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The future of food security in an age of pandemics: Building a modern and resilient food system in Sri Lanka and Nepal

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Preface

COVID-19 has reshaped the world and radically changed the way people, institutions, and systems function. Pre-existing economic, social, and institutional vulnerabilities have aggravated the impacts of the crisis, especially for less developed and emerging economies and their vulnerable populations. In response, Southern Voice has partnered with both member and non-member think tanks across the Global South to generate evidence and analyses of the pandemic's impact in a variety of contexts. Through this research programme, teams of researchers, embodying different perspectives of the Global South have produced new, evidence-based insights into the challenges as well as the opportunities presented by the coronavirus crisis. Three core themes have guided this research initiative: social impact, economic and fiscal recovery, and accountable and inclusive institutions. Overall, the initiative aims to advance evidence-based policy solutions and recommendations to mitigate the middle- and long-term challenges of the crisis and to promote a better and more sustainable recovery.

Within this general context, the present study focuses on COVID-19's impact on rice and vegetable value chains in Sri Lanka and Nepal, making recommendations about how to strengthen food security as well as social protection measures in both countries. We hope that this joint publication by Southern Voice, the Institute for Policy Studies (IPS), and South Asia Watch on Trade, Economics and Environment (SAWTEE) will help policymakers craft responses to the pandemic that are appropriate for Sri Lanka and Nepal over the medium and longer terms. We also hope that this analysis provides a platform for developing responses to the pandemic in other countries in the Global South.

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and

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Abstract

This study investigates ways to strengthen agri-food markets and value chains—and related social-protection mechanisms—to build a more sustainable, resilient, and inclusive food system in Sri Lanka and Nepal, with the aim of helping these countries make a speedy recovery from the COVID-19 pandemic shock. Combining secondary research with primary data collected through in-depth interviews, the study analyses the impacts of COVID-19 on rice and vegetable value chains in the two focal countries. It illustrates that despite government initiatives to help food producers, distributors, and consumers during the lockdown, supply chain disruptions have had a negative impact on the food security of affected populations and thus the achievement of SDG 2 (zero hunger). In the shorter term, the study suggests that ensuring a smooth supply of inputs, such as seeds, fertiliser, and agro-chemicals; improving access to agricultural financing; establishing efficient decentralised public and private procurement and distribution systems that feature buffer stocks and utilise e-commerce; and strengthening food-related social security programmes can help mitigate the effects of the pandemic. In the medium and longer terms, the study recommends addressing several larger, structural issues in the food system; these issues are related to agri-extension, food-system monitoring, food processing and value addition, and farm-market linkages.

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Content

Preface	iv
Acknowledgement.....	v
Abstract.....	vi
Content.....	viii
List of figures.....	ix
List of tables	ix
Acronyms and abbreviations	x
Introduction	11
Methodology	15
Findings	20
Conclusions and recommendations.....	39
References	45
Appendices	50



List of figures

Figure 1. Timeline of the COVID-19 lockdown in Sri Lanka and Nepal in 2020...	15
Figure 2. Schematic illustration of COVID-19's impact on food systems	16
Figure 3. Marketing channels for paddy/rice in Sri Lanka	21
Figure 4. Marketing channels for vegetables in Sri Lanka	24
Figure 5. A rice value chain map for Nepal.....	27



List of tables

Table 1. Sampling distribution of the primary data in Sri Lanka.....	18
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Acronyms and abbreviations

FAO	Food and Agriculture Organisation
HHI	Herfindahl-Hirschman Index
LKR	Sri Lankan Rupee
MoALD	Ministry of Agriculture and Livestock Development, Nepal
MoICS	Ministry of Industry, Commerce and Supplies, Nepal
MT	Metric Tonnes
NARC	Nepal Agricultural Research Council
NPR	Nepali Rupee
PMB	Paddy Marketing Board
SDGs	Sustainable Development Goals
USAID	United States Agency for International Development
VCA	Value Chain Analysis

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Introduction

The COVID-19 pandemic has resulted in an unprecedented shock to economies around the world. As has gradually become clearer to the global community, severe health risks are only part of the pandemic shock, though they do constitute its root cause. The pandemic has had numerous economic, social, and environmental impacts with far-reaching consequences for both the immediate and the longer terms. Like many countries around the world, with the onset of the crisis, most South Asian economies experienced negative growth rates. Thus, the region, which was the fastest-growing in the world in 2019, entered a slow-growth scenario in 2020 (Raihan et al., 2020). The regional growth estimate was projected to contract by 7.7% in 2020, according to the World Bank, owing to reduced private consumption; this projection signals worse outcomes with respect to poverty in the coming years (World Bank, 2020). Among the many impending crises that have gradually unfolded along with the pandemic, the challenge of rising food insecurity caused by the impacts of economic lockdown measures on food systems, can be considered one of the most critical.

Food systems are a collection of interconnected value chains that ultimately encompass whole populations, given that food is one of the basic needs for human survival. The 2021 Global Report on Food Crises provides an overview of the crisis as it unfolded in 2020 and highlights COVID-19-related shocks on food systems, including poor diets, limited healthcare, and non-optimal care practices, all of which may contribute to higher levels of malnutrition (Food Security Information Network and Global Network Against Food Crises, 2021). In the face of these pandemic-related challenges, achieving food security in Sri Lanka and Nepal requires a new approach that integrates not only the various aspects of food production but also the many complex factors associated

with food systems more generally. Such an approach is necessary if countries are to meet the global 2030 Agenda and its Sustainable Development Goals (SDGs), and more specifically, Goal 2: "End hunger, achieve food security and improved nutrition, and promote sustainable agriculture".

Because communities are increasingly dependent on markets for their food security and nutrition, properly functioning market chains and the uninterrupted flow of agricultural products are key elements within food systems. Therefore, shocks such as disasters and pandemics can cause considerable damage to households' food availability, as well as their access to and utilisation of food. The lockdown introduced from mid-March 2020 onwards to contain the COVID-19 pandemic has highlighted the vulnerability¹ of food systems in all South Asian countries, including Sri Lanka and Nepal. For one thing, the ability of consumers to buy food has been severely affected by the collapse of food distribution systems due to restricted transport and storage facilities and the closure of major wholesale and retail markets. The resulting food insecurity has been felt even in economies with a self-sufficient supply of staples, such as Sri Lanka, let alone in net food-importing countries like Nepal. Indeed, such pervasive, across-the-board food vulnerabilities provide the rationale for the present study.

In Sri Lanka, rising food prices are adding to the difficulties facing the urban poor amidst massive unemployment and lockdown procedures. The measures adopted to contain the pandemic, including placing restrictions on transport and storage facilities and closing major wholesale and retail markets, have caused major disruptions to food supply chains in Sri Lanka, raising concerns about food security overall (IPS, 2020). In turn, the containment measures have eroded residents' access to food, particularly in poor and marginalised households, and led to price spikes. The urban poor, whose livelihoods depend on daily wages, make up part of the group that has been hit the hardest (UNICEF, 2020). In densely populated urban areas, increasing concerns over food insecurity have resulted in public protests over lockdown protocols. At the same time, although production systems in many rural areas have not been affected by COVID-19 per se, food security in those areas can also be threatened when the functioning of any one sector of the food chain is disrupted by the virus.

Conditions are even more severe in Nepal, which has experienced additional hardships due to its land-locked status, deepening the country's existing vulnerabilities with regard to food security and nutrition (World Food Programme [WFP], 2020a). The restrictions of people's movements designed to stem the spread of the virus brought

1 The concept of vulnerability refers, in this context, to a food system's ability to cope with the physical, social, and economic risks presented by disruptive events (Proag, 2014).

economic activities to a standstill, decreasing incomes and pushing nearly a million people into absolute poverty (National Planning Committee of Nepal, 2021). In addition, these same restrictions also crippled supply chains, including those involving agriculture, in the early days of the lockdown. Although the government lifted the initial restrictions placed on food and agriculture-related activities after some weeks, the disruptions to the supply chain affected the planting of some staple crops (Pradhan, 2020).

A pandemic with the scale and severity of the current coronavirus has not been experienced in any of the South Asian countries in recent decades. Furthermore, even apart from challenges presented by the pandemic, South Asia is one of the hotspots of global food insecurity. The 2019 UN Sustainable Development Goals Report stated that in 2018 South Asia was home to 39% of the world's 149 million chronically undernourished children under five years of age (United Nations, 2019). Malnutrition is even more severe in rural populations, and it is especially high amongst women, children, and youth. The adverse circumstances created by COVID-19 seem to have further aggravated the problems in South Asia, pushing many people who are already at the margin into direct risk of starvation (Sharma, 2020). Collectively, in this region, there are many households whose food security is dependent on a daily wage. Amidst a growing health hazard, which has not yet shown any signs of relenting, governments have been overburdened with the responsibility of providing these households with at least one meal per day.

Both the Sri Lankan and the Nepali governments implemented several early initiatives to help food producers, distributors, and consumers when the COVID-19 lockdowns began. In Sri Lanka, consumption support was given to those who were covered by the government cash transfer programme, Samurdhi (= "Prosperity"), in the form of a one-time cash payment. However, this initiative, although welcomed at first, was poorly targeted, leaving many vulnerable people without adequate support. Even when vulnerable groups were targeted by policymakers, local governments often lacked reliable information required to administer the cash transfers. As a consequence, many informal workers who lost employment and were not covered by Samurdhi remained without support.

Likewise, in Nepal, when the government decided to offer cash transfers to the elderly and other vulnerable populations, it was unable to help many in these groups because it did not have up-to-date lists that were needed to identify those most at risk. At the same time, the crises created by the breakdown of supplies worked backwards towards food producers' end of the value chain, resulting in income losses for farmers and low farm gate prices. In both countries, the governments stepped in to purchase harvested crops from farmers. Although this measure provided some relief to producers, the most vulnerable farmers (including female entrepreneurs), who were least likely to obtain loans from the

formal sector, have not benefitted. Overall, these trends indicate that pandemic shocks may have medium- and long-term impacts on food systems—impacts that, in turn, carry far-reaching consequences for the affected populations. Even if the COVID-19 pandemic begins to abate in the short term, the global community may not be able to recover from its effects in the way that it would recover from a temporary shock. The coronavirus crisis has indeed shaken food systems to their foundations in South Asia, revealing profound vulnerabilities when it comes to pandemic shocks. At the same time, available evidence suggests that pandemics are fast becoming a chronic source of global and regional disruptions, posing threats similar to (and likely related to) those of climate change (IPS, 2020). Hence the challenge is not merely to survive the storm that is currently buffeting countries in the region but to strengthen the ship to face future storms. Policymakers, therefore, need evidence-based research and policy recommendations that can support their efforts to mitigate the impacts of COVID-19 in the short and medium terms, while also helping them strengthen the resilience² of food systems in the future.

The remainder of the study is organised as follows: the remaining section of the introduction presents the main research questions. Subsequent sections detail, first, the conceptual framework and methodology used to address those questions, and second, the key findings from the analysis. The concluding section of the paper then offers some policy recommendations based on our analysis.

Using Sri Lanka and Nepal as case studies, this study focuses on ways to strengthen agri-food markets, value chains, and related social-protection mechanisms to promote food security and household income. It also contributes to discussions of how to build more sustainable, resilient, and inclusive food systems in Sri Lanka and Nepal to help both countries make a speedy recovery from the pandemic shock caused by the COVID-19 crisis. To pursue these objectives, the study addresses several research questions. Specifically, despite severe constraints imposed by the pandemic on our efforts to collect primary data, we use a combination of qualitative and quantitative data to answer the following questions about the rice and vegetable value chains in the two focal countries:

- What challenges faced by the rice and vegetable value chains in Sri Lanka and Nepal pre-existed those caused by the current pandemic?
- What are the repercussions of the COVID-19 pandemic on the value chain stakeholders, including those who are members of vulnerable sections of society?
- What measures could support Sri Lanka's and Nepal's recovery from the COVID-19 shock, and build up the overall resilience of these countries' food systems when it comes to facing future shocks?

