Chapter 13

FOOD PROCESSING: A STALLED TRANSFORMATION

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Processed foods account for 80 percent of global food sales. Such foods are becoming increasingly important in low- and middle-income countries, driven by growing demand for convenient and ready-to-eat products (World Bank 2007).[1,2] The aim of this chapter is to analyze the state and evolution of food processing in Myanmar and to assess the effect of the crises (COVID-19 and the military coup) on the different segments—production, trade, and consumption—of the sector. This assessment is important given the possible implications of changes in food processing for agriculture, employment opportunities in the food processing industry and food service sector, and nutritional outcomes.

We look at data from food processing enterprises and analyze the importance of different levels of processing in international food trade and consumption. We then quantify the importance of prices and income in demand for foods categorized by their degree of processing. We further analyze the

1 For example, Reardon and colleagues (2014) show that in Bangladesh, Nepal, Indonesia, and Viet Nam, the average share of processed foods in the value of food consumption was 59 percent in rural areas and 73 percent in urban areas. They also found that the processing share in food consumption rises with income levels, indicating increased importance with possible future income growth. A case study in Tanzania finds that processed food has penetrated the diets of rural areas and those of the rural and urban poor, driven mostly by the effort to save home processing and cooking time but also because of food environment factors (Sauer et al. 2021). On the other hand, de Brauw and Herskowitz (2021) illustrate in the case of Nigeria that consumption of highly processed foods at home has declined, while consumption of food away from home (FAFH), often assumed to be highly processed, has risen substantially.

2 The growth in the consumption of processed foods in low- and middle-income countries has two important associated trends. First, the off-farm segment in agricultural value chains becomes increasingly important—and that segment then evolves into an important source of employment in these countries (for example, Mueller and Thurlow 2019). Second, the increasing consumption of processed, but especially ultra-processed, foods has been linked to rapid increases in overweight and obesity, often referred to as the double burden of malnutrition, given the combination of under- and overnutrition in these countries (Demmler, Ecker, and Qaim 2018; Popkin, Corvalan, and Grummer-Strawn 2020; Reardon et al. 2021). These trends have sparked public health concerns and a policy debate about ways to reverse these outcomes (Boysen et al. 2019).

effects of the recent crisis period on food processors, on international food trade, and on the consumption of foods in the different processing categories.

Throughout this chapter, we use the food classification system focused on processing proposed by Monteiro et al. (2019), the NOVA classification system, to categorize foods by their degree of processing into four groups: (1) unprocessed; (2) minimally processed, which are unprocessed foods altered by industrial processes but without salt, sugar, oils or fats, or other food substances added to the original food; (3) culinary processed, which mostly involves the addition of oils and sugars; and (4) processed foods. See MAPSA (2023) for a detailed description and the annex to this chapter, for the allocation of foods recorded in the national household survey to the four processing categories.

In this chapter, we first analyze the functioning of the food processing sector, then assess food trade disaggregated by food processing category and consider the consumption of processed food products overall and for different socioeconomic groups. Next, we present the results of demand assessments, using a quadratic almost ideal demand system (QUAIDS) model (MAPSA 2023). We use these results to assess the effect of the recent crises in Myanmar on food consumption.

Production in the food processing sector

Characteristics

The role of food processing in the local economy is not well understood. However, several characteristics are worth highlighting. First, food processing is very important in the overall industrial and manufacturing sector, as a number of indicators illustrate. Table 13.1 presents the number of registered industrial enterprises by commodity group, indicating the high share of food processing enterprises: 56 percent of industrial enterprises are involved in the food and beverages commodity group. Table 13.1 further shows that an estimated almost two-thirds (65 percent) of industrial food processing enterprises are small, defined as those enterprises with fewer than 50 employees, whereas an estimated 16 percent are in the large category. This size distribution broadly follows the distribution of other commodity groups.

Second, exact employment numbers in the food processing sector are lacking. As discussed in Chapter 16, Paudel, Filipski, and Minten (2022) estimate, based on the Myanmar Living Conditions Survey of 2017, that about 5 percent of the rural population is employed in manufacturing. They indicate

TABLE 13.1 Registered private industrial enterprises, 2019

Commodity group	Large	Medium	Small	Total	Share (%)
Food and beverages	4,173	6,038	18,987	29,198	56.5
Clothing apparel	926	914	1,314	3,154	6.1
Construction materials	1,246	1,596	1,875	4,717	9.1
Personal goods	709	680	451	1,840	3.6
Household goods	147	87	89	323	0.6
Printing and publishing	109	213	138	460	0.9
Industrial raw material	236	193	175	604	1.2
Mineral and petroleum products	421	735	2,400	3,556	6.9
Agricultural equipment	12	28	37	77	0.1
Machinery and equipment	30	32	31	93	0.2
Transport vehicles	72	28	13	113	0.2
Electrical goods	70	18	17	105	0.2
Miscellaneous	252	1,205	5,970	7,427	14.4
Total	8,403	11,767	31,497	51,667	100.0
Share (%)	16.3	22.8	61.0	100.0	NA

Source: Data from SME Development Agency.

Note: The size of small and medium enterprises is defined based on number of employees, type of activity, and capital invested or level of turnover. Small manufacturing enterprises have fewer than 50 employees and less than kyat 500 million of capital, medium more than 50 and fewer than 300 employees (301–600 employees in labor-intensive manufacturing) and up to kyat 1 billion of capital, and large more than 300 employees and more than kyat 1 billion of capital. NA = not applicable.

that this sector covers mostly food processing activities. In the national Myanmar Household Welfare Survey fielded at the beginning of 2022, 3.2 percent of households reported that they were involved in food processing (MAPSA 2022b). The shares were slightly higher in rural areas (3.4 percent) compared with urban areas (2.9 percent).

Third, rice mills are the most important food processing enterprises, as well as the most important enterprises in the manufacturing sector, as measured by their share in revenue and in value added of the manufacturing sector as a whole (Table 13.2). Table 13.2 also shows—based on a large survey of manufacturing firms (MOPF and UNU-WIDER 2020)—that rice mills make up 59 and 57 percent of total revenue and value added, respectively, in the industrial sector. Rice mills combined with all other enterprises in food, beverages, and tobacco make up 84 and 83 percent. Table 13.2 further shows that the average size of rice mills is significantly larger than the average for other manufacturing enterprises (at more than double the size), measured in revenue as well as value added.

TABLE 13.2 Revenue and value added by industry, 2019

Industry	Revenue		Value added	
	Sum Million kyat	Mean kyat	Sum Million kyat	Mean kyat
Rice mills	15.74	951	4.26	257.7
Food, beverages, and tobacco	6.68	335	1.92	96.5
Textiles, apparel, and leather	1.43	266	0.41	75.4
Wood, paper, and printing	0.78	156	0.21	41.9
Coke, chemicals, rubber, and minerals	0.83	177	0.28	59.0
Metal	0.41	96	0.10	24.1
Electrical equipment, machinery, and motor vehicles	0.42	148	0.11	41.2
Furniture and other manufacturing	0.31	99	0.12	40.3
Total	26.60	430	7.43	120.0

Source: MOPF and UNU-WIDER (2020).

Fourth, innovations in the food processing sector have seemingly been limited in the past decade, but they are increasingly being adopted for some commodities. For example, Belton and Win (2019) show that most oil mills use very old equipment. In the case of pulses, most are exported as unprocessed grains after cleaning and sorting for size and (in some cases) color (Boughton, Haggblade, and Dorosh 2018). It has further been shown that poor tapping and processing practices in the rubber sector have led to low quality and low prices for Myanmar rubber exports (van Asselt, Htoo, and Dorosh 2017).

On the other hand, the rice milling sector has undergone important changes since the industry was liberalized in 2003 (Okamoto 2005), particularly in the decade under the civilian government from 2010 onward. Some upscaling has happened, but medium- and large-scale mills—classified as having a daily throughput capacity greater than 15 tons—accounted for just 12 percent of all rice mills in 2018 (USDA 2020). Yet, in terms of total rice produced, these medium- and large-scale mills are becoming increasingly important as the number of small-scale mills is declining. Goeb et al. (2022) find that such modern mills pay higher prices to their suppliers and, because of extra processing, sell rice at higher prices than their competitors.

