



INTERNATIONAL
FOOD POLICY
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IFPRI Discussion Paper 01421

March 2015

Is More Inclusive More Effective?

The “New-Style” Public Distribution System in India

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INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

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ABSTRACT

In September 2013, the Parliament of India enacted the National Food Security Act (NFSA), which entitles two-thirds of India's population to 5 kg of rice, wheat, or coarse cereals per person per month at 1 to 3 Indian rupees (Rs) per kg. Foreshadowing the possible impact of this comprehensive reform provides the motivation for this paper. Five states in India—Andhra Pradesh, Chhattisgarh, Tamil Nadu, Odisha, and West Bengal—had already implemented somewhat similar changes in the targeted public distribution system (TPDS) a few years earlier using their own budgetary resources. They made rice—coincidentally, all five states are predominantly rice-eating—available in fair-price shops to a majority of their population at very low prices (less than Rs 3/kg). This paper tries to account for the changes in household consumption patterns associated with the change in PDS policy in these states using data from household consumption surveys by the National Sample Survey Organization (NSSO). These data show improvement in the coverage of TPDS and average offtake of grains from fair-price shops between 2004/2005 and 2009/2010 across all states of India. However, the increase in coverage and offtake was significantly higher in four out of these five states than in the rest of India. An average household in these states purchased 3 kg more rice per month from fair-price shops than its counterpart in nontreated states as a result of more generous TPDS policies backed by administrative reforms. The increase in consumption of PDS rice was the highest in Chhattisgarh, the poster state of public distribution system reforms. Households in Chhattisgarh used money saved on rice to spend more on pulses, edible oil, vegetables, sugar, and nonfood items. We also find evidence that making TPDS more inclusive and more generous is not enough unless it is supported by administrative reforms to improve grain delivery and control diversion to open markets.

Keywords: public distribution system, social safety net, National Food Security Act, diet quality, Chhattisgarh

ACKNOWLEDGMENTS

We appreciate valuable discussions and comments on prior drafts from Stuart Gillespie, John Hoddinott, P. K. Joshi, Suneetha Kadiyala, Purnima Menon, Dean Spears, and participants in the Fourth Annual ‘Leverhulme Centre for Integrative Research on Agriculture and Health’ Research Conference in London. Any errors are our own. Financial support from ‘Leveraging Agriculture for Nutrition in South Asia’ (LANSA) allowed Suman to work on this paper.

ABBREVIATIONS AND ACRONYMS

AAJ	Antyodaya Anna Yojana
APL	above poverty line
BPL	below poverty line
MPCE	monthly per capita consumer expenditure
NFSA	National Food Security Act
NSSO	National Sample Survey Organization
PDS	public distribution system
Rs	Rupees (India national)
TPDS	targeted public distribution system

1. INTRODUCTION

The targeted public distribution system (TPDS) of India is the largest food safety-net program in the world. It delivered 51.3 million tons of rice and wheat at subsidized prices (Ramaswami, Murugkar, and Kotwal 2013) to 530 million people in 2011/12. In June 1997, the government of India replaced the erstwhile universal public distribution system (PDS) with a TPDS¹. Before 1997, all households that owned ration cards could buy fixed quantities of rice, wheat, sugar, and kerosene at the same subsidized rates from their designated fair-price shops. This changed after the introduction of TPDS. At the time, 60 million households were classified as below the poverty line (BPL). BPL households were entitled to 20 kg of rice or wheat per month at a cost of 5.65 and 4.15 Indian national rupees (Rs) per kilogram, respectively. Later, in December 2000, 10 million of the poorest of the poor households were identified as beneficiaries of the Antyodaya Anna Yojana (AAY).² They get 35 kg of wheat or rice per month at Rs 2 or Rs 3 per kilogram. The above poverty line (APL) households have to pay higher prices—Rs 8.3 per kilogram of rice and Rs 6.1 per kilogram of wheat. The Indian government introduced TPDS to control the growing food subsidy and to improve its targeting.³ However, even after this change, food subsidy continued to grow apace and remained poorly targeted.⁴

State governments in India, which are responsible for implementing the TPDS, have struggled to implement a narrowly targeted scheme. Identifying AAY and BPL households and reaching them has proved immensely difficult. Gross errors of misidentification have been made. For example, in 2011/2012, more than half of all households in the lowest three deciles of monthly per capita consumption expenditure (MPCE) did not have AAY or BPL cards, while nearly 16 percent of the richest households in the top decile of MPCE had them (authors' own estimates from 68th round of consumption survey by the National Sample Survey Organization, NSSO). Additionally, more than 40 percent of the total subsidized rice and wheat meant for distribution to households through fair-price shops gets diverted to open markets (Gulati et al. 2012).

A few years ago, some states in India, like Andhra Pradesh, Chhattisgarh, Odisha, and Tamil Nadu, evolved what Drèze and Sen (2013) call a “new-style” PDS with the provision of rice at very low prices (Rs 0–2/kg) for a large fraction of their population. The origin of the idea to loosen targeting can be attributed to Tamil Nadu, where the PDS is universal (Drèze and Sen 2013). The new-style PDS combines low prices and near universal targeting with increased administrative effort to ensure timely availability of food grains in their fair-price shops and to control diversion of highly subsidized grains to the open market.

Recent surveys show significant improvement in the PDS in these states. For example, a survey of 900 households in eight districts of Chhattisgarh showed that 92 percent of respondents received their full quota of food grains and 97 percent of the respondents were satisfied with the food quality (Khera 2011b). The 66th round of consumption survey by NSSO also revealed that 9 out of 10 households in the bottom three consumption deciles of Chhattisgarh used PDS to buy rice—the staple grain—and their average offtake level was close to their entitlement of 35 kg/month. Overall, nearly 75 percent of rural households in the state receive 35 kg of rice from the PDS every month at highly subsidized rates (Drèze and Sen 2013). Khera (2009) found that better access to subsidized rice from fair-price shops has resulted in major reduction in self-reported measures of hunger in Chhattisgarh. Similarly, Drèze and Khera

¹ <http://dfpd.nic.in/?q=node/101>).

² AAY is a program sponsored by the government to reduce hunger among the poorest of BPL families. Today, there are 242 million AAY families and 65 million BPL families in India (<http://dfpd.nic.in/?q=node/101>).

³ Originally, it was proposed that BPL households would get food grains (mainly rice and wheat) at half the economic cost and APL households at 80 percent of the economic cost (Sharma 2012), but the prices have not been revised even as the economic cost of grains distributed through TPDS has increased rapidly over the years. As per NSSO data we estimate that the percentage of BPL card-holding households increased from 22 percent to 31 percent between 2004/2005 and 2011/2012 at the national level (2.3 percent to 4.4 percent AAY card holders in 2004/2005 and 2011/2012 respectively).

⁴ If anything, the diversion of rice and wheat from PDS to open market increased after the reform from approximately 39 percent in 1999/2000 to 54.1 percent in 2004/2005 (Khera 2011a; Himanshu 2011 cited in Parikh 2013).

(2013) estimate that the implicit transfer in the form of cheaper cereals from PDS reduced the poverty gap index of rural poverty by 39–57 percent in the state in 2009/2010.

