

Food, Hunger, and Nutrition in India: A Case of Redistributive Failure

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Executive Summary

Over the past 50 years, India has been a pioneer in discussing and introducing policies toward the alleviation of hunger and poverty. India's performance record is somewhere between good and excellent in terms of achievement of goals; unfortunately, the specific policy instruments used by the government have suffered from inefficiency and corruption.

There is considerable evidence to suggest that Indian anti-poverty and anti-hunger policies have not been based on evidence. If hunger is defined as the consumption of two square meals per day, then post-2000, hunger is confined to less than 2 percent of the Indian population. The number is believed to be so low that the household survey authorities (the National Sample Survey Office, or NSS) have stopped asking the question pertaining to hunger.

Since 2000, the government of India has enacted two very large-scale hunger alleviation programs through acts of parliament: the provision of employment (NREGA) to the rural poor (2005) and the provision of heavily subsidized food to two-thirds of the Indian population, the National Food Security Act of 2013.

Earlier variants of these two policies have been in operation in India since the mid-1970s, though neither has been successful in reducing either perceived hunger or poverty. If the target is reaching the poor, then both programs fail: less than 15 percent of the poor population receives the benefits of programs launched in their name.

There is considerable evidence of large-scale corruption in both these flagship programs of reducing poverty and hunger and malnutrition. One reasonable conclusion is that these programs do not offer any guidance to other countries wanting to eliminate hunger. Or, phrased differently, these programs vividly illustrate the potential, and reality, of corruption in government schemes set up in the name of the poor.

It has been consistently argued, by academics and government policymakers, that India needs government food and nutrition programs because nutrition data—not calories but wasting and stunting in children below the age of 5—consistently show that Indian children display the worst record even though India is considerably less poor than sub-Saharan Africa. Hence, the government and scholars argue, the goal should be to increase the provision of food to eliminate the scourge of malnutrition.

Unfortunately, this policy prescription suffers from a severe identification problem. Stunting and wasting in India has little to do with lack of food, or with consumption of calories. The reality is that more food does not lead to greater consumption or nutrition.

India suffered for many years from a mistaken belief, and policy prescription, that calorie consumption should be incentivized via heavy subsidy of food grains (rice and wheat). While this policy may have been true 50 years ago when calorie undernourishment was a major problem, it certainly is not true today. Indeed, the evidence suggests that food grains are an inferior good; that is, their consumption declines as incomes increase. What is needed to solve today's problem of malnutrition is to switch diets away from food grains and to deal with the practice of open defecation.

1. Introduction

This paper is about the experience of India with regard to the policies pursued toward providing food and nutrition security (FNS) for its population, and in particular provision of FNS to the bottom half of the population. FNS is essentially about the removal of hunger within the larger framework of poverty alleviation. The link between the two is both historical and definitional, in that absolute poverty is historically defined in terms of having adequate food intake for survival. Hence, even today there continues to be research in India on minimum caloric needs that is used to define absolute poverty levels.

India was a very poor country at the time of independence, and it is not surprising to note that a considerable portion of the debate, analysis, and policy has been oriented toward the reduction in absolute poverty. This paper examines this approach, especially over the past 40 years. The Indian experience is used as a prism through which to examine the larger experience of other developing countries. What is it that India has done right, from which latecomers can benefit? Equally important, what is it that India has done wrong that others could benefit from eschewing?

Going back to the beginning, the paper examines the links between poverty, hunger, and nutrition. If hunger is the most important driver of policy, then what do we know about policies that can successfully alleviate hunger? Somewhat surprisingly, the first result of our study is that hunger is not an absolute concept, even if theoretically it appears to be a good example of an absolute. This is explored in the next section.

The plan of the paper is as follows. Section 2 evaluates the hunger situation in India and the world. It analyzes the common definitions of hunger (caloric deficiency, household surveys). Section 3 looks at the trends in absolute poverty in India and highlights the fact that in India, differences in the recall period of food consumption (seven-day recall for perishable items rather than 30-day recall for such items) reduces absolute poverty in India from 22 percent to 12 percent, for the same survey year, 2011-12. The poverty line used is the Tendulkar poverty line, which happens to be equivalent to the \$1.25 per person per day, at 2005 purchasing power parity (PPP), and equivalent to \$1.90 a day, 2011 PPP prices. Section 4 analyzes the effectiveness of the public policies oriented toward hunger, food security, and poverty reduction in India, that is, the public distribution system of food grains and the food for work programs, most prominently the large scale, and the largest such program in the world, the National Rural Employment Guarantee Act (NREGA). Section 5 concludes.

2. The state of hunger in India (and the world)

A definition of hunger is needed to evaluate policies to alleviate hunger. As a U.S. Supreme Court justice famously stated in the case of pornography, it may be the case that hunger is a state of “you know it when you see it.” In India, food insecurity was very visible. At the time of independence in 1947, India was a very poor country with a per capita income of only \$2.30 per person per day at 2011-12 PPP prices. Thus, it is obvious that a very large proportion of the Indian population was very poor and likely very hungry circa 1950.

Today, circa 2015, per capita income in India is approximately seven times the level in 1950, but anti-hunger programs are still priorities. The Indian government passed in 2013 the National Food Security Act (NFSA) entitling approximately two-thirds of the population to virtually free rice and wheat for an estimated half of their daily needs for grains. This came on top of another program called NREGA, for National Rural Employment Guarantee Act, aimed at ending hunger and ending poverty. Passed in 2005, this program guarantees, by law, 100 days of employment to at least one member of every rural family that seeks jobs that entail digging ditches, building roads, and other “back-breaking” work.

Food subsidy and employment programs have been in existence in India in one form or another since the 1960s. With the combination of the NFSA and NREGA, the programs have become huge. Direct expenditures on just these two programs have been close to 2 percent of GDP. If one adds other programs meant to end hunger, alleviate poverty, and provide incomes to the poor, the magnitude has varied between 3 and 4 percent of GDP. By most definitions, such redistributive expenditure levels for non-education, non-health, and non-pension purposes are the highest for any country in the world.

The definition and state of hunger

I: Measurement of hunger via caloric consumption

The conventional approach is to measure hunger via calorie consumption. This approach has a long history and follows from a series of principles. Hunger, by definition, is lack of food. The most basic form of food is calories; therefore, the reasoning is that lack of food is a good proxy for lack of calories.

Food, especially for the poor, consists of rice, wheat, and other basic food. Cereals provide a lot of basic energy, so it was natural for economists and policymakers to link policies toward hunger alleviation with policies meant to increase the production and consumption of cereals.

