had flow-on effects, such as outmigration to rural areas in Solomon Islands, increased pressure in some coastal fisheries and heightened burdens on women.
- There has been increased demand for planting materials. In Fiji and Solomon Islands, this has been supported by stimulus packages, but access has been more limited in the Group 1 and 2 countries.
- Prices have fluctuated (both up and down) in the region, despite food supplies remaining relatively stable.
- The urban poor are the most affected, because of movement restrictions and the increasing prices of some commodities. Women face increasing pressures to provide for households.
- Some communities in northern Vanuatu have experienced serious food scarcity because of Tropical Cyclone Harold.
- Logistics disruptions have impacted exports, but food has continued to flow into import-dependent nations.

### Food production

Agricultural production and fishing have been adversely impacted by the restrictions on people moving within and between islands, and the availability of farming supplies. Countries impacted by Tropical Cyclone Harold, especially severely affected Vanuatu and Tonga, faced increased production challenges.

Some citizens working overseas have been unable to return home, which has affected labour availability in Samoa and Tonga. Where people have been able to return to rural areas in Solomon Islands and Fiji,

labour shortages have not been as severe. One respondent noted that communities in parts of Fiji are now farming in groups and learning from each other in order to expand food production on previously unused land.

COVID-19 control measures combined with Tropical Cyclone Harold in Tonga, Fiji, Solomon Islands and Vanuatu have impacted food production in some provinces. The impacts of Tropical Cyclone Harold in Vanuatu were severe: 95% of homes were destroyed in Pentecost, crop damage ranged from 50% to 100% and 27% of the population is estimated to have been displaced (Refugees International 2020). FAO's situational assessment in May 2020 estimated that 17,500 ha of cropland has been affected (FAO 2020e). With the loss of home gardens and crops, it is expected that fishing will increase in the near future in areas where boats were not destroyed. This could concentrate pressure in some coastal fisheries. In Vanuatu, a key informant noted that 'raising awareness of intercropping of kava with food crops to encourage resilience in times of disaster' is essential to build buffers. Cash commodity (kava) dependence in Pentecost was due to a surge in prices after Tropical Cyclone Pam, when people neglected planting of food gardens. The island is now dependent on food relief because of Tropical Cyclone Harold. The inevitable upcoming cyclones in the region will create future stressors to food security. Climate-resilient planting and storage strategies are essential for long-term food security.

### *Impacts of rural migration on ecosystems*

As of July 2020, lockdowns in most Pacific nations had eased. Many residents of urban and informal settlements who moved back to rural areas in response to the lockdowns are now starting to return to the cities, although this rate of return is tempered by employment opportunities. Between April

and July 2020, rural population pressures increased due to an influx of returning urban migrants. Recent migratory analysis from Malaita and the Russell Islands (both part of Solomon Islands) revealed an increase in rural populations, as much as 7.1% in the Russell Islands (Eriksson et al 2020, Piturara 2020). This resulted in an estimated 25–50% more fish being caught and, in some cases, size limits for clams, crayfish, trochus and coconut crabs being ignored. Further anecdotal evidence includes accelerated rates of land clearing to re-establish food gardens.

The movement of people back to rural areas has created pressures on agriculture and fisheries to meet additional local demand. In the Malaita province, Eriksson et al (2020) found that 91% of respondents surveyed believed there were more people in the villages since the lockdown. They also found that, although there have been relatively stable immediate food supplies in the villages, there is increasing concern for the long-term stability of food supplies if lockdowns continue.

### *Farming supplies*

Key informants noted increased demand for planting materials, seeds and gardening equipment, particularly in Group 3 islands. In Fiji, this demand has been partially met by the government's stimulus package, which distributed 11,602 seedling packages to citizens, focusing on corporate employees who are unemployed due to the COVID-19 crisis. In Solomon Islands, government and farmer organisations have enhanced seed distribution and access via a stimulus package offered to larger-scale agricultural and fisheries operators. The package selection criteria exclude some of the most vulnerable, poor or those without clear land titles or evidence of ownership.

In Group 1 countries, the availability of seed, planting material and other agricultural products is a common barrier to farming.

The COVID-19 crisis has stimulated increased demand, adding to pre-existing supply constraints. The availability of agricultural products could be further compromised in the near future if travel restrictions and/or reduced transportation comprise supply networks. Tenuous supply and inherently lower soil fertility across this group may serve as a multiplier of food stress in the months to come.

In Group 2 countries, enhanced demand for seeds and planting material has also been observed. A key informant from Samoa noted that 'Since the lockdown, so many things have emerged that we have never seen before. For example, we've never seen stores closed for seeds—because borders were closed, farmers complain that there are not enough seeds.' Respondents in Tonga noted that many of the seeds come from Australia and New Zealand. They have also noticed a reduction in seed availability.

### *Distribution and marketing*

Group 3 countries have seen a reduction in export and marketing opportunities, particularly in nations where there is a dependence on a small number of logistics options. In Fiji, the horticulture and export sectors are highly dependent on Fiji Airways and have been significantly affected by a reduction in the number of flights and increased freight costs. In Group 1 and 2 countries, dependencies on a limited number of logistics providers is particularly acute. Reduced transport frequency and increased freight costs resulting from the COVID-19 pandemic have exacerbated existing distribution and marketing problems. A key informant from Samoa said, 'Exports are being impacted, overall we are seeing a reduction in our exports, and this is directly impacting farmers. Fish, taro and noni are the commodities most affected.'

### *Demand, prices and consumption*

Reduced incomes due to COVID-19-related job losses in tourism, commercial and

government sectors have already resulted in changes in patterns of food consumption. Reports suggest an increase in the consumption of foods with lower nutrient density (such as rice), which have remained relatively cheap. This may be particularly felt in informal settlements, where there is no ability to grow food.

Despite the substantial reduction in demand for fresh produce from hotels and restaurants (for example, in Fiji and Vanuatu), the existing supply of fresh produce is not being made available due to local market closures and travel restrictions in Group 1 countries. Fresh food remains available in Samoa and Tonga. A significant increase in farm-gate selling has occurred, resulting in greater food availability in some rural areas. Travel restrictions and reduced logistics have decreased the volume of produce making its way to urban areas and informal settlements.

### *Food price fluctuations*

Food prices have fluctuated in some countries in the region more than others. Prices have both increased and decreased and there is no common pattern. In Fiji, for example, it was reported that the price for a fish had declined from FJ\$45 (A\$29) to FJ\$25 (A\$16). The price of pineapples was also down from FJ\$5 (A\$3) for a heap to FJ\$2.50 (A\$1.50). The Solomon Islands government enacted a policy to prevent price hikes of staples, but prices have still increased. Informants have observed a doubling in price of commodities outside of Honiara. In Malaita, 48% of respondents noticed higher prices for rice and 46% noticed higher prices for canned tuna (Eriksson et al 2020). A key informant confirmed that 'another challenge has been the ability to sell food at the market, meaning that we are now selling at the farm gate'.

In Samoa it was reported that prices have remained relatively stable for commodities such as coconut (WS\$0.90/A\$0.50 per kg)

and taro (WS\$2.39/A\$1.20 per kg), but were starting to rise. The Government of Samoa has established a parliamentary committee to control food prices. A key informant noted the nutritional risk of price increases, commenting 'if healthy food gets expensive, people will move to imported, less nutritious food'. Prices in Kiribati and Tuvalu were not reported to have varied.

In May 2020, the World Food Programme Regional Pacific Food Security Cluster identified that Tonga was heavily reliant on imported food due to domestic travel restrictions and lockdowns. Acute shortages may occur if food imports are interrupted as a result of limited food reserves (based on estimates of two days' supply). Ongoing transport and logistics will be crucial for long-term food distribution and security in the region.

### *Employment and remittances*

Reduced income from tourism has been a major impact. Recent analysis shows that under a worst-case scenario, where travel bans extend for more than seven months, the estimated total losses from the decline in tourism in selected countries could be up to US\$1.9 billion (A\$2.7 billion) (Farrell et al 2020, SPC 2020a). This is a 90% drop in tourism income. Reduction of tourism also has ongoing impacts for farm incomes, as there is less demand for foods consumed by tourists (for example, herbs).

Analysis by the Fijian Ministry of Employment has shown that from February to June 2020, 115,000 people have become unemployed (Krishant 2020). In addition, it is expected that a further 130,000 informal workers in the economy are likely to be impacted. In Solomon Islands, non-essential government staff have been laid off, and the national stimulus package offered to pay 50% of the salary of displaced government staff for three months.

The reduction in remittances has impacted immediate on household incomes. A number of key informants identified that the COVID-19 crisis has led to a reduction in remittances across the Pacific as a whole. In nations where remittances make up a small proportion of household income (for example, Solomon Islands, Tuvalu, Kiribati) more modest impacts on remittances reduction have been reported. In Fiji, remittances income is expected to reduce by 15% (McClure 2020), eroding the important social protection function that this source of income plays.

### *Rural social cohesion*

There have been reports of increases in theft and land disputes in Group 2 and 3 nations. Conflicts over use of 'idle' land for new plantings have resulted in violence in Samoa, Solomon Islands and Vanuatu. In Vanuatu, the theft of sandalwood trees has been reported as a problem for communities relying on this high-value but slow-growing commodity. In Fiji and Vanuatu, there is already theft of kava, and two key informants noted that theft of root crops, fruits and vegetables has increased since the pandemic started.

### *Vulnerable groups*

#### *Urban poor*

Poverty is likely to increase in the region. Based on a 5% contraction scenario, poverty would increase by 27% in Solomon Islands and 15% in Vanuatu (Hoy 2020). Under a 20% contraction scenario, 1.2 million people in the region would be pushed into extreme poverty. This is an increase of more than 40% on pre-COVID-19 levels (Hoy 2020). Multiple key informants reported that the urban poor have been most affected as a result of a combination of changing food prices, loss of jobs and an inability to take part in the food-growing programs offered by some governments. A report from Suva (Fiji) found that children in 30 informal

settlements were going without meals, as their unemployed parents had lost the capacity to buy food. This was an issue also noted by key informants.

### *Women*

The COVID-19 pandemic has resulted in women taking on additional roles as primary health carers and having increased household food sourcing and preparation responsibilities. Lockdown has also exposed them more to domestic violence (CARE 2020). Lockdowns and movement restrictions have inequitably precluded women from participating in the workforce, particularly fresh food markets. Key informants noted that in major markets and stalls in Solomon Islands, women who would traditionally act as intermediaries between producers and consumers are no longer able to perform this role due to lockdowns and travel restrictions. Their income from these activities has been reduced.

In Tonga and Samoa, interviewees spoke of the economic impact of lockdowns on rural women's weaving opportunities. As one informant noted, 'Most weaving comes from women, done in a group—however because of the social isolation, women cannot come together and weave, so household income is declining. The entire family is being affected... And now that isolation relaxes, it can take a while for business to start again.' The baskets produced by women's weaving activities are often bought by diaspora communities in New Zealand and Australia, who may be facing their own unemployment pressures due to the COVID-19 crisis.

One informant from Solomon Islands discussed the direct impact of the COVID-19 pandemic in terms of the movement of people and the implications for women in rural households: 'When people move back to the village, this creates a burden to the women as they need to feed the Wantoks

and larger families. The women are the ones that produce and collect the food to feed the families. The women end up eating less because there are more families in the village—women are the ones that will eat last, they will feed visitors and the family first.'

There have also been reports of increased domestic violence against women. This issue is also reported in the Papua New Guinea assessment. Gender-based violence against women in the Pacific is among the highest in the world, with 60–80% of women aged 15–49 years experiencing some sort of partner violence in their life (CARE 2020). One key informant from Fiji noted civil society organisations have seen a 200% increase in reports of domestic violence, as well as additional reports of unwanted pregnancies (Narayan 2020).

### *Youth*

The COVID-19 pandemic has exacerbated a long-term economic challenge of high rates of unemployment among young people. This is most noticeable in Group 3 countries, which have young populations. The Pacific has a very young population, with over 50% of the population under the age of 25 (SPC 2014), and the COVID-19 crisis has reduced their ability to physically attend school or hands-on vocational training opportunities. The flow-on impacts of lack of opportunities for youth can have long-term economic and social stability impacts in the region (Wilson 2020). There are risks of the COVID-19 pandemic exacerbating problems of youth employment in informal sectors, which can have unsafe working conditions, low wages and minimal employment prospects in the long term.

#### **5.4.4 Recovery and resilience**

This section is organised around four recovery and three resilience themes related to the COVID-19 crisis and Tropical Cyclone Harold shocks since March 2020.



The four recovery themes are:

1. Innovative social protection programs: Agriculture and food security strategies are being promoted through different formal and informal systems.
2. Flexibility in food markets and marketing: Marketing of products has continued and taken different forms, notably e-commerce. Women have played an important role in linking products with consumers.
3. Continuous food logistics and balancing short supply chains with food imports: Local supply chains have played a crucial role in enabling food access. Ongoing transport logistics have enabled food imports to continue, which is critical for food availability in import-dependent nations.
4. New modes of disaster preparedness: The combined experience of Tropical Cyclone Harold and COVID-19 has demonstrated the importance of using existing disaster preparedness for planning for future shocks.

The three resilience themes are:

1. Livelihoods and food system shocks: Resilience of livelihoods is determined by the underlying factors that create or inhibit buffers for future shocks. Future shocks include extreme weather events and health associated shocks, as well as ongoing stresses such as climate change and increases in non-communicable diseases. Current food systems need to be plan for these near-term and long-term shocks.
2. Adaptive capacity of Pacific food systems: The adaptive capacity of food systems is affected by a combination of biophysical contexts, and the knowledge and social capital of different groups. Combining existing farmer and fishers' knowledge with new interventions in the food production sector can help advance context-specific adaptive capacities.

3. Coordinated focus on food and nutrition security: Knowledge sharing has been good and information updates have been frequent since the onset of the COVID-19 crisis. Further strengthening of regional governance that links health and production sectors on an ongoing basis and advances food systems approaches to policies and programs can support resilience.

#### *Innovative social protection programs*

On average, Pacific island countries spend less than 1% of their gross domestic product on formal social protection systems (World Bank 2018). While some limited social protection was documented in Solomon Islands and Tuvalu, wider social protection activities have focused on seed distribution and farming, enabled both by governments and community groups, which have supported recovery.

#### *Agriculture*

A focus on agriculture has been a core recovery strategy, both in formal policy and in communities. Key informants agreed that enhancing both production and maturity of agriculture and fisheries value chains represents an effective recovery exercise, particularly in Group 1 and 2 countries.

One example of this type of innovation can be found in Solomon Islands, where the government contracted Sape Farmers Group to cultivate cassava on 40 ha of land for domestic markets, using community labour from nearby villages. The farmers are not only paid for their labour but are trained in new planting techniques and practices.

More direct approaches to encourage greater agricultural production have been undertaken through the provision of seeds and planting material, with reports of successful adoption of the practices in Vanuatu, Fiji, Samoa, Tonga and Tuvalu. In Fiji, one informant noted that 'there is a re-emergence of *Solesolevaki*—the idea of

working together. For example, if you have land, we as neighbours work on it one day, then we work on mine, and so on. This is particularly good for the city people now coming into agriculture.'

A response common to all countries in this assessment was the surge in home gardening in urban and peri-urban settings. This has been supported by training activities run by government and non-government organisations, for example, the training of 100 people supported by the South Pacific Regional Environmental Program in June 2020 (Radio New Zealand 2020). This upswing in urban and peri-urban home gardening may support healthier eating at home, particularly through the consumption of fresh vegetables. This aligns with multiple initiatives across the Pacific that support healthy eating.

#### *Inclusion of vulnerable groups*

Formal social protection systems for agriculture may exclude some vulnerable groups. The urban poor, notably those in informal settlements, will probably face the twin challenges of no access to land for agriculture and lack of safety nets. In rural communities, it remains unclear who will benefit from the current stimulus packages and agricultural support systems being rolled out in the region. Issues of land access and class may prevent some rural people from accessing these benefits, which risks perpetuating poverty and inequality. This may have further unintended impacts on women and youth, who may not be able to access the services and stimulus available for the agriculture sector. If formal systems only target farming, those that depend on non-farm livelihoods may also miss out.

There may be a role for cash-based social protection schemes directed at these vulnerable groups, to complement the agriculture-focused schemes. There is evidence from Fiji's approach following Cyclone Winston in 2015 that recipients

of welfare payments are more likely to recover from shocks, as they are more likely to recover from sickness, replenish food stocks, remediate their land or rebuild dwellings (Mansur et al 2018).

#### *Utilisation of local skills and knowledge*

The Pacific has a history of strong social capital and knowledge exchange between communities, and recovery efforts in the region have drawn on these existing strengths. Donors and governments can play a critical role in addressing resource limitations (for example, planting materials), while leveraging the multiple initiatives of farmer organisations, businesses and governments to support agricultural recovery through using existing skills and capacities. This approach shifts the pervasive narrative of the region as 'lacking and missing' (Barnett 2020) to one of having existing capacities and knowledges that can be used and strengthened to improve food system functionality.

#### *Leverage the skills and capacities of women and youth*

The skills and capacities of women and youth can be leveraged as a recovery strategy. While these groups may face greater disadvantages due to a mix of sociocultural and structural factors, they also play important roles in society and in the current and potential labour force. In Vanuatu, a recent study found that after Tropical Cyclone Pam in 2015, women market vendors played a critical role as capital mobilisers, leaders, innovators and entrepreneurs, despite operating within a gendered and inequitable structure (Clissold et al 2020). Programs such as Youth@Work in Solomon Islands have engaged over 1,000 young professionally-trained agriculturalists to train and mentor youth to establish food businesses. This has improved youth employment in a range of enterprises across the food system—not only growing food—and represents

an approach to enhance production but include marginalised members of the Pacific community.

### *Flexibility in food markets and marketing*

#### *Food availability*

Despite the closure of some markets due to lockdowns, food availability in the region has generally not suffered. This is due to alternative distribution approaches being implemented, including new e-commerce tools. The redirection of food intended for export or tourism enterprises also led to a sharp decline in demand.

Access to available food was also supported by various public policies. In Solomon Islands and Samoa, restrictions on food prices to prevent price gouging allowed people to buy food at reasonable prices. In Vanuatu, the COVID-19 Food Security Response Plan supported commercial food baskets, where produce from farmers was packaged for urban citizens at affordable prices. In Tonga, the reduction in remittances has seen an emergence of new food businesses that are attempting to replace lost remittance income. One informant noted that approximately 16 new food outlets in Tonga are waiting to open.

#### *E-commerce*

E-commerce has increased and played a role in recovery. In Fiji and Solomon Islands, Facebook and WhatsApp markets and bartering systems have gained in popularity. In Fiji, the Barter for Better Fiji group established in April 2020 now has over 180,000 members. While not food-specific, the group has enabled non-cash-based product exchanges during the lockdowns. Similarly, in Solomon Islands, produce that is usually sold to hotels and not typically eaten by local communities, like herbs, were sold on Facebook. These web-based technologies can play useful roles in food systems shocks by continuing the marketing of food.

#### *Food marketing by women*

In the Pacific, 75–90% of market vendors are women (UN Women 2016). Women have continued to market food throughout the pandemic, underlining their crucial role in value chains. A key informant highlighted Fijian women's entrepreneurial capacities: 'The women in Fiji's fisheries are now semi-commercial, they are now working directly in markets and selling their produce. Women have also learned to bargain and supply directly to buyers—you can tell they are more involved in the value chain... Women are engaging with the market with skills they had before COVID-19.' Women are crucial in linking food production with consumers, and continue to demonstrate strong leadership during times of disaster (Clissold et al 2020).

### *Continuous food logistics and balancing short supply chains with food imports*

Short value chains within countries have enabled the flow of fresh food in the Group 2 and 3 countries. Continuation of shipping has allowed the flow of food to Group 1 countries. This demonstrates the importance of balancing domestic and regional value chains with international imports. The different production potential throughout the region for fresh foods makes short and efficient supply chains important in times of a shock, as they allow food to be distributed internally. Imported foods can provide useful buffers in time of disaster, as long as prices remain stable. Local fresh food can be distributed further with improved regional trade and domestic supply networks.

Short value chains can allow urban populations to have access to nutritious food, and rural populations to generate incomes while also having access to nutritious food. The relatively short distances between rural areas and big cities in the countries assessed made food distribution manageable even during lockdowns. For example, when Lautoka (Fiji)

went into lockdown in March 2020, there were reports of organised procurement of food from farmers in the area to Suva and Nadi to maintain cash flow. Transport logistics in these short value chains made food distribution throughout the country possible. There were reports in Fiji and Solomon Islands of communities organising themselves to reduce the number of people travelling to get food to markets. A key informant from Fiji noted that ‘traditional networking systems have managed to reduce the value-chain costs—the communities have established their own value-chain systems’. Ultimately, recovery during and after a shock in the Pacific will be dependent on a combination of short value chains and regional trade, but also adequate price control and distribution of imported foods.

#### *New modes of disaster preparedness*

The experience in the region of planning for and working within a disaster context provides useful skills for future food system shocks. There is already existing knowledge in disaster planning, emergency information sharing and preparing communities for extreme weather event shocks. This knowledge can be adapted to prepare for other food system shocks.

Pacific island communities have accumulated significant experience in managing extreme climatic shocks. There have been extensive efforts by national governments, non-government organisations, donors and the private sector to build preparedness capacities for managing extreme weather events. This knowledge and experience can help manage other disruptions. For example, despite Vanuatu’s high exposure to natural disasters, they are leading the way in integrated adaptation planning and disaster risk reduction across different scales (Hayward et al 2020). Preparedness strategies are driven by a mix of scientific

evidence, and local values and ways of working. Learning from these experiences can support future preparedness.

#### *Livelihoods and food system shocks*

Rural livelihoods are dependent on a combination of contextual environmental and social conditions. In the Pacific, rural livelihoods are affected by immediate shocks (for example, COVID-19 or rhinoceros beetle), as well as shocks and stresses caused by pre-existing exposures (for example, extreme weather events or high rates of obesity). This means that planning for future resilience requires interventions that address both the impacts of current shocks as well as the underlying factors that will affect the future of the system. Underlying resilience can lessen the impact of those shocks. For example, strong innovative social protection that supports diverse livelihoods can create economic buffers. Upcoming shocks from climate extremes, such as inevitable cyclones, can be addressed now by designing climate-smart agricultural strategies to boost resilience. Strategies that create a healthier population can build resilience to the shock on health systems of increased diseases.

#### *Adaptive capacity of Pacific food systems*

Long-term resilience comes from a combination of the immediate responses provided by donors and governments, the detailed knowledge that farmers and rural communities hold about their food systems and the strong social capital and adaptive capacity within communities.

Interventions for food security can support the production of food as well as the other pillars of food security (access and utilisation). Interventions can also support the development of value chains that can adapt to sudden shocks. For example, as discussed earlier, the urban poor are particularly vulnerable due to their high

dependence on incomes for food security. At the onset of the COVID-19 pandemic, the response of the Solomon Islands government showed strong adaptive capacity by enforcing food price limits that protected the urban poor from price gouging. Kiribati and Tuvalu have more limited adaptive capacity, due to their dependence on international food imports. The key recovery initiatives in Tuvalu are providing seedlings and supporting rapid gardening strategies. Landowners are encouraged to practice customary stockpiling techniques to create food buffers. Fisheries provide a strong buffer to food security in Group 1 countries, in light of their low adaptive capacity in agriculture.

An immediate challenge to supporting adaptive capacity during and after the COVID-19 crisis will be preparing already economically affected countries for future potential shocks, notably extreme weather events and the ongoing challenges of pest and disease, which continue to affect food systems.

### *Coordinated focus on food and nutrition security*

#### *Food and nutrition security policy*

The COVID-19 pandemic has highlighted the importance of food and nutrition security as a crucial development and policy objective for the region. This can be seen in the rapid focus on subsidising and supporting agricultural production. This commitment to supporting agricultural livelihoods, coupled with a regional focus on healthy diets, creates an opportunity to support food system resilience through coordinated measures.

The interviews conducted as part of this assessment emphasised the role that different sectors and groups play in regional food security. National governments support agriculture through extension services, subsidies and the allocation of

national budgets to agricultural recovery. Farmer organisations (for example, Rural Integrated Enterprises & Development in Fiji, Kastom Garden Association in Solomon Islands, Mainstreaming of Rural Development Innovation Tonga Trust, the Samoa Farmers Association and the Farmer Support Association in Vanuatu) provide peer-to-peer learning opportunities and training that support immediate farmer needs. Other non-government groups, such as Malaita Youth in Business, enable youth participation in food marketing through innovative technologies, such as phone apps and web-based markets, that youth are familiar with, and lead their implementation.

#### *Agricultural extension*

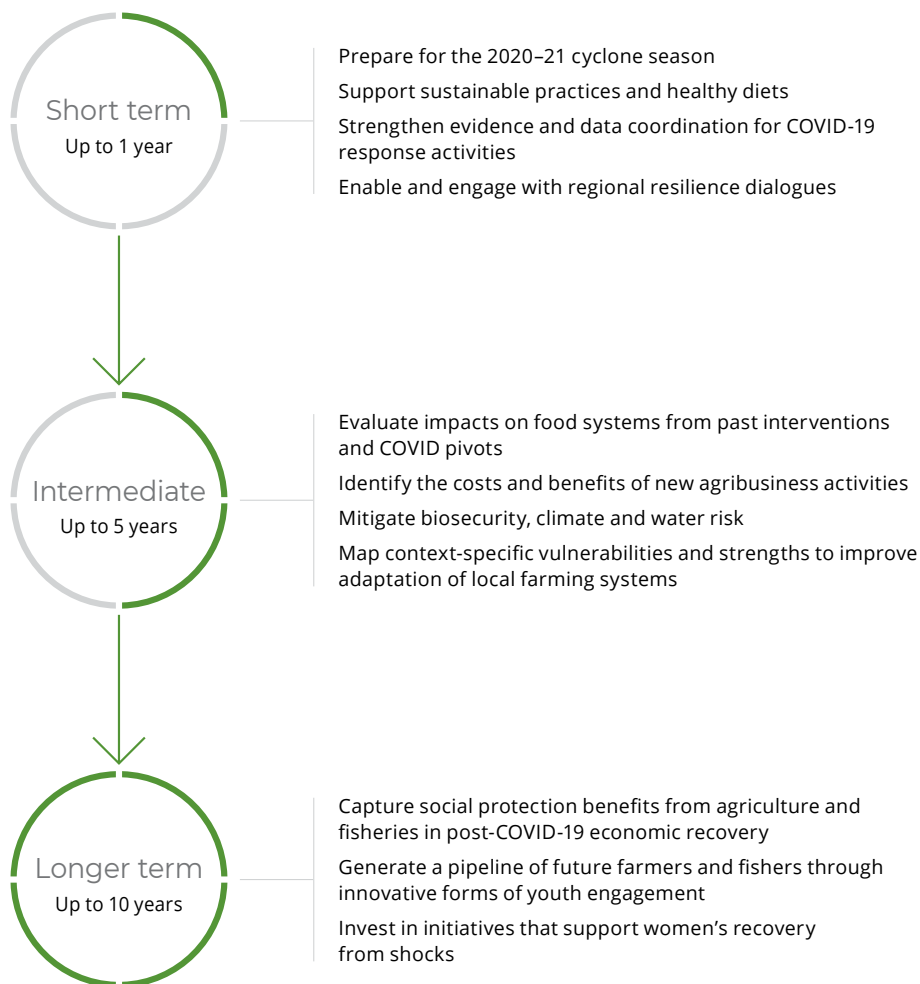
Agricultural extension and support can be diversified beyond the public sector. Innovative opportunities can arise for the private sector and non-government farmer organisations to support extension or enable farmer-to-farmer knowledge exchange. At a regional level, multilateral agencies like the Pacific Community continue to provide technical services to governments. During the COVID-19 crisis, these agencies have been essential in the area of seed distribution and seed saving.

#### *Regional institutions*

Regional institutions can use their expertise and experience to support agricultural recovery and wider food systems leadership. For example, the Pacific Community has provided support to national governments for more than 70 years, drawing on its strengths in food systems across multiple disciplines and sectors. The Pacific Community has increasingly taken a systems approach to tackling issues of food security in the region. The University of the South Pacific also has substantial experience working across different food systems, and their research and knowledge can add value to novel policy directions in food security.

## 5.5 Opportunities for action

### 5.5.1 Snapshot of potential investment options



## 5.5.2 Short term (up to 1 year)

### *Prepare for the 2020–21 cyclone season*

The amplification of food insecurity was most felt in areas affected by Tropical Cyclone Harold, and by urban people who have lost their incomes. Immediate measures need to build future food buffers, for example, through mixed planting and storage strategies. This needs to be done in light of potential severe cyclones in the 2020–21 season.

- Example policy measure: Supplement production in cash commodity systems (which generate income) with fast-growing foods (for self-consumption or local markets). Work with existing humanitarian or food trade/supply corridors to prepare for upcoming cyclone shocks.
- Example research focus: Use existing research infrastructure and knowledge to support seed conservation and distribution, intercropping and climate-smart farming.

### *Support sustainable practices and healthy diets*

This assessment has noted the focus on home gardens, farming and stimulation of the food production sector as a recovery strategy. Increased rural populations and the resurgence of interest in agricultural livelihoods is an opportunity to support governments, non-government organisations and communities to embed sustainable farming practices in these new production systems. This may include low-cost opportunities for composting and recycling farm resources to support agriculture in nutrient-poor islands. This also creates an opportunity to use existing healthy eating guidelines to encourage practice change. Small actions to showcase linkages between agricultural production and adopting healthier diets can help

address the major underlying exposure of pre-existing health challenges.

- Example policy measure: Incorporate sustainable farming strategies (which can be based on past work done by the University of the South Pacific, Pacific Community, ACIAR, Australian Department of Foreign Affairs and Trade, etc) into new incentives to grow food. Home gardening can also provide an opportunity to create low-cost composting and water saving systems.
- Example research focus: Understand links between new agricultural activities and changes in food consumption patterns, and if the type of food available in local markets is changing and how.

### *Strengthen evidence and data coordination for COVID-19 response activities*

There has been significant support for knowledge and information sharing through the World Food Programme Pacific Food Security Cluster. This group is reporting on assessments concluding in the third quarter of 2020. The substantial data collected this year need to be tailored to different governments and multilateral agencies to support their recovery strategies. Identifying and supporting a neutral group or broker to manage this emerging data could help this process.

- Example policy measure: Leverage existing partnerships to continue and improve the data and knowledge sharing that has taken place during the COVID-19 recovery period, ideally through open-data systems. Use the data and evidence that emerges to support bilateral and multilateral partners.
- Example research focus: Understand how the emerging data on COVID-19 food system impacts can be used to increase evidence-based decision-making by governments, non-government

organisations, businesses and communities.

### *Enable and engage with regional resilience dialogues*

The Pacific Week of Agriculture offers an important opportunity for multiple agencies in the region to share experiences and advance policies and strategies for agricultural development. If it goes ahead, the 2021 Pacific Week of Agriculture could be a forum to organise and advance resilience and food systems approaches that have agriculture at the core but link with broader exposure issues discussed in this assessment. The Pacific Community has strong links with governments, and is well positioned to broker technical food systems interventions emerging from these discussions with governments.

- Example policy measure: Identify bilateral and multilateral programs and strategies that seek to take a systems approach to food, and use this as an opportunity to help advance resilience-informed policy.
- Example research focus: Broker a food systems research session during the 2021 Pacific Week of Agriculture that draws from the multiple exposures and impacts to identify new research priorities.

### **5.5.3 Intermediate term (up to 5 years)**

#### *Evaluate impacts on food systems from past interventions and COVID pivots*

The COVID-19 pandemic has presented opportunities to support new food and nutrition security measures by showcasing what has worked and what has not across different food and fish production systems. This can be done by learning from the substantial number of programs, projects and research that have attempted to address one or multiple parts of the food system. There are two scales to this. The

first is context-specific—understanding how food systems and livelihoods have changed because of past interventions and more recent COVID pivots. The second is a more systems-level evaluation. While this is potentially more complex, in light of large data uncertainties, it is important to understand how previous research and regional programs have helped advance food systems resilience across the region as a whole.

