

# Promoting Millets in the Public Distribution System

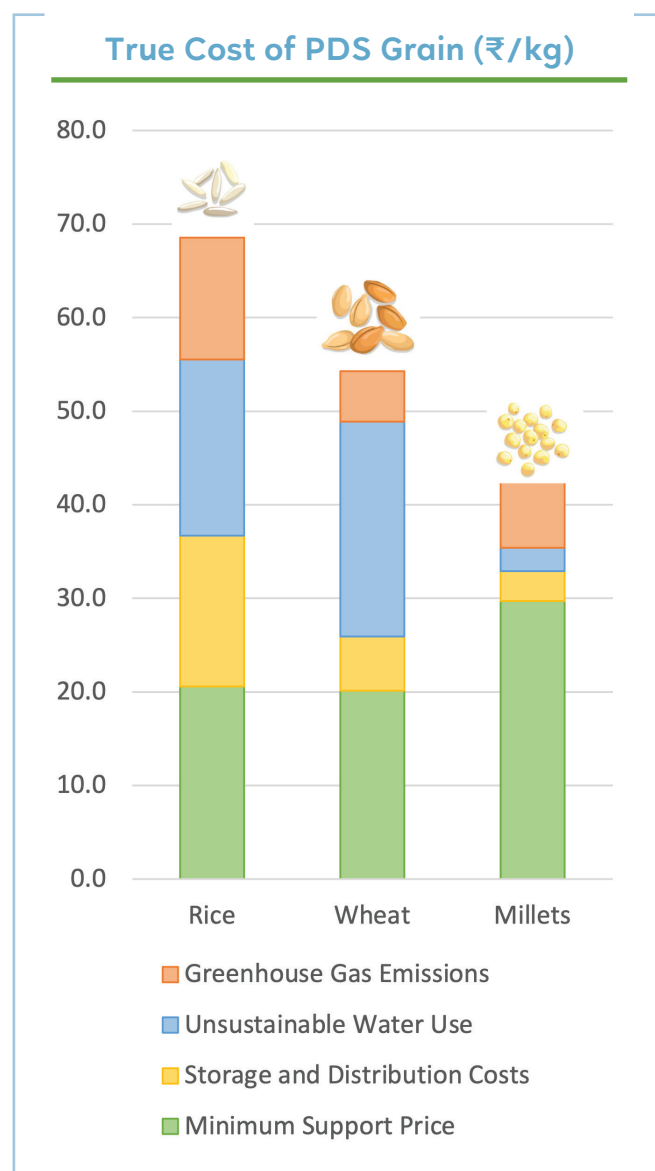
Replacing 1 kg of rice with millets every month for one quarter of beneficiaries can reduce the “true cost” of the PDS by US\$770 million annually.

As the United Nations’ International Year of Millets (2023) ends, there is growing interest in the environmental and health benefits of millets, also known as “nutri-cereals.” Millets have higher nutritional value, require less water, and create less greenhouse gas (GHG) emissions than staple grains, such as rice and wheat.

Research conducted by the Tata–Cornell Institute for Agriculture and Nutrition (TCI) compares the “true cost” of growing and distributing rice, wheat, and millets—Bajra (Pearl Millet), Jowar (Sorghum), and Ragi (Finger Millet)—through the Public Distribution System (PDS) in India using the True Cost Accounting (TCA) methodology.

