



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*



Selected Poster/Paper prepared for presentation at the Agricultural & Applied Economics Association's 2017 AAEA Annual Meeting, Chicago, Illinois, July 30-August 1, 2017

Copyright 2017 by [authors]. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

DO FOOD SUBSIDIES IMPROVE FOOD SECURITY? EVIDENCE FROM INDIA'S PUBLIC DISTRIBUTION SYSTEM

Abstract:

1. Introduction:

India's Public Distribution System (PDS) is the largest food grain distribution system in the world. The PDS provides basic staples at highly-subsidized prices to more than a billion people. It is the largest social assistance program in India that accounts for almost 1% of the GDP (roughly 10 billion 2016 US\$), (Economic Survey 2016-17). Critics attack the PDS on the grounds that the system is expensive to operate and in practice is poorly targeted, prone to leakages, and disproportionately benefits the least poor. The debate on the efficiency of PDS was further kindled in 2013 with the expansion of PDS under the National Food Security Act of India (NFSA). The fundamental question remains: Does PDS actually improve household food security?

PDS enjoys greater public support than alternatives such as unconditional cash transfers, specifically because of the perception that it improves food security (Khera..). Conversely, with cash transfers there is no control over how the cash would be spent by recipients. Particularly among the poor, PDS is popular for its convenience, as basic staple food is delivered almost at their doorstep every month. PDS also enjoys greater political support and is often featured in election manifestos. Since food security is the primary justification for the outlays on PDS or for choosing PDS over other social assistance policies, a comprehensive assessment of its impact on the different dimensions of food security is important. Finally, given the persistence of malnutrition in India, despite strong economic growth, the efficacy of such a mega program in addressing the chronic problem of undernutrition holds important lessons for future food security policy.

PDS has been studied extensively, with a particular focus on its nutritional impact. Most studies find limited improvement in calorie intake (Kochhar, Kaul) and dietary diversity (Kishore and Chakrabari, Kaushal). One of the main reasons behind the common finding of a moderate impact of PDS is the low-take up rates of PDS, in addition to the already low subsidies offered pre-NFSA¹. One key question, therefore is whether the expansion of PDS subsidy post-NFSA, improved adoption and resulting food availability and nutrition. Another concern with much of the literature on PDS is whether the variation in the subsidy can be treated as exogenous. In addition, along with potentially improving food availability and utilization, by providing a regular and assured source of food, PDS may improve stabilization, a fourth attribute of food security (CITE FAO/WHO definition of food security here). However, surprisingly few studies have considered the stabilization aspect of the PDS, possibly undervaluing its total food security

¹ Numerous studies find that leakage rates, targeting errors and the incentives for FPS shop keepers are some of the reasons for low-take up rates (cite Khera's studies

impact.

In this paper, we examine the impact of PDS on food security using ICRISAT's panel data from 30 villages across India during 2010-2015, a period that includes the NFSA and resulting expansion of PDS subsidies. In addition to the NFSA, certain states such as Karnataka and Madhya Pradesh expanded their PDS subsidies by initiating their own state-level PDS programs. We use the spatial and temporal variation in the PDS subsidy rules as a source of exogenous variation to study the impact of PDS. Three dimensions of food security are examined. First, we ask whether PDS improves food availability. That is, if the statutory subsidy reaches intended beneficiaries and translates into availability of PDS grains at the household level. Second, we ask whether PDS improves food access by diversifying diets and increasing overall calorie intake. The third dimension examines food stability, whether PDS insures consumption against weather shocks.

Our study offers several important contributions over previous studies. First, while we follow earlier papers that consider the food access and nutritional outcomes of PDS, we also estimate PDS' impact on the food stability dimension of food security. Second, our study period includes the National Food Security Act (NFSA) and the recent expansion of state-level PDS entitlements. Third, we use exogenous variation in policy rules surrounding both price and quantity with which to identify the effects of the subsidy.