Thus, reviewing this evidence, one obtains the following “know it when you see it” definition of hunger:

- (1) Hunger = poverty = lack of food = low consumption of calories

The definition of hunger, and counting and identification of the poor, thus became narrowed to the counting of calories.

This mesmerizing definition seemed to offer clear guidance to policymakers—an objective and easy to measure definition, and one with a ready and acceptable and plausible policy response: increase food production. Toward this end, the Food and Agriculture Organization of the United Nations (FAO) published calorie requirements for every region, age, sex, and nationality of the world, for those with sedentary habits and not so sedentary habits. It helped that poverty was

mostly in tropical areas, otherwise due considerations would have to be given for needs of shelter and clothing. (Shelter in cold climates is also very important, but that is not a problem in most parts of India.)

However, the caloric equation (which is to say, poverty means low consumption of calories) soon appeared to be problematic. The first problem appears to have been in identifying hunger with food consumption, especially the consumption of calories. The late P.V. Sukhatme theorized as early as 1973 that most of the variation in the consumption of calories was due to genetics. He outlined statistical evidence for the proposition that each human is a different machine in the way it processes caloric intake; that is, each human machine has different efficiencies. His evidence showed that this variation had a standard deviation of 15 percent in the zone of normal consumption. In other words, if 2,100 kilocalories per day is the norm, then normal consumption could statistically lie between 1,470 and 2,730 calories.

At about the same time, the U.S. nutrition authorities had just published the results of an intensive survey into the nutrition habits of Americans. Discussion with the survey authorities revealed that they had taken extraordinary pains to calculate the difference between calories in the pantry and calories in the mouth—in other words, the calories lost in the cooking of hamburgers were taken into account.¹ Also, special care was taken to identify, and tabulate, the calories obtained from beer and other alcoholic drinks. Application of FAO standards suggested that more than 80 percent of adult American females and 67 percent of adult males were undernourished. Application of U.S.-specific requirements, rather than FAO requirements, reduced the U.S. undernourishment figure to 70 percent for females and 46 percent for males.

Neither the development policy profession (for example, major development institutions such as the World Bank and the United Nations) nor the Indian government took Sukhatme's analysis seriously. The political economy of food and foreign aid, and the political economy of corruption (see Section 4 on public distribution systems), ensured that calories policy had an extended run.

There are two additional problems with application of caloric requirements to households in countries like India; first, that with income growth, there is a movement from grains to “meat” (more expensive calories of consumption); and second, that consumption of basic calories from rice and wheat has been steadily declining and today is less than 9.5 kilos (21 pounds) per person per month, about 10 percent lower than the assumed “normal” steady requirement of around 10.5 kilos per person per month. This decline is across all income classes, according to NSS data for 1983 to 2011-12.

II: Measurement of hunger via household surveys in India

As part of the regular consumer and expenditure surveys, the NSS has been regularly collecting data on the magnitude of hunger in India. The exact wording of the NSS hunger question in 2004-05 was:

“Do all members of your household ‘get enough food every day’: yes: every month of the year-1, some months of the year-2; No month of the year-3”

In 1983, some hunger was reported by 14.2 percent of the population, but by 2004-05, this share had declined to only 1.4 percent, or “no” hunger, at least according to consumption surveys on

¹ See Bhalla 1980 for a detailed discussion.

self-identified hunger (Table 1). The 2004-05 NSS survey is the last year the question on hunger was asked. A decade later, the Indian government passed a right to food law to alleviate hunger.

Table 1: NSS data for India shows little hunger by 2004

NSS Year	Food Sufficiency (%)		
	Yes		No
	Throughout the year	Some months of the year	No month in the year
1983	85.8	12.5	1.7
1993	96.6	2.7	0.7
1999	97.8	1.6	0.6
2004	98.6	1.0	0.4

Source: NSS Consumption Expenditure Surveys

Note: In 1983, the question was “Do all the members of your household get two square meals every day?”; in 2004, the question was “Do all members of your household ‘get enough food every day?’”

III: Measurement of hunger in India and the world via Gallup Survey

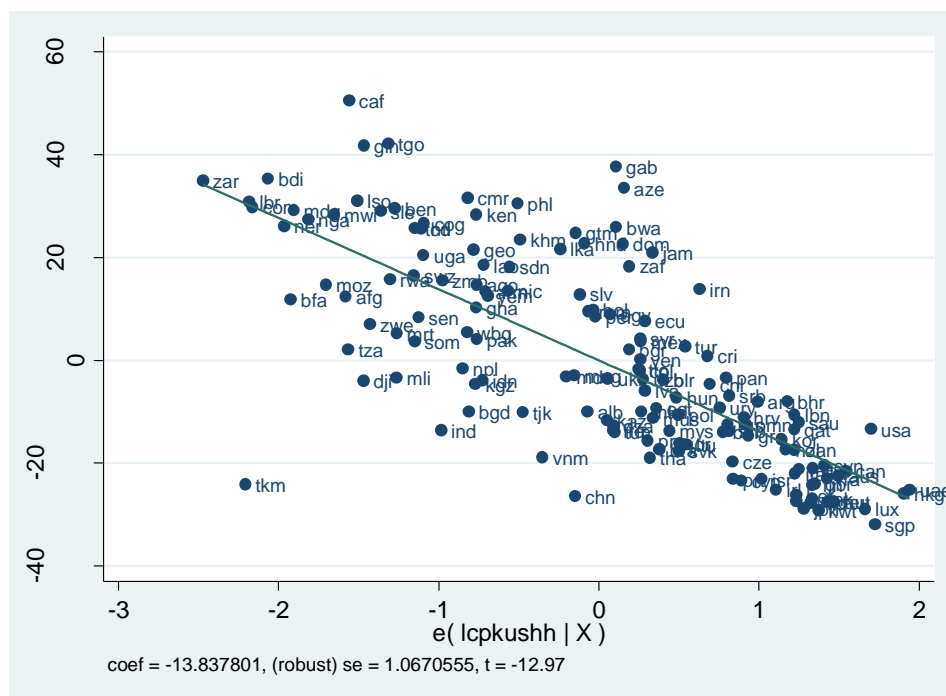
An alternative measure of hunger for India (and most countries of the world) is provided by a Gallup survey. As per Table 2, the question that has been asked since 2007 is: “Does your family have insufficient money/finances to meet food needs?” For India, the share of people answering in the affirmative was 26.3 percent in 2007, 18.8 percent in 2011, and 22.4 percent in 2013.

