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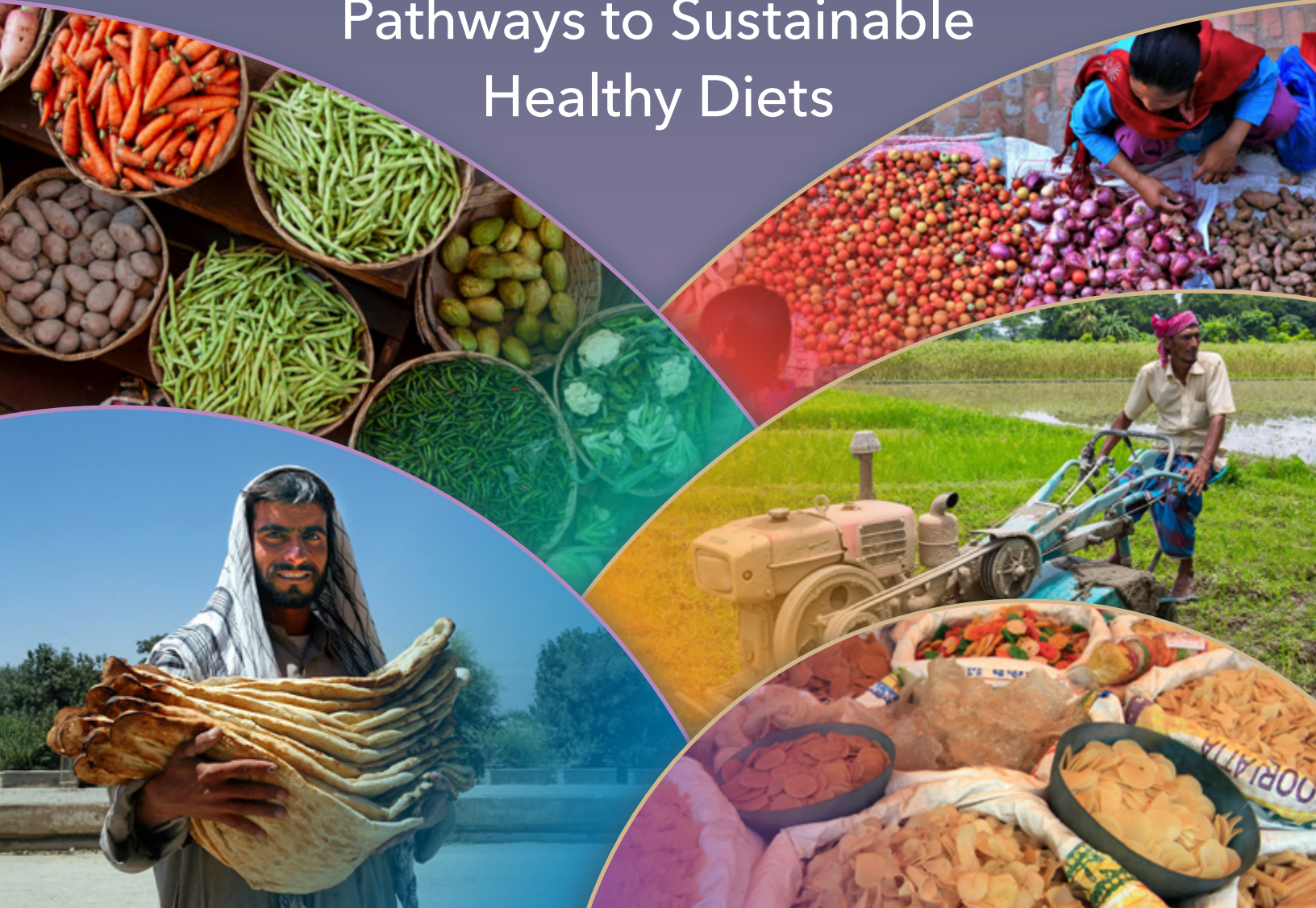
CGIAR

SCALING FOR
IMPACT

BETTER DIETS
AND NUTRITION

THE AGRIFOOD SYSTEM IN SOUTH ASIA

Pathways to Sustainable Healthy Diets



THE AGRIFOOD SYSTEM IN SOUTH ASIA

Pathways to Sustainable Healthy Diets

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Handle: <https://hdl.handle.net/10568/178050>

Recommended citation: International Food Policy Research Institute. 2025. *The agrifood system in South Asia: Pathways to sustainable healthy diets*. Washington, DC: International Food Policy Research Institute. <https://hdl.handle.net/10568/178050>

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EDITORS' NOTE

South Asia is home to an estimated 2.08 billion people, making it the most densely populated region on the planet. This places immense pressure on the region's agrifood systems to ensure that healthy and affordable food is available for all, a goal that can only be met by addressing today's multiple interconnected challenges. Overcoming bottlenecks in agrifood systems – the networks of actors, activities, infrastructure, and policies that are involved in getting food from farms to mouths – requires data and evidence on the many elements of these complex systems. Moreover, that evidence must serve as a catalytic driver of change, which further requires strong partnerships between donors, researchers, civil society, industry, and policymakers.

This report begins with a summary of the latest evidence on diets in the region, and then traces the drivers of current diets, starting from the food environment experienced by consumers, back through the diverse markets and farm production, and finally looks at the role of social protection and agrifood policy. The chapters on diets include close looks at consumption of unhealthy foods, the (un)affordability of healthy diets, and behavioral and environmental drivers of food choice. Production-related chapters consider trade-offs between production and consumption as well as how farming households adapt to climate shocks. Other chapters review evidence on the roles of men, women, and adolescents at different points in agrifood systems. The final chapters address lessons learned from social protection and on structural variations in India's agricultural value chains. Many of the chapters draw from surveys recently conducted in

Bangladesh, India, and Nepal under the CGIAR Research Initiative on Transforming Agrifood Systems (TAFSSA).

Concrete policy options to overcome the identified challenges are identified throughout the report. Evidence-based recommendations come from experts from CGIAR Centers (the International Food Policy Research Institute [IFPRI], International Maize and Wheat Improvement Center [CIMMYT], and International Water Management Institute [IWMI]) and partners (BRAC, Global Alliance for Improved Nutrition [GAIN], Nandi Foundation, Institute for Economic Growth, Cornell University, Tribhuvan University, and government focal points), all of whom we sincerely thank for their thoughtful contributions to this report and remarkable efforts to create lasting change in South Asia.

We also thank Esha Sarswat for handling overall communications related to the report, the editorial and design team who produced the report, Amit Bisht, Jason Chow, Claire Davis, Gillian Hollerich, and Pamela Stedman-Edwards, and all the funders of the CGIAR Trust Fund who supported this work.

As the science on transforming agrifood systems advances, equal efforts are needed to bridge the science-policy divide. Evidence must be translated into actionable change to drive real-world impacts at scale. We see this collection of evidence and insights as an effort along that pathway. We hope this report – which we envision as the first in a series covering multiple global regions – will inspire diverse stakeholders to demand better transdisciplinary evidence and to use the growing evidence base to guide investments and actions within and beyond South Asia.

Samuel Scott

Research Fellow, IFPRI

Avinash Kishore

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Derek Headey

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Overview

AGRIFOOD SYSTEMS TRANSFORMATION IN SOUTH ASIA

An Agenda for Impact and Learning at Scale

Purnima Menon and Timothy Krupnik

Purnima Menon is senior director, International Food Policy Research Institute (IFPRI), Washington, DC.

Timothy Krupnik is director of CGIAR's Science Program on Scaling for Impact, based in Dhaka. Between 2021 and 2024, Purnima and Tim were co-leads of the CGIAR Research Initiative on Transforming Agrifood Systems in South Asia (TAFSSA). This flagship report is a product of the work done under TAFSSA and brought to completion through the CGIAR Science Program on Scaling for Impact.

South Asia is undergoing a profound transformation in both regional dietary patterns and agrifood production systems. Driven by rapid urbanization, rising incomes, changing lifestyles, and evolving food environments and market systems, the region faces a dual challenge: improving diets while ensuring sustainable and equitable food production. Recent surveys and research by CGIAR and partners across several South Asian countries highlight the urgency of action to address poor diet quality, rising consumption of unhealthy foods, and the limitations of current agricultural systems.

INSIGHTS ON AGRIFOOD SYSTEMS IN SOUTH ASIA: FROM PLATE TO FARM

South Asians are at high risk of nutritional inadequacy and diet-related diseases. Unbalanced diets are a major cause of the burden of disease globally and impose large costs on early childhood survival and quality of life, including rising prevalence of noncommunicable diseases. Over the past few decades, South Asian diets have

shifted dramatically. Dietary transitions are evident across both urban and rural areas, and among all income groups. Data from national surveys and small, but comprehensive local agrifood systems assessments reveal widespread consumption of unhealthy foods – sweet beverages, salty snacks, and fried items – among adults and adolescents (Chapters 1 and 2). In India, Bangladesh, and Nepal, diets are dominated by starchy staples such as rice and wheat, with limited intake of fruits, vegetables, nuts, and animal-source foods. These diets signal moderate to high risk of dietary inadequacy and noncommunicable diseases. Adolescents (Chapter 9), particularly in some settings, consume significantly more fried and processed foods than adults, suggesting that unhealthy eating habits are being established early. Driving this problem is the relatively high cost of nutrient-dense foods (Chapter 2).

Food environments are diverse and challenging to regulate. Local food environments and markets play a critical role in shaping diets (Chapter 4). Research in this report shows that markets are a

principal source of what is on people's plates, even in rural farming areas. Markets themselves are diverse. For instance, a market census in Nalanda, a district in the Indian state of Bihar, revealed a mix of formal and informal vendors, with limited infrastructure and poor waste management (Chapter 5). While grocery stores and greengrocers are common, access to animal-source foods and nutrient-dense products varies widely. Informal food enterprises dominate retail, accounting for the vast majority of food businesses. These vendors operate outside regulatory frameworks, making it difficult to enforce taxes or labeling on unhealthy foods. Moreover, markets are not the only source of unhealthy foods – many unhealthy items are home-cooked – further complicating policy interventions.

Agricultural policy reform is needed to produce healthy foods for all. While demand-side changes are reshaping diets, supply-side constraints in agrifood systems limit access to healthy foods. South Asia's agricultural landscape is dominated by cereal production, especially rice, wheat, and maize, as a result of historical food security policies (Chapter 11). This focus has contributed to soil degradation, groundwater depletion, and stagnating productivity. Surveys across the region show that rural households primarily produce these starchy staples as well as tubers and a few vegetables (Chapter 6). Production of nutrient-rich foods including fruits, legumes, and orange vegetables is limited. Livestock production is increasing, particularly poultry and dairy, but varies by region. For example, fish predominates in Bangladesh, while poultry is more common in Nepal. Landholding patterns reveal that many households are landless or operate on small plots, suggesting improving diets for these households requires food sources beyond own production.

Much of the burden of producing, acquiring, and preparing food falls on women. A key finding from recent research is that women's empowerment is closely linked to their agency in household

decision-making, particularly in agriculture and food preparation. Strong gendered dynamics across the food system are illustrated by findings that women are engaged in agriculture, livestock care, and markets, while also bearing nearly sole responsibility for domestic food systems activities (Chapter 8). This contributes to imbalanced and unequal task-sharing in households. Delivering more equitable outcomes will require innovations that help to equalize gendered burdens across the food system, including within households.

Extreme weather threatens farmer livelihoods.

Climate change is affecting food production in South Asia in diverse ways. Rising temperatures, erratic rainfall, and extreme weather events are projected to reduce yields of rice, wheat, and maize by 2050. Groundwater depletion and crop residue burning further exacerbate environmental degradation. Climate shocks directly impact farm productivity and household food access (Chapter 7). Without climate-resilient agricultural practices and diversified cropping systems, food security and diet quality will remain vulnerable. South Asia's robust social safety net programs are a lifeline for families who experience shocks, suggesting that making these programs more responsive and adaptive can strengthen household resilience (Chapter 10). Solutions are thus within reach in this region.

WHAT LIES AHEAD FOR IMPACT AT SCALE AND NEW RESEARCH IN SOUTH ASIA?

Several recommendations emerge for scaling up actions that contribute to healthier agrifood systems across South Asia.

To shape demand and affordability of healthier diets, governments should implement integrated policy tools such as corrective taxes on unhealthy foods, especially sugary beverages, and pair them with targeted subsidies for fruits, vegetables, and pulses. These fiscal measures must be designed to avoid regressive impacts that primarily affect

low-income households. Behavioral change strategies must be scaled through school curriculums, mass media, and digital platforms to promote nutrition literacy and healthier cooking practices.

To shape food environments and markets for healthy diets and economic benefits, labeling regulations should be expanded to include informal and home-cooked foods, possibly through vendor training and community-based monitoring. In addition, informal food vendors must be engaged as partners in nutrition transformation, with incentives to improve food safety and reduce unhealthy ingredients.

To shape new directions for resilient and diverse production systems, nutrition-sensitive agrifood systems will need to align agricultural production with nutrition goals. Identifying how to truly scale crop diversification, home gardens, and livestock rearing to improve dietary diversity will be a challenge, but it must be explored, incentivized, and supported.

To shape agrifood systems that deliver equitable benefits to all individuals, policies in South Asia should emphasize gender-sensitive approaches, extension services, and integration of agriculture with the health and education sectors. Scaling nutrition-sensitive agriculture requires sustained investment, local adaptation, and strong governance, including attention to agricultural subsidies.

Scaling efforts must also be informed by robust data and research. Key questions as we look to the future include: How can informal food environments be transformed to support healthier diets at scale? What are the most cost-effective combinations of fiscal and behavioral interventions for reducing consumption of unhealthy foods? How do gender dynamics influence the scalability of nutrition-sensitive agriculture? What governance models best support coordination among agriculture, health, and education sectors? How can digital tools be

leveraged to monitor diet quality and food environments in real time? What are the pathways to scale for community-led innovations in food production and nutrition education?

SEIZING OPPORTUNITIES

South Asia stands at a crossroads. The region's rapid dietary transition, coupled with unsustainable production systems and social inequalities, threatens public health and food security. However, South Asia is also a vibrant region with robust institutions, growing economies, and a real opportunity to deliver impact through government, business, and social efforts operating at scale. An opportunity to reshape food systems through integrated, evidence-based policies is at hand. Improving diet quality will require continued action on both the demand and supply sides – making healthy foods more available, affordable, and desirable, while curbing the spread of unhealthy food consumption. Governments, civil society, and the private sector must collaborate to build food environments that support healthier choices and sustainable production, and legislation and regulation will be crucial ingredients for change.

Bold, coordinated efforts can fuel a South Asian movement toward a future where nutritious, culturally appropriate, and climate-resilient diets produced in sustainable agrifood production systems are within reach for all.

This report presents clear, actionable insights for policymakers seeking to address affordability, dietary quality, and climate vulnerability across South Asia's agrifood systems. Its findings underscore the need for coordinated multisectoral strategies. CIMMYT remains committed to supporting evidence-based interventions that strengthen resilience, improve nutrition, and enhance systemwide performance.

Bram Govaerts

Director General
International Maize and Wheat Improvement Center (CIMMYT)

IIDS is proud to have been a core partner in the food systems survey from Nepal and neighboring countries that supports several chapters of this report. The findings show clear commonalities across Bangladesh, India, and Nepal in diets, food environments, and climate risks, yet also point to Nepal-specific challenges in affordability, market connectivity, and adaptation. Such locally grounded evidence is critical for informed policymaking in Nepal's agrifood sector.

Biswash Gauchan

Executive Director
Institute for Integrated Development Studies (IIDS)

ACIAR has long supported research on food systems in South Asia, including the TAFSSA work that enabled this report's high-resolution insights. I especially appreciate the insights in the report and its attention to women and youth – groups often missing in food systems evidence – and its focus on climate adaptation, both core themes of ACIAR's strategic priorities in the region.

Pratibha Singh

Regional Manager, South Asia
Australian Centre for International Agricultural Research

Transforming South Asia's agrifood system requires making healthy diets more affordable, nutrient-rich, and climate-resilient. By fostering integrated, resilient food systems backed by sound policies and robust research, the region can close nutritional gaps, strengthen production-consumption links, and ensure sustainable, equitable access to diverse, safe, and nutritious foods for everyone.

Nazma Shaheen

Professor
Institute of Nutrition and Food Science, University of Dhaka

The agrifood system in South Asia is transforming, creating opportunities to scale solutions for sustainable, healthy diets. In Bangladesh, strong collaboration between the government and CGIAR partners supports climate-smart agriculture, nutrition-sensitive value chains, and evidence-based policies. These joint actions aim to enhance food security, dietary diversity, and overall system resilience.

Mostafa Faruq Al Banna

Research Director
Food Planning and Monitoring Unit (FPMU), Ministry of Food, Bangladesh

We cannot wait for perfect data to build healthier food systems. What we need is a commitment to act on the best evidence we have today, and the humility to refine our approach as new insights emerge. This report offers a clear direction for redesigning food environments and reminds us that systems must remain adaptive to drive real transformation.

Soumya Swaminathan

Chair
MS Swaminathan Research Foundation (MSSRF)

Sustained economic and agricultural growth has eased calorie shortages in South Asia, yet undernutrition and poor-quality diets persist, revealing deeper structural challenges in our food systems. Addressing these requires high-resolution, disaggregated data to guide actionable policies for healthier, resilient food systems. This report is an important contribution towards that.

Shahidur Rasid

Director, South Asia
International Food Policy Research Institute (IFPRI)

Dietary patterns change rapidly in a developing world, and while data from South Asia are limited, available evidence shows only modest improvements in the consumption of healthy diets. This is deeply concerning as it threatens both human and planetary health, and calls for immediate action! This publication, grounded in extensive research, outlines priority policy actions that should be embedded in agrifood system transformation efforts in South Asia and supported by the CGIAR research portfolio.

Inge D. Brouwer

Director
CGIAR Science Program Better Diets and Nutrition

South Asia's agrifood systems face unprecedented challenges, but also immense opportunities. By harnessing robust evidence and fostering strong partnerships, we can catalyze transformative change, ensuring healthy, affordable diets and sustainable food production for all. This report charts a path forward, using evidence to identify recommendations for policies to build resilient, equitable, and nutrition-sensitive food systems across the region.

Mark Smith

Director General
International Water Management Institute (IWMI)

This comprehensive report charts a clear path to scaling agrifood systems solutions that tackle the coinciding nutrition and sustainability challenges affecting millions in South Asia. Backed by rigorous evidence produced with an adept set of partners, the editors and authors provide must-read lessons for anyone engaging in research, practice, and policy aimed at sustainable healthy diets.

Johan Swinnen

Director General
International Food Policy Research Institute (IFPRI)

This report reinforces our shared vision for a nutrition-secure South Asia. By acknowledging the critical role of rice along the continuum from production to consumption, it underscores the potential of science and innovation to bring about meaningful change. IRRI is proud to contribute to this effort through its research on one of the region's dominant staple cereals and on local food environments and fully supports the publication and impact of this report

Yvonne Pinto

Director General
International Rice Research Institute

This report brings together evidence from across the food system – from consumers and food environments to markets, production, and policy. Understanding these interconnected drivers of poor diets is essential for designing solutions that translate to better health and nutrition outcomes for people across South Asia.

Deanna Olney

Director, Nutrition, Diets, and Health
International Food Policy Research Institute

Chapter 1

WHAT ARE PEOPLE EATING IN SOUTH ASIA?

Samuel Scott, Rasmi Avula, Aklima Parvin, and Malay Kanti Mridha

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Rasmi Avula is a research fellow, IFPRI, New Delhi. **Aklima Parvin** is a senior project manager, IFPRI,

Dhaka. **Malay Kanti Mridha** is a professor and deputy dean, James P Grant School of Public Health, BRAC University, Dhaka.

KEY MESSAGES

- The limited data available on diets in South Asia show low consumption of fruits, vegetables, and animal-source foods, and high intake of snacks, sweet drinks, and fried foods.
- Diet patterns vary by factors such as age, gender, and wealth; adolescents and men tend to consume more unhealthy foods, while wealthier groups consume more healthy foods without reducing intake of unhealthy foods.
- Improving diets in South Asia requires multisectoral actions, including regulation of processed foods, school- and safety net-based interventions, and incentives for the food industry to provide healthier options.
- Better data and targeted policies are essential, using advanced and traditional diet assessments to inform context-specific strategies that promote nutritious, affordable diets across diverse South Asian populations.

Major shifts in dietary patterns have occurred over the past three to four decades across the world. These changes have coincided with demographic transitions toward lower fertility and mortality, as well as epidemiological shifts from a pattern of high infectious disease prevalence, associated malnutrition and famine, toward a high prevalence of chronic and degenerative diseases. They have also occurred in an increasingly urbanizing world where automation in daily lives is contributing to reduced physical activity and increased availability of processed foods is contributing to new dietary habits (Popkin and Ng 2022). In this chapter, we describe the current state of diets and diet quality in South Asia, with highlights from five recent surveys that collected dietary data from approximately 10,000 adolescents and adults living in rural areas across Bangladesh, India, and Nepal. We discuss how diets vary by factors including age, gender, wealth, and caste. We end by reflecting on research and policy efforts that may help promote healthy diets.

DIETARY TRANSITIONS IN A DEVELOPING WORLD

Globally, diets today are more energy-dense than they used to be. Processed foods have replaced high fiber foods; sweetened beverages have replaced water and milk; portion sizes have increased; and eating away from home and snacking have become increasingly common (Popkin 2011). In Asia, increases in income and urbanization have coincided with an increase in consumption of vegetables, fruits, animal proteins, pulses, and processed foods (Reardon et al. 2014). Access to money is facilitating consumption of diverse diets that are protective against noncommunicable diseases (NCDs), but also fueling consumption of soft drinks, sweet and salty snacks, and deep-fried foods that contribute to the risk of developing NCDs (Global Diet Quality Project 2022). Alongside the rising urban middle class, the spread of supermarkets and fast-food outlets (Pingali 2007), popularization of certain diets through media, and promotion of ultra-processed foods

(Popkin and Ng 2022) have converged into increasingly Westernized dietary patterns and lifestyles in Asia (Pingali 2007). Sales data from 2006 to 2013 and projections to 2017 in most countries, including South Asia, indicate remarkably high sales growth in ultra-processed foods led by the soft drinks and oils and fats categories in most countries, including in South Asia (Baker and Friel 2016). Further, with women facing competing time demands as they enter the labor force in increasing numbers, time-saving prepared foods often present an attractive alternative to traditional meals prepared using raw ingredients at home (Popkin and Reardon 2018). Chapter 2 in this report has more details on ultra-processed food consumption in India.

CONSUMPTION OF HEALTHY AND UNHEALTHY FOODS IN SOUTH ASIA

Dietary data from large-scale national surveys in South Asia are limited (Scott et al. 2022), due in part to the complexity of dietary assessment and the lack of simple tools to measure dietary intake. However, the Global Diet Quality Project (dietquality.org) in 2016 and subsequent creation of the Diet Quality Questionnaire to rapidly assess consumption of 29 food groups within existing population-based surveys (Gallup polls) has broadened our understanding of what foods (but not how much of them) are consumed around the world. Data collected between 2021 and 2023 reveal that consumption of unhealthy foods by adults is common in South Asia (Figure 1.1).

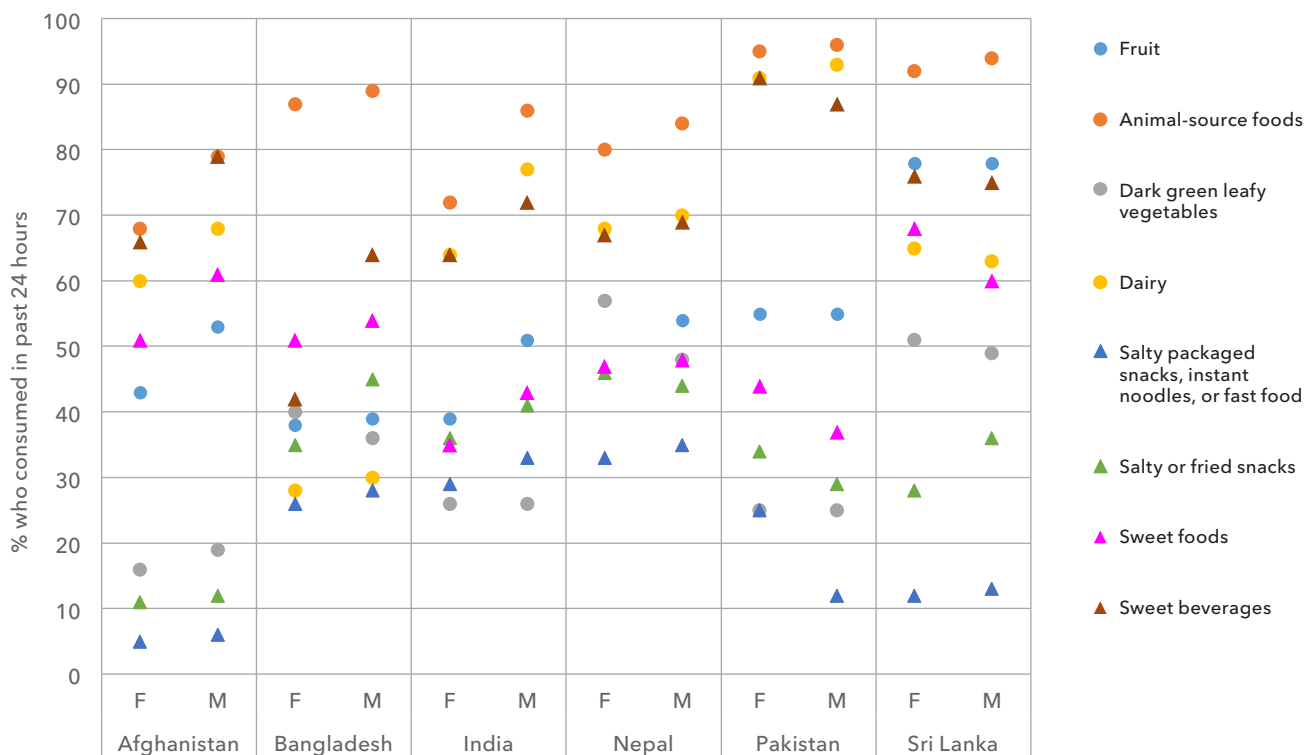
Sweet beverages and foods were consumed by most individuals, with a higher proportion of men than women consuming these types of foods in four of six countries. Salty or fried snacks were also consumed by between 10 percent (Afghanistan) and 45 percent (Nepal) of adults, again with consumption more widespread among men than women. Healthy foods such as fruit and dark green leafy vegetables were consumed in the past day by less than 60 percent of the population, except fruits in Sri Lanka (78 percent). Consumption of dark green leafy vegetables was particularly low in Afghanistan, India, and

Pakistan, and only about 30 percent of individuals consumed dairy products in Bangladesh. Women in all countries, but especially in Afghanistan and India, were less likely to consume animal-source foods than men. These data also show that the diets of adults living in urban and rural areas are not starkly different (not shown in Figure 1.1), although unhealthy foods have a slightly greater reach in urban areas.

Surveys conducted in 2023 in rural areas by the CGIAR Research Initiative on Transforming Agrifood Systems in South Asia (TAFSSA) allow for a more detailed look at what adults are consuming. The district agrifood systems assessments were conducted in five districts across Bangladesh (Rajshahi and Rangpur), India (Nalanda, in the northern state of Bihar), and Nepal (Banke and Surkhet) (Gupta et al. 2022). These surveys captured

consumption of foods on the previous day and in the previous week for approximately 10,000 individuals. Overall, the pattern of food intake was indicative of poor-quality diets associated with moderate to high risk of dietary inadequacy and NCDs, as indicated by low Global Diet Quality Scores (GDQS). These scores take into account the quantity of 25 food groups (16 healthy, 7 unhealthy, and 2 unhealthy when consumed in high amounts) consumed in the past day, with a higher score indicating a healthier diet (Bromage et al. 2021). The GDQS scores for the study districts were between 16 and 18 out of a maximum possible score of 49. These low scores reflect insufficient consumption of healthy foods and overconsumption of unhealthy foods. Biscuits and baked goods, for example, were consumed by 88 percent of men in the districts surveyed in Bangladesh. Nuts

FIGURE 1.1 Percentage of women and men who consumed healthy (circles) and unhealthy (triangles) foods in past 24 hours in six South Asian countries



Source: Data from Global Diet Quality Project, Gallup polls 2021-2023.

and seeds were consumed by fewer than 1 in 10 individuals in all countries.

In terms of the types of foods consumed, the TAFSSA surveys found that diets were high in starchy staples, with rice dominant in the study districts in Bangladesh and Nepal, and both rice and wheat commonly consumed in Nalanda, India. Diets were generally low in diversity, with only 3 to 4 out of 10 food groups consumed per day on average. A few foods were consumed by nearly all individuals with high frequency – potatoes, onions, lentils, and tomatoes – but foods such as animal proteins, fruits, and orange vegetables were consumed less frequently. The source of animal protein varied by location, with more than 90 percent of individuals in the Bangladesh districts consuming fish versus 10–15 percent in the districts in India and Nepal, whereas poultry was most commonly consumed in the districts in Nepal. About 40 percent of individuals across sites had consumed milk in the previous week, whereas egg consumption varied greatly, from about 15 percent in Nalanda to about 75 percent in Bangladesh; in Nalanda, where a high percentage of the population is lacto-ovo vegetarian, milk is an important source of protein and vitamins.

Diet quality in South Asia varies across dimensions such as age, gender and wealth. Understanding heterogeneities in diets related to these characteristics can inform program design and targeting for particular subpopulations. Data are scarce on what adolescents eat, especially those ages 10 to 14. Describing diets in this age group is important as young adolescents are entering their childbearing years and will pass habits on to their children; adolescence is also a stage of life when individuals can start making their own food-related decisions (Chapter 8 discusses this key age group from a food systems lens). In the TAFSSA surveys, adolescents (ages 10 to 19) in Nalanda, for example, were three times more likely to consume purchased fried foods compared with adults (age 20+). Weekly consumption of unhealthy foods among adolescents, assessed using a food frequency questionnaire, revealed that biscuits and baked

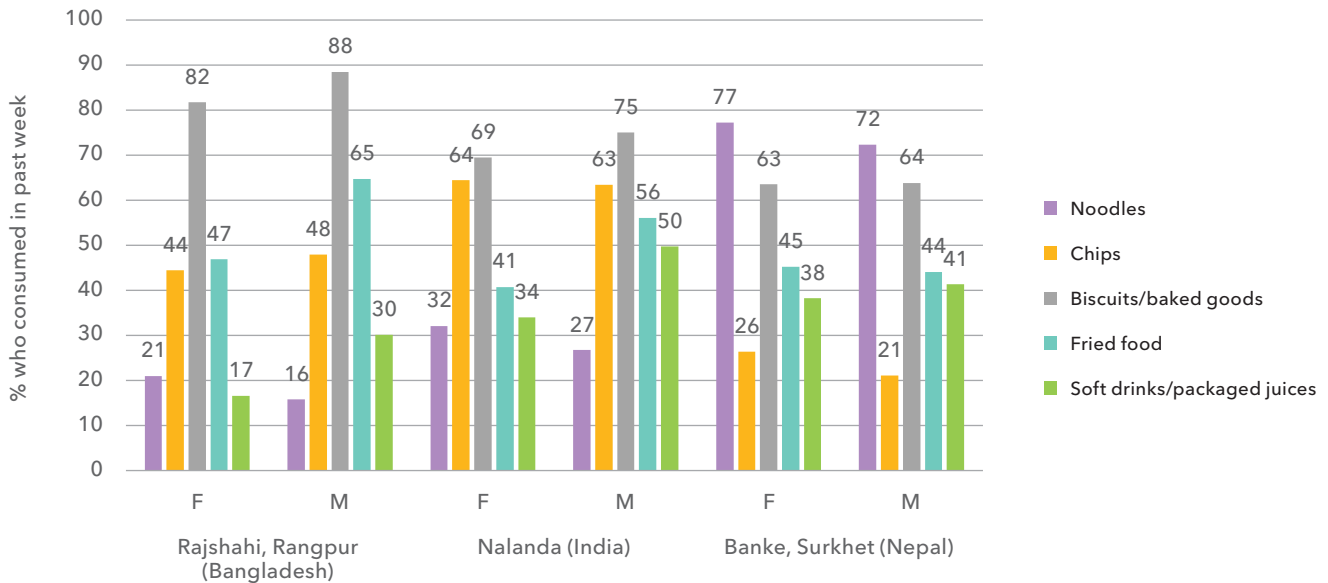
goods, chips, and deep-fried foods are commonly consumed across all countries surveyed (Figure 1.2). For example, more than 80 percent of adolescents in the Bangladesh districts consumed biscuits or baked goods at least once in the past week; about 15 percent of this group consumed these products daily and 60 percent consumed them “a few times a week.” Consumption of unhealthy foods was higher among male than female adolescents in the districts in Bangladesh and India, but similar between genders in districts in Nepal.

Contrary to the commonly held notion that women’s diets are generally poorer than men’s diets, GDQS scores were similar among women and men in all districts. Wealth levels exhibited different patterns in consumption of healthy and unhealthy foods; whereas all wealth quintiles in all locations had similar GDQS– (unhealthy) scores, GDQS+ (healthy) scores increased with increasing wealth in Bangladesh and India. This finding suggests few barriers, if any, to unhealthy food consumption and, as households move up the wealth ladder, they may opt to consume more healthy foods but are unlikely to opt out of unhealthy food consumption.

LOOKING FORWARD: EVIDENCE-BASED POLICY FOR BETTER DIETS

Improving the healthiness of diets for South Asians is a challenge. Both the availability and affordability of healthy foods are under threat from climate shocks and increasing food prices (Gunaratne et al. 2021; Dizon and Herforth 2018), while corporations profit from selling ultra-processed unhealthy foods that are widely consumed in the region. A first step in addressing the issue is diagnosing the problem, that is understanding the current state of diets and drivers of these diets, in detail, in different subgroups of the population. To this end, the Global Diet Quality Project has been useful, but routine surveys that measure consumption of individual foods and their quantities are needed to better assess specific divergences from healthy diet guidelines. Ideally, such surveys would be representative at

FIGURE 1.2 Percentage of adolescent females (F) and males (M) who consumed different types of unhealthy foods in the past week



Source: Data from TAFSSA agrifood systems assessment in five districts, 2023.

Note: n = 4,000 adolescents.

a subnational geographic level (such as the district, province, or upazila) to inform local decision-making on strategies to improve diets. Sustained political commitment to such efforts is critical, particularly given the high cost of detailed subnational surveys using current methods to assess diets. Looking ahead, technological and methodological advancements, such as the use of artificial intelligence to identify foods through mobile phone photographs and to link this data to existing data on the macro- and micronutrient content of the foods, may offer a more efficient way of tracking diets. While such tools are already being developed and tested, traditional dietary surveys using resource-intensive measurement methods are still required to assess how well current diets align with dietary guidelines.

Research focusing on diet quantity and quality among adults and adolescents in South Asia is still at its nascent stage. Research on why people eat what they eat or “drivers of food choice” is even newer, but this work will be important in designing interventions

to improve diets. Some of these drivers are explored in Chapters 3 and 4 in this report. Although more evidence is necessary, several policy and programmatic actions can be undertaken based on the available data. Low consumption of fruits and vegetables, along with high consumption of processed foods and added sugar, is a common problem for all countries in South Asia, in both urban and rural areas and across the wealth spectrum. It is very clear that South Asians today should be eating more of some foods and less of others. Making healthy foods more available, desirable, accessible, and affordable (and making unhealthy foods less available, desirable, accessible, and affordable) requires a multisectoral approach that takes advantage of the wide reach of the health and education sectors to deliver interventions. The food industry is also a key partner and should be incentivized to deliver healthy foods that everyone can afford. Governments need to regulate when appropriate, following successful efforts in other regions such as Latin America, where taxes

on sugar-sweetened beverages, for example, have raised revenue while decreasing consumption and disease incidence (Sandoval et al. 2021). Other opportunities to enhance diets in South Asia include increasing the nutritional quality of foods delivered through existing safety net programs, complementing cash or in-kind transfers with education on healthy diets, restricting unhealthy food advertisements, and improving food labeling to better inform consumers about the benefits and risks of consuming certain foods.

Ensuring healthy diets for all may require reorientation of agriculture sector priorities toward foods that provide both adequate energy and adequate nutrients. Given the high population density in South Asia, governance of land resources and trade agreements to ensure food supplies are sustained throughout the year, especially in remote areas, remains important. Policies and strategies to reduce food and nutrient losses along the value chain are also important. Large variation within and between South Asian countries in terms of food choices, production, culture, and equity makes research on diets and drivers of diets complex. Likewise, policy and programmatic interventions to build food systems that support healthy diets for all need to be context-specific and address both supply-side and demand-side challenges.

Acknowledgments

We would like to thank the report editors and Elodie Becquey for constructive feedback and helpful suggestions, which have strengthened this chapter. We also thank the survey respondents and enumerators, as well as the whole TAFSSA team, for their contributions.

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Chapter 2

CONSUMPTION OF FOODS HIGH IN FATS, SALT, AND SUGAR IN INDIA

Prevalence, Patterns, and Policy Imperatives

Avinash Kishore and Suman Chakrabarti

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KEY MESSAGES

- Calorie-dense foods high in saturated fats, salt, and sugar (HFSS) now account for nearly one-fifth of household food budgets in India, with US\$62 billion spent on these foods in 2023/24. This surpasses spending on fruits, vegetables, pulses, eggs, fish, and meat in both rural and urban India.
- Consumption of HFSS foods is near universal: 96 percent of households consumed packaged ultra-processed foods, 90 percent purchased paid meals, and 70 percent consumed sugary drinks.
- Many widely consumed HFSS foods are home-cooked or bought from unregulated vendors, limiting the impact of regulations designed to reduce consumption, such as taxes or labeling.
- Effective policy requires integrated tools, including front-of-package labeling, nutrition education, and engagement with informal vendors to curb rising HFSS demand and mitigate health risks including obesity and diabetes.

Indian diets are changing rapidly. While more households are consuming nutrient-rich foods such as milk, fresh produce, and animal-source foods (Kapoor et al. 2024), the consumption of calorie-dense foods high in saturated fats, salt, and sugar (HFSS) and ultra-processed foods is growing at an alarming rate (Gupta and Kishore 2025), driven by lifestyle changes, rising incomes, and food industry marketing (Menon and Olney 2024). According to a recent report from the World Health Organization, sales of ultra-processed foods in India grew by 13.4 percent per year between 2011 and 2021, highlighting the urgency of understanding this transformation (WHO 2023).

Using the 80th round of the National Sample Survey's Household Consumption Expenditure Survey (NSS-HCES) (India, MoSPI 2024), this chapter describes recent patterns of HFSS consumption and expenditure, explores their socioeconomic drivers, and outlines how these findings can inform actionable pathways for healthier food systems. The chapter not only describes the magnitude of dietary change but also aims to serve as a catalyst for reform across fiscal, regulatory, and behavioral domains.

For the purposes of this analysis, HFSS foods comprise three main categories drawn from the NSS food groups: packaged ultra-processed foods, sugary beverages, and served processed foods. Additionally, ice cream and prepared sweets from the milk and milk products category are included in total HFSS expenditure calculations. These HFSS categories were constructed using item-level NSS consumption codes.

Packaged ultra-processed foods consist primarily of ultra-processed items – such as ice cream, biscuits, instant noodles, cakes, chocolates, salty snacks (*papadam*, *bhujia*, *chanachur*, chips, nachos, puffs), wafers, jams, jellies, ketchup, mayonnaise, and other packaged foods such as ready-to-cook *poha* – all typically purchased from retail outlets or through online orders. This category excludes breakfast cereals, baby food, pickles, bakery bread, and health supplements.