Fifth, the inflow of foreign direct investment in low- and middle-income countries has been associated with innovations and improved efficiencies in food processing. For example, the liberalization in China of foreign investment in food processing in the 1990s and 2000s unleashed large foreign direct investment inflows, contributing to an increase in food processing

investments (Reardon 2015). However, foreign direct investment in food processing in Myanmar has been limited. While there has been increasing interest by foreign companies in investing in processing—for example, Wilmar International, a large Singapore-headquartered agrifood sector investment holding company, invested in the rice sector in 2019 after partial liberalization in that sector—the number of firms that have done so is still very small.

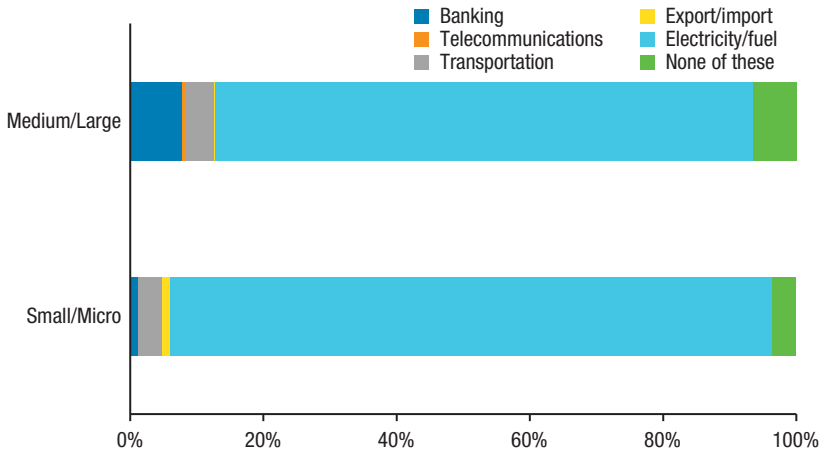
Sixth, food processors typically achieve higher revenues through branding and product differentiation. Reardon and colleagues (2012) show in several Asian countries that rice mills have changed their functions over time from only custom milling, where customers bring paddy to the mill and pay only for the milling services, to procuring paddy, milling it, and then packaging and branding the milled rice for sale. Similar processes are happening in Myanmar, where branded local products are increasingly appearing in local retail markets (Euromonitor 2020). Belton and Win (2019) show in the case of oil mills that rural mills focus mostly on custom milling, whereas urban mills, in addition to milling the oil, also are involved in value-addition and branding. Increasing urbanization in the country—and demands for choice and quality by richer urban residents—likely is contributing to this change in practices of millers.

Seventh, the increase in consumption of processed products has been linked to the rapid emergence of modern retail in a number of other countries (Demmler, Ecker, and Qaim 2018; Reardon et al. 2021). It is estimated that modern retail grew by double digits in the decade before the 2020s, albeit from a low base (Euromonitor 2020). The growth of modern retail has been concentrated mainly in urban areas and mostly in Yangon, the largest city, as is the pattern typically seen in the early stages of modern retail rollout (Reardon et al. 2012). In any case, that growth might have been associated with an increase in the sales of processed foods, whether imported or obtained from local firms.

The effect of the crises—the case of rice millers

To illustrate the effect of the crises on food processing, we focus on the rice milling industry, given its pivotal importance for farmers, consumers, and export earnings. In March 2022, millers were asked a series of questions on different forms of disruptions faced in the 30 days prior to the interview. Overall, fuel and electricity were the most common disruptions. About 80 percent of modern larger mills reported high fuel prices and difficulties accessing electricity. Many traditional smaller mills run on diesel generators; nearly 90 percent reported disruptions as a result of high fuel prices. Fuel access was thus a large disruption for both mill size categories.

FIGURE 13.1 Most significant reported business disruption reported by rice millers, by mill size, March 2022



Source: Authors' analysis based on miller survey, March 2022 round.

Modern millers require transportation for both paddy input and milled rice output. Thus, they were severely affected by rising transportation costs (65 percent) and transport restrictions and curfews (35 percent). Among those millers reporting transport disruptions, the most common restrictions were checkpoints (35 percent), the need for special permissions (27 percent), and increased fees (23 percent).

To further evaluate these challenges, millers were asked to identify which group of disruptions they considered the most significant (Figure 13.1). With frequent power outages and rising fuel prices from the start of 2022, electricity and fuel were overwhelmingly the largest disruptions for both mill types, overtaking banking, which dominated throughout 2021. Disruptions related to banking were also still a challenge, particularly for medium and large mills, which conduct more purchases and sales.

The surveys also asked a series of questions on milling operations to understand how rice mills had responded to these challenges. For the 2021/22 monsoon harvest season, millers reported an average total throughput decline of about 15 percent relative to the 2020/21 season (Table 13.3). Throughput in the 30-day periods prior to interviews showed larger declines, perhaps reflecting the acute power challenges mills were facing. Paddy storage had also declined, and these results together suggest a decline in monsoon paddy production. While this is likely the main factor in reduced milling throughput,

TABLE 13.3 Rice mill operations, employment, and credit in March 2022 compared with March 2021

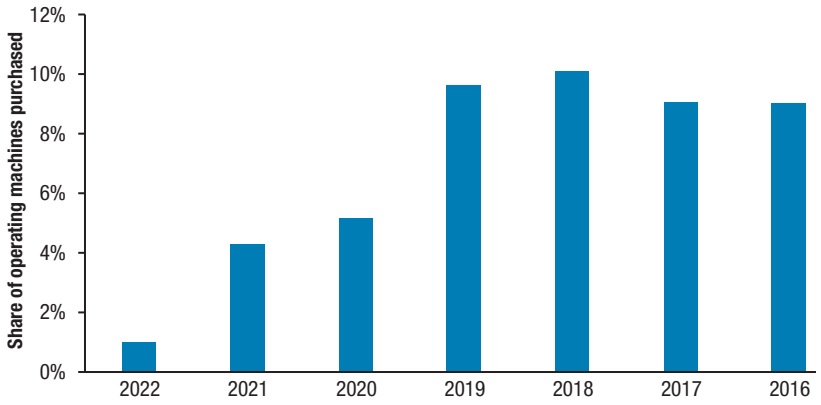
	Small/micro mills			Medium/large mills		
	March 2021	March 2022	% change	March 2021	March 2022	% change
Throughput (average)						
Last 30 days (tons)	39	26	–35%	366	272	–26%
Monsoon harvest season (September–March, tons)	199	166	–16%	1,504	1,275	–15%
Storage (average)						
Paddy (number of bags)	1,246	901	–28%	24,676	20,343	–18%
Rice (number of bags)	58	63	8%	724	717	–1%
Transport (average)						
Cost of diesel (kyat/l)	976	2,186	124%	911	1,843	102%
Employees (average)						
Permanent employees (number)	2.8	2.4	–13%	6	6	0%
Daily workers (number)	2.1	2.1	–2%	20.5	20.5	0%
Daily wage (kyat /day)	6,936	7,021	1%	7,691	7,701	0%
Working capital (average)						
Weekly capital to buy paddy (kyat '00,000)	29	29	–1%	612	556	–9%
Milling commission fees (average)						
Fees for milling 108 lb. bag (kyat)	1,131	1,218	8%	1,207	1,290	7%
Credit lent out						
Share lending out	4%	5%	33%	18%	18%	2%
Conditional average amount (kyat '00,000)	158	120	–25%	834	781	–6%
Credit borrowed in						
Share borrowing	4%	5%	33%	13%	14%	9%
Conditional average amount (kyat '00,000)	235	209	–11%	1,559	1,530	–2%

Source: Miller survey, March 2022 round.

electricity and fuel disruptions likely also contributed to lower operating hours. Average diesel costs more than doubled in 2022. This increased operating costs and widened the price gap between consumers and producers (Chapter 11) (Minten et al. 2023).