The Gallup data suggest a strong negative relationship between the Gallup survey and per capita consumption (Figure 1). The estimated equation for 2011 is:

$$\text{Hunger \% (Gallup)} = 63.4 - 13.8 * \text{Log Household Survey Per Capita Consumption}$$

where per capita consumption is measured in 2011 PPP prices; number of observations=146, $R^2 = 0.56$

Figure 1: Regression Plot of Hunger Percent on Household Per Capita Consumption



Source: Gallup Survey Data; NSS Consumption Survey

On a cross-section basis, in 2007, except for two regions, world hunger was a near constant 25 percent. The two exception regions were the developed economies (9 percent) and sub-Saharan Africa (52 percent). East Asia was at 30 percent, some 4 percentage points higher than South Asia.

Table 2: How Hungry Is the World? 2007

Region	Gallup Hunger Index	Share of Population that has a Per Person Per Day Income of			
		< 1.6 PPP \$	> 1.6 PPP \$ and < 3.2 PPP \$	> 3.2 PPP \$ and < 12 PPP \$	> 12 PPP \$
Developed economies	8.8	0.4	0.9	2.8	77.1
East Asia	29.8	2.3	8.5	43.5	46.9
Russia & Eastern Europe	26.4	0.7	3.7	20.0	75.4
Latin America	28.4	2.9	8.4	33.5	56.7
Middle East + North Africa	25.3	1.2	4.3	22.5	71.2
South Asia	26.1	3.2	22.6	65.6	11.8
Sub-Saharan Africa	51.6	34.6	59.6	32.4	7.7
Average	26.1	5.6	16.8	38.1	40.8

Source: Gallup, Author's computations based on 2011 ICP data

Note: The Gallup Hunger Index presents the share of the population that has insufficient money/finances to meet food needs.

In 2013, Gallup Hunger had increased in most parts of the world. The distribution is shown in Table 3. Note that the Middle East-North Africa region has shown a large jump, from 25 to 41 percent, while East Asia almost halved its share (from 30 to 16 percent).

Table 3: How Hungry Is the World? 2013

Region	Gallup Hunger Index	Percentage of Population that has a Per Person Per Day Income of			
		< 1.6 PPP \$	> 1.6 PPP \$ and < 3.2 PPP \$	> 3.2 PPP \$ and < 12 PPP \$	> 12 PPP \$
Developed economies	13.4	0.1	0.4	3.2	77.0
East Asia	15.8	4.5	13.1	38.1	47.9
Russia & Eastern Europe	22.8	1.0	3.4	21.0	74.6
Latin America	32.5	3.4	8.4	28.8	61.2
Middle East + North Africa	40.8	1.4	5.4	32.4	60.1
South Asia	23.6	0.9	14.2	64.8	20.8
Sub-Saharan Africa	56.9	36.3	64.3	28.3	7.3
Average	24.6	5.5	15.0	36.9	44.8

Source: Gallup, Author's computations based on 2011 ICP data

Note: The Gallup Hunger Index presents the share of the population that has insufficient money/finances to meet food needs.

What the Gallup data strongly suggest is that hunger is more of a relative concept than an absolute concept. Just as absolute poverty in the world has declined, and individual country absolute poverty lines have been raised in real terms (the Indian poverty line has been raised by around 40 percent in real terms since the mid-1970s; see Section 3), so it appears to be the case for individual country hunger.

IV: Hunger and nutrition

One of the major goals of the food intervention policies has been to enhance the nutrition status of Indians. Malnutrition affects stunting and weight, and despite having considerably higher per capita income, India is worse in terms of nutrition status than the poorest countries of sub-Saharan Africa (see Dreze & Sen 2013). Sukhatme's point about different needs for calories because of different efficiencies was pointed out earlier. But these differences apply equally to all individuals; hence, the bad nutrition status of Indians is not explained.

Virmani (2007) was the first to highlight the importance of sanitation in determining nutrition status. "For instance a child suffering from diarrhoea much of the time is unlikely to be able to ingest much good and healthy food and absorb the nutrition, even if it is freely available and provided to the child by the mother/parents. . . . In the Indian environment access to water and toilets, breast feeding (to impart immunity in an unhealthy environment), access to sound health advice/treatment, prevalence of vaccination and availability of vitamin supplements" are indicators of bad health, malnutrition, and other bad indicators. (2007, p. 26). Some years later, Spears (2013) and Hammer-Spears (2013) documented the important role that open defecation played in explaining India's bad indicators relative to sub-Saharan Africa. Which raises the obvious question: would India have not been considerably better off in terms of health,

nutrition, and welfare if instead of spending thousands of crores on food subsidies, India had spent money on essential public goods such as sanitation?

3. Facts on reduction of absolute poverty in India

This section will assess the nature of poverty decline in India and relate it to economic growth. The next section will explicitly look at the policies that have been followed to enhance food production and food consumption among the poor.

While there are several instruments of welfare policies, the basic goal of all such policies is the same: to provide a minimum level of income support to those who need it: the poor. There are two broad approaches to reducing poverty. The first is an indirect approach commonly known as trickle-down growth. This approach or philosophy has as its premise the belief that if economic growth occurs, and it is broad-based, then all sections of the population will benefit, and perhaps the poor will benefit at a faster pace. Mitigating against the prospect of the growth rates being faster (or equal) for the poor is the likelihood that the development process is inherently unequal, and therefore the incomes of the poor will increase at a rate that is lower than average. This prospective reality is the basic motivation for the direct approach to poverty reduction.

World Bank and Indian poverty lines the same

Depending on its own ethical values and political and economic structure, each country defines the poor according to its own standards. The poor can be defined in many ways, but the consensus is to define poverty in per capita income (or consumption) terms. The measurement of poverty takes place via the definition of a poverty line. For India, two poverty lines are available—the national poverty line and the World Bank poverty line for developing countries. As it happens, the World Bank poverty line is identical to the Indian poverty line for both the 1990 World Development Report PPP \$1 a day line and the 1996 base PPP \$1.08 a day line. (See Bhalla 2002 for details.)

