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 territories[1] 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.

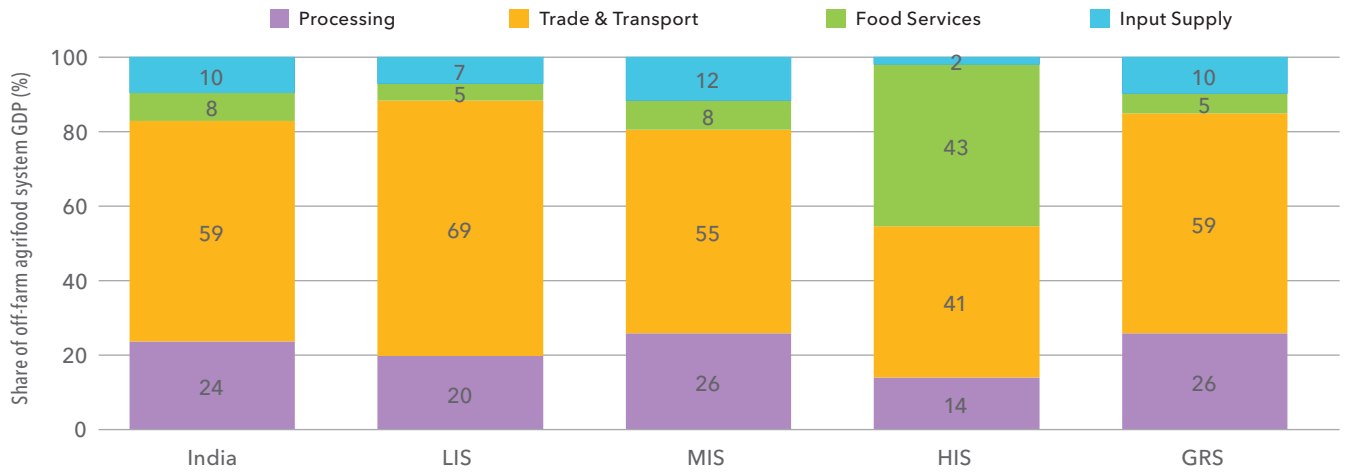
within state economies. Low-income states exhibit the highest reliance on agrifood systems: These systems contribute 37.5 percent of their total GVA, compared to the national average of 31.3 percent. Agriculture alone accounts for 25 percent of GVA in low-income states, compared to 15 percent in middle-income 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

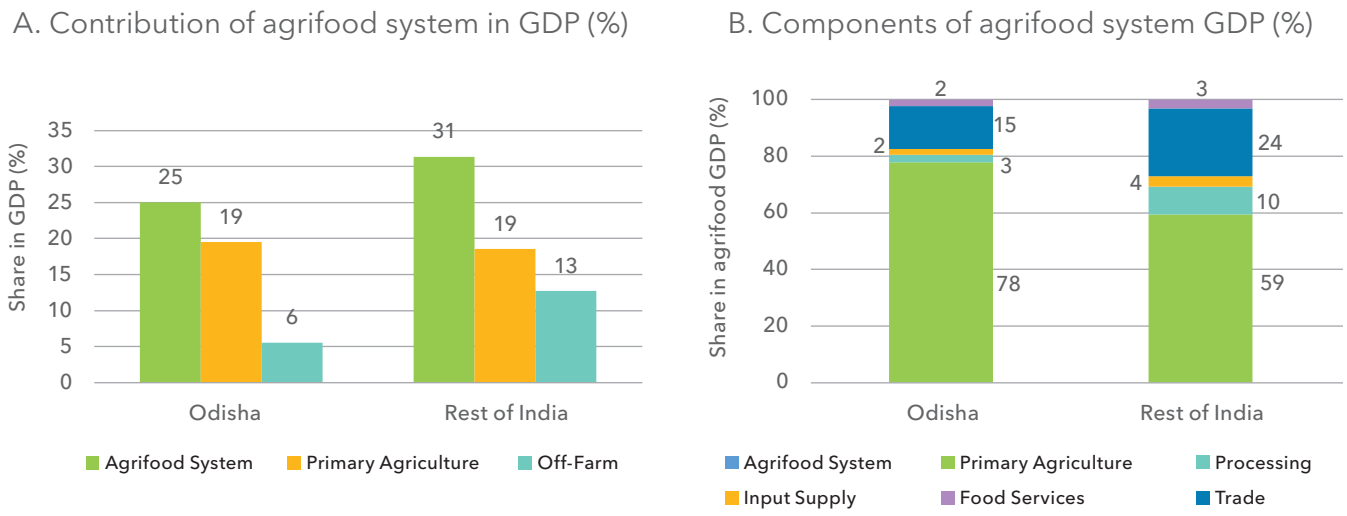
FIGURE 11.1 Share of off-farm components in total off-farm agrifood system GDP across state groups (%)