Although Chhattisgarh is the poster state for PDS reforms, all states in India have had some improvements in the performance of PDS since 2004/2005, including the states where grains were not made any cheaper and the system was not made more inclusive. For example, between 2004/2005 and 2009/2010, the percentage of all households in India using PDS increased from 24 percent to 39 percent to buy rice, and from 11 percent to 28 percent to buy wheat. The share of PDS purchase in total household consumption also roughly doubled: from 13.0 percent to 23.5 percent for rice and from 7.3 percent to 14.6 percent for wheat. Additionally, the estimated diversion of grains from PDS to open market came down from 54 percent of total offtake from the central pool in 2004/2005 to 40 percent in 2009/2010 (Gulati et al. 2012).

Drèze and Sen (2013) attribute this general improvement in TPDS to the rise in cereal prices in open markets after the global food crisis in 2008/2009 and the increased difference between the prices of rice and wheat in fair-price shops and in the open market. As the price difference increased, more families have turned to the PDS for rice and wheat.

Given the coincident improvement in TPDS across India in the last few years, a question arises: How much of this increase in offtake of subsidized grains by intended consumers (and the corresponding decrease in leakage) in states that implemented the “new-style” PDS should be attributed to higher subsidy and less targeting?

This is an important policy question for at least two reasons. First, providing cereals nearly free to a large population has high fiscal costs. Whether benefits will exceed the cost is yet to be ascertained. Second, the National Food Security Act (NFSA), approved by the Parliament of India in September 2013, follows the new-style PDS model of providing cheaper grains to a larger population. Its main provision legally entitles two-thirds of India’s total population of 125 billion to 5 kg of rice, wheat, or coarse cereals per month at highly subsidized prices of Rs 1–3 (16–50 US cents) per kilogram. In essence, this provision seeks to extend the policy strategies of states such as Chhattisgarh and Tamil Nadu to all of India. A careful assessment of how the PDS in these states improved as a result of these strategies, therefore, give us a sense of the effect that the NFSA may have after it is implemented.

We compare the average quantity of rice purchased per month by households from fair-price shops—between states that made their public distribution system more generous and inclusive and other states that did not—before and after the implementation of reforms (difference-in-difference) to estimate the difference made by changes in the TPDS.

Policy changes that characterize the new-style PDS started at different times in different states. However, looking at the average price of rice paid by all households that bought it from fair-price shops in 2009/2010 provides an interesting comparison. The average price was below Rs 3/kg—the price set by the NFSA—in five states: Andhra Pradesh (Rs 2.0), Chhattisgarh (Rs 2.0), Odisha (Rs 2.1), Tamil Nadu (Rs 1.0), and West Bengal (Rs 2.7). The average price remained at a higher level—closer to the central issue price—in all other states of India (Table A.1 in the Appendix). In 2004/2005, this price was above Rs 3 in all states of India. There may have been some policy changes in the PDS during this period (2004/2005 to 2009/2010) in other states of India, too, but we include only these five in our treatment group.⁵

That the average price of rice paid for by all PDS buyers, including the APL buyers, in these states was below Rs 3/kg in 2009/2010⁶ suggests that grains were being provided cheaper than the central issue price to many more households than originally recognized as AAY and BPL by the government of India.

⁵ In recent years, other states like Madhya Pradesh, Karnataka, and Rajasthan have also reduced prices of wheat and rice in PDS shops to Rs 1–2/kg. However, in all these states, the new policy was announced and implemented after 2009/2010.

⁶ Rs 3/kg is the price at which rice will be sold to priority households after the implementation of NFSA. Interestingly, none of the wheat-eating states had implemented a similar strategy until 2009/2010.

Having identified the treatment states, we ask two questions:

- Has making TPDS more inclusive and generous resulted in an increase in the average quantity of rice purchased from fair-price shops in these five states? If so, by how much more than the trend increase in the rest of India?
- What is the impact of increase in access to cheaper rice in these five states on household consumption of other food items?

We use the difference-in-difference technique and data from various rounds of consumption surveys conducted by the NSSO to answer these questions.

A large body of work exists on the nutritional impact of food prices and food subsidy—both in India and in other countries. In India, Kochar (2005) showed a small effect of PDS subsidy on calorie intake. More recently, Kaushal and Muchomba (2013, 24) also find that increase in food subsidy after expansion of TPDS in 2002 had “a negligible to negative effect on calorie and protein intake and no statistically significant effect on fat intake.” In China, too, Jensen and Miller (2011) do not find any overall improvement in nutrition due to food price subsidy.

Our results are qualitatively different from much of the published literature on the effect of the food subsidy on dietary intake of households in India. We find that changes in the public distribution system led to a significant increase in the percentage of households who purchased subsidized rice in four out of the five states. Not only that, an average household in these states purchased 3 kg more rice per month from fair-price shops than its counterpart in nontreated states as a result of the introduction of a more generous and more inclusive PDS. We see the largest impact in Chhattisgarh, the poster state for the new-style PDS. We also find that households used money saved on rice to buy more pulses, edible oil, vegetables, and sugar. Thus, increase in cereal subsidy also led to improvement in diet quality.

Our results may be different from the published papers, but they are similar to the findings of newer studies that use data from more recent years in India. Like ours, these studies also find a positive impact of increase in PDS subsidy on calorie intake and diet quality (Kaul 2013; Krishnamurthy, Pathania, and Tandon 2014). Kaul (2013) estimates that an increase in the value of the PDS subsidy by 1 percent increases caloric intake by 0.144 percent, while an increase of 1 percent in income (expenditure) is associated with an increase of 0.4 percent in caloric intake. Her projections suggest that the NFSA will increase the per person caloric intake of the present beneficiaries of the program by 72 calories per day in urban area and 66 calories per day in rural areas.

We see positive and significant effects of PDS expansion in more recent data, perhaps because the subsidy is now much higher than what Jensen and Miller offered in their experiments in China (8–25 percent) and even in the TPDS expansion in India in 2002 that Kochar (2005) and Kaushal and Muchomba (2013) analyzed.⁷

⁷ The subsidy has increased since 2002 because the price difference between open market and proposed PDS prices in NFSA is much higher now than it was back then.

2. DATA

We use data from various rounds of NSSO household consumption surveys. NSSO collects recall data on consumption expenditure from a representative sample of just over 100,000 households from all over India every five years. These large five-yearly survey rounds are called “thick” rounds.⁸ We compile data from five rounds of NSSO consumption surveys corresponding to years 1992/1993, 1999/2000, 2004/2005, 2009/2010, and 2011/2012. This gives us consumption data from a repeated cross-section of more than one-half million households⁹ covering all states and union territories of India over a period of two decades.

In each round, NSSO collects recall data on quantity and value of more than 300 items consumed by the household in the last 30 days. For rice and wheat (and also for sugar and kerosene), the survey collects data separately for quantity purchased from fair-price shops and price paid in the fair-price shops. The data on purchases from fair-price shops allow us to analyze the performance of PDS and the impact of changes in PDS policies in some states of India. Timings of the 61st and the 66th round of consumption survey, carried out in 2004/2005 and 2009/2010, respectively, are especially appropriate for us because all five states significantly reduced the price of rice and increased the number of beneficiary households in the interval between these two rounds. Thus, between these two rounds of the NSSO survey, we have data from both before and after the policy changes.