The rising fuel costs and declines in throughput contributed to lower mill profits and an average decline in working capital of 9 percent for larger mills. However, employment and credit were mostly stable, particularly for larger

FIGURE 13.2 Purchase year of operating machines owned by modern rice mills



Source: Miller survey, March 2022 round.

mills. Last, banking restrictions meant that millers continued to be heavily reliant on cash. On average, cash transactions accounted for 99 percent of paddy purchases and 69 percent of rice sales. However, in-person bank transfers had risen relative to previous months to 19 percent of rice sale transactions in March 2022, suggesting improvements to bank operations.

The turbulence and uncertainty resulting from the COVID-19 pandemic since 2020, along with the political unrest since early 2021, has led to a clear decline in machinery investments for modern larger mills (Figure 13.2). Data from the mills survey indicate significant problems in the sector during the crises. Changes in the once rapidly expanding and modernizing rice milling sector have stalled, machines are depreciating without replacement, and output is declining. These changes suggest broader changes in the manufacturing sector (World Bank 2022).

To summarize, the milling sector has seen important disruptions but has helped ensure both market access for paddy producers, as paddy rice is the most important crop for farmers in quantity and value terms, and reliable access for consumers to milled rice at competitive prices, even as higher energy and transport costs have widened the price wedge between paddy and milled rice. However, continued declines in new investment in mills will undermine Myanmar's competitiveness in rice markets, with impacts on the welfare of farmers and consumers alike.

International trade

Figure 13.3 shows the value of international trade over the period from 2009 to 2022 for three food categories based on processing: unprocessed and minimally processed, culinary processed, and processed. Panel A illustrates that the value of food imports increased rapidly in nominal US dollars—by 18 percent annually over the decade—leading to a fivefold increase from $732 million in 2009 to $3,419 million in 2019.[3] In 2022, however, it had declined by 16 percent compared with three years earlier and by 29 percent compared with the peak in 2016. On the exports side (panel B), we also note a substantial increase, continuing during the crisis years. The value of overall food exports increased in nominal terms by 10 percent annually, from $1,520 million in 2009 to $3,993 million in 2019, almost a tripling over that period. It has increased further since—the value of exports in 2022 was 22 percent higher than in 2019.

Myanmar participated substantially more in international trade over the period from 2009 to 2019, but food imports increased much more rapidly than exports. In value terms, Myanmar was a net agricultural exporter in 2009 (of $788 million) as well as before the crisis years ($574 million in 2019).[4] However, that situation improved during the crisis years. A substantially larger trade surplus is noted in 2022 than in 2019, at $2,326 million or a tripling of that surplus in only three years. This growth in the agricultural trade surplus was driven by new stringent import restrictions, especially on palm oil, as well as increasing prices in international agricultural commodity markets.

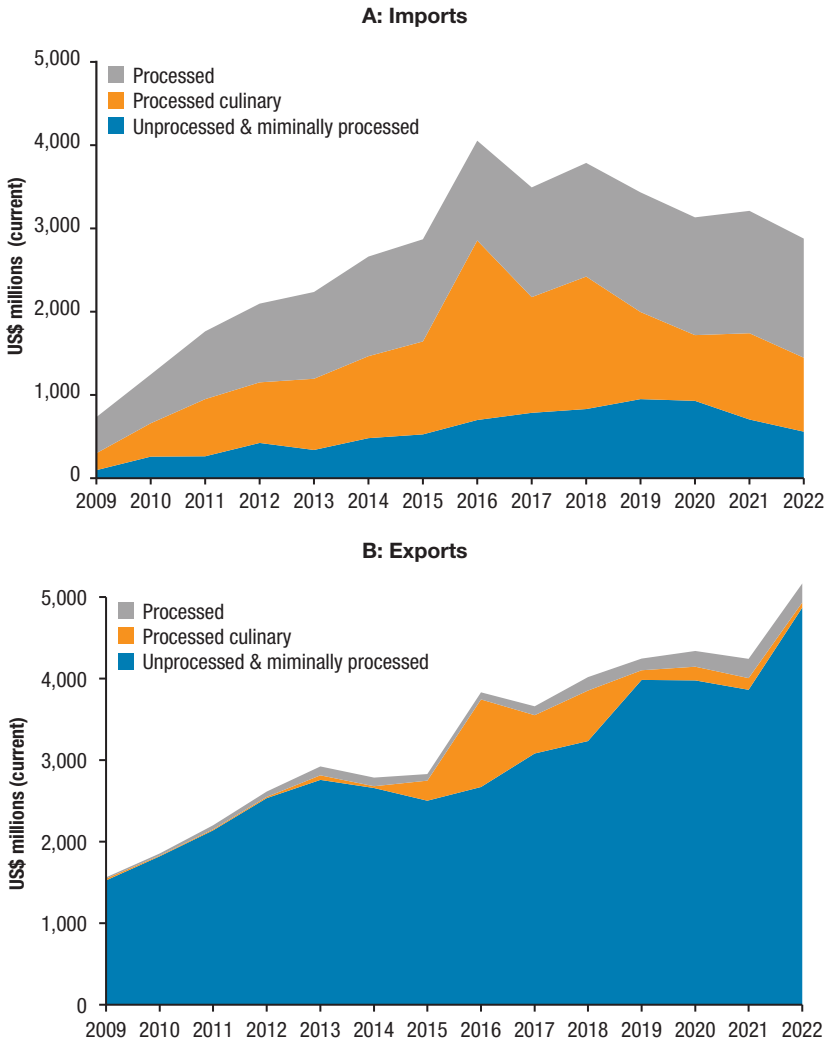
We further see a large difference in the composition of food imports and exports. Within food imports, culinary processed foods (31 percent of value imported in 2022) and processed foods (50 percent in 2022) are the two main categories of food imported. For culinary processed ingredients, palm oil and sugar are the two major imported commodities.[5] The category of unprocessed and minimally processed food imports, making up 19 percent of total food imports, is diverse, with wheat, apples, frozen bovine meat, nuts, and citrus fruit together accounting for half of the food imports in this category. In contrast, unprocessed and minimally processed food products were the major

3 The peak in imports in 2016 in Figure 13.3 is explained by substantially higher imports of sugar in that year.

4 A caveat for the current assessment is that we rely only on official statistics. There is substantial informal trade as well, which does not appear in the official statistics.

5 Together, they accounted for two-thirds of culinary processed food imports in 2019.

FIGURE 13.3 Food trade in Myanmar, by processing level, 2009–2022



Source: Authors' analysis using BACI database (Gaulier and Zignago 2010).

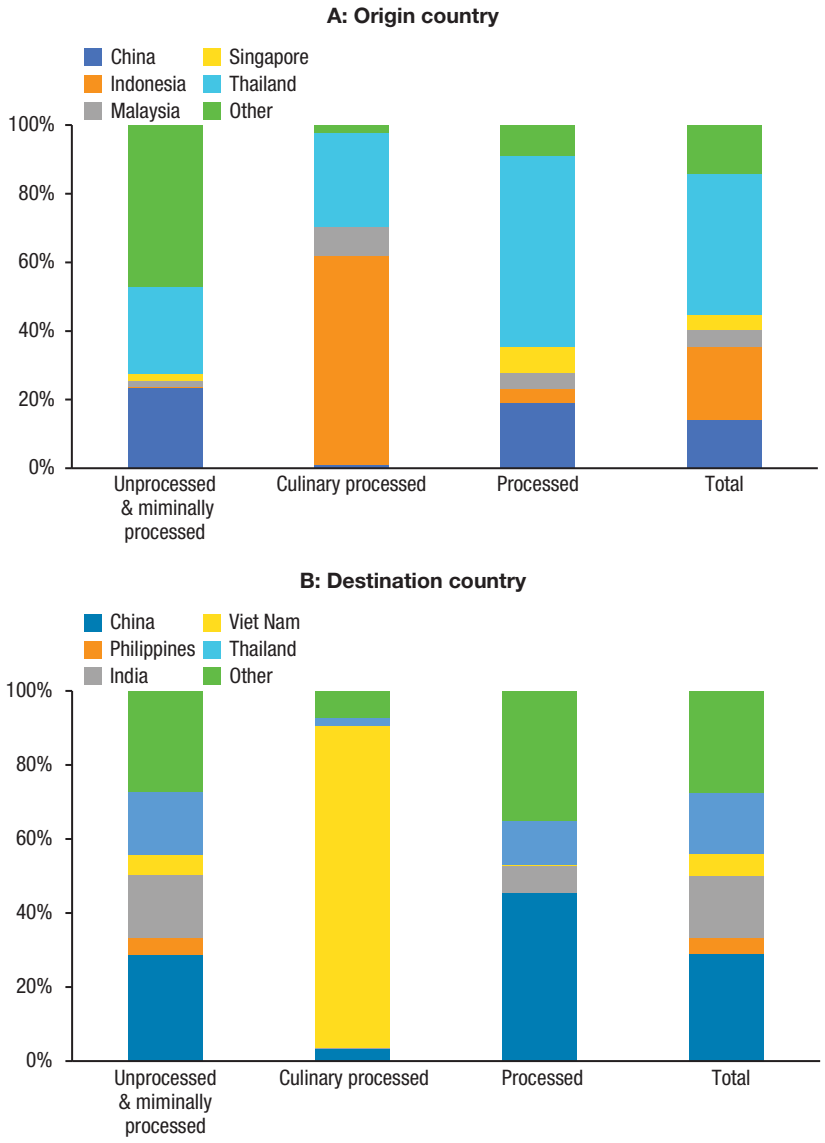
food groups exported between 2009 and 2022, accounting for 94 percent of the value of total food exports in 2022.