That the new World Bank 2011 base of PPP \$1.90 is also identical to the Indian poverty line is documented as follows. First note that until the 2009 NSS survey, the Indian poverty line was the Dandekar-Rath poverty line of Rs. 49 per capita per month in October 1973 prices and hence, the World Bank PPP \$1 and PPP \$1.08 line. The government of India constituted a committee to devise a new poverty line under the chairmanship of Suresh Tendulkar. This committee recommended a new poverty line that was approximately 19 percent higher than the Dandekar-Rath line. As noted, the old 19 percent lower Dandekar-Rath poverty line was matched by the World Bank with its 1996 PPP \$1.08 line. For the 2011-12 agricultural year (July 2011-June 2012), the Tendulkar rural poverty line was set equal to Rs. 840 per capita per 30-day month and the urban poverty line was set at Rs. 1,025 per capita per 30-day month. Equivalently, the rural poverty line was set equal to Rs. 27.6 and the urban line was set equal to Rs. 33.7 per person per day. (The lines varied from state to state according to consumer price deflators specific to each state.) In PPP \$ terms, given a PPP exchange rate for consumption of Rs. 14.97 for one PPP \$, and an urbanization rate of 28.5 percent in 2011 works out to an all-India weighted poverty line of PPP \$1.96 per capita per day for the year July 2011-June 2012. However, given a period of high double-digit inflation, the price index for calendar year 2011 is 3.7 percent lower than the price index for July 2011-June 2012. This yields the Indian poverty line for calendar year 2011 to be 3.7 percent lower than \$1.96, or PPP \$1.89 per person per day.

Poverty decline in India, 1957-2012

Table 4 documents the nature of poverty decline in India for its two poverty lines (Dandekar-Rath and Tendulkar) or alternatively and equivalently the World Bank 1996 PPP and the World Bank 2011 PPP poverty line. In addition, data are presented according to a third method for the years 2009-10 and 2011-12. This method has the same poverty lines, but from a separate NSS household survey conducted in each of the two years. These surveys were identical in all respects except that they covered a different set of households and had different recall periods for different consumption items—most importantly, food consumption data were collected according to a seven-day recall period than the traditional 30-day period. The seven-day recall period for food has been recommended for greater accuracy and is the practice in most parts of the world (see Deaton 2005).

Table 4: Poverty Decline in India, Various Methods

Year	Poor Percent			
	Dandekar - Rath (PLine I)		Tendulkar (PLine II)	
	t1	t2	t1	t2
1957	58.1			
1961	49.7			
1964	58.2			
1967	65.7			
1970	57.3			
1973	59.6			
1977	55.8			
1983	48.4		58.3	
1993	40.4		45.6	
1999	25.8	23.2	43.2	39.9
2004	21.7		37.7	
2009	15.6	10.4	29.9	21.7
2011	10.8	6.8	22.2	14.9

Source: World Bank, Dandekar-Rath, NSS Consumption Expenditure Surveys

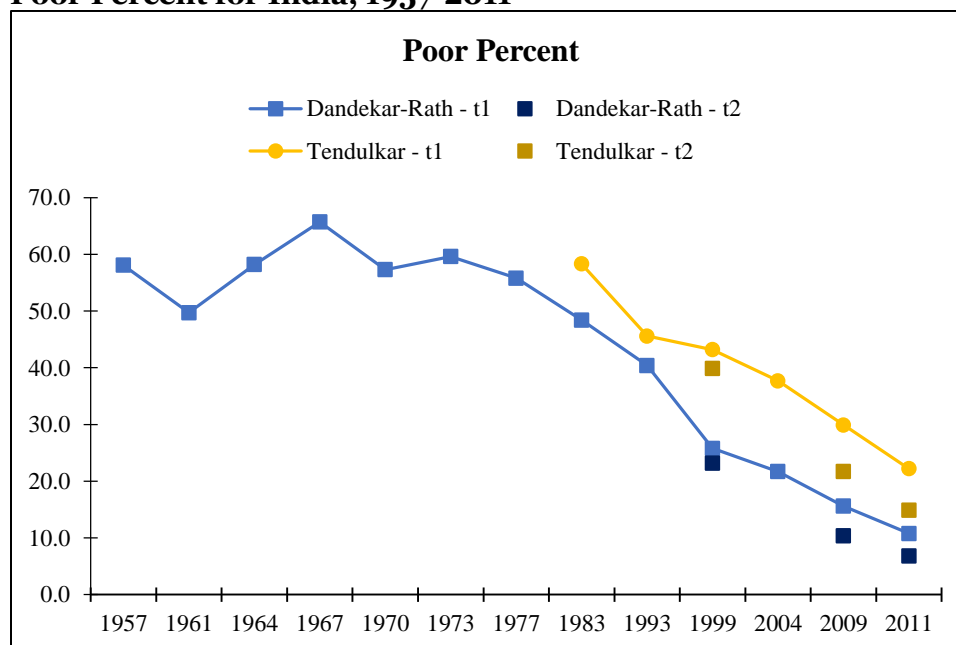
Note: t1 refers to the standard convention of a 30-day recall; t2 refers to a seven-day recall.

Poverty decline in India has been impressive. In 1957, close to 60 percent of the population was poor (PLine I) and this share was down to 10.8 percent in 2011-12; according to a seven-day recall period, the fraction of poor in 2011-12 was even lower at 6.8 percent. How different methods of “counting” yield to very different results is indicated by the levels of poverty obtained for PLine II in 2011/12. According to a 30-day food recall, poverty in India was a high of 22.2 percent for PLine II; if food was counted on a seven-day basis, poverty in India would be 7.3 percentage points lower, at 14.9 percent. The trend in poverty decline, in other words, is the same, regardless of the method used (Figure 2).

The head-count ratio of poverty at any point in time is a function of the mean level of per capita consumption and the distribution of consumption. Per capita consumption is estimated to be 10 to 20 percent higher if the household survey asks questions for one-week consumption rather

than one month's consumption. Food is more than 50 percent of a poor household's consumption, and incorporation of one week of data reduces the poverty rate by 10 percentage points (from 23 percent to 13 percent) in a single year, 2011-12.