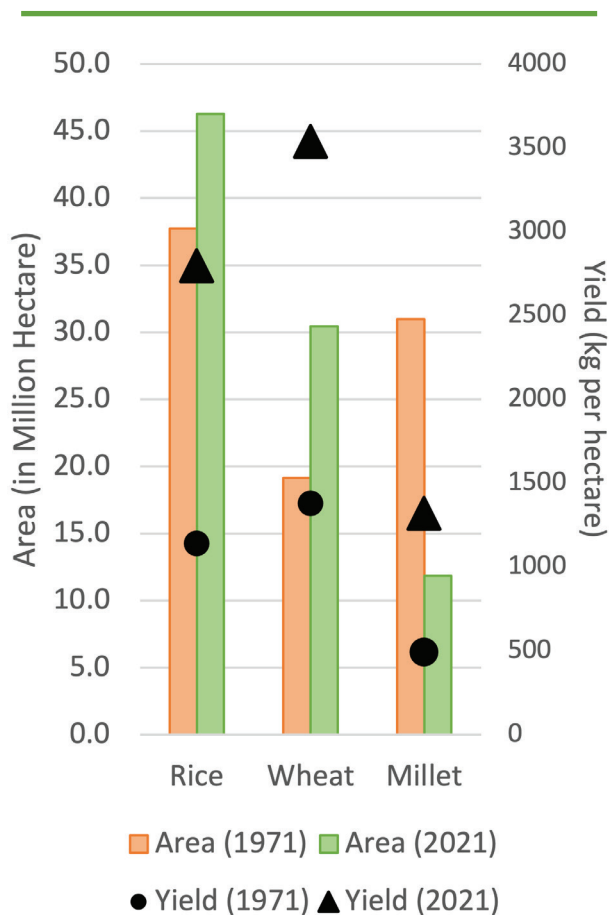
**The cost of producing a kilogram of rice or wheat is 1.6 or 1.3 times, respectively, that of producing a kilogram of millets, when costs associated with GHG emissions and unsustainable water use are accounted for in the “true cost.”**

Although the true cost of millets is significantly lower than the true cost of rice and wheat when measured per hectare, we focus on the per-kilogram costs to account for different yields of the three grains. Millets have a significantly lower yield and area under cultivation relative to rice and wheat. As seen in the chart on page 2, rice and wheat yields (kg per hectare) are 2.1 and 2.7 times that of millets, respectively. The areas under rice and wheat cultivation are 4 and 2.6 times, respectively, that of millets.



**Introducing millets into the PDS will require significant investments to increase productivity, expand the area under cultivation, develop infrastructure (procurement, storage, and processing), and promote millets to a population with a strong taste preference for staple grains.**

**Area Under Cultivation and Yields (1971-2021)**



### True Cost Accounting

With growing concerns over the “hidden costs” associated with the production and consumption of food, TCA provides a framework to identify, quantify, and monetize positive and negative food-related impacts on health, the environment, biodiversity, the economy, and livelihoods.

Earlier TCI research presented estimates of the true cost of the current food basket (a

combination of rice and wheat) provided through the PDS. This brief focuses on the benefits and limitations of including millets in the PDS food basket, accounting for the environmental costs (GHG emissions and unsustainable water use) associated with production.

