Chapter 4

DIETARY QUALITY AND NUTRITION: PAST PROGRESS, CURRENT AND FUTURE CHALLENGES

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Prior to the onset of the COVID-19 pandemic in 2020 and the military coup in 2021, Myanmar was experiencing a period of rapid economic growth and transformation in the wake of economic and political liberalization. Between 2005 and 2017, average annual growth in real GDP per capita was 7.8 percent, making Myanmar the fastest growing economy among the Association of Southeast Asian Nations (ASEAN) countries. Strong growth was accompanied by a halving of the national poverty rate between 2005 and 2017 from 48.2 to 24.8 percent (CSO, UNDP, and World Bank 2019).

COVID-19 and the economic and political shocks affecting the country since 2021 have led to an economic contraction: 2021 saw an 18 percent drop in real GDP per capita; in 2022, real GDP per capita was estimated to be 15 percent lower than in 2019 (World Bank 2022). The impacts on poverty were even more dire. A high-frequency panel phone survey of mothers and young children in urban Yangon and the rural Dry Zone revealed incomes collapsing during the COVID-19 lockdowns and further income losses in the wake of the February 2021 military takeover (Headey et al. 2022). Prices rose dramatically, with the consumer price index rising by 20 percent between July 2021 and July 2022 (MOPF 2022), while food prices rose by 34 percent over the same period and by about 50 percent between December 2021 and December 2022 (MAPSA 2023; WFP 2022; 2023). Nationally, a variety of different poverty indicators suggest that between 40 and 50 percent of the population was living in poverty in 2022 (MAPSA 2021; 2022b; World Bank 2022)—poverty rates similar to those found between 2005 and 2010.

This reversal in economic growth and poverty reduction gains, alongside sharp increases in food prices, has profound implications for dietary quality and, hence, malnutrition. The international literature shows strong connections between economic growth and improvements in key nutrition outcome indicators, such as preschooler stunting (Headey 2013; Smith and Haddad

2002), while at the micro level, increases in household wealth remain one of the strongest predictors of stunting reduction over time (Headey, Hoddinott, and Park 2016). Recent research also suggests that economic growth shocks and food inflation are important risk factors for child wasting (Headey and Ruel 2022a; 2022b).

While COVID-19 and the political crisis have precluded the implementation of anthropometric surveys, a deteriorating nutritional situation is to be expected. Dietary quality is strongly associated with household income or wealth. In good times, as incomes rise, smaller shares of household income are spent on food (Engel's law), and diet composition shifts from baskets heavy in starchy staples toward more diverse diets comprising relatively more expensive foods (Bennett's law). Conversely, when incomes decline, dietary diversity also tends to decline. One key explanation is that foods rich in micronutrients and high-quality protein—such as animal-source foods (ASFs), fruits, and vegetables—are typically expensive sources of calories (Headey and Alderman 2019). Thus, poor households concerned about basic hunger (calorie adequacy) tend to consume fewer nutrient-dense foods as their incomes decline. The lack of consumption of nutrient-dense foods results in low intake of micronutrients and high-quality protein and rising deficiencies in key nutrients.

Numerous reports and studies carried out prior to COVID-19 document the poor state of nutrition in Myanmar, including high rates of stunting among preschoolers, overweight/obesity among adult women, and micronutrient deficiencies across a range of demographic groups (Grover et al. 2019; MoHS 2019; MoHS and IFC 2017; MoHS, WHO, and WDF 2015). During the pre-COVID decade of sustained economic growth and development, stunting among preschoolers fell from 35 percent in 2010 to 27 percent in 2018 (MoHS 2019; Grover et al. 2019; MoH and MNPED 2010;). However, around one-quarter of adult women were overweight or obese in 2015, and there was evidence of rising levels of diet-related noncommunicable diseases prior to COVID-19, such as hypertension and type 2 diabetes, particularly in urban areas (Aung, Nguyen, and Sparrow 2018; Grover et al. 2019; MoHS, WHO, and WDF 2015; Ueno et al. 2021). Huge regional disparities in nutrition outcomes and diet quality were also seen. For example, stunting was found to be especially high in remote areas, such as Rakhine and Chin States, where in 2015/16 roughly one in two preschoolers were stunted.

Addressing malnutrition comprehensively, including both undernutrition and overweight/obesity, requires an inclusive, multisectoral, and nutrition-sensitive development strategy. It must be inclusive because poverty is a root cause of poor diets through a sheer inability to afford a healthy diet. This strategy must be multisectoral because malnutrition is caused by both poor diets and a poor health environment, including poor access to health services; poor water, sanitation, and hygiene conditions; and lack of education and caregiver knowledge. And it must be nutrition-sensitive in the sense that traditional approaches to development require new, nutritionally smarter strategies to transform agricultural and food systems as a whole, as well as to appropriately engage health, sanitation, hygiene, family planning, and other nutritionally relevant sectors. Unfortunately, economic, social, and political crises represent a significant barrier to developing and implementing an improved strategy to address malnutrition, and only a resolution to these crises will allow the country to resume meaningful progress.

This chapter applies economic techniques to a wide range of surveys implemented in Myanmar to assess the food and diet situation in the country prior to these crises, before turning to more recent evidence from surveys conducted during and since COVID-19 and the political crisis, including a new nationally representative household survey conducted in 2022. This chapter makes a valuable contribution in that, while there have been many studies on nutrition outcomes in Myanmar and a few small sample surveys on diet quality, there has been little research on diet quality at the national level, and evidence on diet quality during COVID-19 and the political crisis is minimal.

The chapter first documents variations in household dietary quality using past national economic surveys and explores the socioeconomic factors that explain these variations. The following section then presents household food demand estimates to get a sense of food preferences, particularly to gauge household consumption responses to income and price changes. Next, dietary quality in 2020/21 is examined using evidence from the aforementioned panel survey of mothers of young children in Yangon and the rural Dry Zone, as well as a new nationally representative phone survey of some 12,000 households. The chapter concludes with a discussion of the policy priorities to regain progress against malnutrition in both the immediate and the longer term, assuming that resolution of the political crisis can put Myanmar back on a more progressive development path.

Diet quality prior to the current crisis

We use data from two national household surveys with modules designed to capture household food consumption and expenditure. Most of the analysis is based on the 2015 Myanmar Poverty and Living Conditions Survey (MPLCS) (MOPF and World Bank 2017c). We also use the Integrated Household

Living Conditions Assessment (IHLCA) from 2009/10 to explore dietary changes over time (MNPED, UNDP, and Sida 2011).[1]

In both the IHLCA and the MPLCS surveys, households report quantities of foods consumed during specified recall periods together with quantities and values of purchased food items. Methods for constructing quantities of food consumed, unit values, and household total and food consumption expenditure are presented in a technical report (MNPED, UNDP, and Sida 2011). We also calculate food quantities in edible portions, as well as the nutrient content of foods, with results reported on a per adult equivalent basis.[2]

Evolution of household dietary patterns

We begin by exploring the evolution of food consumption by detailed food groupings. Between 2010 and 2015, the incidence of poverty nationally fell from 42.4 to 32.1 percent (MOPF and World Bank 2017b), and real GDP per capita rose an average of 7 percent per year. Real household consumption expenditure rose an average of 3 percent per year. However, it was uneven, with urban household consumption expenditure increasing by 4.1 percent per year compared with only 2.9 percent in rural areas (MOPF and World Bank 2017a). During this time, food expenditure shares decreased considerably by 2.9 percent on average per year—2.5 percent in urban areas and 3.5 percent in rural areas (authors' calculations). This pattern is consistent with Engel's law.

According to Bennett's law (Bennett 1941; 1954), we would also expect a corresponding shift in consumption from energy-dense staple foods to a relatively more expensive and diverse set of foods. We explore this by examining changing dietary energy shares between 2010 and 2015 (Table 4.1). Total

1 An MPLCS poverty report (MOPF and World Bank 2017a) details important differences between the two surveys that could affect comparability, including differences in sampling and survey design as well as seasonality (IHLCA: December 2009/January 2010 and May 2010; MPLCS: January–April 2015). Key differences in the collection of food data include differences in food lists, recall periods for some foods, and methods of collecting information on food consumed away from home (FAFH).

2 Food wastage factors and the energy and nutrient content of foods are obtained from the United States Department of Agriculture food composition table (USDA 2016), supplemented with information from Bangladesh (Shaheen et al. 2013), the Association of Southeast Asian Nations (Institute of Nutrition 2014), Japan (MEXT 2015), West Africa (Stadlmayr et al. 2012), and World Fish for Myanmar (Scott 2019). Wastage factors allow for the conversion of "as purchased" food quantities to edible portions. All food quantities are reported in edible portions. In calculating the nutrient content of foods, we apply USDA (2007) nutrient retention factors for typical cooking techniques in Myanmar. Some results are reported per adult equivalent, which we calculate using an adult equivalency scale derived from the daily age–sex energy needs of individual household members relative to that of a 30-year-old adult woman—2,195 kilocalories—following the methodology described by Waid and colleagues (2017) and outlined for Myanmar in Mahrt et al. (2019).

TABLE 4.1 Evolution of dietary energy percentage shares by detailed food groupings, 2010 and 2015

Food group	Detailed food grouping	National			Urban			Rural		
		2010	2015	Change	2010	2015	Change	2010	2015	Change
Staples	Rice	65.0	57.4	–7.7	57.7	50.9	–6.8	67.6	59.8	–7.8
	Other cereals	1.6	1.1	–0.5	2.4	1.4	–1.0	1.3	1.1	–0.3
	Roots and tubers	0.7	0.9	0.2	0.7	0.9	0.2	0.6	0.9	0.2
	Total staples	67.3	59.4	–7.9	60.8	53.2	–7.6	69.6	61.8	–7.8
Animal-source foods (ASFs)	Fresh milk	0.1	0.1	0.0	0.2	0.3	0.1	0.0	0.0	0.0
	Eggs	0.8	1.0	0.2	1.1	1.4	0.3	0.7	0.8	0.1
	Small fresh fish	0.2	0.3	0.0	0.2	0.3	0.1	0.3	0.3	0.0
	Other fresh fish/seafood	1.1	1.0	0.0	1.4	1.2	–0.1	0.9	0.9	0.0
	Small dried fish/shrimp	0.3	0.3	0.0	0.4	0.3	0.0	0.3	0.3	0.0
	Medium/large dried fish	0.3	0.3	0.0	0.4	0.4	0.0	0.3	0.3	0.0
	Fish/shrimp products	0.4	0.4	0.0	0.3	0.3	0.0	0.4	0.4	0.0
	Poultry	0.8	1.3	0.6	0.9	1.9	1.0	0.7	1.1	0.4
	Other meat	2.8	2.0	–0.8	2.5	2.3	–0.3	2.9	1.9	–1.0
	Total ASFs	6.8	6.7	0.0	7.5	8.4	1.0	6.5	6.1	–0.5
Pulses	Pulses and products	3.7	3.3	–0.3	4.2	3.5	–0.7	3.5	3.3	–0.2
Vegetables	Dark green leafy veg.	0.6	0.3	–0.3	0.6	0.4	-0.2	0.6	0.3	–0.3
	Other vegetables	1.3	1.9	0.6	1.4	2.1	0.6	1.2	1.9	0.6
	Total vegetables	1.9	2.3	0.4	2.0	2.5	0.5	1.9	2.2	0.3
Fruits	Fruits	1.9	1.4	–0.5	2.1	1.9	–0.2	1.8	1.3	-0.6
Fats	Oils	9.3	12.0	2.7	10.9	12.9	2.0	8.7	11.6	2.9
	Nuts and seeds	1.5	1.1	–0.4	1.1	0.8	–0.2	1.6	1.2	–0.4
	Total fats	10.7	13.1	2.3	12.0	13.7	1.7	10.3	12.8	2.5
Other foods	Sugars and sweets	2.1	2.7	0.6	3.0	3.2	0.2	1.8	2.5	0.7
	Seasonings	1.3	1.6	0.3	1.2	1.4	0.2	1.3	1.6	0.3
	Alcoholic beverages	0.4	0.9	0.5	0.3	0.7	0.4	0.4	1.0	0.6
	FAFH	3.8	8.6	4.8	6.7	11.3	4.6	2.8	7.6	4.8
	Total other foods	7.5	13.7	6.2	11.2	16.7	5.4	6.3	12.6	6.4
Kilocalories per adult woman equivalent		2,449	2,442	NA	2,081	2,080	NA	2,578	2,581	NA

Source: Authors' calculations using 2010 IHLCA and 2015 MPLCS.