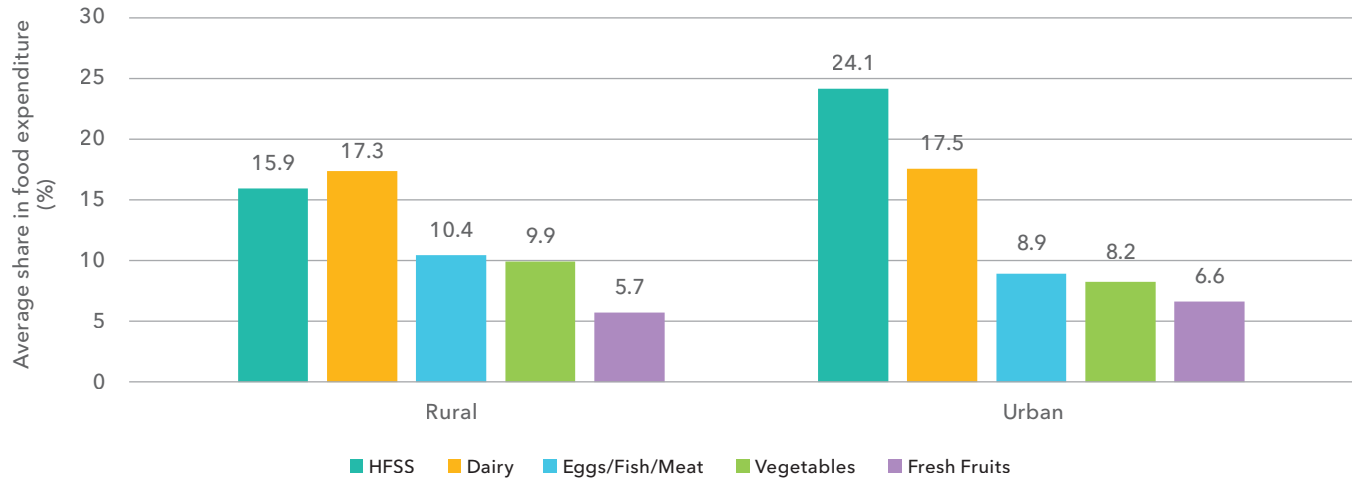
Sugary beverages include tea, coffee, carbonated drinks, cold beverages, fruit juices and shakes, sugarcane and date-palm juice, cocoa, drinking chocolate, and health drinks. Tea leaves and coffee powder are excluded from this category.

Served processed foods include purchased cooked meals, snacks, and other prepared foods obtained from vendors, restaurants, or caterers. These items are often higher in salt, sugar, and saturated fat than meals prepared at home using raw ingredients (Gupta and Kishore 2025). This category explicitly excludes cooked meals received free at workplaces, purchased at subsidized rates, received as assistance, or purchased at full price through institutional channels, since the HFSS content of complete meals cannot be reliably determined. Such exclusions may lead to an underestimation of total HFSS expenditure if subsidized or free meals are in fact high in fat, sugar, or salt.

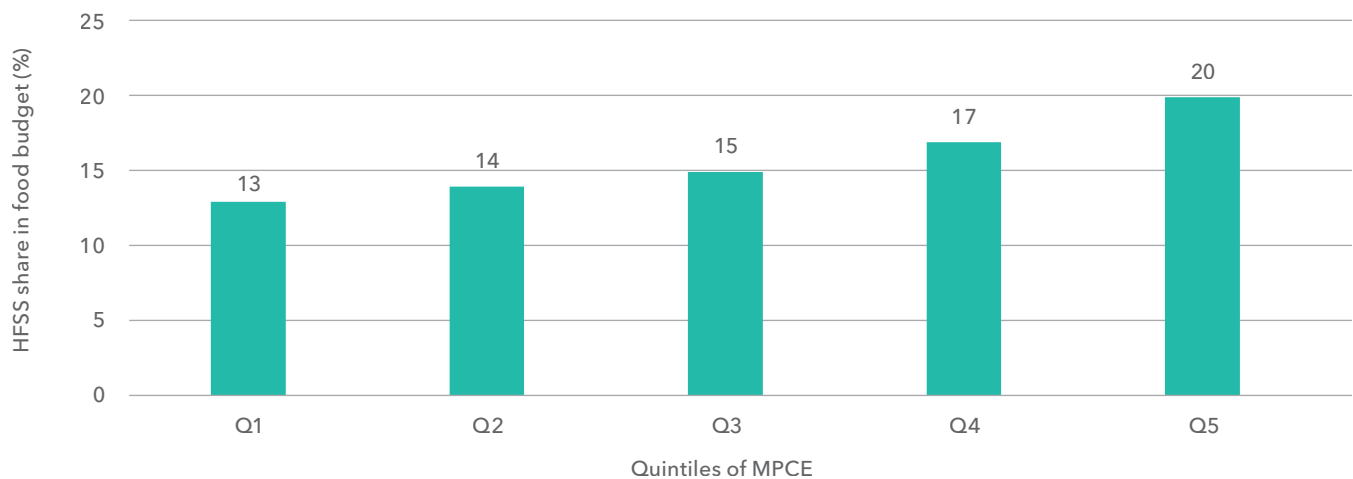
HFSS PENETRATION AND EXPENDITURE PATTERNS

Analysis of the NSS-HCES 2023/24 data shows the extraordinary penetration of HFSS foods across Indian households. Ninety-nine percent of Indian households reported purchasing some HFSS item during the reference week, including 96 percent consuming packaged ultra-processed foods, 70 percent consuming sugary drinks, and 90 percent consuming served processed foods. Consumption spans all income groups and geographies, driven by the converging forces of changing food environments, aggressive marketing, and consumer preferences for convenience and taste.

Households spent an estimated US\$62 billion on HFSS foods in 2023/24, or nearly one-fifth (18.6 percent) of total food expenditure. This includes \$14.6 billion on sugary beverages, \$22.3 billion on served processed foods, and \$25.2 billion on packaged ultra-processed foods.

FIGURE 2.1 Share of different food groups in total household food expenditure in rural and urban India, 2023/24

Source: Authors' estimates using the NSS-HCES 2023/24 data (India, MoSPI, 2024).

FIGURE 2.2 Share of HFSS foods in total food budgets across quintiles of monthly per capita consumption expenditure

Source: Authors' estimates using the NSS-HCES 2023/24 data (India, MoSPI, 2024).

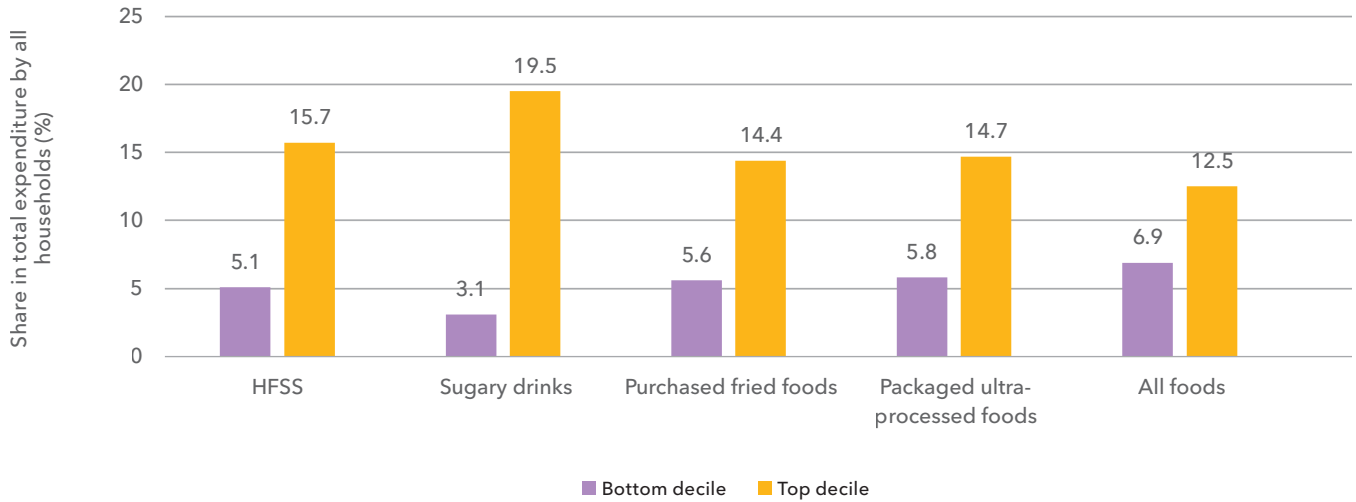
Note: MPCE = monthly per capita consumption expenditure.

HFSS foods accounted for the largest share of urban households' food budgets, surpassing spending on vegetables, fruits, pulses, and animal-source foods. Only spending on dairy products exceeded HFSS spending in rural areas (Figure 2.1). While these figures demonstrate the prominence of HFSS foods in household budgets, it remains unclear whether this high expenditure crowds

out consumption of healthier foods such as fruits and vegetables.

Wealthier households allocate a greater share of their food budgets to HFSS foods (Figure 2.2) and account for a disproportionately larger share of total household spending on these products in India (Figure 2.3). Households in the top decile of monthly per capita consumption expenditure (MPCE) spend

FIGURE 2.3 Share of bottom and top deciles in aggregate expenditure on different types of HFSS foods in India

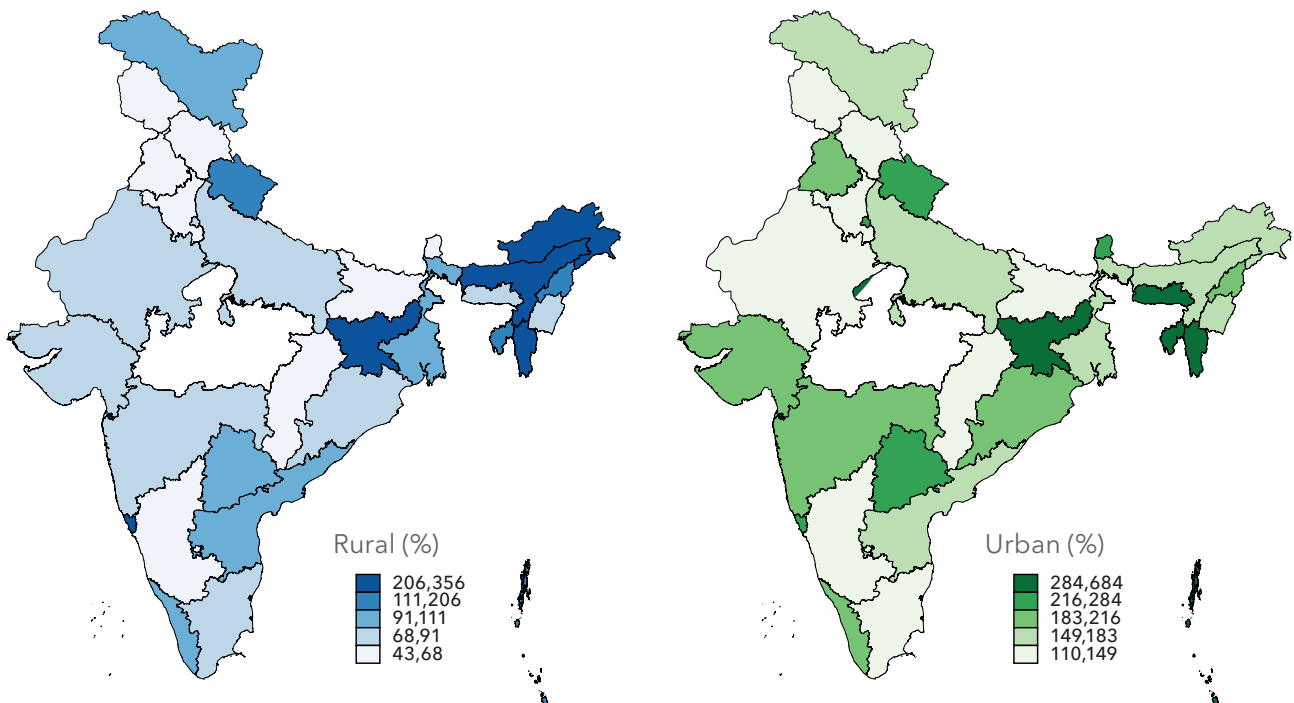


Source: Authors' estimates using the NSS-HCES 2023/24 data (India, MoSPI, 2024).

FIGURE 2.4 State-level variation in per capita weekly expenditure (rupees) on HFSS foods, rural and urban

A. Rural

B. Urban



Source: Authors' estimates using the NSS-HCES 2023/24 data (India, MoSPI, 2024).

TABLE 2.1 Weekly consumption patterns of HFSS foods compared to healthy options: Household penetration and per capita expenditure

Item	Mean [N = 261,953]	
	Households (%) who consumed the item the past 7 days	Average expenditure (rupees/person/week)
Vegetables (excluding potatoes and onions)	96.9	46.7
Fresh fruits	92.2	35.4
Packaged ultra-processed foods	95.9	36.8
Ice-cream	22.0	4.1
Biscuits	85.0	10.7
Noodles	24.2	3.1
Cake	14.3	2.9
Chocolates	32.4	2.7
Salty snacks (<i>papad, bhujiya, namkeen, mixture, etc.</i>)	53.8	6.6
Chips, nachos, puffs, wafers, etc.	47.0	4.5
Sauce, jam, jelly, mayo, etc.	4.4	0.3
Other packaged snacks	8.4	1.9
Sugary drinks	69.7	23.3
Tea	46.9	9.2
Coffee	3.4	0.9
Carbonated drinks	7.0	1.1
Other canned or bottled cold beverages	12.3	2.4
Fruit juice and shakes	32.3	8.6
Other hot beverages (cocoa, drinking chocolate, health drinks, etc.)	7.6	3.1
Any purchased cooked food	90.5	63.6
Purchased cooked meals	15.5	29.4
Cooked snacks purchased (<i>samosa, puri, parantha, momo, roll, chowmein, idli, dosa, vada, chops, pakoda, pav-bhaji, vada-pao, etc.</i>)	87.1	31.1
Other served processed foods (<i>chaat, golgappa, bhelpuri, etc.</i>)	13.1	3.1

Source: Data from NSS-HCES 2023/24 data (India, MoSPI, 2024).

about three times more on HFSS foods compared with those in the bottom decile. The expenditure gap is largest (6.4 times) for sugary drinks, while it is 2.5 to 2.6 times higher for served processed foods and packaged ultra-processed foods. However, using the available data, we cannot determine whether this gap arises because richer families consume HFSS foods more frequently and in larger quantities or because they purchase higher quality (more expensive) foods than poorer households.

Interstate and rural-urban differences

Figure 2.4 shows state-level variation in weekly per capita HFSS expenditure. The spatial patterns highlight two important points. First, higher spending is evident in richer states, hill regions, and the islands, while poorer states (Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh) record relatively low expenditures. Second, although urban households spend more everywhere, rural expenditures are also nontrivial, especially in parts of

eastern and northeastern India, pointing to the nationwide expansion of HFSS consumption beyond urban markets.

Popular products driving HFSS consumption

Disaggregated data reveal which specific products dominated household diets. Nearly every household consumes some form of packaged snack each week, with biscuits and fried salty snacks emerging as the most widely consumed items. Chips and chocolates also reach large segments of the population, while products like instant noodles, cakes, and jams remain relatively niche purchases.

Data on beverages show a similar pattern: about 70 percent of households reported consuming sugary drinks, with fruit juices and tea accounting for the bulk of spending. Only 7 percent of households reported consuming carbonated drinks in the past week. These results suggest that HFSS penetration extends well beyond common items like cola or chips – consumption of a diverse range of HFSS foods and drinks has become routine in household diets.

From a policy perspective, this broad dispersion indicates that interventions focused narrowly on single products, such as soda taxes, may have only limited effect on consumption. Moreover, some of the most widely consumed items – such as tea and salty snacks – are often prepared at home or purchased from unregulated kiosks and vendors. Taxing only packaged varieties may therefore have limited impact on reducing overall consumption of HFSS unless complemented by broader strategies addressing the full range of HFSS drivers. Moreover, with the 2025 Goods and Service Tax (GST) reforms reducing tax rates on many ultra-processed foods, fiscal disincentives have weakened, underscoring the need to rely more on other instruments such as clear front-of-package labeling, marketing restrictions, mandatory product reformulation standards, and consumer education to ensure that policies and public action address the full spectrum of products driving dietary change, rather than just isolated categories.

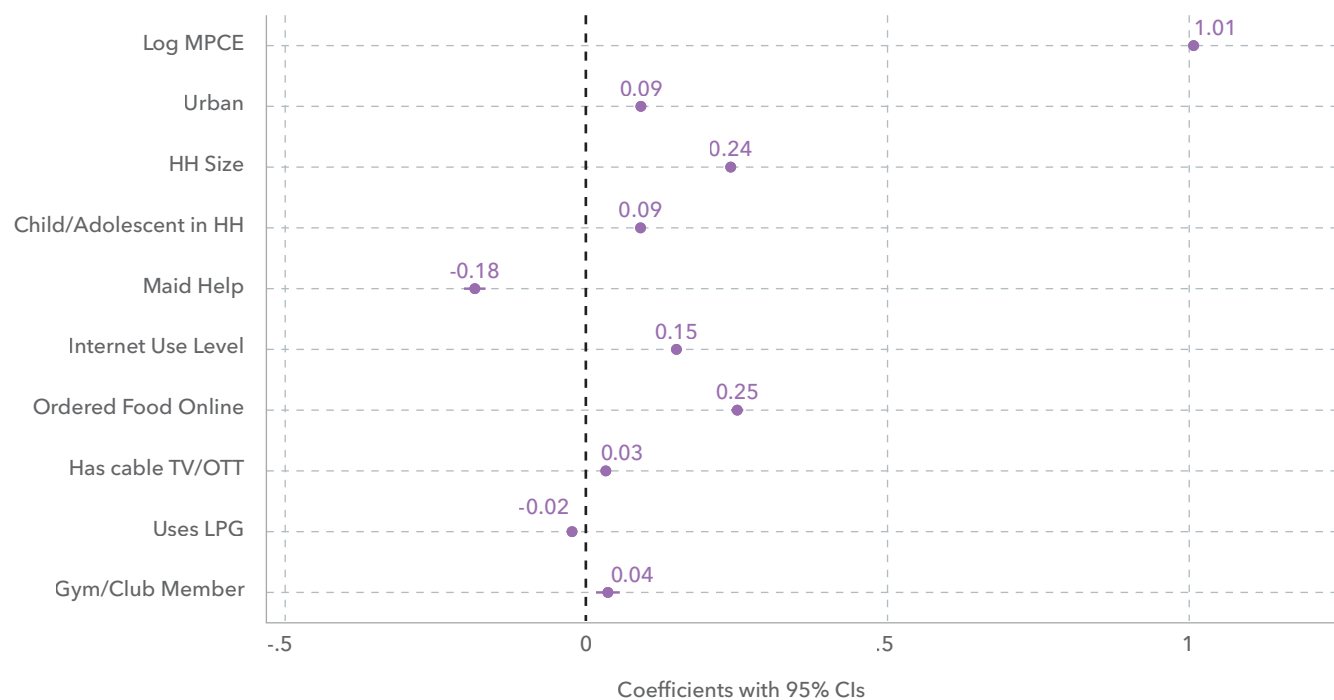
UNDERSTANDING HFSS DEMAND: KEY DRIVERS

We examine the correlates of HFSS food expenditure using a regression model that controls for household demographics (household size; number of children and adolescents ages 5-19 years; age, gender, marital status, and education level of the household head), location (rural or urban), income, access to clean cooking fuel, and lifestyle factors including internet access, online food ordering, cooking fuel type, domestic help employment, and gym membership.

Figure 2.5 summarizes the results. The strongest positive associations with HFSS expenditure are with log of monthly per capita consumption expenditure (log MPCE), household size, urban residence, and access to digital infrastructure – particularly internet use and online food ordering. Households with domestic help and those using LPG for cooking spent less on HFSS foods, suggesting that convenience and time constraints play important roles in consumption decisions. In contrast, households with older or female heads tend to spend smaller shares on HFSS foods, while expenditure is higher in families with children or adolescents, reflecting generational differences in dietary preferences.

To examine how HFSS consumption responds to changes in household economic status, we estimate the percentage change (elasticity) in household spending on HFSS associated with a 1 percent increase in total household expenditure. Values above 1.0 indicate spending rises faster than income, while values below 1.0 suggest spending rises more slowly than income. For example, an elasticity of 0.88 means that when household income increases by 10 percent, HFSS spending increases by only 8.8 percent.

For India overall, HFSS elasticities follow an inverse-U pattern: rising from 0.88 at the 10th percentile to 0.95 at the median, before declining to 0.74 at the 95th percentile (Table 2.2). All values remain below 1.0, indicating that HFSS expenditure grows with income, but less than proportionally.

FIGURE 2.5 Income, urban living, and digital access drive HFSS spending: Correlates of household expenditure on HFSS foods

Source: Authors' estimates from an ordinary least squares (OLS) regression using the NSS-HCES 2023/24 data (India, MoSPI, 2024).

Note: Each dot shows how much the log of HFSS expenditure changes with a one-unit increase in the corresponding variable (e.g., log MPCE, urban residence), while keeping other factors constant. A dot to the right of zero means higher HFSS spending; a dot to the left means lower spending. The model includes controls for age, sex, marital status, and years of education of the head of the household; if the household purchased any subsidized foods from the public distribution system; whether anyone in the family spent days away from home; and state fixed effects.

TABLE 2.2 Percentage change in expenditure on fresh fruits, vegetables, and foods high in fat salt, and sugar from 1% increase in total household expenditure per capita

Percentile of MPCE	Mean MPCE value (Rs)	HFSS	Vegetables	Fresh Fruits
10th	2670	0.88	0.73	1.29
50th	4915	0.95	0.55	1.16
95th	13,630	0.74	0.60	0.78

Source: Authors' calculations using NSS-HCES 2023/24 data (India, MoSPI, 2024).

Compared to HFSS, expenditure elasticities for vegetables are lower throughout the distribution, while fresh fruits exhibit higher elasticities – exceeding 1.0 for most households except the wealthiest 5 percent. This suggests that vegetables function as basic necessities, with spending relatively insensitive to income changes.

These patterns have troubling implications for dietary quality as incomes rise. While households increase fruit consumption substantially with higher incomes, they show moderate increases in HFSS spending and minimal increases in vegetable consumption. This suggests that income growth alone may not automatically improve overall diet quality, as gains from increased fruit consumption may be offset by higher HFSS intake.

These results suggest distinct roles for HFSS foods within household budgets across the economic spectrum. Among low-income households, HFSS consumption may be driven more by affordability constraints than preferences, as families seek accessible sources of calories and preferred taste. Middle-income households show the strongest responsiveness to income changes, indicating that HFSS foods function as discretionary or aspirational purchases in this income group – though these households may also face greater time constraints due to increased labor force participation that make convenient processed foods more attractive. However, the NSS-HCES does not collect detailed employment or time-use information for all household members, so we cannot directly test this linkage. Wealthy households demonstrate lower responsiveness, suggesting that factors beyond income – such as health consciousness, dietary preferences, or access to alternative foods – increasingly influence their consumption decisions.

The complex relationship between income and consumption across different income groups underscores that effective interventions must consider the diverse motivations driving HFSS food choices – from calorie supplementation among the poor to aspirational consumption among the middle class to preference-driven choices among the wealthy.

POLICY PRIORITIES: BEYOND REGULATION TO CONSUMER BEHAVIOR

The evidence presented in this chapter provides an example of how data collection and analysis can aid in identifying actionable entry points for multiple stakeholders trying to address the growing consumption of HFSS foods. Policymakers can use analysis of consumption patterns across income groups to devise progressive fiscal measures and target subsidies; industry can identify reformulation priorities and market risks; civil society organizations can focus advocacy efforts on the most vulnerable populations; and financial institutions can integrate nutrition considerations into lending decisions. This section outlines how these actors can translate findings into coordinated action.

The scale and breadth of HFSS consumption across the economic spectrum revealed by the data justifies stronger public intervention. Even the poorest households consume these products, driven not only by affordability but also by accessibility, marketing, and convenience. This creates a complex policy challenge that cannot be solved by governments and fiscal tools or labeling regulations alone, particularly in a country where nutrition policies still prioritize addressing undernutrition over the emerging double burden of malnutrition (undernutrition and micronutrient deficiencies coexisting with overweight and obesity) and diet-related noncommunicable diseases. An integrated strategy is needed that combines taxation, front-of-package warning labels, consumer education, and engagement with both formal and informal food enterprises, coordinated across policymakers, scientists, civil society, and industry to shift diets toward healthier patterns and mitigate rising health risks.

Realigning fiscal and health goals. Tax rates on foods and beverages are not currently aligned with nutritional content, and the September 2025 GST reforms have further weakened fiscal disincentives to consumption of HFSS products by lowering rates on many ultra-processed foods. Raising tax rates

on HFSS foods could slow consumption growth and incentivize reformulation toward healthier alternatives. Several Asian countries, including the Philippines, Saudi Arabia, Sri Lanka, and Thailand have introduced taxes on sugary and sweetened beverages, resulting in lower average sugar content in taxed products (Lane 2022). However, such taxes may disproportionately affect poor households, who spend larger shares of their income on food and may struggle to replace cheap ultra-processed foods with healthier alternatives (Pineda et al. 2024). These regressive effects can be mitigated by pairing such taxes with subsidies on healthy foods targeted specifically at low-income groups (Valizadeh and Ng 2024).

Labeling. Clear, mandatory front-of-package labeling can enable consumers to identify unhealthy foods and push firms toward reformulation. Sri Lanka’s experience with color-coded labels and media campaigns demonstrates this potential: sugar content in beverages dropped and carbonated drink sales declined. In India, however, the food industry has successfully resisted implementation of labeling requirements (Bansal 2021; Resnick and Nogales 2024). The Food Safety and Standards Authority of India’s pending star-based labeling system should be strengthened through mandatory implementation. Coupled with voluntary industry pledges to reduce salt, sugar, and fat and consumer awareness campaigns conducted by government, civil society, and even the food industry, such labeling can become a catalyst for large-scale product reformulation. For industry, the data on rising HFSS consumption across demographic groups signal both reputational risks and reformulation opportunities – companies that act early can gain competitive advantage as consumer awareness grows.

Regulatory challenge. The evidence that roughly 90 percent of food businesses operate as small, informal enterprises outside tax and regulatory frameworks has direct implications for policy design and public action. This dominance limits the effectiveness of fiscal measures and risks

shifting demand to unregulated vendors selling similar products. Moreover, HFSS consumption is not limited to purchased foods. NSS data show a steady increase in dietary fat even within home-cooked meals – from 43 to 60 grams in rural areas and from 53 to 70 grams in urban areas between 2009/10 and 2022/23 – making it clear that India’s nutrition transition is unfolding in kitchens as well as in markets and on food delivery platforms. This reality demands policy approaches that reach beyond formal retail to influence cooking practices and food culture more broadly, including partnerships with media, culinary influencers, and community organizations that can shift social norms around food preparation.

Behavioral nudges and consumer campaigns.

The evidence that HFSS consumption is driven by convenience, marketing exposure, and aspirational preferences, not just price, underscores the need for behavioral interventions alongside fiscal and regulatory measures. Corrective taxes and food labeling need to be combined with nutrition literacy and consumer education. Promising approaches include integrating nutrition education into school curriculums, using social media and influencers to promote healthy swaps for HFSS foods, and partnering with online delivery platforms to display nutrition warnings and promote healthier menu options. The Prime Minister’s 2023 call to reduce unhealthy fat and oil consumption (PIB Delhi 2025) signals high-level political support for behavioral strategies that complement regulatory tools with efforts to shift cooking practices, cultural norms, and everyday food choices. Civil society organizations can amplify these messages through community-level campaigns, while digital platforms can use evidence on youth consumption patterns to design targeted interventions.

Building multistakeholder coalitions.

Transforming India’s HFSS trajectory requires action beyond government. Research institutions can develop the evidence base needed to create common ground for diverse actors to engage constructively. Civil society and consumer advocacy

groups can use evidence to advocate for transparency, monitor industry compliance with reformulation commitments, and pressure policymakers for stronger regulations. Food and beverage companies can use data on product-level consumption patterns to identify reformulation priorities, adopt voluntary targets to reduce salt, sugar, and fat, and develop self-regulation codes that preempt stricter government mandates. Banks and investors can integrate evidence on rising diet-related health risks into environmental, social, and governance (ESG) performance frameworks, adjusting credit assessments for food manufacturers based on product portfolios and reformulation progress. Coordinated engagement across actors, linking fiscal policy with labeling, behavioral interventions with industry commitments, and consumer awareness with reformulation incentives, offers the best prospect for shifting dietary patterns at the scale and speed required to address India's emerging nutrition crisis.

Acknowledgments

We would like to thank the report editors and Derek Headey for constructive feedback and helpful suggestions, which have strengthened this chapter.

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Chapter 3

THE (UN)AFFORDABILITY OF HEALTHY DIETS IN SOUTH ASIA AND THE IMPLICATIONS FOR NUTRITION-SENSITIVE FOOD POLICIES

Derek Headey and Kalyani Raghunathan

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KEY MESSAGES

- Cost and affordability of healthy diet metrics are critically important new indicators of food insecurity, and reveal that balanced nutritious diets are relatively expensive and unaffordable for many South Asians.
- The share of people unable to afford the global healthy diet in the 2018-2022 period varies between 5 percent in Bhutan to 21 to 57 percent in other South Asian countries. In total, more than 1 billion South Asians cannot afford the global healthy diet.
- There are three major barriers to achieving convergence of actual diets to healthy diets: poverty (low incomes), the high cost of nutrient-dense foods, and weaker preferences for healthy foods compared with unhealthy foods.
- “Healthy diet poverty” is still the main barrier for many South Asians, highlighting the importance of inclusive economic growth as well as the need to scale up nutrition-sensitive social protection with more appropriate coverage, size, nutritional adequacy, and comprehensiveness of transfer packages, and increased intensity of complementary nutrition education interventions.
- High prices are problematic for some nutrient-dense foods, especially fruits, vegetables, and animal-source foods, but there is scope to reduce prices through diversified agricultural investments, improvements in transport, storage, and logistics infrastructure, and more nutritionally oriented trade policies.
- As incomes in South Asia grow, so too does the preference problem: Even though many South Asians cannot afford a healthy diet, factors such as poor nutrition knowledge, convenience, taste, advertising, and status considerations also inhibit consumption of healthy diets. Nutrition education and behavioral change interventions are needed at scale, and throughout the life course, including “double duty” interventions that increase demand for healthy foods and decrease demand for unhealthy foods.

The 1996 World Food Summit defined food security as “all people, at all times, having physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (FAO 1996). While food security is surely a basic human right, ensuring access to nutritious foods—especially those consistent with local customs and preferences—is immensely challenging in South Asia. The household food budget of the average South Asian household is either insufficient to afford the healthy diets recommended by nutritionists and food-based dietary guidelines, or at best only marginally sufficient, so that households opt to consume much less costly diets. Moreover, even if healthy diets are affordable in a strictly monetary sense, households from all socioeconomic classes often choose relatively unhealthy diets, either for reasons of taste, convenience, tradition, or inadequate nutrition knowledge.

Improving the affordability of healthy foods and diets is a critically important intermediate goal for nutrition-sensitive food policies. To understand these challenges, in this chapter we first focus on the most recent evidence on the cost and affordability of healthy diets in South Asia. We then interpret empirical findings through a broadly defined food policy lens, focusing on both how policy-makers could raise incomes to bridge the healthy diet affordability gap and how they could reduce retail prices of nutritious foods in an economically and environmentally sustainable fashion.

HOW (UN)AFFORDABLE ARE HEALTHY DIETS IN SOUTH ASIA?

In the past five years, healthy diet affordability metrics have become influential, starting with pioneering work in South Asia itself (Dizon et al. 2019; Raghunathan et al. 2021) and neighboring Myanmar (Mahrt et al. 2019). Since 2020, these metrics have been published in the State of Food Insecurity and Nutrition (SOFI) reports (FAO et al. 2024), using food price data from the International

Comparison Program (ICP) (World Bank 2023) and income/expenditure distribution data from the World Bank’s Poverty and Inequality Portal (World Bank 2025). Most SOFI reports estimate the cost of a generic global healthy diet derived from commonalities across national food-based dietary guidelines (Herforth et al. 2022; FAO et al. 2024) and based on six food groups reported in Table 3.1. Within each food group, the cheapest food items are selected to meet group-specific calorie targets as well as an aggregate daily intake target of 2,330 kcal for a representative adult. The cost of a healthy diet is then essentially used as a new, nutrition-sensitive food poverty line, and the determination of whether an individual or household can afford a healthy diet depends on whether their food budget (that is, expenditure net of nonfood needs) is sufficient to afford a healthy diet at retail market prices.

Table 3.1 shows the cost of this global healthy diet in seven South Asian countries for the most recent 2021 ICP round. On average, the healthy diet costs \$3.79 per capita per day in 2021 international dollars, although this varies between a low of \$3.11 per day in India to roughly \$4.00 per day in the Maldives and Sri Lanka and almost \$5.00 per day in Bhutan. Factors such as agroecological conditions, remoteness and transport costs, trade policies, and consumer and producer subsidies (especially for staple grains) likely explain these differences in diet costs across South Asian countries. For example, it is notable that the three smallest countries in South Asia (Bhutan, Maldives, and Sri Lanka) have the highest healthy diet costs, most likely because they are more dependent on imports for some key food groups (such as fruits and vegetables) compared to the four larger countries.

The composition of healthy diet costs also sheds light on the potential structural and policy factors explaining these variations. Although starchy staple consumption recommendations usually amount to around 50 to 60 percent of an individual’s total caloric intake, they only comprise 12 percent of healthy diet costs on average in South Asia, with oils and fats accounting for 7 percent, and pulses

TABLE 3.1. The costs of a “global healthy diet” and its six food group components in seven South Asian countries in 2021

	Total healthy diet cost	Oils and fats	Starchy staples	Pulses, nuts, and seeds	Vegetables	Fruits	Animal- source foods
South Asia (N = 7)							
Healthy diet costs	\$3.79	\$0.25	\$0.45	\$0.34	\$0.81	\$0.86	\$1.08
Food cost shares	100%	7%	12%	9%	21%	23%	28%
Bangladesh	\$3.37	\$0.12	\$0.40	\$0.23	\$0.67	\$0.58	\$1.37
Bhutan	\$4.96	\$0.25	\$0.56	\$0.40	\$0.96	\$1.45	\$1.34
India	\$3.11	\$0.24	\$0.42	\$0.37	\$0.64	\$0.53	\$0.91
Maldives	\$3.95	\$0.14	\$0.18	\$0.45	\$1.26	\$0.99	\$0.93
Nepal	\$3.69	\$0.27	\$0.60	\$0.39	\$0.79	\$0.72	\$0.92
Pakistan	\$3.34	\$0.28	\$0.46	\$0.33	\$0.40	\$0.78	\$1.10
Sri Lanka	\$4.13	\$0.43	\$0.53	\$0.24	\$0.93	\$0.98	\$1.01

Source: World Bank (2024a).

Note: Costs are in 2021 international dollars.

and nuts 9 percent. Hence almost three-quarters of healthy diet costs stem from vegetables (21 percent), fruits (23 percent) and animal-source foods (28 percent), with this last group generally either dairy (such as in India) or fish (Bangladesh, Maldives, Sri Lanka). The immediate implication of this simple but striking result is that if a country wants to reduce the cost of a healthy diet, it should primarily focus on policies and programs that would directly or indirectly reduce consumer prices of vegetables, fruits, and animal-source foods.

Of course, the share of the population that cannot afford a healthy diet depends on a country’s distribution of household income or consumption expenditure. While the price data in Table 3.1 pertain to 2021, consumption surveys in South Asia take place in different years, as noted in Table 3.2, and extrapolation or interpolation techniques are used to derive healthy diet (un)affordability estimates for 2021 (Herforth et al. 2022). To give a feel for the extent and depth of the affordability challenge, Table 3.2 first compares the healthy diet costs from Table 3.1 to median consumption per capita (both in 2021 international dollars). For example, the cost of a healthy diet in Bangladesh is \$4.13 per capita, but median consumption for both food and

nonfood needs is just \$4.78 per capita, suggesting a typical consumer cannot afford a healthy diet. Healthy diet costs are also very close to median consumption per capita in India. Comparisons for both Sri Lanka and Pakistan need to be interpreted with caution, as these countries conducted their last household income and expenditure surveys (HIES) prior to the COVID-19 pandemic and before recent economic and political crises that included high rates of inflation.

The last two columns of Table 3.2 report the estimated prevalence of people unable to afford a healthy diet in 2021 and the associated population in millions. In Bhutan, where median consumption is far higher than in other South Asian countries, just 5.6 percent of the population cannot afford a healthy diet, despite Bhutan having the highest healthy diet costs (\$5.48). In the remaining countries, this share ranges from 21.4 percent in Nepal to 31.9 percent in (pre-crisis) Sri Lanka and 57.3 percent in Pakistan, with India also having a high share (51.6 percent). In terms of absolute numbers, the estimates for 2022 suggest that 917 million South Asians could not afford a healthy diet in these six countries.

Furthermore, a number of South Asian countries subsidize staple grains (and in some Indian states,

TABLE 3.2. The cost and affordability of a “global healthy diet” in six South Asian countries in 2022

Country	Year	Source	Healthy diet cost (\$ per capita)	Median consumption (\$ per capita)	Unable to afford healthy diet	
					Prevalence (%)	Population (millions)
Bangladesh	2022	HIES	\$4.13	\$4.78	49.1%	83.1
Bhutan	2022	LSS	\$5.48	\$13.86	5.6%	0.2
India	2021	CPHS	\$3.40	\$3.94	51.6%	729.4
Nepal	2022	LSS	\$3.89	\$7.41	21.4%	7.2
Pakistan	2018	HIES	\$2.91	\$4.07	57.3%	130.1
Sri Lanka	2019	HIES	\$3.70	\$6.91	31.9%	7.2
Total					57%	917

Source: Data from World Bank (2024b).

Note: HIES = Household Income and Expenditure Survey. LSS = Living Standards Survey. The CPHS is the Consumer Pyramids Household Survey, with consumption re-weighted by World Bank staff to redress undersampling of poorer households. Data for Maldives are not reported because of the lack of a recent household income or expenditure survey. Costs are in 2021 international dollars.

pulses), so the true costs for some poor consumers may be somewhat lower than those reported in Table 3.1, and healthy diets somewhat more affordable than those reported in Table 3.2.

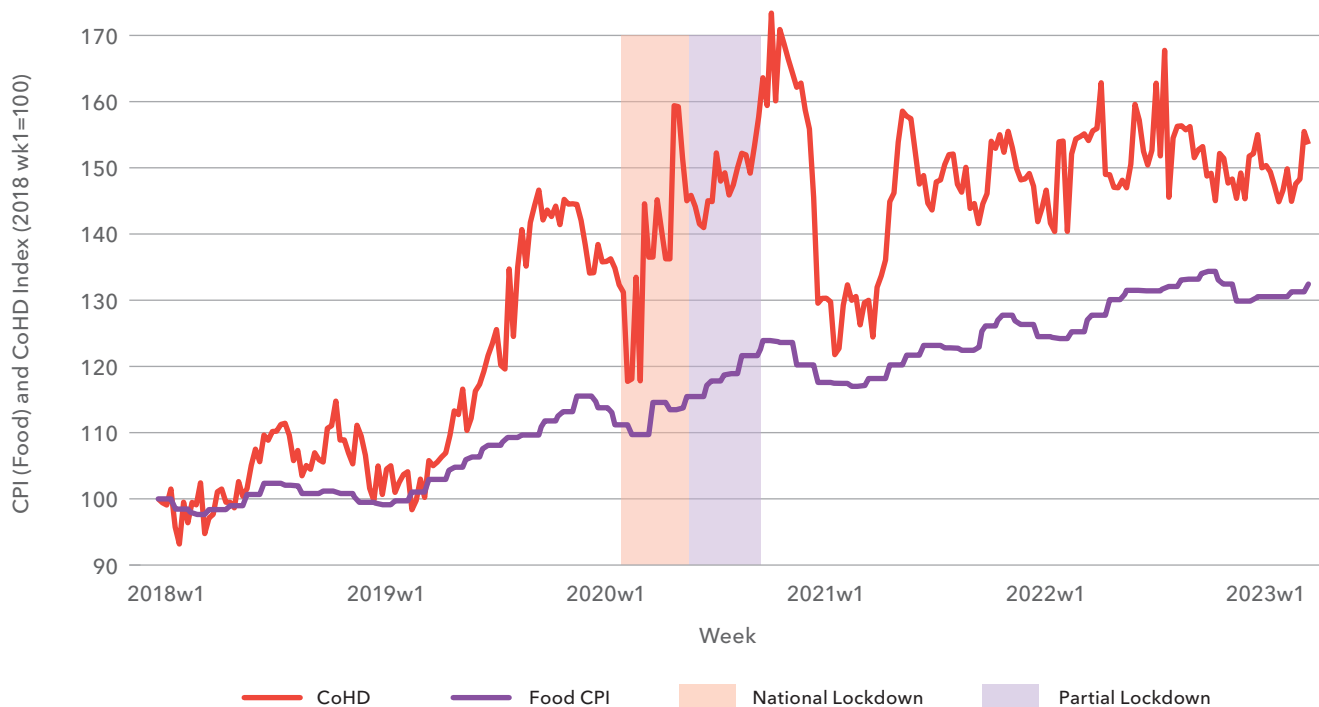
Both food and nonfood inflation have become a major economic problem in South Asia in the wake of the economic impact of large COVID-19 stimulus packages and Russia’s invasion of Ukraine (Abay et al. 2023). While Pakistan and Sri Lanka stand out as having exceptionally high food inflation – reaching 60 percent in Sri Lanka in 2022, and 25 and 38 percent in Pakistan in 2022 and 2023, respectively – other South Asian countries have also struggled with food inflation that is unusually high by recent historical standards. The Reserve Bank of India, for example, considers 6 percent inflation a tolerance threshold, above which it should take monetary policy action.