### The Public Distribution System

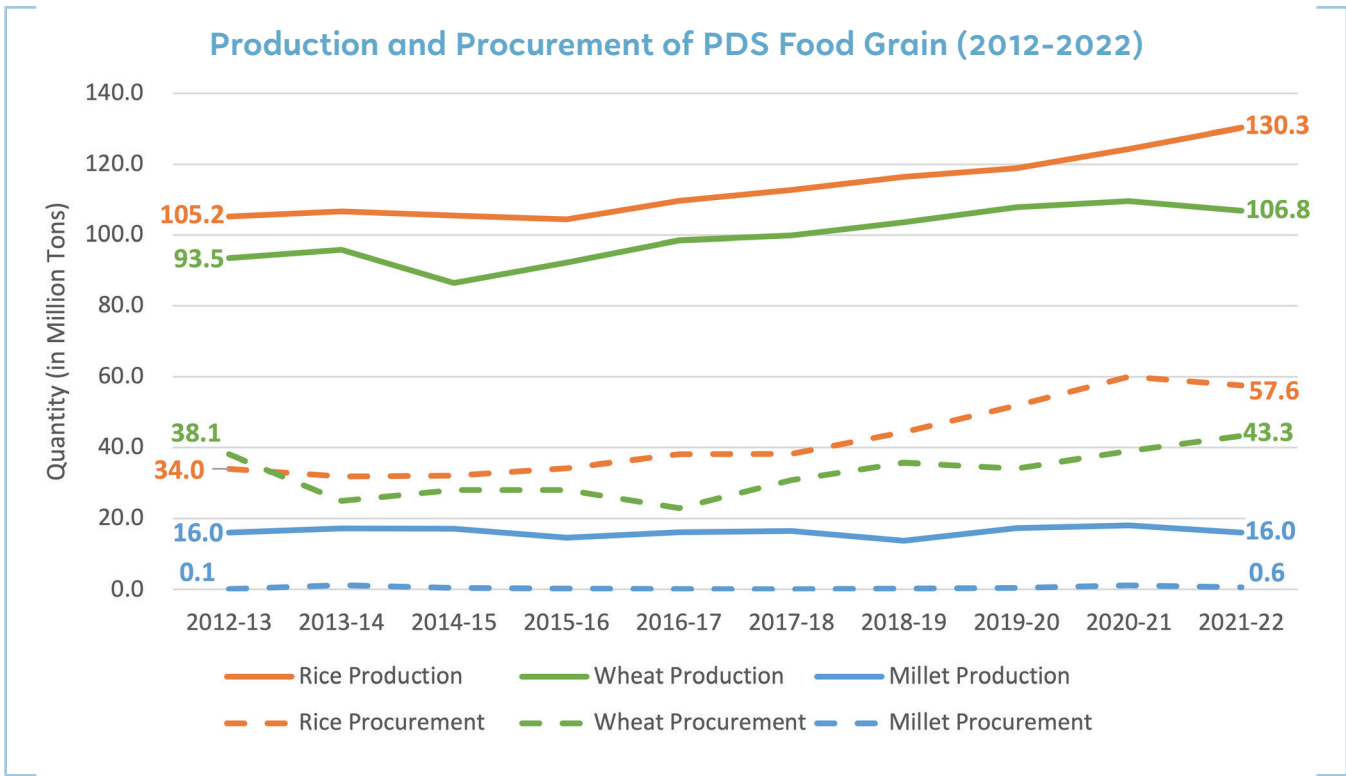
Approximately 800 million Indians receive 5 kg of highly subsidized food grain every month from the PDS. The government procures this food grain from farmers at the Minimum Support Price (MSP) and distributes it to PDS beneficiaries through a nationwide network of Fair Price Shops (FPSs).

Although the PDS ensures the food security of millions of low-income households, it has been criticized for promoting rice and wheat production and consumption over other nutritious food grains, such as millets.

Even though the National Food Security Act (NFSA) of 2013 has a provision for distributing millets as part of the 5 kg-monthly food grain entitlement, only a few states have introduced millets in their PDS over the past decade.

### Environmental and Health Impacts of PDS Procurement

The maps on page 4 highlight the mismatch in each state’s share of production, procurement, and distribution of food grain (rice and wheat) for 2021–22. Although a majority of PDS consumers live in Uttar Pradesh and Bihar, two of the most populated states in India, procurement of PDS food grain is highly



concentrated in Punjab, Madhya Pradesh, and Haryana.

In addition to the high costs of procurement, storage, and transportation of food grain from producer to consumer states, intensive rice and wheat cultivation also results in negative environmental and health-related impacts, such as GHG emissions, overconsumption of groundwater, excessive use of fertilizers, and pollution from the burning of crop residue.

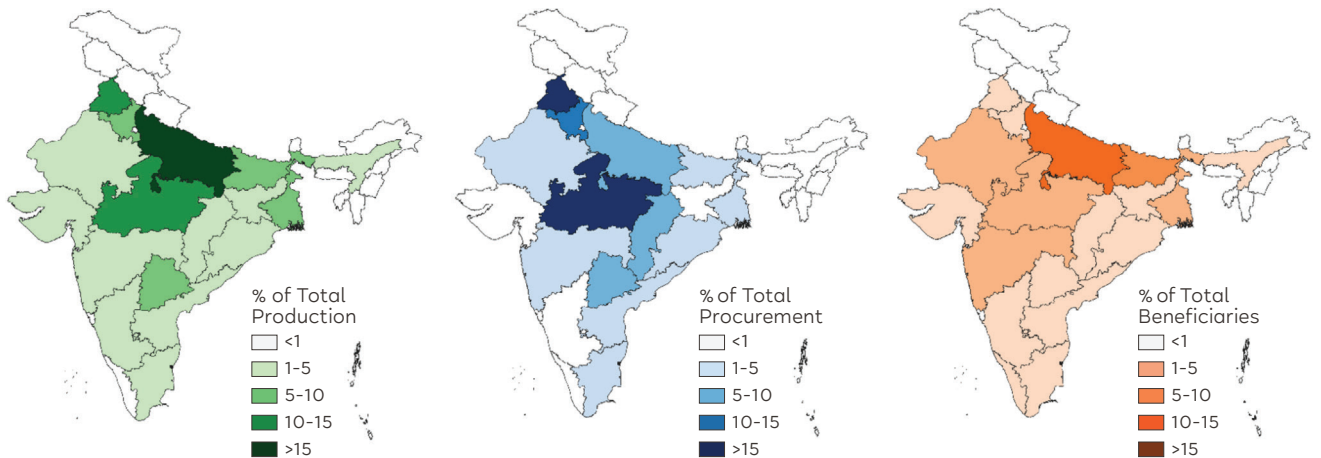
Previous research by TCI found that distributing rice and wheat through the PDS costs US\$15.4 billion to the government and PDS beneficiaries. However, the true cost of the PDS is 40 percent greater than this amount when costs associated with environment and health are considered.