Note: ASFs = animal-source foods. FAFH = food consumed away from home. NA = not applicable.

energy intake at the national, urban, and rural levels is quite similar between survey years. However, consistent with Bennett's law, energy shares of staple foods at home declined by 11 percent between 2010 and 2015 at the national level, or 7.9 percentage points. One caveat is that we do not know the energy shares from staple foods in food consumed away from home (FAFH), and indeed, declining staple consumption at home was accompanied by increased FAFH consumption, whose share rose by 4.8 percentage points.[3]

In addition, consumption shares of added oils and fats rose by 2.3 percentage points, while discretionary foods (sugars and sweets, condiments, and alcohol) rose by 1.4 percentage points in aggregate. Since much FAFH may be unhealthy, this suggests a nutrition transition toward relatively unhealthy foods, as observed elsewhere in Asia (Pingali and Abraham 2022). Increased shares of added fats in the diet were further driven by the greater availability of cheaper imported oils, particularly palm oil, due to the relaxation of import restrictions in 2011 (Belton and Win 2019) and a general global decline in palm oil prices.

Nationally, the share of dietary energy from nutrient-dense ASFs remained constant between 2010 and 2015, while energy shares increased in urban areas (13 percent) and declined in rural areas (–7 percent). Within ASFs, consumption shifted from pork and beef to eggs and poultry. Nationally, chicken consumption shares increased by 72 percent and more than doubled in urban areas. Increased consumption of chicken and eggs is consistent with the growth of commercial chicken farming during the same period (Belton et al. 2020). Though reported vegetable consumption increased and fruit and pulse consumption declined, seasonality is an important factor in the consumption of some of these foods. Consequently, the different timings of the 2010 and 2015 surveys mean it is imprudent to draw firm conclusions on consumption patterns for seasonal foods.

Household dietary patterns by subnational household groups in 2015

Table 4.2 examines consumption patterns by household consumption expenditure quintiles; Table 4.3 presents the same results by agroecological zone (AEZ) and Yangon. The last column in Table 4.2 shows differences between the richest quintile (Q5) and the poorest quintile (Q1). As expected, energy

3 The IHLCA and MPLCS surveys take quite different approaches to collecting data on food prepared and consumed outside the home. This difference affects the comparability of their results. However, whether either approach has a relatively greater upward or downward bias is unclear.

TABLE 4.2 Dietary energy percentage shares by detailed food groupings and consumption expenditure quintile, 2015

Food group	Detailed food grouping	Q1 (poorest)	Q2	Q3	Q4	Q5 (richest)	Q5–Q1 (gap)
Staples	Rice	67.2	63.1	57.7	52.7	45.9	–21.3
	Other cereals	0.8	0.8	0.9	1.4	1.8	1.0
	Roots and tubers	0.8	0.9	0.9	0.9	1.0	0.2
	Total staples	68.8	64.8	59.6	55.0	48.8	–20.0
Animal-source foods (ASFs)	Fresh milk	0.1	0.0	0.0	0.1	0.3	0.2
	Eggs	0.6	0.9	0.9	1.1	1.3	0.7
	Small fresh fish	0.4	0.3	0.3	0.2	0.2	–0.2
	Other fresh fish/seafood	0.6	0.8	1.0	1.2	1.5	0.9
	Small dried fish/shrimp	0.4	0.3	0.3	0.3	0.4	0.1
	Medium/large dried fish	0.2	0.2	0.4	0.4	0.5	0.3
	Fish/shrimp products	0.3	0.4	0.4	0.4	0.4	0.0
	Poultry	0.6	1.0	1.2	1.7	2.2	1.6
	Other meat	0.9	1.5	2.1	2.2	3.2	2.3
	Total ASFs	4.1	5.4	6.4	7.6	10.0	5.9
Pulses	Pulses and products	3.0	3.2	3.2	3.7	3.5	0.5
Vegetables	Dark green leafy vegetables	0.3	0.3	0.3	0.4	0.4	0.1
	Other vegetables	1.8	1.8	1.9	2.0	2.2	0.3
	Total vegetables	2.1	2.1	2.3	2.4	2.6	0.4
Fruits	Fruits	0.9	1.0	1.3	1.7	2.3	1.4
Fats	Oils	11.3	11.5	12.2	11.9	12.9	1.6
	Nuts and seeds	0.8	1.1	1.1	1.3	1.2	0.5
	Total fats	12.1	12.6	13.4	13.2	14.1	2.0
Other foods	Sugars and sweets	1.4	1.8	2.7	3.6	3.8	2.4
	Seasonings	1.7	1.6	1.5	1.5	1.5	–0.2
	Alcoholic beverages	1.0	0.9	0.8	1.1	0.7	–0.3
	FAFH	4.9	6.6	8.8	10.2	12.6	7.8
	Total other foods	8.9	10.9	13.8	16.4	18.6	9.7
Kilocalories per adult woman equivalent		1,904	2,296	2,483	2,719	2,811	907

Source: Authors' calculations using 2015 MPLCS.

Note: Q1 to Q5 refer to consumption expenditure quintiles estimated using spatially deflated total household consumption expenditure per adult equivalent. FAFH = food consumed away from home.

shares of staple foods decline incrementally as consumption expenditure increases. Households in Q1 derive 67 percent of their total energy from rice, compared with 46 percent in Q5. Richer households make up for this smaller share of starchy staples with higher consumption of nutrient-dense foods—and also unhealthy foods. The poorest quintile derives 4 percent of total energy from ASFs, compared with 10 percent in the richest quintile; 1 percent from fruit, compared with 2 percent; 1 percent from sugary foods, compared with 4 percent; and 5 percent from FAFH, compared with 13 percent. Mahrt and colleagues (2023) find a strong relationship between FAFH and total consumption expenditure—FAFH is estimated to increase by 5 kyat with each 100 kyat increase in daily income (per adult equivalent).

Consumption of most other nonstaple foods and food groupings also increases by quintile, but to a lesser degree. Within ASFs, energy shares from small fresh fish decline with increasing quintiles, whereas small dried fish and fish and shrimp products hold steady. In contrast, all other ASFs increase by two to five times between the poorest and the richest quintiles.

Regionally, staple shares are highest in the Hills and Mountains, Delta, and Coastal AEZs (Table 4.3), consistent with their higher poverty rates (Mahrt et al. 2022; MOPF and World Bank 2017b). Grains other than rice have more importance in the Hills and Mountains, as do roots and tubers (also more important in the Dry Zone). Energy shares from ASFs are lowest in the Hills and Mountains and the Dry Zone (where pulse consumption is relatively high), while fish and seafood are more important in the Delta and Coastal AEZs and Yangon. Energy shares for oils are around 10 percent, which is likely an underestimate given the expected high oil content in FAFH, which is not observable. The widespread use of palm oil likely means oil consumption is a major risk for overweight/obesity and noncommunicable diseases. In contrast, total fruit and vegetable shares across areas are fairly similar but relatively low (3.5–4.1 percent).

Diet composition relative to healthy diet guidelines

Food-based dietary guidelines outline culturally appropriate healthy dietary recommendations with the intent of serving as educational tools and informing national policy. The guidelines are designed to meet an individual's nutrient requirements. The guidelines also consider non-nutrient health properties of foods, such as recommending foods known to reduce risks of noncommunicable diseases. We assess dietary quality by evaluating how closely observed household food consumption adheres to healthy diet recommendations.
The government has developed preliminary food-based dietary guidelines

TABLE 4.3 Dietary energy percentage shares by detailed food groupings and agroecological zone and Yangon, 2015

Food group	Detailed food grouping	Hills and Mountains	Dry Zone	Delta	Coastal Zone	Yangon
Staples	Rice	61.7	53.2	59.7	64.1	51.8
	Other cereals	1.8	1.0	1.0	0.6	1.2
	Roots and tubers	1.2	1.2	0.6	0.8	0.6
	Total staples	64.7	55.4	61.4	65.5	53.6
Animal-source foods (ASFs)	Fresh milk	0.1	0.1	0.1	0.1	0.3
	Eggs	1.0	0.8	0.9	0.7	1.5
	Small fresh fish	0.2	0.2	0.3	0.8	0.3
	Other fresh fish/seafood	0.6	0.5	1.5	1.2	1.6
	Small dried fish/shrimp	0.2	0.3	0.3	0.9	0.3
	Medium/large dried fish	0.2	0.2	0.4	0.4	0.4
	Fish/shrimp products	0.2	0.3	0.5	0.3	0.4
	Poultry	1.2	0.9	1.4	1.0	2.3
	Other meat	2.2	2.0	1.9	1.5	2.3
	Total ASFs	5.9	5.2	7.3	6.9	9.3
Pulses	Pulses and products	3.5	4.7	2.8	1.0	2.8
Vegetables	Dark green leafy veg.	0.3	0.4	0.3	0.3	0.4
	Other vegetables	2.1	2.1	1.7	2.2	1.8
	Total vegetables	2.3	2.5	2.0	2.5	2.2
Fruits	Fruits	1.4	1.4	1.4	1.2	1.9
Fats	Oils	9.6	15.1	11.1	8.2	12.3
	Nuts and seeds	1.0	1.6	1.0	1.2	0.5
	Total fats	10.6	16.7	12.1	9.4	12.8
Other foods	Sugars and sweets	2.5	2.2	3.1	2.6	3.2
	Seasonings	1.3	1.4	1.9	1.7	1.6
	Alcoholic beverages	1.1	0.9	0.8	1.1	0.8
	FAFH	6.6	9.7	7.2	8.2	11.9
	Total other foods	11.5	14.0	13.0	13.5	17.4
Kilocalories per adult woman equivalent		2,235	2,500	2,672	2,465	2,123

Source: Authors' calculations using 2015 MPLCS.