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



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 index[4] 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.

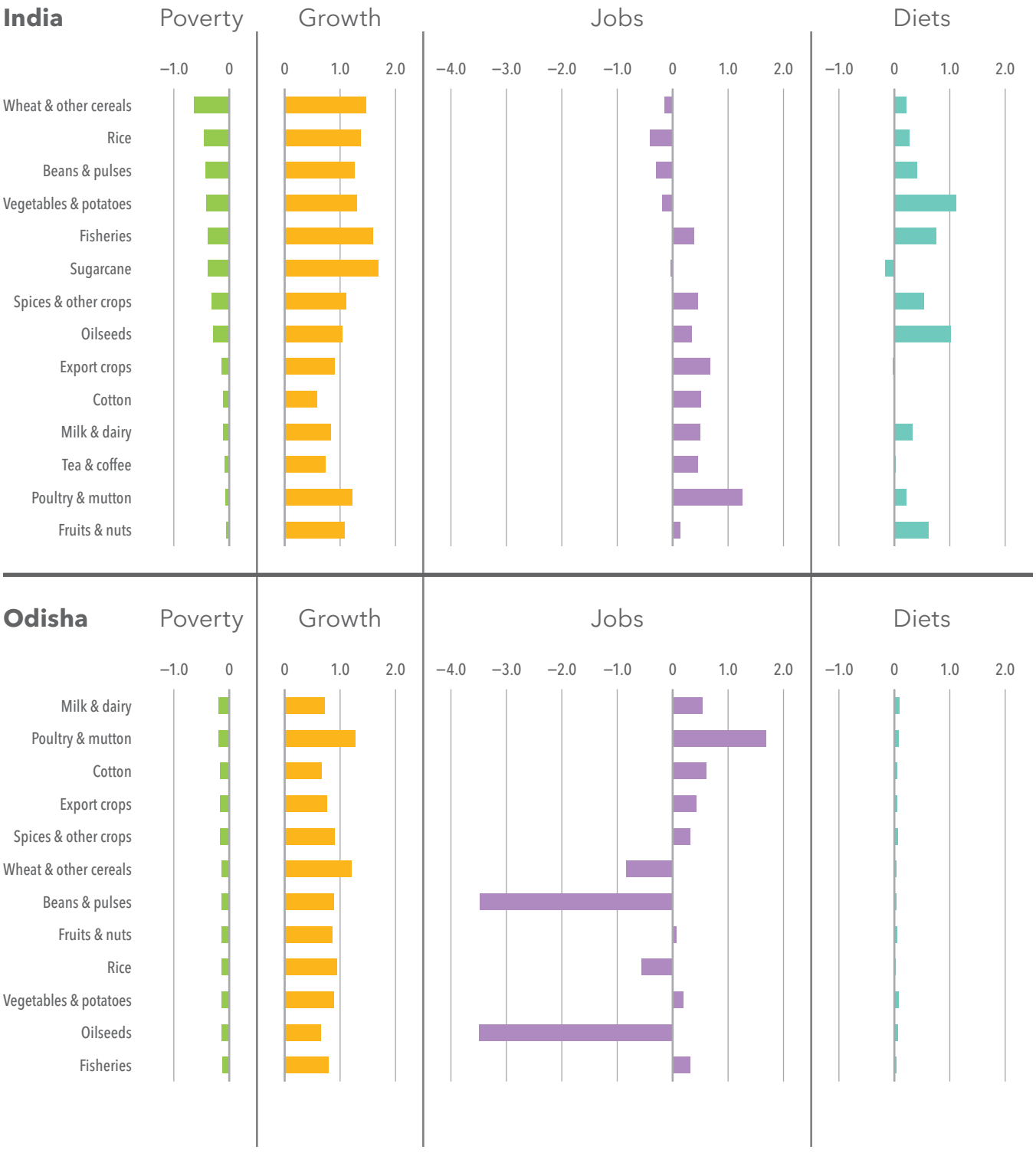
Nationally, the sugarcane value chain has the highest growth multiplier at 1.7, meaning every $1.00 increase in sugarcane GDP generates an additional $0.70 elsewhere in the economy. It scores highly on poverty reduction but has negative effects on job creation and diet quality. Growth in the wheat and 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.