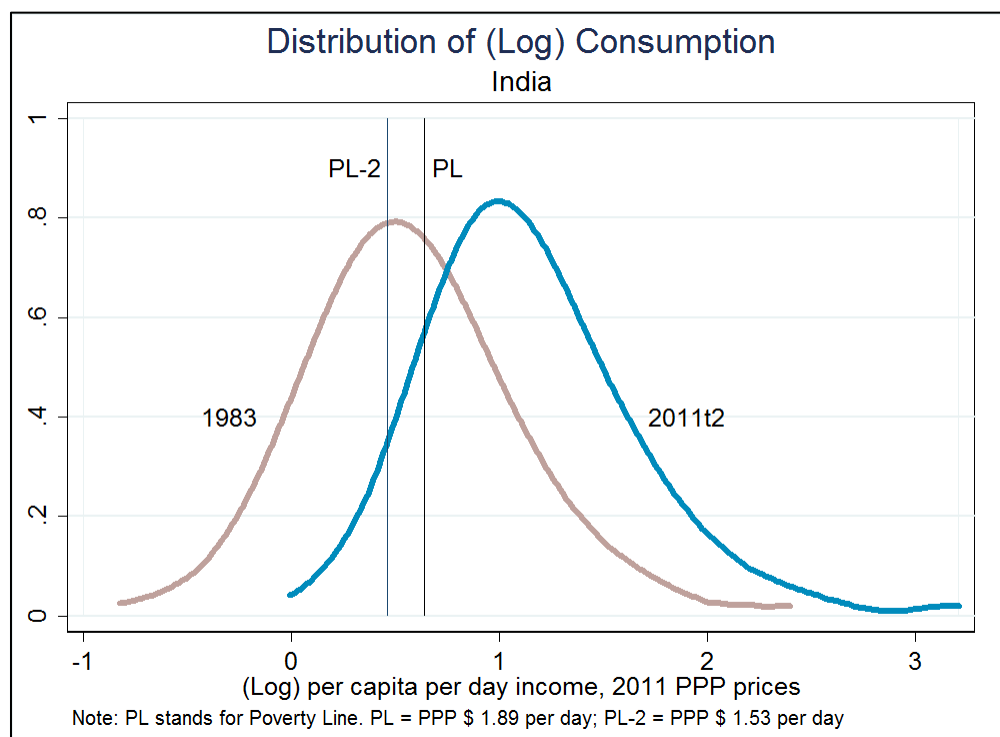
Figure 2: Poor Percent for India, 1957-2011



Source: World Bank, Dandekar-Rath, NSS Consumption Expenditure Surveys

Note: t1 refers to the standard convention of a 30-day recall; t2 refers to a seven-day recall.

As discussed in Bhalla (2002), the entire distribution is not relevant; what matters most for the estimation of poverty decline for a unit of growth is the distribution “around” the poverty line and an approximation to this is given by the slope of the distribution around the poverty line. The flatter the slope, the higher the amount of poverty reduction for a given amount of growth in mean consumption (this is called the shape of the distribution elasticity, or SDE, in Bhalla 2002); the steeper the slope, the less the impact. If this slope is “fat,” as in 1983 (Figure 3) the SDE has a high value of 0.85; when the slope is steep, the elasticity of poverty reduction with respect to changes in mean consumption is lower. For 2011-12 the value of SDE is 0.53. One can easily follow the course of SDE by mentally shifting the consumption distribution to the right. In 2015, the SDE has further reduced to 0.36. In other words, while in 2011, 1 percent extra consumption growth brought about a 0.53 decline in the head-count ratio, today that same 1 percent extra mean growth will bring down the ratio by only 0.35 percentage points.

Figure 3: Distribution of (Log) Consumption for India, 1983 and 2011-12

Source: NSS Consumption Expenditure Surveys, 1983 and 2011-12

Four results stand out. First, “only” 22 percent of the population was poor in 2011-12, and if the poverty line had not been revised upward by the Tendulkar committee, the poverty level would have been close to 11 percent. Second, poverty levels stayed stagnant at around 60 percent of the population for the low growth period of 1950-80, but there is a distinct acceleration in the speed of poverty decline post-1980. Third, poverty decline is the steepest during the most recent high of 8 percent-plus growth period in 2003-12. Fourth, poverty in 2011-12 is seven percentage points lower at around 12 percent for the seven-day recall period.

4. Have poverty reduction policies mattered? Examination of anti-poor, anti-hunger policies

The Indian government decided very early that the battle against poverty and hunger was to be fought via food production and food consumption. Toward this end, it set up an elaborate mechanism to intervene in the product markets by setting minimum support prices for farmers and providing subsidies for fertilizer, irrigation, and power. Through this it hoped to increase the supply of food. In addition, and in parallel, it set up an elaborate mechanism to purchase the major cereals (rice and wheat) and sugar from the farmers, to store the food, and to send it to ration shops where the population, especially the poor, could purchase the food at very subsidized prices. The population was divided primarily into two categories—below and above the poverty line—and the two sets were to get the food at better than market prices, with the poor obtaining the food at lower prices than the non-poor. This part of the policy package aimed to ensure that food would be affordable for the poor, so their demand for calories would be met.

How well the government policies have been successful in increasing production is examined in this section; the distribution of food policies is examined in the next subsection 4b and 4c.

Section 4a: Wheat and Rice Production

Wheat and rice production levels are a function of the area allocated to the crop and the (yield) productivity of the area. The latter is dependent on irrigation and rainfall, among other factors. Rainfall data are available from 1871 onward, and the popular usage of these data are in terms of the departure of rainfall from the mean for the important rainfall months of June to September. In Bhalla (2010), there is a more refined measure of rainfall deviation, defined in terms of the standard deviation.

Table 5 reports on several regressions relating to area, production, and yield of rice and wheat for the period 1980-2013. In addition to rainfall, the regression results report the effect of the log change in the relative price of wheat and rice; these relative prices are estimated as the price of wheat (rice) relative to the price index for all agriculture (GDP deflator for agriculture).

The regression results are indicative of three conclusions. First, not surprisingly, rainfall (and lagged rainfall) plays a very strong role in the allocation of area, and growth in production, and/or yields. Second, production of both rice and wheat has grown at approximately 2.5 percent per annum for the past 30-odd years. Third, relative prices have had very little role to play in production increases, which mostly seem to be driven by “technology” and rainfall.

Table 5: Regression Analysis for Wheat and Rice

Dependent Variable	Independent Variables				Constant	Adjusted R-squared
	Rainfall	Lagged Rainfall	Relative Price	Area Growth Rate		
<u>Regressions for Wheat</u>						
<i>Area Growth Rate</i>						
Model W1	1.6	-2.2***			0.8	0.17
Model W2	1.4	-2.4**	0.05		0.8*	0.15
<i>Quantity Growth Rate</i>						
Model W3				1.5***	1.9**	0.46
Model W4	4.3***	-2.0		1.1***	2.5***	0.55
Model W5	4.2**	-2.2	0.03	1.1***	2.5***	0.53
<i>Yield Growth Rate</i>						
Model W6	4.5***	-2.3*			2.6***	0.23
Model W7	4.4***	-2.4*	0.04		2.6***	0.21
<u>Regressions for Rice</u>						
<i>Area Growth Rate</i>						
Model R1	5.7***	-0.8			0.8**	0.69
Model R2	5.5***	-1.0**	0.09		0.8**	0.70
<i>Quantity Growth Rate</i>						
Model R3				2.5***	2.2**	0.70
Model R4	2.0	-5.3**		2.1***	1.7*	0.75
Model R5	2.3	-5.7**	0.13	2.0***	1.8*	0.75
<i>Yield Growth Rate</i>						
Model R6	8.0***	-6.1***			2.6***	0.49
Model R7	7.7***	-6.6***	0.23		2.6***	0.49

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Note: 1. The rainfall is calculated as the standard deviation from the long-term average for the Jun-Sep quarter.