However, a novel insight from recent research on cost of healthy diet metrics is that indices of healthy food prices can often deviate markedly from the more conventional consumer prices indices (CPIs) used to track food inflation. Such deviations are possible because CPIs are weighted averages across a wide variety of foods that place greater weight on staple foods such as rice, wheat, oils, and

fats. Prices for these nonperishable commodities naturally tend to be less volatile, though South Asian governments also take many steps to keep these prices stable. Similarly, processed foods – though often unhealthy – have much more stable prices than do fresh fruits, vegetables, and animal-source foods, which are often highly perishable and only produced on a seasonal basis

To see this, Figure 3.1 (from Narayanan et al. 2024) compares the food CPI for urban India to a new Cost of Healthy Diet (CoHD) index covering 2018 to early 2023, including an extended period of national lockdown and partial lockdown in 2020. Although both price indices trend upwards, the CoHD index rose substantially faster overall, and was far more volatile than the food CPI, with spikes in 2019 and 2020, and again in 2021. Narayanan et al. (2024) argue that the CoHD should be regularly monitored in India to provide a more nutrition-focused benchmark of food inflation.

Of course, whether inflation in healthy diet costs is an indication of increased food and nutrition insecurity entirely depends on what is happening to incomes. Household income or consumption, however, can be costly to measure, and most governments only conduct nationally representative

FIGURE 3.1. Trends in the food CPI and the cost of a healthy diet in urban India, 2018–2023

Source: Narayanan et al. (2024).

Note: (1) CoHD is normalized to 2018 week 1 and Food CPI to 2018 month 1 prices; (2) CoHD is the national weekly cost of healthy diets across centers with all eight food group prices; and (3) Food CPI is the urban consumer food price index.

surveys every 5 to 10 years. India and Nepal had 10-year gaps between consumption surveys, and as we saw in Table 3.2, Sri Lanka and Pakistan have not conducted national surveys since their economic crises in 2022–2023. How, then, can governments, NGOs, and international development agencies monitor the affordability of healthy diets at higher frequency?

A recent paper by Headey et al. (2024) argues that high-frequency data on the wages of unskilled, semi-skilled, and skilled workers offers a suitable proxy for the incomes of the poor and lower-middle class. Throughout South Asia, the nonfarm poor primarily depend on selling their labor to earn a living, and wages for different occupations tend to follow similar trends. Moreover, Deaton and Dreze (2002) make the argument that the wages of the poor can be thought of as a poverty measure in their own right. Fortunately, most South Asian countries

do collect wage data at high frequency, though government agencies have not yet combined food prices and wages to track the affordability of healthy diets relative to wages, that is, trends in the “health diet wage.”

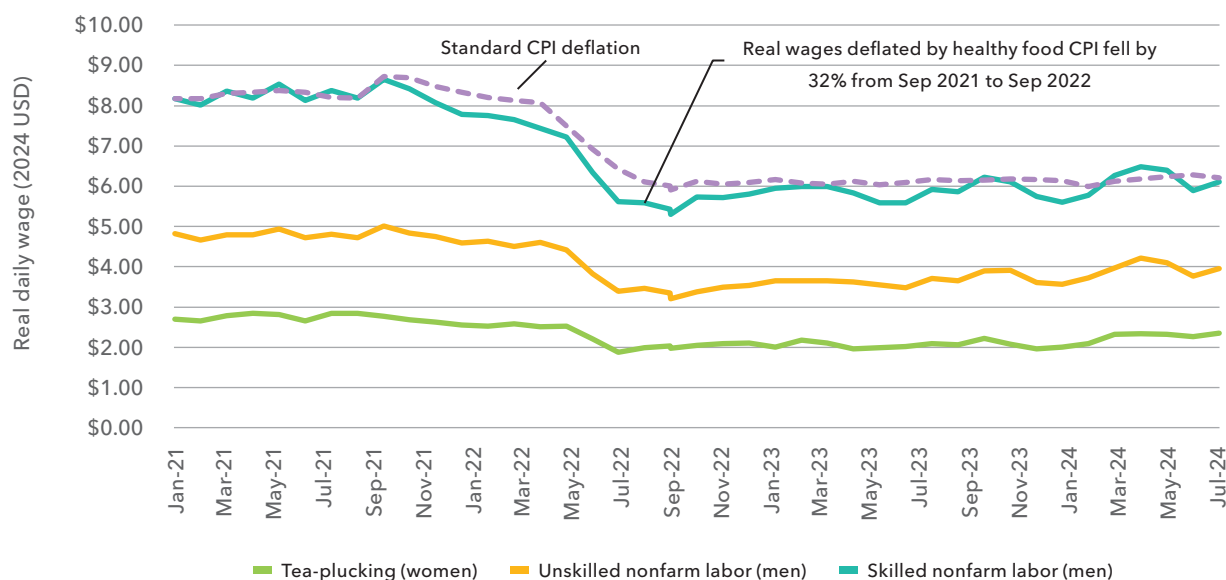
Yet doing so would fill a critically important data gap, especially in crisis-hit countries. Figure 3.2 demonstrates this for Sri Lanka, which saw a 60 percent increase in food prices over just a few months from March to June 2022, following the country’s sovereign debt default and a sharp depreciation of its currency. The Central Bank of Sri Lanka (CBSL 2025) monitors both retail and wholesale prices of a range of healthy foods, as well as wages of men and women in the large tea, rubber, and coconut estate sectors, in rice production, and in manual nonfarm occupations with different skill levels. For the real wage trends reported in Figure 3.2, we deflated wages by a new CPI in which the standard food CPI

component is replaced by a healthy food price index, while the nonfood CPI is left in place. We constructed the healthy diet CPI by first estimating separate price indices for eight different food groups (a fish price index, a fruit price index, and so on) and then applying weights to each food group designed to generate a CPI that is associated with a healthy and balanced diet (see notes for Figure 3.2). In deflating nominal wages for different occupations and genders, we can derive high-frequency (monthly) estimates of changes in the affordability of healthy diets for workers of very low socioeconomic status (for example, tea pluckers) as well as lower-middle-class occupations, such as skilled nonfarm labor (in this case, carpentry and masonry).

We report these real wage trends deflated by the healthy diet CPI over the January 2021 to July 2024 period, which includes the March 2022 onset of Sri Lanka's exceptionally severe economic

crisis. For skilled nonfarm labor (men), real wages deflated by the healthy foods CPI fell by a remarkable 32 percent from September 2021 to September 2022. A similar reduction is observed for unskilled nonfarm labor for men (–29 percent), and tea plucking for women (–21%), though the graph also reveals that wage rates for women in the tea estate sector are just 60 percent of those for nonfarm wages for men. Finally, the graph shows that despite some macroeconomic recovery in late 2023 and 2024, real wages have scarcely improved since their trough in mid-2022. Figure 3.2 therefore illustrates the critical importance of monitoring wages and healthy diet costs at high frequency, across occupations and genders, and ideally across geographic areas. In South Asia, moreover, constructing such indices would be fairly simple, as most national government agencies in the region already regularly collect a rich array of food price and wage data.

FIGURE 3.2. Trends in real wages of male and female workers of different skill levels during Sri Lanka's economic crisis deflated by healthy foods consumer price index



Source: Authors' construct from price and wage data reported in CBSL (2025), as well as the nonfood consumer price index.

Note: For the healthy foods CPI, we first construct price indices for eight food groups and then create an aggregate healthy foods price index by applying weights that would lead to a balanced healthy diet. The food groups and corresponding weights are (1) rice (weight = 20%); (2) other starch staples (potato, plantain) (weight = 5%); (3) beans (weight = 10%); (4) staple vegetables (onions, tomatoes, pumpkins) (weight = 15%); (5) other vegetables (weight = 10%); (6) fruits (bananas) (weight = 15%); (7) fish (weight = 15%); and (8) poultry (meat, eggs) (weight = 10%).

POLICY OPTIONS FOR IMPROVING AFFORDABILITY OF HEALTHY DIETS

In IFPRI's *2024 Global Food Policy Report*, a think piece on global healthy diet affordability challenges (Headey, Hirvonen, et al. 2024) discusses three main barriers to achieving a sustainable shift to healthy diets: poverty, prices, and preferences.

The poverty problem

Too many people in South Asia simply do not earn enough to purchase the recommended quantities of healthy foods in their local food environments. How quickly could economic growth improve the affordability of healthy diets in LMICs? It has been estimated that a 1 percent increase in per capita GDP is typically associated with a 1.3 percent reduction in the number of people who cannot afford a healthy diet (Headey, Hirvonen, et al. 2024), though population growth works in the other direction. So faster economic growth certainly helps, although more inclusive economic growth that raises wages and incomes for the poor will have even larger effects.

However, since large swathes of poor people in South Asia currently have incomes that fall far below the cost of a healthy diet, nutrition-sensitive social protection could offer a more immediate means to bridge affordability gaps (see Chapter 10). A significant problem in South Asia is that although social protection programs often reach large sections of the population (including nonpoor households in some instances), the value of the transfers is so low that they close only a small portion of the healthy diet affordability gap. During the extraordinary circumstances of the COVID-19 pandemic, for example, poorer households in lower-middle-income countries in Asia typically received around \$0.50 per day (in cash or in-kind). For a household of five, that amounts to \$0.10 per individual. Clearly, such a modest transfer could only have a very limited impact on diet quality (Ecker et al. 2023). This suggests that nutrition-focused social protection programs should

consider additional cash or in-kind food supplements for the most nutritionally vulnerable groups. There is surely also scope to scale up social protection in South Asia through internal reallocation of other government expenditures to support social protection programs.

The price problem

The average healthy diet cost in South Asia in 2021 was \$3.79 per day in 2021 international dollars (Table 3.1), raising the question, How can this cost be reduced? In principle, there are a number of ways to reduce prices of healthy foods, but important trade-offs exist in terms of fiscal costs, the speed at which prices might change, equity considerations, and financial sustainability. For example, price subsidies for healthy foods can immediately reduce the real costs consumers face, but such subsidies are costly and likely to be regressive because better-off households consume more nutrient-dense foods than poorer households. Subsidies to staple food production in South Asia almost certainly inhibit diversification into healthy food production and also have serious environmental costs, such as groundwater depletion, but cheaper grains free up room in household food budgets for spending on nonstaple foods, potentially allowing for greater dietary diversification (though income/cash support would do the same).

In the longer term, improving production of healthy foods could have significant effects on relative prices, given that many healthy foods are highly perishable and thus not cost-effectively tradable over long distances. This means that an increase in productivity of egg production, for example, would be expected to reduce real egg prices. This is precisely what has been observed in India and other Asian countries, and indeed at a global level (Morris et al. 2018). However, more systematic modeling and research are needed to understand price effects of productivity improvements both on the farm and in supply chains for nutritious foods, including transport, logistics, and infrastructure considerations.

The preference problem

If, tomorrow, all South Asians were given the incomes required to afford healthy diets, would they actually choose to purchase and consume these diets? Unfortunately, the answer is no. South Asia's dietary transition to unhealthy processed foods is well documented (see Chapter 2). Latent demand for foods dense in unhealthy oils/fats, sugar, and salt is strong in the region, while consumer preferences for vegetables and fruits are generally weak. Hence, income growth/support and cost reductions for healthy foods would be insufficient to move diets in the right direction. Nutrition-oriented policies and programs are needed to shift food preferences at scale through behavioral change communication or food environment interventions. That is the subject of ongoing research in CGIAR and elsewhere, but it obviously constitutes an immense challenge that requires interventions targeted at the individual, household, food environment, and industry levels to facilitate change at scale.

POLICY ACTIONS TO ACHIEVE A SHIFT TO HEALTHIER DIETS

There may be as many as 1 billion South Asians who are unable to afford a healthy diet. Putting healthy diets within reach of all South Asians will require:

1. **Improving national and subnational high-frequency monitoring of healthy diet affordability through improved utilization of food price, wage, and household survey data.** This will provide a stronger evidence basis for interventions, a new dimension to early warnings systems, and a stronger platform for nutritional advocacy at the national level.
2. **More rapid and pro-poor economic growth** reforms that countries can implement to catalyze faster and more equitable growth.
3. **Realignment of agricultural and food policies and investments toward nutritious foods** (including fortified foods and other nutritious processed foods) that make healthier, nutritious diets more affordable, through price and/or income mechanisms.
4. **Improving transportation, infrastructure, storage, processing, and logistics systems** relevant to domestic *and* international trade in food – especially perishable nutritious foods – including both investments in hard infrastructure and development of efficient businesses in the midstream of value chains.
5. **Scaling up nutrition-sensitive social protection with more appropriate** coverage, size, and nutritional adequacy, with comprehensive transfer packages, and with greater intensity of complementary nutrition education interventions.
6. **Scaling up “double duty” interventions to increase demand for healthy foods and decrease demand for unhealthy foods.** More evidence and experimental programming are needed.

More policy-oriented research is needed to provide a strong evidence base to support these actions, but that should not delay more ambitious multisectoral efforts to immediately improve both supply of and demand for healthy diets, for all South Asians, at all times.

Acknowledgments

We would like to thank the report editors and Harold Alderman for constructive feedback and helpful suggestions, which have strengthened this chapter.

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Chapter 4

FOOD ENVIRONMENTS AND BEHAVIORAL DRIVERS OF FOOD CHOICE IN SOUTH ASIA

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KEY MESSAGES

- To improve diets, policy interventions are needed across the four key dimensions of the food environment: accessibility, affordability, availability, and desirability.
- The distinction between rural and urban food sectors is diminishing, with increased availability of packaged foods from multinational companies playing a significant role in this shift.
- Establishing an effective regulatory framework for food packaging, labeling, and marketing is essential to creating healthier food environments and shaping consumer perceptions of food products and their desirability.
- There is increasing support for taxing food products that are high in unhealthy fats, salt, and sugar, such as sugar-sweetened beverages, chips, biscuits, and so on.
- Low consumption of fruits and vegetables, driven by both supply- and demand-side constraints, poses a significant challenge to achieving healthy diets in South Asia.
- Exposure to advertising and digital food environment reach are high among high-income groups, yet knowledge about the promotion and reach of healthy diet information is limited.
- The proliferation of digital food environments also poses regulatory challenges, as marketing targeted at wealthier households creates a ripple effect across lower income groups who emulate these behaviors.

Food environments encompass all physical and digital spaces where individuals interact with and access food. These environments play a critical role in shaping dietary patterns, including where and how people purchase, consume, and engage with food (Turner et al. 2018; Downs et al. 2020). Examples of food environments include grocery stores, farmers' markets, large retail outlets, restaurants, school canteens, and tea and coffee shops, as well as digital platforms that facilitate the sale and delivery of food directly to consumers (Singh et al. 2024). Decisions within food environments are influenced by both consumer demand and producer supply-side factors, including purchasing power, market access, food availability, and tastes (Turner et al. 2018). Policies and interventions can be implemented to reshape food environments with the aim of promoting healthier diets (Blake et al. 2021).

Using primary and secondary data sources, this chapter examines the characteristics of food environments across South Asian countries and explores key aspects of the policy landscape that influences them. The first section illustrates key drivers of food choices and their relationship with food consumption. The second section describes food environments in rural South Asia and digital food environments in India. The last section proposes possible policy solutions to emerging challenges related to food environments in the region.

HOW DO CONSUMER PERCEPTIONS OF THEIR FOOD ENVIRONMENTS INFLUENCE THEIR FOOD CHOICES?

The *2024 Global Food Policy Report* underscores accessibility, affordability, availability, and desirability as the important food environment domains driving food choices (IFPRI 2024). Accessibility refers to the ease of acquiring food (distance to markets or the proximity of roads, for example) while availability refers to the presence of a food source or the product itself (market supply)

(Charreire et al. 2010; Lake 2018). Affordability is a function of individual or household purchasing power and market prices (Gaupholm et al. 2023; Bassi et al. 2021), whereas desirability is a function of personal preferences and tastes (Moitra and Madan 2022). These food environment domains can be measured at multiple levels (Turner et al. 2018). The district agrifood systems assessment survey conducted by the CGIAR Research Initiative on Transforming Agrifood Systems in South Asia (TAFSSA) included these food environment measures at individual, household, and market levels (see Box 4.1 on the importance of studying food environments in the region). This section focuses on results from a novel tool, developed by TAFSSA, to understand individual perceptions of these food choice drivers.

Individual perceptions of food accessibility, availability, affordability, and desirability

The TAFSSA survey was conducted in five locations: Rajshahi and Rangpur districts in Bangladesh, Nalanda district in India, and Banke and Surkhet districts in Nepal. TAFSSA considered foods high in fats, sugar, and salt unhealthy, whereas unprocessed fresh foods dense in nutrients were considered healthy. Respondents were requested to "agree", "disagree", or "neither agree nor disagree" (Likert scale) with statements related to individual-level drivers for six common foods: dal, eggs, green leafy vegetables, and bananas (healthy foods); and biscuits and fried food (unhealthy foods). The responses were assigned a score (agree=1, disagree=0, neither agree nor disagree=0.5). The scores for the food items were summed and standardized (as proportions) to range between 0 (lowest) and 1 (highest).

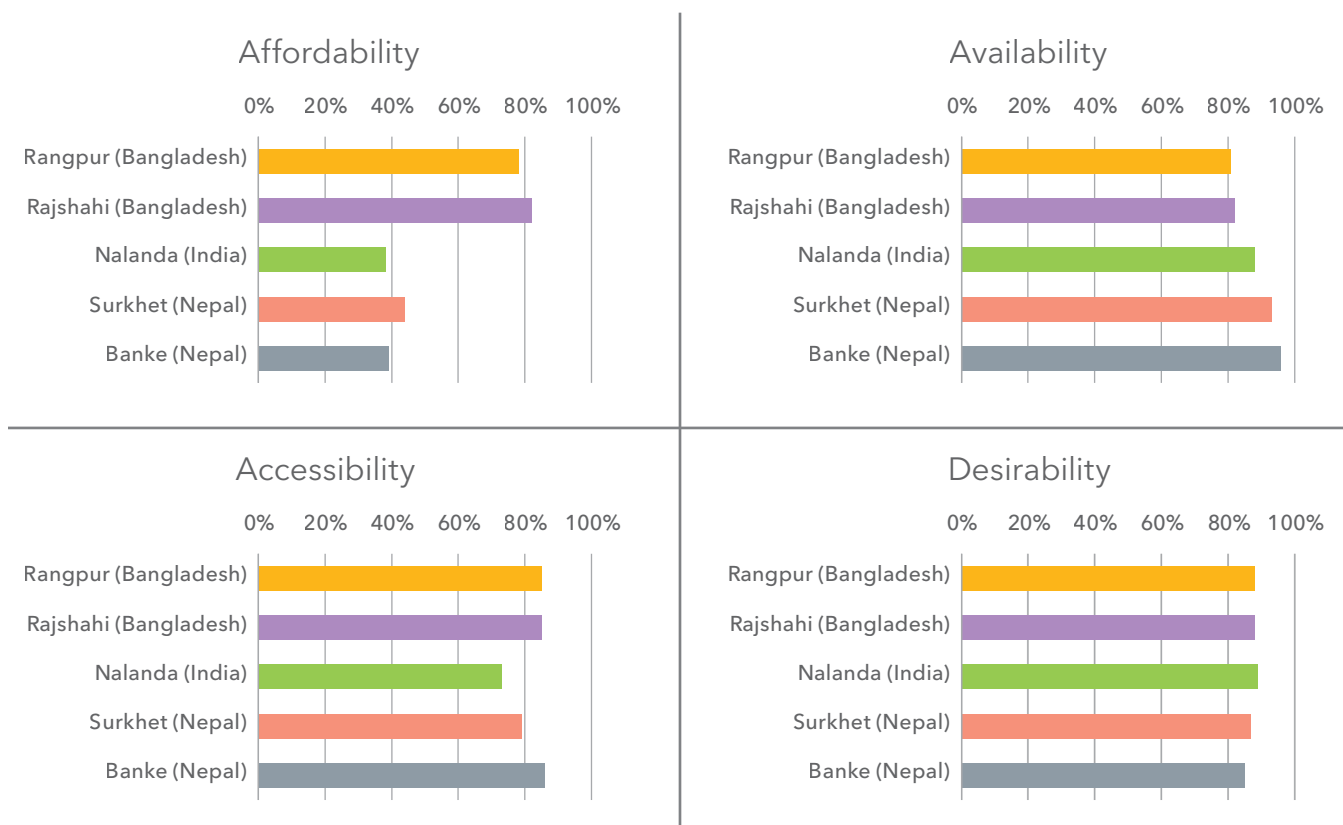
Figure 4.1 shows the percentage of respondents who agreed with statements about perceptions of individual-level food choice drivers for all six foods in all five districts combined. High agreement rates for healthy and unhealthy sentinel foods for accessibility (65–92 percent) and availability (81–96 percent), resulting in higher averages across

BOX 4.1 Why study food environments in South Asia?

While food environments are evolving rapidly across low- and middle-income countries, South Asia presents a unique setting for several reasons.

- Household incomes across the region have been steadily increasing for decades, enabling consumers to purchase a wider variety of foods (Pingali and Abraham 2022).
- South Asian countries are experiencing rapid urbanization, with significant migration from rural to urban areas (Shivakoti 2022; Naz and Khan 2021; Bren d’Amour et al. 2020).
- South Asia’s food environments are characterized by a large share of informal markets and vendors, which are often challenging to regulate (Henson et al. 2023).
- The widespread adoption of smartphones and internet access in South Asia is driving a swift transition to and growth in the digital food environment (Pingali and Abraham 2022; Ma et al. 2022).
- The region faces a high burden of diet-related noncommunicable diseases, highlighting an urgent need to assess and intervene in food environments to steer dietary patterns toward healthier outcomes (Gopalan et al. 2018).

FIGURE 4.1 Percentage of respondents who agreed with statements about perceptions on individual-level food choice drivers



Source: Data from the TAFSSA district agrifood systems assement. Note: The following statements were posed to respondents: Affordability (Given my income, _____ are not too expensive); Accessibility (It is easy to acquire _____ close to where I spend most of my time); Availability (I know of at least one vendors/shop who sells _____); and Desirability (I like the taste of _____)

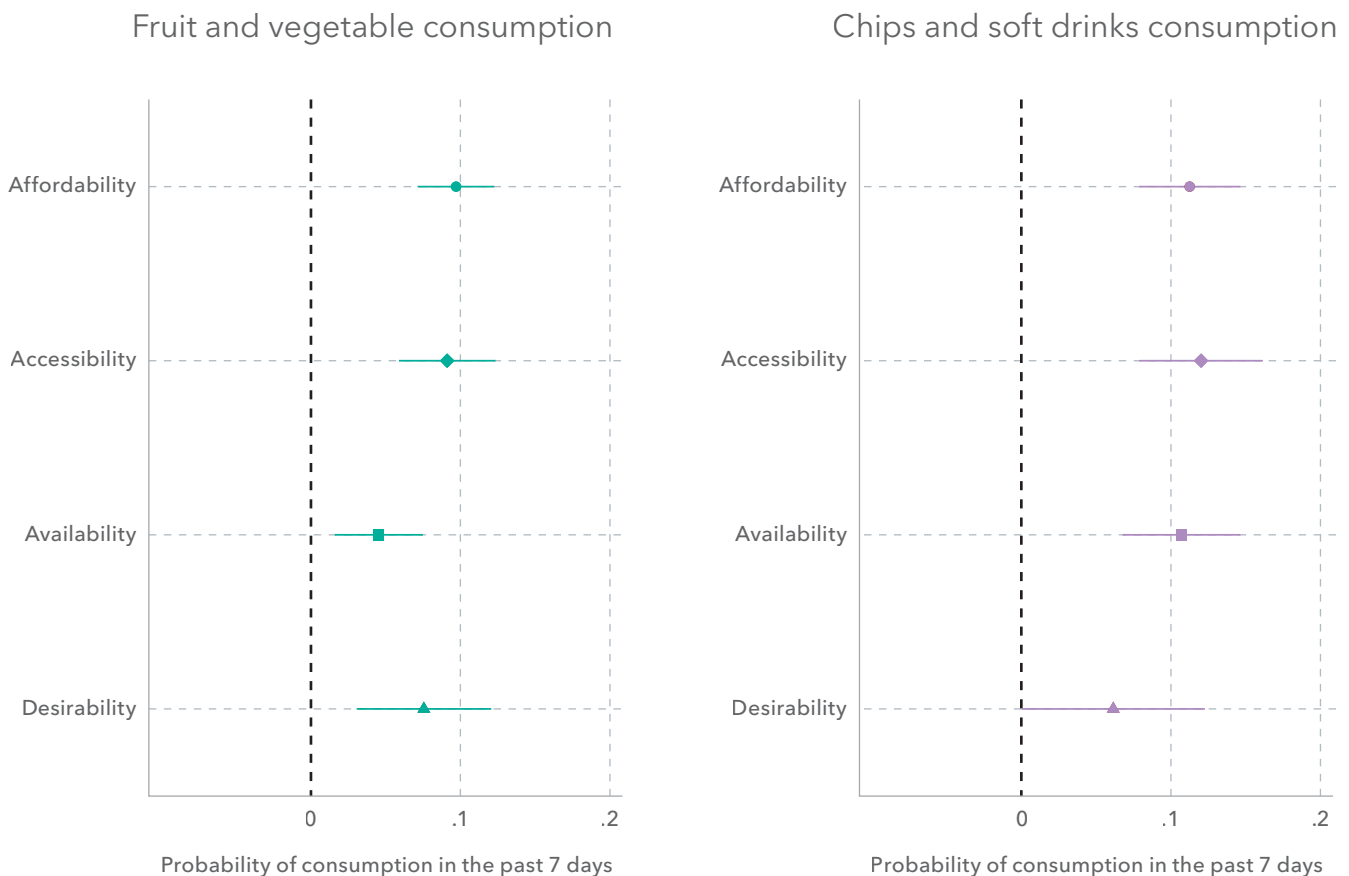
districts, indicates that even rural markets in South Asia appear to be evolving into “food swamps,” where there is a co-occurrence of unhealthy foods along with traditional healthy foods (Bridle-Fitzpatrick 2015; Bevel et al. 2023). The most commonly perceived constraint among the four domains was low affordability, especially in India and Nepal.

Food accessibility, availability, affordability, and desirability and their association with food choice

This section examines how individual-level food choice drivers correlate with the consumption of

healthy foods (fruits and vegetables) and unhealthy foods (chips and soft drinks). Consumption was measured using a Food Frequency Questionnaire, and outcomes were measured as respondents reporting consumption of the food group at least once in the past seven days. We used an ordinary least squares model to test the association between food intake for this period with the four individual-level food choice drivers: average perceived accessibility, availability, affordability, and desirability for all six foods. The models controlled for age, sex, and district fixed effects. With binary outcomes, the regression coefficients are interpreted as

FIGURE 4.2 OLS estimates for consumption in the last seven days against perceptions of affordability, accessibility, availability, and desirability



Source: Data from the TAFSSA district agrifood systems assement.

Note: OLS = ordinary least squares analysis.

higher or lower probabilities of consuming the food group at the maximum level of the respective food choice drivers.

Higher levels of agreement across all four individual-level food choice drivers are associated with higher levels of fruit/vegetable and chips/soft drinks consumed (Figure 4.2). In the figure, the dots represent regression point estimates and bands represent 95 percent confidence intervals. Wherever the bands intersect with the vertical line at zero, the estimate is not statistically significant. Affordability, accessibility, and desirability were independently important for the consumption of fruits and vegetables. For instance, individuals who reported that all six foods were affordable had a 10 percent greater probability of consuming fruits and vegetables the previous week. Perceptions of availability had different associations with the consumption of healthy foods and of unhealthy foods. High perceived availability of all six foods increased the probability of consuming chips and soft drinks (by 11 percent) more than the probability of consuming fruits and vegetables (by 5 percent). A caveat to these results is that food choice drivers with high averages also have low variation, thus reducing the likelihood of being predictive.

As income levels rise, the affordability constraint on food choices may gradually relax, potentially alleviating a key barrier to accessing healthier diets. However, with other domain perceptions – such as availability, accessibility, and desirability – already at high levels, increased income could also lead to greater consumption of unhealthy foods. This dual possibility underscores the importance of understanding how income growth interacts with food environments to influence dietary behaviors (Gaupholm et al. 2023; Moitra and Madan 2022). The findings on desirability highlight a critical focus area for interventions aimed at promoting healthier diets. The positive association between perceived food availability and unhealthy consumption underscores the need to investigate market-level factors that influence household and individual

dietary patterns. While it is crucial to understand consumer perceptions of individual-level drivers of food choice, designing interventions that effectively promote healthy eating habits also requires an analysis of external food environment factors. We discuss these in the last section.

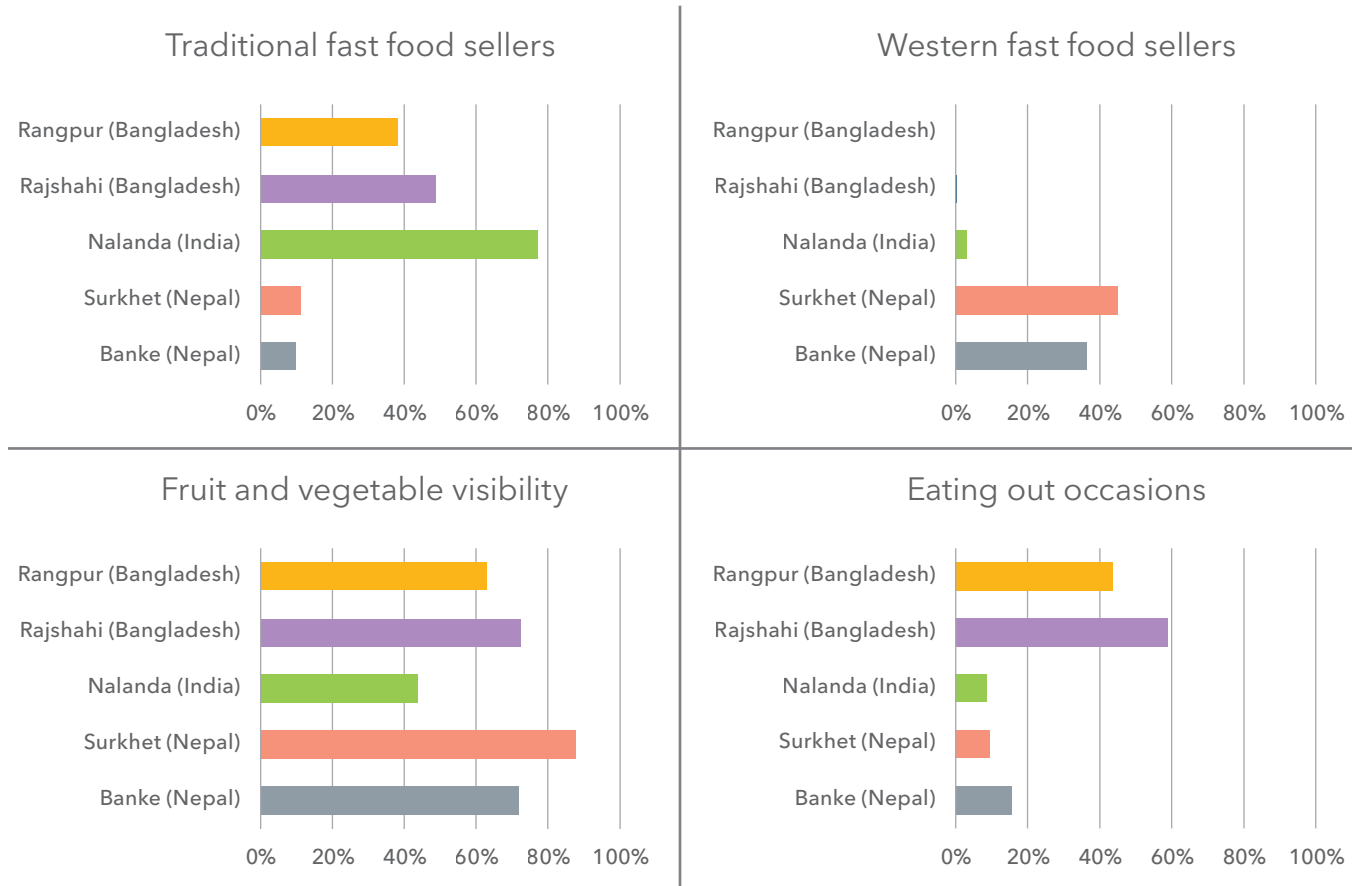
HOW DO ATTRIBUTES OF LOCAL FOOD ENVIRONMENTS INFLUENCE FOOD CHOICES?

Market penetration of fast food and prevalence of eating out

As countries urbanize and develop economically, fast-food chains increase their market penetration, leading to changes in dietary habits and a rise in the frequency of eating out among urban populations (Regmi 2001; Tefft et al. 2017). In South Asia, rapid urbanization has led to the proliferation of vendors offering both traditional foods and Western fast foods that are high in calories and low in nutrient density, reflecting changing dietary patterns and the influence of globalization on local food cultures (Popkin et al. 2012). In general, the healthfulness of both traditional and Western fast foods depends on the ingredients used and whether they are ultra-processed and/or high in fats, salts, and sugar. On the one hand, traditional fast foods, such as *dahi chaat*, contain a combination of healthy and unhealthy ingredients and have been consumed for long periods without a concurrent increase in noncommunicable diseases (NCDs). On the other hand, a growing body of research has demonstrated that increased access to Western fast-food outlets is associated with rising obesity rates (Wu et al. 2021). The presence of Western fast food can be seen as part of wider shifts in lifestyle and diets that accompany the epidemiological transition.

Product placement at retail outlets

Ultra-processed foods (UPFs), such as chips and biscuits, are widely available even in rural areas of South Asia (Samin et al. 2023). A key concern is the visibility and prominence of UPFs in stores relative to healthier food options. Retailers often prefer

FIGURE 4.3 External food environment indicators

Source: Data from the TAFSSA district agrifood systems assesment.

Note: Panels refer to (1) percent of sampled villages that had traditional fast-food vendors; (2) percent of sampled villages that had Western fast-food vendors; (3) percent of households that reported eating out; and (4) percent of sampled vendors that placed fruits and vegetables at visible locations in their stores.

to display UPFs at eye level or in high-traffic areas, such as checkout counters, due to their longer shelf life and ready-to-eat convenience (Shaw 2020). The TAFSSA survey defined high visibility as products being displayed outside, near the counter, or in the front of shops. Across South Asian districts (Figure 4.3), the visibility of fruits and vegetables is moderate. These patterns may result from product placement and marketing strategies, as UPFs are typically packaged in bright, colorful, and attractive ways and often leverage promotions, branding, and endorsements to draw consumer attention (Shaw et al. 2020).

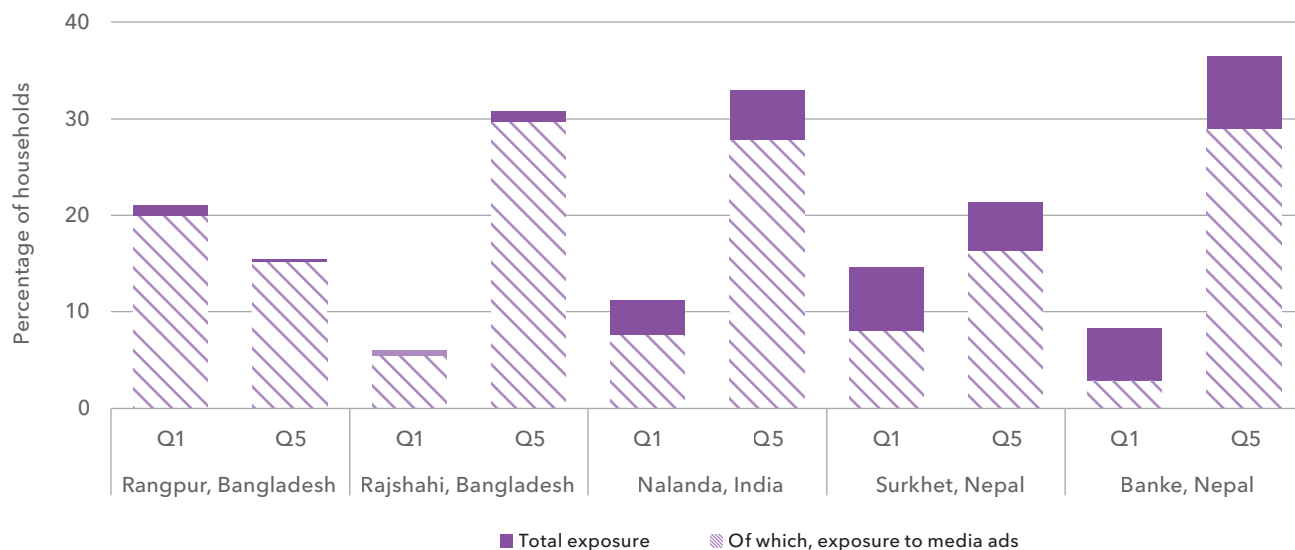
HOW DO ATTRIBUTES OF DIGITAL FOOD ENVIRONMENTS INFLUENCE FOOD CHOICES?