### Addressing the Imbalance in the Procurement of Food Grain

In 2012–13, five states accounted for 77 percent of food grain procurement for the PDS. A decade later, this figure stands at 71 percent. Two states—Punjab and Haryana—procured 45 percent of PDS food grain in 2012–13 and continue to account for 38 percent of total PDS food grain procurement in 2022–23. Despite the government’s push to promote decentralized procurement, the PDS continues to rely on a few states for food grain.

Decentralized procurement can lower the true cost of PDS food grain by reducing costs and emissions associated with transportation of food grain from producer states to consumers.

## Mismatch between PDS Production, Procurement, and Consumption



**Including millets in the PDS can help promote decentralized procurement of food grain by expanding procurement to states that do not grow a large share of rice and wheat.**

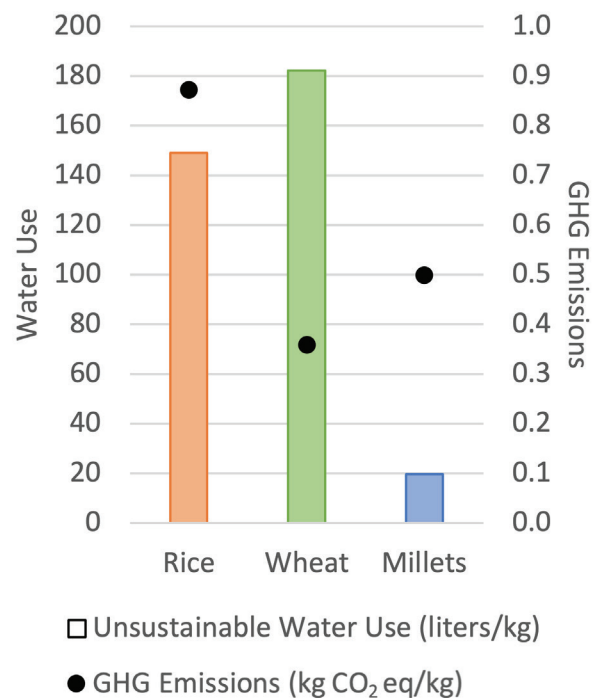
### Environmental Impacts

Millet cultivation results in significantly lower GHG emissions and more sustainable water use than rice and wheat. The chart below highlights the differences in GHG emissions and unsustainable water use for rice, wheat, and millets.

Unsustainable water use is the share of blue water (surface and groundwater) use that is unsustainable. Producing a kilogram of wheat has the highest unsustainable blue water use, as it is grown during the dry (winter) season.

GHG emissions are calculated in kg CO<sub>2</sub> equivalent per kg of grain. Millets have approximately half the GHG emissions (per kg)