- Example policy measure: Identify from previous evaluations and reviews what contributions have been made to resilience, and whether these have been sustained.
- Example research focus: Investigate how long-term investments into particular farming and fishing practices and technologies have supported food and nutrition security, and determine how past interventions have coped with previous shocks and disruption (for example, cyclones) to understand the resilience of research activities.

#### *Identify the costs and benefits of new agribusiness activities*

New agribusiness activities will emerge in response to the COVID-19 crisis, including in those countries where remittances have declined. Opportunities exist for current and new businesses to value add and/or substitute products, including replacing imported products with local ones. The substitution of imported wheat and cooking oil with local produce are two prospective options. The costs and benefits of new ventures in value adding and/or substitution need to be thoroughly understood. In addition to food production, it is vital to consider the extent to which such a venture might generate employment and associated support services. For example, a new digital extension service could leverage future employment by engaging with youth



vocational training programs during its development and application.

- Example policy measure: Use existing market and value-chain projects to stimulate new businesses emerging in response to the lockdown. Support the linking of primary food producers with entrepreneurial activities.
- Example research focus: Determine how youth can be engaged in food sector employment that is not necessarily farming, including innovative food businesses. Analyse the economic returns of import substitution of selected products.

#### *Mitigate biosecurity, climate and water risk*

An ongoing focus on the pressing biological and ecosystem exposures in the region is important. Biosecurity control of current and potential threats (such as African swine fever) is critical for food security. The inter-related impacts of water scarcity and extreme climate changes provide an opportunity to identify climate-resilient farming strategies.

- Example policy measure: Work with existing biosecurity frameworks and policies and support biosecurity control using the existing capacities in the region.
- Example research focus: Identify gaps in knowledge of current and emerging biosecurity risks. Investigate country-specific climate-resilient varieties that are socially acceptable and nutritious. Understand water use practices in agriculture and the potential of water conservation technologies.

#### *Map context-specific vulnerabilities and strengths to improve adaptation of local farming systems*

It is important to understand the areas in the system that can support or inhibit future resilience. To date, there are

limited studies, data sets and analysis of the different Pacific food systems.

Understanding how communities, governments and different food systems have recovered after previous shocks would be an important evidence base for planning future measures.

- Example policy measure: Enable policy dialogues and alignment with bilateral and regional agencies aiming to support food systems. Identify policy systems that have demonstrated the ability to enable resilience.
- Example research focus: Synthesise how production and prices changed in light of the COVID-19 crisis and understand which commodity sectors and groups are most affected.

#### **5.5.4 Longer term (up to 10 years)**

##### *Capture social protection benefits from agriculture and fisheries in post-COVID-19 economic recovery*

Agriculture and fishing have been effective forms of social protection for Pacific island communities during the COVID-19 pandemic. The scope for agriculture and fisheries to play a stronger role and make a more expansive contribution to social protection should be considered by Pacific island countries, individually and collectively, in post-COVID-19 economic recovery planning and implementation.

- Example policy measure: Strengthen existing farming and fishing supply stimulus activities that support the generation of producer incomes.
- Example of research focus: Identify how existing agricultural and fisheries policies in Pacific island countries might better deliver social protection outcomes.

### *Generate a pipeline of future farmers and fishers through innovative forms of youth engagement*

Agriculture and fisheries continue to play an important role in the economy, but the reality is that much of this work is done by an ageing group of farmers and fishers. The high number of youth in the region provides an opportunity to create new ways of growing food and supporting new types of employment. This will require better understanding of social barriers to youth engagement in agriculture and fishing. Scholarships, training and vocational programs all offer long-term opportunities for strengthening the food sector.

- Example policy measure: Design and implement long-term programs that link youth with businesses in the food sector. In doing so, establish the most effective ways of engaging rural and urban youth based on local evidence.
- Example research focus: Understand the social determinants of increasing youth participation in the food sector. Determine how diets can be improved by creating healthier food environments in different places (for example, churches, schools, meetings).

### *Invest in initiatives that support women's recovery from shocks*

An increased focus on agriculture as a recovery tool must not come at the cost of women's wellbeing. Women play critical roles in the production, marketing and food preparation components of the food system, but they face multiple structural barriers. Any measures need to be sensitive to gender implications and focus on strengths-based partnerships with the women involved in order to critically examine how the project intersects with underlying gender norms.

- Example policy measure: Advance women-led market opportunities and

understand the gender implications of agricultural recovery plans.

- Example research focus: Support research led by local experts in the Pacific to address data gaps on women's contributions to fisheries and agriculture and use this to inform policies.

## 5.6 Conclusions

So far, the impacts of the COVID-19 pandemic on food systems in the Pacific have been:

- reduction of international tourists and subsequent reduction in income
- reduction in remittances (mostly in Tonga and Samoa)
- loss of employment in urban informal settlements and subsequent migration to rural areas
- increased pressures on rural women
- limited ability to market produce due to lockdowns and loss of freight
- limited farming supplies to boost production.

These impacts have had a multiplier effect on vulnerable groups, such as the urban poor or unemployed youth, and on communities that were affected by Tropical Cyclone Harold in April 2020. The Pacific has benefited from relatively stable global food supply, given the relative stability of international imports; however, this may create risks for high import-dependent countries in Group 1 and 2 if transport and logistics cease. The economic ramifications of COVID-19 may trigger further poverty in the region, amplifying food insecurity. Given the crucial role that agriculture and fisheries play in Pacific national and rural economies, building the adaptive capacity of this sector to manage the current and inevitable future shocks, such as cyclones, is critical.

Recovery in the food system has come from:

- strategies to augment domestic food production
- the agility of markets and marketing
- stability in food logistics
- learning from existing disaster preparedness.

Throughout the region, there has been substantial interest in agricultural stimulus and planning for food security in light of the COVID-19 crisis. The increased interest in home gardening and a focus on agriculture as an economic recovery strategy can provide immediate opportunities for the supply of essential fresh foods in the region, and support healthy eating practices.

However, it remains unclear if there will be sufficient adoption of these agricultural practices in the long term, especially for those new to farming and working on previously 'idle' land.

The elevated status of food and nutrition security in post-COVID-19 national strategies provides an opportunity to support new ways of farming that focus on sustainable practices and include women and youth. This could create more long-term diversification of people farming in the region. The region has demonstrated the ability to quickly develop new ways of marketing, such as self-organising food distribution systems and the emergence of e-commerce. The immediate future of food systems in the region will need to ensure that agricultural recovery strategies are also linked to equitable economic development. This is an opportunity to address underlying inequalities and use agriculture as an inclusive economic recovery strategy.

Strategies to build resilience in Pacific food systems must take into account current and underlying exposures, notably climate change and poverty. This means supporting the existing capacities of food systems and enhancing their adaptive capacities

across different contexts. Coordinated measures are needed that work not just with agriculture and fisheries sectors but also engage with organisations focused on youth, health and gender issues, and include non-government organisations and the private sector. The Pacific has multiple private and non-government groups that work with farmers to increase production, distribute food to markets, enable knowledge exchange and create opportunities for women and youth. These largely social determinants of resilience, coupled with increasing sustainable resource management and biosecurity controls, can support adaptive capacities throughout the region.

Short-term measures can leverage the current interest in agriculture to support food security. These opportunities for action emphasise the need to build food production buffers in light of upcoming cyclone seasons, find new resource recovery systems for farming inputs such as compost, and embed healthy eating and learning from COVID-19 crisis assessments into ongoing practices and policies.

Intermediate-term investment opportunities could better enable regional food systems coordination beyond primary food production. These measures should examine the systemic impacts of previous food research and projects, create novel business innovations from existing products, enable food systems dialogue at regional forums such as the Pacific Week of Agriculture to support regional food systems capacities, and better understand the most vulnerable food systems in the region.

Longer-term measures could tackle the underlying determinants of future food systems exposures. This means focusing on the future labour force in food systems, removing structural barriers to women's participation in formal employment in food

systems, reducing unintended burdens from new food system interventions, and creating food-based social protection systems.

Existing knowledge and capacities in the region provide a strong basis for interventions and additional research to support the management of future food system shocks and the building of long-term resilience. ACIAR's historical research provides a solid platform for understanding the underlying biophysical and economic structures of Pacific food systems. These strengths should be complemented by a broader systems understanding of the sociocultural factors that intersect with biophysical exposures. Future research into food systems in the region should maintain a focus on the biosecurity, agronomic and fish needs of the region. It must also support critical food systems governance at multiple scales and with different bilateral and multilateral agencies, as well as synthesising food security successes and failures from a food systems perspective. This can help support the development and implementation of policies and measures based on context-specific evidence to best ensure food systems security and resilience in the Pacific islands.

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## 5.8 References

- ADB (Asian Development Bank) (2017). *Country partnership strategy: Fiji 2014-2018 poverty analysis*, ADB, Manila.
- Alexandra S, Jamora N, Smale M & Ghanem ME (2020). The tale of taro leaf blight: a global effort to safeguard the genetic diversity of taro in the Pacific. *Food Security* 2020, doi:10.1007/s12571-020-01039-6.
- Andrew NL, Bright P, de la Rua L, Teoh SJ & Vickers M (2019). Coastal proximity of populations in 22 Pacific island countries and territories. *PLOS ONE* 14(9): e0223249.
- Barclay K & Cartwright I (2007). *Capturing wealth from tuna case studies from the Pacific*, Asia-Pacific Press, Canberra.
- Barnett J (2011). Dangerous climate change in the Pacific islands: food production and food security. *Regional Environmental Change* 11(1):229–237.
- Barnett J (2020). Global environmental change II: political economies of vulnerability to climate change. *Progress in Human Geography* 44(6):1172–1118, doi:10.1177/0309132519898254.
- Bell J & Taylor M (2015). *Building climate-resilient food systems for Pacific islands*, WorldFish, Malaysia.
- Bell JD, Taylor M, Amos M & Andrew N (2016). *Climate change and Pacific island food systems*, CCAFS & CTA, Copenhagen, Denmark, and Wageningen.
- Bell JD, Kronen M, Vunisea A, Nash WU, Keeble G, Demmke A, Pontifex S & Andréfouët S (2009). Planning the use of fish for food security in the Pacific. *Marine Policy* 33(1):64–76.
- Béné C (2020). Resilience of local food systems and links to food security—A review of some important concepts in the context of COVID-19 and other shocks. *Food Security* 12:805–822, doi:10.1007/s12571-020-01076-1.
- Bündnis Entwicklung Hilft (2017). *WorldRiskReport*, Bündnis Entwicklung Hilft, Berlin, accessed 10 July 2020, [http://weltrisikobericht.de/wp-content/uploads/2017/11/WRR\\_2017\\_E2.pdf](http://weltrisikobericht.de/wp-content/uploads/2017/11/WRR_2017_E2.pdf).
- Campbell JR (2015). Development, global change and traditional food security in Pacific island countries. *Regional Environmental Change* 15(7):1313–1324.
- CARE (2020). *Rapid gender analysis of COVID-19 Pacific Region*, CARE International, Melbourne.
- CBSI (Central Bank of Solomon Islands) (2007). *2007 Annual Report*, CBSI, [www.cbsi.com.sb/publications/annual-report/](http://www.cbsi.com.sb/publications/annual-report/).
- Chand S & Yala C (2008). Informal land systems within urban settlements in Honiara and Port Moresby. *Making Land Work* 2:85–106.
- Charlton KE, Russell J, Gorman E, Hanich Q, Delisle A, Campbell B & Bell J (2016). Fish, food security and health in Pacific island countries and territories: a systematic literature review. *BMC Public Health* 16(1):285.
- Clissold R, Westoby R & McNamara KE (2020). Women as recovery enablers in the face of disasters in Vanuatu. *Geoforum* 113:101–110, doi:10.1016/j.geoforum.2020.05.003.
- Connell J (2015). Food security in the island Pacific: Is Micronesia as far away as ever? *Regional Environmental Change* 15(7):1299–1311.
- COVID-19 Gender Working Group (2020). *Gendered impacts of COVID-19 on women in Fiji*, DIVA, FWRM, MCO, ADB, MWCPA, Suva, <https://static1.squarespace.com/static/536c4ee8e4b0b60bc6ca7c74/t/5ebd9dcbc948f2507a496a39/1589485021543/FinalGender+and+COVID+Guidance+No+te+-+Rapid+Gender+Analysis%5B1%5D.pdf> (tinyurl.com/y2nd4zjy).
- Cvitanovic C, Crimp S, Fleming A, Bell J, Howden M, Hobday AJ, Taylor M & Cunningham R (2016). Linking adaptation science to action to build food secure Pacific island communities. *Climate Risk Management* 11:53–62.

- Edwards R (2020). Bubble in, bubble out: lessons for the COVID-19 recovery and future crises from the Pacific. *World Development* 135:105072, doi:10.1016/j.worlddev.2020.105072.
- Eriksson H, Ride A, Boso D, Sukulu M, Batalofo M, Siota F & Gomese C (2020). *Changes and adaptations in village food systems in Solomon Islands: a rapid appraisal during the early stages of the COVID-19 pandemic*, WorldFish, Malaysia.
- FAO (Food and Agriculture Organization of the United Nations) (2000). *2000 World Census of Agriculture*, FAO, Rome.
- FAO (Food and Agriculture Organization of the United Nations) (2010). *Asia and Pacific Commission on Agricultural Statistics*, Food and Agriculture Organization, accessed 9 July 2020, [www.fao.org/economic/ess/ess-events/ess-apcas/ess-apcas23/en/](http://www.fao.org/economic/ess/ess-events/ess-apcas/ess-apcas23/en/).
- FAO (Food and Agriculture Organization of the United Nations) (2011). *FAOSTAT*, FAO, Rome, accessed 2 July 2020, <http://faostat.fao.org/site/342/default.aspx>.
- FAO (Food and Agriculture Organization of the United Nations) (2020a). FAO data, accessed 10 July 2020, [www.fao.org/faostat/en/](http://www.fao.org/faostat/en/).
- FAO (Food and Agriculture Organization of the United Nations) (2020b). *FAOSTAT Country Profiles*, FAO, accessed 2 July 2020, [www.fao.org/faostat/en/#country/155](http://www.fao.org/faostat/en/#country/155).
- FAO (Food and Agriculture Organization of the United Nations) (2020c). *Gendered impacts of COVID-19 and equitable policy responses in agriculture, food security and nutrition*, FAO, Rome.
- FAO (Food and Agriculture Organization of the United Nations) (2020d). *Impacts of COVID-19 on the food systems in the Pacific small island developing states (PSIDS1) and a look into the PSIDS responses*, FAO, Rome.
- FAO (Food and Agriculture Organization of the United Nations) (2020e). *The Pacific islands: Tropical Cyclone Harold*, FAO, accessed 12 July 2020, [www.fao.org/fileadmin/user\\_upload/emergencies/docs/Sit%20Rep\\_Cylone%20Harold\\_6May2020.pdf](http://www.fao.org/fileadmin/user_upload/emergencies/docs/Sit%20Rep_Cylone%20Harold_6May2020.pdf).
- Farrell P, Thow AM, Wate JT, Nonga N, Vatucawaqa P, Brewer T, Sharp MK, Farmery A, Trevena H, Reeve E, Eriksson H, Gonzalez I, Mulcahy G, Eurich JG & Andrew NL (2020). COVID-19 and Pacific food system resilience: opportunities to build a robust response. *Food Security* 12:783–791, doi:10.1007/s12571-020-01087-y.
- Gillett R (2016). *Fisheries in the economies of Pacific island countries and territories*, SPC, Noumea.
- Gillett R & Tuati M (2018). *Fisheries of the Pacific islands: regional and national information*, FAO, Rome.
- Global Nutrition Report (2020). *Country Nutrition profiles*, Global Nutrition Report, accessed 10 July 2020, <https://globalnutritionreport.org/resources/nutrition-profiles/>.
- Gnecchi-Ruscione E & Paini A (2017). *Tides of innovation in Oceania: value, materiality and place*, ANU Press, Canberra.
- Government of Samoa (2016). *Agriculture Sector Plan 2016–2020*, Ministry of Agriculture and Fisheries, Apia, accessed 30 June 2020, <https://pafpnet.spc.int/attachments/article/560/ASP%20Vol%201%20Agriculture%20Sector%20Plan%2026.05.16.pdf> (inyurl.com/y4degbfv).
- Government of Solomon Islands (2015). *Agriculture and livestock sector policy*, Ministry of Agriculture and Livestock, Honiara, accessed 30 June 2020, [https://pafpnet.spc.int/images/articles/policy-bank/solomon/Solomons-Islands-NALSP\\_Final%20Draft\\_151118.pdf](https://pafpnet.spc.int/images/articles/policy-bank/solomon/Solomons-Islands-NALSP_Final%20Draft_151118.pdf).
- Government of Tuvalu (2016). *Tuvalu National Agriculture Sector Plan, 2016–2023*, Department of Agriculture, Funafuti, accessed 7 July 2020, <http://extwprlegs1.fao.org/docs/pdf/tuv170765.pdf>.
- Government of Vanuatu (2015). *Vanuatu Agriculture Sector Policy*, Ministry of Agriculture, Livestock, Forestry, Fisheries, and Biosecurity, Port Vila, accessed 30 June 2020, [https://malffb.gov.vu/doc/Vanuatu\\_Agriculture\\_Sector\\_Policy.pdf](https://malffb.gov.vu/doc/Vanuatu_Agriculture_Sector_Policy.pdf).
- Halavatau S (2018). *Growing root crops on atolls*, SPC, Suva.

- Hayward B, Salili DH, Tupuana'i LL & Tualamali'i J (2020). It's not "too late": learning from Pacific small island developing states in a warming world. *Wiley Interdisciplinary Reviews: Climate Change* 11(1):e612, doi:10.1002/wcc.612.
- Hoy C (2020). *Poverty and the pandemic in the Pacific*, devpolicy@ANU blog, 12 June 2020, accessed 23 July 2020, <https://devpolicy.org/poverty-and-teh-pandemic-in-the-pacific-20200615-2/>.
- IHME (Institute for Health Metrics and Evaluation) (2018). *Global burden of disease compare*, accessed 10 July 2020, <http://vizhub.healthdata.org/gbd-compare>.
- Krishant N (2020). *PM confirms 115,000 Fijians have lost their jobs or have had their hours cut as a result of COVID-19*, Fiji Village, Suva, accessed 9 July 2020, [www.fijivillage.com/news/PM-confirms-115000-Fijians-have-lost-their-jobs-or-have-had-their-hours-cut-as-a-result-of-COVID-19-8fxr45/](http://www.fijivillage.com/news/PM-confirms-115000-Fijians-have-lost-their-jobs-or-have-had-their-hours-cut-as-a-result-of-COVID-19-8fxr45/).
- Leal Filho W, Ha'apio MO, Lütz JM & Li C (2020). Climate change adaptation as a development challenge to small Island states: a case study from the Solomon Islands. *Environmental Science & Policy* 107:179–187, doi:10.1016/j.envsci.2020.03.008.
- Mansur A, Doyle J & Ivaschenko O (2018). *Cash transfers for disaster response: lessons from Tropical Cyclone Winston*, Development Policy Centre Discussion Paper 67, Development Policy Centre, ANU.
- McClure H (2020). *COVID-19- The Pacific response: 22 July*, Asia and the Pacific Policy Society, accessed July 23 2020, [www.policyforum.net/covid-19-the-pacific-response-22-july/](http://www.policyforum.net/covid-19-the-pacific-response-22-july/).
- McGregor A (2007). The export of horticultural and high-value agricultural products from the Pacific islands. *Pacific Economic Bulletin* 22(3).
- McGregor A, Bourke M, Manley M, Tubuna S & Deo R (2009). Pacific island food security: situation, challenges and opportunities. *Pacific Economic Bulletin* 24:24–42
- McGregor A, Kaoh P, Mariner LT, L'al PN & Taylor M (2011). *Assessing the social and economic value of germplasm and crop improvement as a climate change adaptation strategy: Samoa and Vanuatu case studies*, IUCN, Suva
- Narayan V (2020). *CSO Alliance calls for action after reporting 200% increase in violence against women, lack of food, unwanted pregnancies and increasing thefts of root crops*, Fiji Village, accessed 12 July 2020, [www.fijivillage.com/news/CSO-Alliance-calls-for-action-after-reporting-200-increase-in-violence-against-women-lack-of-food-unwanted-pregnancies-and-increasing-thefts-of-root-crops-5rx8f4/\(tinyurl.com/y2qooej3\)](http://www.fijivillage.com/news/CSO-Alliance-calls-for-action-after-reporting-200-increase-in-violence-against-women-lack-of-food-unwanted-pregnancies-and-increasing-thefts-of-root-crops-5rx8f4/(tinyurl.com/y2qooej3)).
- PIFON (Pacific Island Farmer Organisations Network) (2020). *COVID-19 & agriculture: Pacific farmers have their say*, Pacific Island Farmer Organisations Network, Suva.
- Piturara J (2020). *COVID-19 impact on fishing and coastal communities: Russell Islands, Solomon Islands*, LMMA Network, Russell Islands, Solomon Islands.
- Plahe JK, Hawkes S & Ponnampereuma S (2013). The corporate food regime and food sovereignty in the Pacific islands. *The Contemporary Pacific* 25(2):309–338.
- Radio New Zealand (2020). *Food gardens for urban dwellers in Vanuatu's capital*, accessed 6 July 2020, [www.rnz.co.nz/international/pacific-news/420570/food-gardens-for-urban-dwellers-in-vanuatu-s-capital](http://www.rnz.co.nz/international/pacific-news/420570/food-gardens-for-urban-dwellers-in-vanuatu-s-capital).
- Refugees International (2020). *A new vulnerability: COVID-19 and Tropical Cyclone Harold create the perfect storm in the Pacific*, accessed 13 July 2020, [www.refugeesinternational.org/reports/2020/6/1/a-new-vulnerability-covid-19-and-tropical-cyclone-harold-create-the-perfect-storm-in-the-pacific](http://www.refugeesinternational.org/reports/2020/6/1/a-new-vulnerability-covid-19-and-tropical-cyclone-harold-create-the-perfect-storm-in-the-pacific).
- Samoa Bureau of Statistics (2016). *Samoa Census 2016*, Samoa Bureau of Statistics, [www.sbs.gov.ws/economics](http://www.sbs.gov.ws/economics).
- Sialaoa A (2019). The Samoa economy 2005. *Pacific Economic Bulletin* 18(2):1–19.

- Singh D, Jackson G, Hunter D, Fullerton R, Lebot V, Taylor M, Iosefa T, Okpul T & Tyson J (2012). Taro leaf blight—a threat to food security. *Agriculture* 2(3):182–203.
- Sleet P (2019). *Fiji: Poor nutrition and agricultural decline has caused food security slump*, Future Directions International, accessed 3 July 2020, [www.futuredirections.org.au/wp-content/uploads/2019/08/Fiji-Poor-Nutrition-and-Agricultural-Decline-has-Caused-Food-Security-Slump.pdf](http://www.futuredirections.org.au/wp-content/uploads/2019/08/Fiji-Poor-Nutrition-and-Agricultural-Decline-has-Caused-Food-Security-Slump.pdf).
- SPC (Pacific Community) (2014). *The Pacific Youth Development Framework 2014–2023*, SPC, Noumea/Suva.
- SPC (Pacific Community) (2015). *A new song for coastal fisheries pathways to change: The Noumea strategy*, Pacific Community, Noumea.
- SPC (Pacific Community) (2016). *Strengthening food systems; framework for addressing food security and NCDs in the Pacific*, Pacific Community, Suva.
- SPC (Pacific Community) (2020a). *Economic and social vulnerability indicators*, SPC, Noumea, accessed 22 July 2020, <https://sdd.spc.int/disasters-data/covid-19>.
- SPC (Pacific Community) (2020b). *SPC food systems for health and nutrition integrated programme successfully completes online design workshop series*, SPC, Noumea/Suva, accessed 22 June 2020, [www.spc.int/updates/blog/2020/05/spc-food-systems-for-health-and-nutrition-integrated-programme-successfully](http://www.spc.int/updates/blog/2020/05/spc-food-systems-for-health-and-nutrition-integrated-programme-successfully).
- Taylor M, McGregor A & Dawson B (eds) (2016). *Vulnerability of Pacific island agriculture and forestry to climate change*, SPC, Suva.
- Tin STW, Vivili P, Na'ati E, Bertrand S & Kubuabola I (2020). Insights in public health: COVID-19 special column: the crisis of non-communicable diseases in the Pacific and the Coronavirus disease 2019 pandemic. *Hawai'i Journal of Health & Social Welfare* 79(5):147.
- UNDP (United Nations Development Programme) (2020). *Human development reports*, UNDP, accessed 10 July 2020, <http://hdr.undp.org/en/content/2019-human-development-index-ranking>.
- UNESCAP (2018). *Ocean cities of the Pacific islands: Policy brief #1 the ocean and the city*, UNESCAP.
- UN Habitat (2015). *Urbanization and climate change in small island developing states*, UN Habitat: Nairobi, Kenya.
- UN Women (2016). *Markets for change in Vanuatu*, UN Women, accessed 6 July 2020, <https://asiapacific.unwomen.org/en/digital-library/publications/2016/02/markets-for-change-vanuatu>.
- Wairiu M (2017). Land degradation and sustainable land management practices in Pacific island countries. *Regional Environmental Change* 17(4):1053–1064.
- WHO (World Health Organization) (2020). *COVID-19 Pacific islands situation report*, WHO, accessed 24 July 2020, [www.who.int/westernpacific/emergencies/covid-19/pacific/situation-reports](http://www.who.int/westernpacific/emergencies/covid-19/pacific/situation-reports).
- Wilson C (2020). *Demanding the future: navigating the Pacific's youth bulge*, Lowy Institute, accessed 12 July 2020, [www.lowyinstitute.org/publications/demanding-future-navigating-pacific-youth-bulge](http://www.lowyinstitute.org/publications/demanding-future-navigating-pacific-youth-bulge).
- World Bank (2018). *The state of social safety nets*, World Bank, Washington DC.
- World Bank (2020). The World Bank Databank for Health, Nutrition and Population Statistics, accessed 10 July 2020, <https://databank.worldbank.org/home.aspx>.



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



Photo: ACIAR / Conor Ashleigh

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

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## 6.1 Abstract

The Papua New Guinea (PNG) Government imposed a state of emergency in March 2020 in response to the COVID-19 pandemic, which was subsequently lifted on 16 June. At 31 July 2020, 63 cases were reported, with two deaths. Further cases may overwhelm PNG's health service, which is already operating beyond its capacity to cope well. The greatest impact of the COVID-19 pandemic on food security has been on the sale of fresh food, due to the closure of fresh food and fish markets. This has particular implications for female sellers, urban consumers and others in the local communities. Long-term development issues exposed by the state of emergency include data gaps in many aspects of agriculture, food consumption and marketing; the particular impact of the state of emergency on women's income; the lack of availability of planting material of improved types of many food crops; and institutional capacity issues to better support rural and urban food security.

The assessment identifies an immediate opportunity 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, support measures that bolster smallholders' access to cash income, better planting materials and higher smallholder adoption, and improved teaching and research outcomes in tertiary agricultural programs.

## 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



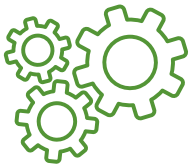
#### Governance

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

**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 Kopyago	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

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 2009:55.20). 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 2009:52.5).

#### *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
<i>Karuka</i> 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.

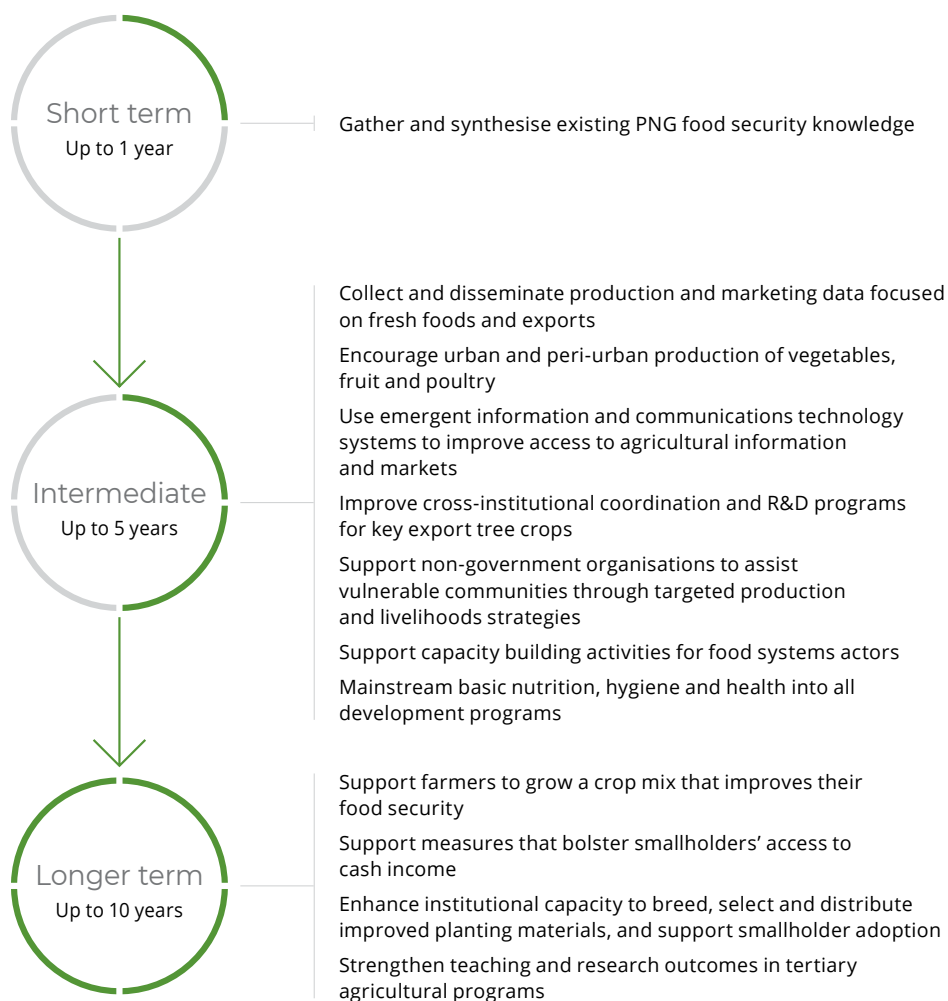


**The greatest impact of COVID-19 in PNG has been on people who sell fresh food and betel nut.**

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

- 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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## 6.8 References

- Allen B (2009). Rural poverty. In: Bourke RM & Harwood T (eds) *Food and agriculture in Papua New Guinea*, ANU E Press, Canberra, 484–488.
- Allen BJ & Bourke RM (2001). The 1997 drought and frost in PNG: overview and policy implications. In: Bourke RM, Allen MG & Salisbury JG (eds), *Food security for Papua New Guinea*, ACIAR Proceedings No 99, Australian Centre for International Agricultural Research, Canberra, 155–163.
- Allen BJ & Bourke RM (2009). People, land and environment. In: Bourke RM & Harwood T (eds), *Food and agriculture in Papua New Guinea*, ANU E Press, Canberra, 27–127.
- Allen BJ, Bourke RM & Gibson J (2005). Poor rural places in Papua New Guinea. *Asia Pacific Viewpoint* 46(2):201–217.
- Benson T, Gilbert R, Holtemeyer B, Rosenbach G & Schmid E (2019). *Papua New Guinea rural household survey on food systems*, International Food Policy Research Institute, Washington.
- Bourke RM (2010). Altitudinal limits of 230 economic crop species in Papua New Guinea. In: Haberle SG, Stevenson J & Prebble M (eds), *Altered ecologies: fire, climate and human influence on terrestrial landscapes*, Terra Australia 32, ANU E Press, Canberra, 473–512.
- Bourke RM & Allen B (in press). *Estimating the population of Papua New Guinea in 2020*, Asia and Pacific Policy Studies.
- Bourke RM & Harwood T (eds) (2009). *Food and agriculture in Papua New Guinea*, ANU E Press, Canberra.
- Bourke RM & Kanua MB (2020). *Potential response to COVID-19 epidemic in PNG: support for food production*, devpolicy@ANU blog, 21 April 2020, <https://devpolicy.org/potential-response-to-COVID-19-in-png-support-for-food-production-20200421-1/>.
- Bourke RM & Sar S (2020). *Fall armyworm in Papua New Guinea: how big is the risk?* devpolicy@ANU blog, 26 May 2020, <https://devpolicy.org/potential-impact-of-fall-armyworm-in-papua-new-guinea-20200526-1/>.
- Bourke RM & Vlassak V (2004). *Estimates of food crop production in Papua New Guinea*, Land Management Group, The Australian National University, Canberra.
- Bourke RM, Gibson J, Quartermain A, Barclay K, Allen B & Kennedy J (2009). Food production, consumption and imports. In: Bourke RM & Harwood T (eds), *Food and agriculture in Papua New Guinea*, ANU E Press, Canberra, 129–192.
- Bündnis Entwicklung Hilft (2017). *WorldRiskReport*, Bündnis Entwicklung Hilft, Berlin, accessed 10 July 2020, [http://weltrisikobericht.de/wp-content/uploads/2017/11/WRR\\_2017\\_E2.pdf](http://weltrisikobericht.de/wp-content/uploads/2017/11/WRR_2017_E2.pdf).
- de Albuquerque K & D'Sa E (1986). *Spatial inequalities in Papua New Guinea: a district-level analysis*, IASER Discussion Paper No 49, Institute of Applied Social and Economic Research, Port Moresby.
- DFAT (Department of Foreign Affairs and Trade) (2018). *Pacific Health Security Scoping Mission: Papua New Guinea Country Report following consultations in Port Moresby and Goroka, 9–14 April 2018*, accessed 15 September 2020. <https://indopacifichealthsecurity.dfat.gov.au/Scoping%20Mission%20Report%20-%20Papua%20New%20Guinea>.
- DoH (Department of Health) (2015). Annual report on child morbidity and mortality. *Annual Report 2015*, PNG DoH, Port Moresby.
- DoH (Department of Health) (2020). *Coronavirus disease 2019 (COVID-19) PNG Situation Report 20*, DoH, Port Moresby.
- DoH & WHO (Department of Health & World Health Organization) (2020). *PNG coronavirus disease 2019 (COVID-19) health situation report no. 28*, Department of Health and World Health Organization, Port Moresby.