Data from the earlier rounds of NSSO’s consumption survey allow us to test for parallel trends in variables of our interest between these five states and other states of India.¹⁰ Parallel trends are necessary between the treatment and control groups before the policy change so that estimates from difference-in-difference method can be reliable (Angrist and Pischke 2009).

⁸ These five-yearly rounds of NSSO survey are called *thick rounds* because of their large sample size. NSSO also conducts a similar consumption survey every year where the sample size is much smaller. These annual surveys are called *thin rounds*.

⁹ Since the NSSO sample is representative at the state and cluster (a group of a few districts) levels and the sampling strategy has remained unchanged over these five rounds of the survey, we can also use panel data techniques for state- or cluster-level analysis of data.

¹⁰ The 55th round of the NSSO is not used for core parametric analysis because of a modification in the reference period in that round.

3. ECONOMETRIC STRATEGY

We are interested in knowing if the average quantity of rice purchased from fair-price shops between 2004/2005 and 2009/2010 has increased greater in the five treatment states than in other states of India. If so, by how much? We use the difference-in-difference method to answer this question.

The first difference compares this outcome for the five treatment states—Andhra Pradesh, Chhattisgarh, Odisha, West Bengal, and Tamil Nadu—between 2004/2005 (before) and 2009/2010 (after). Since this difference across time is confounded by a number of other changes taking place in India's food markets, such as the rising price of food in open markets without any corresponding increase in price in fair-price shops, we use other states of India as a control group. These other states of India serve as control group because they also experienced an increase in the price of grains in the open market but did not make the PDS more inclusive and more generous. However, one common problem of a multistate treatment-effect analysis is the heterogeneity of the pretreated and newly treated groups (Nandi and Deolalikar 2013; Bertrand, 2004). States in India are different from each other in many respects. We control for time-invariant heterogeneity using fixed effects, but we do not control for time-varying heterogeneity, which may be important in this case. We do test for parallel trends assumption, both parametrically and graphically, and find evidence for it, which gives us some confidence in our econometric strategy. Still, the problem of imperfect controls remains. Kaushal and Muchomba (2013) and Nandi and Deolalikar (2013) are other recent papers that have used similar econometric strategy to exploit interstate differences in social policies in India to measure their impact on households.

The difference-in-difference impact of implementing these new-style PDS reforms is estimated by

$$Y_{hst} = \beta_0 + \beta_1 \cdot A_{hst} + \beta_2 \cdot T_{hst} + \beta_3 \cdot A_{hst} \cdot T_{hst} + X_{hst} + \varepsilon_{hst}, \quad (1)$$

where Y is the outcome variable of interest corresponding to household h , in state s and time t . A is an indicator of being an after-treatment year (2009/2010); T is a dummy for being in a treated cohort (Andhra Pradesh, Chhattisgarh, Odisha, West Bengal, and Tamil Nadu). β_3 gives us the difference-in-difference estimate of the impact of being exposed to the PDS reform policy. All standard errors are clustered at the state level.

Since outcomes could vary by household characteristics, we add controls for household demographics (caste, religion, household type, household size, and age of the household head) and for socioeconomic status (household head education, female-headed households, marital status of the household head, ownership and cultivation of land, and total monthly consumption expenditure of the household). In addition to capturing variations in the outcomes, adding controls improves the accuracy of our estimates by decreasing the residual variation to be explained. We show results both with and without household controls. Our preferred estimates, however, are the ones with the complete set of household controls.

We also use the same econometric strategy to measure the impact of increase in subsidy of rice on average household expenditure on other food and nonfood items.

4. RESULTS

Changes in PDS Prices and Coverage

Table 4.1 shows changes in (a) household coverage of TPDS, (b) average offtake quantity of rice from fair-price shops per household, and (c) average price paid for PDS rice between 2004/2005 and 2009/2010 by the poor and nonpoor households in the five treatment states and in all other states. In 2004/2005, none of the states in India sold rice (or wheat, but those data are not shown here) at or below Rs 3/kg (in 2004/2005 current prices) even to households in bottom three MPCE deciles. Food prices in fair-price shops were close to the central issue price, set by the government of India, in almost all states of India in 2004/2005. The only exceptions were Tamil Nadu and Gujarat, where rice was sold for less than Rs 4 per kilogram.

Table 4.1 Inclusion and Targeting in the PDS in India

	Treatment States					
	Below poverty line			Above poverty line		
	2004/2005	2009/2010	Difference	2004/2005	2009/2010	Difference
N	12,200	6,248		20,223	19,870	
Percentage of households that bought PDS rice at a target price of Rs 3/kg or less						
Mean	3.9	70.9	67	1.3	49.9	48.6
Percentage of households that bought PDS rice						
Mean	47.3	72.2	24.9	32.9	50.7	17.8
Average quantity of PDS rice bought (kg) (including zeros)						
Mean	9	15.2	6.2	5.5	8.7	3.2
N	5,746	4,544		5,786	8,628	
Average price of PDS rice bought (Rs/kg)						
Mean	4.6	1.9	-2.7	4.6	1.7	-3.1
Nontreatment States						
N	30,451	17,786		58,947	54,911	
Percentage of households that bought PDS rice at a target price of Rs 2.5/kg or less						
Mean	7	14.8	7.8	2.7	6.9	4.2
Percentage of households that bought PDS rice						
Mean	20.3	35.4	15.1	9.5	18.5	9
Average quantity of PDS rice bought (kg) (including zeros)						
Mean	3.1	5.7	2.6	1.6	2.7	1.1
N	6,747	6,379		6,956	5,967	
Average price of PDS rice bought (Rs/kg)						
Mean	5.2	5	-0.2	6.1	6	-0.1

Source: Based on author's calculations from NSSO data (rounds 61 and 66).

Note: PDS = public distribution system; Rs/kg = Rupees per kilogram. Treatment states include Chhattisgarh, Andhra Pradesh, Tamil Nadu, Odisha, and West Bengal.

By 2009/2010, 7 out of 10 poor households—defined here as those below the official estimated poverty line of the government of India¹¹—and 1 in 2 nonpoor households (households above the poverty line) in the treatment states were getting rice at less than Rs 3/kg (at 2009/2010 current prices), while in the rest of India less than 15 percent of all households were getting rice (or wheat) at those prices. In 2009/2010, the central government policy provided for rice at Rs 3/kg only for the estimated 25 million poorest of the poor (called *Antyodaya*) households in the country. The central issue price of rice for AAY households had been kept constant at Rs 3.00/kg since the introduction of this scheme in December 2000, while that of rice for BPL households was Rs 5.65/kg since July 2002 (Department of Food and Public Distribution, government of India)¹². Thus, between 2004/2005 and 2009/2010, some states rolled back the narrow targeting introduced in 1997 by selling highly subsidized rice and wheat to a much larger number of households, including a significant number of households in upper consumption (MPCE) deciles too. These states used their own budgetary resources to increase the food subsidy, while other states of India continued to follow the federally decided prices and targeting scheme.

It is important to point out that even in 2004/2005, a much higher portion of households bought grains from fair-price shops in the five treatment states (47 percent versus 20 percent for poor households and 33 percent versus 10 percent for nonpoor) and the average monthly offtake of grains was also significantly higher there (Table 4.1). Thus, these states had a much better public distribution system to start with—even before they had fully implemented the new policy of higher subsidies for more households.

