Chapter 21

SOUTH ASIA

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Food systems in South Asia have evolved tremendously over the past 50 years, beginning with the technological innovations of the Green Revolution and then applying lessons learned from that period to address present-day challenges to agriculture, nutrition, and health. The last half-century has been marked by progress in establishing agricultural growth linkages, policymaking and investments in agriculture, and institutional innovations that left an enduring legacy in the region. Policy research has played a critical role in shaping national policies on food security, rural development, and nutrition over this period. Looking ahead to 2050, research on climate change, digitalization, and diets and nutrition will be needed to support South Asia in continuing to build sustainable and resilient food systems that nourish more than 2 billion people while delivering equitable and sustainable outcomes for the region.

Evolutions in policy and research over the past 50 years

As one of the most notable events in the history of agriculture over the past century, the Green Revolution arguably had the greatest impact in South Asia. The new technologies, and the associated policies and institutions, were central to the region's success in increasing productivity, reducing poverty, and transforming its chronic food deficit into a food surplus in less than two decades (Hazell 2009), although many have since raised concerns over the environmental issues created by these technologies and the uneven distribution of their benefits.

The Green Revolution first began to take hold in South Asia in the 1970s, when the region was heavily dependent on food aid imports and facing chronic food shortages related to the extreme poverty, food insecurity, and livelihood vulnerability prevalent under colonial rule. Prior to this period, none of the critical components of the Green Revolution—fertilizer, irrigation, and modern seeds—existed in the region, nor did any of its countries have the policies, institutions, or infrastructure needed to promote these new technologies (Rashid et al. 2008).[1] Trade and exchange policies were restrictive, infrastructure was weak, and institutions for risk mitigation, such as credit and insurance, and incentives for farmers to adopt new technologies, such as subsidies and pricing policies, were nonexistent.

During this time, international development organizations including CGIAR and IFPRI made major contributions through analysis of policies to promote the Green Revolution and agricultural growth in the region. The resulting evidence base from South Asia constituted largely new work in the agriculture and development policy field. Studies by IFPRI and others covered the diffusion and impacts of modern inputs, role of infrastructure, social protection and related institutions, market liberalization, and agriculture-nutrition linkages, among other topics (Figure 21.1).[2]

Of this body of work, research in three main areas has proven especially influential: agricultural growth linkages, returns on public investment in agriculture, and innovation in social protection and nutrition programs.

Agricultural growth linkages

Early efforts to promote agricultural growth in South Asia were influenced by the theory of agriculture-led development, a then-novel approach that posited agriculture as the primary driver of structural transformation in developing economies (Johnston and Mellor 1961) and marked a major shift from prior development thinking (see Chapters 3 and 17).[3] The trajectory of countries such as Japan had supported the theory, but South Asia became a testing ground to study it from the very start of the region's growth process. Research

1 For instance, when India embarked on promoting the Green Revolution, the country was using less than 1 million metric tons of nitrogen-phosphorus-potassium fertilizer in 1965/66, a rate that jumped to more than 5 million tons in 1980, about 18 million tons in 2000, and roughly 33 million tons in 2020 (FAOSTAT).

2 This large body of literature includes A. Ahmed (1992), A. Ahmed and Sampath (1992), R. Ahmed (1979b, 1985) Desai (1991), Dorosh and Valdes (1990), Edirisinghe (1988), Goletti et al. (1991, 2000), Meinzen-Dick (1996), Pinckney et al. (1988), Rogers (1988), and Stone (1979).

3 For more on this topic, see Balassa (1978), Bhagwati and Srinivasan (1978), Prebisch (1951, 1964), Singer (1986), and Singer and Alizadeh (1988).

FIGURE 21.1 IFPRI research on key policy issues in South Asia, number of publications (1975–2000)

Source: Authors' calculations based on data from CGSpace repository.
Note: Only peer-reviewed research publications are included in the figure.

on the linkages between agricultural growth and other sectors demonstrated that agricultural growth not only increased farm income but also generated higher nonfarm income, which in turn led to both higher consumption and faster reductions in poverty (Hazell and Haggblade 1990, 1991a). Agricultural growth linkages remain foundational to the region's development even today, with almost all countries in the region emphasizing agricultural growth linkages in their development strategies.

Investments in agriculture

Research focused on infrastructure, institutions, and policy constraints to agricultural growth made lasting contributions to the national policies and strategies of South Asia's governments. In Bangladesh, for example, research on the effects of a dual pricing system on foodgrain supply, distribution, and consumption in the late 1970s (Ahmed 1979a) and a subsequent study on food policy served as the catalyst for instituting the country's Food Planning and Monitoring Unit, which continues to act as the coordinating body for food security programs involving 16 different ministries. A study on the impacts of rural infrastructure in Bangladesh, which found associations between infrastructure and higher household income and income from agriculture, fisheries,

and livestock (Ahmed and Hossain 1990), led to the development of the predecessor to the Local Government of Rural Development, an important unit within the country's Ministry of Planning.