- FAO (Food and Agriculture Organization of the United Nations) (2019). *Country gender assessment of agriculture and the rural sector in Papua New Guinea*, Food and Agriculture Organization of the United Nations, Port Moresby, [www.fao.org/3/ca6308en/ca6308en.pdf](http://www.fao.org/3/ca6308en/ca6308en.pdf).
- FAO (Food and Agriculture Organization of the United Nations) (2020a). *Papua New Guinea food security situation report*, Sitrep No: 01-2020, reporting period 12 April–5 May 2020, FAO, Port Moresby.
- FAO (Food and Agriculture Organization of the United Nations) (2020b). *Papua New Guinea food security situation report*, Sitrep No: 02-2020, reporting period 5 May–25 May 2020, FAO, Port Moresby.
- FAO (Food and Agriculture Organization of the United Nations) (2020c). *Papua New Guinea food security situation report*, Sitrep No: 03-2020, reporting period 25 May–30 June 2020, FAO, Port Moresby.
- Garnaut R & Namaliu R (2010). *PNG universities review: report to Prime Ministers Somare and Rudd*, unpublished report, Melbourne and Kokopo, accessed 14 September 2020, [www.dfat.gov.au/sites/default/files/png-universities-review.pdf](http://www.dfat.gov.au/sites/default/files/png-universities-review.pdf)
- GBD (Global Burden of Disease Study) (2016). Measuring the health-related Sustainable Development Goals in 188 countries: a baseline analysis from the GBD study 2015. *Lancet* 388:1813–1850.
- Gibson J (2001). The economic and nutritional importance of household food production in PNG. In: Bourke RM, Allen MG & Salisbury JG (eds) *Food Security for Papua New Guinea*, ACIAR Proceedings No 99, Australian Centre for International Agricultural Research, Canberra, 37–44.
- Gibson J & Rozelle S (2003). Poverty and access to roads in Papua New Guinea. *Economic Development and Cultural Change* 52(1):159–185.
- Gibson J, Datt G, Allen B, Hwang V, Bourke RM & Parajuli D (2005). Mapping poverty in rural Papua New Guinea. *Pacific Economic Bulletin* 20(1):27–43.
- Global Nutrition Report (2020). *Country Nutrition profiles*, Global Nutrition Report, accessed 10 July 2020, <https://globalnutritionreport.org/resources/nutrition-profiles/>.
- Goro J (2020). The impact of coronavirus pandemic on access to public transport in Papua New Guinea. *Spotlight* 18(8), National Research Institute, Port Moresby.
- Hanson LW, Allen BJ, Bourke RM & McCarthy TJ (2001). *Papua New Guinea rural development handbook*, The Australian National University, Canberra.
- Hoy C (2020). *Poverty and the pandemic in the Pacific*, devpolicy@ANU blog, 15 June 2020, <https://devpolicy.org/poverty-and-teh-pandemic-in-the-pacific-20200615-2/>.
- Inamara A (2020). *Sustaining fresh food supply in Lae during the coronavirus (COVID-19) crisis*, Department of Pacific Affairs, The Australian National University, Canberra.
- Kabilo P (1 May 2020). *COVID-19 impacts on the informal economy in Wewak, Papua New Guinea*, Pacific People Partnership, accessed 14 September 2020, <https://pacificpeoplespartnership.org/covid-19-impacts-on-the-informal-economy-in-wewak-papua-new-guinea/>.
- Kanua MB, Bourke RM, Jinks B & Lowe M (2016). *Assessing village food needs following a natural disaster in Papua New Guinea*. Church Partnership Program, Port Moresby.
- Koczbarski G, Curry GN, Bue V, Germis E, Nak S & Tilden G (2018). Diffusing risk and building resilience through innovation: reciprocal exchange relationships, livelihood vulnerability and food security amongst smallholder farmers in Papua New Guinea. *Human Ecology* 46:801–814.
- Koczbarski G, Curry GN, Nake S, Tilden G, Peters E, Germe E, Nailina R, Natera K, Ryan S & Nelson P (2019). *Strengthening livelihoods for food security amongst cocoa and oil palm farming communities in Papua New Guinea: final report*, Australian Centre for International Agricultural Research, Canberra.

- Loukos P, Arathoon L & Zibi G (2019). *Landscaping new opportunities for digital agriculture in Papua New Guinea*, Global Systems for Mobile Communication Association, London.
- Manning M (2001). Food security in PNG. In: Bourke RM, Allen MG & Salisbury JG (eds), *Food security for Papua New Guinea*, ACIAR Proceedings No 99, Australian Centre for International Agricultural Research, Canberra, 15–22.
- Mola G (1 May 2020). *Handling the corona virus epidemic in Papua New Guinea* [Facebook], [www.facebook.com/permalink.php?story\\_fbid=1481634785342506&id=100004879960218](https://www.facebook.com/permalink.php?story_fbid=1481634785342506&id=100004879960218).
- NSO (National Statistical Office) (2002). *Papua New Guinea 2000 census: final figures*, NSO, Papua New Guinea, Port Moresby.
- NSO (National Statistical Office) (2013). *Papua New Guinea national population and housing census 2011 census: final figures*, NSO, Papua New Guinea, Port Moresby.
- NSO & ICF (2019). *Papua New Guinea demographic and health survey 2016–18: key indicators report*, National Statistical Office of Papua New Guinea: Port Moresby and The DHS Program, ICF, Rockville, Maryland, USA.
- Schmidt E, Gilbert R, Holtemeyer B, Rosenbach G & Benson T (2019). *Papua New Guinea survey report: rural household survey on food systems*, IFPRI Discussion Paper 01801, International Food Policy Research Institute, Washington.
- Sharp TLM (2016). Trade's value: relationship transaction in the Papua New Guinea betel nut trade. *Oceania* 86(1):75–91.
- Shaw B (1985). *Agriculture in the Papua New Guinea economy*, Institute of National Affairs Discussion Paper No 20, Institute of National Affairs, Port Moresby.
- UN (2020). *World population prospects: Papua New Guinea*, United Nations, Department of Economic and Social Affairs, Population Division, UN.
- UNDP (United Nations Development Programme) (2020). *Human development reports*, UNDP, accessed 10 July 2020, <http://hdr.undp.org/en/content/2019-human-development-index-ranking>.
- UNICEF (2020). *Country report: Papua New Guinea*, UNICEF.
- Whitecross N & Franklin P (2001). The role of rice in the 1997 PNG drought. In: Bourke RM, Allen MG & Salisbury JG (eds), *Food security for Papua New Guinea*, ACIAR Proceedings No 99. Australian Centre for International Agricultural Research, Canberra, 255–259.
- Wilson RK (1975). Socio-economic indicators applied to sub-districts of Papua New Guinea. *Yagl-Ambu* 2(1):71–87.
- World Bank (2004). *Papua New Guinea: Poverty Assessment*, World Bank, Washington.
- World Bank (2020). The World Bank Databank for Health, Nutrition and Population Statistics, accessed 10 July 2020, <https://databank.worldbank.org/home.aspx>.

## 7. COVID-19 and food systems in the Philippines



Photo: ACIAR / Conor Ashleigh

# 7 COVID-19 and food systems in the Philippines

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## 7.1 Abstract

This assessment examines the impacts of the COVID-19 pandemic on the Philippines' food security using a supply-chain approach. The National Capital Region (NCR) (also known as Metro Manila) is the focus, as it is acknowledged to have incurred both the greatest health impact from COVID-19 and critical supply-chain disruption in terms of food demand and consumption. The assessment explores four key food commodity chains (rice, pork, cabbage and Lakatan banana), the impact of the pandemic on the production, distribution and demand for those commodities and the interaction of COVID-19 with other external shocks and pre-existing sensitivities.

Four key themes regarding exposure and impacts emerged:

- Other external drivers were playing a more significant role in food availability across the four food commodity chains than COVID-19.
- Local enforcement of transport restrictions is creating supply-chain bottlenecks, particularly for production inputs and produce distribution.
- Consumer and retail components of the food commodity chains have been significantly affected by enforced community quarantine.
- Despite the large number of women engaged along these food commodity chains, there has been no targeted response designed to support them, particularly in the processing and retail segments.

Opportunities for short-term measures include:

- exploring other food commodity chains and locations
- addressing knowledge gaps that have arisen from the assessment
- encouraging innovative synergies between producers and consumer segments
- realigning government recovery funds to support food security.

Opportunities for intermediate- and longer-term measures include:

- improving coordination systems for food logistics
- improving the efficiency and flexibility of value chains
- exploring and mainstreaming mechanisms with which agriculture can support inclusive social protection
- exploring processing and storage to address food waste
- developing national food security infrastructure such as food depots that incorporate aspects of food availability, access and utilisation.



## 7.2 COVID-19 in the Philippines

### 7.2.1 Country overview (July 2020)



#### Land use

Land area: 300,000 km<sup>2</sup>  
41.7% agricultural land  
9.3% GDP from agriculture and fish (2018)



#### Population

110 million people  
53% rural  
Adjusted income per capita  
US\$3,835



#### COVID-19 and health

First recorded case: 30 January 2020  
At 31 July 2020:  
89,374 known cases;  
1,983 recorded deaths\*  
Hotspot in Metro Manila



#### Local response to COVID-19

State of public health emergency: 8 March 2020  
Suspension of travel, schools and work attendance in capital  
Enhanced Community Quarantine in Metro Manila and Luzon  
Bayanihan to Heal as One Act and Social Amelioration Program established



#### Agriculture and fisheries

Top staples: cereals, rice, coconuts, bananas, maize  
Agriculture and fisheries production declining  
Low farm productivity compared to similar ASEAN countries  
One of the top fish producers; need for more sustainable practices



#### Key risk multipliers

Agricultural pests and diseases  
Exposed to frequent tropical cyclones (typhoons) each year

\* The assessment reports 26,420 known cases and 1,098 recorded deaths at 15 June 2020, reflecting the situation at the time of core aspects of the research.

### 7.2.2 Development context

The Philippines is home to an estimated 110 million people who inhabit 7,641 islands. It has enjoyed a period of rapid economic growth, with an average rate of 6.3% from 2010 to 2018 (World Bank 2020a). The benefits of this rapid growth include significant reduction in poverty, from 23.5% in 2015 to 16.7% in 2018, despite an increase in the poverty criteria threshold from 22,747 Philippine pesos (PHP) (US\$455) per capita in 2015 to PHP25,813 (US\$516) per capita in 2018. The incidence of food poor has also dropped from 9.1% in 2015 to 5.2% in 2018 (PSA 2020a). An overview of Philippine agricultural, fisheries and nutrition context is provided in Table 7.1.

Collectively, the country's agriculture, forestry and fisheries sectors have shown a steady decline in contribution to gross domestic product from 12.7% in 2010 to 9.3% in 2018 (World Bank 2020a). According to Dy (2017), this decline is the result of a continued primary focus on domestic markets; an export base that is primarily focused on coconuts (which is experiencing a decline in global market value due to increased palm oil production) and Cavendish bananas (a relatively new product, primarily operated by large private companies); and generally small landholdings (an average of 1 ha per farmer). Citing United States Department of Agriculture Economic Research Service Data, Dy (2019) also shows lagging farm productivity, with an average total factor productivity rating of 1.87 (2001–13) compared to similar ASEAN countries, which ranged from 2.22 to 2.85.

Agricultural productivity and associated livelihoods are highly variable across the Philippines. Poverty incidence provides an indirect indicator of this heterogeneity. The incidence of poverty in the NCR—a cluster of highly urbanised cities—is 2.2%. In the more rural settings of Luzon, Visayas and

Mindanao, poverty incidence ranges from 11.4% to 31.6%.

### 7.2.3 Status of COVID-19 in the Philippines

As of 15 June 2020, there were 26,420 confirmed cases of COVID-19 in the Philippines and 1,098 deaths (GOV.PH 2020). The national COVID-19 situation is coordinated by the Inter-Agency Task Force for the Management of Emerging Infectious Diseases (IATF).

The first local positive case was detected by the Department of Health on 30 January 2020, coinciding with a declaration from the World Health Organization (WHO) elevating COVID-19 to a global public health emergency. Between February and March 2020, much of the Philippine government efforts were focused on establishing and enforcing border closures and domestic travel restrictions.

The following timeline highlights the rapid development of a national COVID-19 response:

- 7 March 2020: Department of Health confirmed the first case of local transmission, leading to a declaration of a state of public health emergency across the country the following day. This included announcements on the suspension of school activities, prohibition on mass gatherings (church activities, social events, etc.) and request for changes to working arrangements encouraging more working from home.
- 12 March 2020: Identifying a sudden increase in local transmissions and the WHO declaration of COVID-19 as a global pandemic, the IATF increased the alert status to Code Red sub-level 2 and announced intentions to impose a community quarantine on NCR to commence on 15 March 2020.

**Table 7.1** Agricultural, fisheries and nutrition context of the Philippines

Indicators	Unit	Value	
Surface area <sup>a</sup>	'000 km <sup>2</sup>	300	
Agricultural land <sup>b</sup>	percentage of land area (1996)	41.7	
Age of population <sup>a</sup>	0–19 years	percentage of total population	40.7
	20–39 years	percentage of total population	31.8
	40–59 years	percentage of total population	19.5
	over 59 years	percentage of total population	7.6
Stunting rate <sup>c</sup>	under 5 years	percentage of age group	33.4
Wasting rate <sup>c</sup>	under 5 years	percentage of age group	7.1
Overweight <sup>c</sup>	under 5 years	percentage of age group	3.9
	male	percentage of total population	26
	female	percentage of total population	29
Obesity <sup>c</sup>	male	percentage of total population	5
	female	percentage of total population	7
Prevalence of undernourishment <sup>c</sup>	percentage of total population	13.3	
Population distribution <sup>a</sup>	rural	percentage of total population	53
	urban	percentage of total population	47
Gross domestic product per capita <sup>a</sup>	US\$	3,103	
Adjusted net national income per capita (2018) <sup>a</sup>	US\$	3,385	
Agriculture and fisheries, value added <sup>a</sup>	percentage of gross domestic product	9.3	
Government expenditure on agriculture <sup>c</sup>	percentage of total outlays	3.8	
Top staples (ranked most to least) <sup>c</sup>	cereal, rice, coconut, banana, maize, cassava, sweetpotato, taro, yam		
UNDP Human Index ranking <sup>d</sup>	out of 189	114	
Sustainable Development Goal Indicator 2.1.2: Prevalence of moderate or severe food insecurity in the population <sup>b</sup>	percentage of total population	52.5	
2017 World Risk Index (mean value calculation 2012–2016) <sup>e</sup>	out of 171	3	

a World Bank (2020b)

b FAO (2020)

c Global Nutrition Report (2020)

d UNDP (2020)

e Bündnis Entwicklung Hilft (2017)

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

- 15 March 2020: Air, sea, and land travel was suspended into and out of NCR.
- 17 March 2020: President Duterte declared that NCR and the entire Luzon island would be under enhanced community quarantine, effectively suspending work outside of healthcare, food processing and food distribution. Initially, the enhanced community quarantine was scheduled to end on 12 April 2020, but it was extended twice and continued until 1 June 2020. For the rest of the country, enhanced community quarantine was imposed upon recommendation by local government units and/or the Department of Health via the IATF.
- 25 March 2020: The Bayanihan to Heal as One Act (RA No. 11469) was signed by President Duterte. RA 11469 provides the president (and IATF) the ability to quickly respond to the rapidly growing case numbers and concerns regarding ineffective community quarantine. These include:
  - implementation and enforcement of community quarantine rules
  - release of subsidies to low-income households via the Social Amelioration Program
  - permission for local government units to use more than 5% of their existing Calamity Funds<sup>2</sup>
  - ensuring availability of basic goods
  - strict regulation of business and consumer practices (hoarding, profiteering, etc.)
  - ensuring the availability of credit.
- 1 June 2020: Restrictions were relaxed, with most areas of the country under a general community quarantine. Although still under strict physical distancing rules, most business establishments and some public transports were allowed to operate once more. The general community quarantine was extended to the end of July 2020.

### 7.3 Assessment approach

This assessment examines the impacts of the COVID-19 pandemic on the Philippines' food security using a supply chain approach, applying the analytical framework described in Chapter 2. The components of the framework were operationalised using local policies and programs, and through consultations with ACIAR Philippines partners.

The NCR is the focus of the assessment, as it is acknowledged to have incurred both the greatest health impact due to COVID-19 and critical supply-chain disruptions in terms of food demand and consumption.

The assessment explores four key food commodity chains (rice, pork, cabbage and Lakatan banana) in terms of the impact of the pandemic on production, distribution and demand for these commodities and the interaction of the COVID-19 crisis with other external shocks and pre-existing sensitivities.

Given the rapid nature of the assessment, it should be viewed as snapshot of food system dynamics at the start of the pandemic—mainly between March and mid-May 2020—and may not be representative of issues and concerns across the whole of the agricultural sector or the country in general.

2 The Calamity Fund—more formally known as the Local Disaster Risk Reduction and Management Fund—is a fund reserved for purposes of disaster and emergency situations and used by local government units. The fund is authorised by the 2010 Philippine Disaster Risk Reduction and Management Act (RA 10121).

### 7.3.1 Data collection methods

The methods employed for this assessment combine a desktop literature review with structured and semi-structured interviews (focus group discussion and key informant interviews). The desktop review utilised macro-data on the Philippines and NCR data, and COVID-19 and food system-related government policies sourced from official government websites, such as the Philippine Statistics Authority and other national government agencies, released from January to mid-June 2020.

A focus group discussion and key informant interviews were conducted with 17 participants (7 women) who were confirmed to have directly and indirectly participated in the selected food chains, and who are representative of farming communities, agribusiness companies, government agencies and civil society organisations, including women's organisations.

### 7.3.2 Assessment framing using food commodity chains

To reach consensus on which food system to investigate for this assessment, a three-step process was adopted:

1. establish a case study region that includes a high incidence of COVID-19 cases, an intersection of multiple food chains, and good availability and granularity of data
2. select representative food commodity chains that are traceable back to the case study region with demonstrated high utilisation, and with prioritisation among ACIAR partners
3. assess food security of the selected food commodity chains in terms of impact on availability, accessibility and utilisation.

### Case study region

The NCR serves as the case study for the country assessment. It is home to almost 14 million individuals, or 12.7% of the country's total population. The NCR is the seat of government and is the single largest local food market, with US\$9.3 billion equivalent every year, capturing 18.5% of the total annual food expense of the country (PSA 2019).

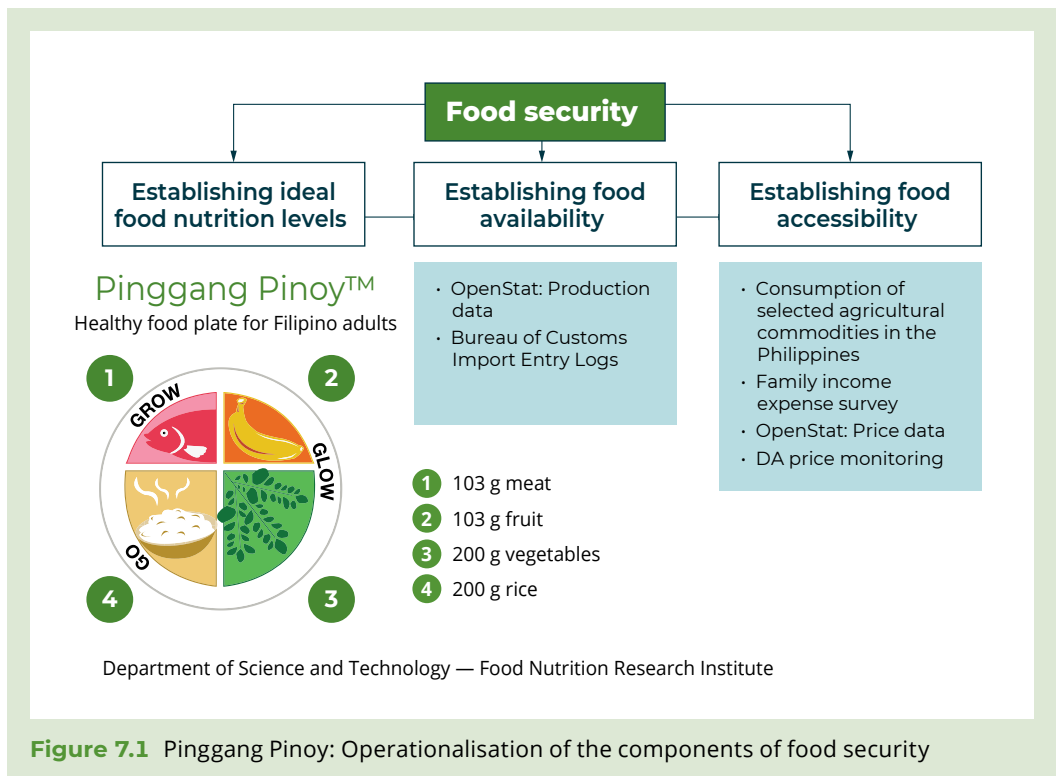
In the Philippines, the NCR has also been hardest hit by COVID-19. As of 4 June 2020, the total number of confirmed COVID-19 patients in the NCR was 11,609 (57% of total cases in the country). The NCR has also had the most stringent application of community quarantine rules imposed since mid-March 2020.

### Food commodity chain selection

The Pinggang Pinoy (Filipino Plate) concept (Figure 7.1) was developed by the Food and Nutrition Research Institute as a way to promote an easy-to-follow healthy food proportion guide for meals (FNRI 2016). The model recommends a daily intake of 200 g of rice, 200 g of vegetables, 103 g fruit and 103 g of meat. For the purposes of this assessment, the Pinggang Pinoy model was used to identify the key food groups and highlight which value chains to examine.

The key food commodity chains include:

- **Rice:** Rice is the main food staple in the Philippines. Key informants with direct participation for the rice food commodity chains included a farmer entrepreneur who also heads a municipal-level farmers organisation, and representatives from social enterprise.
- **Pork:** Pork was chosen primarily to explore its interaction with the African swine fever virus that has been present in the Philippines since 2019. Pork meat is also the second most-consumed meat in NCR (PSA 2017). Key informants with direct participation in the commodity



**Figure 7.1** Pinggang Pinoy: Operationalisation of the components of food security

- chain included representatives from agribusiness companies providing inputs and farm services to both commercial and backyard grower farms.
- Cabbage: Cabbage is the highest consumed highland vegetable in NCR. It is also a priority commodity for the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (PCAARRD) and the High Value Crops Development Program. Key informants with direct participation for the vegetable component included an agribusiness platform that performed logistics linkages in the early months of the community quarantine.
  - Lakatan banana: Lakatan banana is the most-consumed fruit in NCR (PSA 2017) and is also a priority crop of PCAARRD. Assessment of the interaction of COVID-19 with extreme weather events is of special interest in the banana commodity chain. Typhoon Kammuri in early December 2019 and Typhoon Vongfong in mid-May 2020 hit key banana production areas in the Quezon province. Key informants included farmer entrepreneurs and members of a banana growers association.

## 7.4 Assessment results

### 7.4.1 Snapshot of key findings



#### Smallholders

Limited availability of agri-inputs  
Climate exposure encourages conservative farming  
Logistical restrictions a common disruption to farm activities  
Additional disruptions from typhoons in November and May



#### Supply chains

COVID-19 not predominant disruption to food availability in studied chains  
Quarantine impacts significant for consumer and retail segments  
Emergence of online options for agricultural trade  
Programs purchasing local produce for emergency food packs



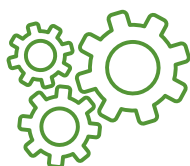
#### Governance

Local enforcement of restrictions creates supply chain bottlenecks  
Local government able to purchase directly from farmers  
National agencies purchased produce from cooperatives  
Social Amelioration Program supports 20 million households



#### Community

Women impacted due to smaller cash flow and reserves; limited credit options  
Estimated 40% decrease in remittances



#### Employment

Underemployment and unemployment reduce household purchasing power  
Immediate contraction in economic supply and demand from lockdown

### 7.4.2 Exposure and impacts

This section examines how the COVID-19 crisis and the government’s response have affected Philippine food systems, as represented by the four food commodity chains. The data collected and inferences made relate specifically to the four food commodity chains that link back to markets in the NCR, and may not capture the diversity of exposures and impacts that exist across the broader Philippine agricultural sector or the country as a whole.

Four themes regarding exposure and impacts are presented here:

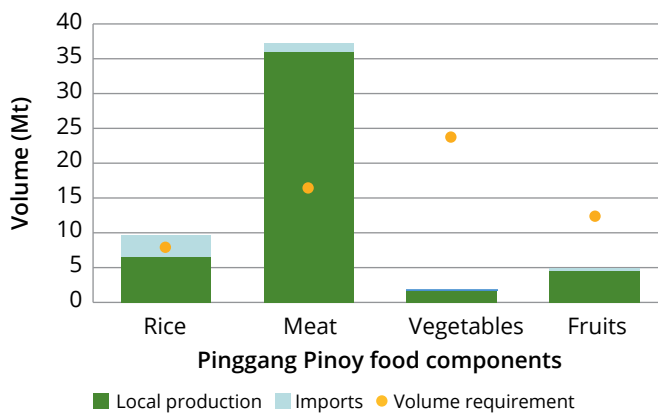
- At this time, other external drivers are playing a more significant role in food availability across the four food commodity chains than the COVID-19 crisis.
- Local enforcement of transport restrictions is creating supply-chain bottlenecks, particularly for production inputs and produce distribution.
- The consumer and retail components of the food commodity chains have been significantly affected by community quarantine.
- Despite the large number of women engaged along these food commodity chains, there has been no targeted response designed to support them, particularly in the processing and retail segments.

The sections below provide a more detailed account of these four exposure and impact themes.

#### COVID-19 is not the predominant disruption to food availability

Pinggang Pinoy recommends the volume of food needed to meet nutrition requirements. Figure 7.2 provides a snapshot (quantified in 2019) of food availability from locally produced food and food imports:

- Pork meat has the highest volume of locally produced commodity,



**Figure 7.2** Comparison of food availability from local production and imports to volume requirements from the Pinggang Pinoy model (2019)

Note: Meat data is an aggregate of 4 animal and 17 fish varieties; vegetable data is an aggregate of 23 varieties; fruit data is an aggregate of 13 varieties but excludes Cavendish bananas and pineapples. Vegetable and fruits data are derived from average of trends from 2015 to 2018.

Source: FNRI (2016), PSA (2020b) and Bureau of Customs (2020).



achieving a 129.1% surplus against the volume requirement of the Pinggang Pinoy model.

- Rice, which has been the focus of government for decades (Dy 2017), achieves 24.8% surplus after rice imports have been added.
- Vegetables and fruits are significantly lower than the target recommended by Pinggang Pinoy, with shortages of 92.2% and 59.8% respectively.

Trend analysis of these data from 2015 to 2019 indicate that these production volumes have been quite stable over time.

The following sections examine the dynamics of the selected commodity chains during the COVID-19 pandemic.

### *Rice*

In March 2020, the Department of Agriculture announced the likelihood of severe rice shortages in the latter half of 2020 due to rice export bans instituted by Vietnam and the cancellation of an order of 400,000 t earmarked for the Philippines.

In 2019, the share of imported rice to the overall supply of the country increased with the ratification of the Rice Tariffication Act (RA 11203) in response to the expired extensions on rice import volume restrictions and high inflation rates.

While RA 11203 led to a significant drop in inflation, from 6.7% in September 2018 to 2.8% in September 2019 (NEDA 2019), the impact was detrimental to local farmers. Prices dropped as low as PHP8 per kg for fresh paddy (with rice production being on average 4 t/ha, the resulting gross revenue is PHP32,000 against an operating cost of PHP56,000 per ha). Fortunately, the beginning of the COVID-19 pandemic also coincided with the rice dry harvest, increasing the overall available volume of rice nationally.

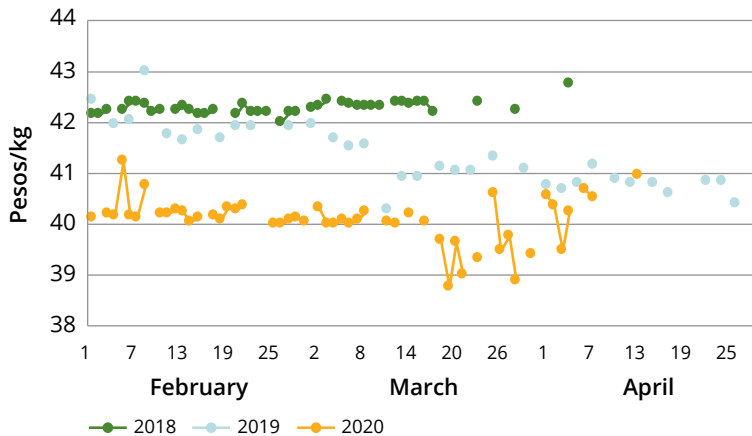
The Bayanihan to Heal as One Act (RA 11469) allowed local government units to access their Calamity Funds to purchase fresh rice directly from farmers (in some cases, at a higher price than would be found at market). National agencies also purchased large volumes of rice from cooperatives and other farming groups for distribution as part of relief packages in areas with no rice production (NCR and other highly urbanised areas). These relief packages contained 2–5 kg of rice per family, and were distributed with variable frequency from March to June 2020.

The fear of rice shortages resulted in significant spikes in farming activity along the rice food commodity chains during the COVID-19 pandemic (Figure 7.3). With the resumption of rice exports from Vietnam in May 2020, and the expiration of the Bayanihan to Heal as One Act on 25 June 2020, it is not clear if high prices for local rice can be sustained as greater volumes become available. There are some suggestions that a Bayanihan 2 program may be implemented to continue and expand the activities of the Bayanihan to Heal as One Act, but there was no significant movement in legislation at the time of the assessment.

Well-milled rice, the more popularly consumed type of rice sold in the market, generally had a lower retail price in 2020 when compared to both 2018 and 2019 in the months February–April (Figure 7.3). While there is a clear increase in prices from the start of the Community Quarantine in mid-March to mid-April, the Department of Agriculture implemented a price freeze in April in order to arrest these increases.