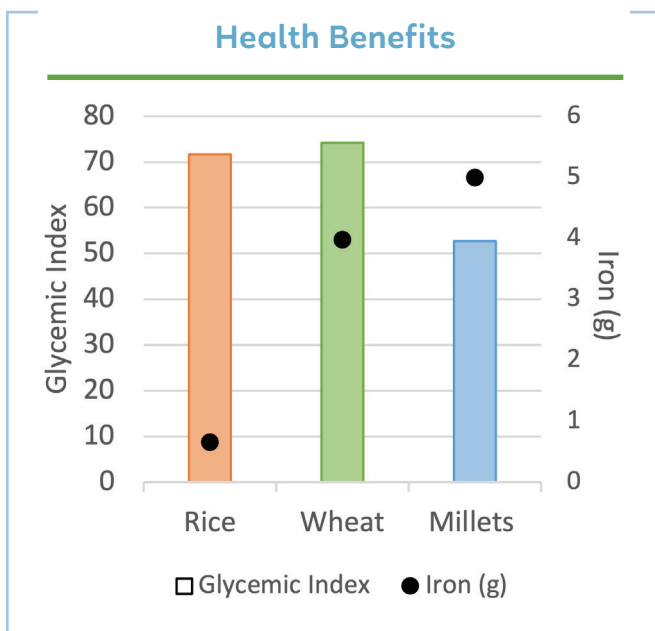
### Environmental Impacts



of rice due to lower use of inputs (fertilizer and water) and no requirement for flooding fields with water.

## Health Benefits

Millets have a higher nutritional value than rice and wheat. Including them in the PDS food basket has the potential to help improve health outcomes for beneficiaries.



Millets have a higher iron content relative to rice. Bajra, Jowar, and Ragi have approximately 6, 10, and 7 times, respectively, more iron content than rice. Millets provide the possibility of addressing the high prevalence of anemia in India.

With the increasing prevalence of noncommunicable diseases such as diabetes in India, millets provide a healthier alternative to rice and wheat, as they have a lower glycemic index.

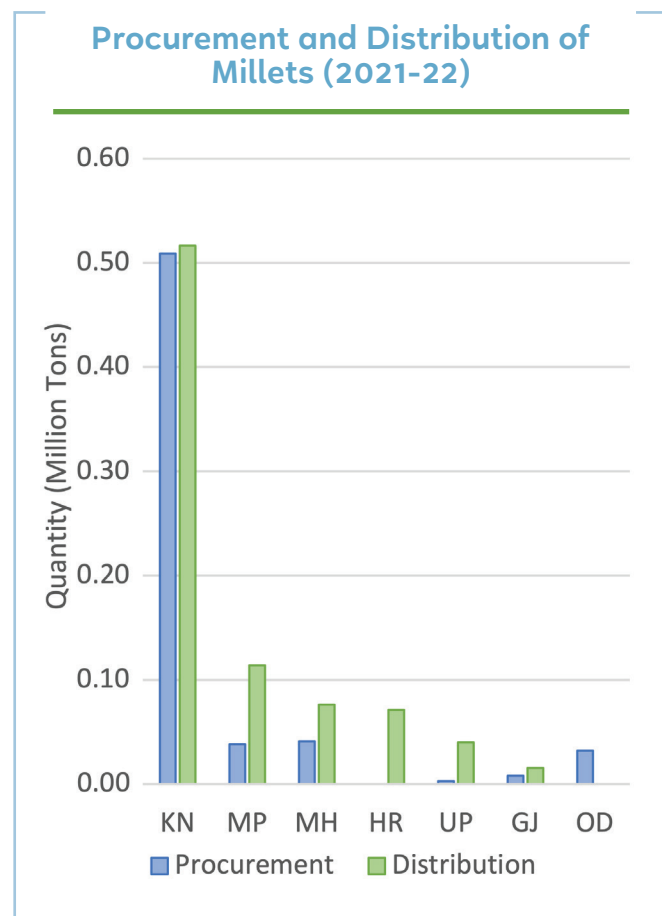
Millets are also a rich source of calcium. Ragi, in particular, has 48 times the amount of

calcium in rice. Bajra and Jowar have 3.5 times the amount of calcium in rice.