Note: FAFH = food consumed away from home.

for the general population that include six healthy food groups—starchy staples; vegetables; fruits; dairy; meat, fish, eggs, and legumes; and nuts and oils—plus some allowance for sugary foods (MoHS 2016).[4] However, because Myanmar's guidelines do not specify a healthy diet in grams per food group, we adapt the healthy diet guidelines from neighboring Bangladesh, where diets are broadly similar (Nahar et al. 2013) (Table 4.4). One additional adaptation pertains to dairy, which is not often consumed in Myanmar, whereas consumption of calcium-rich small freshwater or marine fish is common throughout the country.[5] Therefore, we combine ASFs into a single food group rather than having a separate dairy group, which is consistent with the approach taken by Myanmar's guidelines for pregnant and lactating women (Zaw, Thar, and Lee 2022b).

Recommended average quantities applied to a typical Myanmar diet align closely with the energy needs of a reference 30-year adult woman (2,195 kilocalories). Thus, for each food group, we compare daily per adult woman equivalent food group consumption measured in food group equivalent grams[6] with healthy diet average food group quantities. The household is considered deprived in a food group when consumption is less than the healthy diet quantity. However, since the extent of deprivation matters, food group gaps measure the percentage shortfall between consumption and the healthy diet quantity, where the shortfall equals zero in households that consume sufficient quantities.

We begin by comparing the consumption expenditure and energy composition of average household consumption of healthy diet food groups with

4 The Food and Agriculture Organization of the United Nations (FAO) recently released guidelines for pregnant and lactating women that specify six food groups: staples, pulses/ASFs, fruits, vegetables (with an emphasis on colorful fruits and vegetables), nuts/seeds, and fats (Zaw, Thar, and Lee 2022b). UNICEF has also released guidelines for children ages two to five years (Zaw, Thar, and Lee 2022a); these guidelines disaggregate milk products from the pulses/ASFs group.

5 In a report of a calcium taskforce assembled to assess global calcium deficiencies, Bourassa et al. 2022 present the merits of food-based interventions in populations with low calcium intake, including promoting the consumption of small fish with bones. Hansen et al. (1998) demonstrate that fish consumed with bones provide calcium absorption at levels comparable with calcium in milk. Furthermore, fish species from tropical areas contain higher concentrations of calcium, iron, and zinc relative to cooler areas (Hicks et al. 2019).

6 Serving sizes apply to typical foods within each food group (for example, dried rice, dried pulses, or fresh fish) but are not specified for atypical foods (for example, potatoes, bean curd, or dried fish). We convert atypical food quantities to food group equivalent quantities using the ratio of a reference macronutrient contained in each item to the average macronutrient content among typical foods in the food group (Herforth et al. 2020; Mahrt et al. 2022). This process allows within-food group quantity comparisons and aggregations.

TABLE 4.4 **Bangladesh healthy diet guidelines adapted for Myanmar, daily amounts per person**

Food group	Subfood group	Recommended number of servings			Serving size (grams)	Recommended average quantity (grams)	Reference macronutrient
		Min.	Max.	Avg.			
Starchy staples		9	15	12	30	360	Carbohydrate
Pulses		1	2	1.5	30	45	Protein
Animal-source foods (ASFs)	Meat/fish/eggs	1	4	2.5	40	100	Protein
	Dairy	1	2	1.5	150	225	NA
Vegetables	Dark green leafy veg.	1	2	1.5	100	150	NA
	Other vegetables	2	4	3	100	300	NA
Fruits		1	3	2	100	200	NA
Fats		3	6	4.5	7	30	Fat

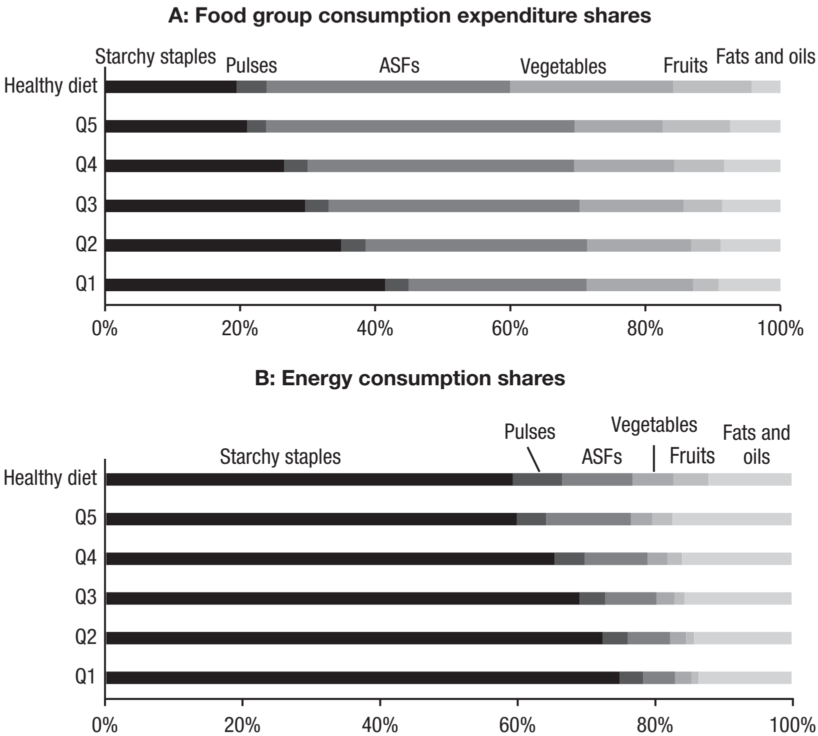
Source: Nahar et al. (2013).

Note: Healthy diet serving sizes and quantities are specified in the key messages and the food pyramid of the guidelines. A food exchange list provides further clarity on serving sizes for pulses and ASFs. Avg. = average. Max. = maximum. Min. = minimum. NA = not applicable.

the composition of the healthy diet guidelines (Figure 4.1),[7] focusing on the expected differences between richer and poorer households. The poorest quintile (Q1) spends 40 percent of its healthy food budget on starchy staples, amounting to 75 percent of its calorie consumption; in contrast, Q5 spends around 20 percent on staples, or 60 percent of its healthy diet calorie consumption. The richest quintile is, therefore, close to the 60 percent starchy staple share recommended in the healthy diet guidelines. However, these better-off households overconsume calories from fats and oils, a notable pattern observed across Asia (Pingali and Abraham 2022). The richest quintile roughly achieves the recommended intake of ASFs but under-consumes fruits, vegetables, and pulses. The gaps for these nutrient-dense foods get progressively larger for poorer household groups, and the poorest quintiles also under-consume ASFs. From the differences in the share sizes between panel A (consumption expenditure) and panel B (calories) in Figure 4.1, one can also infer which foods are calorically expensive—ASFs, fruits, and vegetables

7 We estimate the consumption expenditure and energy composition of the healthy diet guidelines by assigning Myanmar-specific foods to each food group following Mahrt and colleagues (2022). Using the MPLCS food consumption data, Mahrt and colleagues generated healthy diet food baskets aligned with recommended healthy diet food group quantities. Within each food group, foods consumed by poor and near-poor households were weighted according to observed quantities consumed relative to the total food group quantity consumed, measured in food group equivalent grams.

FIGURE 4.1 Food consumption expenditure and energy shares by food group: Actual consumption compared with the healthy diet share, by consumption expenditure quintile

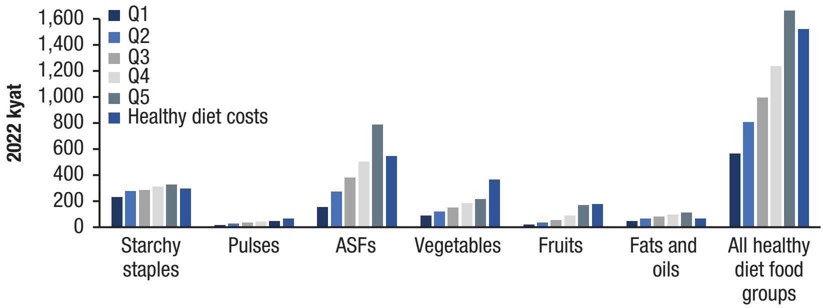


Source: Authors' estimations using 2015 MPLCS and Bangladesh food-based dietary guidelines (Nahar et al. 2013).
Note: Q1 (poorest) to Q5 (wealthiest) refer to consumption expenditure quintiles estimated using spatially deflated total household consumption expenditure per adult equivalent. The figures exclude consumption of food consumed away from home and foods not classified into healthy diet food groups. ASFs = animal-source foods.

are expensive sources of calories. In contrast, oils, fats, and starchy staples are cheap sources of calories but sparser in key nutrients.

Figure 4.2 explores household healthy food group consumption expenditure levels compared with the estimated cost of a recommended healthy diet. Overall, total household expenditure on all healthy food groups is about two-thirds the total cost of acquiring a healthy diet, but only one-third in the poorest households. Households spend about half the healthy diet costs of pulses, vegetables, and fruits, and three-quarters the cost of ASFs. In each food group, expenditure increases by consumption expenditure quintile. The poorest households spend less than one-third of what the richest households allocate

FIGURE 4.2 Healthy diet costs compared with reported expenditure (August 2022 kyat), by food group and consumption expenditure quintile



Source: Authors' estimations using 2015 MPLCS and Bangladesh food-based dietary guidelines (Nahar et al. 2013).

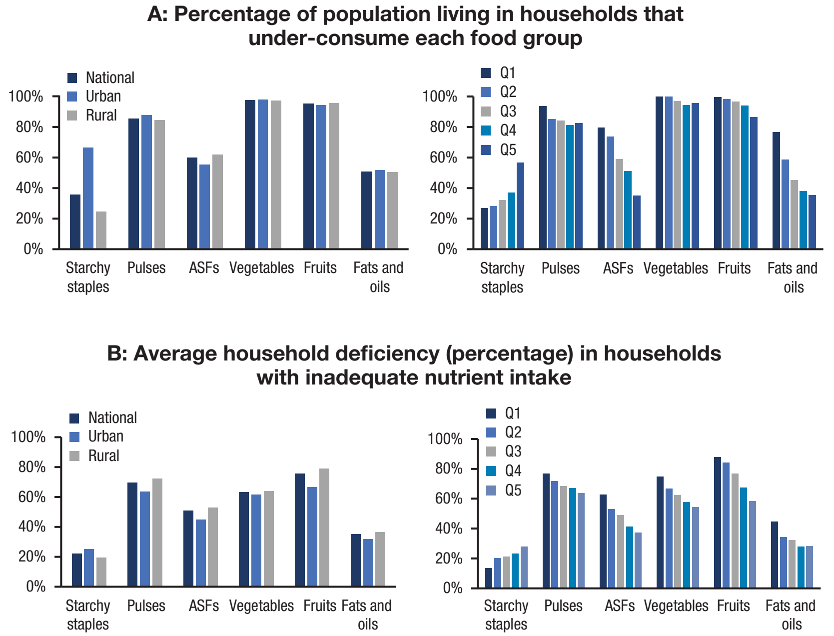
Note: Q1 (poorest) to Q5 (wealthiest) refer to consumption expenditure quintiles estimated using spatially deflated total household consumption expenditure per adult equivalent. The figure excludes expenditure on FAFH and foods not classified into healthy diet food groups. The category "All healthy diet food groups" is the sum of starchy staples, pulses, ASFs, vegetables, fruits, and fats and oils. 2015 kyat are adjusted for inflation based on the official food price index for January 2015 to April 2021 (CSO 2021) and price data collected by IFPRI between May 2021 and August 2022 (MAPSA 2023). ASFs = animal-source foods. FAFH = food consumed away from home.

to healthy food groups in total, with the poorest spending less than one-fifth of what the richest households spend on ASFs and fruits. Even upper quintile households underspend on pulses and vegetables.