### *Pork*

Pork is the second most-consumed meat commodity in the NCR, with residents consuming 13.6 kg per capita per month (PSA 2017). Using estimated 2019 population data and consumption levels of



**Figure 7.3** Retail prices of well-milled rice, National Capital Region, the Philippines (February–April 2018, 2019 & 2020)

Source: Department of Agriculture (2020)

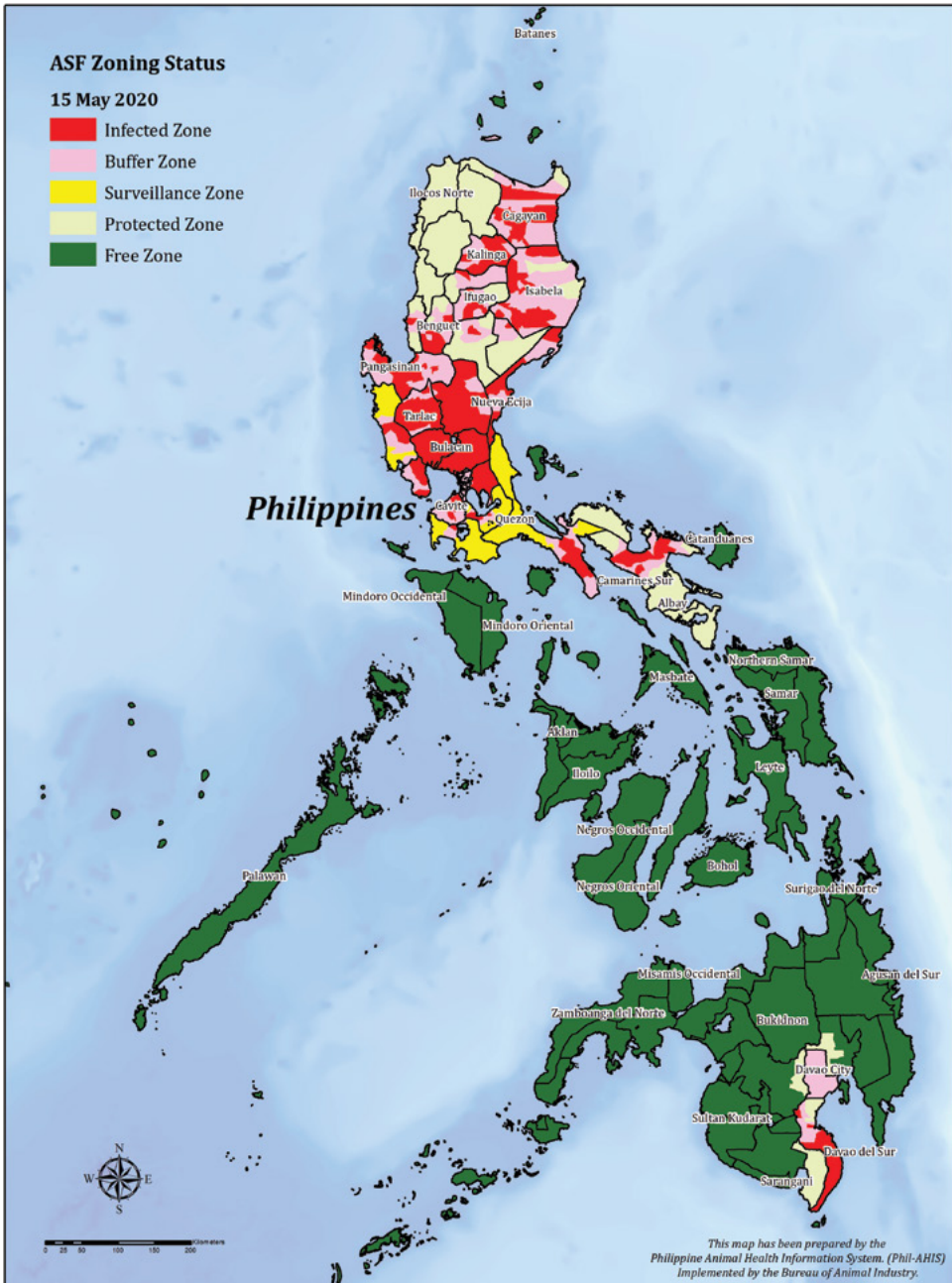
pork (PSA 2017), the national requirement for pork meat is 0.962 Mt. Slaughterhouse data indicates that locally produced pork exceeds 1.9 Mt per year, exceeding the volume requirement by 98%. Despite this massive surplus, the Philippines still imported 4.5 Mt of pork meat in 2019 (Bureau of Customs 2020). Food processors use imports for up to 85% of their raw meat requirement (of pork and other meats). The stated reasons were the non-alignment between local production quality and the food processors' technical requirements (Board of Investments 2016).

The Department of Agriculture confirmed the first outbreak of African swine fever in the Philippines in July 2019. Despite efforts to restrict the movement of livestock, infections spread to provinces north of the NCR: Bulacan, Pampanga and Nueva Ecija (Figure 7.4). By 15 May 2020, the Department of Agriculture reported the culling of 284,607 animals due to African swine fever.

Retail prices of lean pork meat were significantly lower in February 2020 than in 2019 (Figure 7.5), suggesting a reduction in demand, most likely due to erroneous fears that African swine fever is zoonotic.

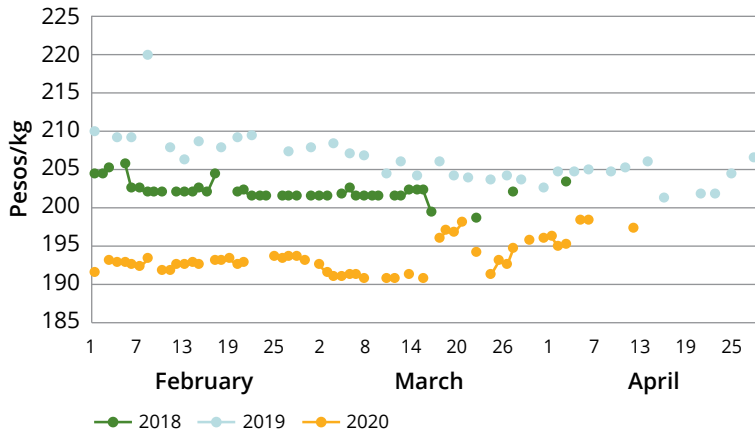
Informants from the swine industry suggested that while pork meat supply from areas north of NCR has been disrupted due to African swine fever, the main source of pork meat for NCR is South Luzon, which has so far managed to maintain the spread of African swine fever.

By May 2020, Mindanao, the southernmost major island of the Philippines (and around 1,000 km south of Manila) reported an oversupply of pork meat and was earmarked as a potential source for NCR pork requirements in the coming months. However, high inter-island shipping costs (more expensive than shipping products to Hong Kong) (Dy 2017) and logistical restrictions brought about by the community quarantine make this strategy costly.



**Figure 7.4** African swine fever zoning map (15 May 2020)

Source: Bureau of Animal Industry (2020)



**Figure 7.5** Retail prices of lean pork meat, National Capital Region, the Philippines (February–April 2018, 2019 & 2020)

Source: Department of Agriculture (2020)

The occurrence of African swine fever has had significant impacts on both production and consumption elements of the pork value chain. As of 15 July 2020, the scale of impacts of the COVID-19 crisis have been far smaller. The travel restrictions imposed in response to the pandemic may have contributed to a slowing in the spread of African swine fever, but this has yet to be confirmed. Informants noted that pig farmers are slowly restarting their activities and estimate that the swine industry will rebound to its pre-African swine fever performance in the last quarter of 2021.

### Cabbage

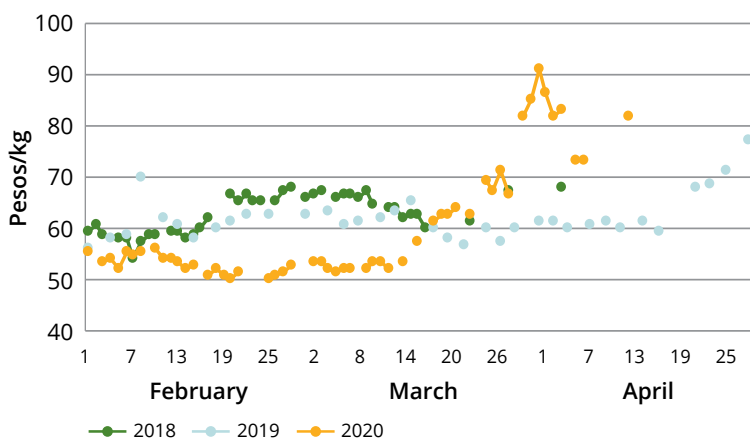
Cabbage is the most highly consumed highland vegetable in NCR at 2.1 kg per capita (PSA 2017); however, more affluent sections of the community consume it more frequently, with increasing consumption trends associated with Japanese, Korean and Chinese restaurants opening in the NCR.

The main source of cabbage for NCR is the Cordillera Autonomous Region, approximately 300 km north of NCR. It is estimated that this region provides approximately 26,000 t of cabbage to NCR each year, representing 42% of the total volume of cabbage brought to NCR trading posts (JICA & PwC Philippines 2019).

Farm-gate prices for cabbage in the Cordillera Autonomous Region are typically PHP20/kg (US\$0.40/kg) (JICA & PwC Philippines 2019). However, in February 2020, farm-gate prices dropped to PHP4.96/kg (US\$0.01/kg) due to plentiful supply and lower demand from NCR restaurants.

By the beginning of April, cabbage retail prices in NCR had risen to a three-year high of PHP90/kg as a result of restrictions on travel and transport (Figure 7.6).

Despite the demand for inclusion of vegetables in relief food packs, this was not uniformly applied due to difficulties of transport and distribution of these fresh



**Figure 7.6** Retail prices of cabbage, National Capital Region, the Philippines (February–April 2018, 2019 & 2020)

Source: Department of Agriculture (2020)

goods. Informants observed farmers throwing vegetables away (including cabbage) due to a lack of demand.

### Lakatan banana

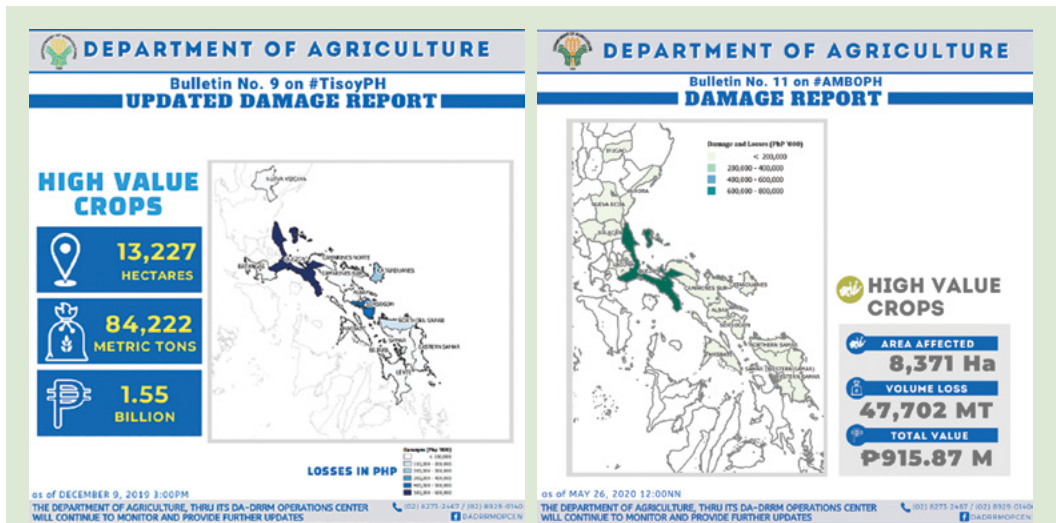
Banana is the most-consumed fruit in NCR at 12.2 kg per capita (PSA 2017). In 2019, the production of Lakatan banana was estimated at 930,000 t, covering 75% of the volume requirements of the Philippines (PSA 2020b). Of significant concern for the local banana is its high spoilage rates of up to 30% (Nuevo & Apaga 2010). For this reason, many banana grower groups also process their harvested banana into banana cake, which is typically prepared and marketed by women.

The Climate Change Commission has shown that 92% of damage to Philippine agriculture from 1990 to 2006 was attributable to climate and weather disturbances: 70% from typhoons, 18% from floods, and 4% from droughts (Llanto 2016). The Philippine Atmospheric, Geophysical and Astronomical Services Administration estimates that the

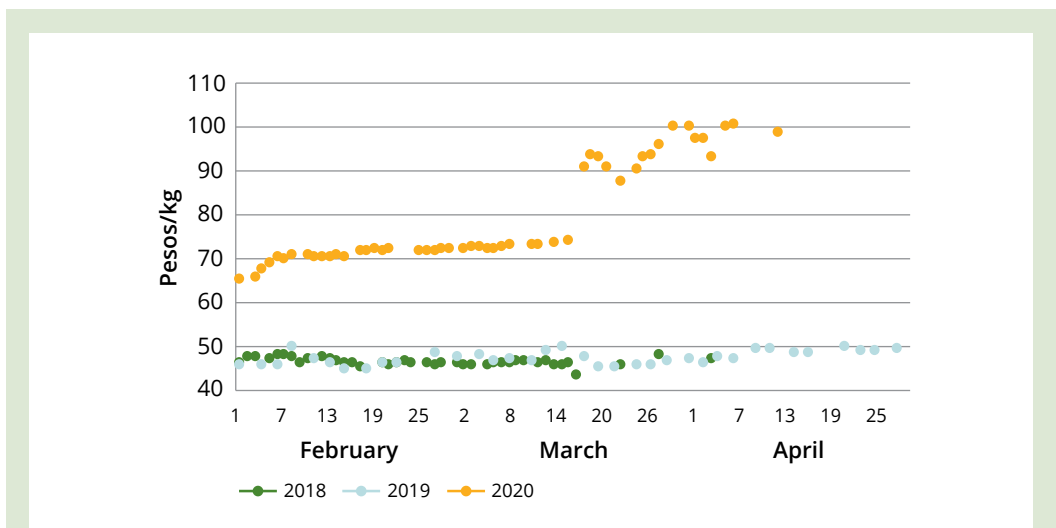
country is hit by 20 tropical cyclones on average each year. On 30 November 2019, Typhoon Kammuri (locally known as Typhoon Tisoy) entered the Philippine Area of Responsibility and by 2 December 2019, the tropical cyclone was above the Southern Luzon area with maximum sustained winds of 155 km per hour and maximum gusts of 190 km per hour (PAG-ASA 2019).

Typhoon Kammuri led to significant damage to banana farms in Southern Luzon, disrupting farm and economic activities (Figure 7.7). When the COVID-19 pandemic reached the Philippines, a large portion of banana production in those areas was still in disarray.

Unlike rice and pork meat, banana prices were not subject to a price freeze during community quarantine. Sharp increases in prices were observed between 14 March 2020 and 17 March 2020. This came on top of already significantly higher prices compared with 2018 and 2019 (Figure 7.8).



**Figure 7.7** Department of Agriculture bulletin report on Typhoon Kammuri (left) (9 December 2019) and Typhoon Vongfong (right) (16 May 2020)



**Figure 7.8** Lakatan banana prices (February–April 2018, 2019 & 2020)  
Source: Department of Agriculture (2020)

In mid-May 2020, Typhoon Vongfong (known locally as Ambo) made landfall over the major producing region for Lakatan bananas. Farmers shifted to other fast-growing cash crops, such as squash, in order to ensure some continuity in cash flow. Recovery efforts for these farming households are led by the Department of Agriculture and normally involve provision of subsidies for input materials.

Prior to the COVID-19 pandemic, some sectors of Philippine agriculture were already suffering production disruptions due to poor policy implementation, pests and disease spread and severe weather events.

#### *Local enforcement of logistics restrictions creates supply chain bottlenecks*

On 17 March 2020, the enhanced community quarantine came into effect in the NCR and the rest of Luzon. In addition, IATF Resolution No. 13 (17 March 2020) stated:

The [Philippine National Police] is instructed to allow the unimpeded movement of all types of cargoes, subject to its authority to conduct inspection procedures in checkpoints for the purpose of ensuring that protocols on strict home quarantine are observed.

In concert with the IATF Resolution, the Department of Agriculture released an internal memorandum on 'Implementation procedures related to Food Lane Accreditation' to facilitate the continued distribution of agricultural commodities between rural and urban regions. It covered transport of:

...rice, perishable agricultural commodities, such as fresh fruits and vegetables, livestock and poultry, frozen meat and processed food products, feeds, fertilisers and other agricultural inputs and fishery commodities.

As of 2 April 2020, 21,177 Food Lane Passes had been distributed for Luzon alone according to the Department of Agriculture Agribusiness and Marketing Assistance Service. Despite sufficient Food Lane Passes being issued, it has been widely reported that ad hoc stoppages have disrupted the flow of food into the NCR (Figure 7.9).

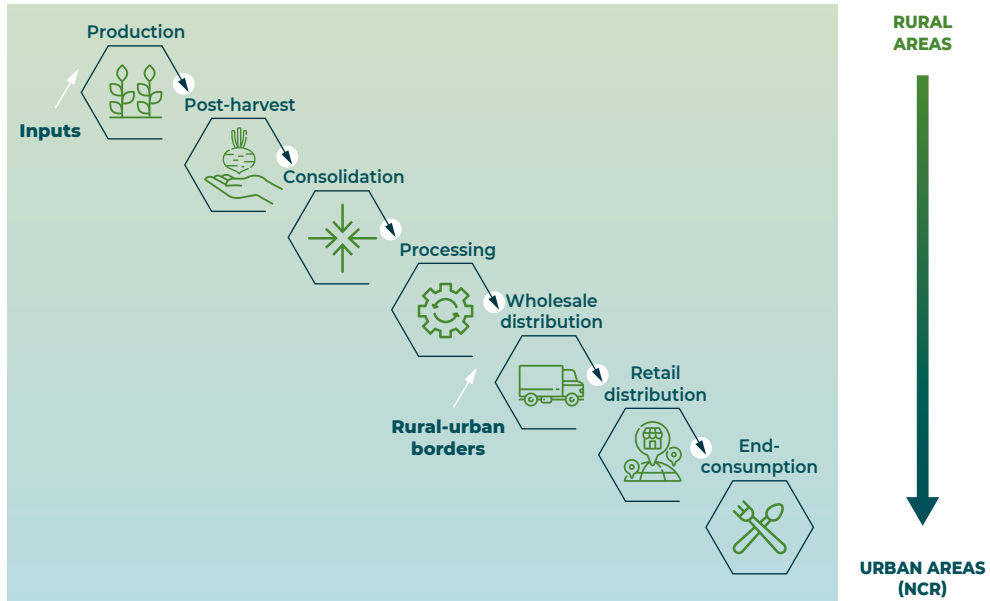
A National Economic and Development Authority survey revealed that 14% of respondents reported lengthy checkpoint stoppages, despite having the required paperwork. Ineffective implementation of the passes resulted in transport interruptions and contributed to significant price volatility (Figures 7.3, 7.5, 7.6 and 7.8).

#### *Consumer end of food commodity chains significantly affected by community quarantine*

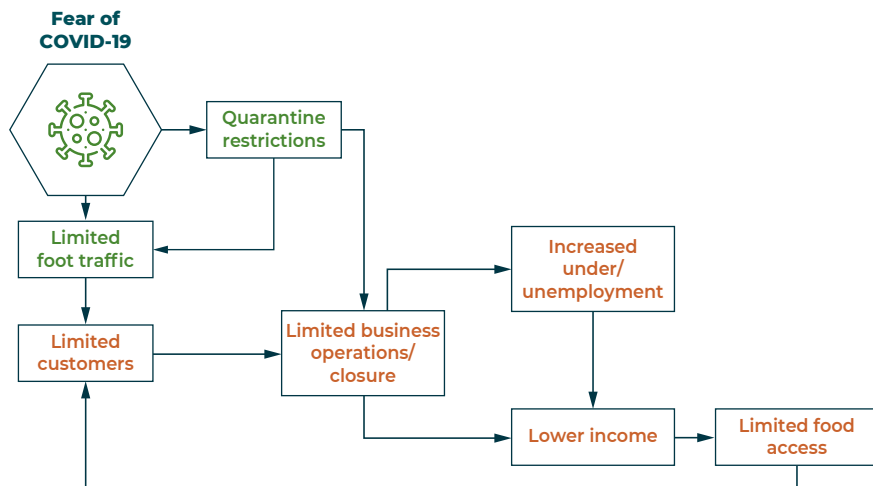
The Philippines is a consumer-driven economy. Household final consumption comprised over 70% of gross domestic product for more than a decade, reaching 73.2% in 2019 (World Bank 2020a). Throughout these years, 40% of household final consumption was attributable to food-related expenditure (PSA 2019).

Prior to the COVID-19 pandemic, NCR residents spent US\$9.3 billion each year on food expenses, capturing 18.5% of the total annual food expenditure of the country (PSA 2019). For the whole country, an estimated US\$2.9 billion is spent annually on food purchased outside homes (PSA 2019), directly supporting around 40% of the 92,000 food retail establishments (PSA 2015, Rubio 2019).

As the pandemic continued, impacts on patterns of NCR consumption changed in response to changes in employment and income. As a result of the restrictions, movement within the NCR was limited, resulting in a reduction in customer numbers, reduced purchases and consumer demand, and the closure of businesses



**Figure 7.9** Logistical bottlenecks at all parts of the supply chain, particularly for transport inputs and movement at rural–urban borders



**Figure 7.10** Impact of the COVID-19 crisis on the consumer side of the food system



(Figure 7.10). With business closures, unemployment rates rose rapidly, with an estimated 2.2 million workers displaced or unemployed (Inter-Agency Task Force Technical Working Group for Anticipatory and Forward Planning 2020). Significant increases in underemployment ensued, as workers were stood down.

Unemployment and underemployment served to reduce the purchasing power of many households, with 70% reporting reduced incomes and 44% reporting insufficient income to meet basic household needs. As a result, 60% of households have reportedly reduced their food consumption with 60% of micro, small and medium-sized enterprises recording no sales between mid-March and early April 2020 and up to 75% of small and medium-sized enterprises facing closure of their businesses (Inter-Agency Task Force Technical Working Group for Anticipatory and Forward Planning 2020).

The authors estimate that, to afford the volume of foods stipulated by the Pinggang Pinoy model, a family of five would need to spend an estimated PHP14,368 (US\$287) per month. Assuming complete reliance on savings from January to March 2020, it is estimated that only the top 5% (95th percentile) of NCR families have a high enough combined family income to purchase these food volumes (PSA 2019) over the next three months.

Many low-income families have become beneficiaries of the government's Social Amelioration Program, which targeted 20 million households nationwide. The Social Amelioration Program is in addition to subsidies provided by the local government units and food packs provided by both national and local government.

It is clear that the Social Amelioration Program will not be able to cover the basic needs of families past the end of May 2020. Food packs released by Department

of Social Welfare and Development are designed to cover only two to three days per family (Official Gazette 2013).

The Department of Labor and Employment released projections indicating a decline in remittances of as much as 40%, estimated at US\$13 billion for the year. This projection was based on the department's findings that only 55% of the 345,000 overseas Filipino workers intended to stay abroad. For the remaining 45%, displacement from work and voluntary repatriation were cited among overseas Filipino workers as reasons for returning. This also contributes to the decreased purchasing power of many households dependent on remittances.

### *Lockdown disrupted demand and supply for women in agrifood system*

Across all local industries, women account for 37.9% of total employees, comprising 15.4% upstream food commodity chains segments, 9.8% processing food commodity chains segments and 74.8% downstream food commodity chains segments (services, retail and wholesale) (PSA 2018). An estimated 2.25 million women work in agriculture, hunting and forestry, making these industries the second-largest employer of women in the Philippines (PSA 2018).

The lockdown produced an immediate contraction in the economic demand and supply that has distorted the local economy. Women in agribusiness face specific difficulties absorbing that economic shock. Some examples from informants include:

- A lead farmer and 20 women farmers in her cooperative were unable to sell any produce at the market or trade with neighbouring municipalities because of local government restrictions during lockdown.
- A retail store owner was unable to access store supplies and could not collect

accounts owed by creditors in lockdown, impacting directly on her cash flow.

- Many food stall owners in Manila (predominantly women) have been forced to close stalls, while others (including a key informant) are operating below capacity to remain open. This not only impacts on household incomes but the incomes of employees.

Women in food systems face difficulties absorbing economic shocks. With smaller cash flow and reserves, limited credit options, less inventory and a reduced (or absent) client base, women face significant challenges in returning to business as usual.

Coping strategies vary. The women farmers were able to sell some of their produce to the regional Department of Agriculture's Kadiwa Program and worked with multiple retail sellers to distribute produce for sale. The food stall owner is operating at 30% capacity, preparing a restricted menu and catering to take-out orders but is apprehensive about the drastic drop in daily sales. The retail store owner has concentrated on fast-selling goods, such as canned goods, noodles, fresh eggs and cooking oil. She applied for a Food Lane Pass and is now able to source products from further away and to collect accounts.

There has yet to be any major COVID-19 response program designed specifically for women, and very little information, specifically relating to women has been developed or disseminated (Inter-Agency Task Force Technical Working Group for Anticipatory and Forward Planning 2020).

### Recovery and resilience

Resilience here is defined as the ability of a food system to absorb stress while maintaining its basic structure (Allen & Prospero 2016). A highly resilient system will have the ability to continue with minimal adjustments when facing a stressor.

A system with low resilience would need a significant change in its structures in order to thrive again. This section assesses the resilience of the food system components and where and how recovery might be best achieved.

### *High resilience among farmers and farming activities*

At the beginning of the COVID-19 pandemic, informants noted that farmers just carried on farming. This was corroborated by a National Economic and Development Authority survey suggesting that 86% of farmers continued their farming activities and that 96% of farmers intend to continue or restart their farm activities in the next cropping season (Inter-Agency Task Force Technical Working Group for Anticipatory and Forward Planning 2020).

A number of factors have contributed to this continuation:

- Farmers in the Philippines have built resilience over time as they face high levels of risk and frequent external shocks to their farm activities.
- In general, on-farm activities are compliant with physical distancing requirements. Activities such as farmer meetings can be easily adjusted to meet these protocols.
- National government agencies, local government units and development and charity organisations have purchased local produce for distribution as part of emergency food packs (driven primarily by the Bayanihan to Heal as One Act). In many cases, these new buyers have temporarily replaced distribution and retail businesses that have suspended operations due to the pandemic or community quarantine.

Suppliers of meat processors are unlikely to be severely affected by the closure of many food manufacturing and service establishments because many of these establishments relied on imported raw meat materials, which made up as much as 85% of their total volume requirement (Board of Investments 2016).

Most of the disruptions to farming activities have been related to logistical restrictions, with 35% of farmers being unable to sell their produce (Inter-Agency Task Force Technical Working Group for Anticipatory and Forward Planning 2020).

While 69% of inorganic fertilisers have been imported into the Philippines for the past two decades (Ani & Abeleda 2018), there are no clear data on the amount of inorganic fertiliser actually needed for optimal soil nutrition.

Farmers have noted difficulty accessing production inputs such as fertiliser, seed and herbicides. It seems likely that farmers and suppliers are running down existing stocks and there are suggestions that supplies are also being procured and distributed as input subsidies for farmers by local government units. This suggests that resilience is declining, and continued border restrictions could create issues for both the next cropping season and future soil fertility.

### *Food services in the NCR need alternative business models*

Micro and small enterprises are at particular risk, as many of them have thin cash flows and lack buffers such as insurance. Informants noted that, despite this, owners still needed to compensate workers who were stood down. In acknowledgment of this stress, the government has suspended tax collection (April was the annual income tax filing month) on property rents and loan interests (Inter-Agency Task Force

Technical Working Group for Anticipatory and Forward Planning 2020).

Informants observed that to maintain business operations during the pandemic and community quarantine, enterprises had to change their business models:

- Restaurant owners are emphasising delivery services and marketing activities through social media or in partnership with internet-based food delivery platforms. They are also forging partnerships with vegetable growers to develop a more differentiated set of food offerings.
- Variety store owners (locally known as sari-sari stores) are shifting from pure retail to including wholesale trading. This has helped establish links with suppliers (who only sell in bulk) and allows them to supply other variety stores.
- Business owners are using more online options for sourcing commodities and are embracing a range of new online business opportunities.

Online shopping has significantly increased during the pandemic, with some online retail platforms claiming a 15-fold increase in transactions (ABS-CBN News 2020). Online food deliveries have become a popular mechanism for food access, which has generated much interest among international development organisations. Residents in NCR spend US\$244 million per month on food purchased outside their homes, which represents one-third of total food expenses per family (PSA 2019). However, it should be noted that online services cater to a small segment of Philippine society. At close to US\$2 per delivery, online delivery fees are equivalent to the cost of one person's daily meal requirement. This is not affordable on a regular basis for most families.

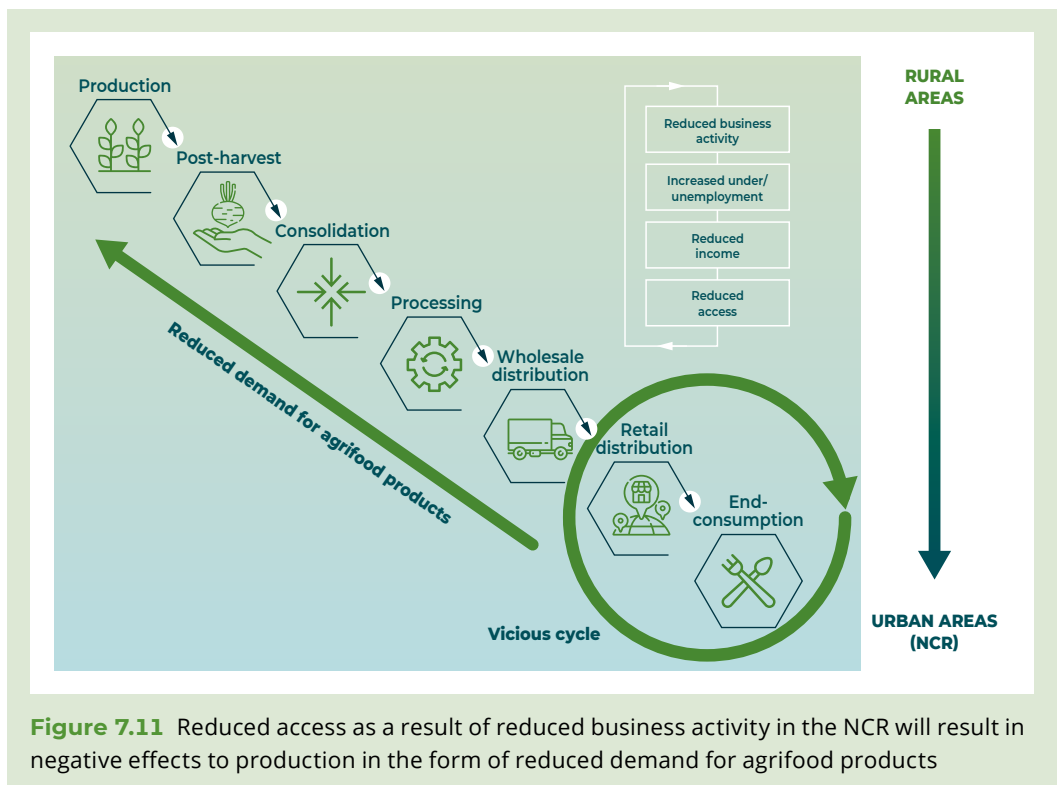
The frequent shocks experienced by the agricultural communities have built resilience among farmers. However, this resilience is characterised by a risk-averse attitude that limits the adoption of high-risk, high-value farming activities and perpetuates conservative low-input farming practices.

While the majority of the farmers have continued to farm and have benefited from shorter value chains driven by government and charitable organisation procurement, these gains are likely to be temporary.

If there is a return to social isolation and travel restrictions, the significant COVID-19 crisis-related impacts being felt at the consumer end of food commodity chains is likely to move to the production side as well.

The NCR is experiencing reduced business activity resulting in increased underemployment and unemployment. This is impacting on patterns of consumption and causing reduced demand for some food commodities. This has already resulted in some localised oversupply of foods and greater price volatility (Figure 7.11).