Figure 13.4 further presents an assessment of the origin (panel A) and destination (panel B) countries of differently processed items in 2022. The relative shares for the five most important countries that import (panel A) or export (panel B) are shown. On the imports side, Thailand is an important source of processed products. For culinary processed products (palm oil and sugar), Indonesia and Thailand are the two most important countries. The top five countries represent 86 percent of all products imported in Myanmar. On the export side, China is the most important destination country, importing 29 percent of all agricultural exports from Myanmar, in value terms, in 2022. China imports a significant share of unprocessed and minimally processed products, as well as almost all culinary processed products. Thailand comes second, closely followed by India. The top five countries represent 73 percent of the total value of food exports, indicating a slightly lower concentration than for imports.

Finally, we look at the prices—averaged for the period 2009–2022—for different types of processed foods in imports as well as exports (Figure 13.5). Prices are calculated by simply dividing the value of a specific processing category by traded quantities. Within processing categories, we see small differences between prices for imports into and exports from Myanmar. If there are differences, these are driven mostly by different portfolios between exports and imports. However, we note significant price differences between processing categories, with processed products being two to three times more expensive than unprocessed and minimally processed products. This suggests that Myanmar exports mostly cheap unprocessed or minimally processed primary products and imports significantly more expensive processed products.

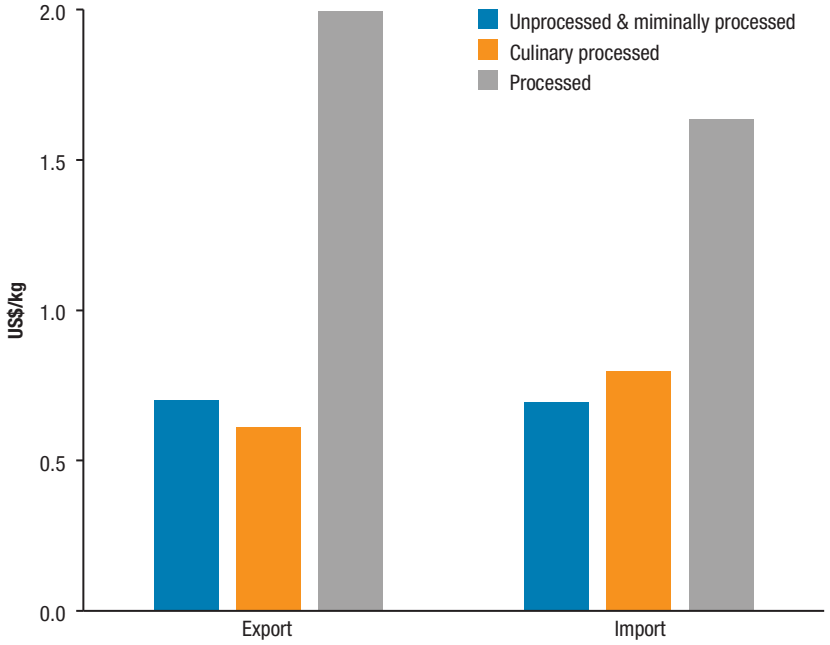
Since the military coup, international trade has altered in important ways. First, the military government abandoned the managed floating exchange rate regime and fixed the exchange rate at an overvalued rate, leading to a growing spread between the parallel and official market rates. Second, international trade is now restricted through a system of requirements on import and export licensing, import bans and quotas, and restrictive currency policies. In 2021, only 35 percent of imported items required trade licenses; this had increased to 81 percent by mid-2022 (World Bank 2022). The capacity to manage these licenses is limited, leading to long delays in obtaining licenses for imports, increasing uncertainty, and price rises for imported products such as processed foods. On the export side, 13 percent of export items were subject to license

FIGURE 13.4 Origins and destinations of food trade in Myanmar, by processing level, 2022



Source: Authors' analysis using BACI database (Gaulier and Zignago 2010).

FIGURE 13.5 Import and export prices, by processing level, average for 2009–2022



Source: Authors' analysis using BACI database (Gaulier and Zignago 2010).
Note: For export levels, 2016 is not included.

requirements in mid-2022, including agricultural products such as beans and pulses, oilseeds, and edible oils.

The vegetable oil market is a good example of the effects of these policies. Over time, the government has attempted through different policy measures to reduce imports of palm oil, the most important imported (culinary processed) food product. The intention is to promote increased consumption of locally produced edible oils, such as groundnut, sunflower, and sesame oils. Prior to 2010, quotas limited palm oil imports to 20,000 tons per month; this restriction was lifted from May 2011 onward. The military government reestablished import restrictions at 50,000 tons per month at the end of 2021, permitting 81 companies to import edible oils.

If there were no trade and market restrictions, the price of palm oil in the local market should be determined by the full cost of imports.[6] To compare

6 This includes insurance, freight charges, prices of imports at the port, tariffs, taxes, transport, handling and marketing, and exchange rate costs.

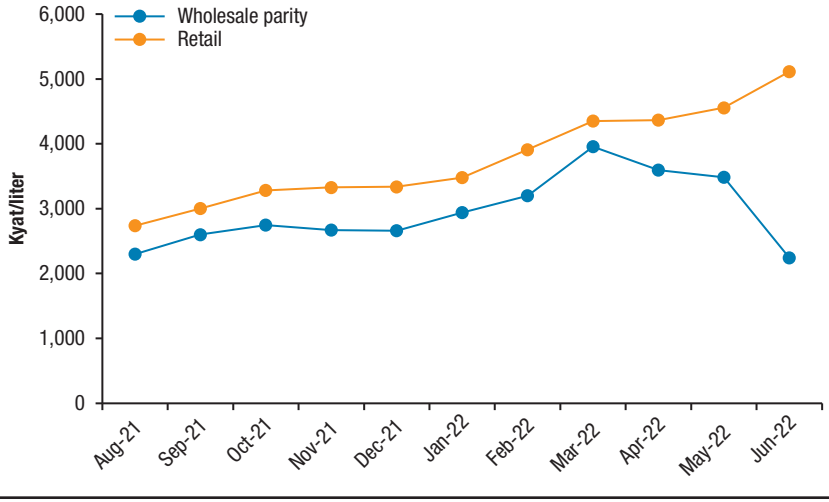
prices of imported palm oil with prices of local palm oil in retail markets, we calculate import parity prices, reflecting the free on board (f.o.b.) price, at the major port in Yangon. We plot monthly these import parity prices against a price series of average national retail prices collected by the World Food Programme (WFP) in a large number of retail markets in the country (Figure 13.6). Using the market exchange rate, we note that margins between palm oil retail prices tracked import parity prices at the wholesale level rather well over most of the period examined. Average markup margins were, on average, 20 percent over the period between August 2021 and April 2022. However, we see an increasing wedge after this period, with retail prices in July 2022 more than double the wholesale parity price, which suggests an increasing "starvation" of palm oil in local markets (Frontier 2022).