Access to mobile phones and internet and exposure to advertising

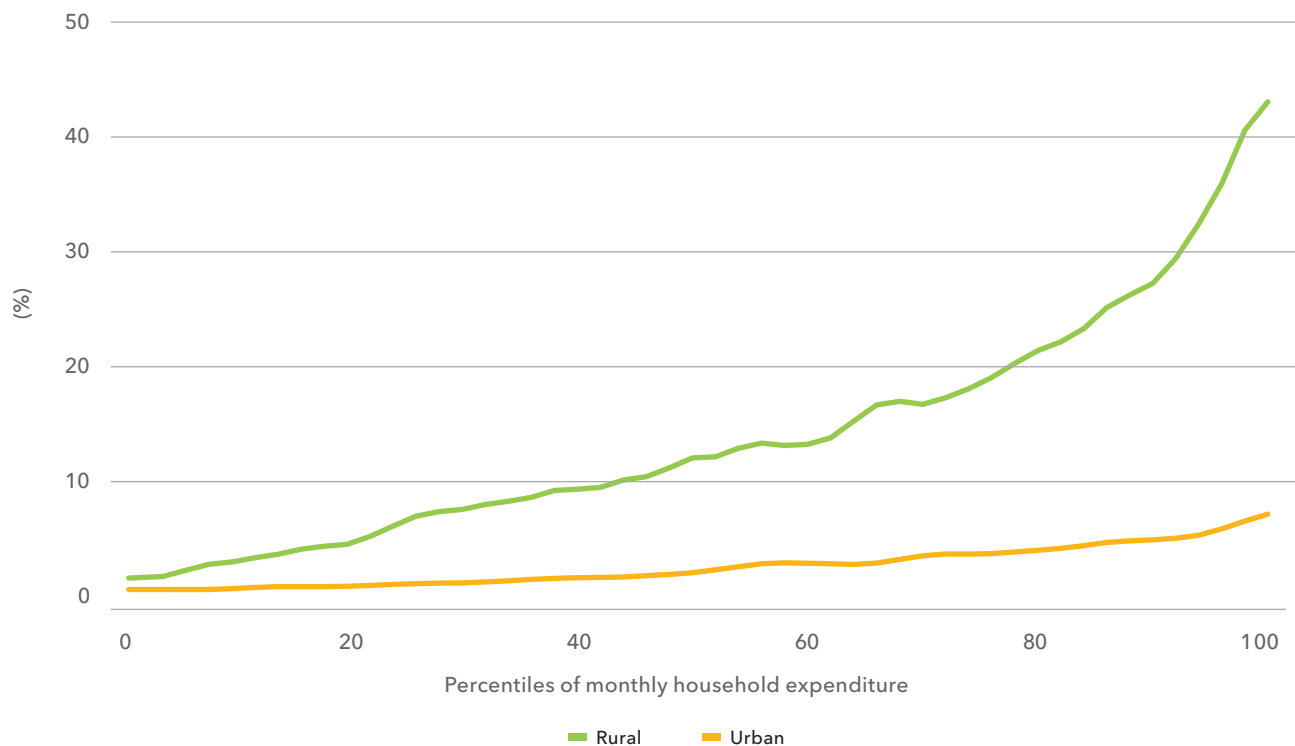
Another key marketing strategy employed by the food industry is the use of food advertisements, which play a crucial role in shaping consumer preferences and dietary choices (Giammattei et al. 2003). Rapid growth of media platforms such as television and mobile phones across South Asian countries is reflected in high access and ownership (GSMA 2023). For example, in India in 2021,

FIGURE 4.4 Exposure to advertisements and online food purchases

A. Exposure to advertisements for unhealthy foods, share of households



B. Household online food purchases in India, 2023



Source: Panel A – Data are from TAFSSA district agrifood systems survey, open-access agrifood system data from 4,000 households across Bangladesh, India, and Nepal. CGIAR. Panel B – Data are from the National Statistical Office (2024), Consumer Expenditure Survey 2022–2023. Ministry of Statistics and Programme Implementation, Government of India. The y-axis indicates the percentage of households reporting any online food purchases in the previous week.

BOX 4.2 Food environments in Sri Lanka from a FRESH perspective

The CGIAR Research Initiative on Fruit and Vegetables for Sustainable Healthy Diets (FRESH) conducted scoping reviews of published literature on food environments in Sri Lanka (Clarke et al. 2024), deep dives into fruit and vegetable (F&V) consumption (Silva et al. 2023), and a study on urban food environments in Colombo's low-income areas (Gooneratne 2024). These are the key findings from each study:

- The majority of published studies focus on formal markets, measuring vendor and product properties, prices, availability, and desirability. Barriers to healthy eating identified included the high cost of animal-source foods and vegetables, marketing of unhealthy snacks and fast food to adolescents, food labels' limited influence, and use of credit as a coping mechanism for food insecure households (Clarke et al. 2024).
- Studies on F&V consumption recommended promotion of education and awareness around the benefits of eating F&V through mass media campaigns; improving access through farmers' markets and community gardens and mobile produce stands; implementing programs that promote F&V consumption in workplaces; mandating F&V inclusion in school meals; and encouraging the development of value-added products and processing techniques for excess or perishable F&V (Silva et al. 2023).
- The urban food environment investigation revealed that price is not the sole determinant of consumers' choice: produce quality plays an important role; infrastructure determines what is bought, the method of preparation, and the utensils used to prepare the food; mid-day meal coverage is low; some households are aware of good nutritional practices, with many taking care to alter meals to reduce noncommunicable diseases; and mothers are likely to buy and cook items that their children like to eat (Gooneratne 2024).

54 percent of women and 78 percent of men owned mobile phones (IIPS and ICF 2021). Similarly, in Bangladesh, 47 percent of women and 74 percent of men reported mobile phone ownership (NIPORT and ICF 2020), and in Nepal, mobile phone access is even higher, with 77 percent of women and 90 percent of men owning mobile phones (Nepal Ministry of Health et al. 2017). These devices have become critical channels for accessing information, including advertisements, and play a prominent role in influencing food choices through digital food platforms. Moreover, internet use in these countries has seen significant growth (World Bank), increasing by 45 percentage points between 2000 and 2023. For instance, as of 2023, India reported 970 million internet subscribers (more than 60 percent of the population) (TRAI 2024). This widespread internet access further expands the reach and impact of digital food marketing.

Food marketing across various settings and media platforms predominantly promotes UPFs and sugary beverages, with children and adolescents being particularly vulnerable to such marketing (Harris and Graff 2015). Using TAFSSA survey data, Figure 4.4, panel A, shows that nonpoor households (represented by the highest asset quintile, Q5) report substantially higher exposure to advertisements, particularly through media channels, compared to the poorest households (Q1) across most districts surveyed. For instance, in India, the exposure of wealthy households to advertisements is 22 percentage points higher than for those in the lowest wealth quintile, underscoring the importance of socioeconomic status (SES) to advertising reach.

Digital platforms for online food purchases

South Asia has a large working-age population, which contributes significantly to its labor force. According to the World Bank, the working-age population (ages 15–64) in South Asia was approximately 65 percent of the total population in 2022 (World Bank). This demographic structure provides a substantial regional workforce, often at competitive labor costs compared to global averages,

particularly in India, Bangladesh, and Pakistan (ILO 2025). A significant portion of the workforce is employed in the informal sector, including emerging areas such as food delivery services, which have seen rapid growth with the expansion of the gig economy (Chen and Carré 2020). Data from India's latest national household consumer expenditure survey (2023) indicate that online food purchases increase with household wealth, particularly in urban areas (Figure 4.4, panel B). This pattern is notably pronounced among higher SES groups, with online food purchases sharply increasing among the highest-spending urban households and reaching nearly 50 percent in the top expenditure percentile.

These SES gradients in advertising exposure and online food purchases may contribute to a shift away from traditional, healthier diets toward more processed, calorie-dense foods high in sugar, salt, and unhealthy fats among wealthier households (Pingali 2007). Trends in obesity across South Asia closely mirror these SES gradients (Wu et al. 2021). Greater exposure to food marketing, such as advertisements for junk food, among wealthier households may differentially influence diet quality and health outcomes, increasing unhealthy consumption in that stratum. Concerningly, the dietary behaviors of the high-SES population could become aspirational for lower-SES populations, potentially promoting unhealthy eating habits more broadly.

POLICY RECOMMENDATIONS AND RESEARCH PRIORITIES

Policymaking for food environments is a multifaceted process involving diverse stakeholders, including government bodies (national and provincial), producers (farmers, food processors, producer associations, and retailers), and consumers (households, workers, children, and adolescents). Our analysis of the TAFSSA survey data emphasizes that policy interventions are needed across the four key dimensions of the food environment: accessibility, affordability, availability, and desirability. The distinction between

rural and urban food sectors is diminishing, with increased availability of packaged foods produced by multinational companies playing a significant role in this shift (Pingali 2007). Lack of regulations on product packaging, size, and labeling allows unhealthy UPFs (such as chips and candy) to easily enter household consumption patterns through small affordable packets and aggressive targeting of susceptible groups, including children. Over time, consumption of these products alters children's tastes and preferences, displacing healthier alternatives (Cornwell and McAlister 2011). With affordable pricing, convenient access, and sensory appeal, UPFs present a significant challenge for nutrition policy, requiring both regulation of unhealthy foods and promotion of healthier options.

Establishing an effective regulatory framework for food packaging, labeling, and marketing is essential to creating healthier food environments and shaping consumer perceptions of food products and their desirability. Due to the wide heterogeneity in consumer understanding, conveying clear information on nutrient composition is crucial. Front-of-package nutrition labeling (FOPNL) offers a simple, visual representation of a product's nutritional quality, helping consumers make healthier choices. Various countries have adopted FOPNL systems – such as Nutri-Score, Health Star Rating, and traffic light and warning labels – designed to discourage the consumption of unhealthy foods and beverages (Pettigrew et al. 2023). Promoting healthy food consumption also requires broader nutrition education and awareness initiatives. For instance, campaigns that help consumers understand and interpret warning labels are essential in populations with low literacy levels. While schools and workplaces serve as traditional platforms for disseminating such information, South Asia has unique community-based channels that can be leveraged, including village health centers, consumer associations, producer cooperatives, and women's collectives (Kumar et al. 2024). These platforms offer promising avenues to engage diverse populations in adopting healthier diets (An et al. 2017).

From a fiscal policy perspective, there is increasing support for taxing food products high in unhealthy fats, salt, and sugar (HFSS), such as sugar-sweetened beverages (Krishnamoorthy et al. 2020). These taxes are typically assessed based on value added or the quantity of HFSS components in the product. Many tax systems already impose different tax rates based on food categories. For example, in India, aerated beverages are subject to higher taxes than other unhealthy food products. However, food taxation policies face criticism for their potentially regressive and distortionary effects that disproportionately impact lower-income consumers. Additionally, systematic reviews of global literature suggest that quantity-based taxation – such as levies on sugar or salt content per unit – can incentivize reformulation of HFSS products toward healthier compositions, potentially reducing overall intake of these ingredients (Pineda et al. 2024).

UPFs are widely available and often strategically packaged in small amounts to be affordable for low-income consumers. Companies effectively raise prices by reducing quantities but holding prices and package sizes constant. Research increasingly shows that the aggressive marketing of highly processed foods and sugary drinks negatively influences dietary habits, particularly in young children, contributing to NCDs (Dixon et al. 2007). In response to growing concerns, the World Health Organization (WHO) and UNICEF have escalated calls to regulate the targeted marketing of unhealthy foods and beverages to children in South Asia (WHO 2023; UNICEF 2023). WHO has developed global recommendations aimed at curbing the influence of food advertising and reducing children's exposure to such promotions (Paglia 2023). While the advertising of HFSS foods remains dominant, limited promotion of healthier options is emerging. Evidence suggests that advertising boosts product sales, so fiscal measures such as tax concessions or subsidized advertising rates for healthy food options could incentivize their consumption over HFSS products. The TAFSSA and National Sample Survey datasets reveal a high prevalence of advertising and

digital food environment reach among high SES groups, yet knowledge about the promotion and reach of healthy diets remains limited.

Low consumption of fruits and vegetables poses a significant challenge to achieving healthy diets in South Asia, driven by constraints to both supply and demand. Box 4.2 describes learnings from a CGIAR study on constraints to fruit and vegetable consumption. On the demand side, affordability is a primary barrier preventing poor and food insecure populations from eating diets rich in fruits and vegetables. On the supply side, agricultural policies in the region have largely overlooked the promotion of fruit and vegetable production and supply chains, with existing initiatives yet to demonstrate broad-scale impact (Faqeerzada et al. 2018). The fragmented nature of these efforts suggests that a piecemeal approach to food policy will offer limited benefits. To address this, South Asian countries should aim to leverage existing national platforms, such as school meal programs, nutrition supplementation initiatives, and nutrition education to promote fruit and vegetable consumption (Buse et al. 2020). Further research is essential to understand the barriers to implementation and to evaluate the effectiveness of these interventions for health outcomes, providing the necessary evidence for more effective, context-specific policy reforms.

The pattern of increased online food purchases and exposure to digital food marketing among higher SES groups in South Asia underscores challenges for food systems and public health in the coming decade. From a food systems perspective, the shift toward processed, calorie-dense foods driven by digital platforms and aspirational behaviors may exacerbate the nutrition transition already underway in the region (Pingali 2007). This transition risks displacing traditional diets, further entrenching reliance on UPFs. The proliferation of digital food environments also poses regulatory challenges, as marketing targeted at wealthier households creates a ripple effect across lower SES groups who emulate their behaviors (Ali-Alsaadi et al. 2023). From a health perspective, these dietary shifts are likely

to accelerate the dual burden of malnutrition, with rising obesity rates among higher-income groups coexisting with persistent undernutrition across the population (Kelly 2016). Addressing these dynamics will require integrated interventions, including promoting healthier digital food environments by strengthening regulatory frameworks for food marketing on digital applications.

CONCLUSION

This chapter explores how food environments shape dietary patterns in South Asia, a region where urbanization, growing incomes, and digital platforms are rapidly transforming food systems. Traditional diets persist, but the appeal and availability of UPFs are growing. Affordability continues to hinder access to healthier diets, while aggressive marketing and the growth of digital food environments are driving greater consumption of unhealthy foods, particularly among wealthier groups. Addressing these challenges requires a multifaceted policy approach that leverages programs and policies operating at scale. Potential strategies include subsidizing nutrient-rich foods, integrating healthy options into public safety nets, introducing front-of-package labeling, and regulating the marketing of unhealthy foods promoted on physical and digital platforms. At the same time, leveraging digital spaces to advocate for healthier choices and fostering grassroots, community-led initiatives are critical. Scaling for impact toward healthier diets requires targeting the entire population base through unique interventions designed for children, adolescents, and adults, while simultaneously, large-scale supply-side initiatives are needed to promote availability and accessibility of healthy foods.

Acknowledgments

We would like to thank the report editors and Swetha Manohar for constructive feedback and helpful suggestions, which have strengthened this chapter. We also thank the survey respondents and enumerators, as well as the whole TAFSSA team, for their contributions.

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Chapter 5

EVOLVING RURAL FOOD ENVIRONMENTS IN SOUTH ASIA

The Role of Processed Foods, Traditional Markets, and Marketing Influences

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KEY MESSAGES

- Food environments in South Asia are undergoing a rapid transformation, marked by the growing consumption of processed and ultra-processed foods – a trend largely driven by accelerated globalization and aggressive marketing strategies.
- Rural food environments in South Asia remain dominated by traditional, informal food outlets. Village retail shops primarily sell packaged foods and everyday household items, while open-air multivendor markets offer diverse fresh foods, including fruits, vegetables, fish, and meat, often at more affordable prices.
- Most villages have reasonable access to retail food shops, but accessing open-air markets often involves traveling longer distances, either within the village or to neighboring areas.
- Rural residents in South Asia are highly exposed to the promotion and advertising of unhealthy foods, particularly through mass media campaigns.
- Stronger policies and improved infrastructure are needed to foster healthier food environments. Key strategies include supporting local markets, regulating the promotion of unhealthy foods, and enhancing the presence of healthy food options in retail settings.

As low- and middle-income countries (LMICs) tackle the double burden of malnutrition – the simultaneous presence of undernutrition and overweight or obesity (Popkin et al. 2012; Popkin and Hawkes 2016) – food environments are receiving increased policy focus (Fanzo 2019). Food environments are the spaces in which individuals interact directly with the larger food system, and thus they significantly influence dietary habits (Turner et al. 2020). Their critical role has been emphasized in several international reports (HLPE-FSN 2018; FAO 2016), and food environment research has gained prominence in recent years in high-income countries (HICs) in response to increasing rates of overweight, obesity, and related noncommunicable diseases (NCDs) (Caspi et al. 2012; Gamba et al. 2014; Lytle and Sokol 2017). However, the number of studies on food environments in LMICs remains limited compared with those conducted in HICs.

Food environments in LMICs are viewed as more complex, with higher variability and dynamism than those in HICs. This complexity arises from rapidly changing sociocultural and economic conditions, seasonal fluctuations, and an increasing variety of food sources (Constantinides et al. 2021; Glanz 2009; Gómez and Ricketts 2013; Gupta et al. 2023). According to World Bank estimates, 64 percent of the South Asian population resides in rural areas and exhibits significant differences in food environments, dietary behaviors, and health outcomes compared with urban populations. In the following sections, we document the dynamics of rural food environments in South Asia using data from market surveys conducted in rural Bangladesh and India as part of the CGIAR Research Initiative on Transforming Agrifood Systems in South Asia (TAFSSA), as well as data from existing literature. We focus on the interplay between shifting consumption patterns, the continued presence and transformation of traditional markets, and the growing influence of food marketing. Chapter 4 of this report examines consumers' perceptions of various dimensions of their food environments and how these perceptions influence dietary patterns. This

chapter complements that analysis by presenting findings from TAFSSA's comprehensive census of retail food environments and detailed survey of the sampled outlets, and then employs novel metrics to assess food availability and accessibility in these rural areas.

TRANSITIONS IN CONSUMPTION AND FOOD ENVIRONMENTS IN SOUTH ASIA

According to statistics from the Food and Agriculture Organization of the United Nations, the share of dietary energy derived from cereals, roots, and tubers declined in Asia in the past decade (2010–2022) (FAO 2024). At the same time, the average protein supply, particularly protein from animal sources, increased. However, the benefits of these dietary shifts are overshadowed by the increased consumption of processed and ultra-processed energy-dense foods. The current dietary patterns reflect this decline in traditional diets alongside a rise in the consumption of modern, Western-style diets (Pingali 2007; Park and Agarwala 2023). The intake of sugar, fat, and salt from processed foods and beverages has surged in both lower-middle-income and upper-middle-income countries in Asia, while this trend has plateaued in HICs (Baker and Friel 2014). Consumption of processed and ultra-processed foods (UPFs) is already common in South Asia (including in Bangladesh, Pakistan, Sri Lanka, and India). In a recent study, about 75 percent of the interviewed respondents in Bangladesh, Sri Lanka, and north India had consumed UPFs within the past 24 hours, while in south India and Pakistan, the proportion was about 40 percent (Bhagtani et al. 2024). The demand for these products is fueled by widespread advertising, promotional pricing, and various marketing strategies aimed at building consumer loyalty (Popkin and Ng 2022). Rural communities are affected by the surge in UPFs. As shown in India, consumption of high-carbohydrate and sugar-rich foods and drinks marketed in small packages at low prices has become pervasive in

rural communities (WHO 2023; Prakash 2015). This nutrition transition often results in increased incidence of obesity and diet-related NCDs, although undernutrition remains a primary problem in South Asia (TCI 2023; Fanzo 2019).

Globally, food environments in LMICs are experiencing rapid transformations, driven by constantly evolving sociocultural and economic factors (Gupta et al. 2023; Downs et al. 2020; Herforth and Ahmed 2015). Food systems are becoming more globalized, influenced by factors such as interconnected transnational food supply chains, urbanization, increased reliance on imports, demographic shifts, and a decline in traditional diets in favor of energy-dense, nutrient-poor foods (GLOPAN 2016). The value of packaged food in South Asia's retail markets has increased between 10- and 20-fold over the past two decades. India, for example, has witnessed a dramatic expansion in sales of UPFs, from US\$0.9 billion in 2006 to \$37.9 billion in 2019 (WHO 2023), and the country is now one of the world's top five markets for sugary beverages (Popkin et al. 2020).

Low prices, easy accessibility, and the long shelf life of those unhealthy foods are the main drivers of increased sales in South Asia. Food retail policies that would reduce the presence of unhealthy foods and beverages while enhancing access to healthier options at the retail level (Pineda et al. 2024) are either absent, such as in Bangladesh, or weak, as in India. The few existing policy measures, including taxation, that target unhealthy foods represent a modest yet meaningful step toward fostering healthier dietary habits in the region. For example, carbonated and sugary beverages, which are closely associated with NCDs, are subject to a "sin tax" in India, intended to discourage their consumption. These beverages are subject to the highest tax rate, at 40 percent (comprising a 28 percent Goods and Services Tax plus a 12 percent surcharge) (Government of India 2022). In another notable move, the Food Safety and Standards Authority of India imposed a ban on the sale of junk food within school premises

and within a 50-meter radius of schools, aiming to curb unhealthy eating habits among children (FSSAI 2020); under the Food Safety and Standards Regulations of 2019 and the Eat Right Movement, the sale and promotion of prepackaged foods high in fat, salt, and sugar are prohibited in school canteens, mess halls, and hostel kitchens and during school events.

FOOD MARKETS IN RURAL SOUTH ASIA

The food supply and retail sector has undergone significant changes in LMICs, a shift that is strongly linked with urbanization. Large and formal retail establishments are more frequently found in or close to urban areas, whereas informal vendors and traditional outlets are more prevalent in rural regions. Large and formal vendors have yet to become a significant part of rural food environments (Kelly et al. 2014; Reardon and Hopkins 2006; Wertheim-Heck et al. 2015; Turner et al. 2020). The Indian retail market, for example, is still dominated by numerous small local grocery stores, which make up 93 percent of the food sales (USDA and GAIN 2024), although early predictions had anticipated that modern food retail would continue to develop in India over the next several decades, as in other developing countries (Reardon and Minten 2011). The growth in modern retailing can benefit overall health and the economies of LMICs but can have some drawbacks, especially for poorer households. Traditional vendors have the advantage of being inclusive of poor consumers, poor farmers, and poor traders (Narayanan 2007) and notably resilient during disruptions such as the COVID-19 pandemic (Narayanan and Saha 2021).

TAFSSA data show that rural regions of South Asia continue to be dominated by traditional informal outlets such as village local grocery stores, greengrocers, specialized shops, restaurants and tea shops, and open-air markets. Table 5.1 presents the classification and description of various types of food outlets in the region. Open-air multivendor markets are known for offering a diverse range of

TABLE 5.1 Types of food outlets and food items sold

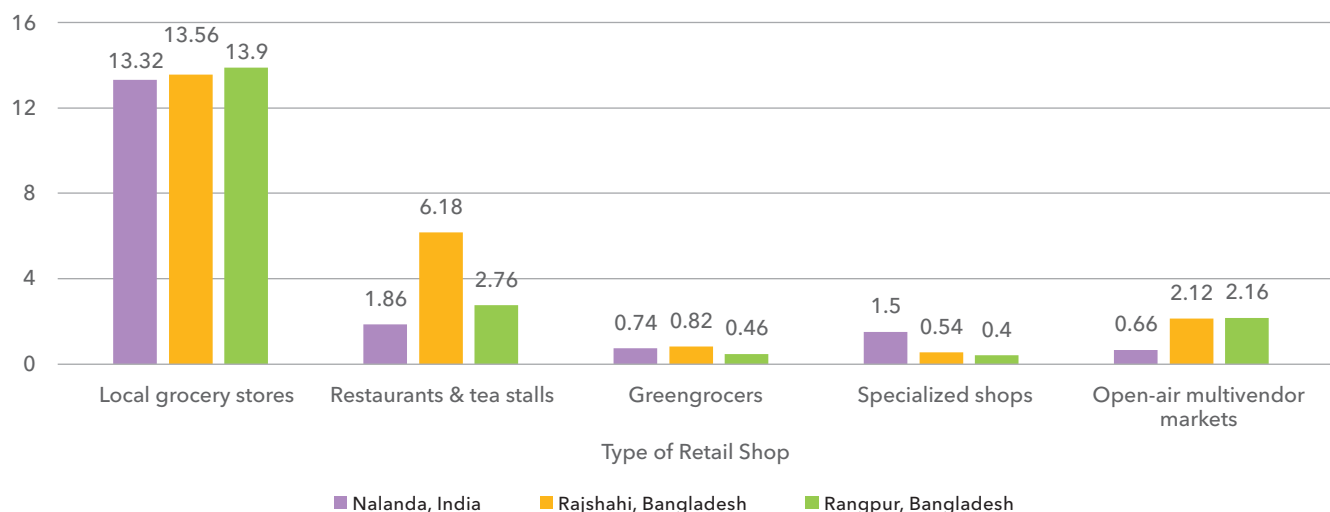
Retail shop type	Food items sold
Local grocery stores	A variety of food and nonfood items, including household staples, packaged and dry foods, and a limited selection of fresh produce
Restaurants and tea stalls	Prepared food items (usually snacks that can be quickly consumed) and tea and coffee
Greengrocers (vegetable/fruit shops)	Perishable food items, including fresh fruits, vegetables, roots, and tubers
Specialized shops	Meat, fish, or dairy products
Open-air multivendor markets	Fresh foods, such as fruits, vegetables, fish, and meat

Source: Authors' compilation.

fresh foods, such as fruits, vegetables, fish, and meat, at affordable prices. In contrast, village retail shops tend to offer a more limited selection of fresh food and prioritize selling packaged goods and everyday household items.

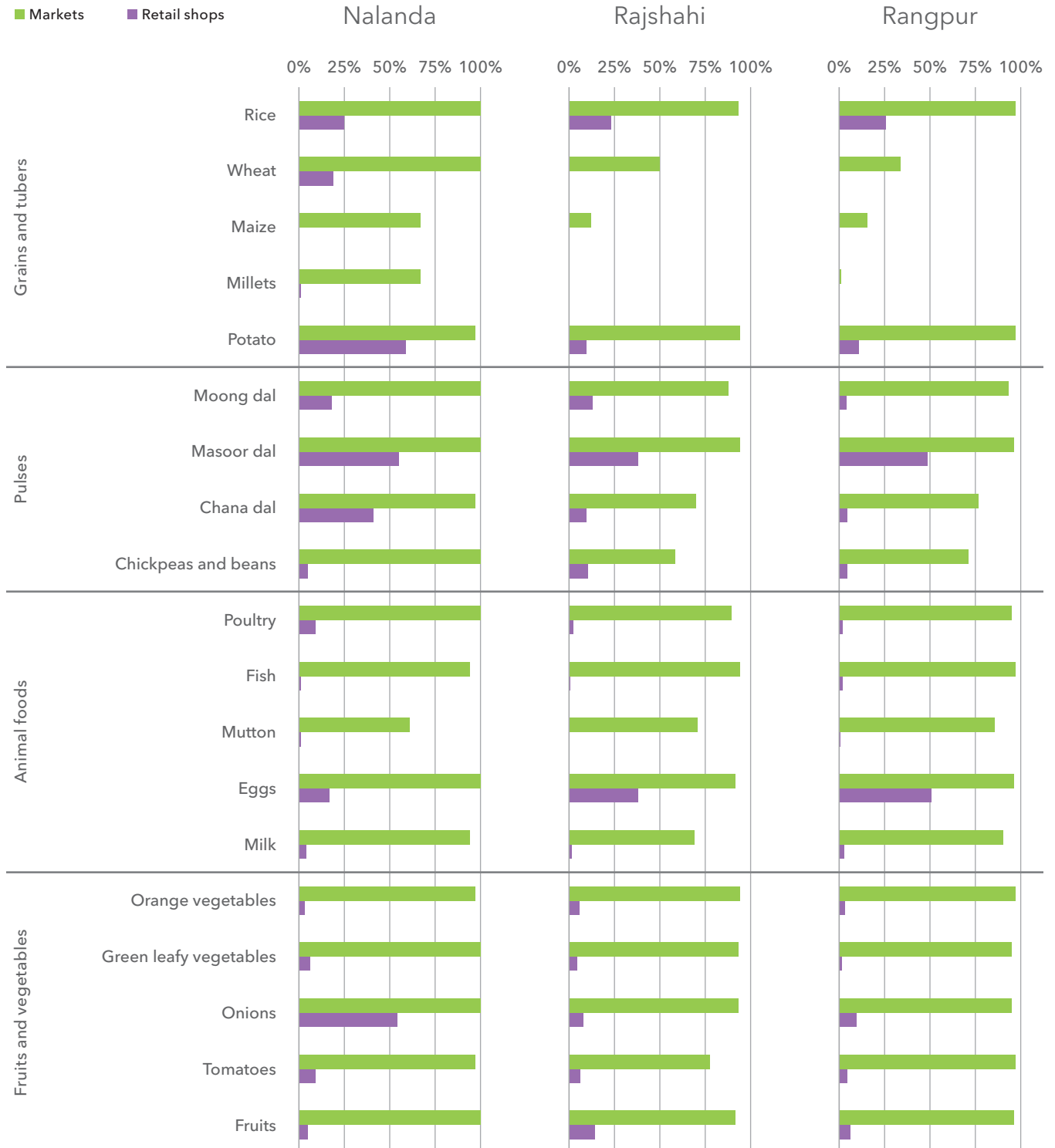
TAFSSA data were collected in Bangladesh (Rajshahi and Rangpur districts), India (Nalanda, in the northern state of Bihar), and Nepal (Banke and Surkhet districts) (Gupta et al. 2022). On average, the surveys found 19 retail food shops per village, with 8 shops serving 1,000 inhabitants on average.

The Rajshahi district in Bangladesh had the highest density of food retail shops both per village and per 1,000 inhabitants. Local grocery shops, which offer both healthy and unhealthy food items, were the most common type of shop in all districts, accounting for more than two-thirds of all shops (Figure 5.1). They also made up the largest share of food retailers. Greengrocers and specialized shops that sell only healthy food items were rare, constituting less than 15 percent of the shops; there were fewer than one of these shops per village.

FIGURE 5.1 Number of shops of different types at the village level in each study district

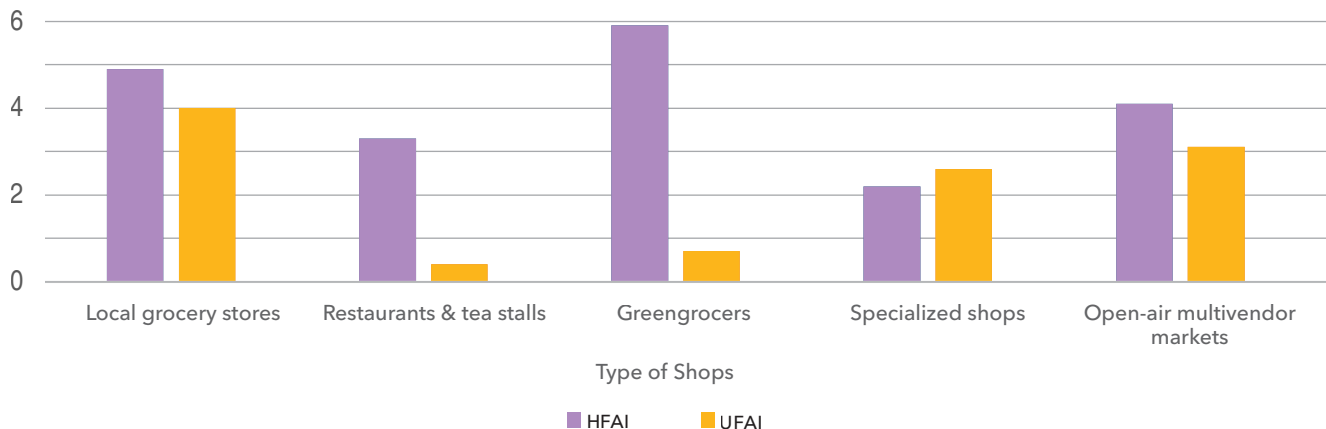
Source: Data from TAFSSA agrifood systems assessment.

FIGURE 5.2 Availability of food items in open-air markets and retail shops in Nalanda (India), Rajshahi (Bangladesh), and Rangpur (Bangladesh) districts



Source: Data from TAFSSA agrifood systems assessment.

FIGURE 5.3 Store-level healthy and unhealthy food availability indices, means across rural Bangladesh and India



Source: Data from TAFSSA agrifood systems assessment.

Note: HFIA = Health Food Availability Index; UFAI = Unhealthy Food Availability Index. See footnote 1 for explanation.

BOX 5.1 Association of food availability indices with village characteristics

Factors determining the Healthy Food Availability Index (HFAI) and Unhealthy Food Availability Index (UFAI) at the store level were assessed using a negative binomial regression model with data from the TAFSSA retail food market census. A positive and significant correlation was observed between HFAI and UFAI; hence their direction of association with the other village characteristics remains consistent in both cases. The density of retail shops has a negative association with the availability of both healthy food and unhealthy food. However, as the distance to the nearest town increases, the HFAI decreases but UFAI does not. As anticipated, the availability of both healthy and unhealthy foods was related to shop type. Large shops selling more than 50 items have greater availability of both healthy and unhealthy foods compared with small shops, but the impact of shop size is greater for healthy foods.

Source: Unpublished International Rice Research Institute research findings.

Where greengrocers were easily accessible to consumers, these shops were the primary source for healthy and perishable food items. However, prices for healthier food items were lower in open-air food markets than in these retail shops. On average, in each village in the Nalanda district, India, one multivendor market was within a 10 km radius, whereas in the Bangladesh villages surveyed, two multivendor markets were within the same radius.

Altogether, the retail food environment in the study districts was characterized by the presence

of several small retailers, with more than 80 percent of these retail shops selling fewer than 50 different food items. The food landscape was mostly informal, with more than 80 percent of markets lacking a management structure and retail shops operating without a license. Retail shops were predominantly owned by men in the study locations. Most multivendor markets operated as open-air or portable units, whereas retail shops were typically housed in permanent structures. A sizable portion of markets exhibited some structural damage, in contrast to only about half of the

retail shops, which were in better physical condition. Compared with retail shops, markets tended to have better road connectivity and more amenities, such as water connections, sewage systems, waste collection areas, and toilets.

While more market vendors than retailers reported food spoilage, the percentage of products spoiled was higher in retail shops than in markets. As expected, vegetables, leafy green vegetables, and fruits had the highest spoilage rates, reported by 60 to 70 percent of vendors. This information was collected by asking vendors whether they had observed spoilage in different categories of food items and what the typical percentage of spoilage was in each category. Open drainage and garbage dumps near the shops were reported by more than 20 percent of retailers. Foods with unpleasant smells or visible signs of damage or rodents were other hygiene concerns observed in the food outlets.

AVAILABILITY AND ACCESSIBILITY OF FOOD IN RURAL SOUTH ASIA

TAFSSA data show that the availability of food items, particularly healthy foods, was greater in multivendor markets (located farther from villages) compared with retail shops (located nearby). In Indian retail shops, potatoes were the most common item available from the grains and tubers category (Figure 5.2), while in Bangladesh, rice was the most common item. In the pulse category, masoor dal was the most commonly available item in retail shops. Retail shops had a higher availability of unhealthy foods compared to multivendor markets. More than 50 percent of village retail shops sold UPFs at low prices, with biscuits and sweets the most widely available unhealthy items in the retail shops of all the districts (sold by more than 80 percent).

The Healthy Food Availability Index (HFAI) (range 0–28) and Unhealthy Food Availability Index (UFAI) (range 0–8) are used to measure the quantity and variety of these food items available at the store

or market level.¹ In general, the HFAI was found to be high for multivendor markets in India and Bangladesh, with mean scores of 25 and 21, respectively. Data on the availability of unhealthy food options were not collected for open-air multivendor markets. The average HFAI score of retail shops (4.9) was at the bottom of the range, whereas the UFAI scores were much higher in relation to their potential maximum (4.0) (Figure 5.3). There was substantial evidence of variations in overall healthfulness of foods offered depending on the type of retail store, with greengrocers offering the highest quantity of healthy foods and local grocery shops providing the highest number of unhealthy foods. Greater availability of healthy foods was correlated with the greater availability of unhealthy foods, indicating that the presence of healthy options may be counterbalanced by the availability of unhealthy ones, especially in local grocery stores (Box 5.1). Food outlets such as restaurants and tea stalls sell both healthy and unhealthy food items. In restaurants, legumes and fruits were the most available items from the healthy food categories.

Factors determining the HFAI and UFAI at the store level were assessed using a negative binomial regression model with data from the TAFSSA retail food market census. A positive and significant correlation was observed between HFAI and UFAI; hence their direction of association with the other village characteristics remains consistent in both cases. The density of retail shops has a negative association with the availability of both healthy food and unhealthy food. However, as the distance to the nearest town increases, the HFAI decreases but UFAI

1 The HFAI was initially adapted and implemented by Franco et al. (2008) and was further modified in this study to align with the food categories relevant to our analysis. The HFAI measures the availability of healthy foods within stores, with a higher score indicating greater availability. The score is obtained by adding +1 for the availability of each healthy food category and an additional +1 score if more than three varieties are available within that healthy food category. The UFAI measures the availability of the unhealthy foods within stores, with a higher score indicating greater availability. This score is obtained by adding +1 for availability of each unhealthy category and an additional +1 score if more than three varieties are available within that unhealthy food category.

does not. As anticipated, the availability of both healthy and unhealthy foods was related to shop type. Large shops selling more than 50 items have greater availability of both healthy and unhealthy foods compared with small shops, but the impact of shop size is greater for healthy foods.

GEOGRAPHIC ACCESS TO FOOD SOURCES

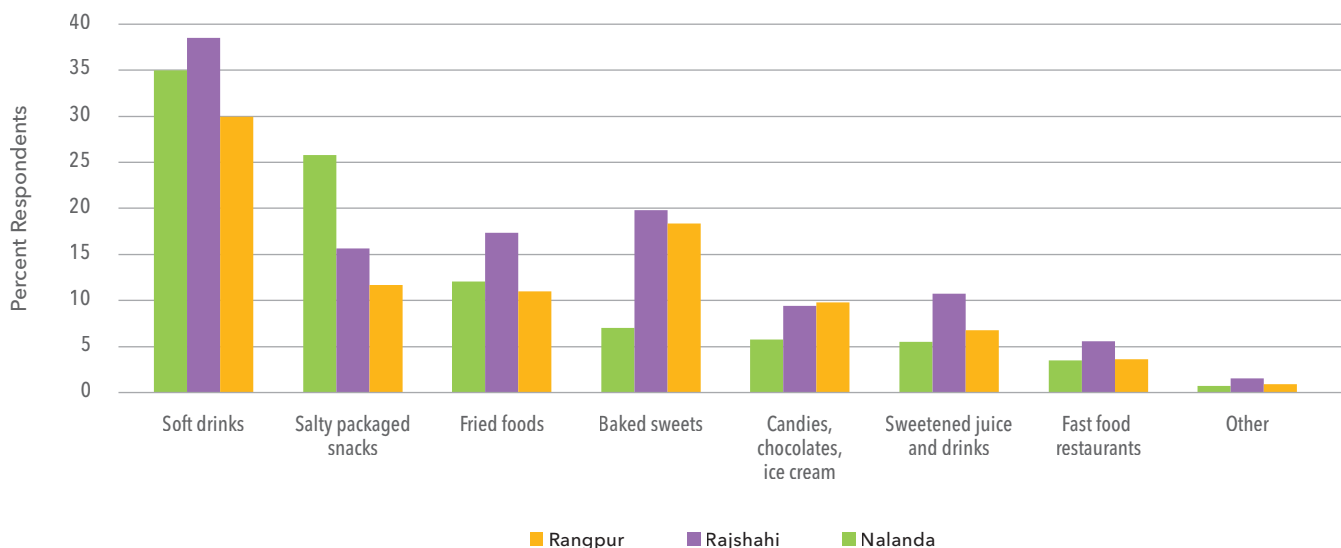
In food environment research, accessibility is frequently proxied using the geographic distance consumers must travel to reach food outlets (Yenerall et al. 2017). Easy access to affordable, fresh, and high-quality food can significantly improve dietary habits (Ball et al. 2015; Rahmanian et al. 2014), and proximity to local wet (fresh food) markets has been shown to have a positive association with dietary diversity (Liu et al. 2014; Duran et al. 2016). For rural households in the Nalanda district, India, the average distance to the nearest open-air markets, where they can shop for fresh produce at affordable prices, was 4.07 km (SD =

2.18). For these households, food outlets selling both healthy and unhealthy foods, such as local grocery stores, were located much closer; on average, households in Nalanda were 300 meters from the nearest food retail shop, and only a small proportion of villages in the district had poor access (16 percent) or limited access (6 percent) to retail shops. In contrast, in Bangladesh, retail shops were located farther from the surveyed households, at an average distance of 1,000 meters, mostly on the village periphery, meaning most households had limited or poor access to village retail shops. However, open-air markets in Bangladesh were situated at shorter distances, averaging 2.95 km from dwellings, compared with 4.07 km in India.