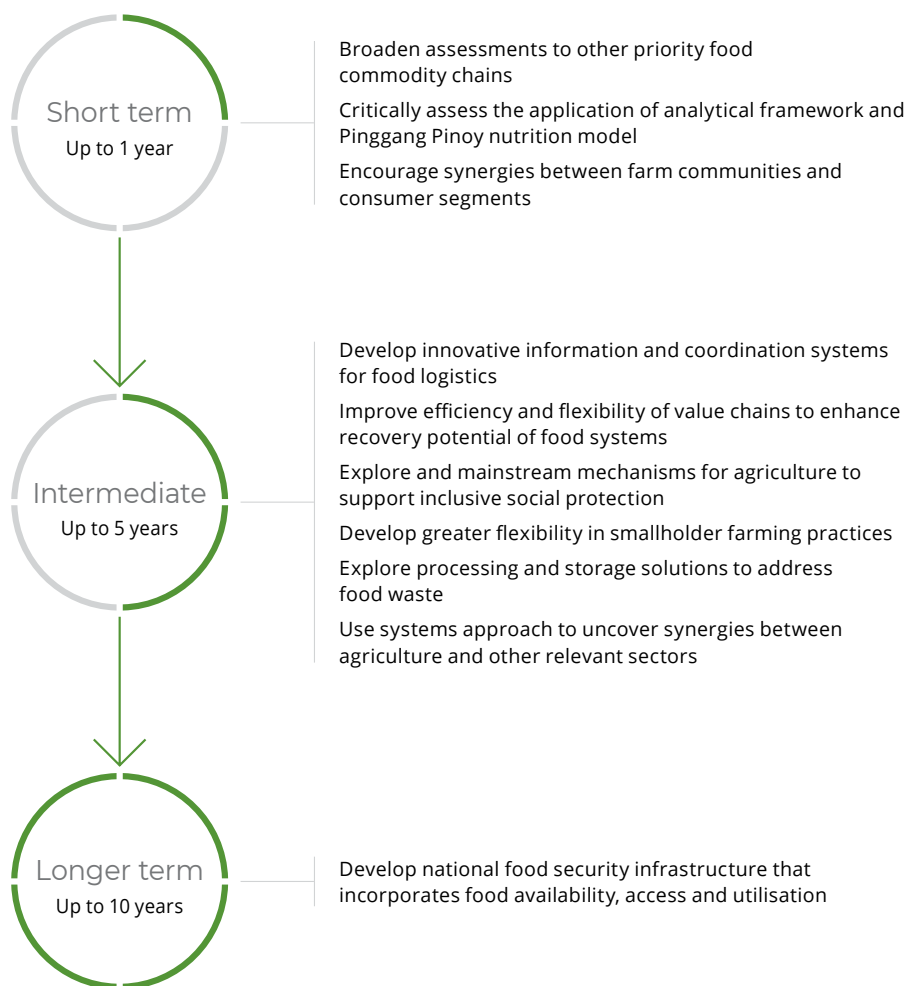
New procurement activities from national government agencies, local government units and developmental and charitable organisations have been beneficial for farmers, and have maintained demand and commodity prices. This is not likely to persist, and when it ceases, this will result in disrupted food chain activities and suspended business operations.



**Figure 7.11** Reduced access as a result of reduced business activity in the NCR will result in negative effects to production in the form of reduced demand for agrifood products

## 7.5 Opportunities for action

### 7.5.1 Snapshot of potential investment options



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

#### *Broaden assessments to other priority food commodity chains*

The current food system assessment only covers four identified food commodity chains, all of which are anchored to the NCR. Assessments covering other food commodity chains of high demand and utilisation could be conducted. These could focus on other highly urbanised areas, such as Metro Cebu in the Visayas or Metro Davao in Mindanao, or any location of interest. There is much interest in fisheries, as well as other crops of priority programs, from PCAARRD and the Department of Agriculture.

In the conduct of the current assessment, the following topics arose as worthy of further exploration:

- the effects of changes in remittances and on food access among recipient households
- agricultural development in the context of the COVID-19 pandemic and how multiple indicators (apart from production and economic development) will change over the next six months
- food systems assessment from the perspective of vulnerable groups, such as women, children, senior citizens, people with disabilities and ethnic minorities.

#### *Critically assess the application of the analytical framework and the Pinggang Pinoy nutrition model*

The current assessment investigates food system vulnerabilities that have been particularly exposed by the COVID-19 pandemic and the community quarantine response, and the resilience and recovery potential of these food systems in the context of the COVID-19 crisis. The Food and Nutrition Research Institute's Pinggang Pinoy model has added structure to the assessment with particular attention to food nutrition practices. To guide future

assessments, an evaluation should examine the efficacy of the analytical framework used in this assessment in concert with the Pinggang Pinoy model, while also considering frameworks or food models that might better suit the demands of any future assessments.

The framing of future assessments should also focus on food security, with special emphasis on food access and food nutrition among consumers within targeted areas. This approach will support more transformative change in the food systems through improvements not just in access but also in health as a result of more nutritious diets, as opposed to merely restoring production capacities within a food system.

#### *Encourage synergies between farm communities and consumer segments*

As a large consumer-driven economy, there is an opportunity to link farm communities with co-located food industries and also to consumers. Simply producing food is not a guarantee that it will be purchased, but on-farm or co-located value adding will improve synergies between the supply and demand sides of the food commodity chains.

Exploration of alternative marketing arrangements, with two-way flows of raw materials and training, technology and markets, may be an effective model for building resilience to future shocks.

Improving consumers' perceptions of sense of place or provenance of specific commodities may also encourage increased consumption of local produce.

The highest annual income class, with incomes of US\$10,000 and over, represent only 7.6% of all Philippine families but they account for 26% of total food expenses in the country. In the NCR, they account for 28.7% of total food expenses (PSA 2019). The ability to cater to the food demands of this segment is an opportunity that needs

to be maximised. Informants mentioned an increase in purchases of more nutritious but more expensive food in response to health concerns during the pandemic (in addition to the high increase in transaction volume through online retail). Nevertheless, the creation of food access channels that cater for the remaining 74% of the population, while complying with physical distancing requirements, needs to be explored quickly. The sari-sari variety stores could act as one channel, immediately jump-starting and expanding their inventory portfolios to include more nutritious food items. This could be done quickly and is immediately scalable.

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

#### *Develop innovative information and coordination systems for food logistics*

One of the biggest contributors to disruptions in the food commodity chains has been logistical and temporary trade restrictions. While the national government endeavoured to ensure unrestricted food logistics, implementation and real-time monitoring among national agencies and local government units was poorly coordinated. Better monitoring and evaluation approaches and commodity tracing are needed to improve implementation and maintenance.

Various technologies are now available to national agencies and local government units, and fast information exchange can be readily achieved. However, training in communications is needed to ensure that messages are well articulated and fully understood by all supply chain stakeholders. For information dissemination to be more effective, the legal language used in official memoranda will need to be simplified and coupled with other critical information drawn from a broad range of sources.

#### *Improve efficiency and flexibility of value chains to enhance recovery potential of food systems*

The recovery potential of a food system is strongly dependent on the efficiencies of value chains within that system. Increased efficiency comes about when value-chain actors and agencies in their enabling environment work together effectively. The best-case scenario is when these stakeholders work together in real time to solve problems that stifle the movement of food commodities from the supplier to consumers.

This may require an immediate adjustment such as shortening chains by removing intermediaries in the supply chain, selling to local markets or choosing logistical routes that provide low travel and/or paths of least sociopolitical resistance. Mechanisms like these are found in non-political, national platforms like Grow Asia's Philippines Partnership for Sustainable Agriculture, which coordinates public, private and development sectors and farm groups to increase value-chain efficiencies. Assessing such platforms to develop improved and scaled-up models may provide a sustainable way to improve value-chain efficiencies in the Philippines.

#### *Explore and mainstream mechanisms for agriculture to support inclusive social protection*

The role and performance of agricultural communities has been placed in the spotlight with the looming COVID-19-induced food crisis. Immediately, agricultural communities involved in food (especially staples) were tapped to produce and ultimately bring food to low-income, local communities and the urban poor. These measures addressed immediate food access problems. The ways that agriculture has been used for social protection should be explored further to improve the mechanics of such programs, understand

how to mainstream these activities as part of disaster risk management protocols and understand how stakeholders other than government can contribute to the development and implementation of more sustainable systems. Insurance and guarantee mechanisms, along with relevant business models, should be explored to inform the development of a robust, readily available and accessible mechanism against future shocks, whether acute or longstanding like the COVID-19 pandemic.

Social protection innovation is needed that leads to more inclusive outcomes (meeting the needs of vulnerable groups such as women, children and low-income farmers), better nutritional levels for all groups and sustainable and resilient agricultural systems. Such social protection designs could use technology (for example, higher quality agricultural inputs and new ways of enhancing credit access) and involve multi-stakeholder engagements (rather than being driven solely by government).

### *Develop greater flexibility in smallholder farming practices*

In this assessment, farm producers have demonstrated their resilience against shocks like the COVID-19 pandemic. However, this is also attributable to risk aversion, which prevents these producers from engaging in high-risk, high-value agricultural practices. Risk aversion is associated with the high prevalence of rural poverty, itself a longstanding vulnerability in the food system. The low income associated with traditional agricultural practices limits participation of local farms in high-demand markets (such as food processing) and the engagement of youth in agriculture. Transformational changes must be sought, rather than efforts that are designed to return farm producers to their previous (suboptimal) state.

Transformational changes may be achieved by increasing the level of flexibility smallholder farmers have around their agricultural practices. This will allow them to change and adjust quickly in response to market demands while also retaining the ability to bounce back quickly after being hit by external shocks. A flexible farm system could be characterised as having increased diversification of high-value food products (achieved through intercropping, companion planting and other multi-product models) and adoption of technology and innovation. While each high-value product would carry higher risk, the distribution of risk across multiple products would mean lower overall risk. Risk may be further mitigated with the introduction of buffer mechanisms such as insurance and guarantees. Studying where and under what contexts such models are being implemented appropriately could improve the likelihood of success for these alternative farm production models.

It is recommended that a more in-depth examination of barriers to adoption of these flexible models and technologies be undertaken to better understand their underpinnings (personal, cultural, etc.) and identify measures to address barriers. Activities involving behavioural and attitudinal changes should be explored, along with ways of underwriting communities and/or agribusinesses that are testing new technologies.

One challenge is exploring new ways to deliver agricultural extension outside local government services. Care must be taken to make these service-delivery mechanisms appropriate to the community context and in keeping with health-related protocols that are designed to prevent COVID-19 spread (such as physical distancing, remote learning, e-extension programs).



### *Explore processing and storage solutions to address food waste*

Despite the looming food crisis, a large amount of food has been discarded. Although primarily due to lack of access to markets, food consumption preferences also played a role. In response, the Department of Agriculture identified points of high food wastage with the aim of setting up food-processing facilities and storage to prolong the shelf life of these food commodities. More information on the value chains of perishable food commodities—often high-nutrition foods—is needed in order to match demand requirements (volume and technical requirements) against production practices. Value-chain information such as this may help develop circular economy models where food wastes can be processed and delivered as inputs for another chain (for example, crop food wastes used as animal feed, and animal wastes used as inputs for crop farming).

### *Use systems approach to uncover synergies between agriculture and other relevant sectors*

Taking a whole-of-system perspective may reveal possible synergies with areas not typically associated with agriculture. For example, movements like One Health look at biosecurity as combining environmental factors, human health and animal health. Many of the safety protocols designed for COVID-19 are similar to biosecurity protocols for preventing the spread of African swine fever. This presents synergies that may open up more opportunities for synergy and resource access than when these issues are addressed in silos.

## **7.5.4 Longer term (up to 10 years)**

### *Develop national food security infrastructure that incorporates food availability, access and utilisation*

The National Food Authority was originally designed to manage the whole country's food security requirements. The National Food Authority now focuses on ensuring a buffer of rice stocks. Informants suggest that many National Food Authority warehouses, which are strategically located to maximise reach to populated areas, are underutilised. These warehouses could be used for buffer stocks of food items in addition to rice, such as meat products, vegetables and fruit. This would require these warehouses to be equipped with appropriate cold storage facilities, as well as protocols for the disposal and replenishment of stocks to effectively manage spoilage.

The operations of these food depots should already be informed by the main pillars of food security—not just availability and accessibility, but also utilisation. Food nutrition—whether based on the simplified Pinggang Pinoy model or a more in-depth dietary plan—should be at the heart of food depot models in order to ensure sufficient nutritious food for the population, even during longstanding crises such as a pandemic.

## 7.6 Conclusions

The Philippines assessment was a rapid and focused approach to illustrate the growing impacts of the COVID-19 crisis on the food system of a country that is already one of the most hazard-prone in the world. The value-chain approach used in the assessment provided an opportunity to explore both production constraints and vulnerabilities, and critical supply chain disruptions in terms of food demand and consumption.

Strong engagement with relevant in-country agencies helped align the selection of commodities with priority research and development programs, as well as national nutrition targets. Demonstration of the analytical framework provides a platform to expand understanding of impacted food systems dynamics to other commodities, regions and supply chain complexity.

Four key themes emerged from the assessment:

- At the time of the assessment, other external drivers (for example, climate factors, pests and diseases) were playing a more significant role in food availability across the four food commodity chains than COVID-19.
- Local enforcement of transport restrictions is creating supply-chain bottlenecks, particularly for production inputs and produce distribution.
- Consumer and retail components of the food commodity chains have been significantly affected by enforced community quarantine and restricted logistics.
- Despite the large number of women engaged along these food commodity chains, there has been no targeted response designed to support them, particularly in the processing and retail segments.

These findings and others suggest a range of research and investment opportunities across the three study time frames. In the shorter-term, opportunities include:

- additional focus on priority food commodity chains, vulnerable societal groups and geographies
- linking producers to consumers through alternative distribution and marketing mechanisms.

In the intermediate-term, opportunities include:

- improved information management and coordination systems for food logistics
- supporting food system recovery through improved efficiency, coordination and flexibility across value chains, including smallholders
- finding ways for agriculture to support inclusive social protection and to better mitigate food waste.

In the longer-term, there is an opportunity to develop national infrastructure to better equip the country for future food crises, that incorporates multiple aspects of food security, including food availability, access and utilisation.

## 7.7 References

- ABS-CBN News (April 16 2020). *Lzada: Grocery demand grew 15 times during lockdown*. ABS-CBN News (Philippines), accessed 6 June 2020, <https://news.abs-cbn.com/business/04/16/20/lazada-grocery-demand-grew-15-times-during-lockdown>.
- Allen T & Prospero P (2016). Modelling sustainable food systems. *Environmental Management* 57:956–975.
- Ani PB & Abeleda MF (2018). *Towards a more productive agriculture. A review of the policies affecting the Philippine fertilizer industry*. Food and Fertilizer Technology Center for the Asia and the Pacific Region, accessed 2 June 2020, [http://ap.iftc.agnet.org/ap\\_db.php?id=895](http://ap.iftc.agnet.org/ap_db.php?id=895).
- Board of Investments (2016). *Processed Meat Industry*. Board of Investments (Philippines), accessed 5 June 2020, <http://industry.gov.ph/wp-content/uploads/2016/08/Processed-Meat-Industry-Roadmap-by-Francis-Penaflor-BOI-Sectoral-Champion.pdf>
- Bündnis Entwicklung Hilft (2017). *WorldRiskReport*. Bündnis Entwicklung Hilft, Berlin, accessed 10 July 2020, [http://weltrisikobericht.de/wp-content/uploads/2017/11/WRR\\_2017\\_E2.pdf](http://weltrisikobericht.de/wp-content/uploads/2017/11/WRR_2017_E2.pdf).
- Bureau of Animal Industry (2020). *African swine fever zoning map*. Bureau of Animal Industry, Philippines.
- Bureau of Customs (2020). *Daily Entries of Import Logs*. Bureau of Customs (Philippines), accessed 1 June 2020, [customs.gov.ph/import-reports/](https://customs.gov.ph/import-reports/).
- Department of Agriculture (2020). *Price Monitoring*. Department of Agriculture, accessed 5 June 2020, [www.da.gov.ph/price-monitoring/](http://www.da.gov.ph/price-monitoring/).
- Dy RT (2017). *Agribusiness and Rural Progress: Actions for Poverty Reduction*, University of Asia and the Pacific, Pasig City, Philippines.
- Dy RT (2019). *Agribusiness: Pathways to Prosperity*, University of Asia and the Pacific, Pasig City, Philippines.
- FAO (Food and Agriculture Organization of the United Nations) (2020). *FAO data*, accessed 10 July 2020, [www.fao.org/faostat/en/](http://www.fao.org/faostat/en/).
- FNRI (Food and Nutrition Research Institute) (2016). *Pinggang Pinoy: Healthy food plate for Filipinos*, FNRI, Philippines, accessed 1 June 2020, [www.fnri.dost.gov.ph/index.php/tools-and-standard/pinggang-pinoy](http://www.fnri.dost.gov.ph/index.php/tools-and-standard/pinggang-pinoy).
- Global Nutrition Report (2020). *Country Nutrition profiles*, Global Nutrition Report, accessed 10 July 2020, <https://globalnutritionreport.org/resources/nutrition-profiles/>.
- GOV.PH (2020). *Laging Handa*, GOVPH, Philippines, accessed 15 June 2020, [www.covid19.gov.ph/](http://www.covid19.gov.ph/).
- Inter-Agency Task Force Technical Working Group for Anticipatory and Forward Planning (29 May 2020). *NEDA 'We recover as one' report details road to new normal*, National Economic and Development Authority, Philippines, accessed 15 June 2020, [www.neda.gov.ph/wp-content/uploads/2020/05/We-Recover-As-One.pdf](http://www.neda.gov.ph/wp-content/uploads/2020/05/We-Recover-As-One.pdf).
- JICA & PwC Philippines (Japan International Cooperation Agency & PwC Philippines) (2019). *Survey on issue analysis of food value chain in the Philippines*, JICA report, Philippines, accessed 1 June 2020, <https://openjicareport.jica.go.jp/pdf/1000041342.pdf>.
- Llanto GM (2016). *Risks, shocks, building resilience: Philippines*. Philippine Institute for Development Studies, accessed 3 June 2020, [https://dirp3.pids.gov.ph/websitecms/CDN/PUBLICATIONS/pidsdps1609\\_rev.pdf](https://dirp3.pids.gov.ph/websitecms/CDN/PUBLICATIONS/pidsdps1609_rev.pdf).

- NEDA (National Economic and Development Authority) (2019). *Rice Tariffication Law proves it is beneficial*, media release, NEDA, Pasig City, Philippines, 4 October 2019 [www.neda.gov.ph/rice-tariffication-law-proves-it-is-beneficial-neda/#:~:text=RICE%20TARIFFICATION%20LAW%20PROVES%20IT%20IS%20BENEFICIAL%20%E2%80%94NEDA,-October%204%2C%202019&text=The%20Philippine%20Statistics%20Authority%20reported,lowest%20rate%2](http://www.neda.gov.ph/rice-tariffication-law-proves-it-is-beneficial-neda/#:~:text=RICE%20TARIFFICATION%20LAW%20PROVES%20IT%20IS%20BENEFICIAL%20%E2%80%94NEDA,-October%204%2C%202019&text=The%20Philippine%20Statistics%20Authority%20reported,lowest%20rate%2) (tinyurl.com/y52llbd7).
- Nuevo PA & Apaga AR (2010). *Technology reducing postharvest losses and maintaining quality of fruits and vegetables (Philippines)*. 2010 AARDO workshop on technology on reducing post-harvest losses and maintaining quality of fruits and vegetables, 154–167, accessed 1 June 2020, [http://ir.tari.gov.tw:8080/bitstream/345210000/2827/1/publication\\_no147\\_17.pdf](http://ir.tari.gov.tw:8080/bitstream/345210000/2827/1/publication_no147_17.pdf)
- Official Gazette (2013). *Infographic: Average contents of a DSWD family food pack*, Official Gazette, Philippines, accessed 2 June 2020, [www.officialgazette.gov.ph/2013/11/12/average-contents-of-a-dswd-family-food-pack/](http://www.officialgazette.gov.ph/2013/11/12/average-contents-of-a-dswd-family-food-pack/).
- PAG-ASA (Philippine Atmospheric, Geophysical and Astronomical Services Administration) (2019). Press statement on Typhoon 'KAMMURI', 29 November 2019, PAG-ASA, accessed 2 June 2020, <http://bagong.pagasa.dost.gov.ph/press-release/60>.
- PSA (Philippine Statistics Authority) (2015). *2012 Census of Philippine business and industry: accommodation and food service activities*. PSA, accessed 1 June 2020, <https://psa.gov.ph/content/2012cpbi-accomodation-and-food-service-activities>.
- PSA (Philippine Statistics Authority) (2017). *Consumption of selected agricultural commodities in the Philippines*, volume 1—national and regional, PSA, Philippines, accessed 2 June 2020, <https://psa.gov.ph/content/consumption-selected-agricultural-commodities-philippines>.
- PSA (Philippine Statistics Authority) (2018). *2018 Gender statistics on labor and employment*. PSA, accessed 1 June 2020, [www.psa.gov.ph/sites/default/files/2018%20Gender%20Statistics%20on%20Labor%20and%20Employment.pdf](http://www.psa.gov.ph/sites/default/files/2018%20Gender%20Statistics%20on%20Labor%20and%20Employment.pdf).
- PSA (Philippine Statistics Authority) (2019). *2018 family income and expenditure survey*, PSA, 4 December 2019, accessed 1 June 2020, [www.psa.gov.ph/content/annual-family-income-estimated-php-313-thousand-average-2018](http://www.psa.gov.ph/content/annual-family-income-estimated-php-313-thousand-average-2018).
- PSA (Philippine Statistics Authority) (2020a). *Updated 2015 and 2018 full year official poverty statistics*, PSA, 4 June 2020, accessed June 15 2020, <https://psa.gov.ph/poverty-press-releases/nid/162559>.
- PSA (Philippine Statistics Authority) (2020b). OpenSTAT, accessed 2 June 2020, [openstat.psa.gov.ph](http://openstat.psa.gov.ph).
- Rubio JC (2019). FoodRetail Sectoral Report (Philippines). United States Department of Agriculture, accessed 2 June 2020, [https://apps.fas.usda.gov/newgainapi/api/report/downloadreportbyfilename?filename=Retail%20Foods\\_Manila\\_Philippines\\_7-8-2019.pdf](https://apps.fas.usda.gov/newgainapi/api/report/downloadreportbyfilename?filename=Retail%20Foods_Manila_Philippines_7-8-2019.pdf).
- UNDP (United Nations Development Programme) (2020). Human Development Reports, UNDP, accessed 10 July 2020, <http://hdr.undp.org/en/content/2019-human-development-index-ranking>.
- World Bank (2020a). Philippines, World Bank Open Data, accessed 15 June 2020, <https://data.worldbank.org/country/PH>.
- World Bank (2020b). The World Bank Databank for Health, Nutrition and Population Statistics, accessed 10 July 2020, <https://databank.worldbank.org/home.aspx>.

## 8. COVID-19 and food systems in Timor-Leste



Photo: ACIAR

# 8

## COVID-19 and food systems in Timor-Leste

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### 8.1 Abstract

As the people of Timor-Leste continue the process of post-Independence nation building, there remain multiple development challenges along the pathway to prosperity. They include continuing poverty and rural-urban inequalities across multiple indicators of disadvantage. The financial benefits that have flowed from the sovereign wealth Petroleum Fund provide important support for essential services and infrastructure as well as a range of social transfers to ameliorate the harsher aspects of poverty. The first case of COVID-19 in Timor-Leste was recorded on 21 March 2020. The government declared a state of emergency, closing the international borders and restricting all but essential internal movement. Early measures proved effective, with just 24 recorded cases and no deaths, but the nation remains ill-equipped to cope with a major new outbreak of the pandemic.

Economic impacts were immediate and widespread, especially among informal employment sector workers, as market trading, retail shops, transport and hospitality businesses were shut down, along with the tourism sector. The government

responded with a range of emergency distributions of cash (US\$200) to over 300,000 households, supported by food relief distributions from non-government organisations, the church and extended familial networks.

Proposed opportunities include:

- improved social protection measures for vulnerable households
- a renewed focus on the productivity of smallholder agriculture with gradual intensification and improved feed and biosecurity regimes
- greater efforts to expand private-sector market developments and increased employment
- greater focus on education and relevant technical training to increase the availability of skilled graduates.

## 8.2 COVID-19 in Timor-Leste

### 8.2.1 Country overview (July 2020)



#### Land use

Land area: 149,000 km<sup>2</sup>  
25.6% agricultural land  
17.5% GDP from agriculture and fish (2018)



#### Population

1.3 million people  
69% rural  
Adjusted income per capita US\$1,371



#### COVID-19 and health

First recorded case: 21 March 2020  
At 31 July 2020: 24 known cases; no deaths  
At July 2020: No spread; no hotspots



#### Local response to COVID-19

State of emergency: 28 March 2020  
School, business, international border closures  
Medical testing and messaging campaign  
Government and community support for unemployed and vulnerable  
Imported rice stockpiled



#### Agriculture and fisheries

Top staples: cereals, maize, rice, coconuts, bananas  
Low productivity; low soil fertility  
Local demand for staple food crops  
Imports critical for food availability  
Small-scale and seasonal fishing for local markets



#### Key risk multipliers

Agricultural pests and diseases  
Highly variable climate and onset of monsoon; seasonal droughts  
Risk of COVID-19 outbreak for health system

### 8.2.2 Development context

An overview of Timor-Leste's agricultural, fisheries and nutrition context is shown in Table 8.1. Today in Timor-Leste, around 915,000 people (70% of the 2020 population) live in rural areas. The great majority of these people derive their incomes from semi-subsistence and seasonal food cropping, mixed with small-scale animal husbandry and varying degrees of foraging for wild crops and game.

Despite improvements in a range of essential services, there is a high prevalence of poverty, with 42% of the population living on less than US\$2 per day (UNICEF 2018). There is accompanying illiteracy, especially among women, and infant stunting rates are among the highest in the world (GDS, Ministry of Health & ICF 2018, Gorton 2018, Provo et al 2017). The core problem facing most Timor-Leste rural households is their inability to generate reliable incomes from agriculture and thereby improve the living conditions and livelihood opportunities of their families (Costa et al 2013).

The reasons for constrained on-farm production and productivity are complex and varied. Key drivers include:

- highly variable weather conditions (irregular onset of monsoon, seasonal droughts, high winds, heavy rains) affecting crop establishment and subsequent yields
  - feral pigs, rats and insects causing crop losses and post-harvest storage losses
  - low-nutrient soils, steep slopes and labour constraints at critical times in the production cycle
  - low use of fertiliser inputs due to limited availability in market networks and perception of investment risks
  - some organic fertiliser use in horticulture
  - heavy reliance on other agri-inputs like seeds, day-old chicks and pesticides
- little or no market demand for staple food crops beyond local distribution
  - high dependency on food supply imports
  - consistent national underinvestment in smallholder agriculture with budget allocations constrained to less than 2% of the national budget and late disbursement of funds.

Timor-Leste has a young population with a median age of just 19.1 years (UNDP 2018a:2). Every year, 20,000 or so new entrants to the job market compete for no more than 2,000 paid positions in the formal economy (ILO 2016). The prospects for absorbing the steady stream of high school graduates and aspiring workers are poor. In a telling statistic about Timor-Leste's working-age population (15–64 years), which amounts to over 660,000 people, 42% are classified as 'unemployed, unpaid household workers, informal labour, retired, or not seeking work' (Scheiner 2015). The absence of manufacturing and a limited private-sector presence means that just 5% of the workforce is employed in the private-sector. This drops to 2.4% in rural areas (GDS, Ministry of Health & ICF 2018, UNDP 2018a:2). One response is a growing youthful international labour migration sector that generates significant remittance flows (more than \$US40 million per annum in 2017) (Curtain 2018).

The structure of governance in Timor-Leste is based on a democratic semi-presidential system with an elected national parliament and the prime minister (McWilliam & Leach 2019). There are 13 constituent municipalities with limited budgets and administrative capacity. Subdistricts (*postu*) and villages (*suku*) provide local-level governance, much of which is strongly influenced by limited financial support and the persistence of customary patterns of elected political authorities and land tenure systems based on ancestrally constituted kinship and marriage alliances. From January 2020, parliamentary



**Table 8.1** Agricultural, fisheries and nutrition context of Timor-Leste

Indicators	Unit	Value	
Surface area <sup>a</sup>	'000 km <sup>2</sup>	14.9	
Agricultural land <sup>b</sup>	percentage of land area	25.6	
Age of population <sup>a</sup>	0–19 years	percentage of total population	49.4
	20–39 years	percentage of total population	29.5
	40–59 years	percentage of total population	14.6
	over 59 years	percentage of total population	6.2
Stunting rate <sup>c</sup>	under 5 years	percentage of age group	50.9
Wasting rate <sup>c</sup>	under 5 years	percentage of age group	10.5
Overweight <sup>c</sup>	under 5 years	percentage of age group	5.8
	male	percentage of total population	19
	female	percentage of total population	24
Obesity <sup>c</sup>	male	percentage of total population	3
	female	percentage of total population	5
Prevalence of undernourishment <sup>c</sup>	percentage of total population	24.9	
Population distribution <sup>a</sup>	rural	percentage of total population	69
	urban	percentage of total population	31
Gross domestic product per capita <sup>a</sup>	US\$	2,759	
Adjusted net national income per capita (2018) <sup>a</sup>	US\$	1,371	
Agriculture and fisheries, value added <sup>a</sup>	percentage of gross domestic product	17.5	
Government expenditure on agriculture <sup>c</sup>	percentage of total outlays	2.2	
Top staples (ranked most to least) <sup>c</sup>	cereal, maize, rice, coconut, banana		
United Nations Development Programme Human Index ranking <sup>d</sup>	out of 189	131	
2017 World Risk Index (mean value calculation 2012–2016) <sup>e</sup>	out of 171	10	

a World Bank (2020)

b FAO (2020a)

c Global Nutrition Report (2020)

d UNDP (2020)

e Bündnis Entwicklung Hilft (2017)

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

governance has been stymied with the abstention of support for the 2020 national budget by the National Congress for Timor Reconstruction, the largest party in the ruling three-party Alliance for Change and Progress (Leach 2020). A new coalition ministry was sworn in on 25 June 2020, including a new Minister for Agriculture and Fisheries.

### 8.2.3 Impact of COVID-19 in Timor-Leste

The first case of COVID-19 in Timor-Leste was detected on 21 March 2020. On 28 March 2020 the national government declared a state of emergency, which was extended into June 2020. A series of lockdown measures were progressively put in place. These measures closed schools and many businesses in the informal sector, as well as the hospitality and the tourism sectors. Movement restrictions and transport services between districts (municipalities) were much reduced and the international border with Indonesian West Timor was closed.

For Timor-Leste, the dramatic health threat posed by COVID-19 has not yet materialised. As of July 2020, there have been just 24 known cases of COVID-19 in the country and all of those people have reportedly recovered. The great majority of known infected people entered the country through the Indonesian land border. No deaths or serious hospitalisations have been recorded, but the risk of an outbreak remains a serious threat, and the Timor-Leste health system is poorly equipped to handle an outbreak of any significance.

The major impact of COVID-19 has been the economic shock that has accompanied the imposition of the state of emergency, which was extended a number of times into June 2020 and resulted in a major contraction of the economy. In the immediate panic following the COVID-19

detection announcement, a large number of expatriates left the country (including Indonesian, Chinese and other nationalities) and these people have not returned. In the pandemic-induced downturn and in the absence of a 2020 national budget, the World Bank has forecast a contraction of 5% or more for the national economy in 2020, a marked reversal to the opening forecasts of 4.6% growth.

### 8.2.4 Local and policy responses

The Timor-Leste Government moved quickly to address the looming pandemic by establishing a COVID-19 coordination committee (Integrated Crisis Management Centre), led by the Ministry of Health and working closely with the World Health Organization and local non-government organisations. The Integrated Crisis Management Centre established hospital and testing protocols, and supplied personal protective equipment and health messaging. A referral system for testing for COVID-19 via the Victorian Infectious Diseases Reference Laboratory in Melbourne, Australia, was established and made functional with support from the Australian Embassy in Timor-Leste. Further assistance was provided by the Menzies School of Tropical Health in Darwin, Australia, supporting health delivery systems, guidelines and cooperative arrangements for strengthening the system of COVID-19 testing (Margalhães 2020).