On top of higher prices, these trade policy changes have led to an increase in the issues related to the availability of vegetable oils in retail markets. In a survey of local food vendors, almost half of food vendors indicated that vegetable oils were less available in March 2022 compared with the same period a year earlier (MAPSA 2022a). Availability was especially an issue in conflict-affected areas. The situation has further worsened since (Frontier 2022).[7] The situation of palm oil illustrates how the new trade regulations are reshaping agricultural pricing and incentives, with important implications for local food processing, as seen in renewed investments in previously uncompetitive oil mills.

In sum, structural constraints and adverse foreign exchange policies have hampered international trade in processed food products. Myanmar has not been able to diversify away from unprocessed and minimally processed exports as imports of more highly processed food products have increased, steadily narrowing the agrifood trade surplus over time. More recently, foreign exchange policies under the military regime have led to large and unpredictable increases in imported cooking oil prices for consumers. The next section examines the effects of price and income shocks on food consumption patterns in detail.

7 In the middle of August 2022, the Myanmar Edible Oil Dealers' Association distributed palm oil to the public at a price of 5,000 kyat per viss (3,125 kyat/l) across the country. However, quantities sold at this price were limited to 0.5 or 1 viss. The distribution took place through a token system, and it is estimated that people sometimes had to queue for three to four hours to acquire this quantity (BBC 2022).

FIGURE 13.6 Palm oil prices, import wholesale parity and retail, August 2021–July 2022



Source: Authors' analysis using MEODA 2022 (parity prices) and WFP retail prices (HDX 2022).

Food consumption

Descriptive statistics

We obtain a number of stylized facts on food consumption and processing from analysis of the consumption data of the Myanmar Population and Living Conditions Survey (MPLCS) 2015. Table 13.4 presents an overview of the share of the consumption of five categories of foods in consumers' expenditures and calories: unprocessed foods, minimally processed foods, culinary processed foods, processed foods, and alcohol and stimulants. We present alcohols and stimulants separately, given the difficulty involved in assigning them to other categories. In addition, we present the share of food away from home (FAFH) consumption, given the rapid growth of this method of consumption in Asia in recent years (Reardon et al. 2014).

The highest shares of the caloric and monetary values of food consumption are in the category of unprocessed (10 percent of calories; 43 percent of food expenditures) and minimally processed (64 percent; 23 percent) food products (Table 13.4). The importance of the latter category reflects the importance of rice in Myanmar's food economy. Four percent of the food budget goes toward alcohol and stimulants, representing 1.5 percent of calories. Processed foods make up 3 percent of calories consumed but 9 percent of expenditure—3 times

TABLE 13.4 Food consumption, by processing level

	Unprocessed	Minimally processed	Culinary	Processed	Alcohol and stimulants	FAFH	Total
National							
Calories (per adult equivalent)	273	1,724	339	85	41	236	2,698
Share in calories (%)	10.1	63.9	12.6	3.2	1.5	8.7	100.0
Expenditures (kyat per adult equivalent)	494	270	69	105	49	169	1,156
Share in total food expenditures (%)	42.7	23.3	6.0	9.1	4.2	14.6	100.0
Rural versus urban share in total food expenditures (%)							
Rural	42.0	25.7	6.5	9.1	4.3	12.3	100.0
Urban	44.2	18.5	4.9	9.1	4.0	19.4	100.0
By expenditure quintile share in total food expenditures (%)							
Q1 (poorest)	36.5	37.9	7.6	8.0	3.5	6.5	100.0
Q2	40.3	31.2	6.9	8.1	4.2	9.2	100.0
Q3	42.6	25.1	6.4	9.1	4.4	12.3	100.0
Q4	43.8	21.9	6.1	9.3	4.6	14.2	100.0
Q5 (richest)	44.9	15.9	4.8	9.7	4.1	20.7	100.0
By agroecological zone share in total food expenditures (%)							
Delta	45.5	23.2	5.5	10.3	4.0	11.6	100.0
Coastal Zone	43.4	22.9	4.4	10.7	4.4	14.2	100.0
Dry Zone	38.3	24.6	8.5	8.6	3.9	16.0	100.0
Hills and Mountains	43.1	27.3	5.6	7.9	5.6	10.5	100.0
Yangon	44.6	18.3	3.9	8.4	3.7	21.1	100.0

Source: Authors' calculations using MPLCS 2015.
Note: FAFH = food away from home.

as much. The average daily expenditure on any processed foods—combining all types of processing—in 2015 was kyat 444 per day.

As in a number of low- and middle-income countries, Myanmar is beginning to suffer from a double burden of malnutrition, whereby incidences of obesity and overweight exist together with a large prevalence of undernutrition. Obesity and overweight are increasingly becoming a problem in urban areas: an estimated 40 percent of women of reproductive age in urban areas are overweight or obese (WFP 2019). This has been linked partly to the rapid increase in the consumption of unhealthy ultra-processed foods. While the share in consumption of highly processed foods is still relatively low, the

consumption data reflect the situation only in 2015; the noted rapid increase in imports of processed foods generates worries of negative nutritional and health impacts (Baker and Friel 2016; Monteiro et al. 2012; WFP 2019).

Significant differences in the composition of consumption baskets are also seen over consumption expenditure quintiles, as documented in other countries (Bouis 1994; Bouis and Haddad 1992; Pingali 2007; Subramanian and Deaton 1996).[8] When people become richer, they also spend relatively more money on FAFH. This process is happening in Myanmar. The rich spend 21 percent of their food budget on FAFH, while the poorest quintile spend 6 percent.[9] There also is a large difference in the share of consumption baskets made up of FAFH between urban areas (19 percent) and rural areas (12 percent).

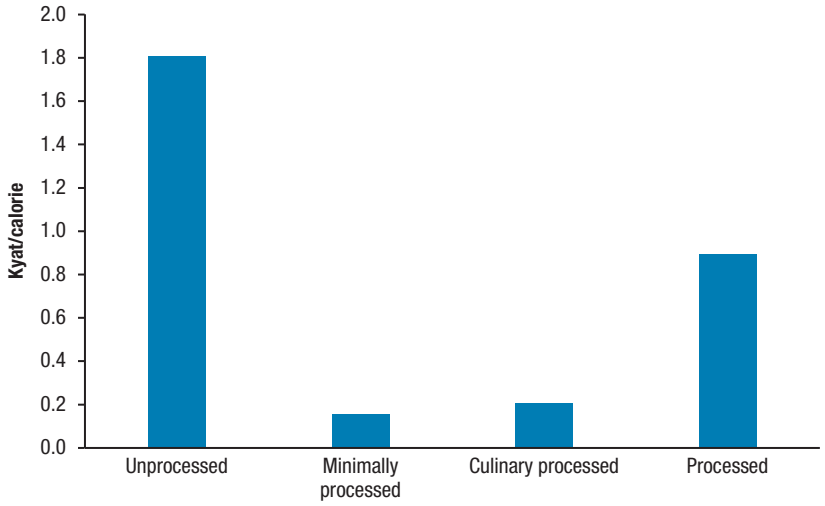
Comparing expenditures and calories allows for the calculation of average calorie prices by processing category. As already illustrated for products that are traded internationally, Figure 13.7 shows large differences between these categories. Unprocessed products are the most expensive. That category reflects the relatively high prices of nutrient-dense (but low-calorie content) foods such as some animal-source foods, fruits, and vegetables. Relatively high prices for these foods have been noted in other countries as well (Headey and Alderman 2019). Prices per calorie for processed foods are found to be about 4 times higher than prices of minimally processed foods (the cheapest of all the categories), which is partly an indication of the economic value added by processing.

