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EXPLORING THE AGRICULTURE–NUTRITION DISCONNECT IN INDIA

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ndia is home to one-third of the world's undernourished children, with rates of child undernutrition remaining stubbornly high for decades. Undernutrition is widespread among adults, too; one-third of all Indian men and women are affected. At the same time, India is the second-fastest-growing economy in the world. Its economic growth, however, has been far less "pro-poor" than growth in other Asian countries such as China, Thailand, and Vietnam, where major strides to reduce child undernutrition have been made during similar periods of economic growth. Why has such progress somehow eluded India? What lies beneath the apparent paradox of simultaneous nutritional stagnation and sustained economic growth in India?

The Indian Enigma

Globally and historically, economic growth has played a critical role in addressing undernutrition; the rate of decline in child underweight prevalence tends on average to be around half the rate of growth of per capita gross domestic product (GDP).¹ If this rough benchmark is applied to India, which grew at 4.2 percent per year from 1990 to 2005, the underweight prevalence would have been expected to decline by 2.1 percent a year, or by about 27 percent overall during this period. But the actual decline in these 15 years was only about 10 percent, according to National Family Health Survey (NFHS) data.

There are undoubtedly many parts to this puzzle. It is now widely recognized that nutrition outcomes are determined by a complex interaction among preconditions, including individual dietary intake and health status, household food security, caring capacity and practice, access to adequate health services, and a healthy environment—all of which are reinforced by deeper social, economic, and political processes that drive and enable them.

But one part of the puzzle surely relates to the role of the agriculture sector. Although declining in its share of India's overall GDP (at 16 percent in 2007), agriculture and allied sectors employ 52 percent of the total workforce in India, and the sector continues to play a major role in the overall socioeconomic development of the country. Through agriculture policy (including price policy), agriculture technology (including irrigation and research and development), and food marketing systems (including the creation of value chains), the agriculture sector has the potential to influence poverty reduction and the conditions under which people are employed (including timeuse patterns, child labor, and exposure to hazards). It also has the potential to improve the availability of and access to diverse foods and, thereby, food consumption patterns.

Box 1 — Tackling the Agriculture-Nutrition Disconnect in India: The TANDI Initiative

Agricultural initiatives alone cannot solve the nutrition crisis in India but they can play a much bigger role toward that end than they have done thus far. This basic belief gave rise in January 2010 to the TANDI initiative, facilitated by the International Food Policy Research Institute (IFPRI) with funding from the Bill & Melinda Gates Foundation. The goal of TANDI is to better understand and address the failure of economic and agricultural growth in order to make significant inroads into reducing malnutrition in India. The initiative is promoting the establishment of a multistakeholder platform, which brings together economists, nutritionists, and other stakeholders to address key knowledge gaps and drive a change in India's nutrition policy and program processes.

Agriculture research and technology development in India have dramatically increased food production and aggregate food availability—rendering large-scale famine a rarity—yet the crisis of chronic undernutrition persists. This brief examines this phenomenon by summarizing key nutrition outcome trends and patterns in agricultural growth and development in the country; presenting a conceptual framework for pathways between agriculture and nutrition; and using an empirical literature review to highlight the evidence for these linkages in India during the past two decades.

Trends in Nutrition Outcomes

The three rounds of the National Family Health Survey (undertaken in 1992–1993, 1998–1999, and 2005–2006) show that the prevalence of *stunting* (low height for age) among children under three years old has dropped 8.1 percentage points in the 13 years between the first and third round of surveys, while *underweight* (low weight for age) prevalence declined by 7.1 percentage points. The proportion of *wasting* (low weight for height) in children has declined only marginally over the same period—in fact, it actually rose significantly between NFHS-2 and NFHS-3.

Among adults, both undernutrition and anemia prevalence rates increased among women between NFHS-2 and NFHS-3, and more than one-third of married women and men in India were too thin, according to the body mass index (BMI) indicator. More than half of women and about one-quarter of men suffer from anemia.

To meet the first Millennium Development Goal, India needs to achieve an average decline of about 1 percentage point per year in the prevalence of child underweight between 2000 and 2015. Although there are substantial interstate variations in nutrition outcome trends, according to NFHS data the actual national rate of decline in underweight children in the most recent survey period has been around 0.5 percentage points per year—only half of what is required.

In addition to stagnation in undernutrition rates, India is facing a rising tide of obesity and related metabolic disorders. This double burden raises important challenges with regard to fine-tuning agricultural policies to deal simultaneously with issues of deficit, excess, and dietary imbalance.

Trends in Agricultural Development

Large-scale government investments in agriculture in the 1960s sparked India's Green Revolution. These investments resulted in improved seeds (primarily wheat and rice), subsidized inputs, infrastructure developments, increased research and extension, and new marketing policies, accompanied by relatively favorable agricultural price regimes and well-coordinated government leadership. Irrigated area doubled, fertilizer use increased sixfold, and cereal production nearly doubled. National food stocks grew, large-scale famine was all but eliminated, and rural poverty fell from 64 percent in 1967 to 50 percent in 1977, and then to 34 percent by 1986.