To address the immediate and continuing economic impact on household livelihoods and incomes, the Timor-Leste Government agreed to access the sovereign wealth Petroleum Fund—valued at US\$17 billion as of March 2020—and provide emergency cash payments to unemployed workers and poor households. The government secured parliamentary approval for a withdrawal of US\$400 million for general spending, as well as public spending to stimulate the economy (10% of gross domestic

product). The funds were drawn down in phases from 2 April 2020 (US\$250 million) and fed into two key government-funded relief programs. The first program provided monthly payments of US\$500 to formal employees who have lost their employment as a result of the COVID-19 impact (estimated 30,000 people). The government has also approved a measure to provide a transfer of US\$15 credit covering electricity bills per electric meter, along with a planned payment of US\$100 per month for three months to low-income households (estimated 318,000 households). Funds were sourced from a dedicated US\$150 million COVID-19 fund approved by the national parliament and administered by the Integrated Crisis Management Centre. Initial payments were rolled out in early June, providing two months of back-dated payments of US\$200 per low-income household. Reports from the districts indicate that the emergency funds have been successfully distributed but there are reports of some people who have missed out or are still waiting for support (researcher, pers comm, 6 July 2020). According to recent reports, the government will not proceed with the third planned payments (DFAT, pers comm, 24 July 2020).

The Catholic church has also been active in developing a COVID-19 response, forming a pastoral support team dedicated to providing spiritual, psychological and material support for the poor and those directly affected by the pandemic (Ora 2020). Working with Caritas, the church is providing up to six tonnes of rice, cooking oil and milk to poor families in more than 30 parishes.

In addition to these measures, a number of non-government organisations and civil society organisations have distributed food hampers (25 kg rice, eggs, oil and other basic domestic goods) to households that have lost livelihoods or need support. Up to 1,500 households in Dili and the

hinterland have reportedly been provided with assistance (Monteiro, pers comm, 9 June 2020), and there are likely to be other groups in the country mobilising their resources in diverse and informal ways.

The government also approved payments (based on host country costs) to support non-scholarship Timorese students who depend exclusively on the financial support of families in Timor-Leste, and Timorese citizens who, due to the closure of the borders, were prevented from returning to Timor-Leste (Government of Timor-Leste 2020ab).

### 8.2.5 Other shocks and drivers of change

#### *African swine fever*

In September 2019, the highly contagious and lethal African swine fever was detected in Timor-Leste. This has had a devastating impact on local pig populations, with the death of an estimated 50,000 animals out of a national herd of 420,000 (Barnes et al 2020b; DFAT, pers comm, 2020). The absence of a vaccine for African swine fever means that the only way to limit its impact is improved animal husbandry and better hygiene practices for pig production. Given that pigs and smallholder pig production remain a vital part of the Timor-Leste livelihoods, the emergence of this new virus represents a grave threat to household economies. Pig populations are already exposed to classic swine fever, which is preventable, but vaccination rates are low in Timor-Leste and distinguishing between the two is impossible without laboratory tests.

#### *Fall armyworm*

During March 2020, new outbreaks of fall armyworm, which threatens important crops such as maize and rice, were detected. A recent Ministry of Agriculture and Fisheries (MAF) (2020) assessment found the prevalence of fall armyworm ranged

from 2% to 14% across Timor-Leste, with the highest prevalence in Manufahi. Formally identified as *Spodoptera frugiperda*, the good news is that the fall armyworm attracts a high proportion (79%) of natural predators. This provides the basis for a response plan for the next cropping season and pest management training for farmers (DFAT, pers comm, 2020).

### Localised flooding, dengue fever and climate change

During March 2020, there was major flooding and torrential rains in the capital city, Dili, and surrounding areas. The floods destroyed 200 houses and damaged crops that were ready for harvesting. An estimated 1,105 families and 6,000 people were adversely affected.

From January to March, the city and other urban areas were also subject to an annual outbreak of dengue fever, which causes debilitating illnesses for hundreds of people as well as deaths in a minority of cases.

Climatic variability is a long-term characteristic of Timor-Leste. Climate-change modelling predicts that over the next 30 years (to 2050) the climate will become about 1.5 °C warmer and 10% wetter on average (Molyneux et al 2012).

## 8.3 Assessment approach

This assessment of COVID-19 and food systems for Timor-Leste aims to present a balanced national-level review and analysis of the main impacts and constraints arising from the pandemic. It looks at health and economic impacts and responses, with a particular focus on the status of food supply and longer-term food and nutrition security. The study combines desktop assessments and analysis with a series of targeted interviews (16) and correspondence with a range of knowledgeable commentators, researchers and government officials to discuss a range of observed impacts and

implications of the COVID-19 entry to Timor-Leste.

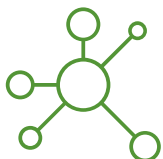
Resources included:

- key national-level policy documents, strategic planning and emergency provisions in relation to COVID-19-related developments and supply-chain shocks
- urban and rural support programs, including social protection distributions to poor and unemployed households
- direct discussions with Ministry of Agriculture and Fisheries staff
- a wide range of literature and reporting on agriculture, food security, poverty and rural development studies
  - regular media reporting (Tatoli)
  - government announcements
  - program evaluations (Australian Centre for International Agricultural Research (ACIAR), Australian Department of Foreign Affairs and Trade (DFAT), World Bank, United Nations Development Programme, United Nations World Food Programme (WFP), International Labour Organization and diverse aid agencies)
  - reports from non-government organisations (Lao Hamutuk, Asia Foundation)
  - research blog posts and commentaries from domestic and international commentators.

In addition, there was a complementary strategy to seek updated and specialised knowledge on aspects of the COVID-19 impact on different regions, sectors and resources from expert stakeholders (56% of whom were female). A range of communication was used, such as mobile and WhatsApp discussions, online questions and email responses to a range of targeted questions. There was a high degree of agreement among the respondents on the range of impacts and vulnerabilities.

## 8.4 Assessment results

### 8.4.1 Snapshot of key findings



#### Smallholders

Main crop already harvested at COVID-19 onset  
Limited availability of agri-inputs  
Transport ban may slow spread of livestock disease

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#### Supply chains

Supply chain disruption across land border  
Reduced demand for export crops  
Imported rice supply chains maintained

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#### Governance

Petroleum Fund used for social protection  
Integrated Crisis Management Group formed  
Temporary income support for poor households

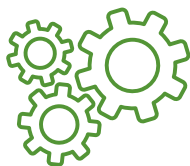
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#### Community

Existing labour migrants continue to send remittances  
Aspiring migrants affected by travel ban  
Greater impacts on women's income, purchasing power and workload  
Off-farm income vital for dry season

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#### Employment

Impact on informal sector; recovery underway  
Major disruption to tourism sector  
Few opportunities for unemployed and underemployed youth

### 8.4.2 Exposure and vulnerabilities

A diverse and variable range of vulnerabilities has been exposed by the arrival of COVID-19 in Timor-Leste society, both directly in relation to potential health outcomes and indirectly across diverse sectors of the national economy. The degree and duration of these vulnerabilities will depend on multiple interconnected factors and will be shaped by any subsequent outbreak of COVID-19 infections and the extent to which the pandemic continues to disrupt the Timor-Leste economy.

#### *Health vulnerabilities*

One of the major challenges for government in post-Independence Timor-Leste has been the restoration and reinvigoration of a national health system to provide high-quality medical care to all citizens. Over the last decade, there have been significant advances in the development of a national distribution of health clinics and the provision of basic preventive health care, health messaging and improved training of health practitioners. This expansion has been supported by the growing services of Cuban-trained Timorese doctors (approximately 1,000 by 2017) and postgraduate medical training at the national university, the University of Timor Lorosa'e (Asante et al 2014). Infant and child mortality rates in Timor-Leste have both declined by about one-third since 2009–10 (Kelly et al 2019). The most notable trend is malaria incidence, which fell from 32 per 1,000 individuals to virtually zero over the past five years, leaving the country poised for malaria elimination (Kelly et al 2019:11).

Despite these advances, the provision of accessible and reliable medical services, and health information<sup>3</sup>, including sexual and reproductive health services, remains patchy and thinly distributed across the

country. Diagnostic and specialist medical equipment and services in regional hospitals are basic and limited. Although health care is nominally freely available, there are a range of costs and cultural barriers that limit access for the poor (Price et al 2016). In a country still grappling with the legacy of a generation of military occupation, there are very limited mental health services and trained practitioners. Most people in rural areas source healing services via a range of local traditional remedies and divinatory procedures.

Timor-Leste has managed to successfully avoid the first wave of COVID-19 infections, but it remains highly vulnerable to subsequent outbreaks and poorly equipped to handle any major increase in demand for intensive care nursing. According to the Global Health Observatory, there were just 59 hospital beds per 10,000 people across Timor-Leste (Chen 2020).

#### *Food and material supply chains*

One of the consequences of constrained in-country food production is that there is currently a reliance on significant imports of staple food supplies, especially Vietnamese rice (100,000 t per annum), that are cheaper than locally grown product and account for around 60% of consumption (Young 2013). Since 2007, there has been a growing reliance on imported frozen chicken meat and eggs, especially from Brazil (16,561 t of frozen chicken meat and 3,850 t of chicken eggs, worth \$US12 million in 2018), as well as flour, sugar, palm oil and seafood from Indonesia (ADB 2019). These imports have in many cases constrained the emergence of local import substitution businesses in direct food production and processing (Rola-Rubzen et al 2011).

The absence of any real manufacturing base in Timor-Leste means that there is

3 World Vision is providing COVID-19 hygiene and social distancing training through the Australian Humanitarian Partnership Disaster READY program.

an extensive list of imported products and commodities (US\$470 million in 2018), including palm oil, tobacco, vehicles, cement and building materials, that provide important contributions to the national economy. The only significant commodity export of any scale, apart from oil and petroleum, is Timorese Arabica coffee, which is produced by cooperative-based smallholders and generated US\$20 million in 2018.

### *High dependence on the sovereign wealth Petroleum Fund*

Timor-Leste remains one of the three most oil-dependent countries in the world. Oil and gas revenues account for 70% of gross domestic product and almost 90% of total government revenue between 2010 and 2015 (IFAD 2017). This has been a great bounty and source of financial security for the newly independent nation. However, the impact of this heavy reliance on the Petroleum Fund has created conditions for the debilitating and now-familiar distorting impacts of the resource curse (Bovensiepen 2018, Scheiner 2019). The nation remains highly dependent on the Petroleum Fund to support development programming and effective governance across the nation. The Petroleum Fund contributes a major share of annual state budgets—83% in 2017 (Scheiner 2019:93)—and is projected to continue at levels beyond the sustainable drawdown rate. The recent volatility in global markets saw the Petroleum Fund lose US\$1.8 billion (10%) in value due to financial market shocks (Lusa 2020). Massive infrastructure investments by government have been criticised in the absence of persuasive analyses of the anticipated benefits (Bovensiepen 2018, Scheiner 2019). Without any new prospects for oil extraction from reserves (such as

the Greater Sunrise Field in the Timor Sea), the need to diversify revenue sources away from fossil fuels is increasingly pressing (Neves 2018).

### *Women and gender vulnerabilities*

Rural women in Timor-Leste experience low incomes and have major responsibilities for domestic work, carting water and firewood, caring for children and the sick, as well as contributing to farming, trading and purchasing in markets and the raising of livestock. Women typically have lower literacy rates (20%) than men (41%), and generate on average 15% less agricultural produce than their male farming counterparts (Gavaluyugova et al 2018). The COVID-19 restrictions and shortages have increased these livelihood pressures and affect women disproportionately (FAO 2020b).

The legacy of conflict and poverty across the country has, for some time, focused attention on the entrenched culture of domestic violence in Timor-Leste. A demographic and health survey (2009–2010) found that 36% of married women had experienced physical, sexual or emotional violence by a husband or partner, and just 24% of women reported the assaults. Women most often sought help from their own family (82%). Only 4% sought help from the police (JSP 2013:3, Gerry & Sjölin 2018). Women risk being rejected by their families and social networks if they involve the justice system.

Given the entrenched nature of domestic violence, the economic impact of COVID-19 is likely to exacerbate existing pressures on households and perpetuate violence in the household<sup>4</sup>. The European Union and the United Nations Resident Coordinator have dedicated US\$1 million from the flagship

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4 A 2010 law against domestic violence defined domestic violence as a public crime and included physical, psychological, sexual and economic violence as prohibited forms of violence. There have been increased prosecutions since then, but there remains much scope for improvement (Gerry & Sjölin 2018).

Spotlight Initiative to address the increased risks of violence against women and girls in the context of the COVID-19 pandemic (UNFPA Timor-Leste 2020).

### *Vulnerabilities in agriculture*

#### *Seasonal crop production*

Across Timor-Leste, a majority of households (more than 200,000) practice forms of seasonal rainfed agriculture focused on the cultivation of maize and beans, as well as a range of secondary food crops including cassava, sweetpotato, pumpkin, squash and diverse tubers (da Costa et al 2013). On the southern littoral, an extended wet season permits a second cropping season. Most of the harvested food is used for home consumption or local market sales.

Men and women actively pursue farming with the understanding that harvest success is dependent on highly variable monsoon weather conditions and a range of unpredictable environmental factors, including droughts, weeds, plant diseases and pests, high winds and floods, as well as post-harvest storage losses due to a combination of weevils, rats and spoilage (>30%) (da Costa et al 2013). Crop losses are common and many families experience food insecurity, particularly when household stores are exhausted and the new harvest has not been secured. Timorese refer to this period (usually December–February) as the hungry season (*tempu rai hamlaha*). Households are forced to rely on foraged wild foods, go into debt or sell assets to cover shortages (da Costa et al 2013, McWilliam et al 2015, Erskine et al 2020). According to one report, 62% of households experienced food shortages for more than one month (Provo et al 2017, Gorton 2018).

Food insecurity is a common experience in the hinterlands and mountains of Timor-Leste, and it contributes to the regularly reported poor nutrition and high poverty

rates. A recent WFP survey found that few households (15–37%) could afford nutritious diets (WFP 2019). At the same time, generations of farming practice and the challenges this involves, including the possibility of outright crop losses, means that rural Timorese farming communities are also highly resilient in relation to the conditions they face. Vulnerability and resilience are closely related and are familiar experiences across the rural hinterlands and mountains. Many families cope with food shortages and poor nutrition on a regular basis. In a continuing COVID-19 environment, these patterns of livelihood will persist in the absence of significant new investment in productive and climate-resilient agriculture.

#### *Irrigated rice*

Irrigated rice production has been cultivated in Timor-Leste for hundreds of years, but for most of that time on a very limited scale. It was only during the late Portuguese colonial period (1960s) that greater investment was directed to irrigation infrastructure, including opening up a number of new areas. These efforts were further developed and promoted during the period of Indonesian governance (1975–99), when massive investments in irrigation infrastructure and road transport transformed farming practices and greatly extended the popularity and cultural acceptance of rice as a high-status staple food. By 1996, for the first and only time, East Timor achieved rice self-sufficiency (Fox 2001). In 1997 rice production reached more than half the tonnage of maize (Pederson & Arneberg 1998:33). In a post-Independence and COVID-19 Timor-Leste, this level of production in rice has not been sustained. Rice production has been in a long-term decline, due to a number of inter-related factors, even though rice has become the preferred staple food.



The destruction that accompanied the withdrawal of the Indonesian armed forces and the pro-Jakarta militia included substantial elements of irrigation infrastructure. Designed irrigation capacity declined by nearly 50% to around 34,649 ha (FAO 2011). In the two decades since, the remaining irrigation infrastructure and the road networks that connected production areas to markets and urban centres have also deteriorated. It is only in recent years that major investment in road and irrigation infrastructure restoration has been initiated and funded through the Petroleum Fund.

The use of fertilisers and pesticides, subsidised during the Indonesian period, have decreased significantly due to a lack of supply and the absence of private-sector traders and investors in the sector. There has also been a growing resistance among smallholder farmers to perceived investment risks. Production yields of rice have also declined from an already low base (1.6–2 t/ha) and most production is consumed or sold locally.

Consistent with trends across South-East Asia, large numbers of young people are resisting a career in smallholder rice production in favour of further education and easier and potentially more rewarding livelihoods in the towns and cities, even as youth unemployment remains a pressing problem. The result is the emergence of an ageing rural labour force (average 41 years) and labour shortages in rural areas, along with comparatively high labour costs (US\$5–6 per day) and reduced areas under production.

Since 2007, with the initiation of drawdown from the Petroleum Fund, growing amounts of cheap milled rice from Vietnam are now imported and sold widely in local markets across Timor-Leste (Young 2013). The impact of importing 66% of national rice consumption demand has undermined any realistic attraction among smallholder

farmers to increase rice production. When farmers cannot compete on price, there is little incentive to produce more. Young (2013) argues that the scale of imports suggest that estimates of local rice production are greatly inflated.

In the face of these multiple and systemic constraints against increased local irrigated rice production, the optimistic goal for Timor-Leste of ‘self-sufficiency in rice production by 2020’ as articulated in the *Timor-Leste Strategic Development Plan 2011–2030* (Sustainable Development Goals 1 and 2) has failed and is unlikely to be achieved in the life of the planning document. A national agricultural census is currently being completed and is due for release during 2020. Hopefully, this will provide a more accurate assessment of local rice production and institutional support frameworks.

### 8.4.3 Impacts of COVID-19

#### Health

As of mid-July 2020, the direct impact of the COVID-19 pandemic has been minimal, with no reported cases for many weeks. This good fortune for Timor-Leste has allowed authorities to strengthen their medical protocols and facilities in readiness for any future outbreaks. However, the risk of outbreaks of COVID-19 remains high, due to the lightly patrolled land border with Indonesia and the need to maintain imports and trade arrangements. In the absence of a vaccine and effective treatments, the need to open up the economy and increase social engagement will increase the risk of a subsequent wave of infections, which could have devastating impacts and quickly overwhelm the hospital system. Despite significant investment over the last decade, the national health system has very limited diagnostic and medical expertise available. At this stage, the major impacts of COVID-19 are indirect and economic.

### *Informal sector employment*

The declaration of a state of emergency in Timor-Leste on 28 March 2020 set in train a coordinated lockdown of international and internal borders and the general closure of schools and most businesses, which led to extensive job losses in the informal sector. This had immediate impacts across the country. The informal sector provides around 60% of employment opportunities across Timor-Leste and employs up to 250,000 people. This category of work includes seasonal agriculture and a wide range of low wage, often intermittent, remunerative employment for people including farm labourers, shop assistants, security workers, market traders, taxi and bus drivers, domestic workers and hospitality staff.

The closure of businesses, across both formal and informal sectors, along with the return of many urban residents to their home villages has had a significant impact on women's incomes and purchasing power, as well as increased workloads for women who take the primary responsibility for raising children and managing domestic arrangements including raising animals. Some 66% of employed women are self-employed farmers.

Tourism services, which are a growing non-oil sector of the economy, have also been severely hit by border closures and the departure of many expatriates. Given the high dependency ratio in Timor-Leste (71.2% in 2019, with many people relying on fewer providers), the effect on household incomes and consumption has been rapid. Reports indicate that people who lost their employment in the city have returned to their villages of origin, where living costs are lower and support from family members is available (Barnes et al 2020a).

The loss of household incomes as a result of the emergency shutdown was a major shock and prompted the government to

introduce temporary financial payments for over 300,000 households, amounting to US\$100 per month for three months. These measures highlight the widespread impact of income loss, the absence of household savings and the subsequent rapid emergence of food shortages.

### *Food supply chains*

As noted above, Timor-Leste is highly dependent on a diverse range of food supply imports. Apart from some initial concerns about securing additional shipments of rice for stockpiling, these matters have been resolved and the major food importers (Kmanek, Centro and Miemart) have been able to ensure continuity of supplies (MDF 2020). Some disruptions and delays have been caused by the closure of the land border with Indonesia. Timor-Leste custom operations have been operating for just two hours a week to process cross-border commodity flows, with predictable delays. At the start of June, 40 trucks belonging to 17 Indonesian logistics companies were waiting to bring five tonnes of food items into the country (MDF 2020). Local food supply chains, particularly horticulture and fruit supplies, have been disrupted to varying degrees due to delayed agri-inputs and transport disruption. However, over recent months, food supplies and price inflation of food and domestic retail items have remained relatively stable (WFP Timor-Leste 2020).

COVID-19 has reduced the demand for a number of export crops, such as coffee, copra, konjac and candlenut. Coffee is grown by up to 38% of farmers and disruptions to markets have direct and deleterious impacts on farmer household incomes. It is reported that the trading cooperatives, Café Brisa Serena and Alter Trade Timor have had export orders cancelled. It remains unclear if Indonesian traders who normally visit Timor to

purchase coffee will visit in 2020, as a result of travel restrictions and a weakened Indonesian rupiah (MDF 2020).

### *Smallholder agriculture/horticulture*

In the 2019–2020 cropping season, delays in the onset of rains and reports of below average harvests have been reported in regions of the island (for example, Baucau, Atauro, Oecussi). These reduced returns, which may have been affected by fall armyworm, have caused shortages and income deficits in a number of areas. However, the arrival of the COVID-19 emergency came at a time when most households had begun harvesting their main seasonal food gardens. This provided an opportunity to store grain and other secondary crops and generate income from crop sales to regional markets.

In the medium term, the scenario is more uncertain, not simply because of variable monsoon weather, but also because of the prospect of shortages of seed and agricultural inputs to support cropping and farm production. Timor-Leste is highly dependent on a range of vital agri-inputs, including seeds (especially for horticulture), day-old chicks, animal feeds, pesticides, herbicides, tools and equipment (MDF 2020), most of which come across the land border from Indonesian Timor. According to recent reports, a number of local suppliers have exhausted their existing stock or are unable to source new supplies. On the border, three logistics companies have had nine tonnes of agri-inputs held up by customs for two months (MDF 2020). These shortages will have direct impacts on the incomes of vegetable growers and market gardeners, as seed prices increase, or shortages continue. For example, among the few local broiler chicken producers, Vecom and Hanai Malu have already had to stop production because they are unable to source day-old chicks from Indonesia (MDF 2020).

### *Animal husbandry*

As noted above, the COVID-19 pandemic was preceded by African swine fever, a highly infectious and lethal disease that was detected in Timor-Leste on 9 September 2019 and confirmed by the government on 27 September 2019. Over a number of weeks, a total of 100 outbreaks on smallholder pig farms were recorded in Dili. The Ministry of Agriculture and Fisheries formed a taskforce to put control measures in place and implemented ban on the movement of pig and pork products between districts.

Despite these early measures, African swine fever spread rapidly across the country. Outbreaks have been reported in the districts of Baucau, Covalima, Ermera, Lautem, Liquiça, Bobonaro, Manatutu, Manufahi and Viqueque. By early 2020, African swine fever had caused the deaths of up to 50,000 pigs (12.5% of total) (T. Barnes, pers comm, 2020). Some areas are reported to have lost most of their animals, which is a major disaster for many poor rural households. Recent attempts to update the impact of African swine fever in Timor-Leste suggest that outbreaks continue despite biosecurity containment and greater public awareness. Based on regional reports (MAF staff, pers comm, 2020), there appear to be greater losses in the central and western areas of the country than the eastern sector. This suggests that the ban on pig transport may be slowing the spread of the virus, with the COVID-19 emergency restrictions reinforcing those separations.

### *International labour migration*

The growing expansion of formal and informal temporary international labour migration out of Timor-Leste was immediately and significantly disrupted by the declaration of a state of emergency, the closure of borders and quarantine restrictions. Formal migration programs are

managed by the Timor-Leste Government through bilateral agreements with Australia (Seasonal Workers Program) and South Korea (Employment Permit System). There is an expanding demand for participation in these programs, which offer a number of pathways to higher incomes, savings programs and voluntary remittances to supplement source household incomes in Timor-Leste. Timor-Leste now has access to the Australian Pacific Labour Scheme for 'semi-skilled' workers, offering a longer time frame and wider work opportunities (Rose 2019).

Informal labour migration among young Timorese travelling on Portuguese passports to work in the United Kingdom in a range of low-skilled shift and factory jobs has also been popular since 2010 (McWilliam 2020). High rates of remittances to home households has been a prominent feature of this trend, which has provided significant direct benefits to participating families. Curtain (2018) has highlighted the growing contribution of remittances as a non-oil export industry. In 2017, this amounted to US\$40 million, with around 65% sourced from the United Kingdom (Scheiner 2019).

The impact of COVID-19 travel disruptions and varying degrees of lockdown in different countries has had varying negative impacts on the migrant labour migration. In the United Kingdom, most hospitality workers lost work when restaurants, cafes and other businesses shut down, but other sectors were only lightly affected (for example, supermarket and food packaging businesses). In Australia, seasonal workers from Timor-Leste have continued to work and receive remuneration, and remittance flows via Western Union transfers have not been affected.

The main COVID-19-related disruption is to potential labour migrants who have not been able to travel to their planned destinations. With little or no alternative employment in

Timor-Leste, certainly not with comparable wage levels, there is a growing backlog of frustrated applicants for overseas labour migration work, particularly young people.

#### 8.4.4 Recovery and resilience

As of late July 2020, with no records of new COVID-19 infections for two months, the economy of Timor-Leste has been gradually opening up. Dili is reported to be busy and operating close to normal, but with social distancing measures (*distancia fisica*) in place. It is anticipated that, for the continuing period of extended emergency, the only restrictions will be the closure of the international border for travel with Indonesia and restrictions and conditions on entry to Timor-Leste by expatriates (two weeks quarantine) and foreigners (excluded, with some exceptions). Trade and import-export arrangements will remain open but will be prone to disruptions and stoppages in supply chains.

As Timor-Leste adjusts to the COVID-19 conditions and prospects for a period of continuing uncertainty, it is appropriate to consider the prospects for economic recovery and the renewed enthusiasm for continuing the nation-building process that Timor-Leste has been engaged in since Independence in 2002. This section highlights a range of key areas that will provide sources of recovery and resilience.

##### *The Petroleum Fund as a safety net*

During the recovery phase in a continuing COVID-19-constrained environment, Timor-Leste remains heavily reliant on the Petroleum Fund for recurrent spending in the foreseeable future. There is a growing urgency to generate additional oil and gas revenues from new developments (not a short-term prospect) or hasten towards non-oil sources of revenue and income. Both prospects face significant challenges and the looming crisis may force a reappraisal of current investment priorities.

At the same time, with the success of the recent nationwide cash transfer measures for 318,000 households in response to COVID-19, continued use of the multibillion-dollar Petroleum Fund to support vulnerable households directly for longer periods may be both necessary, popular and politically persuasive. On 24 June 2020, the parliament approved a second extraordinary transfer of US\$287 million from the Petroleum Fund to strengthen state accounts and the COVID-19 fund to ensure normal administration prior to the approval of the 2020 State General Budget (Tatoli 24 June 2020).

### *Informal sector employment*

It is likely that much of the informal sector will begin to recover with the lifting of the state of emergency and the resumption of economic activity. These activities include market trading and transportation services, regional agriculture and fishing activity, market gardens, cleaning and security services, shopkeepers, hairdressers and building activities. As long as Timor-Leste continues to be free of any renewed surge in COVID-19 cases, many aspects of the precarious informal sector will gradually return to 2019 levels of activity. This will have significant flow-on benefits to the many households that depend on these forms of income. One with significant potential to provide enhanced household incomes and improve local food supplies is small-scale horticulture, particularly higher-value seasonal vegetable production (Rola-Rubzen et al 2011).

Other employment sectors are likely to remain subdued or inactive, with increased risk of extended hardships for business operators, especially tourism-focused businesses (for example, homestays, tours, dive tourism, vehicle rental, restaurants and affiliated enterprises). In these circumstances, there will be a need for further government budgetary support in the light of continuing high

unemployment. The continuing disruption to women's incomes will also have proportionate impacts on many rural and urban households.

### *Off-farm income*

Another common feature of rural household livelihood practices is the general need to secure off-farm incomes during the dry season or after the main food harvest. Farmer households tend to be opportunistic in these practices, focusing on activities and prospective local resources that provide quick cash returns. Men and women are active in these seasonal activities, which include bamboo, palm thatch and firewood sales to passing traffic, selling construction timber and other building materials, handmade textiles, sea salt, wild honey, fish products, horticulture and the production of vegetables for urban markets, as well as small-scale trading, off-farm labouring on roads or construction crews, and the production of fermented and distilled palm liquor (*tua sabu*), which is widely consumed and used in local rituals. These diverse off-farm supplementary activities are likely to pick up again as transport links and market activity resume. A minimum level of cash is required to purchase domestic essentials and groceries, including noodles, cooking oil, salt and imported rice, which has become a favoured food.

### *Animal husbandry*

The majority of rural households and many urban families integrate animal husbandry into their smallholder livelihood activities. The 2015 census found that almost all households (97%) own livestock, 96% raise pigs and 79% raise local chickens, for the most part on a free-roaming scavenging approach to animal husbandry. Cattle and buffalo ownership among households is lower (23%), which is a reflection of their higher unit cost, but they remain an important component of agricultural livelihoods in Timor-Leste.

### *Pigs and African swine fever*

Historically, pigs are the second most numerous livestock species raised in Timor-Leste (87.2% of households) with a total pig population of 419,169 (Direcção Nacional de Estatística 2018). Pigs are important in traditional ceremonies and represent the greatest contributor to monetary income from livestock. The most common pig-raising system is a free-roaming scavenger system, but some pigs are raised in semi-confined or confined systems with supplementary feeding, often by women and girls. Availability of feed is a key constraint, especially in the dry season, and is the principal reason that pigs are allowed to roam freely in villages and scavenge for food.

The emergence of African swine fever in 2019 added another major risk to smallholder pig rearing. Over time, as the threat of African swine fever in Timor-Leste moves from an epidemic to an endemic situation, there is a need for more widespread and reinforced public education on how to reduce the risk of disease to enable communities to raise pigs safely (Barnes et al 2020b). It should be noted that Timor-Leste already hosts classic swine fever, for which a vaccine is available but rarely delivered. There is no vaccine for African swine fever to date. The difficulty here is that the added costs to establish household-based biosecure rearing practices for their animals (pens, fencing, disinfectants, feed and clean water) may be prohibitive, with no indication of support from the government extension services.

Pigs are highly regarded by Timorese households. They are a store of wealth and they play a vital role in familial exchange practices (*Umane-fetosawa*) and expectations that inform social relations in Timor-Leste communities. While this varies around the country, all life-cycle transitions (births, marriages, deaths, end of mourning, new house commemorations, and so on) engage a network of agnatic and affinally<sup>5</sup> related households, whose connections and contributions are acknowledged with reciprocated gifts. Pigs, cattle and buffaloes play an important ceremonial role in these ritual settings, both as gifts to be exchanged and as contributions to commensal feasting. In addition, although the majority of Timor-Leste citizens are Catholic, ancestral religion remains an important focus for many communities. Sacrificial veneration of ancestors and the use of divination requires the sacrifice of piglets and chickens both as offerings and as the basis of shared meals. As a result of these factors, the dramatic loss of pigs to a new and lethal virus is not only a financial shock to households but has broader impacts on nutrition and the consumption of meat protein (Wong et al 2020).

### *Poultry*

Chickens are a ubiquitous feature of village and urban life in Timor-Leste. Small numbers are raised by the great majority of households for egg production and are used as a source of cash income or for ritual purposes. Chickens are raised mainly by women (Wong et al 2020) on a free-roaming scavenging basis (except for fighting roosters used in cockfighting).

5 All Timor-Leste language communities form around membership to ancestral clans (origin houses) based on either patrilineal or matrilineal kinship connections (i.e tracing membership through fathers and grandfathers or mothers and grandmothers). All of these kin groups are exogamous, meaning that marriage partners are found outside one's 'house of origin' and the relationship creates lifelong patterns of gift exchange and reciprocal obligations via these affinal (in-laws) alliances (McWilliam 2011).