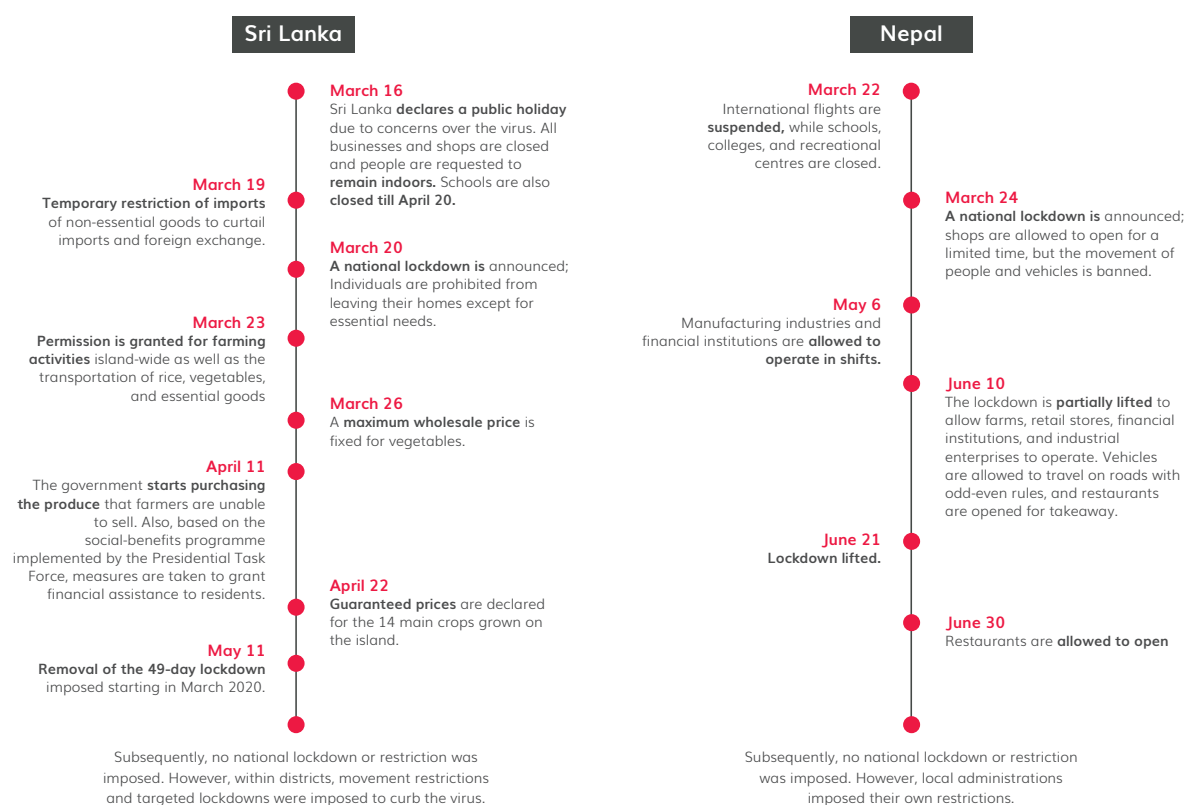
² The resilience of a system corresponds to its ability to reduce, in as efficient a manner as possible, both the magnitude and duration of deviations from its optimal performance levels (Proag, 2014).

Methodology

Conceptual framework

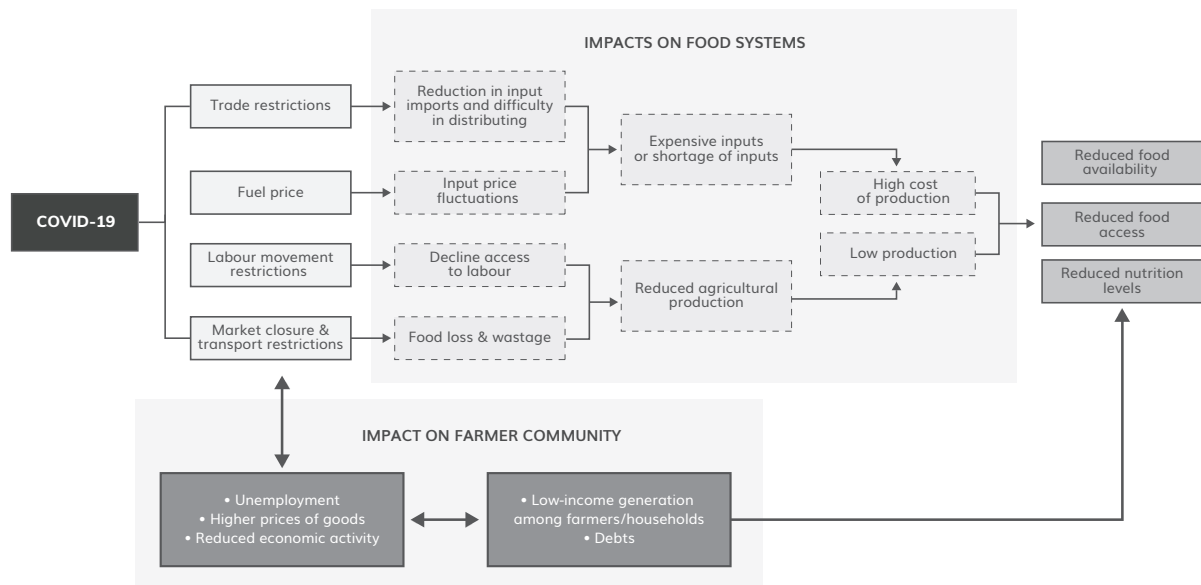
The sustainable food systems approach is “a way of thinking and doing that considers the food system in its totality, taking into account all the [relevant] elements” (FAO, 2018), including social, environmental, and economic dimensions, their relationships, and their larger effects. This study primarily focuses on how the COVID-19 pandemic has disrupted the market and supply chains that play a central role in the food systems in Sri Lanka and Nepal. Figure 1 provides a timeline of some of the key disruptive events in each country. Figure 2, meanwhile, illustrates other important factors that affect the vulnerabilities of the agri-food systems in Sri Lanka and Nepal, including trade policies, the logistics of transport, labour, and capital.

Figure 1. Timeline of the COVID-19 lockdown in Sri Lanka and Nepal in 2020



Note. Based on data provided by the Government of Sri Lanka and press releases issued by the Government of Nepal's Ministry of Communication and Information Technology. Elaborated by the authors.

Figure 2. Schematic illustration of COVID-19's impact on food systems



Source: Authors' illustration, based on data from the United Nations (2020).

The economic system involving food production, distribution, and consumption is organised in the form of interconnected value chains. A value chain consists of all the value-generating activities required to make available a product/service, starting with the primary producers and moving through different phases of production to distribution of the final product to consumers (Kaplinsky, 2000). Food value chains are complex systems that link different economic actors, including producers (e.g., farmers, food processors), marketing intermediaries (e.g., wholesalers, retailers, importers), and other supporting players such as input suppliers, service providers, and government agencies, within environments that enable food production and distribution. Originally developed by Porter in 1985, value chain analysis (VCA) has emerged as a widely adopted analytical tool used to understand different production systems and to formulate development policies accordingly (Kaplinsky & Morris, 2001). VCA is particularly useful for analysing complex multi-market, multi-stakeholder value chains because it coherently organises different kinds of information related to production, trade flows, restriction measures, markets, and consumer behaviours, and thereby allows targeted interventions and mitigation measures to be identified (FAO, 2016). Thus, VCA is a suitable analytical tool for understanding the impact of an external shock like the COVID-19 pandemic on different stakeholders in the context of food value chains and larger food systems (Bellù, 2013).

This study follows a mixed-methods approach that integrates both quantitative and qualitative data to analyse the impact of the COVID-19 pandemic on the whole value chain of rice and vegetables in Sri Lanka and Nepal. The main objective of the VCA is to gain a better understanding of the existing food supply chains in these countries and the mechanisms by which food availability, access to food and nutrition, and household income have been affected by the COVID-19 crisis. The strategies and measures adopted by different market-chain stakeholders to mitigate the difficulties caused by the pandemic are also considered in this study; we take those strategies and measures into account in formulating our concluding recommendations.

Further, the VCA investigates the structure (composition and distribution of market power), conduct (behaviour of buyers and sellers), and performance (achievement, accomplishment, or results) of key markets associated with food value chains in relation to changes created by the pandemic shock. The study also attempts to understand the prevailing political and economic context, relationships, and processes related to three important factors: (1) reduced food availability at the national level; (2) reduced access to food and nutrition at the household level; and (3) reduced

household income due to COVID-19. The standard process of VCA developed by the United States Agency for International Development (USAID) was customised to suit the VCA used for the present study (USAID, 2004). This framework consists of four steps: data collection, value chain mapping, analysis of opportunities and constraints, and vetting findings and developing an action plan. Both secondary and primary data are collected in the first step. These collected data are then analysed as part of the mapping exercise conducted in the second step³. Next, the constraints and opportunities affecting the value chain are identified in the third step. Finally, the findings are vetted through consultation with stakeholders.



COVID-19 has aggravated problems of food security in South Asia, pushing many people into direct risk of starvation.

³ Value chain mapping is the process of developing a visual depiction of how an industry functions, especially the way products flow from raw materials to end markets (USAID, 2004).

Data and scope of the analysis

Rice and vegetable⁴ value chains were selected for this study for several reasons. First, rice and vegetables constitute a large proportion of the diet of both countries (Jayatissa et al., 2014). Second, a significant share of people are engaged in cultivating these crops in both countries. Thus, the crops are particularly important when it comes to ensuring food security and nutrition and reducing rural poverty (Ministry of Agriculture of Sri Lanka, 2020). Third, the supply chains associated with these crops have been massively disrupted by COVID-19 in both countries. To investigate the relevant issues, the study combines secondary data with primary data collected through in-depth interviews. Secondary data include documentary evidence that has direct and indirect relevance for an analysis of the structure and purposes of the rice and vegetable value chains. Primary data collection, meanwhile, has been a challenging task in both Sri Lanka and Nepal due to health guidelines related to COVID-19 and other restrictions that include geo-specific lockdowns. In Sri Lanka, secondary data sources for information related to price, markets, production, and so forth include the Ministry of Agriculture and other relevant ministries, the Hector Kobbekaduwa Agrarian Research and Training Institute (HARTI), the Department of Census and Statistics of Sri Lanka, Sri Lanka Customs, government agencies concerned with rice and vegetable products, and other research conducted by our team. Primary data for the study were obtained from computer-aided telephonic interviews, each of 30-60 minutes duration; conducted by means of a structured questionnaire, these interviews involved 143 different stakeholders in the value chain (see Table 1 for a breakdown of the participants). The farmers were selected by means of a random sampling method from a database of 1,000 farmers in the country's main rice and vegetable producing districts: Anuradhapura, Polonnaruwa, Badulla, Moneragala, Matale, Batticaloa, Ampara, Jaffna, Kilinochchi, Vavuniya, and Mullaitivu. Other stakeholders were selected using a snowball sampling method, whereby the research participants are asked to assist the researchers in identifying other potential stakeholders for the sample.

Table 1. Sampling distribution of the primary data in Sri Lanka

Target Group	Sample
Paddy Farmers	25
Vegetable Farmers	25

⁴ Vegetable value chains are similar across different varieties of vegetables, with our analysis considering a number of representative crops.

Paddy & Vegetable Farmers	50
Paddy Collectors	10
Vegetable Collectors	10
Wholesalers	10
Retailers	10
Millers	3
Processors / Exporters	5
TOTAL	143

Note: Sample numbers were calibrated to suit the telephonic survey and to include all the players in the value chain. Elaborated by the authors.

In Nepal, too, the study relied on both primary and secondary data sources. Secondary data included information about price, production, and trade from the Central Bank as well as government sources such as the Department of Customs, the Trade and Export Promotion Centre, and academic articles. Likewise, secondary information was gleaned from policy reports and surveys on food availability and access during COVID-19 that were conducted by the Ministry of Agriculture and Livestock Development, other relevant ministries and the World Food Programme (WFP). Primary data, meanwhile, was again obtained via in-depth telephonic interviews, each of 30-60 minutes duration. The interviews involved 37 stakeholders associated with the value chains—22 in the case of rice and 16 in the case of vegetables, with one common respondent. Interviewees included farmers (both smallholder peasant farmers and entrepreneurial farmers), representatives of farmer groups and co-operatives, food processors, wholesalers, and retailers (catering to both retail and institutional buyers), agrovets (widely present input suppliers), collection agents, sector-specific experts, former and incumbent policymakers, and representatives of consumer groups.

The analysis of rice value chains in Nepal focuses on the Terai region, the country's lowland area; this region is the country's granary, accounting for about 70% of the country's rice output (Ministry of Agriculture and Livestock Development [MoALD], 2019). That said, it should be noted that despite the heterogeneity in rice production across different areas within the country, the basic structure of the rice value chain remains the same. With respect to vegetable value chains, the primary data are drawn from Province 1, Bagmati, Lumbini, and Karnali, that is, four out of Nepal's seven provinces. Data were obtained from major production areas as well as major markets like Kathmandu and

Butwal. It should be noted that focusing on such major production areas is a limitation, because it leaves out remote, impoverished, and food-insecure regions. To address this issue, during the interviews, we also attempted to obtain information about the livelihoods and the food-security situations of the most vulnerable agricultural workers, such as daily-wage workers. Given that the COVID-19-induced closure of markets enabled the growth of e-commerce sales in Nepal, we also present a brief case study of an e-commerce actor specialising as an intermediary in the agriculture input and output markets.

Findings

This section begins with an account of the established rice and vegetable value chains in the two countries to understand the structure, conduct, and performance of the value chains as well as the power relationships among key value chain stakeholders. It then turns to an analysis of the impacts of the COVID-19 pandemic on the food value chains in question.