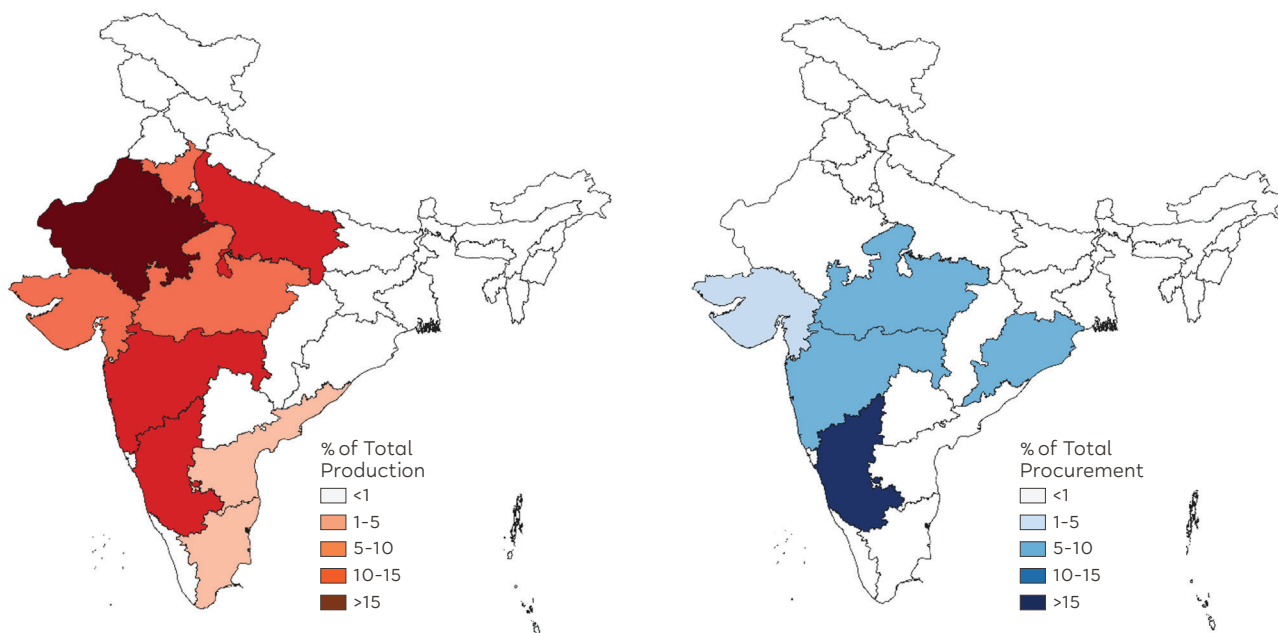
## Mulling over Millets

In 1970–71, India produced 15 million tons of millets. Five decades later, the figure remains identical. In the same period, rice and wheat production increased by 200 and 300 percent, respectively.

Despite an increase in the yield of millets, the area under cultivation has declined considerably. This decline in area under millet cultivation has been attributed to the emphasis



## Production and Procurement of Millets (Bajra, Jowar, and Ragi) in 2021-22



on rice and wheat, and the resulting increase in their yields, during the Green Revolution in the late 1960s.

Over the past few decades, generous price guarantees (MSPs) for rice and wheat and highly subsidized inputs, such as fertilizers and electricity, have incentivized farmers to take up intensive and unsustainable cultivation of these cereals.

With the NFSA making a provision for the inclusion of millets in the PDS, there is an opportunity to make the system healthier and more sustainable. Currently, only Karnataka provides millets at scale in its PDS.

As seen in the map above, the production of millets is concentrated in central and western

India, where rice production is low. This production provides an ideal opportunity to promote the procurement of PDS food grain from farmers in central and western India.

Not only would introducing millets in the PDS help reduce the stress on environmental resources in northwest India, it would also improve the livelihoods of small and marginal farmers in other parts of the country.

### Current Status of Millets in the PDS

In 2021–22, the government procured 0.6 million tons of millets, which accounts for 3.9 percent of total major millets (Bajra, Jowar, and Ragi) production.

Approximately 80 percent of millets were procured from Karnataka, where PDS

beneficiaries receive 2 kg of millets as part of their monthly entitlement. Other states that provided millets through their PDS include Madhya Pradesh, Maharashtra, and Haryana.

### Reducing the True Cost of the PDS

**Based on the true cost estimates of rice and millets, the potential savings from replacing 1 kg of rice with 1 kg of millets for one quarter (~200 million) of PDS beneficiaries in India results in \$770 million in savings, primarily due to a decline in GHG emissions and unsustainable water use.**

This calculation is limited to a quarter of the population to account for the availability of millets for procurement and taste preferences at the state level. A majority of millets are produced in Rajasthan, Maharashtra, Karnataka, and Uttar Pradesh—states that may be more open to including millets in their PDS.