Diet shortfalls

Figure 4.3 shows the percentage of the population living in households that consume less than the recommended healthy diet quantity of each food group (panel A) and, for those with insufficient consumption levels, the percentage shortfalls (Panel B). The results are disaggregated by quintile and location. Each panel's final set of columns measures mean shortfalls across nutrient-dense food groups: ASFs, fruits, vegetables, and pulses. Nationally, nearly everyone lives in households that under-consume vegetables and fruits (95 and 97 percent, respectively) by large margins (65 and 75 percent less than recommended). The majority of the population also reports consuming too few pulses (85 percent), ASFs (60 percent), and added fats (51 percent), with shortfalls of 70, 51, and 35 percent, respectively. However, added fat consumption is likely underreported, as the survey design does not include many processed foods or the composition of FAFH, which is often high in fat. Percentage shortfalls in nonstaple food groups are 5 to 10 points smaller in urban areas

FIGURE 4.3 Food group consumption shortfalls, by urban and rural areas and consumption expenditure quintile



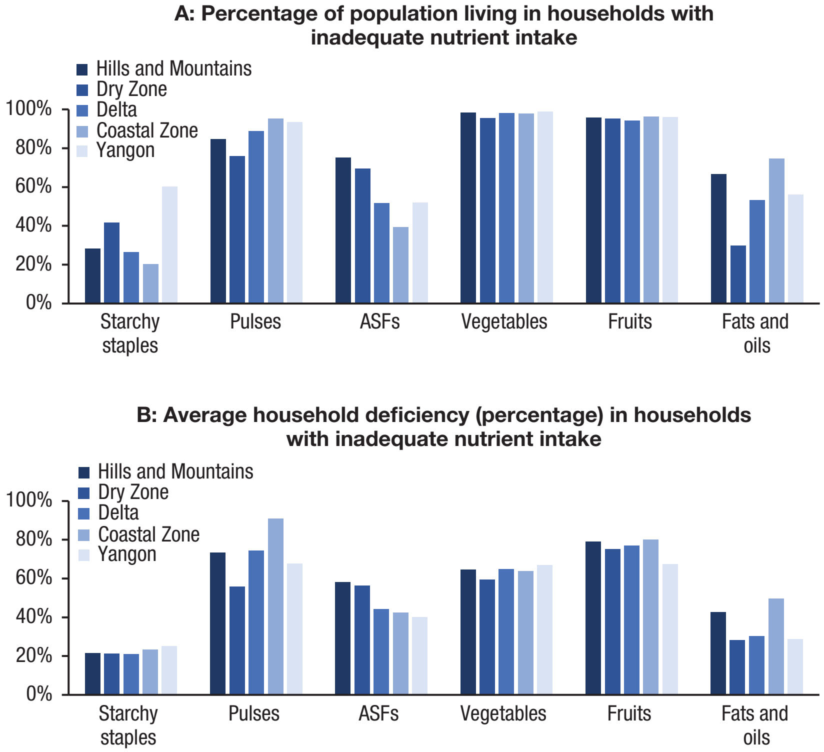
Source: Authors' estimations using 2015 MPLCS and Bangladesh food-based dietary guidelines (Nahar et al. 2013).

Note: Based on household consumption in daily food group equivalent grams per adult woman equivalent relative to total daily grams per food group in the healthy diet guidelines (see Table 4.4). Q1 (poorest) to Q5 (wealthiest) refer to consumption expenditure quintiles estimated using spatially deflated total household consumption expenditure per adult equivalent. ASFs = animal-source foods.

compared with rural areas, which are poorer on average. Both deprivation rates and percentage shortfalls decline incrementally by quintile in most cases.

Consumption of staple foods follows a different pattern—urban areas and better-off quintiles appear to have greater deprivations in both the share of the population with shortfalls and the percentage shortfall. However, the lower reported staple consumption in urban and higher-quintile households is likely related in part to the survey not adequately capturing processed foods and the composition of FAFH. Although there is no way to verify this with the data, urban and better-off individuals tend to be more time-constrained, that is, higher opportunity cost of time, and less income-constrained, making processed foods and FAFH more attractive. More research on these issues is needed in Myanmar.

FIGURE 4.4 Food group consumption shortfalls, by agroecological zone and Yangon



Source: Authors' estimations using 2015 MPLCS and Bangladesh food-based dietary guidelines (Nahar et al. 2013).
Note: Based on household consumption in daily food group equivalent grams per adult woman equivalent relative to total daily grams per food group in the healthy diet guidelines (see Table 4.4). ASFs = animal-source foods.

Figure 4.4 reports shortfalls by AEZ and Yangon separately. The share of the population living in households that under-consume ASFs is considerably higher in the Hills and Mountains and the Dry Zone. The percentage shortfall is also higher in the Hills and Mountains and the Dry Zone than the other AEZs. However, households in the Dry Zone face lower deprivations in pulse consumption.

Nutrient shortfalls

As noted, recommended healthy diets are intended to specify diets consistent with good health in both nutrient intake and other food properties. In addition to assessing food group-level consumption relative to healthy diet guidelines, we directly evaluate intake of 14 nutrients relative to estimated average requirements (EARs) specified in Allen, Carriquiry, and Murphy (2020).[8] For each nutrient, we compare the nutrient content of daily total household consumption, adjusted for typical food preparation methods (USDA 2007), to the sum of the age- and sex-specific EARs across household members. The household is considered deprived in the nutrient if the total adjusted household quantity is less than the household-specific total EAR, and the nutrient gap is measured as the percentage shortfall, where the shortfall equals zero in households that consume sufficient quantities. We again emphasize the important caveat that this analysis excludes FAFH. Another limitation is that we do not observe individual-level consumption or factor in intrahousehold inequalities in consumption, another key area for future research.

Figure 4.5 presents the percentage of the population living in households that consume less than the household-specific EAR of each nutrient (panel A) and, for those with insufficient consumption levels, the percentage shortfalls (panel B). We also present the mean nutrient shortfall facing households with any shortfall. Nationally, 3 percent of the population live in households that consume inadequate levels of protein, and 1 percent consume too little copper. In contrast, more than three-quarters of the population live in households that consume too little riboflavin, calcium, folate, vitamin A, thiamin, and vitamin C. On average, nutrient intake levels are 36 percent less than the household-specific EAR. For most nutrients, shortfalls decline incrementally as consumption expenditure quintiles increase. However, it is striking that there are still sizable shortfalls for households in the richest quintile.

Figure 4.6 presents results by AEZ and Yangon (see Mahrt et al. 2023 for urban and rural results). Regional differences are nuanced and vary by nutrient. One unusual feature in Myanmar is that micronutrient deficiencies are often quite high in Yangon. This is also consistent with poor dietary diversity in Yangon observed in different surveys and different demographic groups, including young children (Headey et al. 2022).

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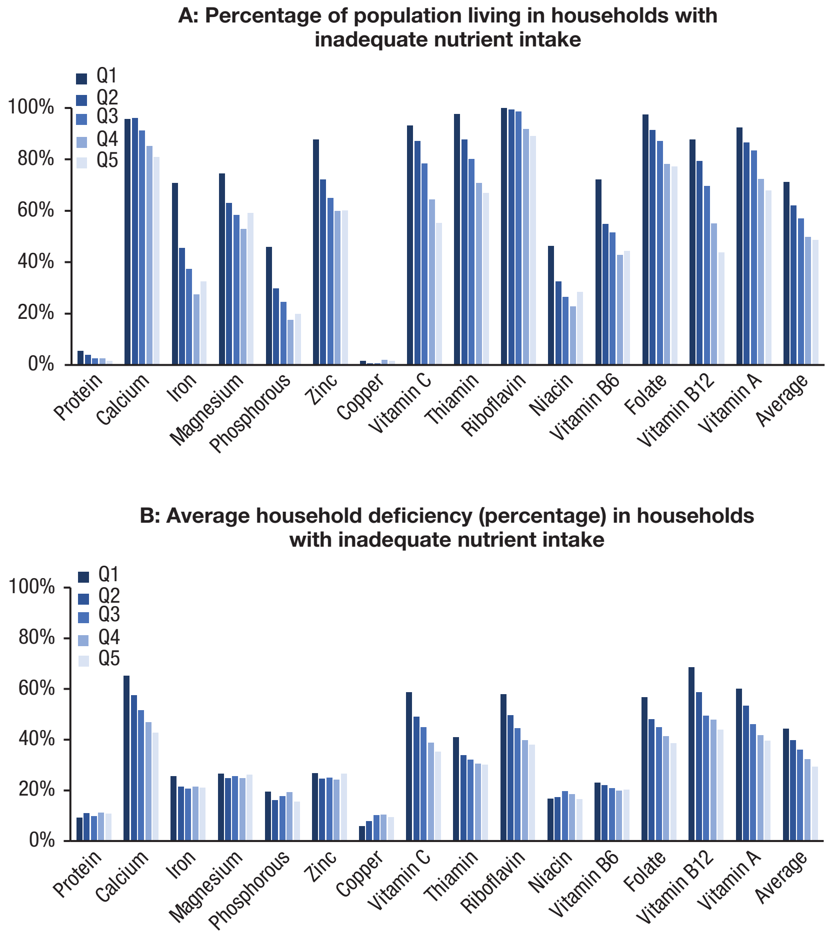
8 EARs are estimates of the nutrient intake that satisfies the nutrient needs of half the healthy individuals in a specified age and sex group (Otten, Hellwig, and Meyers 2006). The reference population (30-year-old adult women) is the same used in global analyses (FAO et al. 2020; Herforth et al. 2020). The nutrient composition of foods relies on the following assumptions: (1) the protein EAR is calculated based on 0.66 g/kg/day and a median weight for attained height of 49.4 kg, (2) iron takes the assumption of a moderate-absorption diet, (3) zinc takes the assumption of a semi-undefined diet; and (4) foods are prepared using typical cooking methods.