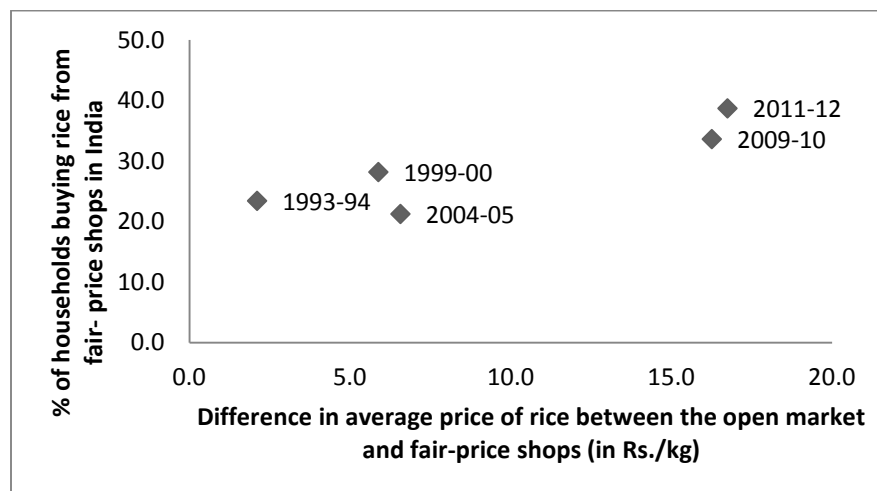
There was a significant improvement in coverage of TPDS—measured by the fraction of all households reporting purchase of rice or wheat from fair-price shops and the average quantity of grain purchased per household per month—in both the treatment and the nontreatment states from 2004/2005 to 2009/2010. This improvement, however, was much bigger in treatment states. Thus, the coverage of TPDS improved much more in treatment states—from their already higher levels of coverage.

What led to the increase in household coverage of average monthly offtake of grains from fair-price shops from 2004/2005 to 2009/2010, even in states where the TPDS did not become more inclusive or the grains did not become much cheaper? Drèze and Sen (2013) suggest that a steep increase in market prices of rice and wheat increased the value of PDS entitlements as the PDS prices remained the same or were even reduced in some states. The increased value of PDS entitlements gave people a much greater stake in the system and increased its utilization across India. Figure 4.1 seems to support the Sen and Drèze conjecture. It shows that across years, the percentage of all households purchasing grains from fair-price shops increased along with the increase in the gap between the market and the fair-price shops' prices of grains.

¹¹ APL, BPL, and AAY households are assigned different types of ration cards color coded as blue, red, and yellow, respectively. NSSO asked respondents the type of ration card they had in the 61st round of the consumption survey in 2004/2005 but not in the 66th round in 2009/2010. We also created our own MPCE deciles separately for urban and rural areas of each state. For regression purposes we call the bottom three deciles *poor* and the top decile *nonpoor*.

¹² <http://dfpd.nic.in/?q=node/101>).

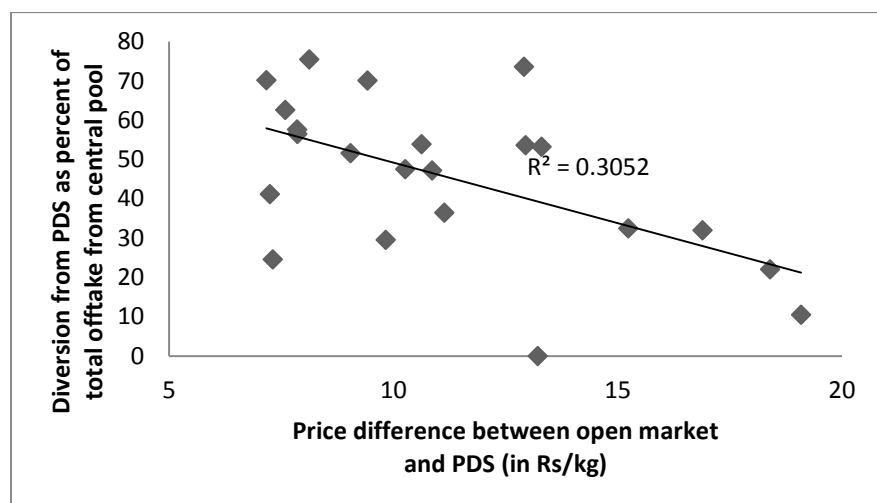
Figure 4.1 Increase in use of fair-price shops with rising price difference between market and central issue prices



Source: Data from National Sample Survey Office (NSSO) consumption surveys rounds 50, 55, 61, 66, and 68.

This increase in the gap between the market and the controlled price could also have led to an increase in diversion of grains from the PDS to the black market, but it did not. Interstate comparison shows that diversion of grains from PDS is lower in states where the price difference between open market and fair-price shops is higher (Figure 4.2). This is a remarkable and somewhat counterintuitive pattern that we see, perhaps because states that committed more of their own resources to make PDS more inclusive and more subsidized also invested into administrative efforts to control diversion and improve delivery of grains to households. Without those efforts, making the system more inclusive and increasing the entitlement itself may not have achieved the positive outcomes.

Figure 4.2 Diversion of rice and wheat from the PDS in different states of India against price difference, 2009–2010



Source: Graph plotted by authors.

Note: PDS = public distribution system; Rs/kg = Rupees per kilogram. Each point in the graph represents a state. The price difference has been calculated using data from 66th round of the NSSO consumption survey. The diversion of rice and wheat from PDS has been estimated using their offtake data from the Food Bulletins of the Ministry of Food and Civil Supplies and comparing it with the total estimated quantity of rice and wheat purchased from fair-price shops in each state. The latter is estimated from NSSO's consumption survey.

West Bengal—one of the five states in our treatment group—is a case in point. Like Andhra Pradesh, Chhattisgarh, Odisha, and Tamil Nadu, West Bengal also reduced the price of PDS rice between 2004/2005 and 2009/2010 significantly below the central issue price. Yet unlike the other four states, it had hardly any increase in the household coverage of PDS or the average monthly offtake of rice from fair-price shops. We think that West Bengal had a different experience because, unlike in the other four states, its government did not invest in improving the logistics of supplying rice through the PDS. This is evident from reports of inadequate availability of rice in fair-price shops and corruption in the TPDS in the state (Sethi 2007)¹³ and complaints from villagers about malpractices and bullying by ration shop dealers and irregular access to PDS provisions.¹⁴

In West Bengal, the performance of PDS, as measured by the average monthly offtake quantity of rice from fair-price shops and the diversion of grains from PDS, did not improve much even after a significant reduction in PDS prices; while in Bihar, we see major improvements after 2009/2010 (Table 4.2) even as subsidy and targeting levels remained unchanged there. Officers in the government of Bihar attribute these improvements to administrative efforts made to improve the functioning of the system. The comparison of performance of PDS in Bihar and West Bengal suggests that administrative reforms are necessary to make PDS more effective. Without administrative efforts, merely increasing subsidy or inclusiveness may not lead to a significant improvement.