Novel research work on returns to public spending in agriculture demonstrated that during the 1970s and 1980s, input subsidies in fertilizer, irrigation, and credit, along with investment in agricultural research, contributed significantly to enhancing agricultural productivity and growth. However, during the 1990s and early 2000s, subsidies crowded out other investments in agriculture, and their contributions to agricultural productivity and growth decelerated. Later research found that agriculture-related public investment in roads and agricultural R&D had much higher returns for both poverty reduction and agricultural growth than did investments in power or irrigation.[4] Demand for this type of research and analysis remains strong in South Asia, and the methods used by these studies have since been replicated in other countries around the world.

Institutional innovations in social protection and nutrition

Beginning in the 1970s, the region's approach to social protection shifted from a singular focus on averting famine to the broader aims of protecting the poor and addressing food insecurity. Research by IFPRI and others focused on restructuring the region's food rationing programs, exploring policy options for dealing with shocks, and examining the efficiency of social protection programs for reducing subsidies, targeting approaches, and linking these programs with overall development objectives (see Chapter 11).[5] These studies consistently found that traditional public distribution and rationing programs were expensive and plagued with corruption, with little reaching the intended beneficiaries. In Bangladesh, IFPRI's research led to the dismantling of the rationing system and the introduction of Food For Education, the first program of its kind (IFPRI 2013). All of the region's countries ultimately shifted from using universal subsidies to targeted food subsidies.

Over the last several decades, many countries in South Asia have drawn on policy research to expand their social protection programs to include nutrition, gender, and agriculture (see Chapters 11, 12, and 14). Policy research by IFPRI and partners has supported decision-making on the design, delivery, and prioritization of social protection programs. For instance, an impact evaluation of the

4 This literature includes Bathla et al. (2018, 2020), Fan and Hazell (2001), Fan et al. (2008), and Joshi et al. (2015).

5 Research on subsidies included A. Ahmed (1992), R. Ahmed (1988), Edirisinghe (1988), Kumar (1979), Rogers (1988), and Sahn (1988); on targeting, A. Ahmed (2000) and Babu (2002); and on linking to development objectives, A. Ahmed and Del Ninno (2002) and George (1979).

operational effectiveness of different transfer modalities in Bangladesh found that combining cash transfers with behavior change communication (BCC) led to significant improvements in child nutrition, along with various spillover benefits for nutrition knowledge and practices (A. Ahmed, Hoddinott et al. 2024; A. Ahmed et al. 2025; Roy et al. 2019). These results led Bangladesh's government to include nutrition BCC in a safety net program benefiting more than a million rural women. Many countries in the region have also introduced programs to strengthen the scale, quality, and impact of school meals, such as PM-POSHAN (formerly the Mid-Day Meal Scheme) in India and the School Health Promotion Program in Bangladesh. IFPRI's research suggests that India's school meals program has likely contributed to intergenerational reductions in child stunting (Chakrabarti et al. 2021); the implications for policy are yet to be determined.

Overall, nutrition has been rising on the policy agenda—and across sectors—in the region for the last two decades. IFPRI's contributions have kept pace with these changes, helping to support policymakers in the region with research and data. For example, Partnerships and Opportunities to Strengthen and Harmonize Actions for Nutrition (POSHAN), a partnership-based evidence-to-policy initiative that undertook research and policy analyses on maternal and child nutrition (POSHAN 2025), supported India's nutrition community in identifying strategic policy directions (Frongillo and Escobar-Alegria 2021) and monitoring the country's nutrition progress (NITI Aayog and IFPRI 2022); similar work is now underway across the region (IFPRI 2025). Linkages between agriculture and nutrition have been at the heart of the evidence-building efforts as well. IFPRI's early work on tackling the agriculture-nutrition disconnect in India (Kadiyala et al. 2012, 2014) set the stage for a variety of agriculture-nutrition research and engagement efforts, including through women's livelihoods program platforms. In Bangladesh, the Agriculture, Nutrition, and Gender Linkages (ANGeL) project, a partnership of the US government, Helen Keller International, and IFPRI, identified actions and investments that could leverage agricultural development for improved nutrition and improve pathways to women's empowerment, particularly within agriculture, paving the way for broader efforts to design, implement, and scale countrywide interventions to improve nutrition and women's empowerment. In India, studies focused primarily on women's livelihood group programs, and shed light on the impact of efforts leveraging these platforms to improve household welfare and diets.[6]

6 For more on ANGeL, see A. Ahmed et al. (2023), A. Ahmed, Coleman et al. (2024), and R. Ahmed et al. (2023); on the project in Bihar, see Raghunathan et al. (2023); for more on the India study with PRADAN, see, Kumar et al. (2024), Raghunathan et al. (2022), and Scott et al. (2022).