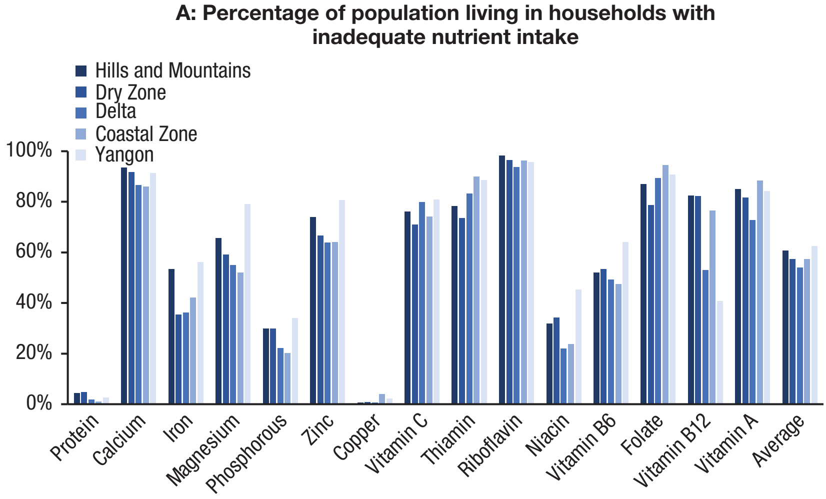
FIGURE 4.5 Nutrient intake shortfalls, by consumption expenditure quintile

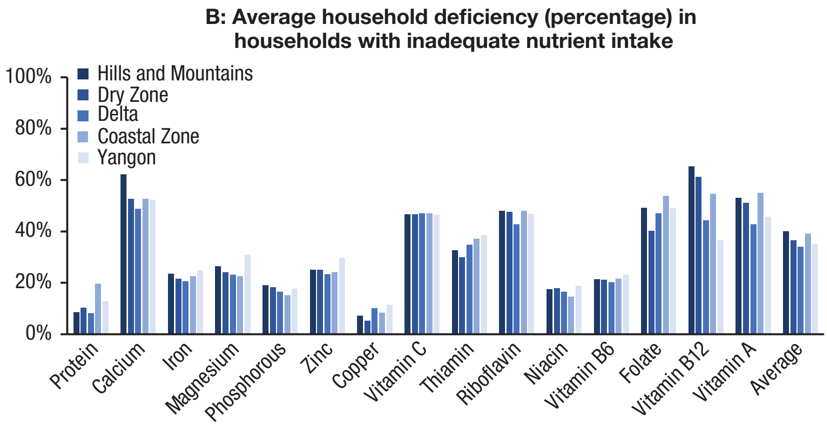


Source: Authors' estimations using 2015 MPLCS, estimated average requirements (EARs) from Allen, Carriquiry, and Murphy (2020); various food composition tables (Institute of Nutrition 2014; MEXT 2015; Shaheen et al. 2013; Stadlmayr et al. 2012; Scott 2019; USDA 2016); and food retention factors (USDA 2007).

Note: Q1 (poorest) to Q5 (wealthiest) refer to consumption expenditure quintiles estimated using spatially deflated total household consumption expenditure per adult equivalent.

FIGURE 4.6 Nutrient intake shortfalls, by agroecological zone and Yangon





Source: Authors' estimations using 2015 MPLCS, estimated average requirements (EARs) from Allen, Carriquiry, and Murphy (2020); various food composition tables (Institute of Nutrition 2014; MEXT 2015; Scott 2019; Shaheen et al. 2013; Stadlmayr et al. 2012; USDA 2016); and food retention factors (USDA 2007).

Note: Q1 to Q5 refer to consumption expenditure quintiles estimated using spatially deflated total household consumption expenditure per adult equivalent.

Healthy diet deprivation index

While examining the incidence and extent of diet deprivation by food group and nutrient is useful, it may be difficult to get a clear picture of how overall diet quality compares across subnational regions or household groups. Existing dietary diversity measures—such as maternal, child, and household dietary scores—have the major limitation that they do not measure the extent of deprivation of any specific food group, being based on simple yes/no consumption measures.

To facilitate more holistic comparisons of diet quality that capture the quantitative extent of deprivation, we generate a multidimensional diet deprivation index that aggregates the healthy food group deprivations described above. The healthy diet deprivation index is an application of the Reference Diet Deprivation index developed by Pauw and colleagues (2023), which follows the Alkire and Foster (2011) methodology used to define the multidimensional poverty index. Pauw and colleagues developed the index in the context of food group deprivations relative to a reference diet.

The index captures three aspects of multidimensional diet deprivation: incidence, intensity, and depth. Incidence of multidimensional healthy diet deprivation (H) measures the share of the population living in households that consume insufficient quantities in at least *k* food groups relative to the recommended healthy diet quantities.[9] We consider a deprivation in any food group as unacceptable and set *k* equal to one dimension. In other words, panel A in Figure 4.3 and Figure 4.4 measures the incidence of deprivations in each food group. In contrast, H measures whether a household has a deprivation in any food group. However, H does not increase as the number of deprivations increases (intensity) or as the extent of deprivations increases (depth). Therefore, H provides a limited perspective on diet deprivations. Thus, the second aspect of multidimensional diet deprivation, intensity of deprivation (A), measures the share of food groups with deprivations in deprived households. Finally, depth of deprivation (G) captures average consumption shortfalls across deprived food groups, where the shortfall is measured as the percentage difference between food group consumption and the recommended healthy diet quantity.

The multidimensional deprivation index is the product of H, A, and G, so it jointly reflects the incidence (H), intensity (A), and depth (G) of diet deprivations. Table 4.5 presents the healthy diet deprivation index.[10] Households are considered healthy diet deprived if they do not consume adequate

9 The Alkire Foster multidimensional index and the Reference Diet Deprivation index allow each dimension to be assigned weights that sum to one across dimensions. Following Pauw et al. (2023), we calculate the healthy diet deprivation index by assigning the same weight to each dimension.

10 For ease of interpretation, we present the index, which falls in the range of 0 to 1, as a percentage of the highest possible deprivation score (1), which is the value in a population that consumes none of the healthy diet food groups.

TABLE 4.5 Healthy diet deprivation index by household group

	Healthy diet deprivation (%)			
Household group	Incidence	Intensity	Depth	Index
National	100	71	59	42
Urban	100	76	52	40
Rural	100	69	62	42
Hills and Mountains	100	75	62	47
Dry Zone	100	68	56	38
Delta	100	69	60	41
Coastal Zone	100	71	67	47
Yangon	100	76	54	41
Q1 (poorest)	100	79	68	54
Q2	100	74	62	46
Q3	100	69	59	40
Q4	100	66	54	35
Q5 (wealthiest)	99	66	50	32

Source: Authors' estimations using 2015 MPLCS and Bangladesh food-based dietary guidelines (Nahar et al. 2013).
Note: Q1 to Q5 refer to consumption expenditure quintiles that are estimated using spatially deflated total household consumption expenditure per adult equivalent. Incidence measures the share of the population living in households with a deprivation in any food group; intensity measures the share of food groups with deprivations, in deprived households; and depth measures average consumption shortfalls across deprived food groups.

quantities of any of the six food groups. This is a strict standard, so nearly all households, even in the highest quintiles, are deemed deprived.

The intensity of healthy diet deprivation measures the share of inadequately consumed food groups in healthy-diet-deprived households, which is, on average, 4.25 of the 6 food groups (71 percent). Intensity of deprivation is 7 percentage points higher in urban areas than in rural areas. The average depth of healthy diet deprivation is 59 percent; in other words, household consumption in food groups with shortfalls is 59 percent lower than the healthy diet food group quantity. In contrast with intensity, depth of deprivation is 9 percentage points lower in urban areas than in rural areas. That is, households in urban areas are deprived in a larger number of food groups, but on average, these deprivations are smaller than those facing rural households.

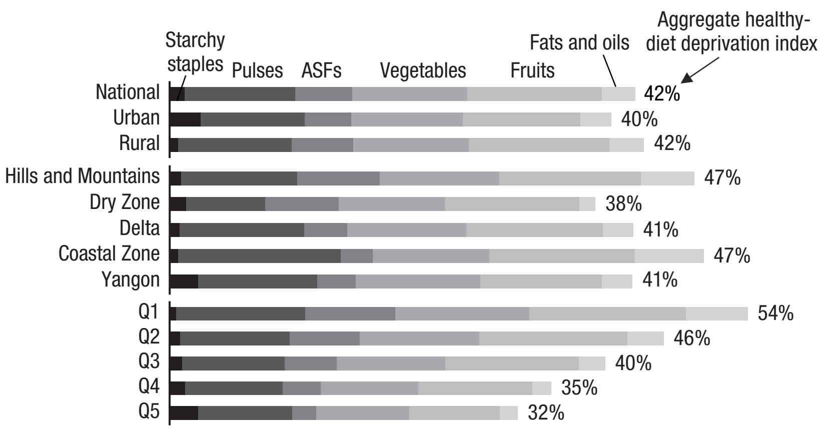
The healthy diet deprivation index, which jointly accounts for the incidence, intensity, and depth of deprivation, is 42 percent nationally. The large differences in intensity and depth between urban and rural areas nearly balance out, with an index of 40 percent in urban and 42 percent in rural areas. This highlights that the deprivation index is useful for ranking diet quality by subnational household group, but the real story lies in the structure of deprivation.

AEZs also experience different structures of deprivation, as seen in various combinations of intensity and depth of healthy diet deprivation—specifically, Coastal Zone: moderate intensity, high depth; Hills and Mountains: high intensity and depth; Yangon: high intensity, low depth; Delta: moderate intensity and depth; and Dry Zone: low intensity and depth. Intensity, depth, and the healthy diet deprivation index are highest in households in the poorest quintile and decline as consumption expenditures increase.

Intensity and depth of deprivation are important in understanding the deprivation index in subnational household groups, as seen in urban and rural areas and AEZs. The contribution of each food group to the healthy diet deprivation index is also useful in understanding differences in subnational deprivations (Figure 4.7). Pulses, vegetables, and fruits account for about three-quarters of the deprivation index nationally (78 percent). Food group contributions are quite similar between urban and rural areas, except for fruit, which contributes more to the deprivation index in rural areas. Notably, hardly any healthy diet deprivation can be attributed to starchy staples.

Across AEZs and Yangon, the contribution of ASFs to the deprivation index is largest in the Hills and Mountains and the Dry Zone, while the

FIGURE 4.7 **Absolute food group contributions to the aggregate healthy diet deprivation index**



Source: Authors' estimations using 2015 MPLCS and Bangladesh food-based dietary guidelines (Nahar et al. 2013).

Note: Staples contribute .01 to .03 points to the indexes; values are not displayed. Q1 (poorest) to Q5 (wealthiest) refer to consumption expenditure quintiles estimated using spatially deflated total household consumption expenditure per adult equivalent. ASFs = animal-source foods.

contribution of pulses is lowest in the Dry Zone and highest in the Coastal Zone. Except for staples, the contribution of each food group to the deprivation index declines as consumption expenditure quintiles increase.