Since the economic reforms in the 1990s, India has seen unprecedented economic growth rates, although agriculture and allied sectors grew much more slowly than the manufacturing and service sectors. While a falling share of agriculture in the GDP is not uncommon in a rapidly growing economy, the agriculture sector shows several disturbing trends.² The average rate of growth of agricultural yield per year has been falling steadily (at 4.4. percent between 1980 and 1990, 2.8 percent between 1991 and 1998, and 0.6 percent between 1999 and 2009). Although India ranks second worldwide in farm output, per capita daily foodgrain availability in 2006 was the same as during the drought years of the 1970s. (Concomitantly, there were rising net exports and additions to government buffer stocks.) The annual growth rate of public investment in agriculture declined from 4 percent in the 1980s to 1.9 percent in the 1990s. The parallel slowing of the povertyreduction rate, epidemic of farmer suicides (indicative of deep agrarian distress), and virtual stagnation in nutrition outcomes nationwide highlight deep-rooted systemic problems.

Pathways between Agriculture and Nutrition

The pioneering UNICEF conceptual framework for nutrition has proved extremely useful in showing the relevance of the "food, health, and care" triad of preconditions that underpin nutritional well-being. The framework's simplicity aids communication between multiple stakeholders, but it is not necessarily optimal for highlighting specific pathways and generating testable hypotheses. Figure 1 shows a framework, developed and modified through an extensive consultative process with multiple stakeholders, that details the seven key pathways between agriculture and nutrition.

First, *agriculture as a source of food*: This is the most direct pathway by which household agricultural production translates into consumption (via crops cultivated by the household). Second, *agriculture as a source of income*: Agriculture can generate income either through wages earned by agricultural workers or through the marketed sales of food produced. For the latter, production decisions are based on tradability and the price that produce can command as a commodity, more than on its desirability for the household's own use. Third, *the link between agricultural policy*



Figure 1 — Mapping the agriculture–nutrition disconnect in India³

Source: Author.

and food prices: A range of supply-and-demand factors will affect the prices of various marketed food and nonfood crops, which, in turn, affect the incomes of net sellers and the ability to ensure household food security (including diet quality) of net buyers. Fourth, *income derived from agriculture and how it is actually spent*: Especially important is the degree to which nonfood expenditures are allocated to nutrition-relevant activities (for example, expenditures for health, education, and social welfare).

Pathways five through seven relate to *the increasing feminization of the labor force* and the implications this may have on (1) women's socioeconomic status and their ability to influence household decisionmaking and intrahousehold allocations of food, health, and care; (2) their ability to manage the care, feeding, and health of young children; and (3) their own nutritional status, when their work-related energy expenditure exceeds their intakes, their dietary diversity is compromised, or their agricultural practices are hazardous to their health (which, in turn, may impact their nutritional status).

All these pathways are significantly modified by a range of factors, including the nature of the agricultural system and whether agricultural growth is driven largely by staples or nonstaples, by cereals or animal production. Other key modifiers include different types of inequities (gender, socioeconomic, caste, religious, rural/ urban, geographical, and so forth), taste and preference, and other nutrition-relevant policies and programs.

Agriculture–Nutrition Linkages in India: What Is Known?

Despite agriculture's potential to affect nutrition in several ways, the current knowledge about linkages between the two is extraordinarily weak. Studies that analyze malnutrition typically progress along three lines of inquiry: (1) consumption of calories, (2) micro- and macronutrient intakes, and (3) anthropometric measures. Studies on agriculture have tended to focus on agricultural productivity, incomes, and price trends. The paucity of unit-level data that combine information on both nutrition and agriculture is itself a form of "empirical disconnect" between agriculture and malnutrition.

Descriptive analyses relating agriculture growth to anthropometric outcomes of children and women show regional differences and variations by the nutrition indicator measured. For example, between 1992 and 2005, Andhra Pradesh, Maharashtra, Himachal Pradesh, Tamil Nadu, Kerala, Bihar, and Assam experienced fairly rapid agricultural growth and significant improvement in at least one anthropometric indicator, but improvements were uneven: Andhra Pradesh made no improvement in child stunting, Kerala made no improvement in underweight prevalence in children, and Assam and Bihar experienced a sharp increase in the prevalence of low BMI in women. Madhya Pradesh and Gujarat saw fairly strong agricultural growth and very poor anthropometric outcomes. In any such analysis, it will be important to investigate differences across entire population distributions for different indexes (stunting, wasting, underweight, and overweight) and for different people (women and children, especially).

In search of explanations for such variance, a systematic search of 15 databases was conducted. This yielded 4,545 citations, which were then screened for their relevance to the pathways described above. Only 71 of these articles—of varying scale, scope, methodology, and rigor—addressed the pathways, and most did so only partially.