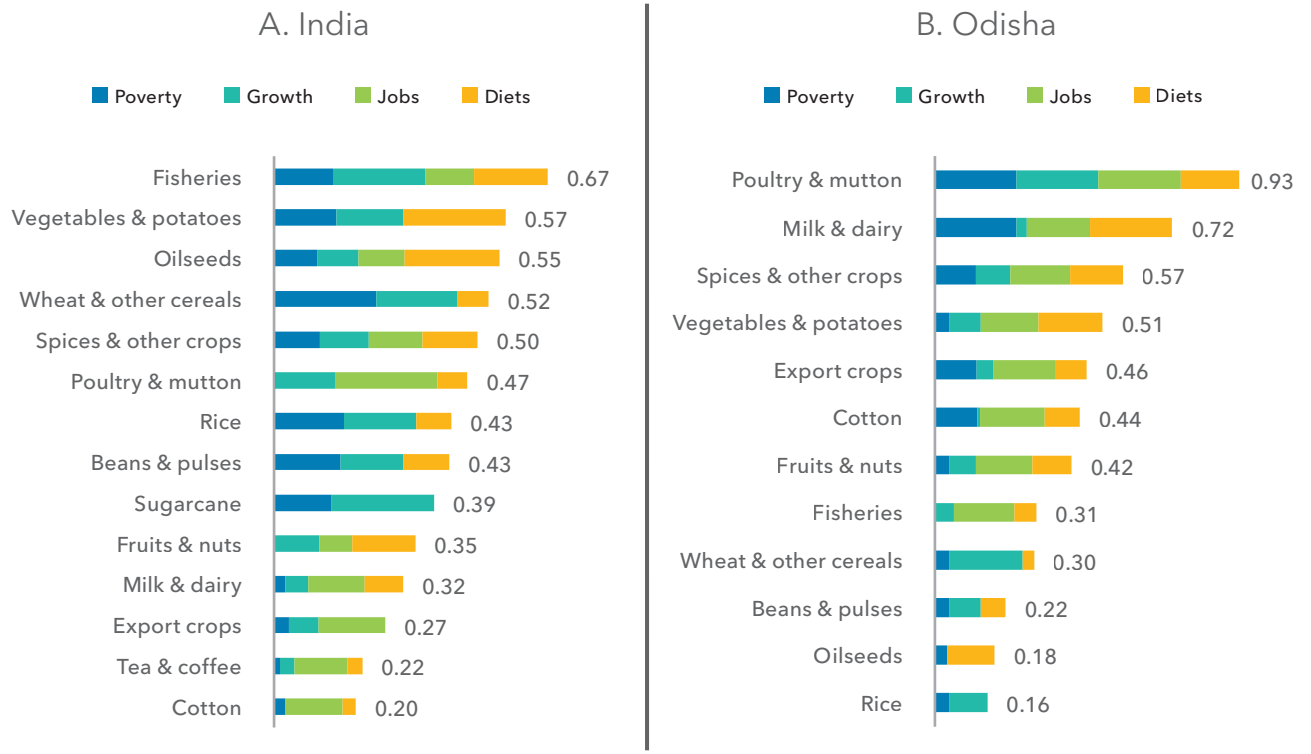
FIGURE 11.3 Impact of value chain growth on individual development outcomes



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.

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