This estimate also assumes that PDS beneficiaries receiving 1 kg of millets (instead of 1 kg of rice) from the PDS will replace 1 kg of rice from their diet with millets.

Consideration of only the “economic cost” (that is, the cost incurred by the government in buying the food grain from farmers and distributing it to beneficiaries) of a similar scenario reveals \$110 million in savings.

Storage and distribution costs associated with millet are based on provisional cost sheets from Karnataka and Maharashtra.

Applying TCA to estimate the true cost of the PDS not only highlights the negative impacts of

the current PDS food basket but also provides possible alternatives that reduce stress on environmental resources, increase nutritional value for PDS consumers, and promote better livelihoods for small and marginal farmers.

### About TCI’s True Cost of Food Subsidies in India Project

With growing concerns over food-related impacts on the environment, biodiversity, health, economy, and livelihoods, TCA has emerged as a holistic tool to estimate direct and indirect costs associated with food systems. TCA quantifies the “hidden costs and value” not reflected in prices paid up front by consumers and helps identify food-related impacts from farm to plate. TCI is using this methodology to estimate the true cost and hidden value of food subsidies in the PDS, India’s national food-based safety net.

### Comparing the True Costs of the Current PDS Food Basket with Alternatives

Though the PDS has played a vital role in ensuring a steady supply of staple grains to food-insecure households, the current PDS food basket emphasizes staples over more nutritious food items, such as millets and pulses, and procuring the majority of PDS grains from a few states.

TCI aims to study these disparities by estimating the true cost of two alternative PDS food baskets: an “augmented” basket that includes millets and a “locally sourced” basket that emphasizes local procurement.

This study will then compare the current PDS food basket with these alternatives by identifying and quantifying the production and consumption-related impacts of each on five focus areas: health, environment, biodiversity, economy, and livelihoods. The results will help recognize the hidden value of the PDS, address hidden costs, and maximize the impact of government expenditure.

## About TCI

TCI is a long-term research initiative that develops and assesses innovative, food systems-based approaches to reducing poverty and improving nutrition and livelihoods in the developing world, with a specific focus on India.

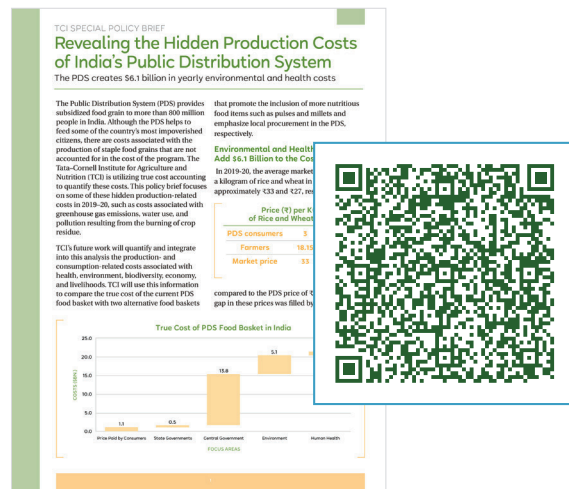
With a diverse team of researchers and graduate students, TCI blends high-quality academic research, field-based projects, and policy analysis to generate and share knowledge relevant to policymakers, research institutions, and development agencies. As a multidisciplinary initiative, TCI provides a space where soil scientists, climate specialists, economists, nutritionists, food scientists, sociologists, and more can learn from each other's work, share their research approaches and methodologies, and expand

their perspectives on the complex nexus of agriculture, nutrition, and development.

TCI's main office is located on Cornell University's campus in Ithaca, New York, where it is part of the College of Agriculture and Life Sciences and is hosted by the Department of Global Development. TCI also has satellite offices in Mumbai and New Delhi, India, where the Institute's Center of Excellence is based.

## Learn More

To learn more about the True Cost of Food Subsidies in India project and read TCI's previous policy brief, "Revealing the Hidden Production Costs of India's Public Distribution System," visit [bit.ly/True-Cost-PDS](http://bit.ly/True-Cost-PDS) or scan this QR code:



TCI is undertaking this project with financial support from The Rockefeller Foundation. The findings and conclusions shared as part of this project are those of the authors and do not necessarily reflect the positions or policies of The Rockefeller Foundation.