Using ICRISAT's longitudinal VDSA data, we find that PDS improves food availability and food access but fails to stabilize consumption. On average, 60 to 70% of the statutory subsidy reaches the intended beneficiaries, with the highest incidence in Karnataka and Andhra Pradesh. PDS improves consumption of staple cereals, pulses, milk products and oils. The elasticities with respect to the value of subsidy are 0.35 Kcals, 0.32 gms of proteins and 0.42 gms of fat. However, PDS fails to buffer the impact of rainfall shocks on staple cereal consumption. We argue that the latter effect may be due to low uptake during rainfall shocks. (More discussion of results).

The paper proceeds as follows. In section 2 we discuss the PDS policy background and the identification strategy. Section 3 and 4 presents the data and results respectively. Section 5 concludes.

2. Background and Context

The PDS mainly supplies rice and wheat at subsidized prices and at times in certain states also includes pulses, sugar, edible oils and kerosene. In this study, we focus on rice and wheat, the two predominant food items distributed under PDS.

The PDS supply chain is operated by the Food Corporation of India (FCI), a central government agency that procures food grains directly from farmers and stores them in government operated warehouses. The state governments then procure grain stocks from FCI and distribute

them to retail outlets known as fair price shops². With more than 532,000 fair price shops spread across the country, the PDS supply chain operates at a massive scale. The difference between FCI's cost of procuring food grains from farmers and the price at which the supplies are sold to the states, also called as the central issue price, is subsidized by the central government. The state governments can further boost the subsidy by providing an additional discount over the central issue price or by increasing the central issued quota. Not all states provide an additional subsidy. The final subsidy is therefore the sum of central and state's outlays on PDS and differs across states as it depends on the state's outlays on PDS.

In most states in India, the PDS subsidy is targeted towards the poor and is available only for those who hold a PDS ration card. Each ration card holder is lawfully entitled to receive a monthly quota of rice and/or wheat at a set subsidized price, where the quantity and subsidized price are hereafter jointly referred to as PDS entitlements. Beneficiary households are broadly classified into three ration card types based on an official state-defined poverty line: Above poverty line (APL), Below poverty line (BPL), and Anthodaya Anna Yojana (AAY). The Anthodaya Anna Yojana (AAY) is a central government scheme that identifies the poorest of the poor households. The value of benefits is targeted towards the poor and hence is the lowest for APL households³ and highest for AAY households, where the central government assures AAY households a minimum PDS entitlement of 35kg of rice and/or wheat. The PDS entitlement for AAY households has been constant and uniform across all states since its introduction in 2002.

The entitlements for BPL households, which form the majority of the population receiving PDS, differs across states and has increased over time. As mentioned previously, the PDS entitlements for BPL households are different in each state as the fiscal expenditures towards the PDS are borne both by the central and state governments and hence are contingent on the state's outlays on PDS. Also, in recent years, PDS entitlements have expanded considerably, either through an increase in PDS quota or a decrease in PDS price. This expansion has been significant especially since 2013, with the introduction of the NFSA. The NFSA prescribed a national standardized minimum entitlement of 2kg rice and 3kg of wheat per individual at Rs 3/kg and Rs 2/kg respectively. The adoption of NFSA by states, however, was not uniform. Some states such as Andhra Pradesh and Karnataka did not adopt NFSA as they already had superior entitlements.

Figures 1 and 2 show the differences in PDS subsidy across states and the gradual expansion of the PDS program in each state over the period 2012-2015. (Foot note for figure: Data collected from fieldwork and the Department of Civil Supplies's website from each state and newspaper articles). The figures show PDS entitlements for BPL households in the following eight states, that corresponds to the village data available from the ICRISAT: Andhra Pradesh, Bihar, Gujarat, Karnataka, Jharkhand, Maharashtra, Madhya Pradesh and Orissa.

² See Balani (2013) for a more detailed explanation of the PDS supply chain.

³ APL households in most states do not receive any PDS grain.