BOX 21.1 School-based meal programs

School-based meal programs are a powerful tool that can lead to positive impacts for both nutrition and education in South Asia. India is home to the region's largest school meal program, PM-POSHAN (formerly the Mid-Day Meal Scheme), and other countries in the region have also implemented diverse types of school meal programs. Early research in Bangladesh demonstrated the beneficial impact of nutritious biscuits in shaping educational outcomes for girls (Ahmed and Arends-Kuenning 2006). More recently, evidence has pointed to potential intergenerational benefits for the children of school meal recipients in India: using nationally representative data from 1993 to 2016, researchers found that the school meals expansion supported intergenerational improvements in child linear growth, providing a further impetus to this agenda (Chakrabarti et al. 2021). Policy engagement and efforts to improve the nutrition of school-age children have also identified new opportunities for school-based efforts to improve healthy diets for adolescents and young adults, an important agenda for the future.

Emerging trends: Challenges and opportunities

Over the last several decades, environmental degradation and climate change, digitalization in agriculture, and changes in diets and nutrition have emerged as trends that present both challenges to and opportunities for improving food systems in South Asia. These trends interact with the persistent gender and social equity issues in the region, including low empowerment and participation of women in the labor force, youth employment challenges, and rapidly increasing urbanization.

Environment and climate change

The extensive body of research that emerged from the Green Revolution documented not only its beneficial impacts but also negative consequences, such as resource degradation and equity implications, that remain relevant today (Hazell 2009; Hazell et al. 1991b; Hossain 1988). In the 1970s, policy attention was focused on the need to increase food production and feed the growing number of hungry people in the region. Even as it became clear that these policies had caused negative environmental impacts, it proved difficult to reform them (Rashid et al. 2007, 2008). For example, although both irrigation and fertilizers played a crucial role in increasing agricultural productivity, irrigation subsidies are a major cause of the region's alarming rate of groundwater depletion—South Asia extracts 25 percent of global groundwater, and India is the

world's largest user of groundwater for irrigation—and fertilizer subsidies have contributed to soil degradation and reduced productivity of farmlands. The financial cost of these policies has also become unsustainably high: India's input subsidies for fertilizer, irrigation, and electricity rose from US$25 billion in 2011 to $48 billion in 2022–2023. Fertilizer subsidies account for 45.6 percent of all subsidies in India, and power subsidies account for another 30 percent (Sengupta 2024). Research suggests that countries should adopt strategies to reallocate these resources to tackle emerging policy challenges, such as climate adaptation and mitigation (see Chapter 18).

In recent decades, South Asia has become a hotspot of climate change, with the region facing significant climate-induced risks that are intensified by existing vulnerabilities. It has already experienced a rise in temperatures, accelerated rates of glacial melting and ground water depletion, and unpredictable patterns in rainfall and heat, leaving a large portion of the population exposed to climate hazards (IFPRI 2022). These trends have profound implications for the future of food production, health and nutrition, and the overall sustainability of food systems in the region.

AI and digitalization in agriculture

As optimism grows around the potential of AI and digital technologies to help transform food systems, South Asian countries have adopted a range of policies and programs to incorporate digital technologies into agriculture and food systems. Bangladesh, India, and Pakistan have adopted national governance plans and/or policies on digital and AI technologies, as well as forming country and corporate partnerships to integrate AI into agriculture. Programs adopted by South Asian countries under these policies have already shown success: in India, more than 17 million farmers and 250,000 traders have registered with the Electronic National Agriculture Market (e-NAM), a virtual platform to facilitate online trading of agricultural commodities, ensure transparent pricing, and enable farmers to receive better prices (MoA&FW 2025). In 2024, e-NAM's total trade volume reached approximately $7.7 million.

Dietary transition and agriculture-nutrition linkages

Despite impressive economic growth, rapid reductions in poverty and stunting,[7] and the introduction of many nutrition-focused public policies, large population sizes mean that South Asia experiences some of the highest burden

7 For documentation, see Avula et al. (2022), Bhutta et al. (2020), Headey et al. (2017), and Nisbett et al. (2017, 2023).