The literature of the past two decades confirms the importance of engaging in agriculture as a *source of food* for producer households. But given the fluctuations in the agriculture sector (due, for example, to market volatility and seasonality), diversifying food sources seems to be important. Diversification of foods grown by a household can itself improve dietary diversity and nutrition outcomes. However, without further investments in public health and nutrition education, producing foods with high nutritional value does not necessarily lead to their increased intake by producer households, and any negative shocks tend to exacerbate the existing intrahousehold allocation bias against women.

While it is not clear if source of household income matters, income does influence food consumption patterns in India. Trends in food consumption during the past two decades show positive but declining income elasticities for calories and protein, but much higher income elasticities for fats. At the household level, the overall pattern is one of stable rice and wheat consumption for the poor, sharp declines in coarse cereal consumption, ongoing declines in pulse consumption, rising consumption of fat, and slowly rising consumption of high-value micronutrient-rich items. Persistent poverty and undernutrition among landless agricultural laborers is a continuing cause of concern.

Demand for nutrients is susceptible to price changes, especially in rural areas where incomes have been stagnant. Most rural households are both producers and consumers and the net impact of price changes in consumption is still unclear. The current evidence points to food prices inducing changes in food-consumption patterns through both direct and cross-price effects. In the case of changes in consumption patterns of rice, wheat, coarse cereals, and pulses, which are relatively close substitutes, policies have played a critical role in driving relative price changes. For example, lack of investment and the policy bias toward wheat and rice (reflected in the large allocation of research-and-development funds, fertilizer and water subsidies, and the inclusion of rice and wheat in the country's Public Distribution System) has led to the marginalization of pulse production in India.

India's Public Distribution System has been found to reduce the vulnerability of households to poverty in a few studies. But in light of falling calorie consumption amid excess national grain stocks, there is growing concern over inefficiency in the system. Critics argue that the problem is distributional and that the Government of India has (incorrectly) responded to the lack of purchasing power among the poor by favoring overproduction of a few staples. The literature suggests that consequent deflationary policies then hit producers as prices are pushed down and as incomes from agricultural wages fall, which contributes to high undernutrition rates.

Evidence about the ways engagement in agriculture influences nutrition-augmenting actions (healthcare, sanitation, and so forth) is scant and points to households adjusting expenditure on food, nonfood, and health items proportionally when faced with livelihood shocks and stresses.

In 2004–2005, about two-thirds of the female labor force in India was employed in the agriculture sector; in rural areas, this proportion was 83 percent. India is witnessing a feminization of the agricultural workforce as men are more rapidly shifting into nonfarm sectors. Yet women's role in agriculture continues to be undervalued. Evidence to date suggests a very heavy work burden of women engaging in agricultural activities. Women are more likely to have chronic energy deficiency, which has implications for intergenerational transmission of undernutrition. The low socioeconomic status of women in India affects intrahousehold allocation of resources required for improving nutrition outcomes. It has been noted for several decades that developments in agriculture, such as its increasing commercialization, should be gender-sensitive and at the minimum not adversely affect the capacity of women to care for themselves and their children. Experiences in India and elsewhere show that the impact on the welfare of women and their children from an increasingly feminized agricultural labor force is determined by the extent to which women's socioeconomic status and decisionmaking power changes.

While policy and program responses lie beyond the scope of this brief, they are being addressed directly in the ongoing TANDI Initiative. However, it is worth highlighting the pivotal need to identify and operationalize mechanisms and incentives for forging links among the agriculture, health, and social welfare sectors to address India's nutrition crisis. To combat such a fundamentally multisectoral issue as undernutrition,

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- L. Haddad, H. Alderman, S. Appleton, L. Song, and Y. Yohannes, "Reducing Child Malnutrition: How Far Does Income Growth Take Us?" World Bank Economic Review 17, no. 1 (2003): 107–31.
- G. S. Bhalla and G. Singh, "Economic Liberalisation and Indian Agriculture: A Statewise Analysis," *Economic and Political Weekly* 44, no. 52 (2009): 34–44.

systems of governance and convergence need to be better aligned across the sectors.

Conclusion

While there is a substantial body of literature focusing on Indian agricultural development, there is an extraordinarily thin evidence base for the links between major agriculture-related institutional, technological, and policy shifts in the past two decades and the nutritional status of women and children. It is urgent that this gap be addressed so that the nature of agriculture-nutrition links or disconnects, and their variations across socioeconomic groups and regions, can be clarified. The need for building nationally representative panel datasets that enable this inquiry in the short and long runs is crucial. Without progress in closing empirical and information disconnects, policy gaps will remain. A commitment to evaluating the impact of agriculture on nutrition outcomes and understanding its pathways is critical if India is to realize the agriculture sector's potential to reduce undernutrition. TANDI's work to build a multistakeholder and cross-disciplinary agriculture-nutrition platform is a major step in this direction.

 Adapted from D. Headey, A. Chiu, and S. Kadiyala, Why Has Agricultural Development Not Contributed to Improved Nutrition in India? Ten Years of War against Poverty conference papers (Manchester, England, UK: 2010).

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