ROLE OF MARKETING AND PROMOTION OF FOOD ITEMS

Marketing and advertisements are pivotal segments of consumers’ food environments. Globally, food marketing has primarily promoted the consumption

FIGURE 5.4 Percentage who saw/heard any advertisement for different unhealthy foods or packaged drinks in the past 30 days



Source: Data from TAFSSA agrifood systems assessment.

of UPFs and sugary beverages (Carins and Rundle-Thiele 2014). While common characteristics of UPFs can contribute to overconsumption – including their convenience, intense flavors that make them highly appealing, and potentially addictive nature for some individuals – the ubiquity of mass marketing and aggressive, often child-focused marketing strategies, coupled with increased disposable income, have certainly contributed to the transformation of dietary patterns (Hebebrand and Gearhardt 2021; Filgueiras et al. 2019; Backholer et al. 2021; Popkin et al. 2012; Popkin 2004). In Asia, however, the nature and prevalence of food marketing are not well-documented.

To help address this knowledge gap, the TAFSSA surveys collected data on whether and where people encountered food advertisements. Mass media was reported to be the main source of advertisements for unhealthy food (Figure 4.4 of Chapter 4), with media advertisements for soft drinks, among all unhealthy food categories, the most commonly seen or heard in all the districts (Figure 5.4). Although very few village retailers displayed promotional messages for food items in or around their shops, those that did were primarily promoting unhealthy food brands. In addition, unhealthy foods were displayed to ensure very high visibility within village retail shops. Moreover, policies concerning food promotion and marketing were reported to be weak across South Asia (Pineda et al. 2024). All of these marketing aspects act together to expand the consumption of unhealthy foods in rural settings.

RESEARCH AND POLICY RECOMMENDATIONS

Food environments and food consumption patterns are transforming in South Asia. Rapid urbanization and aggressive marketing have expanded sales of energy-dense and sugar-rich processed foods throughout the region. To address this issue, policymakers should regulate the marketing of UPFs, particularly to children, and enforce clear front-of-package labeling so consumers can

make informed food choices (see also Chapter 4). Traditional markets provide access to a wider range of fresh, healthy items but are geographically sparse and thus often inaccessible for daily use. Strengthening these markets through vendor support and promoting local food systems can help maintain diverse, affordable options, but efforts are also needed to improve rural infrastructure and to establish and manage multivendor open-air markets that can ensure efficient and continuous access to fresh, nutritious foods. In sum, policies should be put in place to increase the availability of healthy foods and simultaneously reduce the prominence and presence of unhealthy foods that contribute to disease.

Acknowledgments

We would like to thank the report editors and Sudha Narayanan for constructive feedback and helpful suggestions, which have strengthened this chapter. We also thank the survey respondents and enumerators, as well as the whole TAFSSA team, for their contributions.

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Chapter 6

MORE LAND, MORE DIVERSE DIETS?

Exploring Production and Consumption Trade-Offs in the Eastern Indo-Gangetic Plains

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KEY MESSAGES

- Persistent land inequality and gender disparities in land ownership across the Eastern Indo-Gangetic Plains of Bangladesh, India, and Nepal reinforces structural constraints that limit productivity and worsens nutrition outcomes for land-poor households.
- Cereal and tuber yields increase with greater land access – particularly on leased-in land – while leased-out land reduces productivity, indicating that well-functioning rental markets are central to improving staple crop performance.
- Production allocation patterns vary across landholding groups: land-poor households retain more for subsistence, while larger landholders commercialize a greater share, often selling nutrient-dense foods and retaining cereals and milk for home consumption.
- Higher production diversity is associated with improved diet quality, but land-poor households remain at elevated diet-related health risk, indicating that diversification must be complemented by improved land access, market integration, and nutrition support.

The Eastern Indo-Gangetic Plains (EIGP), which cover eastern India, Nepal's Terai, and northwestern Bangladesh, are densely populated and agriculturally important, yet the region is marked by high rates of rural poverty, malnutrition, and fragmented landholdings (Aravindakshan et al. 2018; Pingali 2019; Pyne et al. 2023). Despite the EIGP's fertile soils, the region has experienced sluggish gains in productivity and enduring food and nutrition insecurity. National and provincial production statistics reveal trends in crop yields and production but mask household-level variations in crop-livestock portfolios and allocation of outputs. With the vast majority¹ of farms in the region classified as small or marginal (<2 hectares) (India MoAFW 2023; Bangladesh, BBS 2022; Nepal, NSO 2023), it is vital to understand how landholding shapes production and dietary outcomes.

Although land size is linked to cropping intensity and mechanization (Lowder et al. 2016), limited empirical evidence exists on how households allocate what they produce and whether this influences diet quality or health risks. This chapter uses household-level data to explore the connection between landholding groups and agricultural production, use, and diet quality across five districts: Banke and Surkhet (Nepal), Nalanda (India), and Rajshahi and Rangpur (Bangladesh). It examines (1) landholding structure, (2) productivity patterns, (3) crop use across classes, and (4) production diversity-diet quality relationships. The chapter aims to generate granular insights into agrifood system dynamics and inform inclusive, sustainable development pathways in the EIGP.

METHODS

This chapter uses harmonized agrifood systems survey data from 4,000 farm households in Bangladesh (2,000), India (1,000), and Nepal (1,000), collected under the CGIAR Research Initiative

on Transforming Agrifood Systems in South Asia (TAFSSA). The dataset includes detailed information on landholding, input use, production allocation, and diet quality. Households were grouped as landless, small, or large based on their land size and tenure. Differences among these groups were analyzed using descriptive statistics and one-way analysis of variance.

Productivity analysis focused on cereal- and tuber-producing households, with yield (tons per hectare [ha]) as the dependent variable. Predictors included landholding size, women's land ownership, leasing, mechanization, labor constraints, and irrigation type. Ordinary least squares (OLS) and mixed-effects models (with district-level random intercepts) were compared.

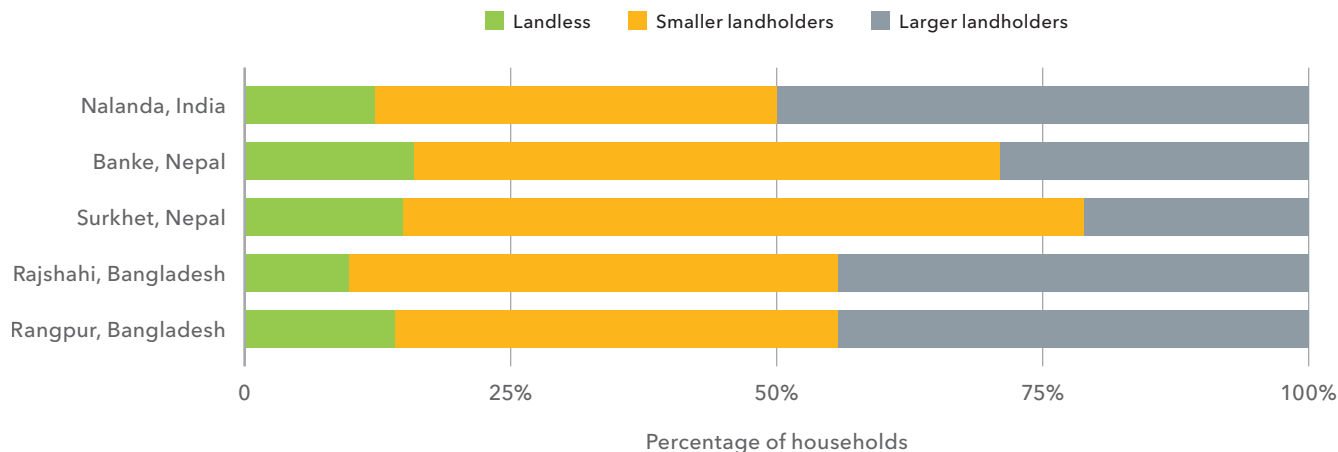
Production Diversity Score and Global Diet Quality Score (GDQS) scatterplots were used to examine associations between production and diet quality, with GDQS classified by risk thresholds. Analyses were stratified by landholding class, and stacked bar plots were used to visualize output allocation (consumption, sale, mixed use, or other). The analysis is descriptive and inferential, rather than causal.

RESULTS

Access to agricultural land and land rental dynamics

High levels of landlessness and near-landlessness remain a defining feature of rural South Asia. At the same time, landholdings are highly fragmented, with most farms operating on very small parcels. In this context, land rental markets can play a dual role by providing access to cultivable land for landless and marginal households and enabling the consolidation of operational holdings despite highly unequal ownership patterns. To examine how households gain access to agricultural land, we categorized them into three groups based on land ownership and operation: landless, small landholders, and large landholders. We then compared their average land ownership, leasing activity, operational holdings, and land held by women.

1 More than 86 percent of Indian farms, with similar rates in Bangladesh and Nepal.

FIGURE 6.1 Landholding status by district in the EIGP, share of households

Source: Data from TAFSSA district agrifood systems assessment.

Figure 6.1 illustrates the distribution of landholding across the study districts in Bangladesh, Nepal, and India. Landlessness was particularly widespread in Bangladesh's Rajshahi and Rangpur districts and in India's Nalanda district, where more than 60 percent of households reported owning no land. In contrast, Nepal's districts (especially Surkhet and Banke) had higher shares of small landholders and relatively fewer landless households. Large landholders were a minority across all districts, with the highest representation – just 24 percent – observed in Surkhet.

Table 6.1 presents the pooled average of land owned and operated by households in each category. Large landholders owned nearly 1 ha on average, compared to 0.18 ha among small landholder households and none among landless households. While small and landless households rented-in modest amounts of land (0.14–0.19 ha), large landholders participated more actively in land rental markets – leasing-in 0.37 ha and leasing-out 0.30 ha on average. These patterns suggest the presence of *reverse tenancy*, where wealthier farmers consolidate land through rentals.

TABLE 6.1 Land ownership and use by landholding category in EIGP, mean \pm SD (pooled data)

Variable	Landless	Smaller	Larger
Total land owned (ha)	0.00 \pm 0.00 ^c	0.18 \pm 0.12 ^b	0.98 \pm 0.67 ^a
Leased-in land (ha)	0.14 \pm 0.27 ^b	0.19 \pm 0.37 ^b	0.37 \pm 1.80 ^a
Leased-out land (ha)	0.00 \pm 0.02 ^c	0.04 \pm 0.09 ^b	0.30 \pm 0.50 ^a
Operated land (ha)	0.18 \pm 1.15 ^c	0.30 \pm 0.37 ^b	0.99 \pm 1.52 ^a
Women-owned land (ha)	0.03 \pm 0.06 ^c	0.10 \pm 0.10 ^b	0.30 \pm 0.36 ^a

Source: Data from TAFSSA district agrifood systems assessment.

Note: Superscript letters (a, b, c) indicate statistical groupings based on Tukey's HSD post-hoc tests. Groups with different letters differ significantly at $p < 0.05$. Groups with the same letter are not statistically different.

Total operational holdings followed a clear pattern: 0.18 ha for landless households, 0.30 ha for small ones, and nearly 1 ha for large landholders. Gender disparities in land access were also apparent. Women's land ownership rose steadily with household landholding status, from just 0.03 ha among landless households to 0.30 ha among large ones. This gradient reinforces structural inequalities, not only by land class but also by gender.

Average patterns are consistent across the region, although notable geographic differences exist. For example, leasing-in by landless and small landholders was more common in Banke and Nalanda, while leasing-out was significant among large landholders in Rajshahi and Rangpur. Women's land ownership was highest in Banke and Nalanda, further underlining the intersection between gender and local context in shaping land access.

Seasonality of crop production

Agricultural activity in the EIGP spans three main seasons – monsoon, winter, and spring – but the extent of crop diversity within each season varies sharply by landholding class. Large landholders are more likely to diversify crops within a season, growing multiple crops on owned or rented land. In contrast, landless households tend to specialize, typically cultivating only one crop per season – usually rainfed rice during the monsoon – due to limited access to land and irrigation. This inequality is particularly visible in winter, the region's most productive season. For instance, in Nalanda (India) and Banke (Nepal), more than half of large landholding households grow three or more winter crops, while less than 15 percent of landless households do so. The most common combinations of winter crops include wheat, maize, potato, mustard, and legumes. In the monsoon season, most households focus on a single rice crop. Again, however, large landholders are more likely to diversify by growing maize, legumes, or other cereals, especially in Surkhet and Rajshahi.

Spring cropping remains limited across the region, engaging less than 13 percent of households, but where it occurs (notably in Surkhet and Nalanda),

it is concentrated among larger landholders growing maize and pulses. Figure 6.2 shows the association between seasonal crop diversity and landholding, underlining the importance of land access, irrigation, and other resources in enabling diversified farming strategies. For landless and smaller farmers, limited land access constrains both seasonal participation and the ability to mitigate risks or improve diets through diversified production.

Uneven yields and unseen variability

Farmer-reported yields in the EIGP vary widely by region and crop, often diverging from national averages. In Bangladesh (Rajshahi and Rangpur), yields were consistently higher than national benchmarks. Cereal yields averaged 5.8 metric tons/ha (vs. 4.5 tons/ha nationally), and vegetable yields reached nearly 20 tons/ha (vs. 6.2 tons/ha nationally), likely reflecting high-yield crops such as gourds or tomatoes. Legume yields were exceptionally high at 5.4 tons/ha (vs. 1.0 tons/ha), possibly due to outliers or specific crop types. In Nepal (Banke and Surkhet), cereal yields (4.3 tons/ha) outpaced the national average (3.4 tons/ha), but compared to the national averages, yields were lower for oilseed (0.5 tons/ha) and vegetables (5 tons/ha). Legume yields were modest and below national levels. In India (Nalanda), yields were generally lower than national averages. Cereals averaged 3.3 tons/ha (vs. 3.9 tons/ha nationally), likely due to the lower-performing rice-wheat system. Oilseed and vegetable yields were also below national yields, while legume yields were roughly the same as national yields.

Sources of staple crops productivity in the Eastern Indo-Gangetic Plains

Regression results (Figure 6.3) indicate that access to land – both owned and leased-in – was most consistently associated with cereal and tuber yields across the EIGP. In the mixed-effects model, total landholding (coefficient: 3.97, $p < 0.001$) and leased-in land (coefficient: 2.95, $p < 0.001$) showed strong positive associations with productivity, while leased-out land was negatively associated (coefficient: -3.85,

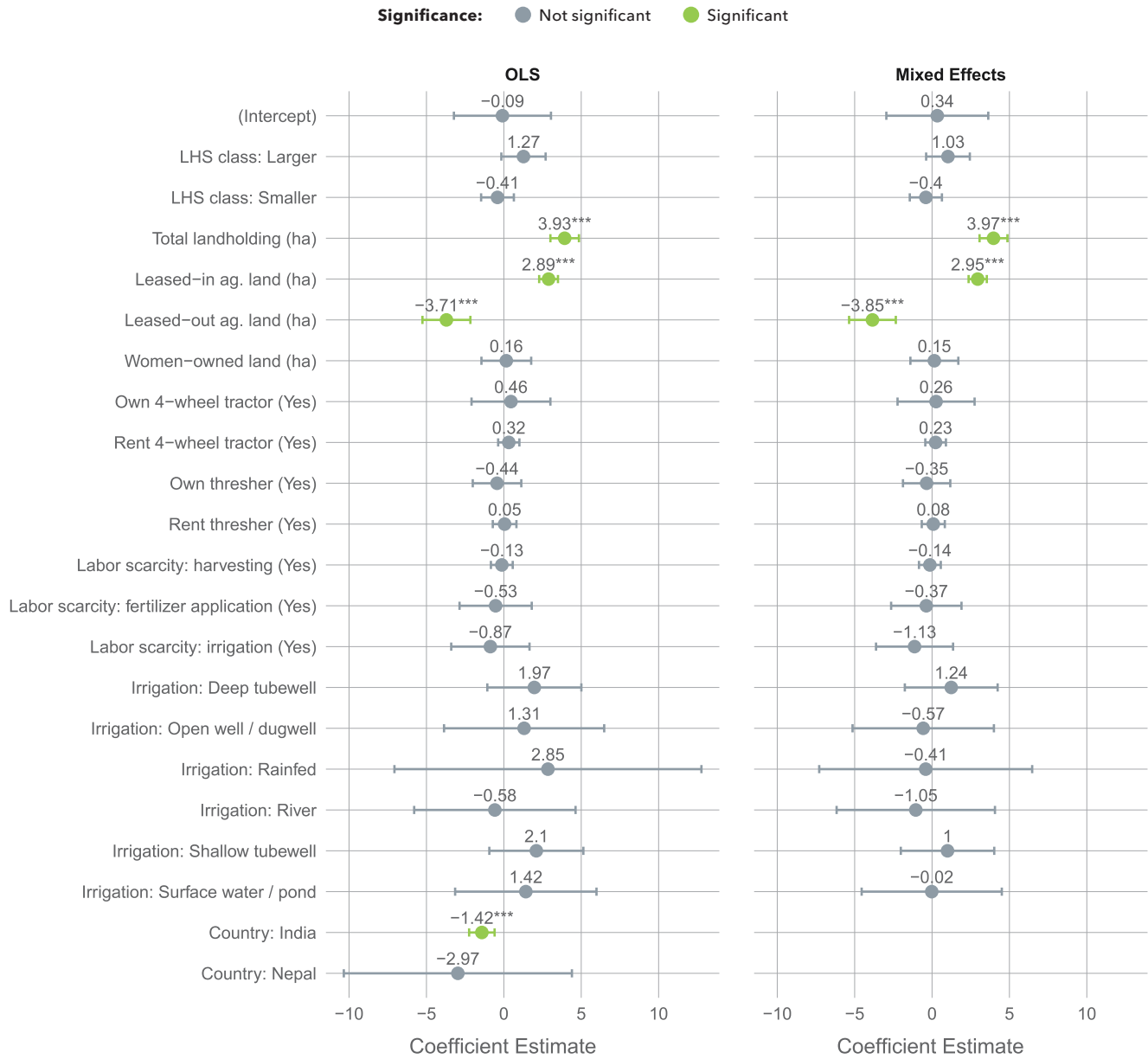
FIGURE 6.2 Seasonal crop diversity by landholding class in the EIGP, share of farmers cultivating 1, 2, and 3 crops



Source: Data from TAFSSA district agrifood systems assessment.

Note: The graph shows the percentage of landless, small, and large landholding households cultivating one, two, or three or more crops during the monsoon, winter, and spring seasons.

FIGURE 6.3 Coefficient estimates of cereal and tuber productivity across the EIGP



Source: Data from TAFSSA district agrifood systems assessment.

Note: Estimates with 95% confidence intervals from OLS and mixed effects models. Productivity = tons/ha. n = 338. *p < 0.1, **p < 0.05, ***p < 0.01, · = marginally significant at p < 0.10. Surkhet (Nepal) excluded due to incomplete data.

$p < 0.001$). Large landholders also had somewhat higher productivity than landless households (1.03, $p \approx 0.12$). This pattern differs from the commonly observed inverse relationship between farm size and productivity in many smallholder systems. However, studies by Larson et al. (2016) and Deininger and Ali (2024) suggest that this inverse association may weaken in areas with better market access, higher input use, and greater mechanization – conditions that are likely present in parts of the EIGP.

Mechanization (ownership or rental of tractors and threshers), labor constraints, and irrigation type were not significantly associated with productivity in the mixed-effects model, possibly reflecting unmeasured variation in quality or timing. Women's land ownership also showed no measurable association.

The OLS model revealed regional differences: households in Nalanda (India) had lower yields than those in Rajshahi and Rangpur (Bangladesh) (-1.42, $p < 0.001$), while yields in Bangladesh and Nepal did not differ significantly. Incorporating district-level random effects improved model fit (Akaike Information Criterion, AIC: 1721.9 vs. 1730.5), where a lower AIC value indicates a better balance between goodness of fit and model simplicity, suggesting spatial heterogeneity not captured by the observed variables. Overall, land access – not mechanization or irrigation – was most closely linked with higher staple crop productivity across the EIGP. This finding underscores the importance of policies that enhance secure tenure and support efficient rental markets to enable more equitable and productive land use in the region.

Patterns of farm produce allocation by landholding class

Household decisions on whether to consume, sell, or share farm outputs vary significantly by landholding status and country, reflecting different levels of market integration, subsistence needs, and production capacity.

Among landless households, output allocation differs notably across countries. In Bangladesh and

India, landless farmers are highly integrated into markets, particularly for cereals, legumes, vegetables, and livestock. These products are mostly sold or used for both consumption and sale. For instance, more than 80 percent of landless households in Nalanda, India, sell cereals and vegetables, while eggs are typically consumed at home. In contrast, landless households in Nepal follow a more subsistence-oriented pattern, especially for cereals, vegetables, and milk, which likely reflects more limited access to markets and infrastructure. However, these households still sell a substantial share of legumes, fruits, and livestock.

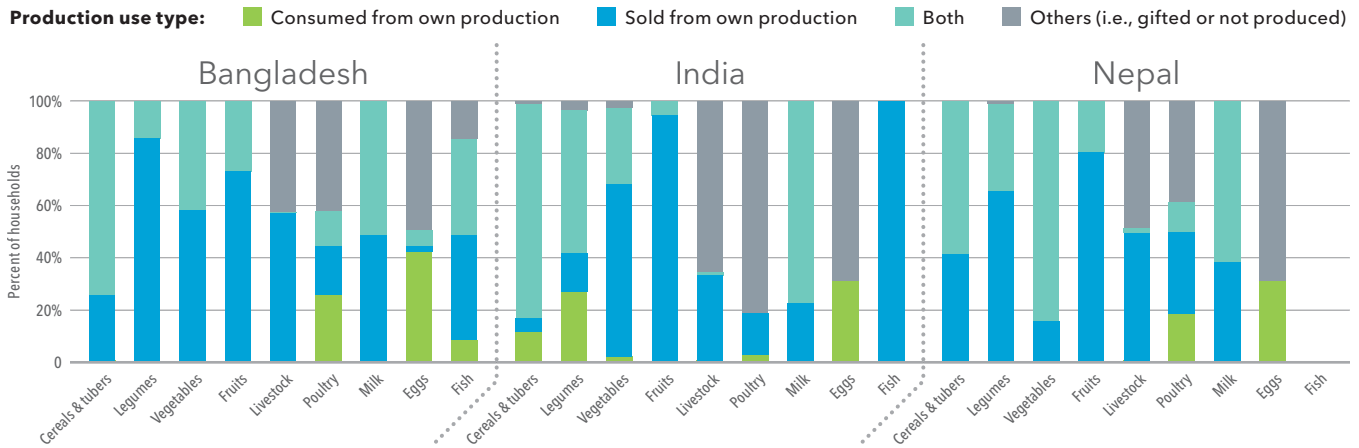
Small landholders display mixed strategies. Across all three countries, most small landholders both consume and sell cereals, with varying degrees of commercialization for other crops. Nepali smallholders are more subsistence oriented, integrating cereals, legumes, and vegetables into household diets. In India, sales are more prominent, especially for livestock and poultry. Bangladeshi smallholders appear to employ both strategies, with dual use of cereals and vegetables but greater commercialization of fruits and legumes.

Large landholders exhibit more commercialization overall, yet they still retain strong household use of staples such as cereals and milk. In Bangladesh and India, fruits, legumes, and livestock are predominantly sold, while cereals and milk are mostly split between consumption and sale. Large landholders in Nepal follow a similar pattern but are slightly less market oriented for livestock products, particularly milk and eggs.

These patterns (Figures 6.4, 6.5, and 6.6) underscore that:

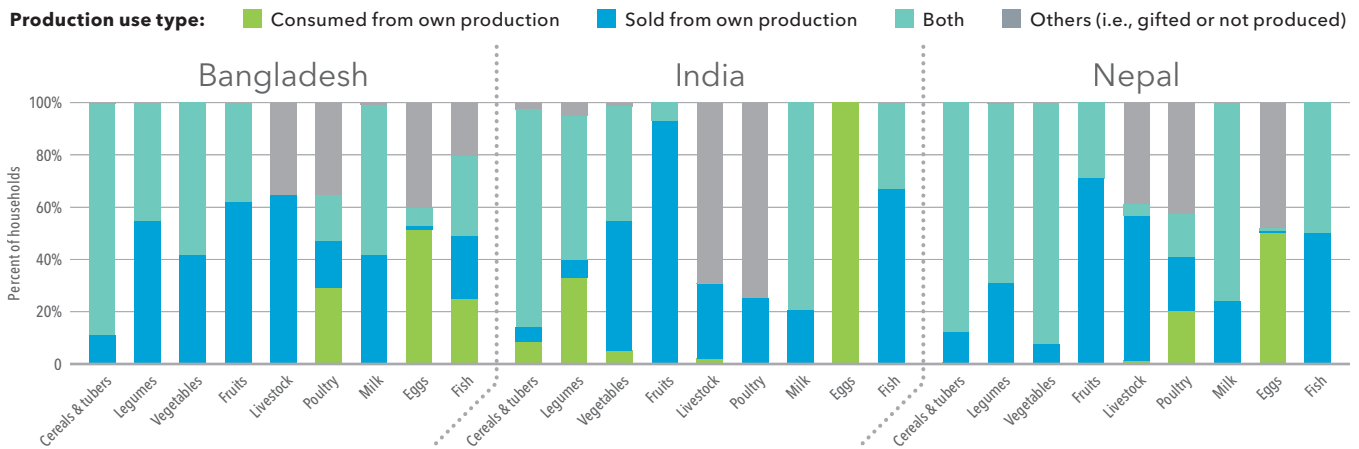
- Staples such as cereals and milk remain central to household consumption, regardless of landholding size.
- Higher-value outputs – such as legumes, fruits, and livestock – are more commonly sold, especially by larger and more land-secure households.

FIGURE 6.4 Use of crops, livestock, and fish products by landless households in EIGP (%)



Source: Data from TAFSSA district agrifood systems assessment..

FIGURE 6.5. Use of crops, livestock, and fish products by small landholding households in EIGP (%)



Source: Data from TAFSSA district agrifood systems assessment.

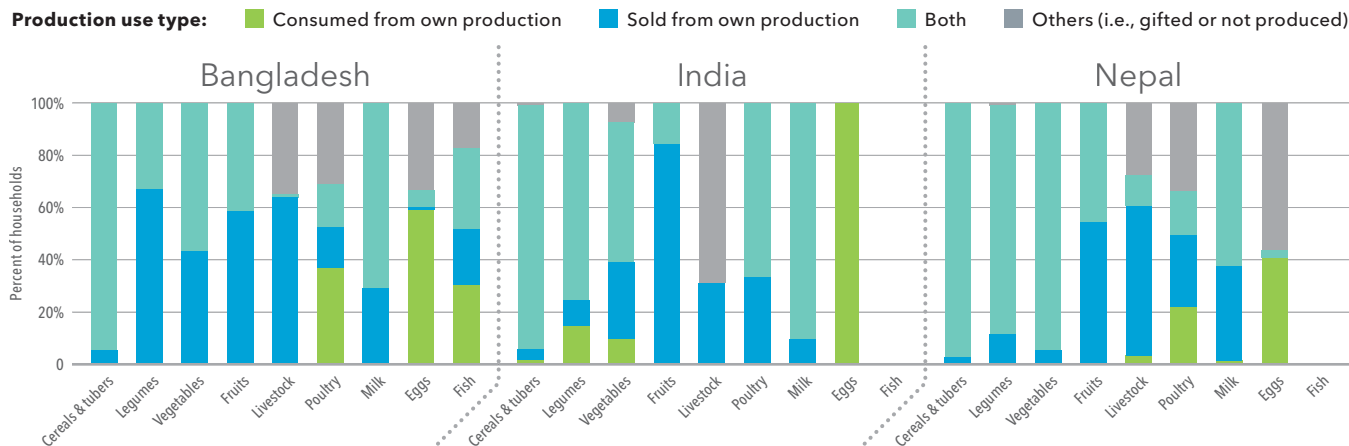
- Country context matters, with Nepal showing more subsistence orientation, especially among landless and small landholding households, while India and Bangladesh display greater market engagement, even among the land-poor.

These data highlight the importance of designing context-specific policies that reflect household production goals, not just yield potential. For

instance, interventions aimed at improving nutrition outcomes must account for the limited on-farm retention of high-protein and nutrient-dense foods among commercialized households.

PRODUCTION DIVERSITY, DIET QUALITY, AND HEALTH RISKS

Figure 6.7 illustrates the relationship between household production diversity and diet quality

FIGURE 6.6 Use of crops, livestock, and fish products by large landholding households in EIGP (%)

Source: Data from TAFSSA district agrifood systems assessment.

across landholding groups. Diet quality is measured using the GDQS, a food-based metric that classifies diets into high, moderate, or low risk of nutrient inadequacy and noncommunicable disease. A GDQS below 15 indicates high risk, 15.0–22.9 suggests moderate risk, and scores of 23 or higher reflect low dietary risk (Bromage et al. 2021). Production diversity, calculated using the Shannon Diversity Index, captures crop–livestock agrodiversity on farm (excluding aquaculture).

Large landholders tend to have both higher production diversity (>1.0) and better diet quality (GDQS scores of 16–22). In Rangpur and Rajshahi, for example, households with production diversity scores between 1.2 and 1.4 also report GDQS values around 20, with very few falling into the high-risk category. These patterns suggest a positive relationship between diversified production and improved diets.

By contrast, landless households consistently show low production diversity and higher dietary risk. In Nalanda, most landless households have nearly zero production diversity and GDQS scores between 12 and 15, indicating elevated health risks. In Rangpur, Rajshahi, Surkhet, and Banke, landless households with diversity scores up to 0.75 often remain below the 15-point GDQS threshold.

Small landholders hold an intermediate position. In Bangladesh, their production diversity ranges from 0 to 1.5, with GDQS scores varying from 12 to 22. Those with diversity scores below 0.5 are more likely to face high dietary risk. In Nalanda, Surkhet, and Banke, few exceed a diversity score of 1.0, and many remain within the moderate-risk GDQS range of 14–20.

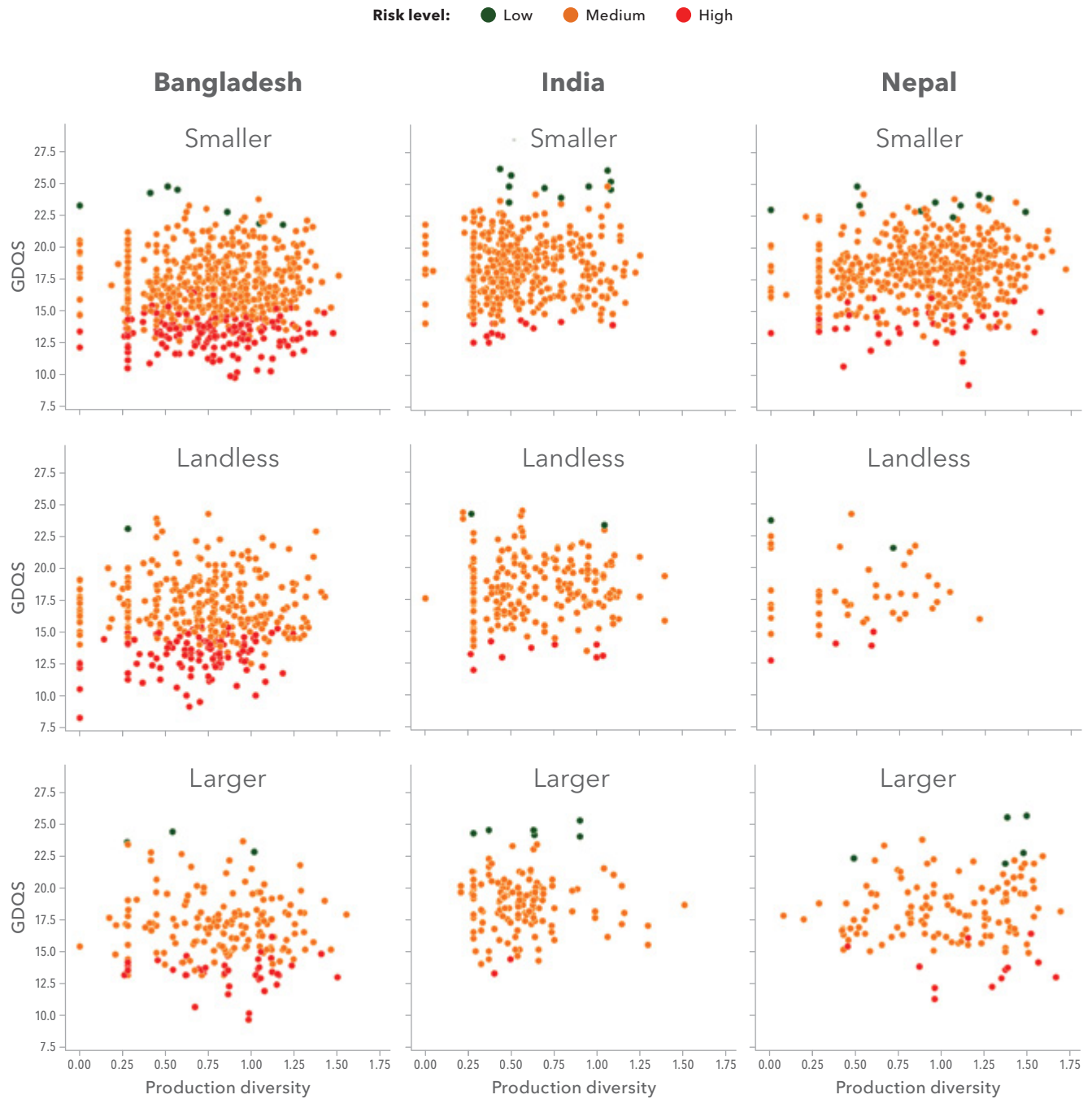
Although greater production diversity tends to support better diet quality, the strength of this association varies by landholding and local context. Higher GDQS scores among larger landholders may also reflect wealth effects, not just on-farm diversity.

Overall, these findings underscore the vulnerability of landless and small landholder households to poor diet quality. These households face elevated dietary risks due to low production diversity and limited access to diverse foods, highlighting the importance of integrating market access and nutrition-sensitive interventions alongside diversification strategies.

DISCUSSION AND POLICY IMPLICATIONS

This chapter explores how landholding patterns and production decisions shape agricultural

FIGURE 6.7 Relationship between production diversity and diet quality across landholding classes in EIGP, with color-coded health risk levels



Source: Data from TAFSSA district agrifood systems assessment.

Note: Diet quality is measured by the Global Diet Quality Score (GDQS). Production diversity is measured using the Shannon Diversity Index. Study areas include Rangpur and Rajshahi in Bangladesh, Nalanda in India, and Surkhet and Banke in Nepal.

productivity and diet quality across five districts in Bangladesh, India, and Nepal. Consistent with earlier studies on agrarian inequality (Li et al. 2024; Matita et al. 2022), findings from the TAFSSA survey confirm that disparities in land access remain central to explaining rural livelihood and nutrition outcomes in the EIGP. Larger landholders report higher yields and are more likely to both consume and sell their produce, while landless households are more dependent on external food sources. Total and leased-in landholdings emerged as strong positive predictors of cereal and tuber productivity, whereas leased-out land significantly reduced yields. The mixed-effects model further underscores that household-level productivity is shaped by structural land access constraints and moderated by district-level heterogeneity (Kakkar 2021). Policy environments across countries have influenced these dynamics: India's fertilizer and electricity subsidies (PPVFRA 2023), Bangladesh's investment in input delivery and machinery access (Bangladesh, General Economics Division 2020), and Nepal's Agriculture Development Strategy reforms (Nepal, Ministry of Agricultural Development 2015) have expanded input access, albeit with varying degrees of implementation and sustainability.

Beyond productivity, the analysis highlights how production diversity is linked to dietary outcomes. Landless and small landholding households in Bangladesh and India are more likely to experience high dietary health risks, while larger landholders in Surkhet, Banke, and Nalanda show better diet quality. However, production diversity alone does not ensure improved diets, reinforcing evidence that market access, nutrition knowledge, and food availability are critical enablers (Herforth et al. 2024; Pyne et al. 2023). Larger landholders are better positioned to allocate produce for both consumption and sale, whereas landless and marginal farmers face constraints in both quantity and use (Quisumbing et al. 2015; von Braun and Torero 2008). Although all three countries have adopted nutrition-sensitive agricultural strategies,

sectoral coordination remains weak (NITI Aayog 2017; Nepal, National Planning Commission 2017; Bangladesh, Food Planning and Monitoring Unit 2022). Strengthening decentralized governance, integrating agriculture and nutrition programming, and targeting support to landless and small landholding households will be essential to improving productivity and dietary outcomes across the EIGP.

Acknowledgments

This study was supported by the CGIAR Regional Integrated Research Initiative on [Transforming Agrifood Systems in South Asia \(TAFSSA\)](#). Drafting of the chapter was also supported by [CGIAR's Scaling for Impact Program](#). We would like to thank the report editors and Avinash Kishore for constructive feedback and helpful suggestions, which have strengthened this chapter, as well as the survey respondents and enumerators, and the whole TAFSSA team, for their contributions.

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Chapter 7

FARMING HOUSEHOLDS' ADAPTATION TO CLIMATIC SHOCKS IN SOUTH ASIA

A Food Systems Perspective

Shreya Chakraborty and Anurag Banerjee

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KEY MESSAGES

- Climate shocks in South Asia often trigger cascading disruptions across the agrifood system – from production to markets to household consumption – highlighting the interconnected nature of system vulnerabilities.
- Household adaptation responses to shocks are not confined to farming practices; they span multiple system components, including livelihoods, consumption, credit, and risk management.
- Smallholders and resource-poor households tend to rely on short-term livelihood, risk, and consumption management coping mechanisms, while wealthier households can adopt loss-reducing investments and strategies. This difference deepens inequalities.
- National adaptation planning continues to have a sectoral focus, with a primary focus on building resilient production systems and minimal focus on other aspects of agrifood systems.
- Social safety net policies exist at scale across the region, offering complementary support to adaptation efforts for the poorest, but these policies are not yet strategically aligned or strengthened with national adaptation planning.

Climate change has critical impacts in South Asia, including growing risks from extreme events and climatic shocks expected in the near and long term. Rising temperatures are projected to increase the likelihood of heatwaves across South Asia, droughts in arid and semiarid areas, floods in monsoon regions, and glacial melt in the Himalayan region (IPCC 2023). Under high emissions scenarios, the region is projected to experience a 20 to 40 percent rise in mean annual precipitation by the end of the 21st century (Mishra et al. 2020), characterized by increased frequency and intensity of heavy rainfall events and significantly increased flood frequency, with severe consequences for lives and infrastructure (IPCC 2023). At the same time, the mean annual maximum and minimum temperatures in the region are projected to rise by 3 to 4°C and 3 to 5°C on average respectively (Mishra et al. 2020) by the end of the 21st century under a high emissions future scenario, increasing the likelihood of heatwaves, droughts, and heat stress conditions (IPCC 2023). These projected scenarios of increasing climatic risks make adaptation a central concern for the region.

Agrifood systems will be increasingly exposed and vulnerable to climate change-led shocks as the incidence, intensity, and uncertainty of extreme events increase. Agrifood systems are complex, encompassing all the interlinked elements (environment, inputs, processes, infrastructures, institutions, and so on), actors, and activities that relate to primary production processing, supply chains, and household consumption, along with the outputs of these activities, including socio-economic and environmental outcomes (HLPE-FSN 2020; FAO 2021). Thus a shock in any component can spread throughout the system (FAO 2021), impacting short- and long-term food and nutrition security. An agrifood systems perspective to understanding adaptation is therefore critical to developing policies that contribute to overall agrifood systems resilience. Yet most climate-change adaptation interventions and policies tend to be sectoral, and the resilience of agrifood systems can thus be undermined by the weakest sectoral links.

At the household level, however, people adapt in numerous sector-agnostic ways, within their capacities, to sustain income and food security in the face of climate shocks. Therefore, understanding adaptation at the local and household levels can inform an agrifood systems' lens on adaptation. This chapter looks at the ways in which households in South Asia cope and adapt to climate shocks to draw lessons for national adaptation planning and interventions.