**Much of the informal sector should begin to recover when the state of emergency is lifted and economic activity resumes.**

Photo: ACIAR

Chickens are also the most commonly eaten meat in Timor-Leste (GDS 2011), but stock losses are high due to predation in young birds from cats and snakes. Knowledge of improved husbandry practices is poor and extension services are weak (TOMAK 2020). The main disease problem affecting flocks is Newcastle disease, which can kill large numbers quickly if there is an outbreak. It is also common practice to consume sick or dead birds, which can have deleterious human health impacts (Wong 2018). There remains a risk of highly pathogenic Asian influenza entering Timor-Leste via the porous land border with Indonesia. Fighting cockerels are said to be much cheaper in West Timor and are easy to transport (The New Humanitarian 2008).

There is a vaccine for Newcastle disease, and the Ministry of Agriculture and Fisheries has an established program in the districts to provide vaccination services on a periodic basis. Lack of effective control of outbreaks is in part due to capacity constraints for Ministry of Agriculture and Fisheries veterinary technicians in terms of meeting demand. The logistics of rural vaccination services also preclude effective coverage, as continuing regular outbreaks of Newcastle disease indicate (MAF staff, pers comm, 2020)<sup>6</sup>. In one ACIAR study, flock-level Newcastle disease sero-prevalence was observed (at least one bird tested had antibodies against Newcastle disease virus) and a total of 35.3% of flocks had a minimum of one bird being Newcastle disease sero-positive at least once over the study period (Serrão et al 2012). Sero-prevalence usually provides an underestimate of Newcastle disease, as birds infected with velogenic strains generally die (R. Alders, pers comm, 2020).

There is a strong demand for both eggs and poultry meat in Timor-Leste, particularly in urban areas and Dili. For the most part, however, these products are supplied by imports rather than local chicken and egg production facilities. They come mostly from Brazil (16,561 t of chicken meat and 3,850 t of chicken eggs, worth US\$12 million in 2018). According to Scheiner (2019:101), about 40% of the goods imported for consumption could be produced in Timor-Leste if agriculture, food processing and small manufacturing were improved. However, there are limited commercial poultry breeding and production facilities operating in Timor-Leste, even though the opportunity to improve local supply is significant. Limited private-sector interest and investment is another constraining feature for commercial chicken meat and egg supply, which will struggle to compete on price with imported products. There is significant opportunity and economic benefits to be gained from cost-effective private-sector investment in local poultry production.

#### *Cattle and buffalo management*

Like pigs, cattle (*Bos javanicus*) and buffalo (*Bubalus bubalis*) in Timor-Leste are prestige animals, acquired and lightly managed by households for participation in the complex exchange relationships of Timorese extended family life. They are also viewed as a store of wealth to be sold for cultural exchange purposes, or to fund household expenses. Communities across Timor-Leste have been building up their herds of (Bali) cattle and water buffalo, which were largely destroyed or disbursed in the destructive withdrawal of the Indonesian occupying armed forces in 1999.

<sup>6</sup> A thermo-tolerant vaccine developed by ACIAR and delivered via eye drops three times a year by trained community vaccinators has proved effective on a trial basis but needs to be scaled up (ABC 2016). [www.abc.net.au/news/rural/2016-04-21/village-chicken-project-delivering-food-security-for-east-timor/7341888](http://www.abc.net.au/news/rural/2016-04-21/village-chicken-project-delivering-food-security-for-east-timor/7341888)



Across Timor-Leste today, more than 150,000 cattle, 100,000 buffalo and 200,000 small ruminants (goats and sheep) graze some 200,000 ha of public lands, most of which is poorly managed open commons (Fordyce 2017). Grazing land is generally highly degraded with dense, woody and unmanaged herbaceous weed infestations (for example, *Lantana camara*, *Mimosa diplotricha* and *Chromolaena odorata*) with very low annual pasture production. The absence of improved pastures, overgrazing and seasonal droughts means that much of the stock is very underweight and significant stock losses occur due to lack of water and feed. Diseases such as brucellosis are endemic and, while not fatal to cattle, cause high rates of calf mortality. These persistent challenges are compounded by the limited availability of veterinary services—Fordyce (2017) reports just 15 qualified vets in the country—and a reliance on a small suite of remedies (antibiotics, antiparasitics and vitamins) to treat animals usually undertaken periodically by district-based veterinary technicians (MAF staff, pers comm, 2020).

There is growing demand for beef in urban areas but marketing, butchering and processing of beef products remains rudimentary. Reports of significant unrecorded sales of cattle into Indonesia markets across the West Timor land border (estimated at 5,000 per annum) due to more favourable pricing may affect the stability of beef supply in Timor-Leste markets (ACIAR project leader, pers comm, 2020). During the COVID-19, period, however, this trade has reportedly been disrupted.

### Fisheries

Timor-Leste has a coastline of around 735 km and 72,000 km<sup>2</sup> of Exclusive Economic Zone waters with rich marine resources and the potential to develop offshore fisheries, especially in the Timor Sea off the southern coast. Coastal and

near-shore waters support modest numbers of artisanal and seasonal fishing activity—FAO (2019) estimate 20,000 fishers—with low-technology dugout canoes and motorised outrigger boats. Sales of fresh and dried fish are localised, with limited and fragmented distribution into hinterland markets and towns by motorbike. Average fish consumption in Timor-Leste is 6.1 kg per capita per annum, substantially lower than the regional Asian average of 17 kg per capita per annum (AECOM 2018:3). However, there is significant variation, ranging from 17.6 kg per capita per annum on the coasts (more than meat) and just 4 kg per capita per annum in the hinterland and mountains. Coastal communities also gain additional year-round supplementary nutrition through regular reef gleaning at low tide (mainly by women and children). Most artisanal fishing around the coast uses relatively low-technology fishing methods (line, net, fish traps and cages) and fish marketing remains localised and poorly coordinated.

In the 2011 National Strategic Plan, it was noted that, compared to other agricultural sectors:

‘(F)isheries is already well regulated with a number of laws, decree laws and ministerial diplomas directly relevant to the sector. However, there is little enforcement and the sector operates much as it has done in the past.’ (RDTL 2011:131)

Over the last decade, Fisheries (within the Ministry of Agriculture and Fisheries) has trialled a number of initiatives and programs, but evidence of any sustained development is minimal. A revised policy approach has now been developed (López-Angarita et al 2019).

The establishment of a sustainable commercial fishing industry accessing the deeper waters of the Timor Sea off the southern coast is a national government

**Timor-Leste has a high prevalence of poverty, with 42% of the population living on less than US\$2 per day.**



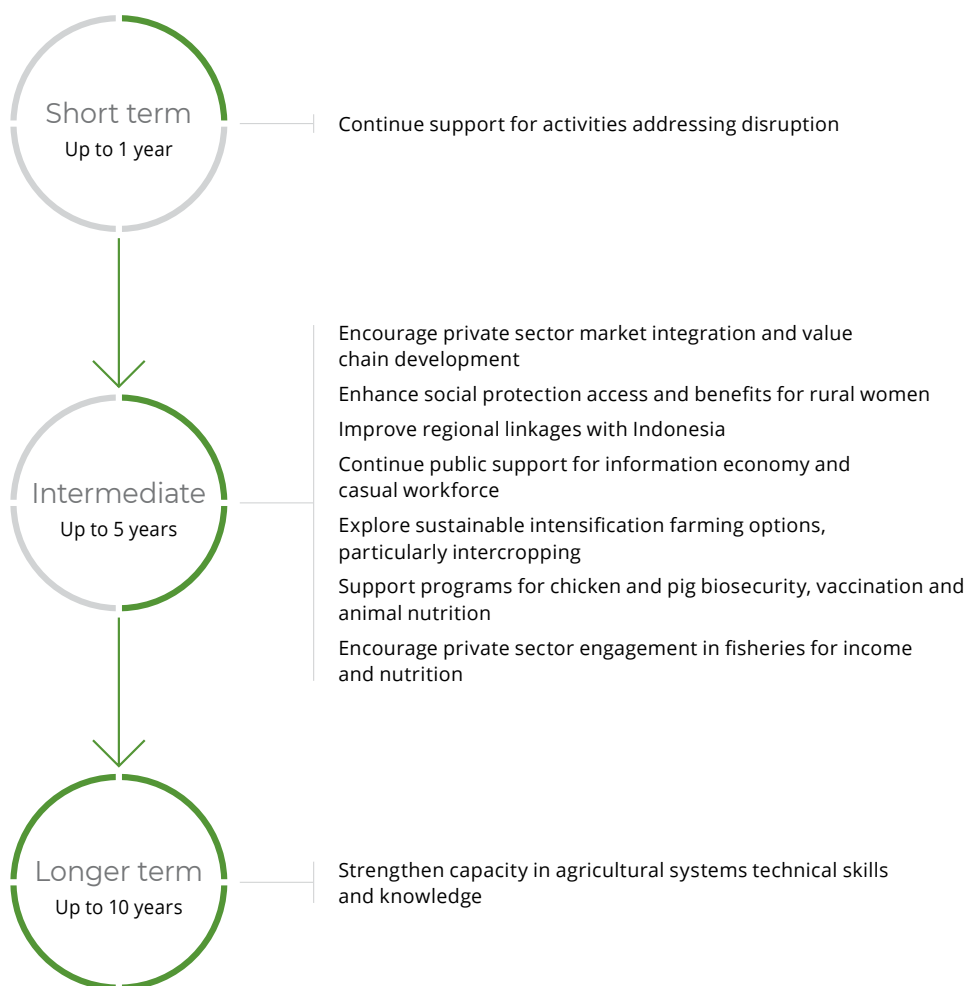
Photo: Joctan Dos Reis Lopes

strategic priority. However, this objective has proved problematic for a range of reasons, with numerous setbacks in planning and licensing of operators. Limited patrol of the marine Exclusive Economic Zone has been a factor in the illegal operations by foreign vessels in these waters. Licensing external operators has also proved fraught, and a number of fishing operations have been shut down and fined. There have been no licensed fishing operations operating in the Timor Sea since 2017 and a fish processing and canning factory developed in the eastern Lautem district in 2017 was abandoned upon completion.

On land, a number of pilot-scale aquaculture projects have been developed in Timor-Leste over the years, focusing mainly on freshwater milkfish and tilapia species production. These attempts have had mixed success. A recent New Zealand evaluation report noted at the end of a five-year technical support program that ‘the business case for aquaculture, including hatcheries, has yet to be proven’ and that ‘five years is too short a time period to establish a well-managed and sustainable aquaculture sector when starting from such modest beginnings and in such a challenging environment’ (AECOM 2018:3).

## 8.5 Opportunities for action

### 8.5.1 Snapshot of potential investment options



### 8.5.2 Australian Government investments in Timor-Leste

ACIAR's research agenda supports Timor-Leste's Strategic Development Plan 2011–2030, which sets out a clear development agenda and aspirational goals. In consultation with the Timor-Leste Government, the agreed medium-term research priorities are:

- improve smallholder and community livelihoods through adopting improved varieties of staple crops and legumes
- make livestock, fisheries and horticultural systems more productive and resilient
- improve individual and institutional research and development capacity in the Ministry of Agriculture and Fisheries and the University of Timor-Leste.

ACIAR projects and the complementary Australian Aid programs funded by DFAT are providing constructive development support and applied research activities that have been formulated in relation to the Strategic Development Plan and with consultation and agreement with the Ministry of Agriculture and Fisheries.

DFAT's current five-year, A\$25 million fund focusing on nutrition-sensitive agriculture and implemented through the TOMAK (To'os ba Moris Di'ak or Farming for Prosperity) program is a good example of a smaller-scale, targeted intervention that creates opportunities and demonstrable benefits for participants, particularly women. The program has recently received an additional boost of A\$500,000 to address immediate shortages, and food and seed supply systems to complement Ministry of Agriculture and Fisheries activities.

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

*Continue support for activities addressing disruption*

*Social protection programs*

The swift response of the Timor-Leste Government to provide interim cash transfers to over 300,000 households across the country highlighted the awareness of the immediate pressures placed on households as a result of the emergency lockdown and the extent of rural household poverty in particular. These broad-based measures to support poor households with direct cash transfers can be seen as temporary elaborations of more formal and systematic social protection policies, such as the Bolsa de Mãe ('Mother's purse', modelled on the World Bank-promoted Brazilian Bolsa familia) introduced in 2008 that provides monthly payments to support child nutrition, education and welfare among poor families. As the economic impact of COVID-19 continues, there is scope for extending the support provided by these kinds of public transfer measures to help sustain the informal economy and casualised workforce.

However, these payments need to be considered in the context of a broader review of national budgets, which already provide significant cash distributions and pensions to large numbers of recipients across the country. The government supports investments for village-based labour schemes on roads and infrastructure that provide relatively well-remunerated supplementary wages for participants. There is also a large budget allocation to registered veterans of the Independence struggle (*veteranus*), who consume a growing and unsustainable portion of the state budget—some 6% or over US\$80 million in 2017 (Scheiner 2019). This is equivalent to the funding allocated to health and agriculture combined (Wallis 2019).

### *Village development funds*

Political and economic decentralisation to support local-level initiatives and governance has been canvassed but delayed over many years. The government has promoted a program for national village development, which allocates regular and loosely tied direct funding to local villages across Timor-Leste. The program offers an opportunity for more effective use of development funds (now mostly directed to infrastructure) to improve access and investment in productive local resources. There is a need for greater coordination and integration of the diverse range of locally supported initiatives and programs that are implemented across the country by non-government organisations and international aid programs to improve outcomes and complement government initiatives (Cardo 2018).

### **8.5.4 Intermediate term (up to 5 years)**

#### *Encourage private sector market integration and value-chain development*

DFAT's Australian Aid support for Timor-Leste supports a market development facility designed to connect individual producers, businesses, governments and non-government organisations with markets and promote business development away from dependence on the fossil-fuel economy (DFAT 2017). In Timor-Leste, there are many niche activities and prospective businesses, particularly in agriculture and tourism, that offer direct benefits to supply-chain stakeholders (producers, households and small businesses) with flow-on effects to the wider economy and labour force. However, as noted above, the private sector in Timor-Leste remains small and underdeveloped in a context dominated by government and public sector controls.

There is scope for ACIAR to engage and partner with a revised DFAT-funded market development facility to scope and explore the feasibility of business opportunities focusing on local productive resources, including agribusiness and agricultural supply chains, as well as the potential for market-based tourism. In doing so, there is a pressing need to promote and support successful private-sector supply and market-oriented value chains.

Potential investments in market development activities include:

- improved government reporting and dissemination of retail food prices and farm-level commodity prices, including regional markets
- implementation of integrated pest management systems for smallholder farming systems to combat fall armyworm and other crop pests
- new and improved livestock marketing, including liveweight sales facilities to promote improved animal handling and welfare arrangements, including more humane and hygienic butchering, processing, chilling and distribution networks to meet growing consumer demand. A focus on cattle/buffalo, pigs, chickens and egg production and fisheries is recommended
- community-based ecotourism focused on defined natural, cultural and religious attractions that may include homestay facilities, dining and guided tours and trekking, field school opportunities, and bicycle and motorbike tours. There are a small number of existing attempts at this kind of venture that have been developed by the local environmental non-government organisation, Haburas (Gomes 2013), but there is significant potential to expand possible locations and involve more communities (Edyvane et al 2012, The Asia Foundation 2018). This initiative could include

marine tourism (reef diving, marine megafauna, fishing)

- a feasibility study focused on the production and distilling of palm liquor (*tua sabu*) and fermented products (*tua muti*) for domestic consumption and export to Indonesia. The great majority of settlements across Timor-Leste use these local alcoholic beverages on a daily basis for social gatherings and sacrificial purposes. At present, the industry is largely unregulated but it provides consistent dry season income for many producers. As a longstanding cultural tradition, distilling also offers tourism potential. The feasibility study would be undertaken to highlight the sector linkages and growth potential, along with social and economic impacts of commercialisation.

#### *Enhance social protection access and benefits for rural women*

Women are often constrained in their access to social protection programs, including cash transfers, public work programs and asset transfers. Integrating gender-sensitive social protection design measures is the key to ensuring that rural women can benefit equally from these interventions (FAO 2020b).

#### *Improve regional linkages with Indonesia*

The continuing closure of the land border between Timor-Leste and Indonesian West Timor, along with the impact on agri-input supply chains and the flow of people, has highlighted the importance of Indonesia as a critical source of and destination for goods and market opportunities. Improving regional linkages and access to Indonesian markets and research agencies can form the basis for mutually beneficial cooperation and collaboration on a range of issues and development opportunities (ADB 2019). In a COVID-19-controlled environment, there are prospective exchanges between university

researchers and students, greater access to Indonesian markets for livestock and value chains, more open access and movement of local populations (who already have familial connections), and agreements around travel corridors for populations in Oecussi.

#### *Continue public support for information economy and casual workforce*

Until COVID-19 intervened, temporary overseas labour migration has been a growing and highly significant economic export and skills training activity that will inevitably become a significant livelihood component of the Timor-Leste economy. In 2017, for the first time, income from labour migration in the form of savings and remittances was the largest source of non-oil revenue (Curtain 2018). This flow of financial support from both formal and informal labour migration activities provides a highly beneficial and direct source of supplementary income for rural and urban origin households. It is also a potential source of investment capital that might be productively directed to improved and intensified production and market systems (Wigglesworth 2017).

There is some evidence that young Timorese returning from overseas work contracts are converting their acquired knowledge and investment savings into innovative agricultural and diversified investment activities. The United Nations Development Programme-sponsored youth business advisory centre in Dili (Klua Juventude Fila-Liman) has focused on encouraging returning migrants to consider more entrepreneurial business start-ups (UNDP 2018b). The informal labour migration sector has seen a growing circular migration to the United Kingdom, with strong remittance flows providing supplementary income for enhancing household wellbeing in rural and urban communities (Curtain 2018, McWilliam 2020). The COVID-19 pandemic has

disrupted return visits and some migrant work in the United Kingdom, but other opportunities have opened up and allowed the remittances to continue flowing.

In a recovering COVID-19 period, as labour migration opportunities (re)emerge, there is scope to promote more productive use and investment of savings and remittances. These include expanding youth business and investment advisory centres in selected urban areas of Timor-Leste and offering a range of information, technical support and networking services to promote ideas exchange, training, investment advice and savings. The longer-term prospects for overseas labour migration and remittance transfers are good and are likely to form a key component of Timor-Leste's post fossil-fuel economic future. Promoting high participation among young women in these opportunities should also be prioritised. In addition, opportunities for labour migration and semi-skilled development programs in Australia could be increased and expanded for young Timorese (18–30 years) working as temporary labour migrants.

### *Explore sustainable intensification farming options, particularly intercropping*

Livestock play a vital economic and cultural role in Timorese social life. Improved animal husbandry (combining food, nutrition, water, control and more effective biosecurity, veterinary and extension services) will result in higher production and lower mortality rates in animals and greater economic returns to smallholders. A key to this recovery is to focus on the gradual intensification of farm management among smallholders, especially the production of food and fodder intercropping on customarily owned farmland that provides de facto secure tenures (Fordyce 2017).

### *Support programs for chicken and pig biosecurity, vaccination and animal nutrition*

While pasture development and management of the rangelands, including weed eradication, may be a long-term national objective, a more targeted approach based around on-farm production and management will yield sustainable results more directly and quickly. Given the nutritional benefits offered by increased consumption of meat and poultry products, there are opportunities for a range of rural development initiatives that focus on improved production and management systems for enhanced community nutrition and income. Interventions need to prioritise the most popular animals: poultry, pigs and cattle/buffalo. As ACIAR has already implemented a number of support projects for each of these livestock groups, further intervention at scale is both feasible and appropriate, with a key focus on feed supply, biosecurity and vaccination management, and improved marketing and related facilities.

### *Encourage private sector engagement in fisheries for income and nutrition*

The more than fourfold difference between fish consumed in coastal villages (17 kg per capita per annum) compared with those in the mountains (4 kg per capita per annum) suggests that it is not food preferences that shapes the results, but availability of the food resource across Timor-Leste. However, Población (2013) argues that fish are not preferred by most Timorese, who value animal meats much more highly because of their exchange and prestige value.

Increased consumption of fish protein and seafood has great potential for improving the nutrition of Timorese diets and reducing the endemic problems of undernutrition, especially among pregnant and/or lactating

women and children. There are several promising interventions:

- The establishment of a deep-water fishing industry presence in the Timor Sea would supply local and export markets, resolve licensing constraints and give Timor-Leste the ability to deny and deflect illegal fishing and enforce national maritime boundaries.
- ACIAR's current fisheries and nutrition study with WorldFish (FIS/2017/032) provides a platform to develop longer-term strategic interventions in the fisheries sector with a focus on community-based and private-sector business and market development. Priority efforts should be directed to near-shore smallholder fishing with co-management of marine resources and expanding the use of fish aggregating devices for higher yields (Mills et al 2013).
- Domestic fish consumption can be promoted through purpose-built facilities (ice making and cold storage) (Población 2013), improved dried fish technologies, coordinated fish marketing supply chains and distribution into rural and mountain areas.

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

As the people of Timor-Leste continue the process of post-conflict and post-Independence nation building, there remain multiple developmental challenges that need to be addressed to lift greater numbers of households out of poverty, reduce rural-urban inequalities across multiple health and socioeconomic indicators, provide access to essential services and generate a stable and effective, decentralised system of political governance. These are medium-long-term challenges that require sustained policy support and program implementation by governments and a growing private sector. From the perspective of ACIAR, there would be much value in focusing on lifting

the quality and effectiveness of education and technical training, especially in relation to agricultural investment and market-based developments.

#### *Strengthen capacity in agricultural systems understanding*

Timor-Leste underinvests in education spending. Only 8% of the national budget was allocated to the education sector in the 2016 and 2017 budgets (Scheiner 2019:96). Much has been written on the limitations and endemic problems of schooling in post-Independence Timor-Leste, including curriculum issues, poor (Portuguese) language learning and comprehension, teacher capacity and qualifications, and high rates of absenteeism among students and teachers. On an average day, more than one-third of Grade 1 students, 13% of primary school teachers and 25% of secondary school teachers are absent (Patrinos & Ramos 2015, NDS 2016). Against a general background of rural poverty, these factors result, unsurprisingly, in poor educational outcomes. Girls in rural areas are often further disadvantaged in favour of their brothers' continuing education (given limited available funds) and are at risk of teenage pregnancy, early marriage and a life of domestic drudgery with little opportunity for further education and training (UNFPA 2017).

In this context, there is scope for a longer-term focus on capacity building and high-quality technical skills training for productive livelihood applications and investment activities in agriculture and compatible enterprises. Key areas of support include curriculum and teacher training for rural high schools and vocational training centres with an emphasis on agricultural and technical qualifications across a range of vocational trades and in-demand services, with a strong emphasis on supporting the economic interests and skills of female farmers.



## 8.6 Conclusions

The detection of the first cases of COVID-19 infections in Timor-Leste during March 2020 was cause for considerable fear and concern. The virus had the potential to quickly overwhelm the existing medical health system. The government's response was swift and effective, declaring an emergency lockdown, shutting the country's borders, closing schools and businesses, and restricting travel between districts. A medical testing regime and social messaging campaign was introduced to encourage effective preventive health practices. As a result of these decisive measures, by July 2020 there were no active COVID-19 cases and there have been no reported deaths or serious hospitalisations due to the virus. The risk of a renewed outbreak, however, remains high, and the Timor-Leste health system is poorly equipped to cope.

The major initial impact from the COVID-19 alert has been economic. Large numbers of people lost their livelihoods and informal sector income sources. The emergency lockdown was sustained for a number of months before restrictions were gradually eased. By July 2020, it was reported that Dili and the regions had returned to a more vibrant level of activity, with schools with markets and shops opening, as well as regular transport between regions.

During the emergency period, the government allocated a number of income support measures and emergency payments (US\$100 per month) to 318,000 poorer households for a period of two months. The government also moved quickly to ensure that additional stockpiles of imported rice were set aside to secure ongoing food supply. Much of these additional stocks were imported from Vietnam by private companies. Food prices have been broadly stable, with some fluctuations reflecting disruption of supplies during the period of emergency.

As of July 2020, COVID-19 has affected some sectors more than others:

- There were major disruptions to the fledgling tourism sector, including restaurants, tours, hotels, rental companies, and flow-on effects to local communities who benefit indirectly from tourism. The private sector is already small in Timor-Leste, but it now smaller, with prospects for recovery some way off. There are larger numbers of unemployed and underemployed young people, with few opportunities for full-time employment.
- Agri-input and other supply-chain provisions across the land border with Indonesia have been disrupted. The border remains closed to people, but despite being officially open to trade, Timor-Leste customs operations have restricted transport movements to a weekly two-hour window, resulting in long delays and disrupted supplies. This has had knock-on effects for horticulture activities (market gardens) and agribusinesses.
- The growing developments in international temporary and circular labour migration (formal and informal) have been severely disrupted with the shutdown of international travel. Timorese labour migrants in the United Kingdom, South Korea and Australia are able to continue working and send remittances to their families, but new and aspiring migrant candidates in Timor-Leste have had their plans thwarted. Labour migration is a growing and important source of non-fossil-fuel export revenue for Timor-Leste (>US\$40 million) that will become more important in a post-COVID-19 world.

### 8.6.1 Risk multipliers

The main potential risk multipliers that could combine to exacerbate existing COVID-19 impacts include:

- the threat of another outbreak of COVID-19 disease infections leading to uncontrolled community transmission and overwhelming pressure on the health system and exacerbated economic disruption
- the risk of further delay in ratifying the 2020 national budget
- a major disruption in food supply chains, particularly the availability of imported staple foods such as rice, oil and chickens
- the arrival of African swine fever, which threatens the pig population across the country, and the livelihoods of thousands of Timorese farmer households who depend on pigs as stores of wealth and ritual gifts to fulfil exchange obligations within familial alliance networks.

### 8.6.2 Resilience and adaptation

Two decades after the end of a generation-long military occupation, Timor-Leste society continues its collective journey towards a more prosperous and peaceful future. This period has been marked by many setbacks and challenges (environmental, economic and political) but the trajectory has been a positive one. There have been significant and sustained improvements in health and income indicators, and the provision of essential services and welfare.

Despite the lingering legacies of historical displacement, trauma and repression, the Timorese people have demonstrated an extraordinary capacity for resilience and adapting successfully to circumstances beyond their control. These qualities are built around the continuing strength of local traditions (*lisan*), including highly detailed technical knowledge of natural resources,

an abiding faith in religious and ancestral protection, and close-knit kinship networks sustained by ongoing exchange and familial obligations.

### 8.6.3 Opportunities for action

Analysis of the economic impacts of COVID-19 against the background of prevailing constraints in Timor-Leste has highlighted a range of gaps and vulnerabilities in existing Timor-Leste food systems. Many of these are systemic problems that have long been recognised but have proved challenging to resolve or overcome. Prospective interventions include the improved and reimagined use of the sovereign wealth Petroleum Fund to provide cash transfers to reduce poverty and enhance wellbeing.

Australian aid assistance to Timor-Leste is currently addressing a range of development gaps where further investment and expansion of effort would assist in alleviating food and nutrition security concerns. The DFAT Australian Aid Investment Plan (2016–2019), which covers a wide range of interventions, has as its stated strategic commitments:

- improving livelihoods
- enhancing human development
- strengthening governance and institutions.

Cross-cutting themes across all of these programs are improving nutrition, empowering women and girls, and supporting disability-inclusive development (DFAT, no date).

The DFAT set of projects under the TOMAK program, which is working closely with rural development projects and support programs, is well targeted. Based on the current assessment of gaps and development opportunities in

contemporary Timor-Leste, the following possibilities should be considered:

- intensification of farming practice and productivity through greater use of intercropping with livestock fodder crops, weed prevention cover crops, higher-value horticulture and tree crops and increased inputs
- promotion of integrated pest management to control insect damage to food crops, including fall armyworm
- improvements to chicken and pig biosecurity and vaccination programs, along with greater promotion of animal nutrition, livestock management and marketing, with a focus on female farmers
- expansion of international labour migration, including the exploration of an expanded role for Australian assistance and new emerging markets in Japan and Canada
- continued support of fledgling private-sector investment and efforts to encourage government promotion of private-sector growth in agriculture and market supply chains, increased employment and reduced regulatory hurdles
- improvements to fish harvesting, marketing, processing and distribution to upland markets and communities for consumption and enhanced nutrition
- new and improved livestock production, marketing and processing arrangements along with facilities to promote improved animal welfare arrangements, more humane and hygienic butchering, processing, chilling and distribution networks to meet growing consumer demand
- further development and expansion of broiler chicken and commercial egg production enterprises to supply urban consumer demand.

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## 8.8 References

- AECOM (2018). *Evaluation report: aquaculture development in Timor-Leste*, report to New Zealand Foreign Affairs and Trade, AECOM, Australia, accessed 3 September 2020, [www.mfat.govt.nz/assets/Aid-Programs/Evaluations/2018/Timor-Leste-Aquaculture-evaluation-final-Jan2018.pdf](http://www.mfat.govt.nz/assets/Aid-Programs/Evaluations/2018/Timor-Leste-Aquaculture-evaluation-final-Jan2018.pdf).
- ADB (Asian Development Bank) (2019). *Enhanced cooperation and integration between Indonesia and Timor-Leste: scoping study*, ADB, Manila.
- Asante AN, Martins N, Otim ME & Dewdney J (2014). Retaining doctors in rural Timor-Leste: a critical appraisal of the opportunities and challenges. *Bulletin of the World Health Organization* 92(4):277–282, doi:10.2471/BLT.13.123141.
- Barnes S, Hall T, Kehi B, Mok Q & Palmer L (2020a). *How Timor-Leste has mobilised against COVID-19*, Medical Xpress, accessed 23 July 2020, <https://medicalxpress.com/news/2020-07-timor-lestes-mobilised-covid-.html> (tinyurl.com/yy7n3omx).
- Barnes T, Morais O, Cargill C, Parke C & Urlings A (2020b). First steps in managing the challenge of African swine fever in Timor-Leste. *One Health* 10(December 2020), <https://doi.org/10.1016/j.onehlt.2020.100151>.
- Bovensiepen J (ed) (2018). *The promise of prosperity: visions of the future in Timor-Leste*, ANU Press, Canberra.
- Bündnis Entwicklung Hilft (2017). WorldRiskReport. Bündnis Entwicklung Hilft, Berlin, accessed 10 July 2020, [http://weltrisikobericht.de/wp-content/uploads/2017/11/WRR\\_2017\\_E2.pdf](http://weltrisikobericht.de/wp-content/uploads/2017/11/WRR_2017_E2.pdf).
- Cardno (2018). *Support for national program for village development*, Cardno, Queensland, Australia, accessed 26 June 2020, [www.cardno.com/projects/support-for-national-program-for-village-development](http://www.cardno.com/projects/support-for-national-program-for-village-development).
- Chen L (2020). Rethinking Timor-Leste's COVID-19 state of emergency: is the country's coronavirus policy protecting the vulnerable or leaving them behind? *The Diplomat*, accessed 27 April 2020, <https://thediplomat.com/2020/04/rethinking-timor-lestes-covid-19-state-of-emergency/>.
- Curtain R (2018). *Remittances biggest export earner for Timor-Leste after oil*, devpolicy@ANU blog, 22 March 2018, accessed 3 September 2020, <https://devpolicy.org/remittances-biggest-export-earner-for-timor-este-after-oil-20180322/>.
- da Costa M, Lopes M, Ximenes A, do Rosario Ferreira A, Spyckerelle L, Williams R, Nesbitt H & Erskine W (2013). Household food insecurity in Timor-Leste. *Food Security* 5(1):83–94, doi.org/10.1007/s12571-012-0228-6.
- DFAT (Department of Foreign Affairs and Trade) (2017). *MDF Timor-Leste* (English version) [YouTube], accessed 18 July 2020, [www.youtube.com/watch?v=60tgouC8HyA](http://www.youtube.com/watch?v=60tgouC8HyA).
- DFAT (Department of Foreign Affairs and Trade) (nd). *Aid investment plan: Timor-Leste 2015/16 to 2018/19*, DFAT, accessed 3 September 2020, [www.dfat.gov.au/sites/default/files/timor-lestes-aid-investment-plan-2015-19.pdf](http://www.dfat.gov.au/sites/default/files/timor-lestes-aid-investment-plan-2015-19.pdf).
- Direcção Nacional de Estatística (2018). *Timor-Leste population and housing census 2015: volume 12*, Analytical report on agriculture, [www.statistics.gov.tl/wpcontent/uploads/2019/10/2015-Census-Agriculture-and-Fisheries-report.pdf](http://www.statistics.gov.tl/wpcontent/uploads/2019/10/2015-Census-Agriculture-and-Fisheries-report.pdf).
- Edyvane K, McWilliam A, Quintas J, Turner A, Perry S, Teixeira I, Pereira CJ, Tibirica Y & Birtles A (2012). *Coastal & marine ecotourism values, issues & opportunities on the north coast of Timor-Leste—Final Report*, Ministry of Agriculture & Fisheries, National Directorate of Tourism, Government of Timor-Leste.