Regression analysis on the predictors of dietary deprivation

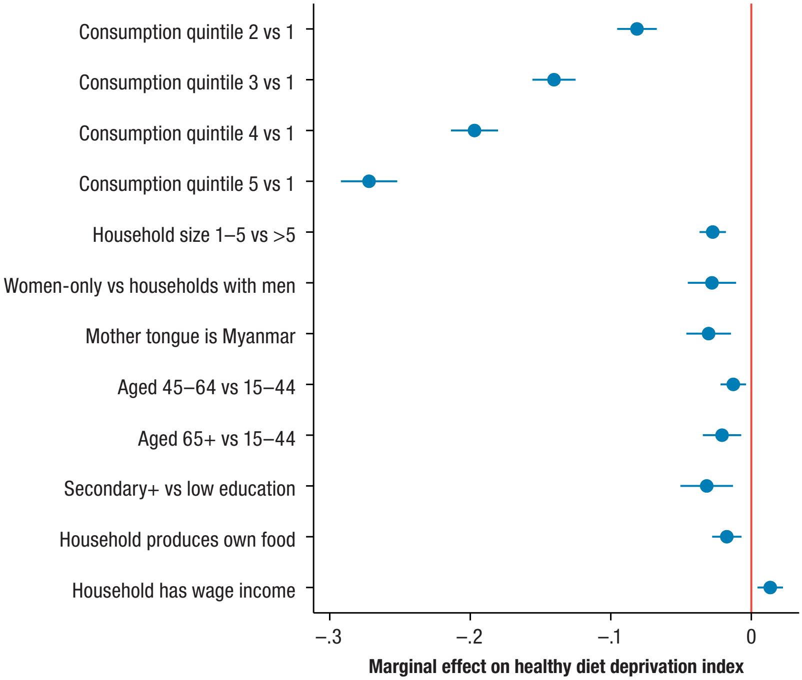
Finally, we use regression analysis to identify household characteristics that explain variation in the healthy diet deprivation index and shortfalls in each food group. As each measure of dietary quality can take values ranging from 0 to 1, we perform fractional logit regressions of dietary quality, interpreting the coefficients in percentage points for ease of understanding.[11] In each regression, we model dietary quality as a function of standard household economic and demographic characteristics known to predict diet quality (in some sense, extensions of Bennett's law): consumption expenditure, asset ownership, sources of income, household composition, household head age, education, and mother tongue. However, since farm households can source food from their own farm as well as markets, the rural regressions additionally control for farm size, use of irrigation, and community distance from a market.

Figure 4.8 displays the marginal effects of key statistically significant explanatory variables (95 percent confidence intervals) on the healthy diet deprivation index. Consumption expenditure—an income proxy—has the most significant association, with the extent of deprivation among the richest households being around 27 percentage points lower than among the poorest households. Having fewer household members, adult women-only households, a head who has completed secondary school, an older head, a head whose first language is Myanmar, and own-produced food consumption each lowers the index by 2 to 3 percentage points, which are small effects relative to consumption expenditure. The index is slightly higher when the household has a wage income (about 1.5 percentage points). Nonfarm business and remittance income were included in the model but had no significant association when other economic controls were included. An exception to this pattern is seen in the urban subsample, for which remittances reduce the risk of dietary deprivation by around 2.3 percentage points (for details, see Mahrt et al. 2023).

Finally, to understand the relationship between household characteristics and the subcomponents of the healthy diet deprivation index, we also ran the model on shortfalls in the pulses, ASFs, vegetables, and fruits food groups

11 Regressions are performed in STATA using the command fracreg logit. To check for robustness, we also implement the same analyses using ordinary least squares and tobit models for food group shortfalls, which are censored at zero. Irrespective of the model, the results are very similar.

FIGURE 4.8 **Marginal effects of key explanatory variables with 95% confidence intervals in regression models exploring associations between the healthy diet deprivation index and household characteristics**



Source: Authors' estimations using 2015 MPLCS and Bangladesh food-based dietary guidelines (Nahar et al. 2013).

Note: Results of fractional logistic models with region fixed effects and standard errors are clustered at the enumeration area level. N = 3,024. Consumption expenditure quintiles are estimated using spatially deflated total household consumption expenditure per adult equivalent.

(for details, see Mahrt et al. 2023). A few interesting differences across food groups are seen.

First, smaller fruit and vegetable shortfalls are associated with owning a vehicle or communication device, smaller and women-only households, education, and own-food production. Lower levels of ASF deprivation are also linked to owning a communication device and education, as well as remittance income and refrigerator ownership, which may indicate some benefits to cold storage (particularly important for milk but also eggs and fresh meat and fish). Households with wage income have higher ASF and vegetable shortfalls.

Second, examination by subcomponents of a healthy diet shows a much stronger deprivation consumption expenditure gradient (negative) for some components than others. For example, the richest households have a 42 and

44 percentage point smaller fruit and ASF shortfall, respectively, than the poorest. In contrast, the Q5–Q1 gaps for pulses and vegetables are 20 and 33 percentage points, respectively. These patterns indicate stronger household preferences for ASFs and fruit compared with other healthy food groups, as we will discuss further in the next section.

Elasticities of food demand

While availability, accessibility, desirability, and convenience all drive food choices, the analyses presented above have highlighted the critical role of affordability in determining dietary quality, which is unsurprising given the country's relatively low levels of development. In this section, we use a standard economic approach to understanding food demand, estimating elasticities of food consumption with respect to real consumption expenditure (an income proxy) and relative food prices. These income and price elasticities can be useful for designing effective policies and programs to improve diets, such as social protection, behavioral change interventions to shift preferences, food taxes and subsidies, and agricultural supply interventions. Income and price elasticities of food demand also indicate how consumers' food choices may respond to real income and food price changes, including longer-term economic growth or contractions and also economic shocks.

We estimated income and price elasticities of food demand using the 2015 MPLCS and methods described in Ecker and Comstock (2021a; 2021b; 2021c).[12] Table 4.6 presents estimated income and own price elasticities of food demand for urban and rural areas in 2015, which measure how much food consumption is expected to change with a 1.0 percent increase in income or prices, respectively. The income elasticity of total food demand suggests that a 10 percent increase in real household income predicts a 5.6 percent increase in total food consumption in urban areas and a 6.3 percent increase in rural areas. The price elasticity estimates of total food demand suggest that a 10 percent increase in food prices decreases total food consumption by, on

12 A two-stage estimation approach is used to estimate household-specific, unconditional income and Marshallian (or uncompensated) price elasticities for 15 food groups as part of a complete food demand system modeling framework. In the first stage, a Working-Leser model (Leser 1963; Working 1943) produces elasticities for total food demand relative to aggregate demand for nonfood consumption. The second stage implements a censored complete food demand system model to estimate income and price elasticities for the 15 food groups. Specifically, the within-food budget allocation is modeled separately using a quadratic almost ideal demand system while allowing for full substitutability between all food groups conditional on the available food budget (Banks, Blundell, and Lewbel 1997; Shonkwiler and Yen 1999). Refer to Ecker and Comstock (2021b) for more methodological details.

TABLE 4.6 Income and own price elasticities of total food demand and major food groups

	Income elasticities				Own price elasticities			
Food group	Urban		Rural		Urban		Rural	
Total food	0.56	***	0.63	***	–0.55	***	–0.60	***
Rice	0.26	***	0.50	***	–0.37	***	–0.67	***
Pulses and nuts	0.62		0.17		–0.54	***	–0.70	***
Starchy roots and tubers	0.55	***	0.75	***	–0.52	***	–0.91	***
Poultry	0.60	***	0.95	***	–1.11	***	–0.88	***
Dairy and eggs	0.55	***	0.83	***	–1.32	***	–1.07	***
Red meat	0.68	***	1.32	***	–0.73	***	–1.48	***
Fresh fish	0.71	***	0.50	***	–0.78	***	–0.83	***
Preserved fish	0.63	***	0.73	**	–0.83	***	–0.85	***
Dark green leafy vegetables	0.54	***	0.71	***	–0.42	***	–0.61	***
Other vegetables	0.62	***	0.76	***	–0.49	***	–0.75	***
Fruits	0.88	***	1.80		–0.65	***	–0.15	
Oils and fats	0.33	***	0.55	***	–0.21	***	–0.44	***

Source: Ecker and Comstock (2021c).

Note: Elasticities are presented for healthy food groups. Total food includes nonhealthy foods, such as sugars, condiments, snacks, and beverages. The need to combine a small number of disparate foods means the results for these other food groups are unreliable and, therefore, not presented. * $p < .10$; ** $p < .05$; *** $p < .01$.

average, 5.5 percent in urban areas and 6.0 percent in rural areas. Thus, rural households' food consumption is more sensitive to income and price changes than that of urban households, which is unsurprising given Engel's law and the lower income levels of rural households.

The results suggest that, as income changes, households make relatively small adjustments to their consumption of rice and oils and fats and large adjustments to their consumption of fruits and ASFs. In rural areas, in addition to rice and oils and fats, adjustments to fresh fish consumption are also expected to be small. In contrast, red meat has an elasticity greater than one in rural areas, meaning that changes in income result in even higher percentage changes in consumption. In addition, poultry has a relatively high elasticity close to one. In urban areas, the elasticities of red meat and fruit are not close to one, but, together with fresh fish, they still have elasticities higher than for other food groups. Dark green leafy vegetables are less income-elastic than fruit and other vegetables, which is unfortunate given their high nutrient density and health benefits

In urban and rural areas, food group-specific price changes result in relatively large changes in consumption of ASFs and, in rural areas, roots and tubers, but small changes in oil and fat consumption. This is relevant given the recent inflation in edible oil prices, suggesting that consumers are likely to cut back relatively little on oils and fats and instead cut back on nutrient-dense foods, such as ASFs. Additionally, the elasticities suggest urban households would not change rice consumption substantially. As with the income elasticity, dark green leafy vegetables are less price-elastic than fruits and other vegetables.

The relatively large (negative) price elasticity of rice in rural areas, which is greater than the overall price elasticity of food in total, could be the result of combining all rice varieties into a single food grouping. If rice were disaggregated, there would likely be varieties that respond little to price changes and others that respond strongly. Another explanation may be that many rural households source rice from their own production, making these estimates somewhat unreliable for the rural sample.

Mahrt and colleagues (2023) present results for each consumption expenditure quintile. In general, income elasticities for different foods tend to decline gradually as households get richer, as one would expect given Engel's law.

Based on patterns of demand observed in 2015, we would expect that, with large reductions in real income coupled with high food inflation, as occurred in 2021 and 2022 with the political instability, the composition of household diets would shift toward greater shares of rice and fat consumption. Rural households and lower income quintiles would likely experience greater pressure on overall diet quality. Consumption of ASFs is particularly vulnerable, though fresh fish consumption in rural areas may be more resilient. Pulses and vegetables, particularly dark green leafy vegetables, have moderate to low income and price elasticities. Consequently, these may prove important sources of micronutrients in times of stress, though in some cases the bioavailability of nutrients from these foods is relatively low.