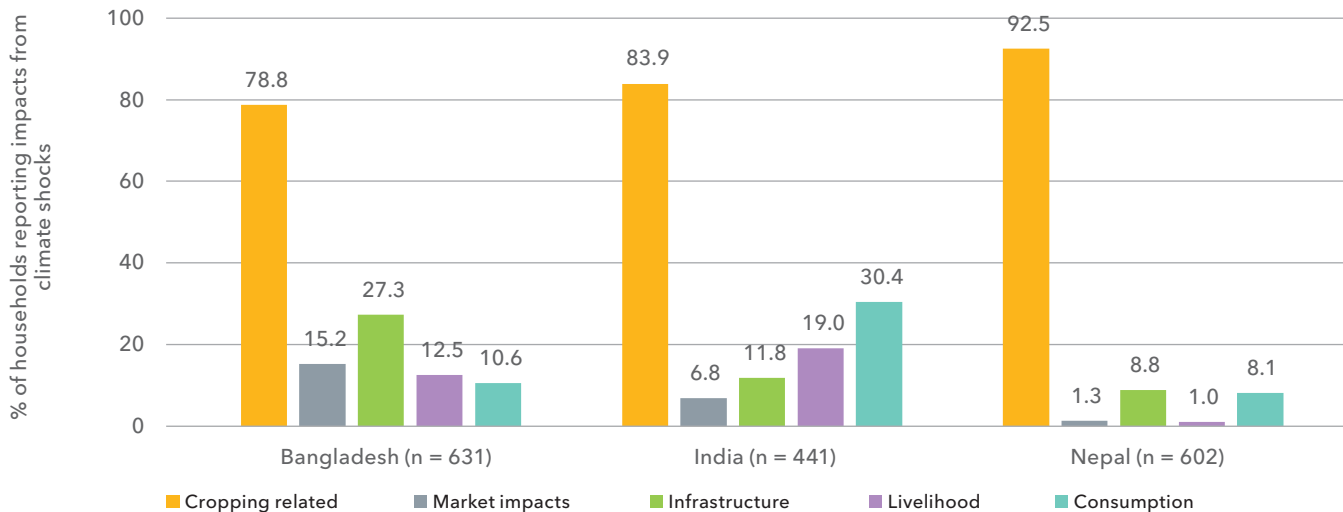
HOW HOUSEHOLDS ARE ADAPTING TO CLIMATE SHOCKS

Under the CGIAR Research Initiative on Transforming Agrifood Systems in South Asia (TAFSSA), an integrated agrifood systems assessment was carried out in five districts in three South Asian countries: Rangpur and Rajshahi in Bangladesh, Surkhet and Banke in Nepal, and Nalanda in India (TAFSSA 2024). The survey included a climate module in which households reported the major climatic shocks they had faced in the past two years, the perceived and experienced impacts, and households' coping and adaptation strategies. The survey also covered a range of variables related to different types of resource access and household endowments that allowed for an analysis of the enabling conditions that facilitate different types of adaptation.

Adaptation strategies range across agrifood system components at the household level

In the five districts assessed, households reported experiencing impacts from climate shocks across the agrifood system – including impacts on agricultural production and market access, livelihood loss, and consumption deficits in food and health services (Figure 7.1). Households' coping and adaptive responses ranged from agronomic initiatives and water management changes to risk management, livelihood responses, and consumption reduction. Although impacts related to agricultural production were the type most commonly reported, adoption of resilient agronomic practices was not always the most frequent adaptive response. Instead, most

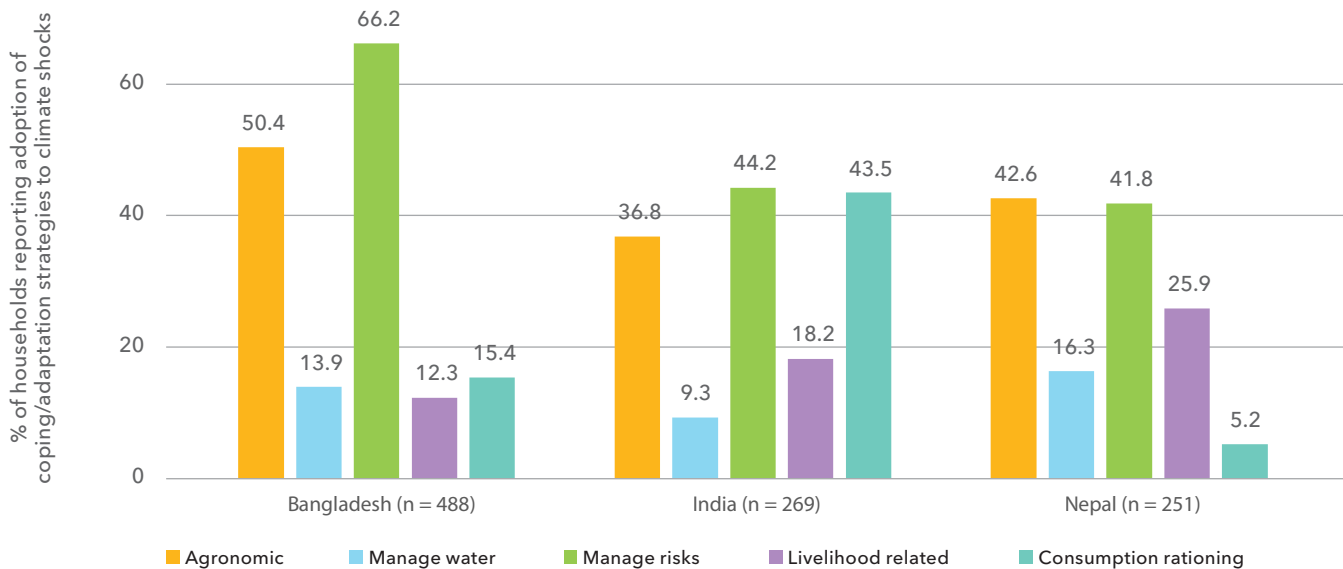
FIGURE 7.1 Types of impacts of climate shocks over last two years reported by survey households in South Asia



Source: Data from TAFSSA agrifood systems assessment.

Note: The survey was conducted in the Rajshahi and Rangpur divisions in Bangladesh, the Banke and Surkhet districts in Nepal, and the Nalanda district in India.

FIGURE 7.2 Adaptive and coping strategies adopted by survey households in South Asia



Source: Data from TAFSSA agrifood systems assessment.

Note: The survey was conducted in the Rajshahi and Rangpur divisions in Bangladesh, the Banke and Surkhet districts in Nepal, and the Nalanda district in India.

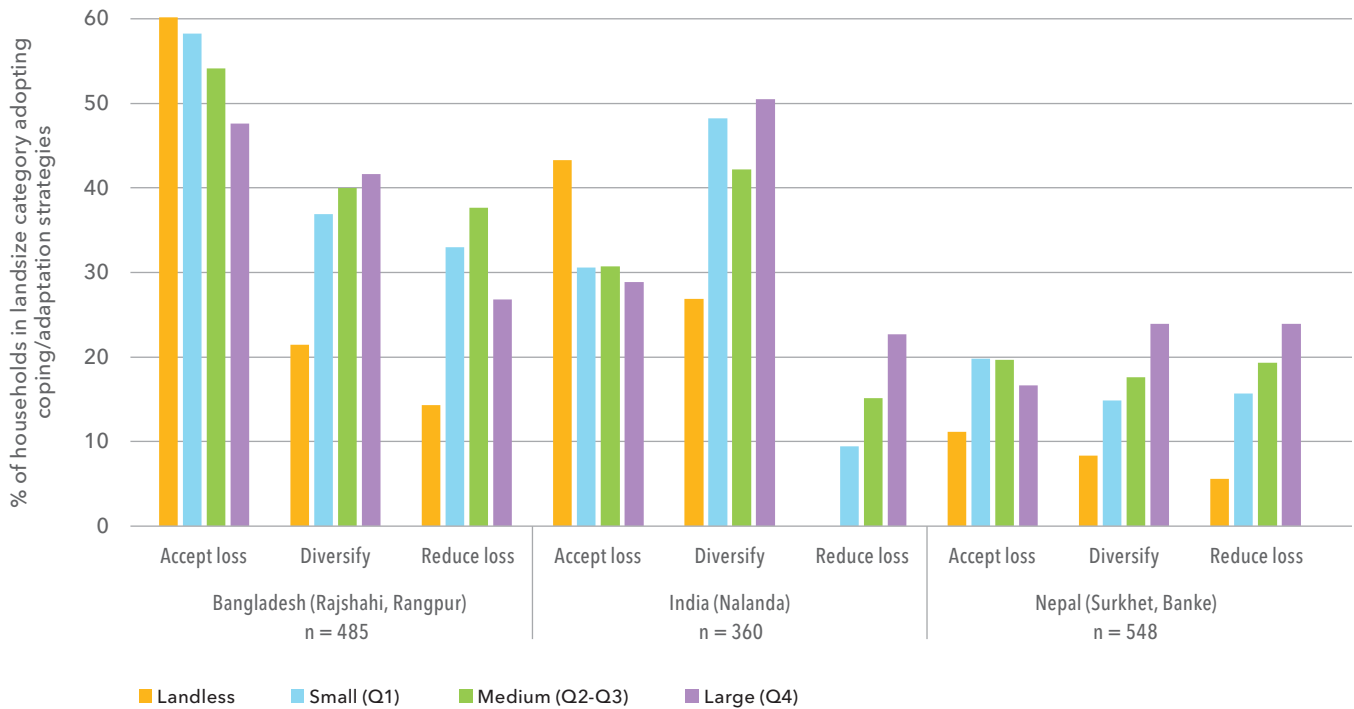
households depended largely on short-term risk management and consumption-related adjustments (Figure 7.2). This indicates that sectoral interventions alone, such as changes in cropping or conservation practices, may not be adequate to address household vulnerabilities. Complementary improvements are also needed in other parts of the system – including risk management mechanisms such as crop insurance and credit access, social safety nets, food rations, medical and health support systems, and livelihood supports, such as employment guarantee programs – to address consumption deficits among smallholder households.

Different households adapt differently

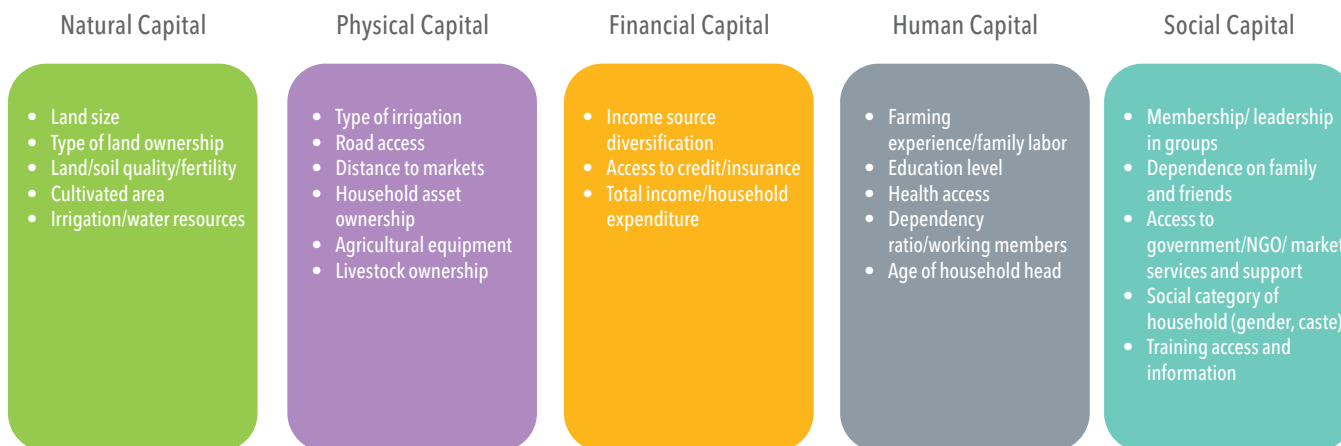
An agrifood systems perspective on adaptation is also required because not all households adapt in the same way. Households have access to different

sets of adaptation solutions depending on their resource endowment and capacity to absorb shocks. For instance, strategies that require capital investments in land, technology, or other resource-intensive assets may not be affordable or accessible to smallholder or landless households. Drawing on a framework adapted from Burton et al. (1993), this chapter identifies three levels of adjustment (Figure 7.3). In the absence of capacity to absorb shock, individuals may be compelled to accept their losses, either bearing these losses entirely or sharing them. With some capacity, they may be able to diversify practices, economic activities, or location to redress the damage to their livelihoods and incomes. With higher capacity to invest in strategies to protect and sustain existing livelihoods and economic activities, they may be able to minimize or reduce losses in the face of shocks.

FIGURE 7.3 Dependence on different levels of adaptation strategies by land size categories (quartiles) of households



Source: Data from TAFSSA agrifood systems assessment.

FIGURE 7.4 Five types of capital relevant for building adaptive capacities in South Asia

Source: Indicators compiled from a review of Datta and Behera (2022); Sardar et al. (2019); Brown et al. (2019); Maharjan et al. (2021); Khanal and Wilson (2019); Sam et al. (2018); Venus et al. (2021); Aryal et al. (2021); and Devkota et al. (2021).

To assess differences in the types of adjustments and adaptations adopted by households with different resource endowments, we categorized household adaptation strategies reported in the survey using this framework (Figure 7.3). Smallholder and landless households tended to resort more to accepting losses through reduction of consumption and expenditures on household requirements, including food, distress selling of assets, and use of credit and urgent remittances. These strategies tend to leave households worse off in the aftermath of a shock. Medium and large landholders, however, are more likely to reduce losses by investing in resource management and climate-smart agronomic practices and technologies, which enables them to sustain or even improve their livelihoods and income in the aftermath of a shock. These differences in adaptation strategies accessed by different classes of households increase the gap between richer and poorer households, deepening existing socioeconomic inequalities (IPCC 2023; Parsons et al. 2024). Policies that facilitate households' access to different adaptation strategies can thus support different classes of households. For instance, integration of social safety net programs for improved livelihoods, access to health services,

and access to food and nutrition even in times of shock can support adaptation strategies of households that are otherwise compelled to accept losses and reduce basic consumption.

Capacity to adapt reflects a multisectoral enabling environment

A household's adaptive capacity is supported by its access to different types of resources and capital – natural, physical, financial, human, and social (Mortreux and Barnett 2017). An enabling environment of policy, institutions, and markets can strengthen households' capacity to adapt by facilitating and deepening their access to these resources. Our review of the literature on adaptive capacities in South Asia found that a variety of capital types are relevant in the region (Figure 7.4). These span access to land, water, roads, markets, and credit and insurance; information and training; and livelihoods, education, and health services. Boosting these different capitals would require policy interventions in multiple social and economic sectors, including the wider system of governance, markets, and food environments. Building capacity to adapt in the face of sudden shocks would therefore require a systems perspective to adaptation.

LESSONS FOR CLIMATE ADAPTATION POLICIES

The TAFSSA household-level assessments revealed that adaptation responses often extend beyond the farm, encompassing livelihood shifts, reduced consumption, reliance on social networks, and informal credit. However, such multisectoral adaptation practices are not reflected in national policy design, and poor or smallholder households remain particularly constrained in accessing resilience strategies. Evidence from South Asia underscores the value and need for taking an agrifood systems approach to adaptation to sustain food security in the face of climatic shocks.

National Adaptation Plans (NAPs), mandated under the Paris Agreement for all signatory countries, are comprehensive strategic policy documents identifying medium- and long-term priorities for adapting to climate change. Bangladesh and Nepal have already developed their NAPs (Bangladesh, Ministry of Environment, Forest and Climate Change 2022; Nepal, Ministry of Forest and Environment 2021). India developed a National Action Plan on Climate Change (NAPCC) in 2008 as a key policy for climate action and is currently in the process of preparing its NAP. The NAPs of Bangladesh and Nepal, as well as India's NAPCC, integrate an agrifood systems perspective into climate adaptation planning to varying degrees.

Bangladesh's NAP shows a strong sectoral focus on agriculture, livestock, and fisheries, emphasizing climate-resilient crops, irrigation, and soil health, but it treats these components in isolation, without addressing postharvest value chains, food environments, or nutrition outcomes. Nepal's NAP offers a more systemic framing – linking agrobiodiversity, food security, water resources, and livelihoods – indicating an effort to use an agrifood systems lens. However, it too underrepresents trade, food loss and waste, and the role of private actors, as well as safety nets and social protection. India's earlier NAPCC emphasizes mitigation and technological adaptation through its National Mission on Sustainable Agriculture, but it

lacks an integrated view of agrifood systems and does not consider nutrition, market dynamics, or localized vulnerabilities.

In all three countries, social safety net policies that offer strong complementary support to other adaptation efforts already exist at scale. These include national food security programs, agricultural marketing reforms, social protection schemes, livelihood supports, and nutrition missions. These policies support access to alternate livelihoods, emergency food rations, or allowances/pensions in periods of extreme crisis, thus facilitating coping and reducing impact. Schemes also exist in these countries for food security (for example, India's Public Distribution System and Mid-Day Meal Scheme and Bangladesh's Vulnerable Group Development Program and Food-Friendly Program) and for livelihood support (for example, India's Mahatma Gandhi National Rural Employment Guarantee Act and Pradhan Mantri Kisan Samman Nidhi, Bangladesh's Employment Generation Program for the Poorest, and Nepal's Prime Minister Employment Program). However, they are not strategically aligned with national adaptation planning. Food security is often reduced to production resilience and technology-centric solutions in adaptation plans. Additionally, institutional coordination remains weak, with limited formal mechanisms for joint planning across sectors such as agriculture, nutrition, health, and social welfare. To strengthen adaptation planning through an agrifood systems lens, national adaptation policies must move beyond a production focus and integrate across the agrifood system, align with social protection mechanisms, and address differences in household capacities.

Policies must also empower local governments to design and deliver context-specific, cross-sectoral strategies, while developing monitoring systems that track resilience outcomes across the food system. An agrifood systems-based approach would ensure that adaptation policies not only safeguard production but also enhance household well-being, reduce inequalities, and build resilience across interconnected agrifood system components to deliver food and nutritional security for households.

Acknowledgments

We would like to thank the report editors and Haris Gazdar for constructive feedback and helpful suggestions, which have strengthened this chapter. We also thank the survey respondents and enumerators, as well as the whole TAFSSA team, for their contributions.

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Chapter 8

GENDER ROLES IN SOUTH ASIAN FOOD SYSTEMS

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KEY MESSAGES

- Women are central to agrifood systems but face structural barriers such as limited access to resources, weak tenure and resource rights, and social norms that undervalue and restrict their contributions.
- Women's time in reproductive and care work is unrecognized, limits their participation in productive or market-oriented work, and reinforces gender disparities in time, income, and well-being.
- Gender norms and social hierarchies shape women's roles and limit empowerment across the food system, from agriculture to markets to the distribution of tasks and food within households, affecting diet and nutrition outcomes.
- Policy must go beyond recognizing women's work to leveling access to resources, ensuring fair pay and safe conditions, and tackling restrictive norms through gender-transformative approaches.
- Empowering women in food systems requires intersectional, data-driven action that addresses caste, class, mobility, and intrahousehold dynamics to ensure equitable food, livelihood, and health outcomes.
- Areas for future research include: engaging men, particularly in sharing care work; reducing labor burdens; and changing attitudes of the young through in-school curricula.

Understanding gender roles in food systems¹ is key to developing strategies that overcome social and institutional barriers to achieving healthy and nutritious diets for all. Although both women and men are key actors in food systems as producers, wage workers, processors, traders, vendors, and consumers, women face many more constraints and limitations, including less access to opportunities, technologies, finance, and other productive resources as well as weak tenure and resource rights (Njuki et al. 2022). Gendered structures and other axes of inequality drive inequities across key food systems components, namely production, food value chains, food environments, and consumers (and their behavior) (Figure 8.1), leading to inequality in diet and nutrition outcomes (HLPE-FSN 2023). Even within the same household, men and women can experience gendered differences in these outcomes due to their unequal roles across the food system and the subordinate status of women in their families and community (Quisumbing et al. 2023).

Globally, women spend at least three times as many hours as men on unpaid work on average, and consequently have a higher total work burden than men, when both unpaid and paid work are considered (ILO 2024). Attempts to increase women's participation in market-oriented work or in remunerative activities have been stymied by the time they spend in reproductive and care work – both unrecognized and uncompensated (Quisumbing et al. 2023) – and the possible toll that market work takes on the welfare of women and their families. Gender disparities in the distribution of paid and unpaid work have important consequences for women's

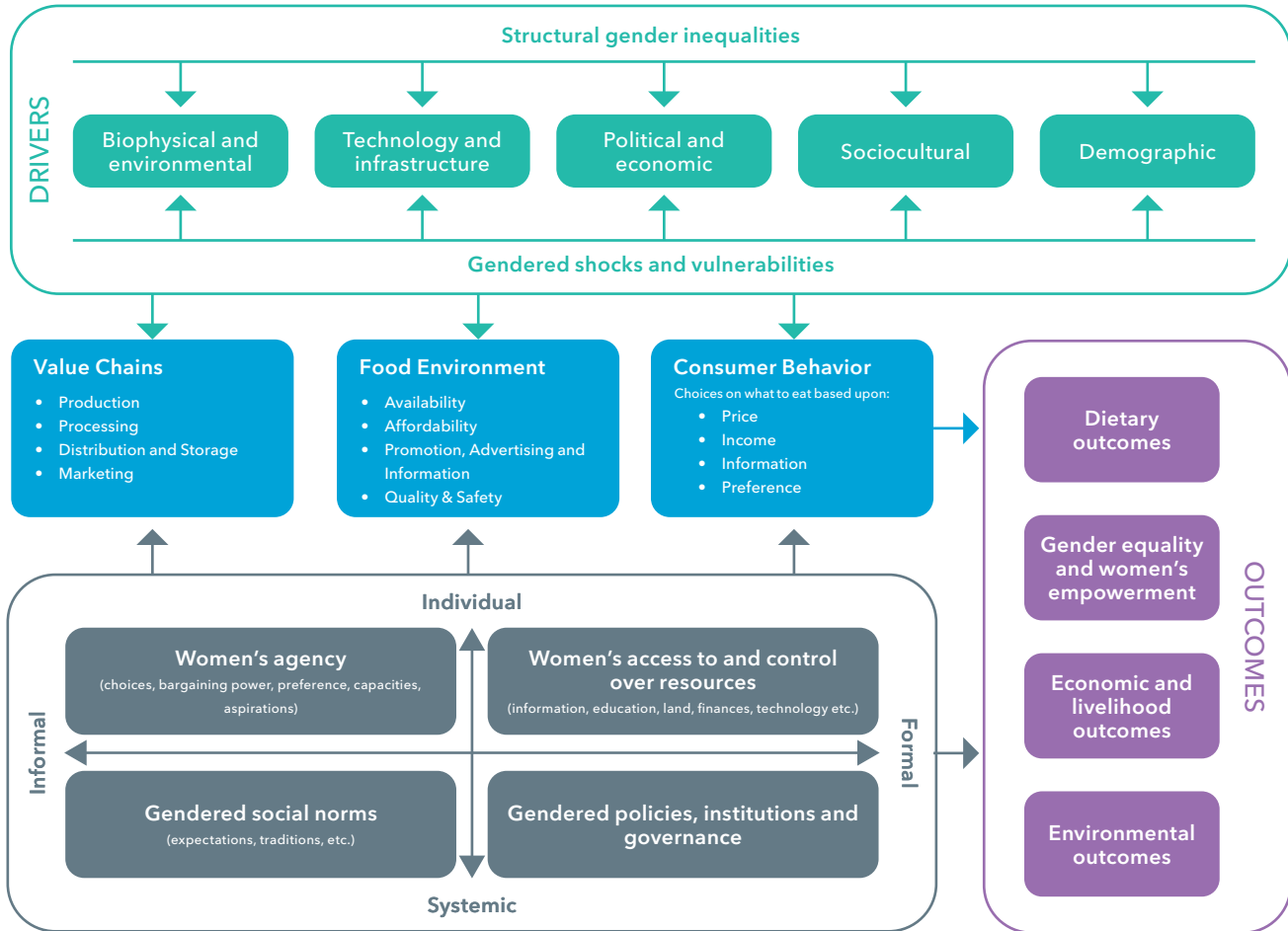
livelihoods; access to paid employment; time for education, leisure, and social activities; and ultimately, their welfare (Seymour et al. 2020).

This chapter draws on existing and new evidence from South Asia to examine women's work within food systems, their roles in the food environment, their work within the household, and factors that influence how food is prepared and allocated. We describe the need to address the multiple barriers and constraints women face, particularly the triple duty of productive, reproductive, and social work, in the formulation of appropriate food systems policies and programs. Finally, we discuss the policy and enabling environment needed to enhance gender equality within South Asian food systems and identify areas for future research and action.

WOMEN'S WORK WITHIN THE AGRIFOOD SYSTEM

Globally, as of 2019, 36 percent of working women and 38 percent of working men were employed in agrifood systems, with substantial variations within and across regions. Agrifood systems are a more important source of livelihoods for women than men in many countries (FAO 2023). This is especially the case in South Asia, where 71 percent of women in the labor force work in agrifood systems versus 47 percent of men. In comparison, in sub-Saharan Africa, 66 percent of working women are in agrifood systems, compared with 60 percent of men. Women's paid and unpaid roles in South Asian agrifood systems – and (lack of) recognition thereof – reflect gendered societal norms. Unlike in sub-Saharan Africa, where women's contribution to the agriculture sector is better recognized, in South Asia women are often invisible and undercounted in agriculture (Shah and Soumya 2022). Despite their extensive involvement in agrifood systems, women are assumed to be confined to the domestic sphere and focused on reproductive and care work. These norms are deep-seated and informed by hierarchical and patriarchal structures that place gendered constraints on

1 According to the Food and Agriculture Organization of the United Nations (FAO), agrifood systems comprise the entire range of actors and their interlinked activities that add value in food and nonfood agricultural production and related off-farm activities such as food storage, aggregation, postharvest handling, transportation, processing, distribution, marketing, disposal, and consumption. Food systems, a subset of agrifood systems, comprise all food products derived from crop and livestock production, forestry, fisheries and aquaculture, and other sources, such as synthetic biology. For our purposes, we treat these two terms as interchangeable (FAO 2023, 5).

FIGURE 8.1 Framework reflecting gendered food systems

Source: Njuki et al. (2021); adapted from de Brauw (2019).

decision-making and on access to titles for land and water, markets, agricultural extension, and credit, and also shape the conditions under which paid and unpaid labor takes place (Timsina et al. 2023; Gillespie et al 2019).

Within South Asian agrifood systems, women's share of labor has remained stable over time, while men's share has decreased (FAO 2023). Women are also engaged in agrifood system activities that are closely linked to diets. For example, a higher proportion of women are involved in chicken raising and home gardens (Wong et al. 2017; Patalagsa et al. 2015). Despite women's prominence in agrifood

systems, policies and programming often fail to address gender-specific barriers to women's ability to participate in and benefit from this sector. For example, a study found that women working in food processing plants receive less training than men on improving the quality of food and ensuring hygienic practices (Devi and Somokanta 2016). Norms also shape the lens through which women's employment is understood. In India, employers view women as less capable than men of performing both technical and physically demanding tasks and as primarily capable of unskilled labor (Devi and Somokanta 2016). In Afghanistan, even if women participate in

agricultural activities, their participation is viewed as “help” rather than production or an economic contribution, as they are mainly viewed as mothers and caregivers (Tavva et al. 2013).

Women are not equally represented across stages of the value chain and tend to be less present in downstream, higher-paid nodes, such as marketing, when these involve direct interaction with clients, particularly unrelated men. For example, in the Transforming Agrifood Systems in South Asia (TAFSSA) study – a CGIAR Research Initiative that conducted district-representative household surveys of rural areas in 2023, with study sites in Bangladesh, India, and Nepal² – women made up a minority of retailers. In the Bangladesh sites, all the vendors in multi-vendor markets were men, while in India, only 20 percent of retailers were women. In contrast, 57 to 60 percent of retail stores in the two Nepal sites were owned by women. There is also evidence that participation in some nodes of the value chain is more empowering than in others (Bi et al. 2023a, 2023b, 2023c, 2023d, 2023e). One study in Bangladesh suggests that women’s relational roles in value chains matter to their empowerment and well-being, with women in wage worker and entrepreneur households being less empowered than women in farming households (Raghunathan et al. 2021). While entrepreneurship is often viewed as empowering for women, poor women often engage in small businesses with very low returns. Moreover, intersectionalities between gender and identities shaped by cultural norms, especially around caste and class, add complexity to work patterns among women. In South Asia, these intersectionalities affect women’s ability and need to work. Thus, some studies find that in Bangladesh, as in other countries in the region, women in wealthier households are less empowered, reflecting the value placed on social seclusion for women in higher

socioeconomic strata (Raghunathan et al. 2021; Quisumbing, Heckert et al. 2021). These issues point to the need for both policy and other gender-transformative approaches in South Asia that target structural inequalities and social and gender norms to achieve greater gender equality in agrifood systems and a more equitable distribution of their benefits.

WOMEN’S ROLE IN THE FOOD ENVIRONMENT

The food environment is a critical consumer interface within a food system that “encompasses the availability, affordability, convenience, promotion and quality, and sustainability of foods” (Downs et al. 2020). Despite the sparsity of literature, there is evidence of gender inequities across these food environment dimensions (Twyman et al. 2020). The constraints women face to participation in food-environment-related off-farm activities are similar to those they face as producers, including a higher likelihood of being engaged in informal employment and having less access to productive resources and support services (FAO 2023). Through women’s involvement in food purchasing decisions, they do influence their families’ and their own diets and nutrition (Connors et al. 2023; Sariyev et al. 2020), but the prevailing gender dynamics in South Asia also create challenges in women’s interactions with the food environment as consumers. First, food affordability is affected by constraints that limit women’s access to resources, making it difficult for them to afford certain foods. Second, although accessibility is often linked with physical attributes such as wealth, road networks, and distance to markets (Turner et al. 2018), women’s access to food can be constrained by restrictions on their mobility that limit their travel to markets and other public spaces. Therefore, women who have low autonomy regarding their mobility are less likely to participate in acquiring food and in making decisions related to food acquisition. Women’s mobility has been noted to

2 The TAFSSA cross-sectional household survey was conducted in early 2023 in three South Asian countries. The specific country sites were Bangladesh (Rangpur and Rajshahi), India (Nalanda), and Nepal (Banke and Surkhet).

be positively associated with children's nutrition (Sethuraman et al. 2006).

Women and men spend different amounts of time on food procurement and preparation, with men being more responsible for the former and women the latter, which has implications for the "convenience" dimension of the food environment. Although better knowledge and training can improve women's decision-making for her own and her family's nutritional well-being (Kjeldsberg et al. 2018), the numerous paid, unpaid, and care tasks women undertake affect what they buy and prepare, and can lead them to opt for more convenient, easier-to-cook foods (Bailey et al. 2018; Masilamani and Sudaram 2012).

WOMEN'S WORK WITHIN AGRICULTURAL HOUSEHOLDS

New evidence from the TAFSSA agrifood systems assessment surveys in Bangladesh, India, and Nepal, shows that, in addition to performing a wide array of agricultural tasks, women are disproportionately responsible for unpaid care work and domestic chores within the household (Gupta et al. 2022). Although the TAFSSA surveys are not nationally representative, the data offer useful insights on gender roles within the agrifood system, particularly for rural households, given that 89 percent of households in the sample were involved in doing agricultural tasks. Gendered social norms and women's agency affect intrahousehold task allocation, as indicated by the lower left-hand box of the gendered food systems framework (Figure 8.1).

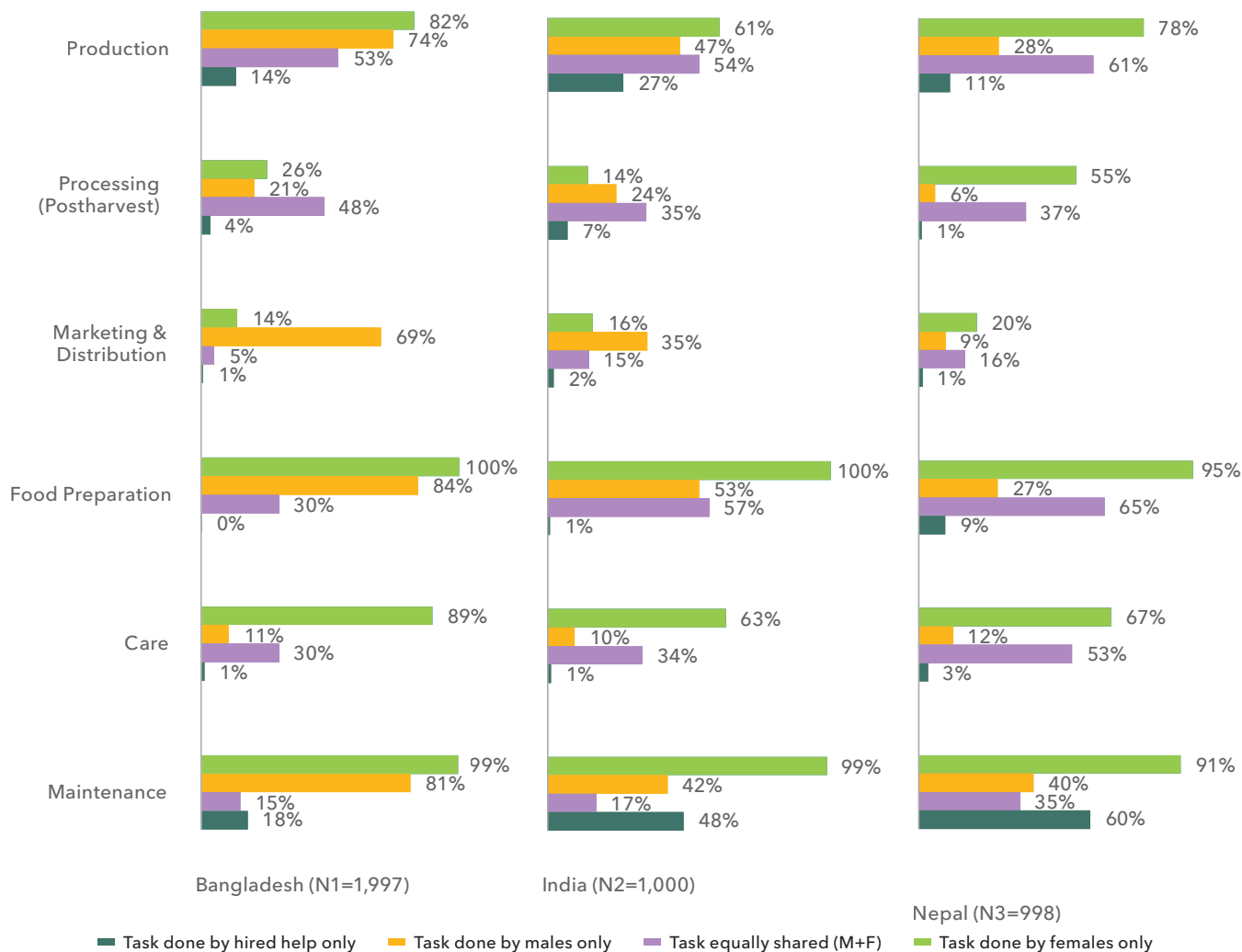
Figure 8.2 compares the distribution of tasks by gender across the agrifood system in the three TAFSSA country sites, for broad task categories: agricultural production, postharvest processing, marketing and distribution, and tasks related to food preparation, care, and maintenance. (Each broad category is an aggregate across specific tasks, for which there may be substantial variation, so the percentages do not sum to 100 percent.) Women perform agricultural production tasks in

all three countries. Among households engaged in agricultural activities, more than four-fifths (82 percent) of Bangladeshi women respondents reported participating in agricultural production tasks, followed by 72 percent of Nepali women, and 61 percent of Indian women. Across all three countries, there is significant sharing of agricultural production tasks between male and female household members undertaking these activities – 56 percent of tasks are shared in Bangladesh, 60 percent in Nepal, and 80 percent in India. Women are less involved in postharvest processing and marketing of agricultural products in all three countries.

In contrast to women's involvement in agriculture-related tasks, men are uniformly less involved in food preparation tasks in all three countries, albeit to varying degrees across study sites. Food preparation tasks are often shared in India (57 percent of households) but less so in Bangladesh (30 percent) and Nepal (27 percent). Care tasks are performed predominantly by women, ranging from 59 percent in Nepal to 89 percent in Bangladesh, although sharing of these tasks between men and women is also common. A large fraction of both women and men report undertaking maintenance tasks. Although labor markets are active, the use of hired help is confined mainly to agricultural production and maintenance tasks, with variation across countries.

Migration of men to cities or other countries to work and send back remittances is common in South Asia, resulting in changes in household structures and task allocation. Although our data do not permit us to directly infer that households without adult males are those with male outmigrants, our analysis of the TAFSSA data enables us to compare task sharing among households with and without adult male members present (Hathi et al. 2021). In our Bangladesh sites, households without adult men present are more likely to rely on hired help for several on-farm tasks (preparing the land, weeding, irrigation, and harvesting), and the female members to perform many of the cultivation tasks and tasks

FIGURE 8.2 Gender distribution of household tasks across Bangladesh, India, and Nepal by task type



Source: Data from TAFSSA agrifood systems assessments.

Note: Percentages refer to the proportion of households and may not sum to 100% due to overlapping task responsibilities.

that involve leaving the homestead (taking produce to market, purchasing food, and obtaining fuel wood).³ Similar patterns are observed in our India sites for households with and without adult men present. In Nepal, where men and women more often share cultivation tasks, women perform many of the

tasks exclusively if adult men are absent, and women and/or hired help are more likely to perform home repairs and maintenance tasks in their absence.

GENDER NORMS AND THE INTRAHOUSEHOLD DISTRIBUTION OF FOOD

Gender norms interact with women’s ability to ensure that resources are mobilized for their own and their family’s nutrition. Although women are most directly

³ The detail by task is not shown here but can be found in the following data notes: Banerjee et al. 2023a; 2023b; 2023c; 2023d; 2023e.

engaged in all aspects of care for children under age five, including what is cooked for and fed to the children, women's nutrition knowledge does not always translate into preparing healthy food or nutritionally sound eating behaviors within a household. The actual practice of intrahousehold food allocation is determined not only by women's knowledge but also by their income, bargaining power, and social status (Harris-Fry et al. 2017; Hathi et al. 2021; ILO 2024). In the region, women "eating last" is well-documented (Hathi et al. 2021). Not all household members have an equal opportunity to eat the food acquired; eating patterns that favor men and boys over women and girls are highly prevalent. Women are most vulnerable to inequitable intrahousehold food allocation in food insecure households; however, women are also more disadvantaged in high-caste, wealthier households compared to lower caste, poorer households.

Empowering women is not a straightforward solution to changing intrahousehold food allocation dynamics, although cross-country evidence shows that directing resources to women, rather than men, is more likely to improve household well-being, particularly in relation to health and nutrition (Yoong et al. 2012). In South Asia, a woman investing more in her sons than daughters may be motivated by self-interest rather than altruism, given the prevailing male advantage in labor markets and property rights, women's need for male mediation in the community, and women's dependence on sons in widowhood or old age (Agarwal 1997). Evidence from a nationally representative survey in Bangladesh shows that, while women's empowerment is associated with more diverse diets for adult men and women, adolescent girls have worse diets than adolescent boys in households where women are more empowered (Sraboni and Quisumbing 2018). This reflects the prevailing marriage pattern in which girls are expected to leave the household to marry during adolescence, meaning parents may not invest in them. This phenomenon may jeopardize young women's future nutrition and reproductive health.

SUPPORTIVE POLICIES AND ENABLING ENVIRONMENTS

Transforming agrifood systems toward gender equality and better diets requires a more inclusive approach and enabling mechanisms to reduce gender inequalities in livelihoods, food security, and nutrition outcomes. To recognize the extent and importance of women's work in agrifood systems, this work must be measured and reported. The availability of gender-disaggregated data on agrifood systems has improved in the last few decades, but the extent and coverage remain incomplete. We need data that not only capture who is employed along the value chain but also their workplace conditions and the extent to which the policy environment supports gender-equitable outcomes. Data disaggregated by gender on resilience, reliance on natural resources, and gender-based violence are all critical when using an evidence-based approach to reducing gender inequities in food systems (Forsythe 2023).