2. The independent variables, relative price and area growth rate, are for rice and wheat for the respective rice and wheat regressions.

Section 4b: Redistribution Policy I - PDS

The procurement and distribution of food grains is handled through the Food Corporation of India (FCI), a public institution set up in 1965. This institution does all of the procuring of food grains, the storage of buffer stocks, and sales to ration shops, which in turn sell it to consumers at different prices (below poverty line and above poverty line). It is very likely that FCI is the largest supply chain organization in the world, and the public distribution system (PDS) the largest such system in the world.

The operation of PDS dates back to the rationing system in operation at the time of the Bengal famine in 1942. In 1960 the operation was extended to few major cities in India. (Pal 2011 has a useful summary of the operation of FCI and PDS.) Starting in 1978, PDS underwent a major expansion as India instituted a coordinated multipronged strategy for the production of food grains, its pricing (minimum price supports), and distribution. Just seven years later, then Indian Prime Minister Rajiv Gandhi described PDS as corrupt or inefficient or both, and concluded that only 15 percent of funds meant for redistribution to the poor actually reach them. (See Bhalla 2014 for discussion.)

In the first extensive study of the PDS, Parikh (1994) concluded, on the basis of the 1986-87 NSS survey, that on average “less than 22 paise [percent] reach the poor in India” (Parikh 1994, p. 15). Food subsidies totaled approximately Rs. 20 billion in 1986-87, which means that the poor received Rs. 4,400 million. If there were 300 million poor in India in 1986-87 (old Dandekar Rath poverty line), the poor would have received an annual subsidy of Rs. 15 or approximately Rs. 1.25 per person per month. This translates into roughly a reduction of 1 percentage point in the poverty rate, or 3 million poor.² Summarizing, for each person from poverty, the government spent approximately Rs. 6,700 through PDS.

How does the PDS performance in 2011-12 (the most recent year for which detailed NSS data are available) compare with 1986-87?

Table 6 provides some aggregate data on the performance of the PDS for five NSS years: 1993-94, 1999-2000, 2004-05, 2009-10, and in 2011-12. Official food subsidy data (Ministry of Finance) are compared with estimates obtained from the NSS surveys. The latter provide for each household the quantity and value of rice, wheat, and sugar obtained from the ration shops (PDS) and the market; thus, for each individual household, the subsidy received from PDS can be estimated, that is, the quantity purchased from ration shops multiplied by the difference in the market and PDS price.

² Almost a decade later (1993-94), the government spent Rs. 13,200 to remove one person from poverty. The percentage reduction in the poor remained the same: about 1 percentage point. See Table 6.

Table 6: PDS Performance (1993-2012)

	Year				
	1993-94	1999-2000	2004-05	2009-10	2011-12
Population (millions)	700	733	982	982	1043
Poor (%)	45.6	42.6	37.7	29.9	22.2
Poor, without PDS (%)	46.2	44.7	39	33.1	25.1
Estimated number of poor made non-poor by PDS (millions)	4.2	15.4	12.8	31.4	30.2
Expenditure to make 1 person non-poor (Rs.)	13,183	6,129	20,210	18,598	24,076
<i>Food Subsidy Received (in Rs. thousand crores)</i>					
All population, government of India figures	5.5	9.4	25.8	58.4	72.8
All population (NSS)	2.5	5.6	7.1	32.2	39.0
- Poor (NSS)	1.0	2.3	3.09	10.8	10.5
- Non-poor (NSS)	1.6	3.3	4.05	21.4	28.5
<i>Food Subsidy Received (NSS as a share of gov't of India)</i>					
All population	46.0	59.1	27.7	55.0	53.5
- Poor	17.9	24.4	12.0	18.4	14.4
- Non-poor	28.0	34.8	15.7	36.6	39.2
Does not accrue to anyone - macro leakage	54.0	40.9	72.3	45.0	46.5

Source: Government of India, NSS Consumer Expenditure Surveys

There are several important facts that emerge from this summary analysis. First, note that a very large fraction of the subsidy, upward of 40 percent, does not accrue to anybody; in 2004-05, this leakage spikes up to 72.3 percent. One can speculate as to where it goes—food rots, some “rotten” food is sold to the liquor trade, FCI purchases of grains go directly to the mills, and so on. There are no data that can estimate the different components of corruption, but this factor is large, and from all accounts, it has been increasing since the 1980s. The second conclusion is that of the food delivered to ration shops, the subsidy received by the poor (based on the Tendulkar or World Bank definition of PPP \$1.90) is no more than a quarter of funds received in any of the years. In fact, in 2011-12, a year characterized by scholars such as Dreze-Khera as a good year for PDS, the amount of the subsidy that made its way to the poor was a mere 14.4 percent. As Dreze and Khera (2013) put it, “First, PDS leakages remain unacceptably high—about 30 percent according to the lowest estimate for 2011–12. Second, there is strong evidence of declining leakages in recent years.”

Out of every Rs. 100 spent by the government on food subsidies in 2011, only Rs. 14.4 was received by the poor. Phrased differently, the government spent Rs. 6.9 to transfer Rs. 1 to the poor in 2011-12, well ahead, and almost double, the inefficiency documented in the Government of India (GOI) (2005) report for the PDS system in 2001. “Taking into account all the inefficiencies of PDS, it is found that GOI spends Rs. 3.65 to transfer Rs. 1 to the poor” (2005, p. xvi). In the year closest to the GOI study, 1999-2000, the NSS estimate of the transfer income required was 100/24.4, or Rs. 4.1—reasonably close to confirm our method, and findings, for the

other years. Uncannily, the 2011-12 estimate of transfers to the poor is identical to the back of the envelope conclusion reached by Prime Minister Rajiv Gandhi in 1985.

One final conclusion: the table also contains an estimate of how many poor people were lifted out of poverty because of the operation of the PDS program in each of the different NSS years. This estimate is the decline in the head-count ratio on the basis of the transfer received. For 2011-12, there were 22.2 percent poor in India. If the PDS system were not in operation, the poverty rate would have been 25.1 percent. In terms of population, 32 million were moved out of poverty at a total cost to the government of Rs. 72,800 crores, or 0.81 percent of GDP. This number is put into perspective by noting that perfect targeting to lift everyone out of poverty (admittedly an impossible task) would have cost the government just 0.53 percent of GDP.