The Pre-pandemic challenges of rice and vegetable value chains in Sri Lanka and Nepal

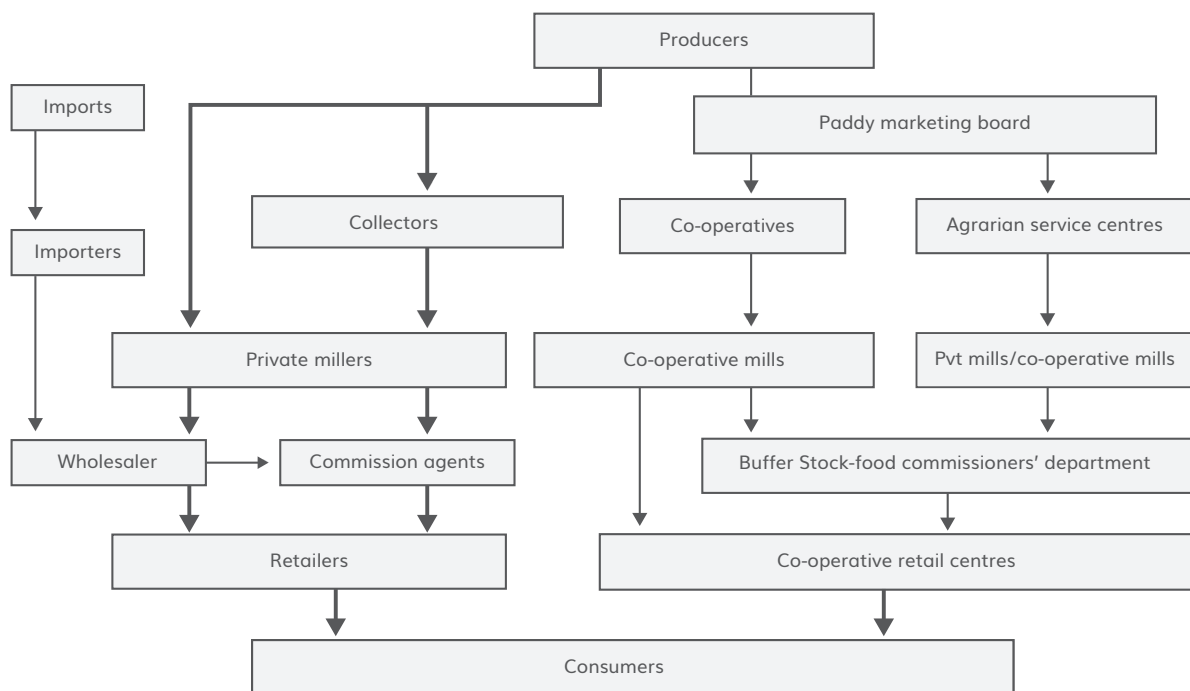
The rice value chain in Sri Lanka

As Figure 3 illustrates, the paddy marketing structure in Sri Lanka is dominated by the private sector, which possesses over 95% of the market share. This structure can be divided into five main components: (1) producers, (2) collectors, (3) processors/millers, (4) wholesalers, and (5) retailers. The majority of Sri Lankan paddy farmers are small-scale producers who own less than one hectare of land and are scattered all over the country. In turn, the collection of paddy from farmers is conducted by village/town paddy collectors. Village collectors sometimes act as village-level money/input lenders, purchasing paddy directly at the farm; by contrast, town collectors usually purchase

”” **The majority of Sri Lankan paddy farmers are small-scale producers who own less than one hectare of land and are scattered all over the country.**

paddy at the village collection centre. The Paddy Marketing Board (PMB) and the co-operatives who represent the public sector in the rice marketing channel handle the remaining domestic production each year, which amounts to less than 5% of the total (PMB, 2010). However, due to the recent decline in PMB purchases, only 61,925 MT, or 1.2% of the total production of 5.1 million MT, was purchased in 2020 (Ministry of Finance of Sri Lanka, 2021).

Figure 3. Marketing channels for paddy/rice in Sri Lanka



Source: Authors' illustration, based on the field survey.

Both the village collectors and town collectors deliver paddy to millers. The well-established large millers in the main paddy-producing areas depend less on paddy collectors, having formed direct connections with farmers. They usually offer a higher price to the farmers than the collectors and sometimes provide interest-free loans to farmers, under the condition that the farmers supply paddy at the prevailing market price to settle the loan. Some of the large-scale private millers have their own sales outlets and distribute rice by means of their own vehicles to other wholesalers or retailers. The milled rice is commonly sold to wholesalers, but it is also sometimes sold directly to retailers. Milled rice from the PMB is sold through Multi-Purpose Cooperative Societies (MPCS) as well as private retailers.

It is estimated that 75% of the wholesalers purchase rice from millers, and the rest (25%) from other wholesalers (WFP, 2017). These sellers, who maintain direct contact with large-, medium-, and small-scale millers, are based in central and municipal wholesale markets established in major cities. Large-scale millers supply the bulk of the milled rice to such sellers, either branded in packages of different weight or as loose, unbranded grain. Retailers (e.g., village shops, co-operatives, supermarkets, and retail chains like Cargills, Keels, and so on) source rice through direct mill purchases (62%) or wholesalers (38%) (Senanayake & Premaratne, 2016). Typically, retail chains either purchase branded rice (e.g., Nipuna, Araliya) directly from large-scale millers or else buy unbranded milled rice from small- and medium-scale millers and then pack the loose grain into containers using their own brand names.

To sustain their businesses during non-harvesting lean periods, millers attempt to accumulate carry-over stocks each season. They purchase rice during the harvesting period with the objective of getting the advantage of declining prices due to high supply in the market. As a result, at the time of harvesting, competition surrounds the selling as well as the buying of paddy. The large-scale millers with considerable storage capacity reap the benefits of low paddy prices during the harvesting period and higher off-seasonal prices during the lean period. A common assumption is that a few leading millers have accumulated market power by establishing modern mills with large processing capacities and by integrating their operations vertically from purchasing paddy to distributing their branded rice products to retailers. However, there is no conclusive evidence supporting this assumption. There are over 7,000 rice mills in Sri Lanka, with small- and medium-scale mills processing 57% of the available rice, large and leading mills processing 33.8%, and custom mills (non-commercial mills utilised by subsistence farmers) processing the remainder (WFP, 2017). For their part, Thibbotuwawa et al. (2020), in an analysis based on the Herfindahl-Hirschman Index (HHI)⁵, find no market-power accumulation by large millers.

The informal sector that comprises rural money lenders, traders, mill owners, paddy collectors, friends, and relatives, satisfies the major requirements of credit (in cash or in-kind) for rice farmers. Despite higher interest rates, these informal lending systems prevail because of easy accessibility, flexible terms, and quick, trust-based transactions (Sandaratne, 2008). Because of the risks involved in providing credit to the paddy sector,

⁵ In analyses using the HHI, the market shares of each participant in the market are squared and the results are then totalled to determine degrees of market-power accumulation, along a spectrum ranging from Highly competitive (where the HHI value is less than 100), to Not concentrated (where the HHI value is between 100 and 1000), to Moderately concentrated (where the HHI value is between 1000 and 1800), to Highly concentrated (where the HHI value is above 1800).

such as decreases in the value of stocks due to price reductions, crop damage caused by natural factors (drought or floods), monitoring and control difficulties over the stocks, and weak legal norms and procedures, formal sector private lending is absent in the paddy sector. Although a number of credit schemes are available to farmers, generally targeting commercial farming and small-scale agricultural enterprises, small farmers' access to these schemes is limited for various reasons, including the lack of collateral, substantial documentary requirements, and the lack of trust in the part of the farmers (Thibbotuwawa et al., 2020).

The vegetable value chain in Sri Lanka

Figure 4 depicts the marketing channels for vegetables in Sri Lanka. The public sector involvement in this value chain is limited to facilitative roles, such as dissemination of price information, maintenance of markets, provision of relevant infrastructure, and research and development through various government organisations. Seeds and planting materials are provided by the Department of Agriculture (DoA) and the private sector. Imported hybrid vegetable seeds are provided solely by the private sector. Chemical fertilisers are provided by public and private sector organisations.

Provision of organic fertilisers (poultry manure and cow dung) is handled by unorganised suppliers. Overall, low farm productivity is a perennial problem in the vegetable sector. Large gaps between the potential yields identified by adaptive research and farmers' actual yields suggest that productivity can be increased by minimising productivity-inhibiting factors. Such factors include the dearth of good-quality seeds, imbalanced fertiliser use, improper pesticide use, excessive dependence on rain-fed irrigation systems versus modern irrigation techniques, and the seasonality of production.

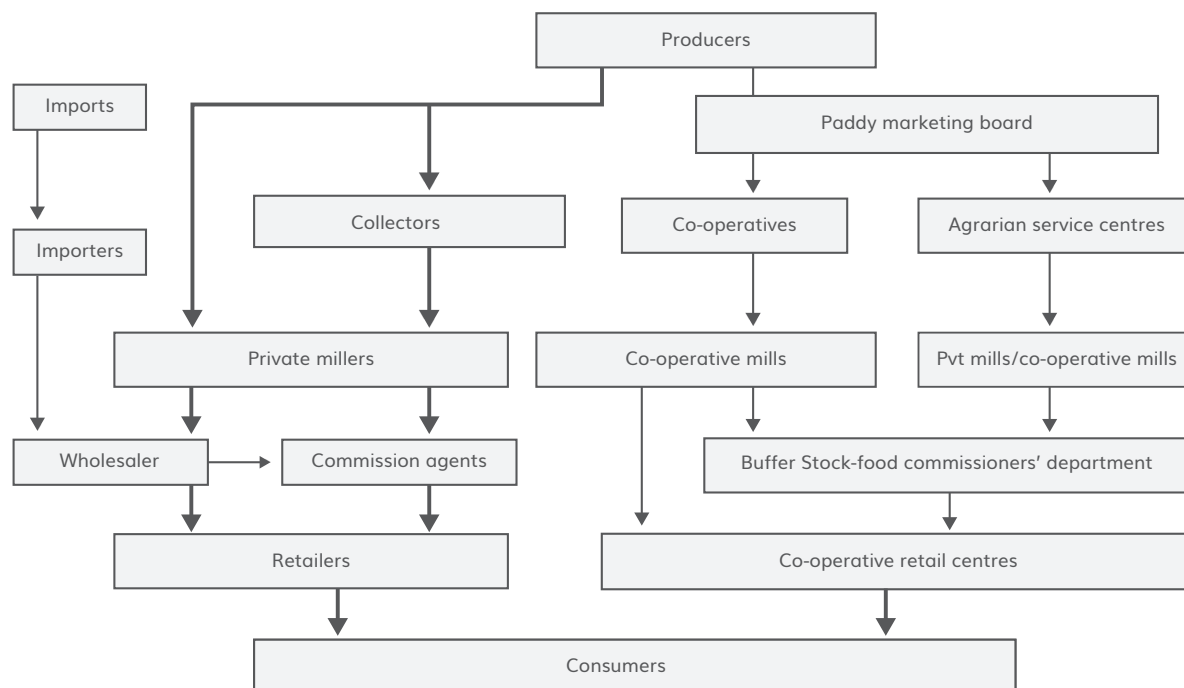
Given that vegetables in Sri Lanka are mostly grown on small farms, "collectors" or "commission agents" take on the role of primary purchasers. Commission agents operate in wholesale centres (Dedicated Economic Centres), and they charge a price-based commission (Senanayake & Premaratne, 2016). Vegetable farmers sell their produce either to collecting agents (village or town traders) or to commission agents who transport the produce to regional markets in other parts of the country or to the large



During the lockdown, the government of Sri Lanka helped e-commerce companies and supermarket chains to procure agricultural products both from farmers and from the markets.

markets in Colombo. Wholesalers who buy from collecting agents distribute the product throughout the country (Perera et al., 2004).

Figure 4. Marketing channels for vegetables in Sri Lanka



Source: Authors' illustration, based on the field survey.

Producers are, in this environment, poorly connected with markets; hence, intermediaries gain arbitrage opportunities while rural producers receive lower prices due to the lack of market information, poor infrastructure, weaker bargaining positions because of small-scale production, and lengthy marketing channels. Meanwhile, market margins are increasing due to increases in transport costs and higher margins for intermediaries. These margins also reflect post-harvest losses and transit losses arising from the inappropriate handling, storage, and transportation of crops. A considerable economic benefit could be obtained by investments in post-harvest loss reduction measures. Moreover, seasonality creates a high degree of price uncertainty for the stakeholders.

Rapid changes in market structure began to be seen in Sri Lanka with the spread of supermarkets linking producers with markets in a sustainable way. Supermarkets have acquired the necessary economies of scale to adopt a vegetable supply chain of their

own using a contract grower system; they procure their required produce from vegetable collectors who bring vegetables to the Central Purchasing Unit (CPU) of the supermarket. Such supply chains are efficient and effective compared to traditional vegetable supply chains, featuring higher prices for farmers, a higher degree of transparency in transactions, greater quality consciousness and accountability throughout the supply chain, a smaller number of intermediaries, and a reduction in post-harvest losses. However, only a minority of farmers have direct access to this supply chain, meaning that the volume of vegetables flowing through the supermarket supply chain is smaller than that flowing through the traditional value chain, which remains the most assured market for farmers despite its disadvantages (Kodithuwakku & Weerahewa, 2013).

Notwithstanding the government's attempt to use various incentives to promote value-added products in the food system, the share of value-added products related to vegetables is very low. In the context of Sri Lanka's food system, the lack of suitable commercial varieties for processing, an insufficient steady supply of vegetables at affordable prices to meet production targets, higher spoilage rates due to improper post-harvest handling, the absence of suitable machinery needed to meet quality standards demanded by modern trade, and small- and medium-scale processors' limited access to capital are major constraints in promoting value addition for vegetables.

The rice value chain in Nepal

In Nepal, rice value chain actors consist of input suppliers, farmers, collectors, processors, traders, and consumers (see Figure 5). Input suppliers comprise private businesses, public-sector companies, and local farmer groups and co-operatives. Farmers' co-operatives and Agriculture Knowledge Centres also sell seeds and other inputs to farmers. In recent years, many farmers' groups have also started to make it possible for member farmers to rent larger pieces of equipment, such as tractors and combine harvesters.

Subsidised fertiliser is made available only through public agencies, so no private sector player is involved in its sale (Singh, 2018). Unfortunately, the distribution of fertilisers in Nepal has traditionally been marred by delays in the process of inviting bids from suppliers. Thus, for many farmers in villages adjacent to India, buying fertilisers informally from neighbouring towns across the border has been the go-to solution.