Table 4.7 presents selected results from a study that uses the same dataset to simulate the dietary impacts of the severe economic shocks of 2021 (Ecker et al. 2023). The table first reports energy and micronutrient consumption gaps for households in the bottom two quintiles at baseline in 2015 (column 1). These are roughly 50 percent for calcium, iron, vitamin A, and folate. With the economic shock of 2021—amounting to a close to 20 percent contraction in GDP at the aggregate level—these gaps increase by 6 to 10 percentage points (column 2). The study then reports the expected impacts of the provision of social protection transfers, all valued at $13/month per household, through three alternative modalities: cash (column 3), plain rice (column 4), and fortified rice (column 5). Strikingly, this cash transfer—which

TABLE 4.7 Nutrient consumption gaps (percentage) among the bottom 40 percent of the expenditure consumption distribution in Myanmar under economic shock simulation scenarios

	(1)	(2)	(3)	(4)	(5)
		Economic shocks with no social protection	Shocks + $13/month worth of social protection		
Characteristic	Baseline (2015)		$13 of cash transfers	$13 of plain rice	$13 of fortified rice
Calories	–4.7	–11.6	–9.3	–7.3	–7.7
Calcium	–52.1	–60.0	–57.6	–57.2	–57.9
Iron	–48.4	–58.7	–55.4	–55.0	–19.5
Vitamin A	–50.8	–61.9	–58.5	–57.9	–13.4
Folate	–55.0	–64.1	–61.4	–60.9	–0.8

Source: Ecker et al. (2023).

Note: The simulation results depict a hypothetical situation for the third quarter of 2021 (July–September), when Myanmar was experiencing the COVID-19 Delta wave and intensifying political instability. Iron consumption gaps assume a moderate absorption diet.

approximates the transfers implemented in 2020 under the democratic regime—has little impact on micronutrient gaps. This is because the gaps are so large at baseline, the transfers are relatively small, and the cash is spent on both nonfood and food items. Transferring plain rice also has little impact—only a modest "real income" effect similar to cash. In contrast, transferring fortified rice has a major impact on closing the gaps for all micronutrients except calcium (rice is not fortified with calcium). The study makes the strong assumption that all fortified rice is consumed—that is, there are no quality, wastage, or consumer preference constraints. Nonetheless, these results suggest much promise for rice fortification in times of crisis.

The impacts of recent economic shocks on diet quality

Results from the previous section are all drawn from household surveys conducted before the severe economic and political crises between 2020 and 2023. As it was not possible in this context to implement in-person surveys—with detailed consumption expenditure modules—we instead analyze data from various phone surveys conducted by IFPRI in recent years. We first report trends in the cost of healthy diets from a food vendor survey conducted regularly in several hundred communities between 2020 and 2023 (MAPSA 2023). Second, we report maternal and child dietary diversity results from the rural Dry Zone subsample of the Rural-Urban Food Security

Survey (RUFSS), a 10-round panel of mothers of young children (Headey et al. 2022).[13] Third, we report trends in dietary diversity for men, women, and young children for the first three quarters of 2022 using the nationally representative Myanmar Household Welfare Survey (MHWS) (MAPSA 2022a).

Trends in the cost of healthy diets over 2020–2023

While the COVID-19 pandemic and the military takeover both resulted in rising poverty rates, there was initially relatively little change in food prices because of the resilience of the agriculture sector and because supply restrictions were offset by lower food demand. However, in late 2021, international food, fuel, and fertilizer prices began increasing, including prices of palm oil, which is an important imported food. To track food inflation through a nutritional lens, we follow Mahrt and colleagues (2022) and MAPSA (2023) in measuring the cost of a healthy diet food basket aligned with food-based dietary guidelines adapted for Myanmar, using a food vendor survey implemented 14 times between June/July 2020 and February 2023 (MAPSA 2023).[14] Figure 4.9 shows that the costs of a healthy diet rose by just 6 percent between June/July 2020 and February 2022 but skyrocketed by 63 percent between February 2022 and 2023. A decomposition of the inflation of the healthy diet food basket between February 2022 and 2023 shows that inflation in ASFs had the largest impact on healthy diet costs (37 percent of the total), followed by that in vegetables (26 percent) and starchy staples (23 percent), with pulses, fruits, and oils seeing small price increases.

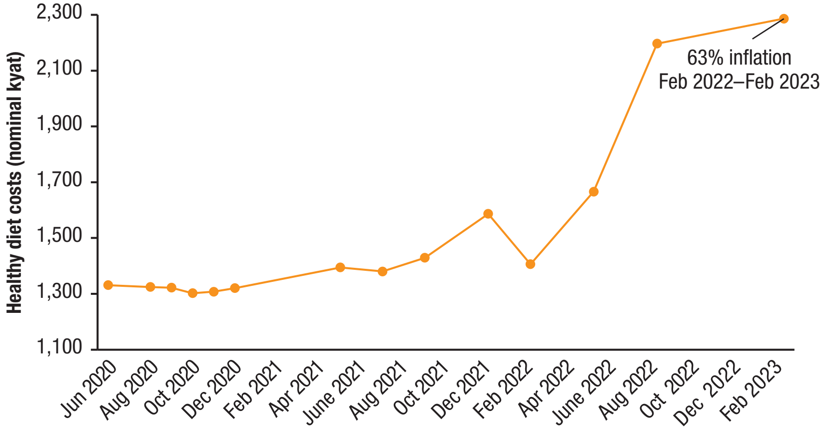
Dietary diversity trends of mothers and young children in the rural Dry Zone in 2020 and 2021

Figure 4.10 examines trends in inadequate maternal dietary diversity—fewer than 5 of 10 food groups were consumed in the previous 24 hours—for the rural Dry Zone from the RUFSS subsample. The figure indicates seasonality

13 We do not report results for the urban subsample of RUFSS because that sample was derived from mothers who were pregnant in early 2020. We found that mothers who had just given birth abstained from eating a number of foods, making an analysis of trends in their diets complicated from the standpoint of inferring impacts from the COVID-19 economic shock. Likewise, children in the urban sample of RUFSS were very young, so they were reported in several RUFSS rounds to have been given only breast milk.

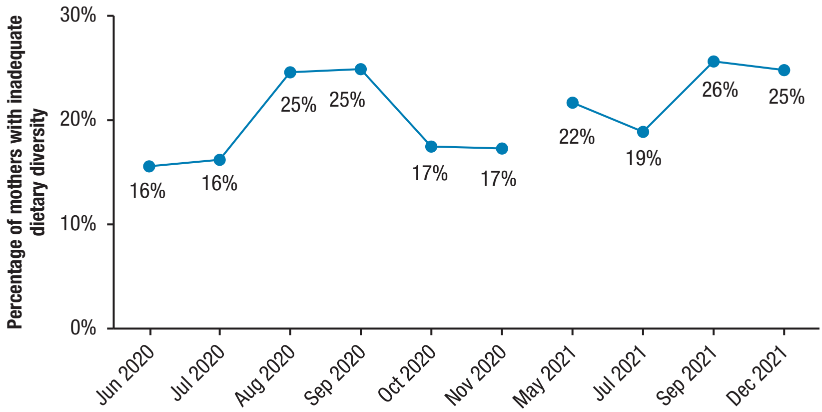
14 The surveys collect data on the cheapest commonly consumed varieties of rice, potatoes, pulses, bananas, dark green leafy vegetables, onions, chicken, fresh and dried fish, and oil. The cost of each item equals its price times the recommended food group quantity in Table 4.4, and each food group cost equals the average item cost, weighted according to within-food group consumption shares obtained from the 2015 MPLCS.

FIGURE 4.9 Changing costs of a healthy diet, June 2020–February 2023, nominal kyat



Source: Authors' calculations using food vendor surveys (MAPSA 2023).

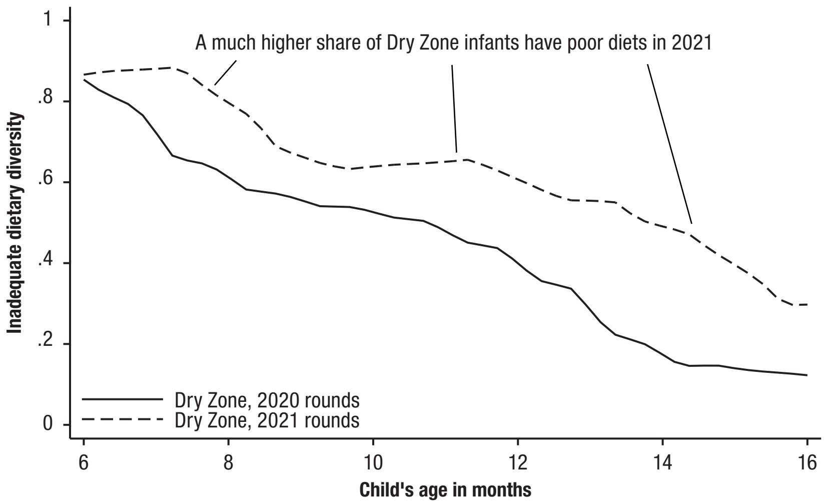
FIGURE 4.10 Trends in inadequate dietary diversity among mothers, rural Dry Zone, 2020–2021



Source: Authors' calculations using RUFSS (various rounds).

in dietary diversity among mothers—August and September are typically lean season months—but there is also evidence of a more secular deterioration in dietary diversity between 2021 and 2022. By December 2021—10 months after the military takeover—25 percent of mothers in the rural Dry Zone had poor dietary diversity compared with 17 percent at the end of 2020.

FIGURE 4.11 Comparisons of inadequate dietary diversity among children ages 6–16 months in the rural Dry Zone sample in 2020 and 2021, by child age



Source: Authors' calculations using RUFSS (various rounds).

Figure 4.11 points to a deterioration in the dietary diversity of infants ages 6 to 16 months, as measured by the share consuming fewer than four of seven food groups in the past 24 hours. Poor dietary diversity is very high among the youngest children just being introduced to complementary foods, but improvements are seen as children get older. However, in 2021, there was a higher share of children with poor quality diets throughout the 6- to 16-month age range. This is deeply worrying, as good nutrition in utero and the first few years of life is critically important for both physical and cognitive development. The adverse impacts of the nutritional insults these young children experienced on their development are unlikely to be fully reversible.

National-level results from the 2022 Myanmar Household Welfare Survey

For 2022, the MHWS provides evidence using nationally representative data on the prevalence of poor dietary diversity among men and women 18 years and older and among children ages 6 to 23 months.

During 2020 and 2021, households were hit predominantly by income losses as the economy contracted due to COVID-19 and the military takeover. However, in late 2021, food prices started to increase rapidly (especially

TABLE 4.8 Percentage share of adults with inadequate diet diversity (fewer than 5 out of 10 food groups)

Adults		Round 1 (December–February 2022)	Round 2 (April–June 2022)	Round 3 (July–August 2022)	Difference: Round 3–Round 1
National	Overall	20.6	27.1	27.6	7.0***
	Male	21.0	25.3	26.7	5.7***
	Female	20.2	28.6	28.4	8.2***
Rural	Overall	21.2	28.3	28.8	7.5***
	Male	21.3	25.9	27.9	6.6***
	Female	21.2	30.3	29.6	8.4***
Urban	Overall	18.9	24.1	24.6	5.7***
	Male	20.2	23.8	23.6	3.4*
	Female	17.7	24.4	25.5	7.8***
National	Asset poor (0–3 assets)	30.5	39.7	37.2	6.7***
	Asset low (4–6 assets)	18.4	24.3	25.3	6.9***
	Asset rich (7–10 assets)	12.6	16.9	19.4	6.8***
National	Income poor	23.7	32.5	31.1	7.4***
	Income not poor	16.6	19.9	22.3	5.6***
Observations		12,100	12,142	12,128	NA

Source: Authors' calculations using MHWS Rounds 1–3.