Section 4c: Redistribution Policy II - NREGA

Food for work programs were pioneered in Maharashtra in 1973 one year after the worst drought in Indian history, based on rainfall data available since 1871. In 1972, the rainfall deficit was 25.1 percent below normal. And in October 1973, oil prices quadrupled, dealing a severe blow to any prospects of economic recovery. Poverty levels (according to the new PPP \$1.90 a day poverty line) were also extremely high—more than three-quarters of the population. And the public distribution system of providing foodgrains to the poor had not started.

This background is important because it shows there was a well-defined objective need for redistribution to the poor in 1973. This was not the case in 2005 when one of the flagship programs of Sonia Gandhi and Manmohan Singh's administration, the National Rural Employment Guarantee Act, was passed as legislation. NREGA became fully operational in 2009.

At this time, as noted, the food delivery system (PDS) was widespread. The amount allocated to NREGA was Rs. 39,900 crores, an amount equal to 0.45 percent of GDP. In other words, this was a large-scale, ambitious employment program.

The goals of the NREGA program were straightforward: to “enhance livelihood security for all adults willing to perform unskilled manual labour in the rural areas of India. No household would get more than 100 days of work, but work could be split among household members.” Interestingly, a minimum work age was specified, but not a maximum work age. The work requirements are very onerous, back-breaking work (digging ditches, building canals, and the like), which only the very desperate poor would opt for in order to make the self-selection targeting method work.

By June 2008, the NREGA was implemented across all rural areas (an urban employment act was envisioned but not implemented). It was endorsed by most as an income transfer poverty reduction program. NREGA (now called MGNREGA with MG standing for Mahatma Gandhi) has been correctly advertised as the largest public works program in world history.

After the phased implementation, there was a mandatory 60 percent of the allocation for wage payments. Very ambitiously, anyone who didn't receive a job within 15 days of applying was eligible for unemployment allowance; also, if a family asked for 100 days of work and was not provided the same, it could, theoretically, sue the government for violating the terms of a constitutionally valid contract.

Compared to the first work program in 1973, conditions were far more favorable in 2009: real per capita incomes were 3.6 times the level of 1973, the head-count ratio of the poor was less than half (29.9 percent in 2009-10 versus 76.9 percent in 1973). Stated simply, the need for a new income redistribution via employment generation program was not very compelling in 2009.

Section 4d: NREGA – How Important and How Successful?

There are several parameters by which to evaluate the success of the NREGA: how many jobs it provided; how good the self-targeting method was (expected to be very good because of the back-breaking nature of the work involved); and how much poverty declined because of NREGA.

The analysis is helped by the fact that in the first full year of implementation, 2009-10, a year that seemed to have the maximum need (a drought year), there were detailed questions in the NSS Employment and Unemployment Survey regarding the program, such as which households participated, how many days of employment they obtained, at what wage, and what the mean monthly consumption of the household was (and hence whether it was classified as poor or not poor).

For reasons unknown, key questions on household number of days on NREGA were omitted in the 2011-12 NREGA survey. So a rigorous comparison of the two sources of data on NREGA—the NSS and the Ministry of Rural Development (MRD)—cannot be undertaken for 2011-12. Fortunately, a survey nearly identical to the one done by NSS was carried out in 2011-12 by the National Council of Applied Economic Research (NCAER) and the University of Maryland (Desai 2015). This survey goes into detailed analysis of NREGA for 2011-12. These three data sources (NSS, NCAER, and MRD) are used to evaluate the largest employment redistribution program in the world.

Before presenting the results on performance, a brief summary of the claims made in favor of the introduction and continuation of the NREGA program are as follows.

- (1) It is a self-selection program and so targeting of beneficiaries is not a problem.
- (2) The program is large and by mandating and providing minimum wages, it helps raise rural wages.
- (3) It helps reduce poverty by large amounts and therefore may be the most efficacious poverty program not only in India, but in the entire developing world.
- (4) It costs very little—less than 0.45 percent of GDP in 2009-10, the first full year of implementation, and also a drought year so one can attest to its importance.

Each of the assertions is examined below.

Targeting: NREGA was designed to help the poorest households with employment for a maximum of 100 days. The pattern has been that instead of 100 days of employment, only about 37 days were provided per household in 2009-10. While the program was scaled to reach most of the 43.5 percent of the rural population considered to be poor,³ less than a third of the poor households received NREGA employment (Table 7).

³ The NSS Employment survey has a reduced questionnaire for consumption since it is primarily a survey for employment. The NSS consumer expenditure survey reports a level of rural poverty of 33.3 percent in 2009-10

Table 7: Poor Targeting of NREGA

	Years	
	2009-10	2011-12
Total households in rural areas (millions)	163	174
Total workers in rural areas (millions)	283	
Total NREGA workers (millions)	39.4	
Average number of days worked in a year		
- Total	320	193
- NREGA	37.4	34
- NREGA poor	34.7	30
- NREGA non-poor	39.2	35
Days worked in NREGA (% of total)	11.7	17.4

Source: NSS, IHDS

Note: NSS is used for the year 2009-10 and IHDS for the year 2011-12.

Employment: In 2009-10, the rural workforce consisted of 283 million individuals, working an average of 320 days a year, yielding total employment of 90.4 billion workdays. NREGA households (those with at least one day of NREGA work) numbered 39.4 million, and these households found NREGA work for 37.4 days, yielding a total NREGA workdays of 1.47 billion. That is a lot, but it is just a small fraction (1.6 percent) of the total rural work.

Wages: It is claimed that NREGA helped raise the wages of the poor by a considerable extent (e.g., Imbert and Papp 2012, Zimmerman 2012 estimate a 25 percent increase in rural wages for women). However, it seems far-fetched to believe that adding 1.6 percent to the amount of rural work could have had a major impact on rural wages.

Table 8 reports some wage data for the two years 2009-10 and 2011-12. When NREGA started in 2009-10, the wages it paid were slightly above those of a ploughman, according to the NSS. Two years later, the ploughman was making almost half as much again, while the NREGA worker had a wage increase below the rate of inflation. The key point is that rural wages did indeed rise after NREGA's introduction, but a causal link is unlikely. If NREGA wages were pushing up other rural wages, they would probably be growing faster, not slower, than non-NREGA wages.