Table 4.2 Performance of the PDS in Bihar and West Bengal: 2004/2005 to 2011/2012

Variable	2004/2005		2009/2010		2011/2012	
	West Bengal	Bihar	West Bengal	Bihar	West Bengal	Bihar
PDS coverage (% of households that bought rice/wheat from fair-price shops)	12.7	1.9	31.5	14.1	43.1	44
Per capita PDS purchase (rice + wheat in kilograms per month) (all households)	0.4	0.1	1.0	0.8	1.5	2.7
Per capita PDS purchase (rice + wheat kilograms per month) (only fair-price shops using households)	3.0	6.0	3.0	5.5	3.4	6.0
Average price of rice (Rs/kg) in fair-price shops	5.6	5.3	2.7	5.8	2.5	6.8
Leakage (% offtake minus household procurement / offtake)	85.0	91.2	68.7	64.6	56.8	12.2

Source: Based on author's calculations from NSSO data (Rounds 61, 66, and 68). Leakage figures are from Himanshu and Sen a (2013).

Note: PDS = public distribution system; Rs/kg = Rupees per kilogram.

The Impact of More Generous PDS in Five States of India: Difference-in-Difference Results

This paper seeks to measure the impact of reforms that led to the establishment of the new-style PDS in five states of India between 2004/2005 and 2009/2010. However, the PDS in India has undergone a broad-based improvement, possibly due to a rapid rise in market price of food grains during this period. The main challenge, therefore, is to separate the effect of reforms from this broad-based improvement seen everywhere in the country. We use the difference-in-difference method, as shown in Equation 1, for this purpose. We assess the impact of reforms on average monthly offtake of rice from PDS shops.¹⁵

¹³[http://timesofindia.indiatimes.com/India/Panel blames corrupt PDS for kakus food riots/rssarticleshow/2639176.cms](http://timesofindia.indiatimes.com/India/Panel_blames_corrupt_PDS_for_kakus_food_riots/rssarticleshow/2639176.cms)

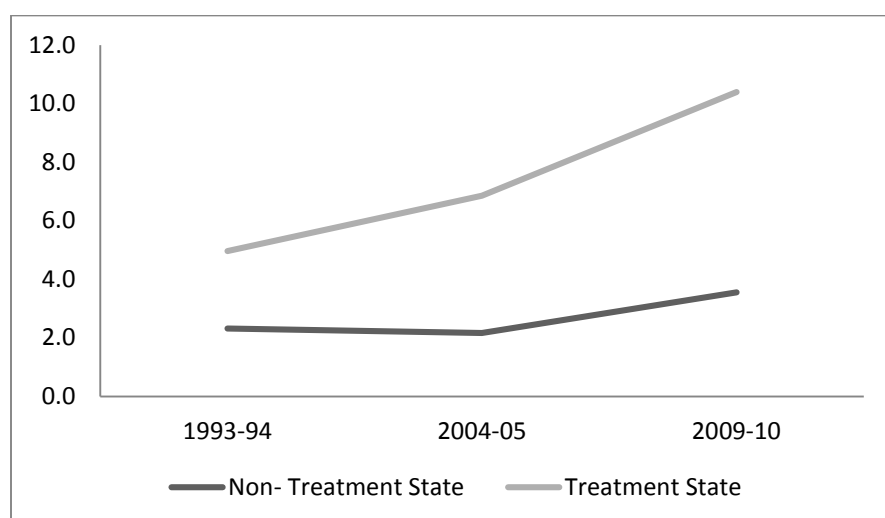
¹⁴<http://www.downtoearth.org.in/content/pds-protests-west-bengal>

¹⁵ We look into change in share of PDS in total consumption of rice because of the declining trend in household consumption of all cereals in India (Deaton and Drèze 2009). This declining trend would result in an underestimate of the impact of reforms if we looked only at the total offtake of rice from PDS shops. That is, the real impact of reforms would have been larger (when measured in kilograms of rice purchased from fair price shops) if the household consumption of rice was not going

Test for Parallel Trends

The difference-in-difference estimate is valid only if we show parallel trends in outcome variables between treatment and control groups in the pretreatment period (Angrist and Pischke 2009). Establishing parallel trends requires data from more than two time periods. Therefore, we add data from the 50th and 55th rounds of the NSSO consumption survey, corresponding to years 1992/1993 and 1999/2000. The 55th round, however, is not comparable to other rounds before or after it because of a change in recall period that led to increased estimates of consumption expenditure in this round (Deaton 2003). We plotted the average offtake of rice from fair-price shops per household (in kilograms) for treatment and control groups—both with and without using data from the 55th round. In either case, we see a somewhat parallel trend across the treatment and control groups until 2004/2005. Figure 4.3 shows plots without the data from 55th round.

Figure 4.3 Average household offtake in public distribution system rice between 1993/1994 and 2009/2010



Source: National Sample Survey data, rounds 50, 61, and 66.

We also use a parametric test for parallel trends by estimating the following regression:

$$Y_{hst} = \beta_0 + \beta_1 \cdot Ahst + \beta_2 \cdot T_{hst} + \beta_3 \cdot Ahst \cdot T_{hst} + \varepsilon_{hst}. \quad (2)$$

This is similar to the difference-in-difference regression (Equation 1), except that here the after-treatment variable, A_{hst} , is replaced by a continuous variable indicating the year, with year 1993/1994 coded as 1, 1999/2000 coded as 6, and 2004/2005 coded as 11. We present regression results in Table 4.3. The interaction term in Equation 2, labeled *parallel trends* in the tables, is the variable of interest. We fail to reject the null hypothesis of parallel trends when the interaction term is statistically not significant. The coefficient on the interaction term is statistically not significant when we group all five treatment states together (column 1), or when we leave West Bengal out of the treatment group (column 2). When we compare each of the five treatment states individually with the rest of India (column 3), the interaction term is not significant only for Chhattisgarh and West Bengal and it is significant for the other three states (Andhra Pradesh, Odisha, and Tamil Nadu). We fail to reject the null hypothesis of parallel trends even when we classify respondents into poor and nonpoor households and test for parallel trends for the two groups separately.¹⁶

down over the years.

¹⁶We classify households in the bottom three deciles of MPCE in each state as poor. The nonpoor are households in the top

Table 4.3 Parametric test for parallel trends: Key outcome

Variable	Quantity of public distribution system (PDS) rice consumed (kg) (including West Bengal)	Quantity of PDS rice consumed (kg) (excluding West Bengal)	Quantity of PDS rice consumed (kg) (disaggregated by treatment states)
Treatment state	2.38 (2.16)		
Time	0.03 (0.04)	0.03 (0.03)	0.03 (0.04)
Parallel Trends	0.27 (0.25)		
Treatment states (excluding West Bengal)		3.78 ⁺ (2.12)	
Parallel trends		0.37 (0.33)	
Odisha dummy			-2.91 ^{**} (0.98)
Chhattisgarh dummy			-0.94 (0.98)
Andhra Pradesh dummy			7.43 ^{***} (0.98)
Tamil Nadu dummy			3.96 ^{***} (0.98)
West Bengal dummy			-1.19 (0.98)
Parallel trends Odisha			1.21^{***} (0.04)
Parallel trends Chhattisgarh			0.01 (0.04)
Parallel trends Andhra Pradesh			-0.28^{***} (0.04)
Parallel trends Tamil Nadu			0.79^{***} (0.04)
Parallel trends West Bengal			-0.03 (0.04)
Constant	2.30 [*] (0.98)	2.16 [*] (0.86)	2.30 ^{***} (0.98)
Observations	358,066	358,066	358,066
R ²	0.037	0.069	0.092

Source: Estimated by authors using data from 61st and 66th rounds of NSSO consumption surveys.