Recognition of women's work also includes valuing the time spent in unpaid care work, which is often overlooked. Fifty-six percent of South Asian women cite care obligations as a reason for not being a part of the work force (ILO 2024), particularly while pregnant and caring for young children. Social protection programs can play an important role in this regard. For example, in India, the National Food Security Act, passed in 2013, gave access to maternity benefits to all pregnant women. However, it was not implemented for the first four years. In 2017, a national maternity benefit scheme, Pradhan Mantri Matru Vandana Yojana (PMMVY) was announced, but it reduced the value of the transfers and limited them to the "first living child." The PMMVY had its own implementation challenges, and the absence of monitoring data made it hard to assess the program's coverage or effectiveness. Despite good intentions, this effort exemplifies the difficulty in designing and implementing such policies.

To reduce gender inequalities in agrifood systems, one must go beyond recognizing women's work to leveling the playing field. This requires

creating (1) economic opportunities for women that compensate them fairly; (2) equal access for both women and men to resources required for success; and (3) an enabling environment in these spaces to ensure that women are able to fully benefit from the opportunities available, including safe working conditions (Maestre and Thorpe 2016), maternity benefits, social protection for women involved in casual, part-time, or seasonal work (Rola-Rubzen et al. 2023), and reduction of mobility challenges. If instead of focusing on options considered “opportunities for women,” we focus on narrowing the major resource gaps between men and women, we can address most of these issues. Understanding the nature of these gaps is important. For example, given that a large majority of the jobs/economic opportunities in South Asian food systems are in the informal sector, policies that focus on skills and infrastructure rather than labor laws would have more impact. Training can focus on the skills that small entrepreneurs need in competitive markets (such as vegetable vendors in vegetable markets) so that women have the bargaining power to command the same price for their products as men. The huge gender gap in retail outlet ownership revealed by the TAFSSA data show the potential of giving women access to the retail sector, an initial step toward expanding entrepreneurship. Understanding the barriers to women’s participation, including gendered aspects of the food environment and labor market, will be important. Policies that support enabling environments are needed so that women are not confined to low-return nodes of the value chain.

Leveling the playing field is not enough. To ensure that women are empowered to leverage and use their equal access to resources, gender-transformative approaches are needed to create an environment where women can succeed. Taking into account intersectionality when targeting policies and programs is especially critical because even among poor women, important differences exist across ethnic, caste, and religious groups in South Asia that have implications for food procurement, waste, and consumption (Ashik et al. 2022). Given the deeply entrenched

social norms underlying gender disparities in the region, gender-transformative approaches – that is, methods that address structural barriers and constraining gender norms – are required and would include addressing gender-biased norms at institutional, community, and household levels that create and perpetuate power asymmetries. Tackling social and gender norms at all levels requires the engagement of those in power, whether men and influential people within their households (such as mothers-in-law) or others in positions of power. There are successful examples of such gender-transformative approaches in Bangladesh, where community leaders were engaged in ensuring that women receiving microfinance loans retained control over the funds, rather than their husbands (Arnold et al. 2021). Learning from these approaches can help identify the range of possible policies and interventions that can be mobilized to change gender norms in the household, community, and society.

RECOMMENDATIONS FOR FURTHER RESEARCH AND ACTION

Transforming gender roles in South Asia requires changing deeply rooted practices and norms. Research can inform the design and implementation of policies and programs for gender transformation. Beyond disaggregated data, more intersectional analysis is required to understand gendered participation across different nodes of value chains (Stoian et al. 2018) and to evaluate trade-offs entailed by interventions that may lead to both empowering and disempowering outcomes (for example, participation in value chains may increase while caretaking tasks or wages remain the same, thus increasing women’s workloads).

Another important step is to consider the role of private industry, especially multinational and global companies, and examine the commercial determinants of gender inequities in the food system that stem from private companies. These companies influence the standard for working conditions and set targets for both producers and suppliers, which

do not always consider gender inequities. There is a role for policy action that targets such companies to support gender-sensitive workplace policies for ensuring safety and improving working conditions (Pyburn et al. 2021; Sidanius et al. 2018).

Promising topics for future research include:

Increasing men’s engagement in care work.

Several interventions in South Asia have used materials such as Helen Keller International’s Nurturing Connections curriculum to engage men and influential family and community members in supporting women in their productive and reproductive roles (Quisumbing, Ahmed, et al. 2021). Approaches such as the Gender Action Learning System have been used to encourage the (re)distribution of care work within the household; discussion with program staff in an intervention in Nepal indicated that men willingly took on additional reproductive work and shared women’s workload (Quisumbing et al. 2023).

Reducing drudgery. Technological development and provision of infrastructure that reduces drudgery, particularly in tasks performed by women, needs to continue. Beyond technology development, implementors must look toward making tools affordable, particularly for low-income women who cannot afford to purchase the technology, such as by promoting rental markets or encouraging group ownership.

Changing attitudes of the young through early in-school curricula. Community interventions aimed at targeting groups at the household level to change collective gender norms have shown promise. For example, in Nepal, newly married women, their husbands, and their mothers-in-law were engaged in a weekly group discussion and activity groups for four months as an approach to change collective gender norms around pregnancy. Improved knowledge on nutrition during preconception and pregnancy and a lower proportion of women eating last

was noted following the intervention (Diamond-Smith et al. 2022). Community conversations among adolescent boys and girls are already being used in attempts to change mindsets among youth. For example, a randomized controlled trial examining a classroom-based gender equality curriculum on gender attitudes, aspirations, and behaviors taught to adolescents in Haryana found a positive impact on gender-equitable behavior and progressive attitudes toward gender equality (Dhar et al. 2022). However, ideas about what is and is not appropriate for women and men to do are set in childhood. Early in-school curricula and modeling by teachers and other adults can be used to encourage girls and boys to share tasks and to move beyond traditional gender roles.

Acknowledgments

We would like to thank the editors and Kalyani Raghunathan for constructive feedback and helpful suggestions, which have strengthened this chapter. We also thank the survey respondents and enumerators, as well as the whole TAFSSA team, for their contributions.

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Chapter 9

ADOLESCENTS IN SOUTH ASIAN AGRIFOOD SYSTEMS

Roles and Aspirations

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KEY MESSAGES

- Adolescents play multiple roles in agrifood systems, from production to sale, acquisition, preparation, and consumption of food.
- Though surveys increasingly include adolescents, data gaps exist on their diets, food choice behaviors, and aspirations for the future, all of which have implications for agrifood systems.
- Fewer than 1 in 10 adolescents wish to engage in farming in the future, according to findings of a 2023 survey of 4,000 adolescents in rural Bangladesh, India, and Nepal.
- The same survey found that adolescent males and females participated equally in agricultural tasks, but that food and domestic tasks were primarily done by adolescent females.
- Recent data show that adolescents have access to and frequently consume unhealthy foods, and are largely missed by school meal programs, which typically only cover children.
- The Eat Well, Live Well social media campaign and follow-on activities in Bangladesh offer an example of innovative approaches to encourage adolescents to make better food choices.

Adolescents are both actors in and beneficiaries of agrifood systems, playing important roles in the production, sale, acquisition, preparation, and consumption of food. In South Asia, one in every five (over 350 million) individuals living in South Asia is an adolescent (defined as ages 10 to 19 years), making this region home to the largest adolescent population globally (UNICEF 2021). Importantly, this age group brings new perspectives and is quick to adopt innovations that both benefit them and can help drive agrifood systems toward greater efficiency and sustainability (Dolislager et al. 2021; Piselli et al. 2019). As the world becomes increasingly connected, adolescents have access to unprecedented amounts of information through social media and the internet that shape their decisions and aspirations about how to act and what to do. Adolescent females are also entering childbearing years, and two-thirds of females in Bangladesh, half of females in Nepal, and 35 to 40 percent of females in India and Pakistan marry before their 18th birthday and have a child before turning 20 (Scott et al. 2021). Understanding adolescents' roles in agrifood systems is therefore critical for the next generation, whose health and well-being depend on choices adolescents make today.

In this chapter, we describe evidence on adolescents in South Asia – their roles, consumption behavior, and aspirations – through an agrifood system lens. Specifically, we examine their involvement in food-related tasks spanning farms to markets to households. We then examine what they eat and the information that may affect their consumption patterns. Finally, having presented evidence on what they do, we examine what they want to do, whether these aspirations align with their parent's expectations, and potential implications of their future work preferences for agrifood systems. Throughout the chapter, we draw heavily on a rural agrifood systems assessment conducted in 2023 that collected data from 4,000 adolescent males and females living in rural areas in five districts across Bangladesh (Rajshahi, Rangpur), India (Nalanda), and Nepal (Banke, Surkhet) (Gupta et al. 2022). We refer to this

as “the TAFSSA survey” as it was conducted as part of the CGIAR Research Initiative on Transforming Agrifood Systems in South Asia (TAFSSA).

WHAT DATA EXIST ON ADOLESCENTS IN SOUTH ASIA?

As the importance of adolescents for economies and as a vulnerable group from a social and health perspective has become more widely recognized, the number of surveys focused on this demographic group has increased over the past decade. Examples include the National Youth Health Survey (Sri Lanka, Family Health Bureau 2015) in Sri Lanka; Improving Adolescent Lives in Pakistan (UNICEF Pakistan 2021); Bangladesh Adolescent Health and Wellbeing Survey (NIPORT et al. 2021); Multiple Indicator Cluster Survey (Nepal, Central Bureau of Statistics and UNICEF Nepal 2020) in Nepal; Comprehensive National Nutrition Survey (India, MoHFW et al. 2019), Teen Age Girls survey (Naandi Foundation 2018), and Understanding the Lives of Adolescents and Young Adults (Anthya et al. 2017) in India; and the Young People's Perspectives on Food Environments and Food Choices survey conducted in multiple South Asian countries (UNICEF 2024). Using varied tools, these surveys assessed a broad range of topics including nutritional status, education, media exposure, diets, mental health, social networks, experiences of violence, gender norms, and sexual health. Key areas relevant to agrifood systems such as food preferences, nutrition knowledge, social media engagement, roles, and aspirations remained undermeasured, leaving gaps in understanding about how adolescents engage with agrifood systems in the region. The TAFSSA survey was designed with these gaps in mind.

WHAT ARE ADOLESCENTS DOING IN RURAL HOUSEHOLDS?

The TAFSSA survey, representative at the district level of rural households with an adolescent living at home, used a novel tool to measure

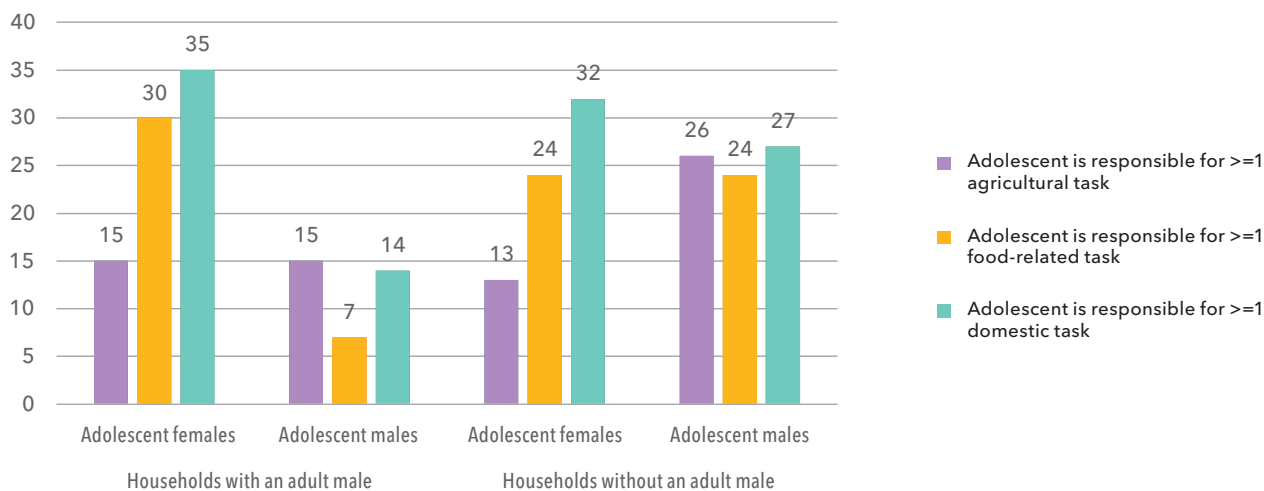
intrahousehold task allocation (see Chapter 8). Linked to the household roster, this module asked an adult respondent to identify which household members were responsible for performing more than 40 different tasks related to agricultural production (such as preparing land, harvesting food, and caring for livestock), food acquisition and preparation (purchasing food, fetching water, cleaning food before cooking, dealing with leftovers, and so on), and domestic work (such as house repairs, feeding young children, and caring for elderly). We found that adolescents were the primary or secondary person responsible for at least one agriculture task in 15 percent of households in Bangladesh, 17 percent of households in India, and 25 percent in Nepal. Female adolescents carried more burden than male adolescents, except in households where male adults were absent (common in the region due to migration for work). In such households, which comprised 18 percent of the sample, male adolescents stepped in to help. For example, in Bangladesh, male adolescents were responsible for agricultural tasks in 15 percent of households with male adults present but 26 percent

of households where male adults were absent (Figure 9.1).

Male adolescents were far less involved in tasks related to food and domestic work compared with female adolescents. In India, female adolescents were responsible for at least one food-related task in 60 percent of households, while male adolescents were responsible for these tasks in 20 percent of households. Female adolescents were responsible for tasks such as cleaning food for cooking, making tea, cooking food, serving food, dishwashing, cleaning floors, and washing clothes in around 50 percent of households, while male adolescents were responsible for these tasks in only 1 to 2 percent of households.

These sobering facts show that gender inequities start early in rural South Asia, with much of the work burden related to food production, preparation, and domestic chores falling on young females, possibly at the expense of educational or skill-building activities (16 percent of adolescent girls in the sample were out of school) that might help them secure a better future. It is common in the region for girls to be married as teenagers, with marriage frequently

FIGURE 9.1 Task responsibilities of adolescents in Bangladesh in households with and without adult males



Source: Data from TAFSSA agrifood systems assessment conducted in 2023 in Rajshahi and Rangpur districts, Bangladesh

Note: n=2000 households

followed by childbearing and school dropout (Scott et al. 2021). Nearly 100,000 young people enter the job market daily in the region, but 93 million children and adolescents are out of school and may miss the opportunity to develop the skills needed to secure higher-paying jobs (Farivar 2024). Agrifood systems require a skilled workforce at all levels, from food production to marketing and food policy and industry leadership. Thus, for well-functioning agrifood systems, it is important to ensure that adolescents are on the right path and have the general education and skills needed to contribute as productive citizens later in their lives. Nutrition is tied into many factors that affect adolescents and their ability to learn and thrive, so we next examine what adolescents are eating.

WHAT ARE ADOLESCENTS EATING?

Although data on diets are inconsistently collected across countries, surveys indicate that diets of adolescents are far from current recommendations. One common finding is a trend of rising consumption of unhealthy and ultra-processed foods – that is, foods high in calories, fat, salt, and/or sugar and low in nutrients that promote health. In India, 36 percent of adolescents reported consuming fried foods and 10 percent consumed sugary beverages in a typical week, while less than half consumed fruits in a typical week (India, MoHFW et al. 2019). In the TAFSSA survey, more than 80 percent of adolescents in Bangladesh and 63 to 75 percent in India and Nepal reported consuming biscuits or baked goods in the previous week. A higher proportion of younger adolescents (ages 10–14 years) consumed biscuits and baked goods and chips, compared with older adolescents (ages 14–19 years). Consumption of deep-fried foods was higher among male than female adolescents in all locations except Nepal.

In the TAFSSA survey, we found that staple grains (rice and wheat) are ubiquitous and consumed at nearly all meals. Other food groups, however, were consumed less frequently, with some notable

differences by location and gender. A slightly higher percentage of female than male adolescents consumed green leafy vegetables in Bangladesh (67 versus 61 percent) and India (57 versus 56 percent), but the reverse was true for Nepal (70 percent of females versus 76 percent of males). Apart from the regularly consumed rice and staple vegetables (such as potatoes, tomatoes, onions, and some green leafy vegetables), adolescents' diets typically consisted of dal and processed foods. More than 80 percent adolescents in Nepal and India and more than 60 percent adolescents in Bangladesh had consumed lentils in the previous week. Animal-source foods were less commonly consumed, especially in India. Egg consumption in the prior week was higher among male than female adolescents across locations (85 percent versus 81 percent in Bangladesh; 37 percent versus 24 percent in India; 53 percent versus 46 percent in Nepal). Adolescence marks a stage of high nutrient requirements due to rapid growth, and animal-source food consumption can make an important contribution toward these requirements (IFPRI 2024).

Adolescents get their food from multiple sources, including school and retailers on their path to school. In a UNICEF youth survey on food environments (UNICEF 2024), 48 percent of school-going respondents (ages 13–19 years) reported the presence of food service facilities at their schools (highest for Bhutan and Sri Lanka at around 70 percent and lowest for Afghanistan and Bangladesh at around 30 percent), but only 17 percent indicated that cooked meals were provided. When hungry at school, most adolescents opted for freshly cooked meals (38 percent), followed by fast foods (17 percent) and packaged snacks (11 percent). The main barrier to eating when hungry at school was insufficient money, reported by 35 percent of respondents. The availability of unhealthy foods near schools was high, with 76 percent noting the presence of packaged snacks, 62 percent reporting sugar-sweetened beverages, and 55 percent reporting fast foods. These statistics suggest that sub-optimal diets

reflect both affordability constraints and unhealthy food environments.

Adolescents' food environments and the type of information they are exposed to can impact their consumption behavior (UNICEF 2024). In the TAFSSA survey, around 50 percent of adolescents had seen or heard advertisements about foods or drinks in the past 30 days. Adolescents were most frequently exposed to advertisements for soft drinks (31 to 48 percent, depending on location) followed by salty packaged snacks in India (35 percent) and Nepal (17 percent), and baked sweets (24 percent)

in Bangladesh. Mass media was the source for most advertisements, followed by shop signs or displays. Media exposure is made possible by mobile phones, which have spread rapidly in recent years. The TAG Survey, conducted in 2018 in India, found that 15 percent of adolescents ages 13 to 15 and 30 percent of those ages 16 to 19 had access to a mobile phone. Post COVID-19, mobile phone usage increased in India due to the adoption of remote learning, and the 2023 Annual State of Education Report found that close to 90 percent of adolescents ages 14 to 18 had access to a mobile phone in

BOX 9.1 A case from Bangladesh: Empowering youth and transforming Bangladesh's food systems through collective action

Contributed by Mehedi Hasan Bappy, Project Coordinator, Youth and Adolescent Nutrition, GAIN & Focal, SUN Youth Network Bangladesh

The Global Alliance for Improved Nutrition (GAIN) has been working with adolescents and youth as key stakeholders to combat malnutrition and strengthen food systems in Bangladesh. From 2017 to 2021, GAIN's Bhalo Khabo Bhalo Thakbo (Eat Well, Live Well) campaign inspired more than 1 million adolescents to pledge to spend their pocket money on nutritious foods, using a narrative that resonated with their motivations (Barnett et al. 2021). This success laid the foundation for further youth-focused initiatives.

In 2024, GAIN, in collaboration with the Ministry of Health and Family Welfare, launched the Scaling Up Nutrition (SUN) Youth Network Bangladesh, a national platform to mobilize youth and adolescents to advocate for healthier diets and improved nutrition outcomes. The network empowers young people with the skills, knowledge, and networks to engage in decision-making and co-create solutions for food and nutrition systems. GAIN's Youth Leadership Initiative further supports this by fostering collective action and policy dialogue.

From January 2024 to July 2025, GAIN trained more than 500 youth (ages 18 to 25) through its Food Systems Youth Leadership Training, equipping them to identify and address existing food systems-related issues through designing and implementing community-based action projects. After completing the training, the participants have been supporting nutrition awareness campaigns, school meals, food safety, and homestead and vertical gardening in flood-prone areas. These efforts aim to promote healthier diets and climate-smart food systems. For example, Minhajul Islam Bappi, a training participant, launched the Nutritious Khichuri for 10 Bangladeshi taka (US\$0.08) initiative, providing affordable meals to more than 3,000 students and teachers across four schools daily.

"The training was an eye-opener. I learned so much about the importance of proper nutrition and how local actions can create big changes. It made me realize that true leadership isn't just about big ideas, but about identifying and solving the problems right in front of you, in your own community." – Minhajul Islam Bappi

GAIN also facilitates youth-government collaboration, ensuring young voices shape national and global dialogues, such as the UN Food Systems Summit, Nutrition for Growth, and Conference of Youth negotiations. By institutionalizing youth leadership through the SUN Youth Network, GAIN is nurturing a generation of nutrition champions driving systemic change for a healthier, more resilient food system in Bangladesh.

the household (ASER Centre 2024). Moreover, close to 80 percent of these adolescents reported using a mobile phone for entertainment, indicating a high possibility of exposure to ads promoting unhealthy food options. A closer look at the food environment-diet association can be found in Chapter 4.

WHAT DO ADOLESCENTS ASPIRE TO FOR THE FUTURE?

Earlier in this chapter, we described the tasks performed by adolescents in rural South Asia. In the TAFSSA survey, we also asked adolescents what they would like to do in the future to earn money. Fewer than 1 in 10 adolescents wanted to take up farming as their future primary occupation. Around half of adolescents aspired to be salaried public sector employees (that is, government workers) and 20 to 30 percent wanted to be highly skilled independent professionals. We separately asked their parents what kind of work they want their adolescent child to do in the future. Parents' expectations for male adolescents aligned with the adolescents' aspirations, but the same was not true for parents' expectations for female adolescents, except in Nepal. In one-third of cases in Bangladesh and India, parents preferred that their female adolescent children become housewives. These differences likely reflect differing gender norms, with girls expected to marry earlier than boys in many South Asian contexts. In the 2020 BAHWS, 42 percent of adolescent females and 54 percent of males believed 18 was the ideal age for girls to marry. The TAG survey in India found that over 70 percent of adolescent girls preferred not to marry before 21 and aspired to careers such as teaching, tailoring, medicine, and the military (Naandi Foundation 2018). However, nearly half of the surveyed girls felt that boys had more educational opportunities. Similar to the TAFSSA survey, the TAG survey found adolescents did not aspire to farming, a finding that may have implications for the future of agrifood systems, especially in low-income countries that practice labor-intensive traditional agriculture.

LOOKING AHEAD: YOUTHS AS CHANGE AGENTS FOR AGRIFOOD SYSTEM TRANSFORMATION

South Asia, relative to other regions, is home to the largest and youngest workforce in the world today (UNICEF 2021). Investment in youth – starting with adolescents and encompassing their health and well-being, education and skills, productivity, economic potential, and leadership – should be a key focus area for policymakers. Educational material on diets and food systems and on roles and opportunities should be made available to adolescents at no cost, either through school curriculums or online. In Bangladesh, efforts by the Global Alliance for Improved Nutrition (GAIN) to involve adolescents in agrifood systems are noteworthy (Box 9.1). Adolescents want to be part of the changes required to improve agrifood systems. In 2021, a team of researchers conducted workshops with adolescents in 16 countries across South Asia, Southeast Asia, Africa, the Middle East, Europe, and Latin America (Fleming et al. 2023). These adolescents were able to draw complex maps of their agrifood systems and understood how food is produced, processed, and transported, as well as how climatic events and human damage to the environment can affect food systems. Adolescents called for four key areas of change: (1) education on sustainable eating practices, (2) spaces for adolescents to share their views and interact with decision-makers, (3) regulation of production practices that harm the environment, and (4) support for adolescents to advocate for making healthy food affordable and accessible, especially for marginalized groups such as Indigenous communities. As adolescents become increasingly educated, empowered, and knowledgeable about the world – much of which may occur through social media rather than traditional schooling – there will be trade-offs for agrifood systems, with a potential reduction in the number of individuals engaged in agriculture but a stronger collective voice to demand healthy, sustainable, and equitable agrifood systems.

Acknowledgments

We would like to thank the editors and Sunny Kim for constructive feedback and helpful suggestions, which have strengthened this chapter.

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Chapter 10

SOCIAL SAFETY NETS FOR A NUTRITION-SENSITIVE FOOD SYSTEM IN SOUTH ASIA

Lessons from India

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KEY MESSAGES

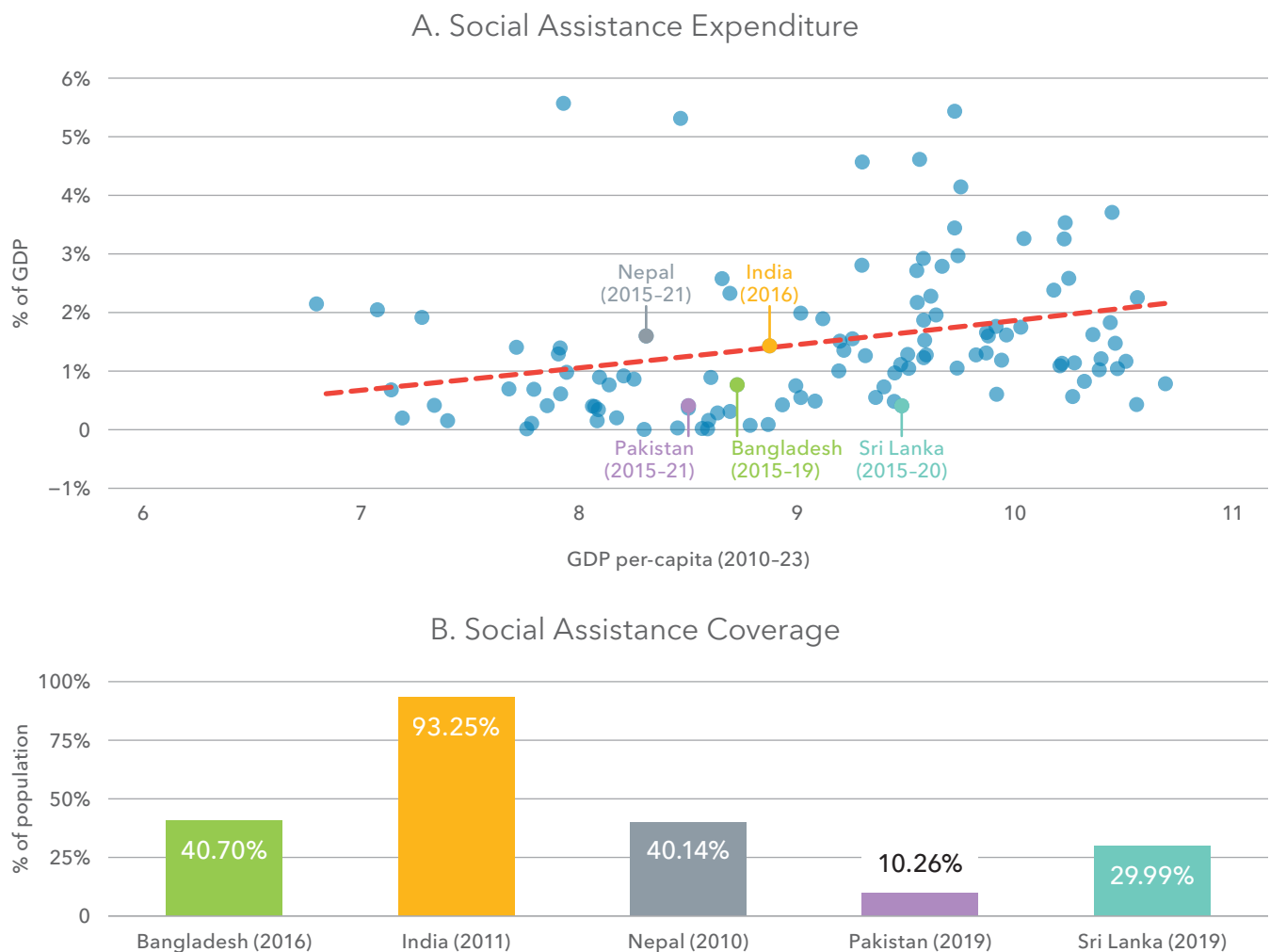
- Social protection programs in South Asia are essential for addressing poverty, undernutrition, and food insecurity but are constrained by limited coverage and weak implementation capacity.
- India's expansive welfare architecture – spanning food, nutrition, health, and livelihoods – and its political economy (genesis, design, and effectiveness) offer critical lessons for the region.
- Maternal and child-related social protection must prioritize the nutritional content of food over calorie sufficiency.
- Digital tools, critical to improving welfare delivery, must avoid the risk of exclusion through decentralization and stronger bureaucratic accountability.
- Social protection must be framed as part of an economic security “system” and not treated as stand-alone schemes.

Social protection is a critical policy instrument to help people move out of poverty and to facilitate broad-based economic progress. In agrifood systems, social protection programs can promote nutrition-sensitive food systems by strengthening food security (across its multiple dimensions), improving maternal health, and promoting better diets, factors that together eventually improve child nutrition (Ruel and Alderman 2013). Access to social protection has expanded, enabling millions of the world’s poorest

to escape extreme poverty, yet around 2 billion people in developing countries remain either uncovered or inadequately covered by any social welfare program (World Bank 2025).¹ In South Asia, a region that accounts for a large share of global poverty and undernutrition, expenditure on social assistance as a share of gross domestic product (GDP) and its coverage remain low (Figure 10.1).

1 For an update on global progress on social protection, refer to World Bank (2025).

FIGURE 10.1 Expenditure and coverage of social assistance programs across South Asia



Source: World Bank ASPIRE Database, <https://www.worldbank.org/en/data/datatopics/aspire>.

Note: Panel A includes all countries.

In South Asia, social protection policies are vital for addressing food insecurity, poor diets, and undernutrition. In recognition of their importance for human well-being, social protection schemes have surged in the region, and all South Asian countries now have some form of direct food and nutritional assistance scheme, wage support through public works programs, noncontributory pensions to protect the elderly poor, or cash transfers (conditional and unconditional). Table 10.1 lists some of the flagship social protection programs across South Asia, along with their stated objectives (*scope*), targeted population (*focus*), and transfer modality (*form*). Yet, despite the rich array of welfare schemes, their effectiveness – as measured by fiscal efficiency of program design and equitable welfare improvements – remains an area of active debate (Javed and Mumtaz 2024).²

Using India as an example, this chapter describes achievements in improving food and nutritional security (in terms of the welfare policy objectives) through its various social welfare programs. It also highlights key challenges intrinsic to the design and implementation of social welfare programs that closely resonate with the experiences of other South Asian countries. India's example is instructive for the region for several reasons. Its programs are the largest in scale and coverage (also the oldest), and the governance weaknesses that affect program implementation and impede effectiveness in India are common across South Asia. Policymakers, therefore, have a lot to learn from one another as they try to design social protection policies as cost-effectively as possible across the region.

SOCIAL SAFETY NETS AND NUTRITION-SENSITIVE FOOD SYSTEMS

The aim of a comprehensive social welfare strategy – reducing poverty and guarding against any form of human vulnerability – is to provide

protection against potential adverse shocks at different stages of a person's life (Figure 10.2). Economic insecurity during early childhood can be particularly debilitating, and hence state support to young mothers and newborn children – through ante- and postnatal care, immunization, and nutrition (appropriate diets and iron supplements) – is a key component of social protection. High rates of undernutrition in poorer countries necessitate a strong focus on reducing child malnutrition, which is also strongly associated with long-term gains in cognitive skills, educational attainment, health, and earning capacity. Increased support for child nutrition is particularly important in South Asia, where healthcare infrastructure is lacking, nutritional awareness is low, and childbirth outside of accredited health institutions is commonplace. Further along the child's developmental path, free school meals serve as a common social safety net that helps bring children to school, increases education, and reduces child labor, while ensuring that students facing economic hardship at home do not suffer "classroom hunger."

Direct food assistance, cash transfers, and wage support through public works programs are among the other forms of household-level social assistance that alleviate poverty, food insecurity, and livelihood uncertainty. These safety nets increase a household's ability to invest in human and physical capital (education, livelihoods, and so on), along with improving access to nutritious diets. Other key forms of publicly subsidized safety nets are old age pensions and health insurance programs, which guard against health-related catastrophic income shocks. Collectively, various social safety net programs can enhance food and nutritional access and reduce livelihood vulnerability to ensure that a healthier and diversified diet is affordable to all.

Despite the transformative potential of social safety nets, these programs remain an active area of debate animated broadly around whether they (1) do reach the poor (equity) and (2) are the best use of tax-funded public expenditure (efficiency) (Banerjee

2 See Javed and Mumtaz (2024) and Scott et al. (2023) for reviews.

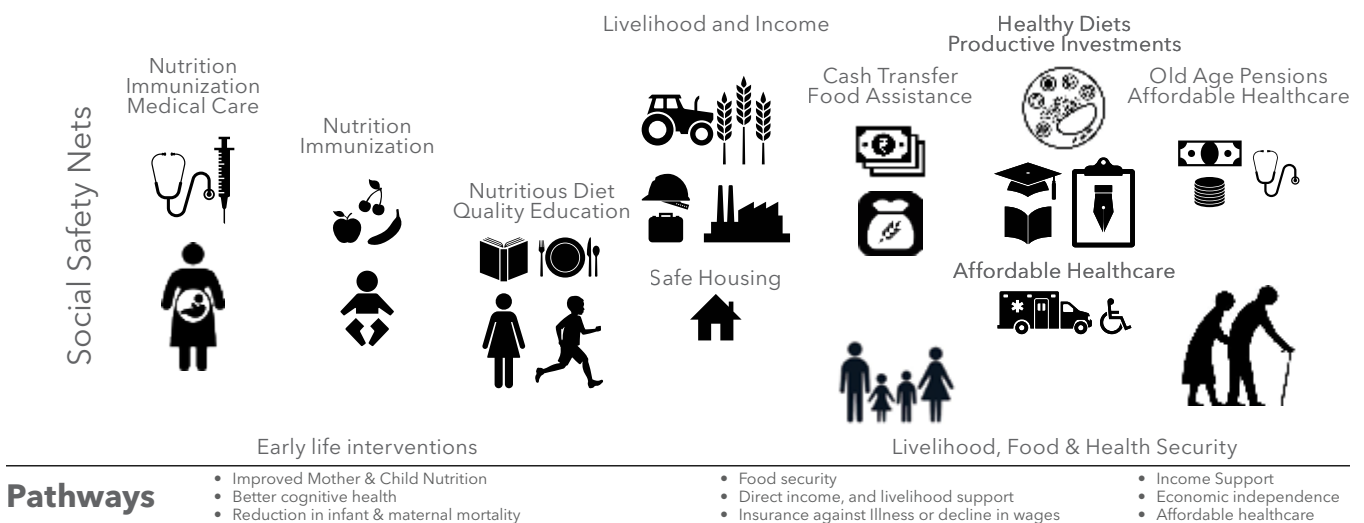
TABLE 10.1 Flagship social safety nets across South Asian nations

Nation	Scheme	Form	Focus	Scope
India	Public Distribution System (PDS)	Food items (mainly rice and wheat)	Poorer	Food security
	Integrated Child Development Scheme (ICDS)	Immunization, take-home food, childcare facilities	Pregnant and lactating mothers, preschool children	Maternal and child nutrition
	Mid-Day Meals Scheme (MDMS, renamed PM-POSHAN)	Hot cooked meals	Schoolchildren	Classroom hunger
	Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS)	Guaranteed wage income for 100 days	Rural wage workers	Income support
	Old Age, Widow, and Disability Pensions	Cash transfers (noncontributory)	Elderly poor	Elderly poverty
	Pradhan Mantri Kisan Samman Nidhi (PM-KISAN)	Cash transfers (every 3 months)	Farmers	Income support
	Ayushman Bharat (PM-JAY)	Subsidized health insurance	Poorer households	Reducing poverty risk
Pakistan	Benazir Income Support Program (BISP)	Unconditional cash transfers to women	Poorer households	Income support
	Benazir Taleemi Wazaif (sub-component of BISP)	Conditional cash transfer	Girl child	Educational enrollment
	Benazir Nashonuma	Conditional cash transfer	Infant children	Child nutrition
Sri Lanka	Samurdhi Programme	Cash transfers, kitchen garden, saving program, etc.	Poor and vulnerable	
	Thripasha National Supplementary Food Program	Nutritional supplementation	Pregnant and lactating mothers, undernourished children	Maternal and child nutrition
	School feeding programs	Hot cooked meals	Schoolchildren	Classroom hunger
	Elderly Assistance Programme	Old age pension (contributory)	Elderly population	Elderly poverty
Nepal	National Health Insurance Programme	Subsidized health insurance	Poorer households	Reducing poverty risk
	Social Security Allowance Programme	Social pension	Elderly poor	Elderly poverty
	Midday Meals to school children (till grade 5)	Hot cooked meals	Rural wage workers	Classroom hunger
	Integrated Child Health and Nutrition Programme	Immunization, nutritional supplementation	Pregnant and lactating mothers, preschool children	Maternal and child nutrition
	Prime Minister Employment Programme (PMEP)	Guaranteed wage income for 100 days	Rural wage workers	Income support

Nation	Scheme	Form	Focus	Scope
Bangladesh	Mother and Child Benefit Programme (MCBP)	Cash transfers	Monthly cash assistance to pregnant and lactating women and their children	Pregnant and lactating mothers, children
	Old Age Allowance (OAA)	Cash transfers (noncontributory)	Monthly allowance for elderly individuals	Elderly poor
	Seasonal Food Security Programme	Employment and food security	Temporary employment and food assistance during lean seasons (e.g., <i>monga</i>)	Rural poor during lean seasons
	Targeting the Ultra-Poor (TUP)	Asset transfer and training	Provision of productive assets, training, and support to the ultra-poor	Households below the poverty line
	Food for Education	Food incentives for education	Distribution of food to families in exchange for children's school attendance	Poor households with school-aged children
	Shasthyo Shuroksha Karmasuchi (SSK)	Health insurance	Subsidized health insurance for low-income families	Low-income households
	Mother and Child Benefit Programme (MCBP)	Cash transfers	Monthly cash assistance to pregnant and lactating women and their children	Pregnant and lactating mothers, children
	Old Age Allowance (OAA)	Cash transfers (noncontributory)	Monthly allowance for elderly individuals	Elderly poor

Source: Author's compilation.

FIGURE 10.2 Conceptualization of social safety nets over the life cycle



Source: Author's conceptualization.

et al. 2024).³ Policy conversations center around improvements in the design and implementation of these programs. Dilemmas policymakers face include whether to provide targeted or universal benefits, whether transfers should be conditional, how technology can be used for better implementation and program governance, and whether lump-sum cash transfers (akin to a universal basic income) should replace independent programs. These questions are pertinent across the world, and India's experience provides key lessons for developing countries.

SOCIAL SAFETY NETS IN INDIA AND THEIR PERFORMANCE

India's array of social safety net programs focuses on various aspects of human deprivation (Table 10.1). Maternal and child nutrition and well-being are addressed through several programs. The Integrated Child Development Scheme (ICDS) supports an assortment of interventions – folic acid tablets, nutritional supplementation, ante- and prenatal advice, creche (childcare) facilities, preschool teaching, and others. The school meals program – the Mid-Day Meal Scheme (MDMS), recently renamed PM POSHAN – addresses classroom hunger among school-going children. Two programs, Janani Suraksha Yojana (JSY) and Pradhan Mantri Matru Vandana Yojana (PMMVY), provide conditional cash transfers designed to encourage institutional childbirth and better health-seeking behavior among pregnant women.

Other social safety net programs include the Public Distribution System (PDS), which provides subsidized staple grains to the poor (67 percent of the total population). The PDS is arguably India's most popular safety net program, along with the rural public works program, the Mahatma Gandhi National Rural Employment Guarantee

Scheme (MGNREGS). With an expenditure of about 2 percent of the country's GDP, MGNREGS aims to provide 100 days of work at a government site at minimum wage to all rural households. Both the PDS and MGNREGS are enshrined as constitutional rights under the rights to food and work, respectively. In addition to MGNREGS, which is primarily focused on agricultural labor, the Pradhan Mantri Kisan Samman Nidhi (PM-KISAN) program, launched in 2019, provides direct cash transfers to farmers to support farm incomes. For the poor who are unable to work due to old age or disability, the National Social Assistance Program (NSAP) provides social pensions. To address the risks of burgeoning health-related out-of-pocket health expenditures, poor households can access a highly subsidized public health insurance scheme, Pradhan Mantri Jan Arogya Yojana (PMJAY).