Farmers mostly practice spot transactions in paddy trade, in which local- and district-level buyers/collectors visit farms and negotiate the price. Sales usually take place within days of harvest. There is an established trade relation between collectors and farmers, whereby payments to farmers are cleared within weeks of the delivery of

paddy. Traders also provide loans to farmers, in many cases during the time of planting. Conditions for the loan may include an explicit agreement to sell the harvest at a certain predetermined price. Some farmers also sell their paddy to the agriculture co-operatives of which they are members. In addition, the state-owned Food Management and Trading Company buys paddy from both farmers and co-operatives.

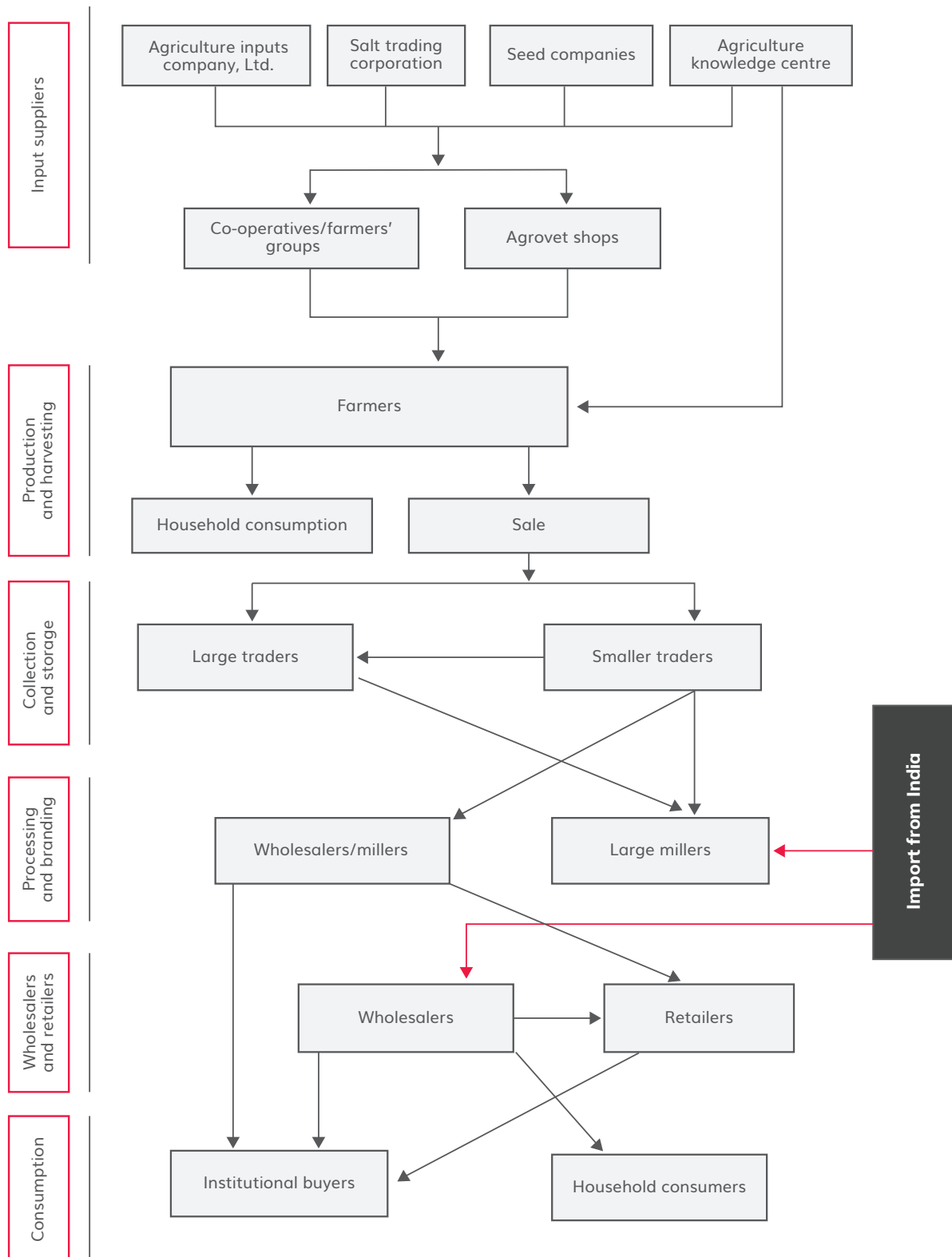
Regarding processors, according to the Association of Nepali Rice, Oil and Pulses Industries (ANROPI), there are around 250 large firms engaged in manufacturing mill products in Nepal (SAWTEE, 2020). The milling process captures the most value in the whole rice value chain, with a value capture rate of around 30% (Pandit et al., 2020)—despite the loss of up to 30% of the paddy, during milling procedures, in the form of bran, husk, and broken rice kernels (Regmi & KC, 2017). According to Nepal's District Agriculture Development Offices, there were around 27,000 registered rice-processing mills across the country as of 2016 (Regmi & KC, 2017); the vast majority of these mills were small-scale units. However, most of these milling operations have not fared well. High costs of production in Nepal make Nepali-processed rice more expensive than the rice imported from India (*Kathmandu Post*, 2015; Joshi et al., 2020).

There are also overlaps among the activities of these various actors. For example, some processors are also collectors and traders. In addition, there may be further intermediaries between the actors, such as smaller traders who connect farmers to larger traders. In this complex system, the government plays the role of the enabler that facilitates the smooth operation of all the relevant activities by framing pertinent policies and programmes. Financial institutions, for their part, provide credit and other necessary financial support to the actors in the value chain.

The rice value chain in Nepal is also characterised by the prominence of informal networks within the country and across the border with partners in India. These informal networks arise from constraints within the country's food system and from the inability of formal networks to meet the demand for agricultural inputs and financial support, among other essential needs.

Furthermore, rice is one of the major imported food items in Nepal. Rice and paddy imported from India amounted to 99% of the total rice and paddy imports to Nepal in the fiscal year 2019-2020 (Department of Customs, 2020). Although a common narrative regarding rice import in Nepal is that domestic production is insufficient to meet domestic demand, a back-of-the-envelope calculation shows that Nepal's domestic production of rice is sufficient for domestic consumption. The issue of rice sufficiency, however, deserves a more detailed examination. In this same connection, it should be noted that rice mills in Nepal do import rice and paddy from India. In the fiscal year 2019-2020, paddy imports accounted for 44% of the total paddy and rice import volumes.

Figure 5. A rice value chain map for Nepal



Source: Authors' illustration, based on the field survey.

The vegetable value chain in Nepal

Vegetable⁶ cultivation and production in Nepal have expanded significantly in the last three decades. In the fiscal year 2018-2019, vegetables were cultivated on 297,195 hectares (ha) of land, or about 10% of the total cultivated area. This figure represents over twice the 140,000 ha that were cultivated in 1990 (MoALD, 2020). Vegetable production has expanded from about 1.5 million MT to over 4.27 million MT in the same period. The yield compares favourably with regional peers such as India, Bangladesh, and Sri Lanka (United Nations Development Programme, 2018). According to the International Fund for Agricultural Development (2017), vegetable production amounts to about 10% of Nepal's agricultural GDP. According to the 2009-10 Nepal Vegetable Crops Survey, over 69% of all Nepali households cultivate vegetables, with smallholders owning less than 0.5 ha of land being responsible for nearly 90% of the country's vegetable production (Central Bureau of Statistics & National Planning Committee of Nepal, 2010). Predictably, marketable surplus is low, at about 18%, and only 10% of those farming vegetables consider such production to be a major source of income (International Labour Organisation, 2019).

Actors in the vegetable value chain in Nepal consist of seed companies, agrovets, farmers, co-operatives, traders, collectors, wholesalers, retailers, exporters, importers, consumers, and various service providers. Seed companies produce seeds via contracted farmer groups/co-operatives with technical inputs from the contracting seed production company. These companies also import hybrid seeds from India, China, South Korea, and Japan and distribute them via dealers. According to a former Chair of the Seed Entrepreneurs Association of Nepal (SEAN), up to 1,200 MT of seeds (out of the 2,000 MT needed annually) are acquired via imports. Of this supply, roughly 1,000 MT are high-yield seeds imported from developed countries, and the rest are mostly non-high-yield seeds sourced from India.

Agrovets sell seeds, fertilisers, pesticides, and tools to farmers, farmer groups, and co-operatives. Farmers sell their produce either directly to consumers or to wholesalers and retailers through collection agents and road-head traders. There are also exporters and importers engaged in the vegetable trade. On average, over 3 million MT of vegetables have been imported annually in recent years, compared to the domestic production of 4.27 million MT in the fiscal year 2018-2019. Exports amount to less than 5% of imports.

⁶ In our analysis, we do not include potatoes, which are classified as a cash crop, in the category of "vegetables."

There are 74 wholesale markets for vegetables, of which 13 are national-level markets (Commercial Agriculture for Smallholders and Agribusiness [CASA], 2020a). The Ministry of Agriculture and Livestock Development (MoALD) supports infrastructure development and subsidises select inputs and equipment. Extension services are provided via extension-services centres at the municipal level as well as by Agricultural Knowledge Centres. For its part, the Nepal Agricultural Research Council (NARC) conducts research on seed varieties and makes recommendations concerning appropriate seed quality.

The repercussions of the COVID-19 pandemic on rice and vegetable value chain stakeholders

The impact of COVID-19 on food systems in Sri Lanka

In attempts to buffer the agriculture sector from the effects of the island lockdown in Sri Lanka, the agriculture sector was exempted from lockdown restrictions. Farmers were allowed to continue with their usual farming operations, and traders were allowed to transport essential agricultural inputs like fertilisers, without any restrictions. The COVID-19 Task Force appointed by the government placed the delivery of an uninterrupted supply of fertiliser and of other inputs for agriculture on a priority basis. These measures have minimised the impact of pandemic-related restrictions on farmers seeking access to the necessary inputs; nonetheless, farmers in some regions have complained about a shortage of inputs such as fertilisers and seeds, particularly at the prices set by the government (The Netherlands and You, 2020).

Further, restricted transport and storage facilities, and the closure of major wholesale and retail markets, have caused disruptions in food supply chains and raised food-security concerns. These lockdown steps have eroded people's access to food in poor and marginalised households; they have also led to price spikes and added to the difficulties facing the urban poor in the midst of massive unemployment, especially daily wage earners. At the same time, food insecurity became more pronounced with panic buying and rising food prices of both domestically produced and imported food items.

Based on the farmer survey that we administered, about 66% of the paddy farmers and their household members had spent about the same number of days as usual, or more, on paddy cultivation during the pandemic (see Appendix 1). However, about 34% of the farmers had spent fewer days than usual working on their farm. By the same token, 54% of the farmers worked fewer days than usual on other farms, and 33% of the farmers used less hired labour for purposes of cultivation. Approximately 23% of the paddy farmers used less seed compared to the same season in 2019, although only 2% of the paddy farmers did not have access to seed (Appendix 2). Also, about 21% of the

farmers used less fertiliser than normal, whereas only 5% of the farmers did not have access to fertiliser. With respect to chemicals, including non-organic fertilisers, herbicides, and pesticides, about 48% of the farmers used less of these chemicals, with 5% of the farmers not using the chemicals at all. These last figures could be due to the government's promotion of organic cultivation methods and to the extra time, farmers had to look after their fields, reducing their need for chemicals.

In terms of vegetable farming, about 80% of the vegetable farmers and their household members had spent about the same number of days as usual, or more, on vegetable cultivation (Appendix 3). However, about 20% of the farmers had spent fewer days than usual on their farms. Also, 43% of the farmers worked fewer days than usual on other farms, and 36% of the farmers used less hired labour for cultivation purposes. In addition, 8% of the farmers did not use hired labour at all, and 6% who typically worked as hired labour on other farms did not do so. Approximately 22% of the vegetable farmers used less seed compared to the same season in the previous year, although only 3% of the farmers did not have access to seed (Appendix 4). Also, about 27% of the vegetable farmers used less fertiliser, with only 5% of the farmers not having access to fertilisers. With respect to chemicals, about 37% of the vegetable farmers used less chemicals, and only 5% did not use chemicals at all.

Moreover, problems with cash flow, which had been an issue in Sri Lankan agriculture even before COVID-19, have had a significant impact on Sri Lankan farmers during the pandemic. As the survey data shows, a sizable proportion of farmers may have suffered due to the high cost of inputs. For example, more than 55%, 37%, and 44% of the farmers had to pay relatively higher prices to buy seeds, fertiliser, and chemicals, respectively (Appendix 5). Prices began to rise during the first days of the lockdown in Sri Lanka (Appendix 6 and 7). From March 2020 through December 2020, some price volatility could be observed in the rice market. Also, the prices of rice varieties became uncontrollable due to the intervention of intermediaries. In April, different rice varieties were brought under control through the establishment of maximum retail prices. Still, however, some traders were not selling rice at the government-set prices, and thus some farmers were not getting a fair price. A perennial problem with the marketing of Sri Lanka's agricultural products is that intermediaries earn excessive prices at the cost of farmers due to various structural and operational deficiencies in the value chain. This same problem has continued during the pandemic.

Amid the growing health hazards presented by COVID-19, the government has been overburdened with the responsibility of ensuring food security for households. It took several early initiatives to make food available and accessible to consumers during the lockdown period. Although an island-wide curfew was imposed on 20th

March 2020, the agriculture sector was released from curfew restrictions on 25th March. Farmers were allowed to continue with their usual farming operations, and traders were allowed to transport essential agricultural inputs, like fertiliser, without any restriction. In some instances, however, producers experienced a drop in the yield from their harvests, as well as problems selling their crops. A farmer in Monaragala District reported that:

We did not receive the fertiliser and other chemicals that we needed on time to have a better harvest. If we had had enough money, we could have purchased fertiliser and other chemicals even at higher prices. In any case, the harvest dropped significantly. The collectors who normally come to our village did not come to collect our harvest. Therefore, we had to bring our goods to distant markets. Due to a lack of buyers, we could not sell our goods for a reasonable price. Our entire family economy collapsed.