Notes: PDS = public distribution system; kg = kilograms. Standard errors in parentheses. ⁺ $p < 0.10$, ^{*} $p < 0.05$, ^{**} $p < 0.01$, ^{***} $p < 0.001$.

The Difference-in-Difference Estimate of Impact of PDS Reforms in Five States of India

The difference-in-difference estimates (based on Equation 1) of the effect of an increase in subsidy of rice on the average household purchase of rice from fair-price shops is shown in the row labeled treatment effect of columns 1–4 in Table 4.4. Columns 1 and 2 in the table show results with West Bengal included in the treatment group, and columns 3 and 4 exclude it. We control for household characteristics (X_{hst}) in columns 2 and 4, while columns 1 and 3 present results from regressions without household controls.

decile of MPCE in each state.

Table 4.4 Effect of PDS reforms on monthly purchase of rice from fair-price shops

Variable	(1) Quantity of PDS rice consumed (kg) without controls	(2) Quantity of PDS rice consumed (kg) with controls	(3) Quantity of PDS rice consumed (kg) without controls, excluding West Bengal	(4) Quantity of PDS rice consumed (kg) with controls, excluding West Bengal
After treatment	1.39** (0.38)	1.73*** (0.43)	1.36*** (0.34)	1.79*** (0.39)
Treatment state	4.69+ (2.41)	4.46+ (2.33)		
Treatment effect	2.16 (1.27)	2.12 (1.29)		
Treatment states (excluding West Bengal)			7.03*** (1.71)	6.89** (1.84)
Treatment effect (excluding West Bengal)			2.93+ (1.64)	2.98+ (1.65)
Observations	225,499	225,497	225,499	225,497
R ²	0.099	0.171	0.165	0.234

Source: Estimated by authors using data from 61st and 66th rounds of NSSO consumption surveys.

Notes: PDS = public distribution system. Standard errors in parentheses. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Positive and significant coefficients on the treatment-state dummy in columns 1 and 2 show that TPDS worked better in the treatment states even in 2004/2005. The difference between the two groups is bigger when we exclude West Bengal from the treatment group. A positive and statistically significant coefficient on the after-treatment variable, A_{hst} , in all four columns of Table 4.4 shows that the average household purchase of rice from fair-price shops increased from 2004/2005 to 2009/2010 in all states of India, including in the nontreatment states. The interaction term, labeled *treatment effect*, is our main variable of interest. It shows that making PDS more generous and inclusive resulted in increase in average monthly household purchase of PDS rice by 2.98 kg over and above the trend improvement in the rest of India. However, the effect is statistically significant only when West Bengal is not included in the treatment group.

We started by looking at the impact of PDS reforms in five states as one group. However, the treatment states are not homogenous. They vary considerably in the performance of PDS before the reforms started and the extent of reforms implemented there as measured by (a) the size of expansion in the number of beneficiary households and (b) the price at which rice was sold to targeted households after reforms. TPDS performed much better in Andhra Pradesh and Tamil Nadu than in Chhattisgarh and West Bengal in 2004/2005. Further, Tamil Nadu made PDS universal again, while the other four states retained some targeting. The price of PDS rice was reduced to Rs 1/kg in Tamil Nadu and Rs 2/kg in Andhra Pradesh, Chhattisgarh, and Odisha. It was even higher in West Bengal.

Given these variations, it is natural that the reforms or the treatment we consider here will have varying impacts in these five states. Therefore, we re-estimate our difference-in-difference regressions shown earlier, this time without clubbing together data from the five treatment states into one group (Table 4.5). As noted earlier, we had found parallel trends in average household purchase of PDS rice only for West Bengal and Chhattisgarh. Results for others states, though shown in Table 4.5, are less compelling.

Table 4.5 Effect of PDS reforms on monthly offtake of rice from fair-price shops disaggregated by states

Variable	(1) Quantity of PDS rice consumed (kg) without controls	(2) Quantity of PDS rice consumed (kg) with controls
After treatment	1.39** (0.38)	1.92*** (0.41)
Odisha dummy	1.66* (0.73)	0.96 (0.78)
Chhattisgarh dummy	4.56*** (0.73)	3.84*** (0.84)
Andhra Pradesh dummy	6.67*** (0.73)	6.73*** (0.76)
Tamil Nadu dummy	10.63*** (0.73)	10.89*** (0.78)
West Bengal dummy	-1.12 (0.73)	-1.48+ (0.74)
Odisha treatment effect	7.49*** (0.38)	7.66*** (0.38)
Chhattisgarh treatment effect	11.12*** (0.38)	10.84*** (0.37)
Andhra Pradesh treatment effect	0.83* (0.38)	0.89* (0.36)
Tamil Nadu treatment effect	0.55 (0.38)	0.58 (0.35)
West Bengal treatment effect	-0.35 (0.38)	-0.57 (0.37)
Observations	225,499	225,497
R ²	0.187	0.258

Source: Estimated by authors using data from 61st and 66th rounds of NSSO consumption surveys.

Notes: PDS = public distribution system; kg = kilograms. Standard errors in parentheses. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Disaggregated results show how grouping the five treatment states together, as we did earlier (in Table 4.4), masks large interstate variation in the impact of PDS reforms across the five states. Dummies for the individual states in the second column indicate that the average household purchase of rice from fair-price shops was significantly higher in Tamil Nadu (10.9 kg), Andhra Pradesh (6.7 kg), and Chhattisgarh (3.8 kg) than in other states of India even in 2004/2005. TPDS in Odisha at par with in other parts of India, while it was worse than the rest of India in West Bengal. The policy of increasing subsidy on PDS rice led to a big increase in the average household purchase of rice from fair-price shops in Chhattisgarh (10.8 kg) and Odisha (7.7 kg) and a small increase in Andhra Pradesh (0.9 kg), but not in Tamil Nadu or West Bengal.

These results show that Chhattisgarh indeed deserves the status of the poster state for PDS reforms in India. Odisha is not far behind either. The nonresults in Tamil Nadu and West Bengal are for two opposite reasons: We do not see the impact in Tamil Nadu because PDS reforms had taken place much earlier than 2004/2005, our baseline year, when the state already had high household coverage and relatively high monthly offtake of rice from fair-price shops. Therefore we see a smaller price reduction in Tamil Nadu and smaller expansion in the number of beneficiary households between 2004/2005 and 2009/2010 and thus smaller improvements there. We do not see any impact in West Bengal because the increase in subsidy was not accompanied by improvement in logistics of rice distribution through the PDS and administrative reforms to improve delivery and control diversion.