Note: NA = not applicable. Statistical significance in difference in means across Round 3 and Round 1: * $p < .10$; ** $p < .05$; *** $p < .01$.

for palm oil, which is imported), and this continued into 2022 as food, fuel, and fertilizer prices increased. Table 4.8 presents the proportion of adults not achieving minimum diet diversity for each of the first three rounds of the MHWS, a period of deteriorating household budgets and rising costs of healthy diets (see Figure 4.9). There was a large and statistically significant increase in the prevalence of inadequate diet diversity among adults from 20.6 percent in Round 1 to 27.6 percent in Round 3—most of the increase occurred between Round 1 and Round 2 when food prices started increasing rapidly. Regarding spatial patterns, adults in rural areas had a somewhat higher prevalence of inadequate diet diversity than urban adults and a larger rate of increase between Round 1 and Round 3.[15] Women were somewhat more likely to have poor dietary diversity than men, which is worrying because poor diet quality can put mothers at risk as well as adversely affect the health

15 Mahrt and colleagues (2023) report further results by state/region.

TABLE 4.9 Percentage share of children (ages 6–23 months) with inadequate diet diversity (fewer than 4 out of 7 food groups)

Children	Round 1 (December–February 2022)	Round 2 (April–June 2022)	Round 3 (July–August 2022)	Difference: Round 3 – Round 1
Overall	40.7	40.0	37.2	–3.5
Boys	39.9	37.4	37.2	–2.7
Girls	41.5	42.6	37.1	–4.4
Observations	684	601	739	NA

Source: Authors' calculations using MHWS Rounds 1 to 3.
Note: NA = not applicable.

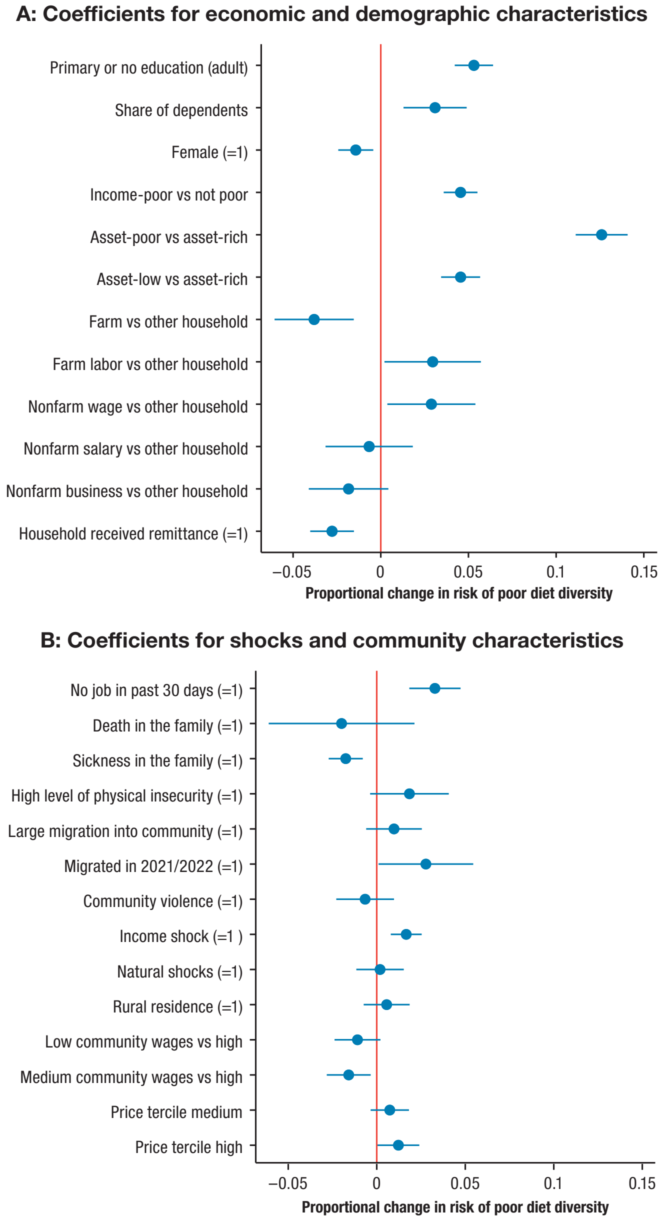
and long-term cognitive ability of their children. We also find that asset-poor households (who own 0–3 of 10 possible assets) were much more likely to have poor dietary diversity than asset-low (4–6 assets) or asset-rich (7–10 assets) households. However, diet quality deteriorated for all three economic groups, as it did for both income poor and nonpoor households.

What about children ages 6 to 23 months? We find that more than one-third of all children in this age group had poor diet quality by the third round of the MHWS (July–August). However, unlike for adults, there is no evidence of increasing rates of poor dietary diversity (Table 4.9). It may be that parents insulated their children from further deterioration in diet quality by sacrificing their own diet quality to some extent.

Finally, Figure 4.12 presents results on some of the most important predictors of inadequately diverse diets among adults. Low income and limited assets are a significant risk for inadequate diet diversity. Farm households are less likely to have inadequate diet diversity, while wage worker households are more at risk of inadequately diverse diets. Adults in low-wage communities are more likely to be less at risk of inadequate diets, but adults in high-price communities are at greater risk. Remittance-receiving households have a lower likelihood of having adults with inadequately diverse diets. Remittances seem to offer substantial resilience to receiving households in this sense. However, recent migrants are more at risk of poor dietary diversity. Self-reported income shocks increase the likelihood of having inadequate diet diversity. Similarly, not having a job in the 30 days prior to the survey has a negative effect on the diversity of adult diets.

In summary, chronic poverty characteristics—low assets, low education, high shares of dependents—and more recent economic and conflict-related shocks are strong predictors of poor dietary diversity among Myanmar's adult populations.

FIGURE 4.12 Linear probability model regressions of household- and community-level predictors of the proportional change in the risk of inadequate diet diversity among adults



Source: Authors' calculations using MHWS.

Note: Additional controls not presented in the figures are age, survey months, and state fixed effects.

Discussion

Myanmar made significant economic progress in the decade prior to 2020. Then COVID-19 first paralyzed the economy, and the military takeover in early 2021 resulted in an unprecedented 18 percent contraction in real GDP per capita (World Bank 2022b). In 2022, economic stagnation continued, and high food and nonfood inflation rates further threatened household food and nutrition security.

This chapter has explored the characteristics of Myanmar's food consumption patterns through a nutrition lens, focusing on food consumption and nutrient deprivation, income and own-price elasticities for food groups, and an analysis of phone survey evidence on patterns and trends in dietary diversity indexes between 2020 and 2022. The main findings are as follows:

First, most of the population has a poor diet relative to the country's (adapted) national dietary guidelines, with very low consumption of pulses, fruits, vegetables, and ASFs and large consumption gaps for several micronutrients and protein. Food group and nutrient gaps diminish as household income (consumption expenditure) increases, though gaps diminish faster for ASFs and fruits than for vegetables and pulses. Income elasticities also indicate strong demand for ASFs, moderately strong demand for fruits, and somewhat weaker preferences for vegetables and pulses. We further find evidence that edible oil consumption is excessively high among better-off households, which may indicate a risk of obesity and noncommunicable diseases. In addition to income being a strong predictor of dietary quality, other social, economic, and demographic characteristics have some explanatory power, though economic drivers seem predominant. However, simulation evidence on the impact of social protection transfers on nutrient consumption gaps, in the context of the economic shocks that Myanmar has faced, points clearly to a critical role for fortification of rice. In contrast, cash or unfortified rice transfers have little impact on nutrient intake or on closing the gap between actual and recommended diets (Ecker et al. 2023).

Second, dietary quality among adults and children in the rural Dry Zone deteriorated in 2020 and 2021. National phone survey evidence shows further deterioration in 2022 during a period of high food inflation and rising costs of a healthy diet. Regression evidence points to chronic predictors of poor diet quality, such as wealth levels, education, and demographic conditions in the household, but also the influence of a variety of shocks pertaining to income and job losses, price increases, conflict, and migration at the household and community level. The negative association between migration and diet quality likely emerges from many households being forced to migrate, the high costs of migration, and the paucity of employment opportunities. In contrast, households receiving remittances have individuals with somewhat better diet quality, suggesting remittances are a source of nutritional resilience.

Several policy and programmatic implications can be drawn from these findings. First, improving diets will require Myanmar to return to a path of sustained and inclusive economic growth, which will require conflict resolution. At the same time, while consumption of some food groups (particularly ASFs) increased quite rapidly with income growth between 2010 and 2015, vegetable and pulse consumption increased only modestly. Nutrition education campaigns may effectively improve consumer awareness of the nutritional benefits of these foods. Nutrition education campaigns and maternal education programs have been shown to be associated with improved short- and long-term child nutrition outcomes in Indonesia (Block 2007; Webb and Block 2004). Other Asian countries, such as Viet Nam, have experimented with incorporating nutrition education in schools (Nguyen et al. 2021). This may be a promising avenue to improve nutritional knowledge at scale in Myanmar.

Another intervention with some potential for improving diets may be the enhanced homestead food production programs pioneered by Helen Keller International in neighboring countries (Haselow, Stormer, and Pries 2016). Phone survey research consistently finds that farm-owning households in Myanmar have better food security and dietary diversity than other rural households. Many parts of Myanmar have relatively good access to water for homestead gardens or irrigated fruit and vegetable production, while homestead poultry production could potentially be scaled up. More commercially oriented diversification of the food system is also warranted and could yield high payoffs for rural income generation and improving diets (Chapter 1), but such an approach would require renewed stability, a more favorable policy environment, investments in agricultural research and development, and critical infrastructure.

Second, while multiple forms of social protection would be highly desirable in the context of multiple economic shocks, for nutritional reasons there are strong justifications for (1) scaling up the fortification of rice and improving access to fortified rice for the poorest segments of the population and (2) directing scarce financial resources toward mothers and young children, perhaps through maternal and child cash transfers. Such transfers have been shown to be highly effective in combatting malnutrition in Myanmar when coupled with nutrition education interventions (Field and Maffioli 2021; Maffioli et al. 2023).

Myanmar's progress against malnutrition has certainly been halted and likely reversed during the current period of crisis. Deteriorating dietary quality is likely a sign of rising micronutrient deficiencies and increased risks of stunting and wasting. These risks are compounded by disruption to other nutritionally important services, such as health, water, sanitation, and education. Reversing this deterioration in nutrition will require the "macro" solutions of conflict resolution, democratization, and economic reform. Yet, in the short run, judicious and innovative "micro" interventions can also play a role in protecting nutritionally vulnerable groups from the worst impacts of Myanmar's multiple crises.

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