When households' physical access to food was reduced due to the closure of Dedicated Economic Centres in Dambulla, Tambuttegama, Nuwara Eliya, Keppetipola, and Embilipitiya to curb the spread of COVID-19, on 5th April 2020, the government initiated a new system for distributing essential food items such as fruits and vegetables at the Divisional Secretariat Level. However, as a farmer in Matale District explained, farmers have still faced difficulties related to selling their vegetables during the pandemic:

We normally send our harvest to the Dambulla Economic Centre. Due to the COVID-19 pandemic situation, the Centre was closed, and collectors from different areas did not come to buy harvests. Therefore, even though buyers were not coming to the Dambulla Economic Centre, we tried to bring our harvest to the Centre. The prices of vegetables dropped drastically, however, and we could not sell our harvest. The wastage of goods was very high at that time. During that period, we faced a lot of difficulties because we did not have any money.

At the same time, during the lockdown, the government helped e-commerce companies and the leading supermarket chains to procure agricultural products both from farmers and from the markets to meet consumer demand through online platforms (Daily FT, 2020). When these online platforms became overwhelmed with delivery orders, the state-owned supermarket Sathosa partnered with PickMe Food to deliver food packs under curfew conditions to ease the food accessibility issues. Several other efforts were made by the government as well; these efforts focused on providing consumers with economic access to food—for example, through the establishment of maximum prices.

On 26th March 2020, maximum wholesale prices were introduced for vegetables, based on a mark-up of LKR 40 per kg for retail sales, so as to control rising vegetable prices while still safeguarding farmers. Further, on 10th April 2020, maximum retail prices

were set for different rice varieties, such as white/redraw (LKR 85 per kg), Samba and Nadu (LKR 90 per kg), and Keeri Samba (LKR 125 per kg). In addition, a consumption support worth LKR 5,000 was provided to about four million Sri Lankans who make up the most vulnerable parts of the population, including senior citizens, people with disabilities, kidney patients, Samurdhi recipients, and the farmers registered with the farmers' insurance scheme (Thibbotuwawa, 2020).

However, these efforts have proved to be insufficient in the face of this crisis. For example, even though the price controls and government-purchase programmes have provided some relief for consumers and farmers, the actors situated at the lower end of the supply chain continue to face challenges. Thus, the most vulnerable farmers have failed to obtain inputs such as seed and fertiliser on time and thus have been unable to sell their product—even at the unprofitable prices arising from exploitation by intermediaries.

Also, unless the massive interest in gardening shown by home-locked people continues even post COVID-19, home-gardening promotion programmes represent a waste of valuable resources due to the absence of proper monitoring and delivery of agriculture extension services amidst the pandemic. From a broader perspective, even in normal circumstances, the linkage between agricultural technology generation and dissemination is weak, given problems such as the duplication of functions, poor coordination in resource allocation, and limited participation by provincial councils

when it comes to national-level planning. Moreover, many vulnerable people have failed to receive consumption support due to a lack of reliable information required to properly target and administer supportive programmes of this sort.

From the consumers' side, high food prices have consistently forced families to adopt a variety of coping strategies to meet their food needs, such as shifting to less costly foods, purchasing fewer non-food items, and informal-sector loans. Here it should be noted that our survey does not cover most of the urban poor; if it did, the findings might have been much worse, given that poverty rates among these communities are much higher than in other sectors. The affected communities may well have reduced the frequency of



The most marked change in rice consumption in Nepal was in smaller quantity purchases instead of bulk buying as before.

consumption and portion size for imported food items or else replaced them with local products, opting for traditional natural foods instead of imported items.

The impact of COVID-19 on food systems in Nepal

As in Sri Lanka, the COVID-19 pandemic has impacted Nepal's food system. That said, despite the logistical challenges posed by the pandemic and resultant lockdown, the accessibility and affordability of rice has not been impacted. Indeed, prices of both coarse and fine rice have declined since the lockdown started. At the beginning of the lockdown, absolute curbs on people's movements created a panic-like situation marked by mass purchases. However, within a few days, the monitoring of movements and of the availability of essential supplies was improved, lessening the buying spree. At the same time, the sudden lockdown prevented any hoarding or price gouging in the early days of the pandemic, at least for cereals such as rice.

According to the Current Macroeconomic and Financial Situation database of the Nepal Rastra Bank, the central bank of Nepal, the lockdown may have had a slight impact on cereal prices (Appendix 8). Year-on-year inflation in cereal prices (with rice being weighted the most heavily in the reference basket of cereals) increased from 3.4% in mid-February through mid-March 2020 (which corresponds to the month of Falgun in the Nepali calendar year 2077) to 3.95% in mid-March through mid-April 2020 (which corresponds to the month of Chaitra in the Nepali calendar year 2077) and 4.88% in mid-April through mid-May 2020 (which corresponds to the month of Baisakh in the Nepali calendar year 2077) (see Appendix 8). Although there was some moderation subsequently, cereal price inflation averaged 4.13% until mid-September through mid-October 2020 (which corresponds to the month of Asoj in the Nepali calendar year 2077). This upward trend in cereal price inflation contrasts with food inflation as well as overall inflation rates, which fell significantly after mid-February through mid-March 2020.

Rice imports in Nepal make up nearly 15% of the total available rice stock. Accordingly, initial disruptions in imports due to border closures and national lockdowns affected the rice supply. In the first couple of weeks of the lockdown, Indian rice traders stopped issuing new export contracts due to logistical disruptions (Jadhav & Bhardwaj, 2020). However, this restriction did not have much of an impact on Nepal: exports resumed in less than a month (Kulkarni, 2020), and imports by Nepal became regular again subsequently (see Appendix 9). Also, the stock of rice in Nepal was sufficient to meet the demand for a few months; thus, there was no threat of shortage (Prasain & Shrestha, 2020; see also Appendix 10). These factors helped stabilise rice prices.

However, although the rice supply situation did not deteriorate, a halt in economic activities and the resultant hit on employment and income seem to have impacted rice consumption patterns. According to retailers, the most marked change in consumption behaviour was that people opted to purchase smaller quantities of rice instead of buying it in bulk, as most did previously. This change, it should be noted, does not necessarily mean that consumers were reducing their overall rice intake. Yet, there was a significant decrease in institutional demand for rice from hotels, restaurants, catering businesses, and schools.

Regarding vegetables, their prices rose from 50% to 100% across all the provinces within the first two months of the lockdown (WFP, 2020b). Areas bordering India faced major supply shocks because the border was completely shut. Hailstorms in April and May of 2020, both planting months, damaged crops, meaning that the price rise that had taken hold since April continued due to reduced supplies (WFP, 2020c). A vegetable sector survey conducted among vegetable producers and traders in early April reports a more than 60% decline in sales for over 50% of the respondents, owing to the closure of markets and institutional buyers not procuring vegetables (CASA, 2020b).

Although policy support in the form of allowing movement in essential sectors (such as those dealing with perishable food items) and grants to transporters and local-authority-run vehicles (so-called agri-ambulances) led to some regularisation, such that prices did stabilise in June. The scale of such interventions was small, and so was their impact on prices and supply (Lamichhane, 2020). Hence, until May 2020, price rises of up to 60% for vegetables were reported in hill districts. Prohibitions of imported vegetables by some local governments also caused painful price rises. The Ministry of Industry, Commerce and Supplies (MoICS) observed in its October 2020 assessment that vegetable supplies had been somewhat normal, but that because production had gone down, there would be more imports in the fiscal year 2020-2021 (MoICS, 2020). Regarding vegetable supplies, the respondent from the Kalimati Market, the country's largest wholesale fruit and vegetable market, suggested that things have been close to normal since October 2020.

Regarding the consumer price index (CPI) for vegetables, year-on-year inflation figures suggest that vegetable prices were growing at rates of close to 40% or more in the three months prior to mid-March (February/March) 2020 (see Appendix 11). The vegetable inflation rate declined in February/March, increased in March/April, and dropped again in April/May 2020; overall, however, it averaged 28%. Prices fell in May/June and June/July before increasing again—sharply in August/September and September/October when the price rise was more than 20%. When the lockdown was imposed, farmers were not able to harvest their wheat crop because people's movements were restricted, and there was thus a shortage of labour (Prasain, 2020; Rawal, 2020). Fortunately for the farmers'

livelihoods, the national lockdown had been loosened by the time paddy seeds were sowed, and only local lockdowns were imposed during the planting period. Moreover, since the lockdown had resulted in migrants from outside and within Nepal going back to their homes, farmers reported that during the 2020 monsoon planting period, they did not face labour shortages as in previous seasons. Paddy planting in 2020 was one of the best recorded in recent times (see Republica, 2020). At the same time, though, the lockdown and border closure created a shortage of other farm inputs, especially seeds and fertilisers.

A shortage of urea, which is a problem even during normal times, has persisted throughout the paddy cycle during the pandemic, according to both farmers and the MoALD. The process of procuring the fertiliser by the Agriculture Inputs Company and Salt Trading Corporation was delayed due to COVID-19-induced restrictions (Verma, 2020). Further, the lockdown in India also affected the transit of Nepal-bound fertiliser that had arrived at Indian ports. According to reports, the lockdown coupled with cyclone Amphan forced a ship transporting 21,000 MT of urea and 20,000 MT of diammonium phosphate for the Salt Trading Corporation to be rerouted to Kandla Port in Gujarat. As a result, the shipment could not be transported to Nepal because that port is not authorised for Nepal-bound transit cargo (Bizmandu, 2020). Likewise, the lockdown affected informal imports of fertilisers and seeds from India. Nepal needs about 700,000 MT of chemical fertilisers annually (as per government estimates cited in Singh, 2018). Of this amount, Nepal formally imports only about 350,000 MT, and the rest is met through informal imports. A survey undertaken in 2017 in two locations on the India-Nepal border found that farmers buy 70-80% of their diammonium phosphate requirements from cross-border markets in India (Singh, 2018).

During the early months of the lockdown, there was a shortage of workers due to severe restrictions on the movements of people; this labour shortage affected vegetable production. According to half of the respondents surveyed for this study, they were unable to access vegetable seeds and fertiliser due to a halt in transportation. Also, according to the ex-Chair of SEAN, hundreds of vegetable seed growers, who have contracts with seed companies like his, lost their crop due to the lockdown, the problem being that routine, crop-management-related visits by company technicians could not take place. Also, as he stated, agrovets and dealers charged extremely high prices, and because high-yield seeds coming from developed countries were unavailable, growers were supplied with often substandard seeds that came from across the border in India.

Further, the pandemic affected the delivery of agriculture extension services in Nepal. Due to physical distancing and restricted movements, farmers had limited access to extension services. Moreover, agri-extension services have been in flux under new federal

guidelines. According to the farmers, the number of agriculture technicians is inadequate, and this issue has affected service delivery. This problem was more pronounced during the pandemic.

By contrast, there was an overall growth in imports of vegetables in the months following the introduction of the lockdown in the last week of March 2020, as compared with the same period in 2019 (Appendix 12). For instance, imports in July 2020 stood at NPR 3.40 billion compared to NPR 2.51 billion in July 2019, representing an increase of over 35%. The three vegetable wholesalers surveyed for this study reported that although both domestic suppliers and importers provide goods on credit, imports are preferred because they allow supplies to be obtained in bulk. The wholesalers also stated that, compared to domestic supply, imported supply is much more assured, with their view being indicative of a functional and somewhat resilient supply chain network, even in the face of the pandemic.

On the export front (Appendix 12), there has been a consistent decline of exports in the post-lockdown months as compared with the same period in 2019. Indeed, although the monthly export data for March 2020 show an increase of under 10%, no exports were recorded in April 2020, that is, immediately after the lockdown. Overall, exports fell by 70% during March-October 2020 compared to the same period in 2019, with a 77.4% fall in March-July and a 63% drop in August-October.

Overall, food value chains in Nepal have been impacted by disruptions to input sourcing, access to extension advice, and marketing, among other key factors. All of these disruptions, along with wild fluctuations in prices and transactions, have resulted in diminished livelihoods as well as food insecurity. Other marginal actors, both upstream and downstream (such as street vendors), have also been impacted. In the case of smallholders, loss of income and uncertainty about the future as the pandemic goes on will result in their withdrawal from production. This effect of COVID-19-related impacts constitutes a double whammy, leading to worsened livelihoods and broken value chains that further undermine food availability and access to vegetables.

A focus on specific cases can further illustrate the impacts of the pandemic on food systems in Nepal. For example, an experienced Kathmandu-based peri-urban farmer saw a significant chunk of his produce rot between March and June of 2020. The farmer's main problem was that the prices offered by buyers were below production costs, and the usual intermediaries had disappeared. Between March and September of the same year, he earned only a tenth of what he had earned the previous year. His plight is partly linked to the crash of demand from institutional buyers in the capital, Kathmandu. People left the city in large numbers, judging from posts on social media accounts in March 2020, i.e., early in the lockdown (The Rising Nepal, 2020).

Turning to Nepal's relatively socio-economically underdeveloped mid-western region, our survey indicates that producers there have been badly hit by the pandemic, to the extent of having to give up planting for as long as eight months (or longer) after the COVID-19-induced lockdown. Between March and July 2020, because retailers were not placing orders, vegetables rotted in the sourcing areas. Because the markets remained shut or operated for only limited hours for nearly three months after the lockdown began, retailers stopped buying.