The PDS reforms, which we explore in this paper, led to extension of the subsidy—previously available only to AAY beneficiaries—to more households even if they were not as poor. In effect, these reforms constituted a bigger policy shock for the nonpoor households than the poorest of the poor. In this part, we explore if the policy affected poor and nonpoor households differently. We do so by dividing households into two groups: The first group, the poor, consists of all rural households in the *bottom three* deciles of MPCE in a state; the second group, the nonpoor, has all households in the *top* MPCE decile.¹⁷

Our results in Table 4.6 show that the poor households in the treatment states enjoyed a bigger advantage over their counterparts in other parts of India in 2004/2005 (9.71 kg) than the nonpoor (2.6 kg), and the poor households recorded a bigger increase in their average monthly purchase of rice from fair-price shops (2.59 kg) between 2004/2005 and 2009/2010 than the nonpoor households (0.87 kg). The impact of PDS reforms in treatment states, captured by the variable called *treatment effect* (the interaction term in Equation 1), is also larger for the poorer households (3.32 versus 1.57 kg), but it is not statistically significant for this group. It is statistically significant only for the nonpoor.

Table 4.6 Effect of PDS reforms: Disaggregated by the poor and the nonpoor households

Variable	(1) Poor households: Quantity of PDS rice consumed (kg) excluding West Bengal	(2) Nonpoor households: Quantity of PDS rice consumed (kg) excluding West Bengal
After treatment	2.59** (0.86)	0.87*** (0.22)
Treatment states (excluding West Bengal)	9.72*** (2.15)	2.61** (0.82)
Treatment effect (excluding West Bengal)	3.32 (2.39)	1.57* (0.65)
Observations	66,123	26,705
R^2	0.252	0.159

Source: Estimated by authors using data from 61st and 66th rounds of NSSO consumption surveys.

Notes: PDS = public distribution system; kg = kilograms. All regressions included household controls, not shown here. Standard errors in parentheses. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

When we carry out the same exercise only for Chhattisgarh, the state where we find the largest impact, again we find that the reforms led to a much larger increase in offtake of PDS rice for the poorer households than the nonpoor ones (12.3 kg versus 3.2 kg, respectively). The coefficient for policy impact is statistically significant for both poor and nonpoor groups for Chhattisgarh. PDS reforms in Chhattisgarh helped households at all MPCE levels, including those in the top 10 percent of per capita consumption expenditure (Table 4.7).

¹⁷ We also ran regressions using the official poverty line to classify households as BPL and APL. The results are similar in direction but larger in magnitude. The treatment effect was estimated at 5.5 kg for BPL and 2.6 kg for APL. Again, only the APL coefficient was significant. The detailed regression results using the official poverty estimates are available upon request.

Table 4.7 Summary of treatment effect in Chhattisgarh

Interaction term regression coefficients with state clustering and controls	Quantity of PDS rice consumed (kg)	
	Mean	Standard Deviation
Deciles of monthly per-capita consumption expenditure		
First	11.16***	0.81
Second	11.91***	0.91
Third	14.39***	0.74
Tenth	3.18***	0.33

Source: Estimated by authors using data from 61st and 66th rounds of NSSO consumption surveys.

Notes: PDS = public distribution system; kg = kilograms. All regressions included dummies for year 2009, treatment states, and household controls, not shown here. Standard errors in parentheses. *** $p < 0.001$.

Chhattisgarh is one of the poorest states in India. All households in the bottom two MPCE deciles in the state should have been beneficiaries of AAY and entitled to 35 kg of rice per month at Rs 3 per kilogram as per the provision of AAY. If so, the PDS reforms in Chhattisgarh, especially the expansion of the target group entitled to 35 kg of rice at Rs 2/kg, should not have changed things much for state's poorest households, except for making rice cheaper by Rs 1 (from Rs 3 to Rs 2 per kilogram). In spite of this we see a large impact of PDS reforms on offtake of rice even for households in bottom MPCE deciles. Why?

The answer lies in the limited coverage of AAY in the state. In 2004/2005, only 8 percent of households (1 in 14) in the bottom three MPCE deciles had the yellow ration card that entitles a household to benefits of AAY. The other 92 percent households did not benefit from AAY even when they were desperately poor. PDS reforms extended the AAY privileges to all such households, thereby removing the errors of omission completely and resulting in a big increase in average monthly offtake of PDS rice by poor families. A less strict targeting policy can be expected to lead to fewer errors of inclusion or exclusion (Niehaus and Atanassova 2013). Moreover, the average monthly offtake of rice of even AAY households increased after reforms from 27 kg to more than 30 kg per month. This improvement on the intensive margin also made a small contribution to the overall effect we see in Table 4.7.

5. IMPACT OF INCREASED PDS ALLOCATION ON HOUSEHOLD CONSUMPTION BASKETS

The PDS in India subsidizes only cereals and sugar among all food items. Some researchers have argued that high subsidy for rice and wheat could also lead to lower dietary diversity—an undesirable outcome. In a recent op-ed, Desai (2014) contends:

...unanticipated effects of the expansion of the public distribution system [PDS] [which] may well result in a reduction in nutritional quality due to its emphasis on cereals. While the proportion of families obtaining food from ration shops has grown from 25 per cent to over 50 per cent between 2004-05 and 2011-12, careful analysis of IHDS data matching households at the same income level using the PDS and not using the PDS shows that PDS use is associated with greater consumption of cereals but lower consumption of fruit and milk. *When caloric needs can be met with cheap cereals, households may not choose to spend money on a diverse food basket.* (Emphasis added).

Jha et al. (2012) also point out the decline in dietary diversity in both rural and urban India from 2004/2005 to 2009/2010 after having increased over the previous decade between 1993/1994 and 2004/2005. However, they do not attribute this decline directly to the expansion of TPDS.

We test the contention that increase in access to subsidized rice (or wheat) leads to lower consumption of noncereal food items using data from Chhattisgarh, the state where we find largest increase in purchase of subsidized rice from fair-price shops. We estimated that changes in TPDS between 2004/2005 and 2009/2010 resulted in increased purchase of PDS rice by more than 11 kg per household per month in Chhattisgarh. This is equivalent to an additional implicit transfer of nearly Rs 200 per month (using Rs 18/kg as the median market price for rice) through TPDS. For comparison, the average monthly consumption expenditure of households in the bottom three deciles was Rs 2,078 in 2009/2010.

How did this additional (implicit) transfer affect household consumption patterns? Again, we use the difference-in-difference method to answer this question with data from the 61st and 66th rounds of NSSO's consumption survey. We run a separate regression for household consumption expenditure on each of the eight food groups (namely, cereals; pulses and pulse products; milk and milk products; edible oil; meat, eggs, and fish; fruits; vegetables; and sugar) for which NSSO collects data, on the bottom three deciles. We also estimate the effect of increase in PDS subsidy on the overall nonfood expenditure. Our regression results are shown in Tables 5.1 and 5.2.¹⁸

¹⁸ We check for parallel trends in consumption expenditure on these food groups and find no evidence for parallel trends; hence, we report the results of the difference-in-difference regressions for consumption items with caution. Regression results for tests are available upon request.