Driven by the relatively high prices per calorie in the unprocessed categories (animal-source foods, fruits, and vegetables), the poor consume less of these unprocessed foods compared with the rich. The share of unprocessed products increases from 36 percent to 45 percent between the poorest and the richest quintile (Table 13.4), indicating a 4.4-times increase in absolute expenditure between the poor and the rich. We further find that the rich spend more than the poor on processed foods in absolute terms but the share of total expenditure is similar. The poorest quintile spent 8 percent of their total food

8 Several changes associated with national income growth affect food consumption patterns. These include changes in lifestyle, with more women working outside the home and access to technology, such as refrigerators and microwave ovens, reducing food preparation cost; the development of better packaging technologies; and the entrance of modern marketing channels, including in retail, processing, and food service industries (Reardon et al. 2021).

9 For example, Smith, Dupriez, and Troubat (2014) noted that food eaten away from home had increased from 10 percent to 49 percent of total food expenditures in the United States between 1900 and 2010. Similar rapid changes in consumption of FAFH were seen in a number of quickly transforming economies, including China, India, and Mauritius.

FIGURE 13.7 Prices per calorie for different processing categories



Source: Authors' analysis using MPLCS 2015.

expenditures on the consumption of processed foods. This contrasts with 10 percent for the richest quintile. As the rich spend (3.5 times) more on food, this implies that the richest quintile spends significantly more on processed foods than the poor do. We further see that the share of minimally processed foods decreases over expenditure quintiles, at 38 percent of the food basket of the poor compared with only 16 percent for the rich.

Extrapolating consumption of processed foods based on expenditures reported by households enables us to estimate the size of the processed food sector, incorporating all foods that are categorized as minimally, culinary, or highly processed. Using this definition, processed food consumption was $6.1 billion out of a total of $15.9 billion spent on food in 2015. Of all the agroecological zones, the value is highest for the Dry Zone and the Delta (each counting for $1.8 billion). The urban population consumed 28 percent of the value of all processed products, and the rural population consumed 72 percent. Comparing consumption numbers with imports in 2015 indicates that local food processing accounted for around 82 percent of the consumption of processed foods in the country.[10]

10 Assuming half of the unprocessed and minimally processed food category falls in the minimally processed food category and there is a margin of 20 percent on imported foods.

Food demand assessments

Tables 13.5 and 13.6 show the results of the demand model estimation for Myanmar (MAPSA 2023). In the results presented, income and poverty are proxied by total household consumption expenditure, as is typically done given the problems of correctly measuring income and that expenditures may better reflect the "permanent income" of a household. The QUAIDS model specification further controls for a rural/urban dummy and for household economies of scale. Elasticities are reported at the per capita population mean and are derived for each household individually. They have further been cleaned for extreme outliers.[11]

Table 13.5 shows that expenditure elasticities vary relatively little between different processing categories—that is, at between 0.69 and 0.82 (except for culinary processed foods), indicating that a 10 percent increase in expenditures leads to an approximated increase in consumption for these categories of between 6.9 and 8.2 percent. These estimated elasticities are consistent with the elasticities estimated from a 15-food-group demand system (Chapter 4) and with the results of de Brauw and Herskowitz (2021), who found point elasticity estimates on processed foods in Nigeria that were relatively close to other food categories. In contrast with other food groups, for culinary processed foods, the expenditure elasticity is relatively low (0.19). This group is dominated by the consumption of oil, sugar, and salt, which generally tend to be less income-responsive than other foods.[12]

Table 13.5 also presents elasticities for urban and rural areas by expenditure quintile. The most striking differences in expenditure elasticities are noted by expenditure quintiles. The gradient is especially large for processed foods, where the expenditure elasticity drops from 0.93 for the poorest quintile to 0.61 for the richest quintile in rural and urban areas, and for FAFH, where we see a similar drop for the same quintiles, from 1.06 (1.08) to 0.61 (0.65) in rural (urban) areas. We see that expenditure elasticities are overall slightly

11 Results based on our estimation approach were compared with the results of the standard QUAIDS command for Stata (which does not address the zero-consumption problem). The latter method produced implausible elasticities for the food groups that have a considerable number of households that did not report food group consumption over the recall period. However, the ranking of the elasticities by magnitude is identical, increasing confidence in the approach followed.

12 Moreover, the food group is diverse (oil, sugar, salt)—oil prices differ substantially from sugar and salt prices—and these items are commonly consumed in most households. Hence, there is considerable bunching of different items within this food group. We note that the elasticities for oils/fats and sugars/condiments separately are each higher but still lower than those for all non-rice food groups derived from our 15-food-group system.

TABLE 13.5 Estimates of expenditure elasticities, QUAIDS model

Food group	Mean	Median	Minimum	Maximum	Standard deviation
			Rural		
Unprocessed & minimally processed foods	0.724	0.742	0.460	0.833	0.070
Culinary processed foods	0.150	0.119	–0.086	0.517	0.110
Processed foods	0.805	0.805	0.342	1.180	0.125
Alcohol and stimulants	0.827	0.842	0.469	1.023	0.091
FAFH	0.887	0.881	0.260	1.584	0.194
			Urban		
Unprocessed & minimally processed foods	0.659	0.675	0.455	0.827	0.087
Culinary processed foods	0.139	0.111	–0.127	0.497	0.098
Processed foods	0.741	0.736	0.372	1.144	0.128
Alcohol and stimulants	0.750	0.761	0.480	1.007	0.109
FAFH	0.830	0.822	0.266	1.455	0.194
Consumption expenditure quintiles by rural and urban (mean elasticities)					
			Rural		
	Q1	Q2	Q3	Q4	Q5
Unprocessed & minimally processed foods	0.747	0.728	0.724	0.711	0.659
Culinary processed foods	0.087	0.127	0.195	0.226	0.249
Processed foods	0.927	0.834	0.770	0.699	0.611
Alcohol and stimulants	0.822	0.825	0.839	0.839	0.795
FAFH	1.059	0.936	0.838	0.724	0.609
			Urban		
	Q1	Q2	Q3	Q4	Q5
Unprocessed & minimally processed foods	0.703	0.695	0.676	0.653	0.622
Culinary processed foods	0.083	0.101	0.124	0.156	0.188
Processed foods	0.928	0.854	0.788	0.718	0.615
Alcohol and stimulants	0.758	0.771	0.763	0.748	0.730
FAFH	1.085	0.995	0.898	0.802	0.651

Source: Authors' calculations using MPLCS 2015.
Note: QUAIDS = quadratic almost ideal demand system. FAFH = food away from home.

higher for rural areas compared with urban ones, likely because of lower income levels in these areas (MOPF and World Bank 2017).

Table 13.6 shows the estimates of price elasticities. For most food groups, these estimates are close to negative unitary, implying that if prices increased by 1.0 percent, consumption would drop by 1.0 percent. This illustrates the

TABLE 13.6 Estimates of price elasticities, QUAIDS model

Food group	Mean	Median	Minimum	Maximum	Standard deviation
			Rural		
Unprocessed & minimally processed foods	–0.846	–0.854	–0.976	–0.622	0.049
Culinary processed foods	–1.161	–1.159	–1.313	–1.012	0.047
Processed foods	–0.978	–0.982	–1.000	–0.822	0.018
Alcohol and stimulants	–0.974	–0.978	–0.990	–0.813	0.015
FAFH	–1.044	–1.052	–1.101	–0.830	0.031
			Urban		
Unprocessed & minimally processed foods	–0.819	–0.830	–0.973	–0.603	0.065
Culinary processed foods	–1.152	–1.150	–1.300	–1.038	0.046
Processed foods	–0.970	–0.976	–1.000	–0.829	0.025
Alcohol and stimulants	–0.973	–0.977	–0.989	–0.771	0.015
FAFH	–1.026	–1.039	–1.098	–0.754	0.047
Consumption expenditure quintiles by rural and urban (mean elasticities)					
			Rural		
	Q1	Q2	Q3	Q4	Q5
Unprocessed & minimally processed foods	–0.848	–0.846	–0.850	–0.849	–0.822
Culinary processed foods	–1.131	–1.158	–1.180	–1.188	–1.193
Processed foods	–0.980	–0.979	–0.976	–0.976	–0.973
Alcohol and stimulants	–0.978	–0.973	–0.972	–0.971	–0.973
FAFH	–1.048	–1.044	–1.043	–1.041	–1.037
			Urban		
	Q1	Q2	Q3	Q4	Q5
Unprocessed & minimally processed foods	–0.827	–0.828	–0.825	–0.818	–0.810
Culinary processed foods	–1.106	–1.132	–1.149	–1.161	–1.177
Processed foods	–0.972	–0.972	–0.969	–0.970	–0.971
Alcohol and stimulants	–0.974	–0.976	–0.973	–0.973	–0.970
FAFH	–1.041	–1.033	–1.027	–1.022	–1.020

Source: Authors' calculations using MPLCS 2015.
Note: QUAIDS = quadratic almost ideal demand system. FAFH = food away from home.

high importance that consumers in Myanmar attach to prices when making food consumption choices. The highest price elasticities are found in FAFH and culinary processed foods and the lowest for unprocessed foods. Few differences are noted for urban versus rural areas and for the poorest quintile compared with the richest one.