By contrast, an interview with a large farming co-operative with over 1,000 members in Central Nepal catering mainly to the markets in Kathmandu and Chitwan revealed that the group experienced only negligible losses in its vegetable trade in the initial months of the lockdown, in part due to local measures that allowed for the transportation of food. Vegetable planting resumed quickly because the co-operative was able to ensure a steady supply of inputs, which it procures in bulk and then re-sells to its members on credit.

A large co-operative in Eastern Nepal growing mainly tomatoes had to sell its produce for a price below production costs between March and May of 2020. Between March and July, the members' average earnings (measured on an annual basis) declined by nearly 33%, implying a high likelihood of food insecurity. An additional driver of income loss was the decision by many producers not to plant in June and July. Given the ineffectiveness of the assistance offered by local authorities, the co-operative lobbied hard to regularise transportation. Assistance from the co-operative in the form of inputs sold on flexible payment terms, together with regularised collection, transportation, and market linkages, enabled production to restart by August 2020, and by late November, the produce had begun fetching remunerative rates.

Although traders in Kathmandu have grappled with a decline in demand, e-commerce has seen a boom, along with challenges, during the pandemic. Kheti.com is an e-commerce player specialising in the agriculture input and output markets. It began operations in January 2019, connecting not just consumers (both retail and institutional) with producers but also farmers with input suppliers such as importers and manufacturers. In the first two to three months of the lockdown, Kheti's input supply business got disrupted significantly because of transportation issues and because importers could not import inputs. Furthermore, while agriculture and agribusinesses were listed as essential businesses that could continue their operations, there was minimal coordination among authorities when it came to facilitating these businesses' functions and services. That said, however, Kheti's sourcing and fulfilling of vegetable orders by retail consumers grew exponentially; this upturn somewhat compensated for Kheti's lost input-supply business as well as the complete freeze in orders by institutional buyers.

Stepping back from these individual case studies to regain a broader view, although the Government of Nepal announced food assistance to the needy and delegated to local governments the responsibility for providing this assistance, a recent survey indicated that over 87% of the surveyed households, including those receiving daily wages, were not receiving any COVID-19-related assistance (WFP, 2020a). Reports of overwhelming numbers of beneficiaries at soup kitchens sponsored by voluntary organisations highlight the levels of vulnerability in Nepali society (Rai, 2020). These reports may be misleading, however, given that the poorest households have been under-represented in telephonic surveys. Citing municipal government data, Rai (2020) suggests that 1.72 million households out of the 1.85 million identified as most affected by the pandemic, in fact, received assistance.

Early in the lockdown, local bodies were directed to provide a 25% subsidy for the transportation of essential food items. Respondents surveyed for this study stated that even though the intervention was well-intentioned, the scale was too small for it to be effective. Similarly, although some measures, such as running agri-ambulances to transport perishable goods, made a lot of news initially, respondents again remarked that the scale of the operation was too small for them to know about it. A number of local governments also started home delivery of vegetables, but these programmes eventually fizzled out because traders found them uneconomical. Monetary measures announced in April 2020, such as the NPR 100 billion refinance fund; interest rate concessions to select sectors, including agribusinesses; and collateral-free additional working-capital loans of up to 10% of the approved amount of businesses' existing working capital loans, have been beneficial to traders and seed companies, which already enjoy concessional interest rates under other schemes. These measures, however, have not been helpful to small farmers, who mostly remain outside the formal financial market.

One of the major steps undertaken by the government to ensure a smooth supply of food and other essential commodities took shape when the MoICS began publishing weekly bulletins on the supply situation. These bulletins have helped bridge information gaps to prevent any hoarding or illegal trading due to perceived shortages. Moreover, unabated imports of food items, including rice, have also helped protect against significant supply disruptions and price fluctuations. Meanwhile, in terms of longer-term policy measures, it appears that the pandemic may have contributed to a change in procedures for the public procurement of paddy. In the midst of the pandemic, for the first time in the six years since the minimum support price (MSP) was instituted, the MSP was announced ahead of the planting season. This early announcement provided assurance to farmers, helping them make investment and expenditure decisions. By the same token, a decision to engage in the public procurement of paddy via farmers' co-operatives has the potential to ensure timely purchases of paddy, and thereby prevent distress selling of paddy harvests.

Conclusion and recommendations

COVID-19 has revealed food systems' significant vulnerability to pandemic shocks. Hence, the challenge is not only to weather the shock that is currently happening but also to strengthen the food system to face future crises by means of evidence-based policy responses.

Accordingly, based on our findings, we suggest the following interventions to help ensure resilient rice and vegetable value chains in our two focal countries—and potentially in other food systems in the region as well.

- Ensuring a smooth supply of inputs: The timely availability of inputs has been highlighted in all agricultural plans, policies, and strategies as important. However, the situation has not improved much in either country and in the case of chemical fertilisers has deteriorated in Nepal. Currently, in both countries, most of the required inorganic fertiliser is imported. Although fertiliser has been subsidised in Sri Lanka for rice for a long period, the country has struggled with the problem of achieving a timely distribution of fertiliser during the pandemic. As such, proper distribution of fertiliser should be handled by the authorities, which need to take the appropriate measures to prevent abuse of the subsidy provision and overuse of the fertiliser itself. In Nepal, a fundamental review of the existing procurement practices needs to be undertaken; the country should impose a strict timeline for bidding on as well as distributing fertiliser. Implementing existing penalties for contractors who do not abide by the conditions on their contracts could help in this regard. The government should also seek out and adopt technologies that enable decreased use of chemical fertiliser. Indeed, given that the demand for organic agriculture has been increasing significantly around the world, gradual adoption of organic agricultural practices appears to be both timely and necessary. Finally, the production of seeds needs to be expanded, with public-sector support for research and breeding programmes being critical for this expansion.
- Installing efficient public and private procurement systems: Marketing is the biggest issue that Sri Lankan paddy and vegetable producers face, and there has been constant public pressure to create dedicated agencies for procuring agricultural produce at guaranteed prices. Thus, Sri Lanka needs to strengthen its storage capacity and maintain a buffer stock of essential food items as a National Food Bank; this national supply should have nodal points at the Provincial Council level, and it could itself act as a nodal point for the South Asian Association for Regional

Co-operation (SAARC) Food Bank. Also, permanent mechanisms for public food distribution should be established at the central level. These mechanisms, which should have clear linkages with provincial and local government institutions, would help ensure timely, economical delivery and distribution of food to remote, rural, and vulnerable areas—areas that, especially in crisis situations, are subject to food deficits. Railway service should be increasingly utilised for the economical distribution of food, which would mean fewer food miles and minimum post-harvest losses. Moreover, farm-market linkages and production clusters should be strengthened for all types of crops—both those grown for domestic markets and those intended for export markets. In the long run, it will also be advisable to invest, through partnerships with private entrepreneurs, in cold storage and refrigerated trucks to store and transport perishable products.

In Nepal, the public distribution of food staples is crucial only for the remote areas where rice is sold by two government entities—the Food Management and Trading Company and the Salt Trading Corporation—at a subsidised rate.⁷ Currently, neither the scope of the distribution nor the amount procured for this purpose is large enough to have a major impact. In this connection, farmers and policymakers agree that providing a minimum support price for paddy purchase can sway farmgate prices. Thus, creating an effective ecosystem of public procurement will prevent farmers from panic-selling, enabling them to wait for a better price. However, the delayed procurement process has dented the price-determining impact of paddy procurement. This year, paddy procurement has been partially outsourced to farming co-operatives in a bid to improve efficiency. Any shortcomings with procuring paddy via co-operatives (e.g., regarding timely payment or delivery) needs to be addressed promptly so that the process can be improved for the following season and beyond. Further, complementary infrastructure, such as proper storage and transport facilities, need to be strengthened to make the public procurement and distribution (including sales) effective. Institutions like co-operatives and farmer groups need to be expanded in the domain of vegetable production as well. Although these institutions are not a perfect arrangement and have been criticised for disproportionate value capture by their most powerful members, the farmers associated with co-operatives have been relatively shielded from pandemic-induced shocks, including access to input, market linkages, or production and harvesting. Yet reliance on co-operatives alone will not suffice, because supplying in bulk will require, for instance, collection centres and other infrastructure.

⁷ The Food Management and Trading Company and the Salt Trading Corporation do not directly subsidise the price of staples in Nepal, but the government does provide subsidies to cover the cost of transporting cereal to geographically remote areas, effectively bringing down the prices in those areas.

- Addressing issues in the food-processing industry: In Sri Lanka, food processing is concentrated in a few enterprises, and private investment in food processing and value addition is insufficient, mainly due to uncertainties related to government policies coupled with inadequate access to finance, knowledge, and technology. These factors, which have hampered linkages between smallholder farmers and markets, need to be addressed as a priority. In Nepal, the rice-processing industry seems to be less competitive than it is in India. The usual support measure adopted by the government and the central bank—namely, the refinancing of loans—may not be sufficient to keep the industry afloat. Revisiting the Nepal-India trade treaty, so as to do away with reciprocal duty-free market access to the primary products that Nepal imports from India and curbing informal exports of paddy from Nepal to India, is one option in this regard. Any proposal to raise tariffs on rice imports needs to be balanced against the interest of consumers, so this issue must be investigated further, and emphasis must be placed on increasing the efficiency of Nepal's processing industry.
- Agri-extension services and information dissemination: To address coordination issues in the delivery of extension services, the focus should be on improving the coordination of programmes offered by different central government ministries and agencies. Likewise, there needs to be better coordination between the central and subnational governance structures in both countries, while steps are also taken to clear space for people's participation in governance. In Nepal, providing for an adequate number of agricultural technicians and tailoring extension services to local needs are essential. Moreover, the agriculture sector in general and overworked agri-extension service providers, in particular, could utilise digital technology to reach beneficiaries. The current pandemic-caused situation could be used as an opportunity to familiarise farmers with digital agri-extension services and information systems made available through mobile applications and short-messaging services.
- Reviewing agricultural financing services: One of the major reasons why farmers agree to low farmgate prices is to secure advance loans from collectors. Given that farmers' access to formal credit is limited, they must resort to informal networks to borrow money, often agreeing to less-than-beneficial sales contracts. In Sri Lanka, inadequate resources (including affordable credit) for the commercialisation and modernisation of agriculture have been a long-standing problem, which has only been further aggravated during the pandemic period. Thus, concessionary credit schemes and simple procedures for providing loan facilities for agricultural activities and agro-based industries should be introduced through state and private banks in a way that targets younger growers and female farmers in particular. In Nepal,

existing rural credit providers such as co-operatives and microfinance institutions charge excessive interest rates, making them suboptimal sources of finance. The recent government-announced farmers' credit card (modelled upon India's Kisan Credit Card) needs to be rolled out and implemented sooner rather than later, so that farmers can at least access state-subsidised credit to purchase necessary inputs. Further, one of the major policy measures adopted by Nepal to fight the economic slowdown brought by the COVID-19 pandemic focuses on providing subsidised credit, with agriculture being a sector that can particularly benefit from loans and refinancing opportunities. Thus, some of the existing COVID-19-induced policy responses have scope for improving access to agricultural finance.

- **Food-related social security programmes:** In Sri Lanka, consumption support was provided for those who were covered by the government cash-transfer programme, Samurdhi, in the form of a one-time cash payment. As noted previously, however, many vulnerable people did not receive adequate support due to poor targeting as well as the lack of information required to administer the transfers. For example, informal workers who lost employment but were not covered by Samurdhi have not received support. In Nepal, the one-off food distribution programme organised by the government helped feed the vulnerable and the needy for a short period only. The state needs to offer longer-term support to feed those in need so as to ensure food security. Subsidised food distribution will also provide economic help to farmers, because the government will have to purchase large quantities of cereals from growers. This arrangement could also help stabilise market prices. The government should, in addition, explore the relative merits and demerits of cash- and food-transfer programmes and decide what type of social security is optimal when it comes to helping the vulnerable in normal times as well as during shocks.
- **Ensuring the quality of food products:** Poor quality- and safety-assurance mechanisms and insufficient traceability along the entire value chain are fundamental, and long-standing problems in both countries. Strengthening market linkages for resilient value chains will require providing producers with effective training in post-harvest technologies such as food grading, weighing, sorting, and packing. These technologies will foster quality and traceability along the entire value chain.
- **Continuous monitoring of food systems:** Domestic food production, imports, domestic and world market prices, input availability, and transportation and logistics systems should all be continuously monitored to ensure national food availability and maintain household access to food. A regular monitoring system can safeguard the local food supply from international trade restrictions and

possible malpractice by local traders, such as the problems uncovered in the rice-milling industry in Sri Lanka. In this connection, establishing a coherent, holistic food-monitoring programming should be a priority, to ensure that high-quality data about food systems are available. This programme should extend across all sectors of the food system and support analyses that can be used for purposes of policy formulation and implementation. Big-data tools such as satellites, telecommunication networks, sensors, drones, and smartphones have the potential to address food-system challenges by improving how relevant information is collected, combined, analysed, and shared.