Figure 1 describes the increase in the PDS grain quota entitlement and Figure 2 describes the gradual decrease in PDS grain price entitlements. Both figures considered together clearly depict the expansion of PDS entitlements since July 2013 (hereafter referred as the post-NFSA regime). Among the eight states, the NFSA was first implemented in Maharashtra and Bihar in February 2014 and later in Madhya Pradesh from April 2014. In addition to the phased rollout of the NFSA, certain states such as Karnataka and Madhya Pradesh expanded their PDS subsidy by initiating their own state-level PDS programs. For instance, in June 2013, the chief minister of Karnataka introduced the “Anna Bhagya Scheme”, essentially doubling the PDS entitlements. Similarly, the chief minister of Madhya Pradesh introduced the “Mukhyamantri Annapurna Scheme” in June 2013, thereby reducing the PDS price entitlements to Re 1/kg for wheat. Both these schemes were initiated during state elections and were believed to have been directed towards gaining the support of the poor⁴. (cite newspaper articles).

In this paper, we exploit the cross sectional and time varying components of the PDS subsidy, especially for BPL households, to assess the impact of PDS policy on food security. The study period includes both NFSA and state-level changes in PDS and therefore the results as such suggest the impact of the overall PDS expansion and may not reflect the impact of NFSA. We study three dimensions of food security – food access, food availability and food stability.

As the PDS policy is framed to primarily address hunger or food access, one would expect that an expansion in the statutory subsidy would translate into increased uptake of PDS grain from the fair price shops and thereby increase consumption of PDS grains. We interpret the increase in PDS grain consumption as an improvement in food availability. Furthermore, as households receive more PDS subsidy (either through an increase in quota or a decrease in price), purchase of staple cereals from the market would decrease and therefore reduced expenditures on staple cereals would consequently induce large wealth effects. If the income effect exceeds the price effect, the subsidy may induce households to transition away from a calorie rich diet of staple cereals, towards a nutrient rich diet including milk, vegetables, fruits and oils. We interpret the increase in the quantities of diverse food items and the enrichment in the calorie, protein and fat intake as an improvement in food access. In addition to the wealth effects, the subsidy may have a stabilization effect. Given that the statutory PDS policy ordains a fixed monthly quota of subsidized grain year-round, irrespective of aggregate or idiosyncratic shocks, one would expect consumption to stabilize. In particular, one would expect, the subsidy to moderate the effect of rainfall shocks and idiosyncratic income shocks on staple cereal consumption. We interpret the interaction effect of rainfall shocks and subsidy on staple cereal consumption as a food stability effect. In short, one would expect PDS subsidy to improve food availability, enrich nutrition and stabilize consumption.

3. DATA:

⁴ The first executive decision taken by the Chief Minister of Karnataka was to increase the PDS entitlements. In MP, reduction of PDS price was part of an election manifesto.

We use the new wave of ICRISAT's VDSA⁵ panel data of 1200 households observed over 60 months from June 2010 to July 2015. The VDSA data include 30 villages spread across eight states in India namely Andhra Pradesh⁶, Bihar, Gujarat, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra and Orissa; with 4 villages in each state, except Madhya Pradesh that has only 2 villages. Figure 1 shows the geographical locations of the villages. Similar to the old VLS, households in each village are randomly selected to represent households in four land-holding classes: large, medium, small and land-less. One limitation with the ICRISAT data is that they are not representative at the national, state or district levels. However, we show in the appendix that the summary statistics from ICRISAT data are consistent with the nationally representative sample from NSSO data, addressing possible concerns that the stratified sample and small sample size oversample outliers.

The VDSA panel data are geographically divided into 18 villages in the Semi-Arid Tropics (SAT) and 12 villages in the Eastern region of India and follows the agricultural cycle in India from June to July. Endowment and household characteristics data such as household size, landholding size and anthropometric indicators are collected annually at the beginning of every panel year in June. Transactions, sales and expenditure data are collected every month. Food expenditures are collected under the Transaction Module and are recorded item-wise along with information about the source of each food item, whether from home consumption or market purchase or from gifts. PDS rice and wheat are recorded as separate food items in the consumption module and are collected every month.