The effect of the crises

We use the expenditure and price elasticities from the previous section to assess the effect of the recent crises on the consumption of different food processing categories.[13] To model the impact of the crises, we need information on income and price changes over the past two years. The crisis generated by the COVID-19 pandemic and the military takeover led to a contraction of the economy and, consequently, household incomes in 2020 and 2021. A World Bank (2021) analysis estimated that the economy in fiscal year 2021 had contracted by 18 percent and that the economy, therefore, would be 30 percent smaller than it would have been in a scenario with no pandemic or military takeover.[14] For 2022, the World Bank estimated that the economy may show 3 percent growth (World Bank 2022).[15]

We have seen large food price changes over the crisis years, especially in 2022 compared with 2021. Table 13.7 presents price changes for a selected number of food products for rural as well as urban areas, based on a food vendor survey fielded regularly between 2020 and 2022. We see that price changes were, on average, higher in urban areas than in rural ones. The cost of an average consumption basket had increased by 1.3 percent in rural areas and 7.2 percent in urban areas in mid-2021 compared with mid-2020. In 2022, these price increases were 54.8 percent and 58.6 percent, respectively. Over the two years, urban prices increased by 70 percent, compared with 57 percent in rural areas. Part of the food inflation was caused by very large increases in the prices of vegetable oils, which rose by more than 200 percent in rural areas. However, rice prices also increased substantially by 43 and 41 percent in urban and rural areas, respectively, between mid-2021 and mid-2022. We use these price changes at the food processing category level based on average changes for the prices of the limited products covered in the survey for each food processing category.[16]

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13 Elasticities were estimated for different product categories using the same methodology as described in Chapter 4. However, in this chapter, they are subsequently used to predict changes in the consumption of different food groups after the crisis. Such predictions were not made in Chapter 4.

14 The World Bank (2022) also showed significant declines in imports and exports in the country in 2021, likely associated with reduced availability of processed products overall.

15 However, given the lack of data, significant uncertainties surround these estimates. Diao and colleagues (2022), for example, estimate a 3.5 percent lower GDP in Myanmar as a result of the impacts of the international crisis linked to the Russia–Ukraine war, which started in February 2022.

16 We use relative food price changes for these food categories (compared with the cost of a food basket) and assume that food price inflation was in line with overall inflation in the country.

TABLE 13.7 Price changes of major food products in 2021 compared with 2020 and 2022 compared with 2021, selected food items, rural and urban

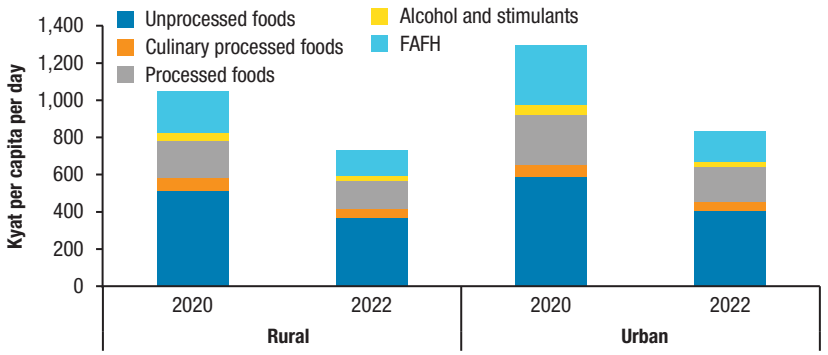
	July 2021 vs. July 2020		August 2022 vs. July 2021	
Food item	Rural	Urban	Rural	Urban
Rice	12.9	14.2	41.0	43.0
Chickpea	19.2	–0.4	71.5	72.1
Potato	1.6	0.6	150.5	137.3
Water leaf	–15.9	15.3	15.5	54.1
Banana	–14.8	12.0	44.4	30.4
Chicken	–4.8	–6.5	29.4	37.5
Fresh fish	–15.9	–13.1	32.0	47.2
Dried sea fish	1.3	12.6	66.7	44.5
Palm oil	75.0	74.9	201.6	177.6
Food basket	1.3	7.2	54.8	58.6

Source: Authors' calculations using MAPSA food vendor surveys.

We model the effects of expenditure and price changes under the scenario for 2022, in which there was positive income growth in line with projections by the World Bank in 2022 (+3 percent), after a dramatic contraction in 2021 (–18 percent). We use the price changes presented in Table 13.7 as indicative of price changes for each food processing category. Because the focus of the exercise is on changes in food consumption caused by the crises, we assume similar consumption levels in 2015 as in 2020. Figure 13.8 presents the results of that simulation for rural and urban areas separately. Base consumption levels in rural and urban areas were 1,050 kyat ($0.84) and 1,293 kyat ($1.04) per capita, respectively.

The results show the large effects of the crises: average real food expenditure levels decreased by 30 percent in rural areas and 36 percent in urban areas. For the different food processing categories, the biggest impacts are seen in FAFH consumption—a decline of 37 and 49 percent in rural and urban areas, respectively. Large reductions are also seen in the consumption of alcohol and stimulants—a decline of 42 and 47 percent in rural and urban areas, respectively. The declines for culinary processed foods are substantially larger in rural areas (36 percent) than in urban areas (27 percent)—partly because of higher price increases and higher own price elasticities for the former—while the opposite is the case for processed products (a decline of 22 percent in rural areas compared with 30 percent in urban areas). Despite the relatively larger impacts of the crises in urban areas, consumption levels in rural areas are, on

FIGURE 13.8 Per capita food consumption for urban and rural areas, by processing category, 2020 and 2022



Source: Authors' analysis using MPLCS 2015.
Note: FAFH = food away from home.

average, still 12 percent below urban ones. The gap was 19 percent before the crises.