- **Revising the Nepal-India transit treaty:** The unusual situation created by the COVID-19 pandemic has made addressing issues related to smooth transit trade even more urgent than before. The bilateral treaty needs to have clauses that allow for flexibility in cases of emergency. Moreover, an agreement enabling Nepal to procure extra fertilisers from India through a government-to-government mechanism has not been renewed since its expiry in 2017. The two governments need to address such urgent issues proactively, without waiting for treaty negotiations.
- **Increasing the capacity of e-commerce:** The increased demand for digital marketing platforms during the COVID-19 pandemic should be capitalised upon to promote the capacity of e-commerce at both ends of the food supply chain. Such ICT platforms, despite capacity concerns, have already proven useful in helping to increase the resilience of the food system vis-à-vis farmers, traders, and consumers during the current crisis. That said, a mechanism needs to be developed to help connect smallholders to e-commerce platforms to prevent elite groups and institutions from totally capturing the digital marketplace. To this end, it is important to link farmers' cooperatives with e-commerce platforms.
- **Sharing of and learning from experiences:** The COVID-19 pandemic has provided researchers and policymakers with an opportunity to analyse the existing vulnerabilities in the food system, and to identify investments and reforms that are necessary to strengthen the resilience of the sector for future shocks and challenges. Therefore, lessons from the COVID-19 pandemic should be integrated with those related to other challenges confronting the food system, such as climate change, and should be used to formulate and implement relevant sectoral policies to make the food system resilient to a range of different shocks. In this connection, effective local governance appears central to effective navigation of lockdown situations. The responses of local bodies varied across the two countries, and lessons learned from these varied experiences need to be documented. One area where improvement is needed involves the poor

coordination among government authorities and agencies—both horizontally (e.g., among central/federal government agencies in Sri Lanka and Nepal) and vertically (e.g., between national and provincial/local government agencies in Sri Lanka and between federal and sub-national governments in Nepal). Lessons about coordination problems need to be learned so as to facilitate, in the future, the equitable enforcement of lockdown measures and also the granting of exemptions for the movement of essential goods.

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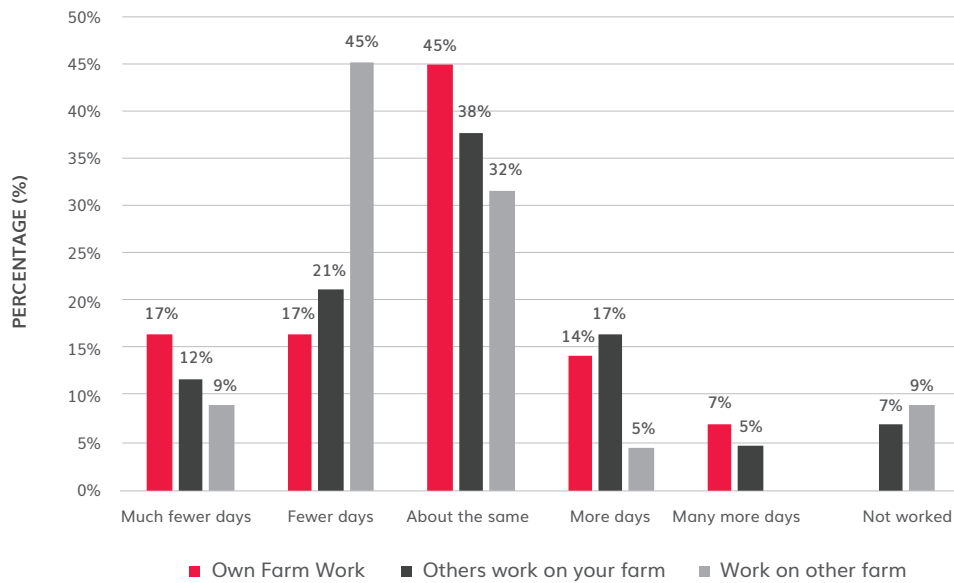
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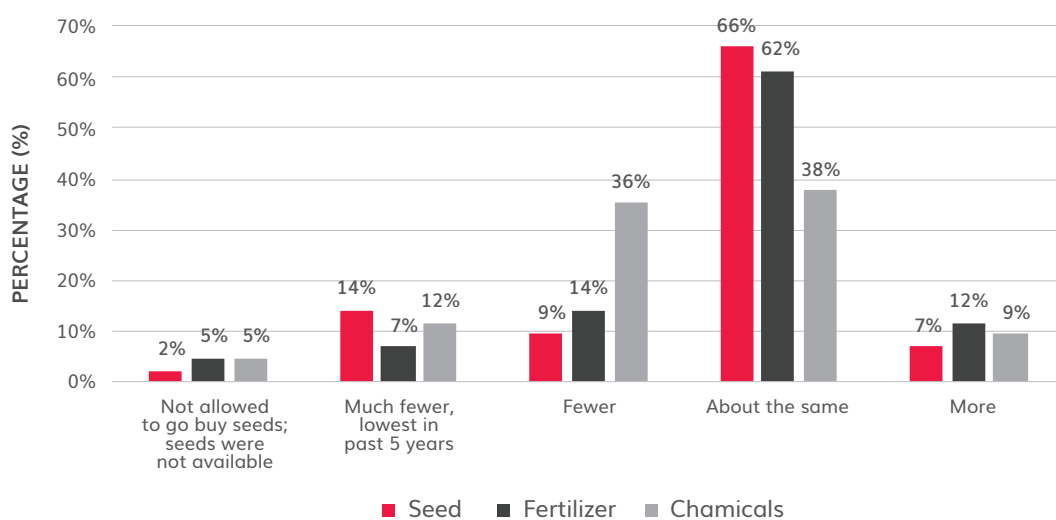
Appendices

Appendix 1. Labour use for paddy during COVID-19 (2020) relative to the same season in 2019



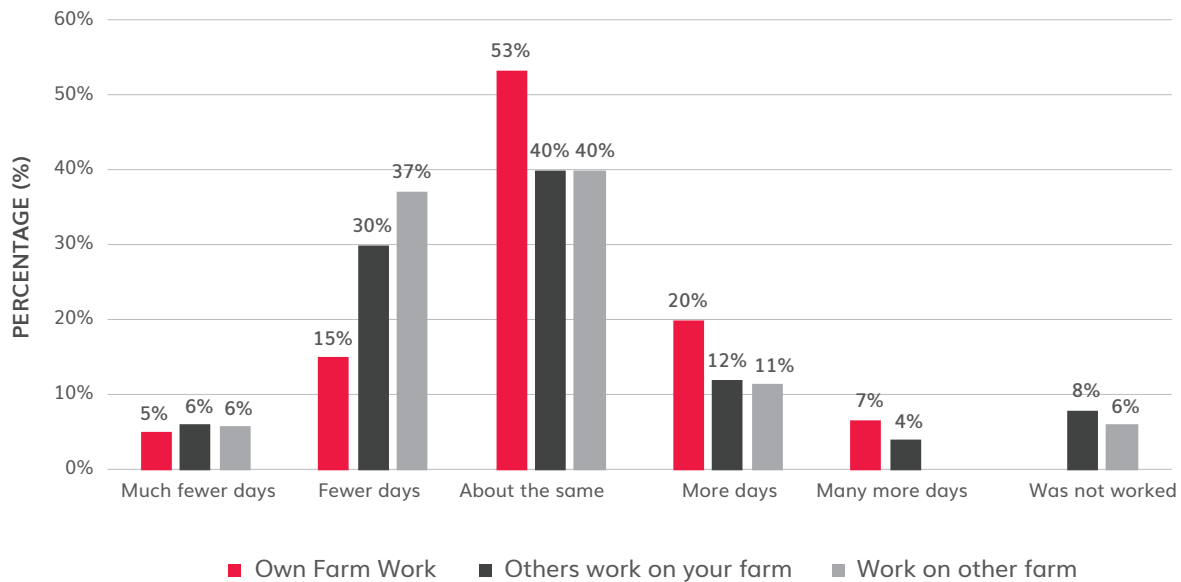
Source: Authors' illustration, based on the field survey.

Appendix 2. Input use for paddy during COVID-19 (2020) relative to the same season in 2019



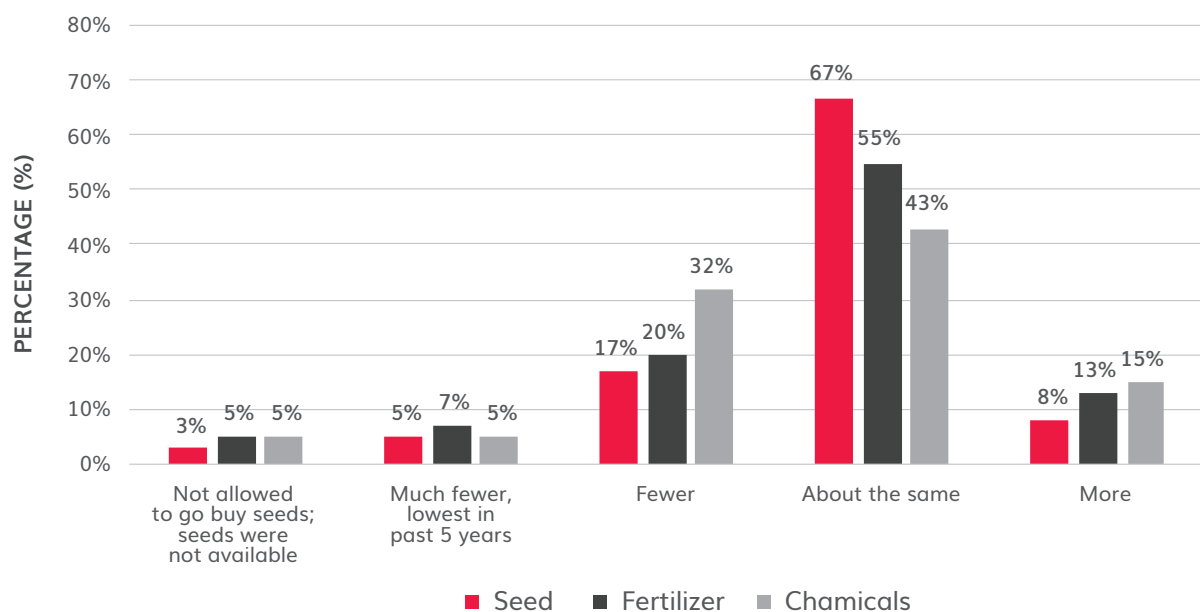
Source: Authors' illustration, based on the field survey.

Appendix 3. Labour Use for vegetable production during COVID-19 (2020) relative to the same season in 2019



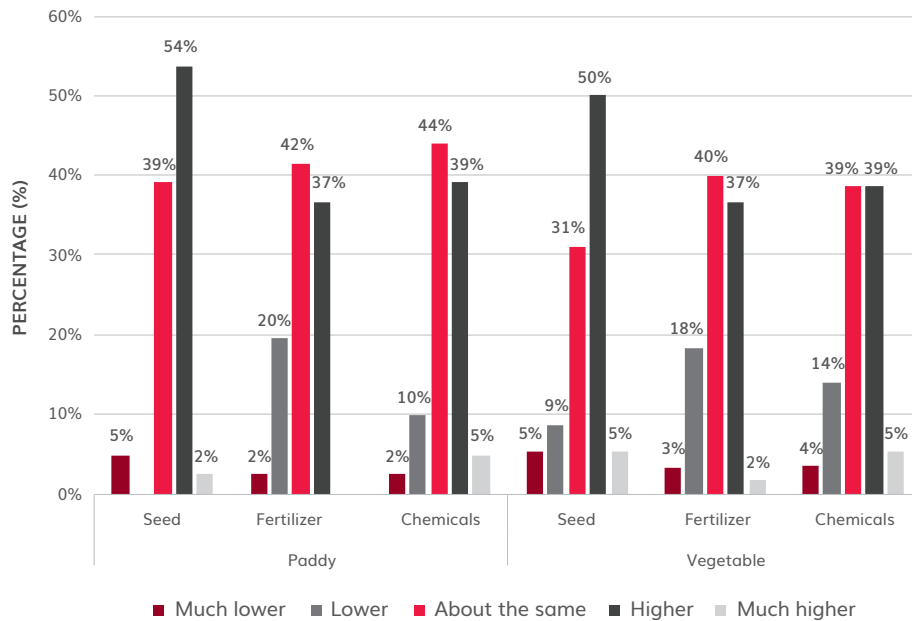
Source: Authors' illustration, based on the field survey.

Appendix 4. Input Use for vegetable production during COVID-19 (2020) relative to the same season in 2019



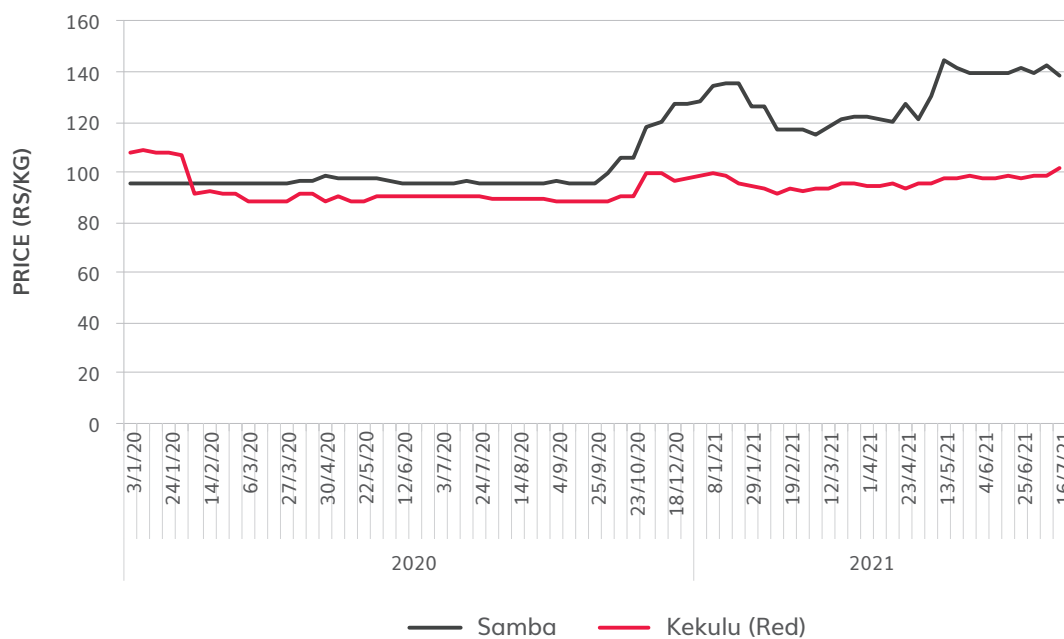
Source: Authors' illustration, based on the field survey.