- Erskine W, Ximenes A, Glazebrook D, Da Costa M, Lopes M, Spycherelle L, Williams R & Nesbitt H (2020). Wild foods and food security: the case of Timor-Leste. In: Connell J & Lowitt K (eds.), *Food security in small island states*, Springer, Singapore, 289–301.
- FAO (Food and Agriculture Organization of the United Nations) (2011). *Aquastat for Timor-Leste*, FAO, accessed 15 June 2020, [www.fao.org/nr/water/aquastat/countries\\_regions/tls/TLS-CP\\_eng.pdf](http://www.fao.org/nr/water/aquastat/countries_regions/tls/TLS-CP_eng.pdf).
- FAO (Food and Agriculture Organization of the United Nations) (2019). *The Democratic Republic of Timor-Leste*, Fishery and Aquaculture Country Profiles, FAO, accessed 19 June 2020, [www.fao.org/fishery/facp/TLS/en](http://www.fao.org/fishery/facp/TLS/en).
- FAO (Food and Agriculture Organization of the United Nations) (2020a). FAO data, accessed 10 July 2020, [www.fao.org/faostat/en/](http://www.fao.org/faostat/en/).
- FAO (Food and Agriculture Organization of the United Nations) (2020b). *Gendered impacts of COVID-19 and equitable policy responses in agriculture, food security and nutrition*, FAO, accessed 3 September 2020, [www.fao.org/policy-support/tools-and-publications/resources-details/es/c/1276740](http://www.fao.org/policy-support/tools-and-publications/resources-details/es/c/1276740).
- Fordyce G (2017). *Enhancing smallholder cattle production in East Timor: final report*, ACIAR, Canberra, ACT.
- Fox JJ (2001). Diversity and differential development in East Timor: potential problems and future possibilities. In: Hill H & Saldanha JM (eds), *East Timor: development challenges for the world's newest nation*, Singapore and Asia Pacific Press, Canberra, 155–173.
- Gavalyugova DK, Caminha S, Verdial T & Perova E (2018). *Women farmers in Timor-Leste: bridging the productivity gap (tetum)*, World Bank Group, Washington, DC, accessed 3 September 2020, <http://documents.worldbank.org/curated/en/220661544729899378/Women-Farmers-in-Timor-Leste-Bridging-the-Productivity-Gap>.
- GDS (General Directorate of Statistics) (2011). *Timor-Leste household income and expenditure survey*, Ministry of Finance, Dili, accessed 3 September 2020, [www.statistics.gov.tl/wp-content/uploads/2013/12/HIES2011\\_Report\\_20\\_20Final.pdf](http://www.statistics.gov.tl/wp-content/uploads/2013/12/HIES2011_Report_20_20Final.pdf) ([tinyurl.com/y44qu4tf](https://tinyurl.com/y44qu4tf)).
- GDS (General Directorate of Statistics), Ministry of Health & ICF (2018). *Timor-Leste demographic and health survey 2016*, GDS & ICF, Dili, Timor-Leste and Rockville, Maryland, USA.
- Gerry F & Sjölin C (2018). *Timor-Leste and the empowerment of women: access to justice and the future for domestic, family and sexual violence survivors*, ANU, Canberra, accessed 18 February 2020, [dpa.bellschool.anu.edu.au](http://dpa.bellschool.anu.edu.au).
- Global Nutrition Report (2020). *Country nutrition profiles*, Global Nutrition Report, accessed 10 July 2020, <https://globalnutritionreport.org/resources/nutrition-profiles/>.
- Gomes DS (2013). *Internship report: Haburas Foundation Timor-Leste*, Monash University, accessed 3 September 2020, [www.academia.edu/5049147/Internship\\_report\\_Community\\_Based\\_Tourism\\_TimorLeste](http://www.academia.edu/5049147/Internship_report_Community_Based_Tourism_TimorLeste).
- Gorton C (2018). *Food and nutrition security in Timor-Leste: challenges and prospects*, Strategic Analysis Paper, Future Directions International.
- Government of Timor-Leste (2020a). *Meeting of the Council of Ministries on April 29, 2020*, accessed 10 June 2020, <http://timor-leste.gov.tl/?p=24225&lang=en>.
- Government of Timor-Leste (2020b). *Meeting of the Council of Ministries of April 8, 2020*, accessed 3 September 2020, <http://timor-leste.gov.tl/?p=24043&lang=en>.
- IFAD (International Fund for Agricultural Development) (2017). *Project Completion Report Validation Timor-Leste Maize Storage Project Democratic Republic of Timor-Leste*, accessed 3 September 2020, [www.ifad.org/documents/38714182/39730985/Timor-Leste+pcrv.pdf](http://www.ifad.org/documents/38714182/39730985/Timor-Leste+pcrv.pdf).

- International Labour Organization (ILO) (2016). *Structural transformation and jobs in Timor-Leste*, ILO, Dili, Timor-Leste.
- Justice Support Programme (2013). *Breaking the cycle of domestic violence in Timor-Leste: Access to justice options, barriers and decision-making processes in the context of legal pluralism*, UNDP, accessed 28 June 2020, [www.undp.org/content/dam/timorleste/docs/reports/DG/Domestic%20Violence%20Report%20with%20cover%20FINAL.pdf](http://www.undp.org/content/dam/timorleste/docs/reports/DG/Domestic%20Violence%20Report%20with%20cover%20FINAL.pdf) (tinyurl.com/yxdt97v).
- Kelly M, Sweeney D, Pereira B & Ferreira D (2019). *Australia Timor-Leste health review report*, DFAT, accessed 3 September 2020, [www.dfat.gov.au/sites/default/files/timor-leste-health-review-report.pdf](http://www.dfat.gov.au/sites/default/files/timor-leste-health-review-report.pdf).
- Leach M (2020). *Out of turmoil, a new majority in Timor-Leste's parliament*, accessed 2 June 2020, <https://insidestory.org.au/out-of-turmoil-a-new-majority-in-timor-lestes-parliament/>.
- López-Angarita J, Hunnam KJ, Pereira M, Mills DJ, Pant J, Teoh SJ, Eriksson H, Amaral L & Tilley A (2019). *Fisheries and aquaculture of Timor-Leste in 2019: current knowledge and opportunities*, Program report: 2019–15, WorldFish, Penang, Malaysia, accessed 3 September 2020, [www.worldfishcenter.org/content/fisheries-and-aquaculture-timor-leste-2019-current-knowledge-and-opportunities](http://www.worldfishcenter.org/content/fisheries-and-aquaculture-timor-leste-2019-current-knowledge-and-opportunities).
- Lusa (2020). *COVID-19: Timor-Leste oil fund loses US \$1.8 billion*, accessed 18 June 2020, <https://jornaleconomico.sapo.pt/en/noticias/covid-19-fundo-petrolifero-de-timor-leste-perde-18-mil-milhoes-de-dolares-566959> (tinyurl.com/y42otncz).
- MAF (Ministry of Agriculture and Fisheries) (2020). *Rapid food security assessment: full report*, Dili, accessed 3 September 2020, <https://asia.oxfam.org/latest/policy-paper/timor-leste-rapid-food-security-assessment-2020>.
- Margalhães F (2020). *Timor-Leste's coronavirus response: Timor-Leste's COVID-19 state of emergency is a twin effort to save people's lives and their livelihoods*, accessed 7 June 2020, <https://thediplomat.com/2020/05/timor-lestes-coronavirus-response/>.
- McWilliam A (2011). Exchange and resilience in Timor-Leste. *Journal of the Royal Anthropological Institute* (JRAI) 17(9 November 2011):745–763.
- McWilliam A (2020). *Social and economic recovery in post-conflict Timor-Leste: redemptive legacies*, Oxon: Routledge, Abingdon, Oxford UK & New York, USA.
- McWilliam A & Leach M (eds) (2019). *The Routledge handbook of contemporary Timor-Leste*, Routledge, London, New York.
- McWilliam AR, Lopes M, Glazebrook D, Ximenes A & De Jesus Da Costa M (2015). Seeds of life: Social research for improved farmer yields in East Timor. In: Price S & Robinson K (eds), *Making a difference? Social assessment policy and praxis and its emergence in China*, Berghahn Books, New York, 126–143.
- MDF (Market Development Facility) (2020). *COVID-19 food security: MDF Timor-Leste. MarketView 7* (15 June), DFAT Australian Aid.
- Mills DJ, Abernethy KA, King J, Hoddy ET, Teoh SJ, Larocca P, Gonsalves D, Fernandes A & Park SE (2013). *Developing Timor-Leste's coastal economy: assessing potential climate change impacts and adaptation options*, Final report to the Australian Government Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security National Initiative, WorldFish, Penang.
- Molyneux N, Rangel da Cruz G, Williams R, Anderson R & Turner N (2012). Climate change and population growth in Timor Leste: implications for food security. *AMBIO: A Journal of the Human Environment* 41(8):823–840.
- NDS (National Directorate of Statistics) (2016). *Timor-Leste population and housing census*, Ministry of Finance, Democratic Republic of Timor-Leste.

- Neves G (2018). Political and economic challenges of petroleum dependency in Timor-Leste. In: Bovensiepen J (ed), *The promise of prosperity: visions of the future in Timor-Leste*, ANU Press, Canberra, 63–84.
- Ora T (2020). *Church in Timor-Leste steps up COVID-19 assistance*, accessed 19 August 2020, [www.ucanews.com/news/church-in-timor-leste-steps-up-covid-19-assistance/87860](http://www.ucanews.com/news/church-in-timor-leste-steps-up-covid-19-assistance/87860).
- Patrinos H & Ramos L (2015). *Timor-Leste: starting an education revolution*, Education for Global Development, accessed 26 June 2020, <https://blogs.worldbank.org/education/timor-leste-starting-education-revolution#:~:text=There%20is%20a%20high%20degree,absent%20on%20any%20given%20day.&text=In%20spite%20of%20these%20-challenges,educating%20all%20of%20its%20children> (tinyurl.com/y3gc9g7h).
- Pederson J & Arneberg M (eds) (1998). *Social and economic conditions in East Timor*, Fafo Institute of Applied Social Science, in cooperation with the International Conflict Resolution Program School of International and Public Affairs, Columbia University, New York.
- Población EA (2013). Fisheries and food security in Timor-Leste: the effects of ritual meat exchanges and market chains on fishing. *Food Security*, 5(6):807–816.
- Price JA, Sousa Soares A, Asante J, Martins K, Williams & Wiseman V (2016). 'I go I die, I stay I die, better to stay and die in my house': understanding the barriers to accessing health care in Timor-Leste. *BMC Health Services Research* 16:535.
- Provo A, Atwood S, Sullivan EB & Mbuya N (2017). *Malnutrition in Timor-Leste: a review of the burden, drivers, and potential response*, DFAT, The World Bank and the European Commission, accessed 3 September, <http://documents1.worldbank.org/curated/en/666231491492248496/pdf/114087-WP-PUBLIC-EAPEC-176-p-MalnutritioninTimorLeste.pdf>.
- RDTL (Democratic Republic of Timor-Leste) (2011). *Timor-Leste strategic development plan 2011–2030*, Government of Timor-Leste, Dili.
- Rola-Rubzen MF, Janes J, Correia V & Dias F (2011). Challenges and constraints in production and marketing horticultural products in Timor-Leste. *Acta Horticulturae* 895:245–253.
- Rose M (2019). Returned seasonal workers and small business in Timor-Leste: reasons for hope, <https://devpolicy.org/returned-seasonal-workers-and-small-business-in-timor-leste-reasons-for-hope-20190722/>.
- Scheiner C (2015). Can the petroleum fund exorcise the resource curse from Timor-Leste? In: Ingram S, Kent L & McWilliam A (eds), *A new era? Timor-Leste after UN*, ANU Press, Canberra, 73–101.
- Scheiner C (2019). After the oil runs dry: economics and government finances. In: McWilliam A & Leach M (eds), *The Routledge handbook of contemporary Timor-Leste*, Oxon: Routledge, 87–109.
- Serrão EJ, Meers R, Pym R, Copland D, Eagles J, Henning (2012). Prevalence and incidence of Newcastle Disease and prevalence of avian influenza infection of scavenging village chickens in Timor-Lesté. *Preventive Veterinary Medicine* 1:104(3-4):301–8.
- Tatoli (24 June 2020). Tatoli News from Timor-Leste, Facebook, [www.facebook.com/permalink.php?story\\_fbid=268603304575873&id=100974658005406](https://www.facebook.com/permalink.php?story_fbid=268603304575873&id=100974658005406) (tinyurl.com/y2ygn7v).
- The Asia Foundation (2018). *Timor-Leste, Tourism Barometer*, The Asia Foundation and Destination Human Capital, Dili.
- The New Humanitarian (2008). Porous border increases avian flu risk. *The New Humanitarian*, accessed 13 June 2020, [www.thenewhumanitarian.org/fr/node/242086](http://www.thenewhumanitarian.org/fr/node/242086).
- TOMAK (To'os ba Moris Di'ak, or Farming for Prosperity) (2020). *Chicken & egg: the hard choices*, TOMAK, accessed 17 June 2020, <http://tomak.org/chicken-egg-the-hard-choices/>.

- UNDP (United Nations Development Programme) (2018a). *Timor-Leste national human development report: planning the development opportunities for a youthful nation*, UNDP, New York.
- UNDP (United Nations Development Programme) (2018b). *Nuno Ridenio: 'I started out by opening Black Box Coffee and then became inspired to expand my business'*, UNDP, accessed 3 July 2020, [www.tl.undp.org/content/timor\\_lesste/en/home/stories/i-started-out-by-opening-black-box-coffee.html](http://www.tl.undp.org/content/timor_lesste/en/home/stories/i-started-out-by-opening-black-box-coffee.html).
- UNDP (United Nations Development Programme) (2020). *Human development reports*, UNDP, accessed 10 July 2020, <http://hdr.undp.org/en/content/2019-human-development-index-ranking>.
- UNFPA (United Nations Population Fund) (2017). *The state of world population 2017—Worlds Apart: reproductive health and rights in an age of inequality*, accessed 9 June 2020, <https://reliefweb.int/report/timor-lesste/empowering-women-and-girls-timor-lesste-inequalities-heart-challenge>.
- UNFPA Timor-Leste (United Nations Population Fund) (2020). *European Union and United Nations are committed to ensuring safety and protection of women and girls during COVID crisis*, media release, Dili, 14 April 2020, <https://timor-lesste.unfpa.org/en/news/european-union-and-united-nations-are-committed-ensuring-safety-and-protection-women-and-girls>.
- UNICEF (2018) *Quality education: realising rights for quality education for all children*, accessed 22 June 2020, [www.unicef.org/timorlesste/quality-education](http://www.unicef.org/timorlesste/quality-education).
- Wallis J (2019). Timor-Leste is a rich country but also a poor one: the effect and effectiveness of public transfer schemes. In: McWilliam A & Leach M [eds], *The Routledge handbook of contemporary Timor-Leste*, Routledge, London, New York, 124–135.
- WFP (World Food Programme) (2019). *Fill the nutrient gap Timor-Leste: final report*, WFP, accessed 14 June 2020, [https://docs.wfp.org/api/documents/WFP-0000112181/download/?\\_ga=2.79681232.553036275.1592285356-1746598671.1588494033](https://docs.wfp.org/api/documents/WFP-0000112181/download/?_ga=2.79681232.553036275.1592285356-1746598671.1588494033) (tinyurl.com/cgn6qfp).
- WFP Timor-Leste (2020). *Market monitor report. MAF | GDS | WFP VAM | Food security analysis. Timor-Leste | Week 26/27 2020 (June 22—July 5)*, accessed 3 September 2020, <https://reliefweb.int/sites/reliefweb.int/files/resources/Market%20Monitor%20Report%20-%20Timor-Leste%2C%20Week%2026-27%2020%20%28June%2022—July%205%29.pdf> (tinyurl.com/cgn6qfp).
- Wong J (2018). *Healthier chickens means healthier children in Timor-Leste*, ACIAR, accessed 12 July 2020, <https://reachout.aciar.gov.au/healthier-chickens-means-healthier-children-in-timorleste>.
- Wong J, Bagnol B, Grieve H, Jong J, Li M & Alders R (2020). Eating meat or eating money? Factors influencing animal-source food consumption in Timor-Leste. In: Connell J & Lowitt K (eds), *Food security in small island states*, Springer, Singapore, 261–287.
- World Bank (2020). The World Bank Databank for Health, Nutrition and Population Statistics, accessed 10 July 2020, <https://databank.worldbank.org/home.aspx>.
- Wigglesworth A (2017). *The South Korea option for Timorese migrant workers*, devpolicy@ANU blog, 13 October 2017, accessed 4 August 2020, <https://devpolicy.org/south-korea-option-timorese-migrant-workers-20171013/>.
- Young P (2013). *Effects of importing maize and rice seed on agricultural production in Timor-Leste: commissioned study for the Seeds of Life program*, Ministry of Agriculture and Fisheries, Dili, 1–19.



## 9. Glossary



Photo: Lisa Robins

# 9

## Glossary

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### 9.1 Terms

#### **Adaptive capacity**

The potential of a system to respond to changes (Prosperi et al 2014:6).

#### **Association of Southeast Asian Nations (ASEAN)**

An intergovernmental arrangement formed in 1967 by Indonesia, Malaysia, the Philippines, Singapore and Thailand to promote political, economic and social cooperation and regional stability. Brunei joined in 1984, Vietnam joined in 1995, Laos and Myanmar joined in 1997 and Cambodia became ASEAN's tenth member in 1999. ASEAN's activities are coordinated by the ASEAN Secretariat based in Jakarta (DFAT 2020).

#### **Exposure**

The elements of a system that are susceptible to adverse effects from the external environmental or sociopolitical stress or shock (IPCC 2012).

#### **Food and nutrition security**

When all people at all times have physical, social and economic access to food, which is consumed in sufficient quantity and quality to meet their dietary needs and food preferences (Wüstefeld 2013).

#### **Food insecurity**

Moderate: When people face uncertainties about their ability to obtain food, and have been forced to compromise on the quality and/or quantity of the food they consume.

Severe: When people have typically run out of food and, at worst, gone a day (or days) without eating (FAO et al 2019:5).

#### **Food system**

All the elements (environment, people, inputs, processes, infrastructures, institutions, etc.) and activities that relate to the production, processing, distribution, preparation and consumption of food, and the output of these activities, including socioeconomic and environmental outcomes (HLPE 2020:11).

#### **Human security**

Elements that extend beyond national security and military protection to engage threats to human dignity (Osisanya 2015):

- economic: creation of employment and measures against poverty
- food: measures against hunger and famine
- health: measures against disease, unsafe food, malnutrition and lack of access to basic health care
- environmental: measures against environmental degradation, resource depletion, natural disasters and pollution
- personal: measures against physical violence, crime, terrorism, domestic violence and child labour
- community: measures against inter-ethnic, religious and other identity tensions
- political: measures against political repression and human rights abuses.

## **Indo-Pacific region**

Ranges from the eastern Indian Ocean to the Pacific Ocean connected by South-East Asia, including India, north Asia and the United States (DFAT 2017).

## **Maladaptation**

Actions that may increase vulnerability to future change over time, creating path-dependency and foreclosing future options (Barnett & O'Neill 2010, Wise et al 2014).

## **Malnutrition**

An abnormal physiological condition caused by inadequate, unbalanced or excessive consumption of macronutrients and/or micronutrients; includes undernutrition (child stunting and wasting and vitamin and mineral deficiencies), overweight and obesity (FAO et al 2019:188).

## **Micronutrients**

Vitamins, minerals and other substances that are required by the body in small amounts; measured in milligrams or micrograms (FAO et al 2019:188).

## **Multiple burden of malnutrition**

The coexistence of forms of undernutrition (child stunting and wasting and vitamin and mineral deficiencies) with overweight and obesity in the same country, community, household or individual (FAO et al 2019:188).

## **National security**

The ability of a state to cater for the protection and defence of its citizenry (Osisanya 2015).

## **Net food importers**

Countries or territories where the value of imports of basic foodstuffs outweighs the value of exports of basic foodstuffs; where food refers to the basic food category, excluding tea, coffee, cocoa and spices (FAO et al 2019:188).

## **Nutrition security**

When secure access to an appropriately nutritious diet is coupled with a sanitary environment and adequate health services and care, in order to ensure a healthy and active life for all household members; differs from food security in that it also considers the aspects of adequate caregiving practices, health and hygiene, in addition to dietary adequacy (FAO et al 2019:188).

## **Nutrition-sensitive intervention**

An action designed to address the underlying determinants of nutrition (which include household food security, care for mothers and children, and primary healthcare and sanitation); does not necessarily have nutrition as the predominant goal (FAO et al 2019:188).

## **One Health**

An integrated transdisciplinary approach to achieving optimal health outcomes by recognising the interconnection between people, animals, plants, and their shared environment, and fair trade (CDC 2020, FAO 2020). In its broader framing, it supports pragmatic and equitable approaches to global health security, food security and food production, and justice in human, animal and environmental health (Alders et al 2017, Cleaveland et al 2017, Lysaght et al 2017, Garcia et al 2020).

## **Recovery potential**

The potential of a system to respond and absorb disturbances in order to continue to function (Allen & Prospero 2016).

## **Resilience**

The ability of a system to cope with disturbance or change and retain its fundamental function and structure, and its capacity to self-organise, learn and adapt (Walker et al 2004, Doherty et al 2019).

## **Risk**

The effect of uncertainty on objectives (Michael & Crossley 2012).

## **Sensitivity**

The potential magnitude of the consequences of exposure to shocks and drivers and their impact on a food system (Prosperi et al 2014).

## **Shock**

Natural hazards, including climate change extreme events; food chain crises of transboundary or technological threats (including plant pests and diseases, animal diseases and food safety); protracted crises, including violent conflicts (FAO 2016:4).

## **Smallholder farmer**

Definitions vary across countries and regions, as this categorisation can depend on a range of factors such as living standards, land ownership, agricultural activity and production scale, access to assets and resources, and share of family labour. Smallholdings may range from 0.5 to 500 ha in Australia; the Food and Agriculture Organization categorises farms under 2 ha as small (Andrade 2016:1).

## **Social protection**

Policies and programs designed to reduce poverty and vulnerability by promoting efficient labour markets, diminishing people's exposure to risks, and enhancing their capacity to manage economic and social risks, such as unemployment, exclusion, sickness, disability and old age (World Bank 2001).

## **Structural transformation**

Both a cause and an effect of economic growth; involves a change in the composition of the economy away from a reliance on agriculture and/or fisheries and towards industry and services, rising involvement in international trade, growing

rural-urban migration and urbanisation; leads to profound political, cultural, social and environmental stresses, which must be managed for long-term sustainability (FAO et al 2019:189).

## **Stunting**

A height that is more than two standard deviations below the World Health Organization Child Growth Standards median (WHO 2020).

## **Sustainable food value chain**

The full range of farmers, fishers and firms and their successive coordinated value-adding activities that produce raw agricultural materials and transform them into food products that are sold to consumers and disposed of after use, in a manner that is profitable throughout, has broad-based benefits for society and does not permanently deplete natural resources (FAO 2014:6).

## **Transformation**

Generally irreversible and fundamentally changed structures and functions of a system, including norms, goals, values, rules and practices (Colloff et al, in press).

## **Undernutrition**

The outcome of poor nutritional intake in terms of quantity and/or quality, and/or poor absorption and/or poor biological use of nutrients consumed as a result of repeated instances of disease; includes being underweight for one's age, too short for one's age (stunted), dangerously thin for one's height (suffering from wasting) and deficient in vitamins and minerals (micronutrient deficiency) (FAO et al 2019:189).

## **Value chain**

The set of actors and activities that bring a basic agricultural product from production in the field to final consumption, where value is added to

the product at each stage; a vertical linking or a network between various independent business organisations; can involve processing, packaging, storage, transport and distribution. The terms 'value chain' and 'supply chain' are often used interchangeably (FAO 2010).

### **Vulnerability**

The susceptibility of an individual, a community, assets or systems to the impacts of hazards. Vulnerability to food insecurity is the range of conditions that increases the susceptibility of a household to the impact on food security in case of a shock or hazard (FAO et al 2019:189).

### **Vulnerable groups**

The characteristics of people and their social, political, economic and environmental context which renders them susceptible to hazards or shocks (Kelly & Adger 2000).

## **9.2 References**

- Alders R, de Bruyn J, Wingett K & Wong J (2017). One Health, veterinarians and the nexus between disease and food security. *Australian veterinary journal* 95(12):451–453, doi:10.1111/avj.12645.
- Allen T & Prospero P (2016). Modelling sustainable food systems. *Environmental management* 57: 956-975.
- Andrade J (2016). *Smallholder farmers and enabling their access to sustainable markets: commentary report*. State of Sustainability Initiatives (SSI), a collaborative effort funded by the State Secretariat for Economic Affairs (SECO) and led by the International Institute for Sustainable Development (IISD), the International Institute for Environment and Development (IIED) and the Finance Alliance for Sustainable Trade (FAST), accessed 22 July 2020, [www.iisd.org/ssi/wp-content/uploads/2019/09/Smallholders\\_publication.pdf](http://www.iisd.org/ssi/wp-content/uploads/2019/09/Smallholders_publication.pdf).
- Barnett J & O'Neill S (2010). Maladaptation. *Global environmental change* 20:211–213.
- CDC (Centers for Disease Control and Prevention) (2020). *One Health*. Centers for Disease Control and Prevention, accessed 20 July 2020, [www.cdc.gov/onehealth/index.html](http://www.cdc.gov/onehealth/index.html).
- Cleaveland S, Sharp J, Abela-Ridder B, Allan KJ, Buza J, Crump JA, Davis A, Del Rio Vilas VJ, de Glanville WA, Kazwala RR, Kibona T, Lankester FJ, Lugelo A, Mmbaga BT, Rubach MP, Swai ES, Waldman L, Haydon DT, Hampson K & Halliday JEB (2017). One Health contributions towards more effective and equitable approaches to health in low- and middle-income countries. *Phil. Trans. R. Soc. B* 372: 20160168, doi:10.1098/rstb.2016.0168.
- Colloff MJ, Abel N, Gorddard R, Lavorel S, Butler JRA, van Kerckhoff L, Meharg S, Munera C, Bruley E, Fedele G, Wise RM & Dunlop M (in press). Adapting transformation and transforming adaptation to climate change using a pathways approach. *Environmental science and policy*.

- DFAT (Department of Foreign Affairs and Trade) (2017). 2017 Foreign Policy White Paper, accessed 9 August 2020, [www.dfat.gov.au/publications/minisite/2017-foreign-policy-white-paper](http://www.dfat.gov.au/publications/minisite/2017-foreign-policy-white-paper).
- DFAT (Department of Foreign Affairs and Trade) (2020). *Association of Southeast Asian Nations (ASEAN)*, accessed 20 July 2020, [www.dfat.gov.au/international-relations/regional-architecture/asean](http://www.dfat.gov.au/international-relations/regional-architecture/asean).
- Doherty B, Ensor J, Heron T & Prado P (2019). Food systems resilience: towards an interdisciplinary research agenda. *Emerald Open Research* 1:4 <https://doi.org/10.12688/emeraldopenres.12850.1>.
- FAO (Food and Agriculture Organization of the United Nations) (2010). *Agricultural value chain development: threat or opportunity for women's employment?* Gender and Rural Employment Policy Brief #4. FAO, Rome.
- FAO (Food and Agriculture Organization of the United Nations) (2014). Developing sustainable food value chains: guiding principles, accessed 20 July 2020, [www.fao.org/sustainable-food-value-chains/library/details/en/c/265156/](http://www.fao.org/sustainable-food-value-chains/library/details/en/c/265156/).
- FAO (Food and Agriculture Organization of the United Nations) (2016). *Increasing the resilience of agricultural livelihoods*, accessed 20 July 2020, [www.fao.org/3/a-i5615e.pdf](http://www.fao.org/3/a-i5615e.pdf).
- FAO (Food and Agriculture Organization of the United Nations) (2020). *One Health*, accessed 23 July 2020, [www.fao.org/asiapacific/perspectives/one-health/en/](http://www.fao.org/asiapacific/perspectives/one-health/en/).
- FAO, IFAD, UNICEF, WFP and WHO (2019). The state of food security and nutrition in the world 2019. *Safeguarding against economic slowdowns and downturns*. FAO, Rome, accessed 20 July 2020, [www.fao.org/3/ca5162en/ca5162en.pdf](http://www.fao.org/3/ca5162en/ca5162en.pdf).
- Garcia SN, Osburn BI & Jay-Russell MT (2020). One Health for food safety, food security, and sustainable food production. *Front. Sustain. Food Syst.* 4:1, doi:10.3389/fsufs.2020.00001.
- HLPE (High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security) (2020). *Food security and nutrition: building a global narrative towards 2030*. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome.
- IPCC (Intergovernmental Panel on Climate Change) (2012). Summary for policymakers. In: *Managing the risks of extreme events and disasters to advance climate change adaptation*. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge.
- Kelly PM & Adger WN (2000). Theory and practice in assessing vulnerability to climate change and assessing adaptation. *Climate change* 47:325–352
- Lysaght T, Capps B, Bailey M, Bickford D, Coker R, Lederman Z, Watson S & Tambyah PA (2017). Justice is the missing link in One Health: results of a mixed methods study in an urban city state. *PLoS ONE* 12(1): e0170967, doi:10.1371/journal.pone.0170967.
- Michael DT & Crossley RL (2012). Food security, risk management and climate change, National Climate Change Adaptation Research Facility, Gold Coast, 152.
- Osisanya S (2015). *National security versus global security*. UN Chronicle, United Nations, accessed 22 July 2020, [www.un.org/en/chronicle/article/national-security-versus-global-security](http://www.un.org/en/chronicle/article/national-security-versus-global-security).
- Prosperi P, Allen T, Padilla M, Peri I & Cogill B (2014). Sustainability and food and nutrition security: a vulnerability assessment framework for the Mediterranean region. *Sage open* 4:1–15.
- Walker B, Holling CS, Carpenter SR & Kinzig AP (2004). Resilience, adaptability and transformability in social-ecological systems. *Ecology and society* 9(2):5, [www.ecologyandsociety.org/vol9/iss2/art5/](http://www.ecologyandsociety.org/vol9/iss2/art5/).
- WHO (World Health Organization) (2020). *Child Growth Standards*, WHO, Geneva, Switzerland, accessed 22 July 2020, [www.who.int/childgrowth/en/](http://www.who.int/childgrowth/en/).

Wise RM, Fazey I, Stafford Smith M, Park SE, Eakin HC, Archer van Garderen ERM & Campbell B (2014). Reconceptualising adaptation to climate change as part of pathways of change and response. *Global environmental change* 28: 325–336.

World Bank (2001). *Social protection sector strategy paper: from safety net to springboard*. World Bank, Washington DC, accessed 22 July 2020, <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/299921468765558913/social-protection-sector-strategy-from-safety-net-to-springboard>.

Wüstefeld M (2013). *Food and Nutrition Security: UNSCN Meeting of the minds nutrition impact of food systems* [slide presentation], 25–28 March 2013. United Nations Standing Committee on Nutrition, accessed 20 July 2020, [www.unscn.org/files/Annual\\_Sessions/UNSCN\\_Meetings\\_2013/Wustefeld\\_Final\\_MoM\\_FNS\\_concept.pdf](http://www.unscn.org/files/Annual_Sessions/UNSCN_Meetings_2013/Wustefeld_Final_MoM_FNS_concept.pdf).

**Shocks such as the COVID-19 pandemic may offer windows of opportunity for food system transformations.**







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