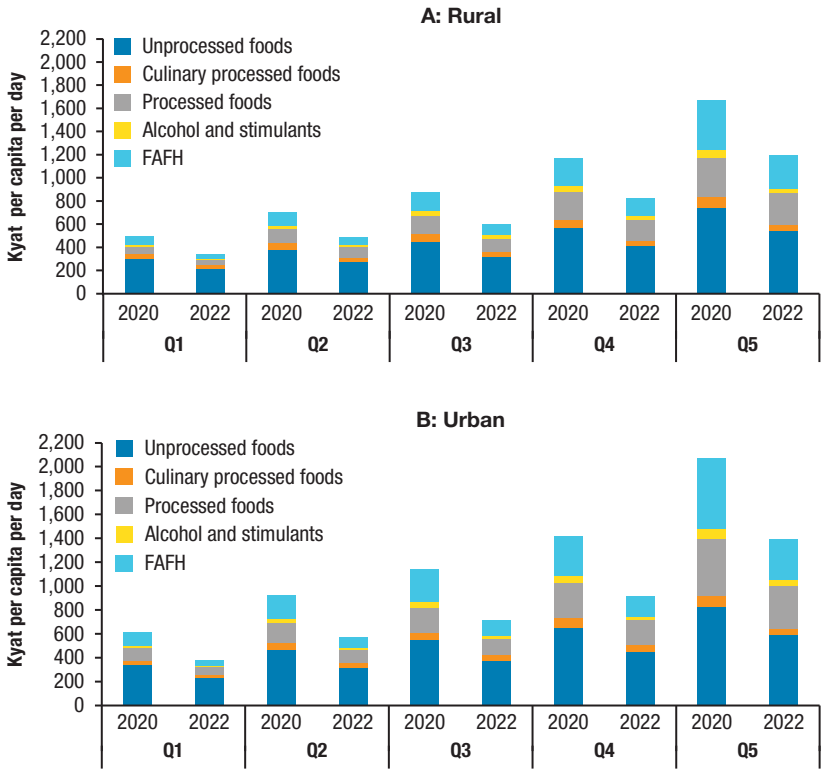
We further assess how urban and rural areas and different poverty quintiles have fared since the triple crisis (Figure 13.9). The poorest quintile saw the biggest declines in consumption, of 31 percent in rural areas and 39 percent in urban areas. This compares with declines for the richest quintile of 29 percent and 33 percent in rural and urban areas, respectively. Despite the bigger decline for the poorest quintile in urban areas, their consumption level after the crises was still 10 percent higher than that of the poorest quintile in rural areas. Within food processing categories, it is noteworthy that FAFH consumption decreased by 60 percent for the poorest urban quintile and is now at almost a similar level to that in rural areas. Processed food consumption also decreased substantially for the poorest urban quintile, but after the crises it was still 36 percent above that of rural areas.

In sum, dramatic increases in food prices over the period from 2020 to 2022, aggravated by lower incomes, forced consumers to reduce food consumption in all categories. The poorest quintiles of consumers have been the most seriously affected.

Conclusions and implications

We assess the status of and changes in the food processing sector by analyzing the production of processed food, international trade in food products, and

FIGURE 13.9 Value of food consumption, by processing category, for urban and rural areas by poverty quintile, 2020 and 2022



Source: Authors' analysis using MPLCS 2015.
Note: FAFH = food away from home.

food consumption by food processing category, and the impact of recent crises (COVID-19, the military coup, and spikes in international commodity prices) on these three segments.

We find that food processing—and especially rice milling—is very important in the country, making up more than 80 percent of the revenue and value addition of the local industrial sector. The value of food imports—dominated by culinary processed foods (oils and sugar) and processed foods—rapidly increased from 2009 to 2019 and then declined over the years of crisis. Agricultural exports increased over the whole period. Exports are, however, dominated by lower-value unprocessed and minimally processed food products: prices of these are half to one-third the price of imported agricultural

products. On the consumption side, we find that the highest share of the value of food and calorie consumption falls in the categories of unprocessed (10 percent of calories; 43 percent of food expenditures) and minimally processed (64 percent; 23 percent) food products. The importance of the latter category reflects the importance of rice in the food economy. There are substantial differences in food composition by income level, with the rich relying more on unprocessed foods, processed products, and especially FAFH than the poor and consuming fewer minimally processed products.

The military takeover and the COVID-19 crises have led to enormous problems related to food demand and the functioning of the food system overall (Boughton et al. 2021; MAPSA 2021a). The growth seen in the food economy and in international food trade has taken a serious hit. Problems with agricultural and business credit, transport, banking, and communications have resulted in substantially reduced agribusiness activities (Boughton et al. 2021; MAPSA 2021b). The impact of the crises is particularly well documented for rice milling—the most important food processing sector—where a consistent drop in business activities compared with normal years has been seen. Meanwhile, import substitution trade policies and foreign exchange control are leading to substantial price increases and lower availability of imported food products, such as palm oil. Food consumption assessments after the triple crisis show a significant decrease in overall food consumption. Moreover, while consumption has declined significantly for all income groups, the rural poor have suffered the most, with food consumption expenditures decreasing by 31 and 39 percent in rural and urban areas, respectively.

The findings of this research have several important implications. First, by focusing more on value addition through investments in processing industries, Myanmar could significantly improve its trade position in agriculture. Current low levels of value-added processing—for example, in pulses and maize—reduce potential earnings from Myanmar's agricultural exports. Emphasis on diversified pulse export markets and an increased focus on value-added processing (noodles, sprouts, flour, dahl, and prepared foods) would improve Myanmar's trade situation, with the added benefit of generating highly nutritious processing residues to meet the country's growing demand for animal feed. Investing in the processing industry would also allow for improved competition with processed food products that are currently imported. Moreover, unprocessed and minimally processed products are not very diverse and have concentrated buyers. This results in potential price volatility for upstream actors, especially producers, which more value addition might counter.

Second, to further stimulate access to rewarding high-value markets for Myanmar, improved incentives through appropriate international trade policies are needed. As the past decade has shown, outward-looking strategies have helped increase international agricultural trade, contributing to an improved situation for its citizens as a result of better incomes for its farmers and more choices for its consumers (World Bank 2021). A more outward trade orientation would bring in new technologies and insights that would significantly help strengthen the export situation as well as local food systems.[17] Investments in trade would, however, best be guided by the comparative advantages of the country and less by import substitution concerns.

Third, it is crucial to create an enabling business environment that will ensure increased investments in the food processing sector, enable better prices for farmers, support more efficient value chains, and provide more choices for consumers. Such an environment would include, among other improvements, predictable policy frameworks; transparent trade rules; secure property rights; low price inflation; access to reliable and affordable communication, electricity, and transport infrastructure; and a well-functioning banking system. These improvements would also attract desired foreign direct investment. More effective incentives to encourage such foreign investment in agricultural trade and processing will help the processing sector achieve the quality and standards required to compete in growing urban and international markets. Investments in more modern local processing plants would be beneficial for farmers, who would obtain higher prices, and consumers, who would have more choices.

ANNEX

List of foods included in different processing categories

NOVA classification category by food processing	Detailed food groups	Food category expenditure share (%)
Unprocessed	Coconut	0.4
	Potatoes	2.4
	Sweet potatoes	0.4

(continued)

17 International trade after the military takeover has been hampered by an implicit export tax resulting from the implementation of a dual exchange rate system (Chapter 14).

ANNEX (continued)

NOVA classification category by food processing	Detailed food groups	Food category expenditure share (%)
	Roots	0.7
	Poultry	15.2
	Pork	9.5
	Beef	4.2
	Other meat	2.2
	Eggs	7.0
	Aquaculture	4.6
	Freshwater capture	9.7
	Sea capture	4.9
	Other fish	0.3
	Dark-green leafy vegetables	4.3
	Other vegetables	19.1
	Fruit	12.5
	Garlic and other fresh seasonings	2.5
	Total	100.0
Minimally processed	Rice (Ngasein)	8.8
	Rice (Emata)	14.6
	Rice (Medone)	2.4
	Rice (Nga kywe)	5.2
	Kaukhnyin (sticky rice)	0.4
	Other rice (local variety)	40.9
	Rice noodles	1.1
	Other cereals	1.2
	Dried pulses	8.6
	Pulse products (tofu, pastes, bean vermicelli)	0.2
	Groundnut	2.1
	Sesame	0.2
	Milk	1.3
	Dried/powdered chili	6.2
	Other seasoning/condiments	1.9
	All other minimally processed foods	5.0
	Total	100.0
Culinarily processed	Oils	86.0
	Sugar and sweets	10.9
	Other seasonings/condiments	3.2
	Total	100.0

(continued)

ANNEX (continued)

NOVA classification category by food processing	Detailed food groups	Food category expenditure share (%)
Processed	Other cereals	1.9
	Pulse products (tofu, pastes, bean vermicelli)	1.1
	Other meat	0.6
	Sea capture	0.4
	Dried medium/large fish	9.7
	Dried small fish/shrimp	2.8
	Fish products	4.8
	Sugar and sweets	5.8
	Other seasonings/condiments	3.5
	Alcoholic beverages	13.7
	All other processed foods	6.7
	Prepared foods eaten at home	5.7
	FAFH	43.4
	Total	100.0

Source: Authors' calculations using MPLCS 2015.
Note: FAFH = food away from home.

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