Appendix 5. Cost of inputs during COVID-19 (2020) relative to their cost in the season prior to the COVID-19 (2019)



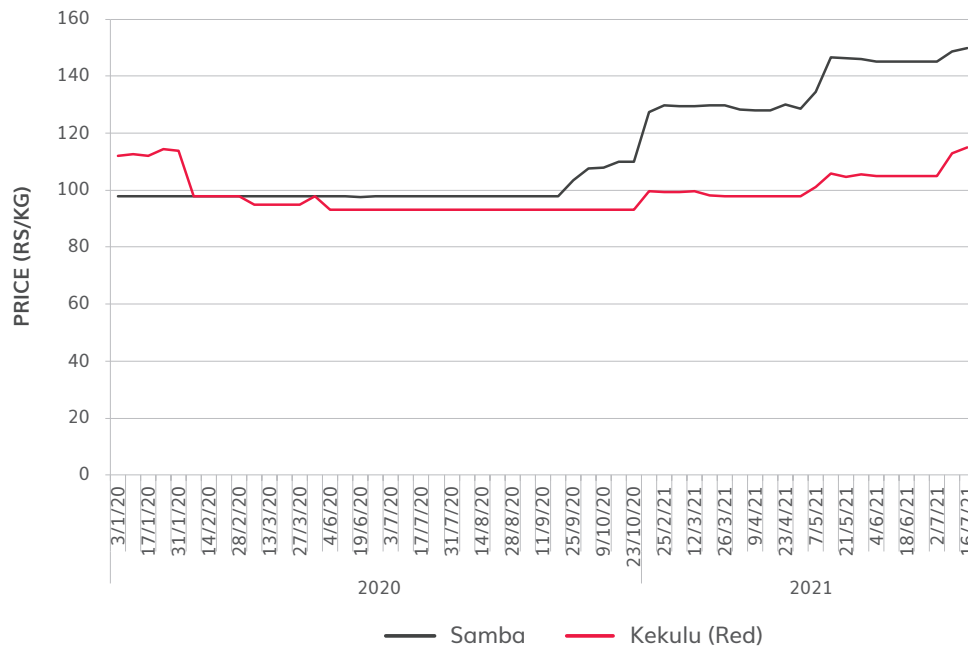
Source: Authors' illustration, based on the field survey.

Appendix 6. Wholesale price spread in the pettah markets in Sri Lanka (2019-2020)



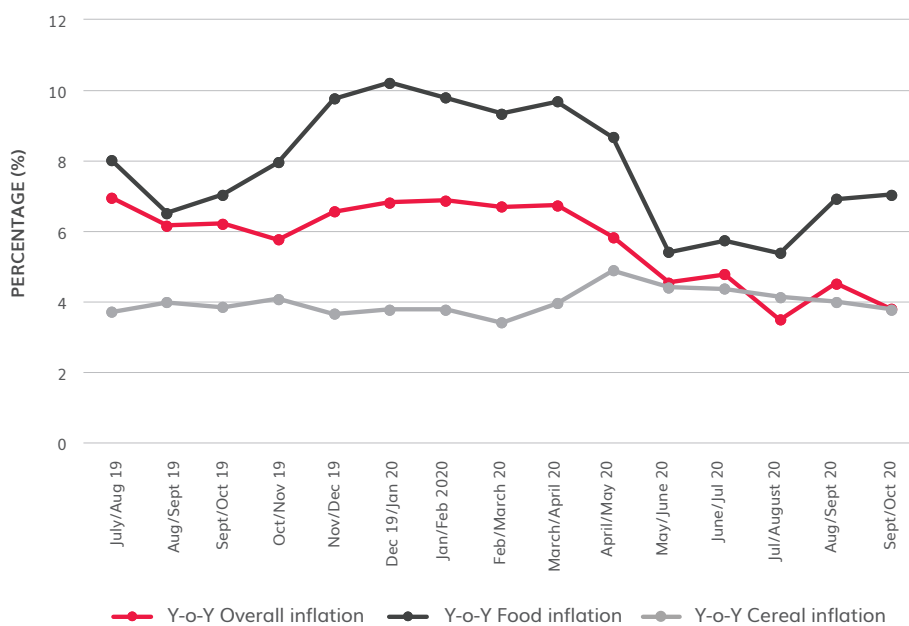
Source: Authors' illustration, based on the field survey.

Appendix 7. Retail price spread in the pettah markets in Sri Lanka (2019-2020)



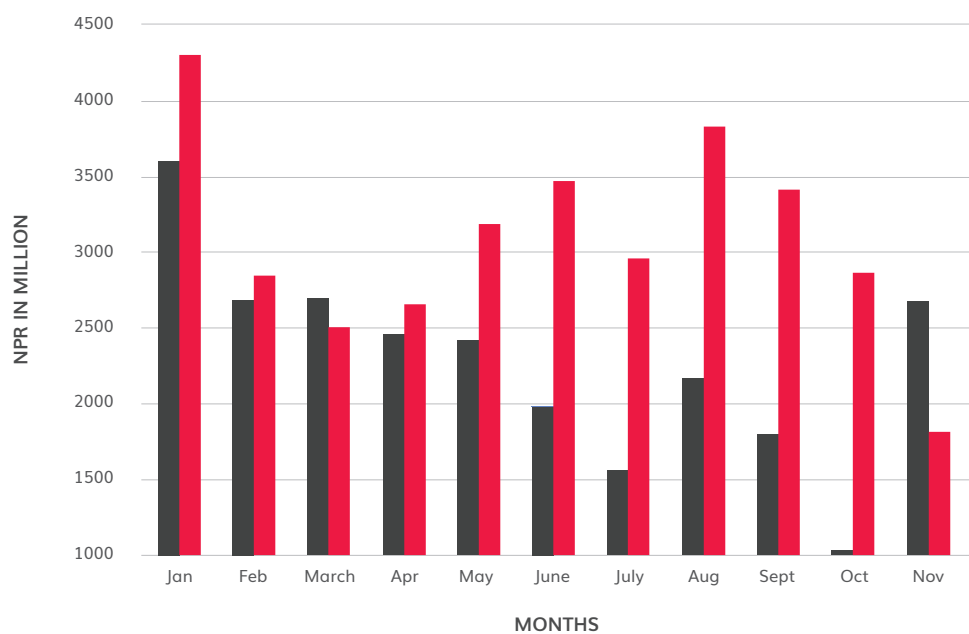
Source: Authors' illustration, based on the field survey.

Appendix 8. Year-on-year inflation in Nepal, 2019-2020



Source: Authors' illustration, based on the field survey.

Appendix 9. Monthly paddy and rice import (in value) in Nepal, 2019-2020

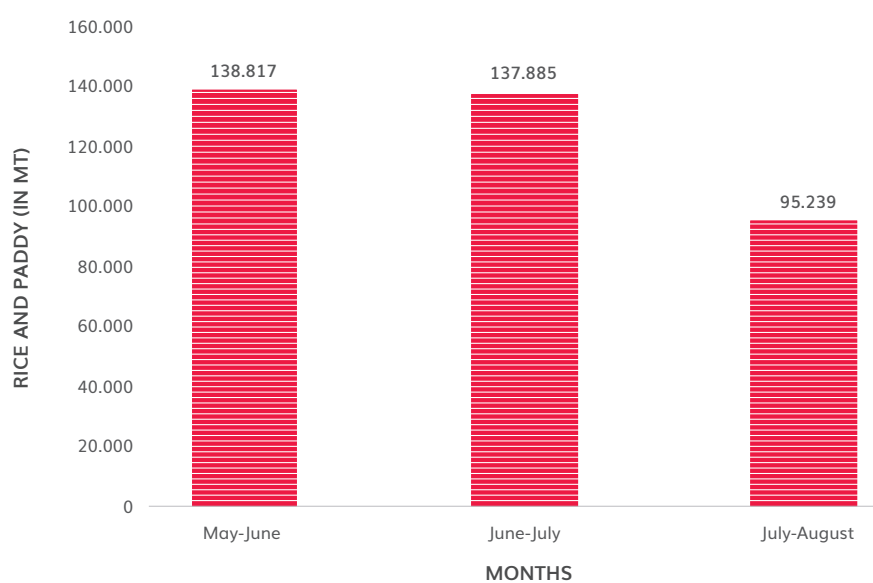


Note. Data for December 2020 are not available.

For each year, the blue bar denotes the year 2019, and the red bar denotes 2020.

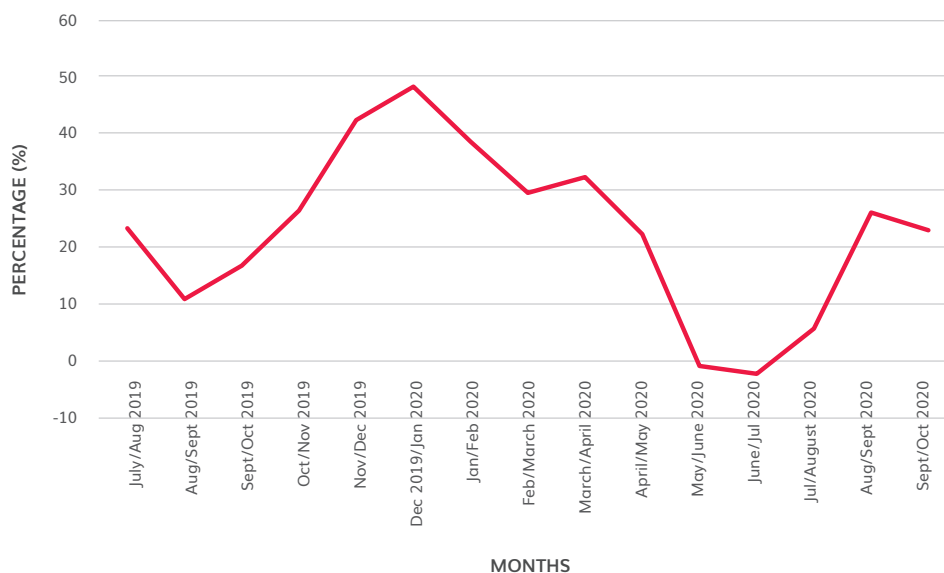
Source: Databank maintained by the Trade and Export Promotion Centre, Nepal (2019, 2020).

Appendix 10. Rice and paddy in stock during and immediately after lockdown (in MT)



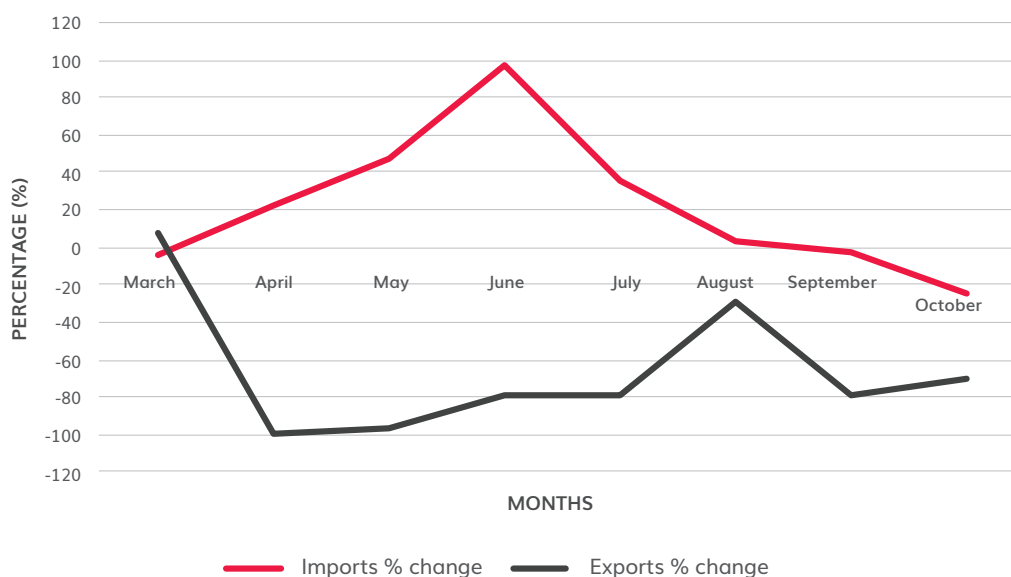
Source: MoICS (2020).

Appendix 11. Year-on-year inflation in vegetable prices in Nepal, 2019-2020



Note. Nepal Rastra Bank (2019, 2020).

Appendix 12. Year-on-year growth in the vegetable trade in Nepal, 2019-2020



Note. Percentage change in a particular month refers to the change in import or export in that month in 2020 over the same month in 2019.

Source: Authors' calculation based on data from Trade and Export Promotion Centre, Nepal (2019, 2020).



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