TABLE 21.1 Prevalence of malnutrition in South Asia, relative to least-developed countries, low- and middle-income countries, and the world, 2022

Indicators	South Asia	LDCs	LMICs	World
Unable to afford a healthy diet	74	72	68	42.1
Child stunting (< 5 years of age)	33	29	26	21.8
Child wasting (<5 years of age)	14	10	7	7.0
Anemia in women (ages 15 to 49)	53	45	38	30.0
Overweight/obesity (<5 years of age)	4	3	5	6.0

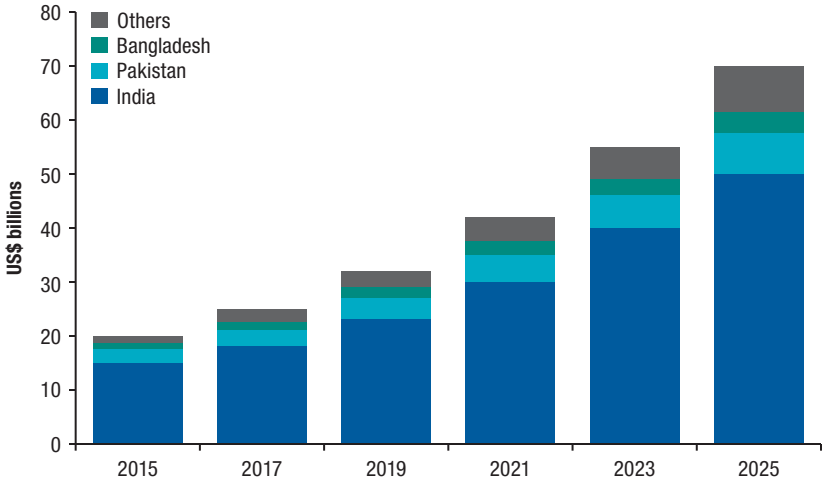
Source: FAO et al. (2024).
Note: LDC=least-developed countries; LMICs=low- and middle-income countries.

of malnutrition in the world (Table 21.1). More than 53 percent of the region's population, or 1.07 billion people, cannot afford a healthy diet; about half of women ages 15 to 49 are affected by anemia; and more than 30 percent of children under the age of five are stunted (FAO et al. 2024). Along with these high rates of undernutrition, the prevalence of overweight, obesity, and noncommunicable diseases among adults is already high, while that among children is on the rise (FAO et al. 2024).

The underlying causes of the persistence of poor nutrition in the region are complex and extend beyond income and information. These new challenges have only recently received attention from the international development community, both in South Asia and the rest of the world, and further policy attention is greatly needed. For example, most countries in South Asia have not yet developed any policies or regulations for the growing market for ultra-processed foods, a serious oversight given the rapid growth of this sector of the food industry.[8] Consumption of unhealthy foods have become more prevalent in South Asia as incomes have risen and the share of staple foods in diets has declined. The ultra-processed food market in the region has more than tripled in just 10 years—rising from $19 billion in 2015 to more than $70 billion in 2025—and is likely to accelerate further in coming years (Figure 21.2) (Euromonitor International 2024). From a food and nutrition security standpoint, this poses major challenges for health outcomes, along with employment and economic well-being. More broadly, improving health and nutrition outcomes remains a major policy challenge, which, given the sheer number of

8 Some policies have been adopted—such as a ban on ultra-processed food sales within 50 meters of school premises and the launch of the Eat Right Campaign in India, a ban on ultra-processed food in schools in Punjab and Sindh in Pakistan, and a national policy on ultra-processed food in schools in Sri Lanka—but there is little to no evidence on their impacts.

FIGURE 21.2 Growth in ultra-processed food market in South Asia, 2015–2025



Source: Authors' construction based on reports from Euromonitor International (2024) and the Food Safety and Standards Authority of India (various years).

Note: "Others" includes Bhutan, Maldives, Nepal, and Sri Lanka.

undernourished children and women, is important not only for the region's countries but also for achieving the Sustainable Development Goals on health and nutrition.

Future food systems research

Looking ahead to 2050, and building on the challenge areas, we note that these also present policy research opportunities for South Asia: climate change, AI and digital efforts in agriculture, and diets and nutrition without losing focus on addressing underlying poverty, gender and social inequities.

Climate change. In the next 25 years, robust policies and innovations will be needed to tackle climate adaptation and mitigation in the region's food systems. Existing research from IFPRI and partners points toward necessary policy actions, as well as pathways for financing programs that could help accelerate a climate-positive food systems transformation (IFPRI 2022). Research partnerships will need to be expanded beyond ministries of agriculture and national think tanks to include ministries of environment, commerce, and planning, as well as other national institutions—such as NITI Aayog in India and planning commissions in other countries—that

coordinate across multiple ministries.[9] At the country level, evidence is needed on the effectiveness of various pilot programs to address climate threats, as well as on adaptive approaches that combine traditional social protection and livelihood interventions with mechanisms to rapidly address disaster- and climate-related shocks (World Bank 2021). This is especially crucial in a region where gender and other social disparities persist despite overall economic progress.