Ration card status of households from 18 villages in SAT and 12 villages in East India come from different sources. In East India, the ration card status is reported in the General Endowment Schedule (GES), and is collected at the beginning of panel year in June. As for SAT, the ration card status is collected during a Household Census Survey (HCS) conducted separately by the VDSA team during 2014. One caveat with the ration card data is that these data will not capture

⁵ Brief note on VDSA data: ICRISAT's Village level studies (VLS) are longitudinal surveys collected between 1975 to 1985 in six villages in the semi-arid tropics of India. Data collection was restarted from 2001 in the same six villages, tagged as the second generation of VLS (VLS2). However, the frequency of household surveys from 2001 to 2004 was limited to annual observations based on the availability of funds, and was increased to monthly data in 2005-06. It was only after 2009, with the funding from the Gates foundation, the VLS was expanded significantly and was renamed as the Village Dynamics in South Asia (VDSA). In 2009, 12 villages in the semi-arid tropics, in addition to the 6 old VLS villages, and 10 more villages from east India were included; summing to a total of 30 villages across India. The data for panel year 2009, however, has many gaps, especially in the consumption module, and is inconsistent with the subsequent panel years. Accordingly, this paper uses data beginning from panel year 2010 until 2014

⁶ Two villages are in Telangana, a state formed in 2014. As our dataset begins before the formation of the new state, and for the purpose of consistency, the 2 villages in Telangana are considered as Andhra Pradesh

a change of ration card status within a year. We address this concern in our robustness checks by considering the landholding size as a proxy for ration card status.

Table 1 shows the summary statistics.

In this paper, we consider monsoon start date as a measure of rainfall shock, measured as the first day after June 1 with more than 20 mm of rain, following Rosenzweig and Binswager(1993). Rainfall data is from the Indian Meteorological Department, defined at a fine spatial resolution of a 0.25° x 0.25° grid cell size. Daily rainfall data for the ICRISAT villages is obtained by mapping the village co-ordinates that fall within each grid cell polygon. No two villages fall within the same grid cell and hence the spatial gridded rainfall data uniquely identifies the village locations. In summary, a rainfall shock corresponds to the monsoon start date and is measured annually for each village.

4. EMPIRICAL STRATEGY

This study examines whether the PDS subsidy improves each dimension of food security, that is food availability, food access, food stability and food utilization. We first define the PDS subsidy. Let Q_{cst}^{pds} be the statutory PDS quota set by state s for ration card holder c in month t and let the price discount be defined as the difference between the market price \bar{P}_s^M and the statutory PDS price P_{cst}^{pds} set by state s for ration card holder c in month t . The total implicit PDS subsidy is calculated as the sum of rice and wheat subsidies, each defined as product of the price discount and statutory quotas, and is represented as follows:

$$Subs_{cst} = \sum_j Q_{cst}^{pds} [\bar{P}_s^M - P_{cst}^{pds}]$$

where ($j = Rice, Wheat$).

We consider the average market price \bar{P}_s^M in state s over the sample period, as the monthly market price for grain at the village level may be endogenous with the demand for grain. Consequently, $Subs_{cst}$ the implicit subsidy measure represents purely exogenous changes in the PDS entitlements.

Changes in Quotas and Prices:

Explain the figures and quota changes in each state. Make a clear argument that these changes are exogeneous and the resultant subsidy variable is also exogeneous.

Impact on Food Security

1) Food availability:

This section examines whether the statutory PDS quota, actually reaches the intended beneficiary households at the statutory PDS price. This is sometimes referred as PDS uptake. Food availability is explored both graphically and empirically.

Figures 4 and 5 show the actual PDS consumption and price reported by BPL households. Figure 1 to 5 show that the actual PDS consumption comoves with the statutory PDS entitlements. A brief discussion on the uptake of PDS in different states and the context.

We also empirically test the impact of PDS entitlements on PDS consumption with the inclusion of household and time fixed effects, as follows:

$$\begin{aligned} Y_{icst} &= \alpha_i + \lambda_t + \beta_1 Q_{cst}^{pds} + \varepsilon_{icst} \\ P_{icst} &= \alpha_i + \lambda_t + \beta_2 P_{cst}^{pds} + \varepsilon_{icst} \end{aligned}$$

where Y_{icst} is the reported PDS quantity consumed at price P_{icst} by household i , with ration card c , in state s and month t ; α_i and λ_t are the household and time fixed effects.