In addition to these social welfare programs, the government has several flagship schemes to address housing, health, and hygiene environments. Free public toilets and clean drinking water access are being provided through the Swachh Bharat Mission (SBM) and Jal Jeevan Mission (JJM), respectively. Another scheme, Pradhan Mantri Ujjwala Yojana (PMUY), provides clean cooking fuel in the form of LPG cylinders to poorer households to improve women's and overall household environments. Poorer households can also access credit-linked subsidies to improve housing quality under the Pradhan Mantri Awas Yojana (PMAY).

The vast scale of these schemes suggests that rapid strides are being made in addressing the root causes of poverty and vulnerability in the country, particularly by empowering citizens and facilitating broad-based prosperity. However, evaluation of the programs suggests that success in improving human welfare has been limited (Rahman and Pingali 2024).⁴ Table 10.2 summarizes the findings from the most credible empirical evaluations of

3 For a comprehensive review around the economics of safety nets, see Banerjee and Hanna (2024).

4 See Rahman and Pingali (2024) for in-depth coverage of the programs and their evaluations.

TABLE 10.2 India's flagship social safety nets: Impacts and challenges

Scheme	Impact	Studies	Challenges
School meals (MDMS)	Improvements in height-for-age z-score (HAZ), insurance against dropping out of school	Chakrabarti et al. (2021); Singh et al. (2014)	Nutritional value of food, reduced preference for government schools
Food transfers (PDS)	Improved diets, calorie intake, reduced child stunting rates	Kishore and Chakrabarti (2015); Rahman (2016); Shrinivas et al. (2025); Gadenne et al. (2024)	Burgeoning subsidy cost, outsized focus on calorie-rich cereals
Maternal and child nutrition (ICDS)	Reduced child malnutrition rates, improved learning at school	Dhamija and Sen (2021); Nandi et al. (2020)	Program Implementation, nutritive content of food
Public works (MGNREGS)	Greater intake of calories, protein, and more nutritious foods	Bose (2017); Muralidharan et al (2016); Cook and Shah (2022)	Subnational differences in implementation, narrow "rural" focus
Social pensions (NSAP)	Higher expenditure on vegetables; fruits and nuts; and meat, fish, and eggs	Unnikrishnan (2022); Unnikrishnan and Imai (2020); Asri (2019)	Targeting errors, low monetary amount of transfers

Source: Authors' compilation.

Note: MDMS = Mid-Day Meal Scheme; PDS = Public Distribution System; ICDS = Integrated Child Development Scheme; NSAP = National Social Assistance Program.

these programs. Their limited impact can be attributed broadly to the modalities of welfare transfers (design and identification of the beneficiaries), insufficient investment in public infrastructure to support welfare direct assistance, and inadequate government capacity to implement welfare programs. The challenge for state capacity lies not only in implementing programs but also in overcoming political economy barriers to bringing about welfare-improving reforms in program design.

Persistence of malnutrition

The persistence of the triple burden of malnutrition is arguably the biggest failing of India's social welfare policy. A combination of factors contribute to this failure, including limited reach of programs, inadequate nutritional content of in-kind food assistance, and the quality of public investment.

The impact of the ICDS on improving maternal and child nutrition is debated, despite the program's importance and wide coverage. While

access to the program has increased food security and education among children, its overall impact is limited by the capacity of the ICDS centers (Anganwadis) to provide the necessary services. The performance of the Anganwadis suffers from poor infrastructure (such as building infrastructure, toilets, and water facilities) and overworked and undermotivated staff, who are volunteers and only receive honorariums. In addition, the food assistance provided through ICDS (focused mainly on calories) does not have the transformative impact on maternal and child nutrition that could be achieved if its nutritive value were enhanced to increase protein and micronutrients in beneficiaries' diets (Singh and Masters 2017; Ganimian et al. 2024).

The school meals program has been a phenomenal success in bringing poor children to school, reducing hunger, and improving nutritional outcomes (Chakrabarti et al. 2021). The most pressing challenge for MDMS now lies in ensuring the food's safety and nutritional content. The

program is often in the news because of food quality problems and the politics around inclusion of eggs in the meal. While cultural politics in addressing nutritional concerns must be avoided, food safety concerns can be easily ameliorated through better storage infrastructure and greater community participation to ensure bureaucratic performance and accountability. An increasingly important challenge for sustaining the success of MDMS lies in improving the quality of education at school (Muralidharan and Singh 2021). Parents (even among the poor) increasingly prefer private schools, even when these provide only the impression of better quality without improving learning. This choice deprives the children of free meals and is more costly for parents.

The success of maternal cash transfers (JSY or PMMVY) in improving mother's health, institutional childbirth, immunization, and mortality rates, as well as overall child nutrition, primarily depends upon the availability of and access to quality healthcare (Carvalho and Rokicki 2019). Low levels of investment in health, vast spatial disparities in public healthcare infrastructure, and quality of service (implementation) place a heavy administrative burden on local bureaucrats to make these programs work, thereby inducing reluctance to participate (Puri 2020).

Sustainability of food systems

India's PDS, which provides a monthly ration of rice and wheat to more than 67 percent of the total population, has been a bulwark against hunger and food insecurity. During the COVID-19 pandemic, the PDS was the principal policy instrument that enabled 800 million people (plus additional beneficiaries under the Pradhan Mantri Garib Kalyan Anna Yojana) to access food at highly subsidized prices. Yet, the PDS is beset by problems with beneficiary identification, leakages, and corruption.

The PDS also faces a trade-off between meeting consumption needs and creating environmental risks in India's food systems, which has led experts to call for providing cash transfers instead of food

grains (Rahman and Pingali 2024). Government procurement of food grains (rice and wheat) from farmers at the minimum support price (MSP) to support the PDS creates a perverse incentive for farmers to grow staple grains at the expense of other nutritious crops; it has reduced crop diversification and added to environmental degradation through aggressive groundwater extraction and crop burning (Puri and Pingali 2024; Shoumitro Chatterjee et al. 2024). Moreover, calories from rice and wheat fail to address the protein and micronutrient deficiencies common among the population.⁵ While replacement of food with cash would preclude the need for government procurement, thus increasing parity among crops, such a policy switch faces public wrath and thus a political economy challenge. The 2020/21 farmer protests in India that attracted global attention are an example of farmer resistance against changes in agricultural policies.

Beyond the political aspect of the cash-versus-food debate, empirical studies show that the success of cash transfers hinges upon the level of economic development, the availability of markets, and citizens' trust in the government (Cunha et al. 2019; Hoddinott et al. 2018). Given the wide spatial disparities in economic development, the lack of market access, and the governance deficit within India, cash transfers might not be prudent in India's near future, even when politically plausible. It would be pragmatic to focus on making the PDS more nutrition-sensitive by replacing some amount of rice and wheat with pulses and coarse cereals, an initiative already undertaken by some Indian states, notably Karnataka and Odisha.

Livelihood support against shocks

Income security is vital for acquiring food and ensuring nutritional security. Agrarian livelihoods, however, are prone to risks arising from rainfall

5 Some of these concerns are now being addressed through distribution of fortified rice by the PDS.

variability, climate change, and inadequate access to input and output markets. As a protection against such livelihood risks, the 100 days of work guaranteed under MGNREGS has grown in importance since its inception in 2006. Despite initial concern that the program would be a drain on fiscal resources, wage employment under MGNREGS has become a key source of social protection for the rural poor. Greater demand for work under the program during the COVID-19 pandemic – when a significant share of urban laborers returned to their villages as a result of the lockdown – has only highlighted its importance for addressing rural livelihood vulnerability. Importantly, work under MGNREGS has built rural infrastructure that is essential for reducing environmental degradation of land and improving irrigation facilities.

Empirical studies find that MGNREGS has significant impact in terms of providing income support and raising wages, thus creating effective demand (including for food) and leading to an overall increase in economic output (Cook and Shah 2022; Bose 2017). Yet, varied performance of MGNREGS across states highlights last-mile implementation challenges, including poor governance, lack of transparency in work assignments, delays in fund transfers, corruption, and dwindling political support for the program as well the lack of wage adjustments to reflect rising prices. Similar issues are found with another rural income transfer program, PM-KISAN, launched in 2019. Early evaluation suggests a positive impact in increasing agricultural investments by farmers, but its long-term welfare impact – with a transfer size of 6 percent of farmers’ income – remains to be seen (Varshney et al. 2021).

Debates about social security in the developed world have focused predominantly on the nature of income support during retirement and protection against high healthcare costs. In an informal economy like India’s with multigenerational family structures, old age pensions have not received the attention they require. Under the NSAP, a monthly sum is provided to those over age 60 who are classified as belonging to poorer households. Some

states have increased the pension amount, but pensions remain too low to shield the poorest people from poverty. In addition, while studies have reported a positive impact on household consumption (Unnikrishnan and Imai 2020), program participation remains low and creates opportunities for corruption in identifying the poor (Asri 2019). Publicly subsidized health insurance programs, similarly, have not reduced out-of-pocket health expenditures, despite growing utilization of the scheme (Reshmi et al. 2021; Puri and Sun 2021). In the absence of appropriate regulation of private healthcare providers, patients are often overcharged, with the cost burden falling disproportionately on women (Dupas and Jain 2024). Together, insufficient pensions and high healthcare costs strain household budgets, leading to a worsening of diets and child undernourishment.

LEVERAGING THE TRANSFORMATIVE POTENTIAL OF SOCIAL SAFETY NETS

India’s rapidly expanding social welfare programs can achieve truly transformative effects only through improved governance, reductions in gender inequality, better infrastructure, increased fiscal resources, and a political commitment from the state to citizens’ welfare. Successful social protection programs exist as part of a strong democratic values system, in which the government aims to eliminate constraints affecting citizens’ ability to attain their human potential. These programs also depend upon enabling infrastructure and governance environment to undergird their effectiveness. Universal sanitation and clean water schemes are a step in that direction. Improving state capacity to deliver welfare is relatively easy (Muralidharan 2024), while making progress on social aspects such as gender norms – which are key determinants of maternal and child nutrition – is a stickier problem (see Box 10.1 for a discussion of interventions in Bangladesh).

The role of digital technology in governance (e-governance) and the “JAM” trinity – universal bank

BOX 10.1 IFPRI's role in strengthening social protection in Bangladesh

Contributed by Julie Ghostlaw, Country Program Manager, International Food Policy Research Institute, Kenya

Bangladesh has a longstanding commitment to social protection as a means of providing immediate relief and improving access to health, education, resilience to shocks, and other essential services. This commitment is reflected in its large and steadily increasing budget allocations. The budget for social protection has more than tripled in recent years – from US\$2.95 billion in FY 2015/16 to \$9.57 billion in FY 2025/26, reflecting approximately 8 percent and 14 percent of these national budgets, respectively (Kathy and Arifeen 2025).

While the government has demonstrated strong commitment to social protection, the system is not without its challenges, including limited coverage, targeting inefficiencies, and resources spread across many programs. There have been concerted efforts to improve the efficiency of the social safety net system, including reducing the number of programs from 115 in FY 2015/16 to 95 in FY 2025/26, expanded use of digital delivery systems, and a shift toward cash-based assistance with “graduation” approaches that link financial support to skills and livelihoods – though significant potential for reform remains (Kathy and Arifeen 2025).

Improvements to Bangladesh's social safety net system have been guided by its 2015 National Social Security Strategy, with support from development partners such as the International Food Policy Research Institute (IFPRI). For decades, IFPRI has provided policy support to the Government of Bangladesh, contributing to strengthening the effectiveness of the social protection system to reduce poverty and improve nutrition. For instance, upon request from the Ministry of Women and Children Affairs and the UN World Food Programme (WFP), IFPRI generated evidence to improve the targeting performance of several large-scale social safety net programs to ensure the most vulnerable are reached. Specifically, IFPRI developed evidence-based beneficiary selection criteria for the Vulnerable Group Development (VGD) program – the largest safety net for rural poor women (Ahmed 2018) – and developed observable, verifiable indicators for targeting the urban poor under the Vulnerable Women's Benefit (VWB) program (Ahmed et al. 2022). Both sets of criteria are being implemented by the government.

While social protection has traditionally been used to reduce poverty, evidence on its role in improving nutrition has been limited. To address this gap, IFPRI designed and the WFP implemented the Transfer Modality Research Initiative (TMRI), a two-year randomized controlled trial in rural Bangladesh testing whether cash or food transfers – alone or combined with nutrition behavior change communication (BCC) – could improve child nutrition. TMRI showed that cash transfers plus high-quality, intensive BCC reduced child stunting by 7.8 percentage points – triple the national reduction rate over the two-year project period – through improved diets and greater consumption of animal-source foods (Ahmed, Hoddinott, et al. 2025). Longer-term impacts included increased household assets and income (Ahmed, Hoddinott, et al. 2025), reduced poverty (Ahmed, Hidrobo, et al. 2025), less intimate partner violence (Roy et al. 2019), and stable food security during the COVID-19 pandemic (Ahmed, Hidrobo, et al. 2025) years after the program ended in 2014. Overall, these results show that substantial cash transfers paired with empowering, income-generating components deliver lasting gains in nutrition and resilience.

TMRI's findings have informed the redesign of large-scale social safety nets to be more nutrition-sensitive in the country, including integrating nutrition BCC into the government's VGD program and the national Mother and Child Benefit Program, which aims to support pregnant women until their children reach age four through a lifecycle approach.

Bangladesh's experience demonstrates the government's strong appetite for using robust evidence to inform the design and reform of its social protection system to more effectively reduce poverty and improve nutrition for the most vulnerable.

accounts through Jan-Dhan Yojana, unique biometric identity through Aadhar, and ubiquitous mobile phones – are increasingly considered the silver bullet needed to address program corruption, leakages, and inefficiency in service delivery. JAM allows for seamless direct benefit transfers to bank accounts for cash transfers and subsidies. Biometric-based identity verification can reduce corruption in wage payments under MGNREGS or food transfers under the PDS. Research suggests that leveraging technology has improved governance of social welfare programs, as click-of-a-button welfare delivery reduces the number of intermediaries. Critics, however, highlight the limited improvement from these technological innovations in terms of beneficiary targeting – a key source of inefficiency and corruption in the programs (Khera 2017). Large-scale empirical studies – even by JAM proponents – further corroborate ground-level reports that these technological interventions can be exclusionary when implemented poorly (Muralidharan et al. 2025).

Moreover, JAM-based welfare delivery does not address systemic issues of local democratic accountability, a key aspect of poor governance. The lack of appropriate grievance redressal mechanisms remains an important source of mistrust between poor citizens and the government – one that technology has done little to remedy. From the perspective of India’s federal political economy, JAM has weakened India’s federal arrangement by increasing the centralization of welfare programs and by disempowering subnational governments, which have primary responsibility for delivering and monitoring welfare programs and the autonomy to introduce new ones. Tension between the central and state governments is increasingly visible, with the central government exercising its discretionary power both in distributing money to the states for welfare scheme expenditures and in reducing subnational tax resources (Deshpande et al. 2017). Accounting for politics, therefore, is key to strengthening social welfare programs.

These politics form the context for the debate over whether the PDS should provide cash or in-kind

transfers. If cash transfers are the more effective solution for improving diets, nutrition, and the environment, foodgrains procurement must come to an end, raising the question, Is there political will and power to do that? It is also unknown how farm incomes – stagnant for the last two decades – would be impacted, at least in the short run. More importantly, if the expansion of welfare programs provides an opportunity for electoral gains, are such reforms even on the political horizon? Increasing taxes to create a welfare state would also require bold political decisions to rationalize the tax structure.

CONCLUDING REMARKS

South Asia can learn from the experience of Latin American nations, which led the successful rise of social protection as a welfare policy tool (Barrientos 2023).⁶ Despite high levels of corruption, social safety nets in countries such as Brazil and Mexico benefited from their rights-based approach to social protection – one that prioritizes building human capital and formed the basis for coherent ideas on policy design and implementation. Rooted in the idea of conditional cash transfers, welfare programs such as Brazil’s Bolsa Familia and Mexico’s Programa Nacional de Educación, Salud y Alimentación (Progresa) were seen as an investment – focusing on education, health, and women – while empowering citizens through greater agency and improving governance (and targeting) through citizen registry systems. Programs in South Asia, however, have been primarily focused on relief. While some South Asian countries – India being an example – have begun to reform program delivery toward building human capital, emulating the Latin American experience might prove challenging given the largely rural population, greater centralization, and complex political economy factors discussed above.

Only time will tell what the future of India’s emerging social welfare architecture will look

⁶ See Barrientos (2023) for more details on Latin American social welfare programs.

like, but it is certain that the impact of individual programs depends on the nation state's economic and sociopolitical realities. Other countries in South Asia face similar challenges, which have shaped their response to social protection. To make social protection more nutrition-sensitive, emphasis must be placed on improving program design and delivery as well as on increasing political commitment, with a clear focus on the aspects of the nutritional challenge they can address. India's expansive set of programs, with coverage spread over a person's life cycle, provides an example for other South Asian countries. However, the common challenge across the whole region remains the weak capacity to delivery welfare programs. Top-down political commitment, greater bureaucratic accountability, improved delivery systems (such as digitization and e-governance), and bottom-up citizen empowerment through decentralized administration are among the reforms that could improve efficiency as well as equity.

Acknowledgments

We would like to thank the report editors and Avinash Kishore for constructive feedback and helpful suggestions, which have strengthened this chapter.

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Chapter 11

INDIA'S AGRIFOOD SYSTEM

Structural Features and Policy Priorities

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KEY MESSAGES

- Agrifood systems contribute one-third of India's gross domestic product (GDP). These systems include both on- and off-farm components: The off-farm sector accounts for 34 percent of agrifood systems GDP in low-income states, 44 percent in middle-income states, and 88 percent in high-income states.
- Agrifood systems transformation is critical to meeting development goals, but these goals cannot all be met by prioritizing a single value chain. A more pragmatic strategy involves selecting a portfolio of complementary value chains to support multiple development priorities.
- Using IFPRI's Rural Investment and Policy Analysis model, this chapter examines simulated impacts of productivity-led growth across 14 value chains at the national and state levels, with a focus on the state of Odisha. It measures how these impacts contribute to four development outcomes: poverty reduction, employment generation, dietary improvement, and economic growth.
- Impacts from these value chains differ across India and Odisha: Nationally, wheat, rice, and pulses have the greatest impact, while in Odisha, poultry, milk, and cotton deliver stronger overall benefits.
- National- and state-level development priorities often diverge, complicating resource allocation and slowing progress. Strengthening coordination between federal and state governments is critical for inclusive and sustainable agrifood system transformation.

Agrifood systems transformation is central to accomplishing the Sustainable Development Goals in low- and middle-income countries that are confronting multiple challenges, especially the need to eliminate poverty and hunger and address environmental concerns (IRENA and FAO 2021; Diao et al. 2010; Timmer 1988). However, the exact nature of this transformation process varies across countries due to differences in the structure and growth trajectories of their agrifood and nonfood subsectors (Dorosh and Thurlow 2013). Given the diversity in economic growth and structural transformation across Indian states, developing an agrifood systems transformation strategy for the country requires understanding how these systems vary across states (Pingali et al. 2019; Chand et al. 2009; Harinder et al. 2011; Haggblade et al. 2007; Virmani 2021). Moreover, states' development objectives are often not aligned with the national government's priorities, complicating resource allocation and progress toward national development targets. Although several studies have analyzed national-level agrifood systems transformation (Diao et al. 2010; Diao et al. 2022; Reardon and Timmer 2014; Pingali et al. 2019; Benfica and Thurlow 2017; Barrett et al. 2022), few have examined interstate disparities in India's agrifood systems or assessed how different value chains contribute to their inclusive transformation.

This chapter analyzes variations in the structure of agrifood systems across Indian states and compares how agrifood value chain priorities differ between India and the state of Odisha. IFPRI's Rural Investment and Policy Analysis (RIAPA) model, with the 2017/18 state-level social accounting matrix (SAM), is used to assess the diverse contributions of value chains in reducing poverty, creating employment opportunities, improving diet quality, and achieving economic growth in both India and Odisha.

STRUCTURAL VARIATIONS IN AGRIFOOD SYSTEMS ACROSS INDIA'S STATES

This section describes disparities in per capita income, economic structure, and agrifood systems

across states in India. Thirty-three Indian states and union territories¹ were classified into three income categories: low-income states with per capita income below US\$1,500;² middle-income states with per capita income between \$1,500 and \$3,500; and high-income states with per capita income above \$3,500. Middle-income states in which Green Revolution technologies were successfully implemented were analyzed separately from other middle-income states, given their historical significance in India's agricultural evolution. Green Revolution states include Punjab, Haryana, Andhra Pradesh, and Tamil Nadu (Pingali et al. 2019).

A comparison of India's agrifood systems across state income categories reveals significant disparities in both scale and composition. Table 11.1 shows that India's agrifood systems generated approximately \$756 billion in 2017/18, representing 31 percent of national gross value added (GVA). The distribution across income groups demonstrates clear economic stratification: middle-income states (not including Green Revolution states) dominated with \$310 billion (41 percent of agrifood GVA), followed by low-income states at \$269 billion (36 percent). Green Revolution states contributed \$166 billion (22 percent), despite their history of adopting improved agricultural technologies. High-income states, primarily union territories, contribute a negligible share.

Low-income states are home to more than half (51 percent) of India's population but generate only 30 percent of national GVA. Their per capita income of \$1,019 is less than half the average per capita income of India's middle-income states (\$2,482), one-fifth that of its high-income states (\$5,039), and well below the average per capita income of the world's least developed countries (\$1,105) (Table 11.1).

These economic disparities are reflected in the share and composition of agrifood systems

1 Excluding Daman and Diu, and Lakshadweep.

2 All dollar figures in this chapter are US dollars.

TABLE 11.1 Decomposing gross value added across India and state groups, 2017/18

	India	State and territory income groups			
		LIS	MIS	HIS	GRS
Number of states	33	10	15	4	4
Population (millions)	1,370	704	454	22	190
Share of total (%)	100	51.4	33.1	1.6	13.9
Total GVA (\$ billion)	2,414	717	1,114	112	472
Share of India's GVA (%)	100	29.7	46.1	4.6	19.5
Agrifood system GVA (\$ billion)	756	269	310	11	166
Share of total GVA (%)	31.3	37.5	27.8	10.0	35.2
Agriculture GVA (\$ billion)	448	178	167	1	102
Share of total GVA (%)	18.6	24.8	15.0	1.3	21.5
Off-farm agrifood GVA (\$ billion)	308.1	90.8	142.9	9.7	64.6
Share of total GVA (%)	12.8	12.7	12.8	8.7	13.7
GVA per capita (\$)	1,762	1,019	2,453	5,039	2,482

Source: Authors' calculations using the 2017/18 state-level social accounting matrix of India.

Note: GRS = Green Revolution states; GVA = gross value added; HIS = high-income states; LIS = low-income states; MIS = middle-income states. States and territories are grouped based on level of GVA per capita: LIS (less than \$1,500); MIS (\$1,500 to \$3,500); and HIS (more than \$3,500); and GRS (Punjab, Haryana, Andhra Pradesh, and Tamil Nadu). States includes administrative states of India as well as union territories, as of 2019. This study excludes two union territories (Dadra and Nagar Haveli, and Lakshadweep) due to the lack of available data.

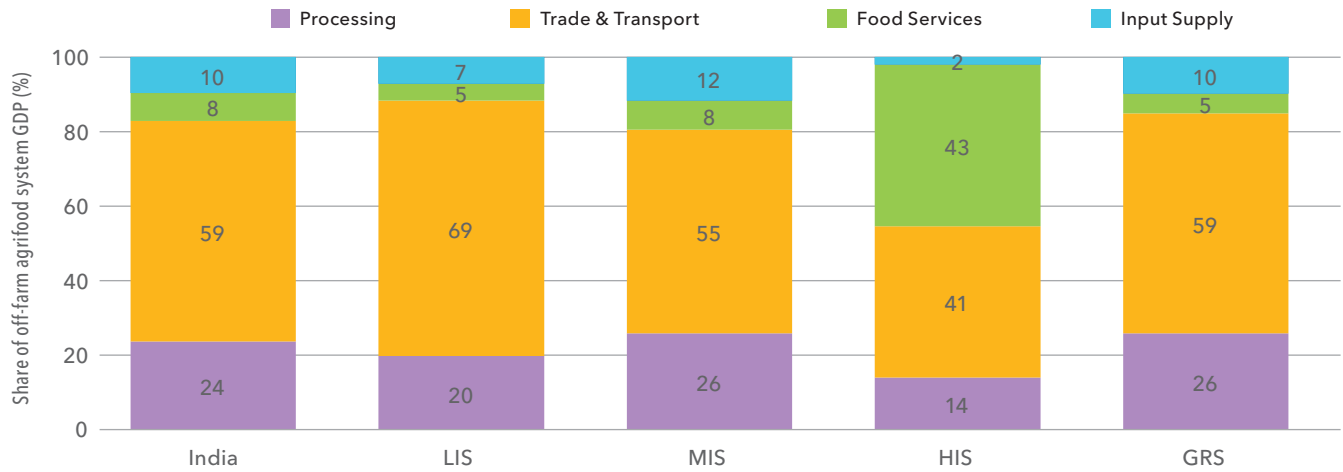
within state economies. Low-income states exhibit the highest reliance on agrifood systems: These systems contribute 37.5 percent of their total GVA, compared to the national average of 31.3 percent. Agriculture alone accounts for 25 percent of GVA in low-income states, compared to 15 percent in middle-income states and only 1.3 percent in high-income states. As states progress from low- to high-income categories, however, the share of primary agriculture in GDP declines, and off-farm activities begin to dominate, indicating a structural transformation of agrifood systems. In both low- and middle-income states, off-farm agrifood activities contribute 13 to 14 percent of total GVA. Primary agriculture contributes more to GVA in Green Revolution states than in other middle-income states, but the off-farm sector's contribution is also higher. In high-income states, the off-farm sector contributes 8.7 percent to the GDP, compared to 1.3 percent from primary agriculture (Table 11.1).

Figure 11.1 shows that trade and transport dominate the off-farm agrifood system in most states (except high-income states) and contribute more than half of off-farm agrifood GVA. In contrast, in high-income states, the food services sector is the largest contributor, accounting for nearly 43 percent of off-farm agrifood GVA.

STRUCTURAL DISPARITIES IN THE AGRIFOOD SYSTEMS OF ODISHA AND INDIA

Odisha is a middle-income state. In 2022–2023, its per capita income was \$2,057, which is below the national average of \$2,436. Between 2004–2005 and 2019–2020, Odisha's GDP grew at 6.8 percent annually, while agriculture's share in GDP declined from 24 percent to 15 percent. Agrifood systems in the state are also evolving amid this economic transformation. In rural Odisha, the share of cereal consumption in total food expenditure dropped from 45.9 percent to 12.8 percent, while

FIGURE 11.1 Share of off-farm components in total off-farm agrifood system GDP across state groups (%)

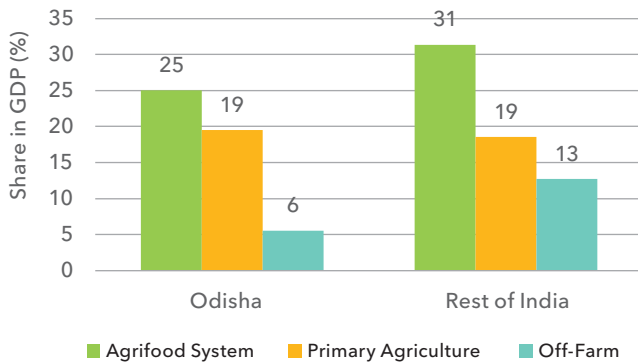


Source: Authors' compilation using data from state-level social accounting matrix of India (IFPRI (2024)).

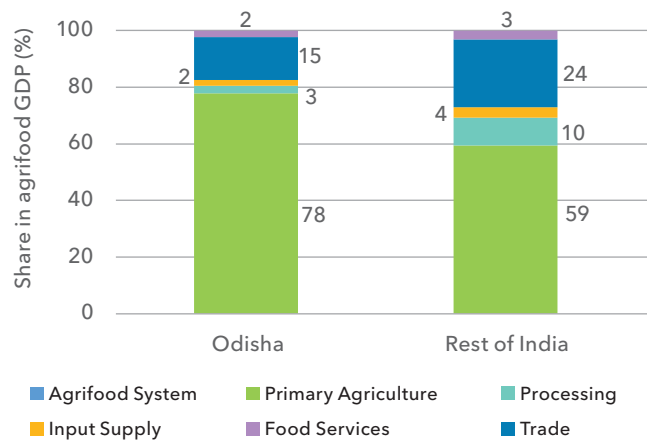
Note: GRS = Green Revolution states; HIS = high-income states; LIS = low-income states; MIS = middle-income states.

FIGURE 11.2 Comparison of agrifood systems in Odisha and India

A. Contribution of agrifood system in GDP (%)



B. Components of agrifood system GDP (%)



Source: Authors' compilation based on the state-level social accounting matrix of India (IFPRI 2024).

the processed food expenditure share rose from 18.3 percent to 39.5 percent during the same period (India, MoSPI 2024).

Figure 11.2 compares the structure of agrifood systems in Odisha and the rest of India. In both cases, primary agriculture contributes 19 percent to GDP. However, Odisha's total agrifood system contribution of 25 percent is lower than in the rest of India (31 percent), mainly due to a smaller off-farm sector (6 percent versus 13 percent). In Odisha, trade contributes the most to off-farm agrifood systems (15 percent), followed by processing (3 percent), input supply (2 percent), and food services (2 percent). In the rest of India, these contributions are 24 percent (off-farm), 10 percent (processing), 4 percent (inputs), and 3 percent (food services) (Figure 11.1).

Fruits and vegetables contribute the most to agrifood system GVA in Odisha, while livestock dominates in the rest of India. Fisheries and forestry account for 28 percent of Odisha's agrifood system

GVA, compared to 14 percent nationally. The share of cereals in agrifood GVA is comparable between Odisha and the rest of India (Table 11.2).

The share of off-farm activities also varies significantly across different agricultural commodity value chains. Processing-intensive commodities, such as beverages (tea, coffee, and cocoa), fibers, and sugarcane, tend to have higher shares of off-farm activities compared to other value chains. However, in Odisha, the contribution of off-farm activities across most value chains is lower than in the rest of India (Table 11.2). This pattern suggests that farm to off-farm linkages are weaker in Odisha relative to the national average, indicating less-developed agrifood value chain integration in the state.

DISPARITIES BETWEEN NATIONAL AND STATE PRIORITIES

Agricultural value chains are connected through the supply and use of intermediate inputs such as

TABLE 11.2 Structure of agrifood systems in Odisha and India

Agrifood value chain	Share of value chains (%) in total agrifood GVA		Share of off-farm activities (%) in GVA of individual value chains	
	Odisha	India	Odisha	India
Agrifood GVA	100	100		
Cereals	14.1	13.4	12.1	33.8
Roots and tubers	1.0	1.3	16.6	28.3
Pulses	2.2	2.7	10.0	15.0
Oilseeds	0.9	4.3	17.0	40.9
Fruits and vegetables	28.9	13.9	19.9	30.2
Sugarcane	0.2	5.0	59.7	65.5
Fibers	1.3	10.8	27.2	85.3
Tea, coffee, and cocoa	0.1	1.3	94.4	69.8
Other cash crops	7.2	9.7	21.9	37.0
Livestock	16.2	23.2	24.3	29.7
Fisheries	15.3	6.9	41.7	45.8
Forestry	12.7	7.1	13.4	34.7
Other food	0.0	0.4	100.0	100.0

Source: Authors' compilation based on the state-level social accounting matrix of India (IFPRI 2024).

Note: GVA = gross value added.

seeds, fertilizer, fuel, water, and machinery. They are also linked to households by employment and consumption patterns. Therefore, growth in each value chain can have unique effects on development outcomes, and these effects can vary significantly between states and the national level.

This section evaluates the effectiveness of value chains in delivering development outcomes in both Odisha and India overall. The authors assume productivity-led growth in different agricultural value chains and simulate productivity growth by increasing total factor productivity (TFP) in the primary agriculture component of 14 selected value chains (excluding forestry) using the RIAPA model (IFPRI).³ Productivity shocks to each commodity have spillover effects across the rest of the value chain, including its off-farm components, and into other sectors of the economy beyond agrifood systems.

For each commodity, development outcomes were measured using four indicators.

- Poverty: the elasticity of poverty reduction, measured as the percentage-point change in the poverty headcount ratio for each unit of agricultural GDP growth
- Growth: a growth multiplier that measures the change in overall GDP for each unit of agricultural GDP growth
- Jobs: an employment multiplier that measures the change in the number of jobs created for each unit of agricultural GDP growth
- Diet: a diet-quality indicator that measures the percentage change in a diet quality index⁴ for each unit of agricultural GDP growth

Value chains differ significantly in how effectively they can improve development outcomes at the state and national levels (Figure 11.3). In Odisha, the poultry and mutton value chain and the wheat and other cereals value chain have the highest growth multipliers of 1.28 and 1.21, respectively. The poultry and mutton value chain also has a strong positive impact on all four development outcomes: It is ranked highest for both growth and employment outcomes and second highest for poverty reduction. Apart from these two value chains, all others have growth multipliers below 1. For example, the multiplier for the milk and dairy value chain is 0.73, implying that a \$1.00 increase in this sector's GDP leads to an increase of less than \$0.73 in overall state GDP. This indicates resource competition, wherein growth in the milk and dairy value chain may crowd-out growth in other parts of the economy. As with the poultry and mutton value chain, the milk and dairy value chain is highly effective in reducing poverty and improving diet quality, though its impacts on job creation are weaker.

Nationally, the sugarcane value chain has the highest growth multiplier at 1.7, meaning every \$1.00 increase in sugarcane GDP generates an additional \$0.70 elsewhere in the economy. It scores highly on poverty reduction but has negative effects on job creation and diet quality. Growth in the wheat and other cereals value chain is more effective in reducing poverty than in generating employment or improving dietary diversity. These trade-offs underscore the importance of aligning value chain strategies with specific development goals.

Which value chain to prioritize depends on the relative importance (or weight) assigned by policymakers and other stakeholders to each outcome. This analysis assumes equal weights for the four outcome indicators and estimates a composite score for each value chain. The composite score shown in Figure 11.4 is the simple average of four normalized scores. Value chains were ranked based on this composite score, and the figure uses color coding to illustrate the relative contribution of each outcome to the final score.

3 For detailed applications of the RIAPA model across countries, visit www.ifpri.org/agrifood-system-diagnostics-country-series/

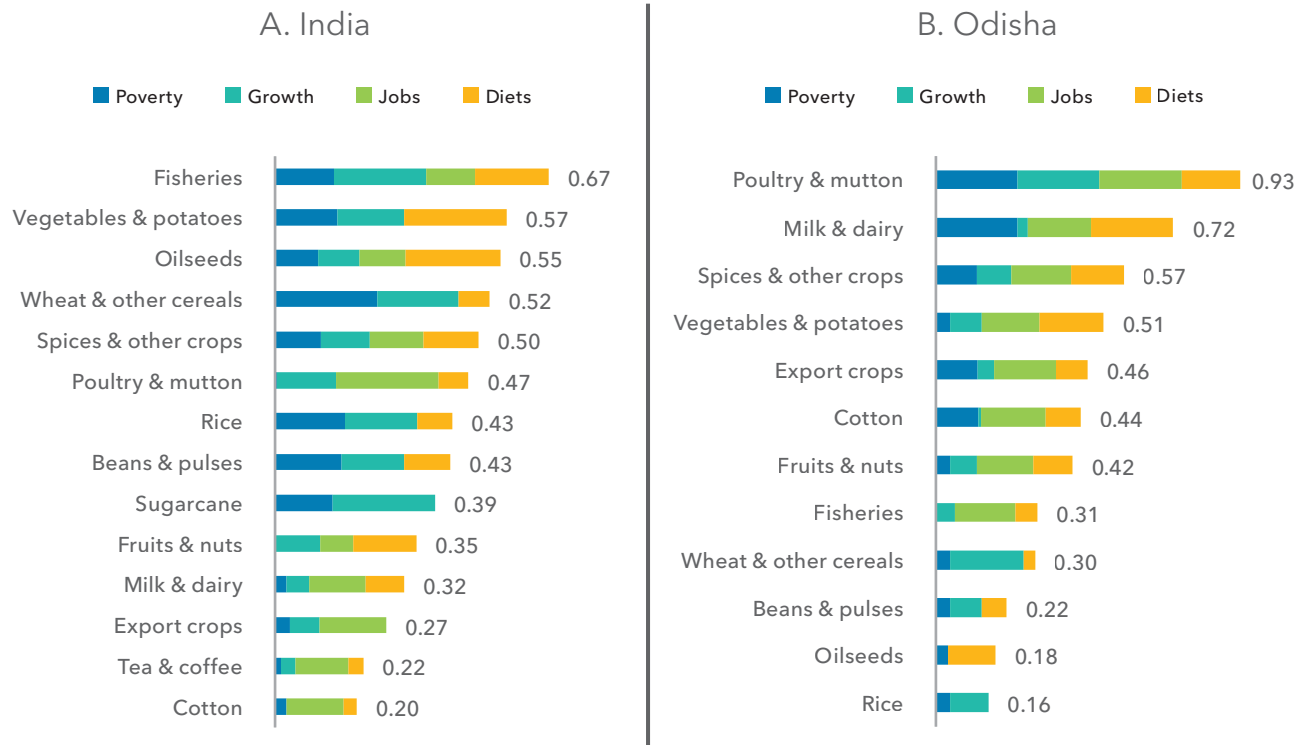
4 The Reference Diet Deprivation (ReDD) index is used for such an assessment.

FIGURE 11.3 Impact of value chain growth on individual development outcomes



Source: Authors' compilation based on RIAPA model results.

Note: Positive scores indicate a favorable effect on the development outcome, while negative scores indicate a counterproductive effect.

FIGURE 11.4 Ranking of value chains, based on combined development outcomes

Source: Authors' compilation based on RIAPA model results.

Nationally, the fisheries value chain is ranked highest, followed by vegetables and potatoes, oilseeds, wheat and other cereals, and spices. In Odisha, however, the highest combined development outcome is achieved through poultry and mutton, followed by milk and dairy, spices and other crops, and vegetables and potatoes. Rice ranked low in both Odisha and India despite having the largest share of cropped area in both the state and the country overall.

POLICY IMPLICATIONS

This chapter highlights the structural diversity of India's agrifood systems and illustrates how value chain strategies must be tailored to regional contexts and development priorities to achieve impacts at scale. Using the RIAPA model, the authors simulated the impacts of productivity-led

growth in 14 different agricultural value chains and assessed their effectiveness in advancing four critical development outcomes: poverty reduction, economic growth, job creation, and dietary improvement.

The results show that no single value chain performs well across all outcomes. Some, such as sugarcane, generate strong GDP growth but offer limited benefits for employment or nutrition. Others, such as poultry and dairy in Odisha, show broad-based development potential by contributing to poverty reduction, job creation, and dietary diversity. These trade-offs reinforce the need for a portfolio-based approach to agricultural investment, which aligns value chain development with the specific development goals of each region.

The analysis also reveals clear differences between national- and state-level priorities. Value chains that are highly effectual at the national

level may not yield similar benefits in individual states, and vice versa. This underscores the risks of prescriptive, one-size-fits-all policy approaches and highlights the importance of state-specific strategies.

More broadly, this chapter provides a glimpse into how tools such as IFPRI's RIAPA model can support evidence-based policymaking. By quantifying the multidimensional effects of value chain development, such models can help governments and development partners identify investment pathways that are both inclusive and contextually appropriate.

Acknowledgments

We would like to thank the editors and Emerta Aragie for constructive feedback and helpful suggestions, which have strengthened this chapter.

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