AI and digitalization in agriculture. Policy research is needed to ensure that AI and digital technologies include everyone in South Asia, even the region's poor. Barriers to achieving this goal include bottlenecks in institutions and infrastructure, combined with market failures within food systems such as limited digital infrastructure, concentration of market power, and issues with data governance and privacy. Inability to tackle these challenges can lead to the "digital divide," a negative outcome that was evident in the region's education sector during the COVID-19 pandemic. While students attending private school or those from richer households could attend virtual classes, students in public schools had no such ability. Innovative programs include the Drone Didi program in India, which aims to provide drones to 15,000 women's self-help groups between 2024 and 2026. After receiving necessary training, women pilots will provide rental services to farmers. The underlying idea is to achieve the twin objectives of improving income and enhancing women's empowerment. Other programs have either been rolled out or are in development to ensure the inclusive and sustainable adoption of AI in agriculture. Generating evidence on the operational effectiveness of the program will be critical—both to improve program design and to generate evidence on broader policy actions that will be critical to fostering inclusion, including through targeted support to smallholder farmers, youth, women, and other vulnerable groups, and through skills development (OECD 2022; World Bank 2019, 2021).

Dietary transition and agriculture-nutrition linkages. Future research on diets and nutrition must cut across the entire food system—from production to consumption—and beyond. Evidence-based insights are needed on how major agricultural subsidies can be reshaped to encourage the production of nutrient-rich foods, while avoiding negative impacts on the availability of

9 In the case of the livestock sector, for example, R&D, extension, and other routine operations fall under the livestock (or livestock and fisheries) ministry; food safety falls under the ministry of health; policies related to greenhouse gas reductions are implemented by the environment/climate change ministry; broader policy or program designs are carried out by the planning ministry; and budgets for the programs are approved by the finance ministry.

South Asia's predominant staple foods. Between the farm and the consumer, research will be essential to strengthen value chains and market opportunities for nutritious and often perishable commodities such as fruits, vegetables, animal-source foods, and other nutrient-rich foods. These foods are currently limited in diets due to limited affordability and accessibility. It will be imperative to identify behavior change innovations, including policy levers such as food labels, taxes, and nudges using digital technology, to redirect consumer preferences and choices toward healthy diets. In a changing social environment, identifying policies and interventions, including for men's engagement, to reshape gender dynamics across the food system will be crucial (Kumar et al. 2024). Finally, efforts to identify the most efficient and effective strategies to address the affordability of healthy diets must remain a top priority for South Asia, since millions of people continue to face economic precarity and poverty in the region. A key challenge for South Asia is whether it can avoid the nutrition trajectories of regions that face major public health challenges from overweight and obesity.

A new strategy for South Asia. Over the past 50 years, research by IFPRI and others in South Asia has contributed toward a better understanding of the linkages between agriculture, nutrition, and health (see Chapter 2). The Institute supported advancement of these efforts through large-scale outreach and new initiatives, notably the 2020 Vision Initiative conference on agriculture, nutrition, and health; numerous nutrition initiatives; and the launching of HarvestPlus in the region. However, most of this research and outreach was carried out in partnership with agriculture ministries or national agricultural research systems.

Given the new realities, IFPRI and other research partners will need to consider new ways of doing business in South Asia. Instead of solely relying on donor funding, organizations should explore opportunities to broaden partnerships and mobilize resources from within the region for future research. In addition to working more with non-agricultural ministries within the regions, IFPRI and others must also strengthen partnerships with regional bodies such as ASEAN, BIMSTEC, and SAARC, and foster triangular South-South cooperation. The challenges of food systems transformation extend far beyond agricultural ministries, and research organizations such as IFPRI need to adjust accordingly to enhance their relevance and funding opportunities for critical research. There is growing demand for IFPRI's research from governments and the private sector, and donors will likely find it strategic to invest in regional body and South-South partnerships that address challenges in South Asia's food systems.

As we look to the future, new partnerships and ways of conducting policy research will be essential to generate enduring impacts for policymaking and academic scholarship and will pave the way for new thinking on sustainable food systems transformation. South Asia's successes have tremendous insights to offer the world, and IFPRI's efforts in the region will also be oriented toward strengthening efforts to translate evidence from the regional to the global level.

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