Table 5.1 Change in consumption expenditure of poor households on different food groups after public distribution system reforms in Chhattisgarh

Variable	(1) Cereals	(2) Pulses & products	(3) Milk & milk products	(4) Edible oil	(5) Meat, eggs, & fish	(6) Vegetables	(7) Fresh fruits	(8) Sugar
After treatment	117.48**	32.86***	-84.37**	-4.00	-2.27	38.16***	-19.50**	-1.47
	(31.38)	(5.94)	(24.25)	(5.56)	(13.91)	(7.66)	(6.10)	(5.72)
Chhattisgarh dummy	67.28**	-13.80**	-46.91***	-16.41**	-1.66	24.47**	-1.51	-5.00
	(22.69)	(4.78)	(11.57)	(5.51)	(8.06)	(6.62)	(1.94)	(5.08)
Treatment effect	-193.65***	11.10*	1.71	39.31***	-5.09	18.63***	-0.55	17.99***
	(20.57)	(5.17)	(8.70)	(3.18)	(5.94)	(4.06)	(2.28)	(3.31)
Observations	66,123	66,123	66,123	66,123	66,123	66,123	66,123	66,123
R ²	0.614	0.488	0.468	0.537	0.240	0.509	0.268	0.459

Source: Estimated by authors using data from 61st and 66th rounds of NSSO consumption surveys.

Notes: Standard errors in parentheses. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. All regressions include household controls, not shown here.

Table 5.2 Change in consumption expenditure of poor households on nonfood items after public distribution system reforms in Chhattisgarh

Variable	(5) Monthly nonfood expenditure	(6) Intoxicants	(7) Total medical expenditure	(8) Education
After treatment	-122.48***	-2.50	-18.00**	-26.90***
	(20.81)	(3.09)	(6.34)	(4.33)
Chhattisgarh dummy	22.99	5.64*	18.99**	11.05*
	(20.13)	(2.67)	(5.82)	(4.38)
Chhattisgarh treatment effect	73.81***	18.87***	-4.95+	-6.48+
	(12.67)	(1.34)	(2.44)	(3.64)
Observations	66123	66123	66123	66123
R ²	0.855	0.041	0.146	0.164

Source: Estimated by authors using data from 61st and 66th rounds of NSSO consumption surveys.

Notes: Standard errors in parentheses. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

We find that increased access to subsidized rice through TPDS resulted in reduced monthly household expenditure on cereals by Rs 194, which is very close to our estimated value of implicit transfer through TPDS. This saving was used to spend more money on the purchase of pulses (Rs 11), edible oil (Rs 39), vegetables (Rs 19), and sugar (Rs 19). We do not see statistically significant effects on household expenditure on dairy products; fruits; and meat, eggs, and fish. Thus, our results on the impact of PDS expansion are qualitatively different from the findings reported in Desai (2014). Increase in access to subsidized rice from TPDS results in reallocation of the saved money to food items other than rice, which also results in increase in overall food intake and diet quality. In her job-market paper, Kaul (2013) also reports results similar to ours: Increase in the subsidy on rice does lead to an increase in the daily consumption of cereals, but it also has a positive effect on consumption of noncereal food items. Her estimates suggest that nearly half of the total increase in caloric intake due to increase in PDS subsidy comes from food items other than rice. Further, increase in purchase of subsidized rice in Chhattisgarh led to increase in expenditure not only on other food items but also on nonfood items and services—by Rs 74 per month per household (column 1 in Table 5.2).

Thus, our analysis shows that increase in access to in-kind food subsidy, as provided by TPDS, may have an impact on household consumption patterns somewhat similar to what we would expect from a cash transfer program. It could lead to increase in expenditure not only on the subsidized items, as is widely assumed, but also on other nonsubsidized goods and services.

6. CONCLUSION

Between 2004/2005 and 2009/2010, some states in India implemented policy changes to extend access to cheap rice through TPDS—earlier available only to AAY beneficiaries—to more households, making their public distribution system less targeted and more inclusive. A few years later, in September 2013, the Parliament of India enacted the National Food Security Act (NFSA) to entitle two-thirds (67 percent) of India's total population¹⁹ to 5 kg of coarse cereals, wheat, or rice every month at highly subsidized prices of Rs 1–3 (1.7–5.0 US cents) per kilogram. This provision of NFSA essentially emulates the expansion in TPDS undertaken a few years earlier in states such as Andhra Pradesh, Chhattisgarh, and Odisha and extends it to all of India. We try to estimate the effect of increased access to subsidized cereals through TPDS on household consumption pattern in these states.

We find that making TPDS more inclusive did lead to a significant increase in its coverage: More households bought more rice from fair-price shops at cheaper prices in the reform states. While there has been some improvement in coverage of TPDS across India during this period, the improvement was significantly larger in states that made the system more inclusive and implemented this inclusive system with greater administrative rigor. We also find evidence that increased purchase of cheaper rice from fair-price shops in Chhattisgarh had a positive impact on consumption of other food items like pulses, edible oil, vegetables, and sugar and also on expenditure on nonfood items. Thus, increase in implicit transfer in the form of cheaper rice worked somewhat like a direct income-transfer program. Savings on rice were used to increase expenditure on other items.

The treatment states implemented three major changes in the PDS: They made grains cheaper than the central issue price, they expanded the group of households entitled to the cheaper grains beyond the original list of AAY and BPL households, and they implemented administrative reforms to control diversion of subsidized grains from PDS and to ensure its timely delivery to fair-price shops.

One major limitation of our paper is that we have not been able to isolate the impact of these three important policy changes; that is, we do not know the relative impacts of these different steps on our outcomes of interest. However, we present suggestive evidence to show that increasing subsidy on rice (or other cereals) sold through PDS and expanding the target group, as NFSA does, works only when accompanied by administrative efforts to improve delivery of grains to households and control diversion of cheap grains to the open market. West Bengal is a case in point. TPDS became more generous there, but it did not become better. We do not prove this, but it is likely that the administrative efforts to control corruption and tighten the logistics could contribute just as much, if not more, to the improvement in performance of TPDS than the increase in levels and subsidy and the number of households who are entitled to it. The massive improvement in the performance of TPDS in Bihar after 2009/2010, mentioned earlier, supports this contention. PDS improved in Bihar even when pricing and targeting policies remained unchanged. Increase in subsidies and increased coverage will not automatically ensure better performance of TPDS after NFSA. Administrative reforms are necessary.

¹⁹ According to World Bank, 68.8 percent of India's population (829 million people) lived on less than \$2/day in 2010 (<http://povertydata.worldbank.org/poverty/country/IND>).

APPENDIX: RESULTS

Table A.1 Average price of rice (Indian rupees per kilogram) in fair-price shops in states and union territories of India in 2004/2005 and 2009/2010

State	2004/2005	2009/2010
	Mean	Mean
Andhra Pradesh	5.25	2.03
Assam	6.81	7.86
Bihar	5.26	5.81
Chandigarh	11.53	7.29
Chhattisgarh	5.52	2.02
D & N Haveli	6.75	4.7
Daman & Diu	7.49	6.96
Delhi	8.53	8.33
Goa	5.16	8.57
Gujarat	3.48	3.6
Haryana	12.25	7.35
Himachal Pradesh	8.65	8.3
Jammu & Kashmir	8.42	10.02
Jharkhand	4.38	4.63
Karnataka	4.19	3.15
Kerala	7.39	5.99
Lakshadweep	8.64	10.05
Madhya Pradesh	6.15	5.13
Maharashtra	6.19	6.79
Orissa	5.11	2.07
Punjab	14.17	12
Rajasthan	15.25	11.7
Tamil Nadu	3.51	1.03
Uttar Pradesh	4.81	5.07
Uttaranchal	7.1	7.64
West Bengal	5.61	2.72

Source: Estimated by authors using data from 61st and 66th rounds of NSSO consumption surveys.

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