We show high PDS uptake rates for BPL households. This is an important finding in contrast to previous studies that show low take up rates.

2) Food Access:

The second step involves whether the high PDS uptake translates into staple cereal consumption and overall increase in calorie intake. Also whether the implicit income transfer affects consumption of other food categories such as coarse cereals, milk and milk products, fruits and vegetables, eggs and meat. The basic equation to estimate the impact of the subsidy on consumption outcomes is:

$$Y_{icst} = \alpha_i + \lambda_t + \beta_1 Subs_{cst} + \varepsilon_{icst}$$

where Y_{icst} represents the outcome variable (such as is the staple cereal consumption, per capita-calorie intake, total food consumption, consumption of other food items, etc.) for household i , with ration card c , in state s and month t . α_i and λ_t are the household and time fixed effects. Standard errors are clustered at the state level.

3) Food Stability:

We examine the food stability dimension in two parts depending on the type of shock - aggregate and idiosyncratic - faced by the households. In the first part, we study whether the PDS subsidy is effective in reducing the impact of rainfall shocks on consumption. In the second part we examine whether PDS subsidy contributes to consumption smoothing.

a. PDS as a buffer against weather: The empirical specification is as follows:

$$Y_{icst} = \alpha_i + \lambda_t + \beta_1 R_{vy} + \beta_2 Subs_{cst} + \beta_3 R_{vy} Subs_{cst} + \varepsilon_{icst}$$

where α_i and λ_t are household and time fixed effects respectively. R_{vy} is the monsoon start date in village v in crop-year y . The above specification asks whether the PDS is able to stabilize food consumption by moderating the effect of rainfall shocks. The coefficient of interest is β_3 . The interaction term measures the impact of grain subsidy during a bad rainfall shock, that is when the monsoon onset is late.

b. PDS as a consumption smoothing mechanism:

To investigate the impact of PDS subsidy on consumption smoothing, we perform regressions that modify the standard omnibus insurance specification (Townsend 1994) to allow the effect of income fluctuation depend on the amount of PDS subsidy received. Alem and Townsend (2011), show that with alternative consumption smoothing mechanisms such as financial participation, a per-period shock common to all households who participate in the financial institution should be added to the standard full insurance regression. In this study, we consider the implicit income received from the PDS as alternative form of consumption smoothing, similar to transfers received from a financial institution. Therefore our consumption smoothing specification takes the form:

$$Y_{icst} = \alpha_i + \lambda_t + \beta_1 I_{icst} + \beta_2 Subs_{cst} + \beta_3 I_{icst} Subs_{cst} + \varepsilon_{icst}$$

where α_i is the household fixed effect, λ_t is a common time effect for all households receiving the subsidy and I_{icst} is the income of household i with ration card c , in state s and month t .

β_3 is the co-efficient of interest. The above specification asks whether the comovement between income and consumption decreases for households who receive grain subsidy than those who do not. If β_3 is negative, then grain subsidy is effective in reducing link between idiosyncratic shocks and consumption.

Results from both the specifications suggest that PDS subsidy does not contribute to food stability.

4) Food utilization:

We first found that the statutory PDS subsidy translates to PDS consumption. Next, we found that the availability of PDS grain at a subsidized price improves staple cereal consumption, calorie intake and consumption of nutrient rich foods such as eggs and meat and fruits. In this section we ask whether the consumption of nutritional items translated into better nutritional status. In particular we examine bmi for women, weight-for-height, weight-for-age.

There is ample evidence that weight typically reacts quickly to changes to calorie intake. (Ashworth 1969, Rand et.al 1995, Foster 1995, Braun et al 1989). So, based on the findings from

the previous section of an increase in staple cereal consumption, one should expect higher weights and better bmi s, especially in children.

Some summary stats about the nutritional status of individuals in the ICRISAT sample.