Table 8: Wages by Different Sources

Wages	Year		Change (2009-12) (%)
	2009-10	2011-12	
<i>Source: Labour Bureau</i>			
Carpenter	161	219	36.0
Ploughman	126	177	40.5
<i>Source: NSS</i>			
Ploughman	82	123	49.2
NREGA worker	89	106	19.4
<i>Source: IHDS</i>			
NREGA worker		110	
CPI Rural Price Index	77	93	21.2

Source: Labour Bureau, NSS, IHDS

Poverty Reduction: How effective has NREGA been in reducing absolute poverty? In Table 6, it was documented that the PDS program, involving an expenditure level of Rs. 58,400 crores, was able to reduce poverty by almost three percentage points. The NREGA employment program involved an expenditure level of 38,900 crores and, in its absence, the rural poverty level would have increased from 38.3 percent poor to 40.5 percent poor. In other words, NREGA allowed 16.3 million individuals to become non-poor in 2009-10. The cost of this policy: Rs. 23,860 to make one individual not poor. In the same year, the PDS program spent Rs. 18,600 to make one individual not poor.

For 2011-12, estimates derived from unit-level data for the 2011-12 NCAER-Maryland survey, suggest similar results. Indeed, by 2011-12, the same nominal expenditure level on NREGA was able to reduce poverty by only 1.1 percentage points (compared with 2.2 percentage points in 2009-10). Other scholars reach different conclusions. Desai-Vandemann (2014) have a very optimistic evaluation of the NREGA program. They state that poverty reduction due to NREGA was almost seven times what we document in Table 9.

“For MGNREGA households, the poverty ratio rises from 31.3% to 38.0% if the effect of MGNREGA income-induced consumption is excluded. That is, a 6.7 percentage-point reduction in poverty can be attributed to MGNREGA. Since poverty fell by 20.9 percentage points between 2004–05 and 2011–12, 32.1% of poverty reduction for MGNREGA participants is due to NREGA employment.” (Desai-Vanneman, p. 59). However, Desai-Vanneman looked only at those households that received some positive NREGA payments, not at the whole universe of poor households.

Table 9: Poverty Reduction Due to NREGA

	Years	
	2009-10	2011-12
Number of rural households (millions)	163	174
Rural population (millions)	741	831
<i>Poor</i>		
% poor households	31.7	20.1
% poor households receiving NREGA (of poor households)	31.8	31.0
Average subsidy per household (in Rs./month)	269.2	311.0
<i>Non Poor</i>		
% non-poor households	68.3	79.9
% non-poor households receiving NREGA (of non-poor households)	20.6	23.0
Average subsidy per household (in Rs./month)	300.1	122.6
<i>Poverty Reduction</i>		
% poor people	38.3	24.1
% poor without NREGA	40.5	25.2
NREGA contribution to poverty reduction	2.2	1.1
Reduction in number of poor (million)	16.3	9.1
Expenditure on NREGA (Rs., or thousand crores)	38.9	37
Expenditure in reducing 1 person from poverty	23,862	40,477

Source: NSS, IHDS

Note: NSS is used for the year 2009-10 and IHDS for the year 2011-12.

In conclusion, less than one-third of poor households received NREGA payments. The average payment received per household in 2011-12 was Rs. 311/month, or about Rs. 2 per person per day, or 7 percent of the rural poverty line. The impact on poverty was consequently quite limited, while the costs of the program have been substantial.

5. Conclusion

Two successive droughts in India, in 1966-67 and 1967-68, had a significant effect on the Indian psyche and policy. To mitigate this situation, India had to go to the United States to obtain tied food aid (PL 480). Fortunately, the Green Revolution was being ushered around the same time, and India readily adopted the high-yield variety of seeds.

For the decade 1970 to 1980, India had a net excess availability of cereals (excess of availability over consumption) of approximately 10 million metric tons (MMT) a year. This net excess has increased by 10 MMT each decade, and for the past 25 years net excess availability has averaged around 40 MMT per year. Thus, India achieved its objectives of national food security, largely through a mix of subsidized inputs and high procurement prices for grains.

For individuals, Indian policy toward the alleviation of hunger, poverty, and malnutrition has been well intentioned, and the intentions have been followed up with large expenditures. However, these programs are best viewed as helping all the classes—poor, non-poor, middle classes, and even the rich—rather than just the poor. And the poor have often received less than what is due as to their share of the population.

These direct welfare expenditures have been accompanied by large leakage. Regardless of the welfare program concerned, e.g. food subsidies or employment subsidies (NREGA), the leakage is often in excess of 50 percent. This leakage is defined as that magnitude of food, or wages, or money, that appears on the government books but does not appear in household surveys to accrue to any individual household.

There is one major policy implication of this study, and that is that the government needs to accelerate its move to direct cash transfers to help the poor. Encouragingly, this is already in the works and the next couple of years should witness a major transformation in the provision, and efficiency, of public goods and public transfers.

A second implication of this study is that the focus of India's FNS interventions must change from encouraging more grain-based calorie consumption to directly targeting malnutrition. Food subsidies and a control regime (minimum support prices for output, control of prices of essential commodities, right to food and food distribution system) have been the defining characteristics of the Indian policy toward food security. Despite excess and subsidized food, nutrition statistics (as in height for weight) have painted India as not only being worse than its poorer neighbors of Pakistan and Bangladesh but also worse than the desperately poor economies of sub-Saharan Africa. Research by Dean Spears and other scholars has documented the strong debilitating effect of the widespread practice (more than 50 percent of the population) of open defecation on nutrition statistics in India. For the very first time, a public official (Prime Minister Narendra Modi) highlighted the problem in a high-profile address on Independence Day, August 15, 2014.

New goals have been set for sanitation. Every school will have toilets, with separate toilets for girls and boys. So far, 3.64 lakh of the 4.19 lakh toilets have been constructed, according to data released by the Ministry of Human Resource Development. Food security is also being deemphasized—food buffer stock targets have been halved (only 30 MMT a year versus stocks of 60 MMT), and it is likely that within the next three years, the procurement and public distribution system of food will be phased out and replaced by a cash transfer system.

Agriculture is also being reformed for the first time in Indian history. Controls on production and distribution are being lifted, and a national comprehensive crop insurance scheme will it is very likely, and very soon, be introduced. Funds for irrigation are also being stepped up, and a reduction of power and fertilizer subsidies is likely. In addition, fuel subsidies have been substantially reduced.

Together, these policy shifts should bring about far greater efficiency and effectiveness in FNS programs in India, both in terms of food production and in the affordability of food and its nutritional impact.

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