Working Paper 297

The National Food Security Act (NFSA) 2013 -Challenges, Buffer Stocking and the Way Forward

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March 2015

INDIAN COUNCIL FOR RESEARCH ON INTERNATIONAL ECONOMIC RELATIONS

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Abbreviations

AAY	Antyodaya Anna Yojana Programme (for poorest of the poor)
APL	Above Poverty Line
BPL	Below Poverty Line
CACP	Commission for Agriculture Costs and Prices
CCTs	Conditional Cash Transfers
CPI	Consumer Price Index
CIP	Central Issue Price
DFPD	Department of Food and Public Distribution
FCI	Food Corporation of India
FPS	Fair Price Shops
GDP	Gross Domestic Product
HP	Himachal Pradesh
ICDS	Integrated Child Development Services
ICT	Information and Communication Technology
IGMSY	Indira Gandhi Matritva Sahyog Yojana
J&K	Jammu and Kashmir
MDM	Mid-day meal
MMTs	million metric tonnes
MP	Madhya Pradesh
MPC	Monthly per capita
MSP	Minimum support price
NFSA	National Food Security Act, 2013
NFSB	National Food Security Bill
NMMT	Nagaland, Manipur Mizoram, and Tripura
NREGS	National Rural Employment Guarantee Scheme
NSSO	National Sample Survey Organisation
OMSS	Open Market Sales Scheme
OWS	Other Welfare Schemes
PDS	Public Distribution System
SECC	Socio-economic and Caste Census
SSP	Social Security Pensions

TN	Tamil Nadu
TPDS	Targeted Public Distribution System
UID	Unique Identification Authority
UP	Uttar Pradesh
UT	Union Territory
VGB	Village Grain Bank
WB	West Bengal
WBNP	Wheat-based Nutrition Programme

Acknowledgements

The research leading to this publication is part of an ongoing ICRIER-ZEF research project titled "Stabilising food prices through buffer stocking and trade policies". It has been funded by the German Federal Ministry for Economic Cooperation and Development (BMZ) within the research project "Commodity Price Volatility, Trade Policy and the Poor" and by the European Commission within the "Food Secure" research project.

The authors wish to thank Dr. Shankar Acharya, Honorary Professor, ICRIER and Prof. Anwarul Hoda, Chair Professor of ICRIER's Trade Policy and WTO Research Programme for reviewing the paper and giving valuable suggestions.

Abstract

The National Food Security Act (NFSA) 2013 combines and expands the scope of some existing food-based welfare schemes. It will be distributing raw rations, meal(s) and/or cash. Approximately 81.35 crore persons or 16.57 crore households are to benefit under the targeted public distribution system (TPDS) under the Act. The annual food grain requirement is estimated at 61.43 million tonnes with annual food subsidy implication of around Rs. 1.31 lakh crore.

The paper empirically maps the annual distribution commitment (61.43 MMTs) of the government with the procurement pattern of rice and wheat, for each quarter, to estimate the quarterly operational stocking norms. In addition to the 61.4 MMTs grains, needed to meet the operational needs, the country also stocks for *strategic* needs. The paper proposes creation of 10 MMTs of grains in this regard- five MMTs to be procured from the domestic market and the remainder from the international market on a need basis. By re-introducing the concept of fungibility between the operational and strategic stocks and by utilizing the dynamics of the procurement pattern, the paper shows that the 61.4 MMTs of annual grain procurement will be sufficient for both the operational and strategic stock needs of the country. The estimated new norms (Scenario 2) are January – 21 MMTs, April – 18.7 MMTs, July – 36.8 MMTs and October – 24 MMTs. Recently approved CCEA norms, on comparison, are found to be on the higher side indicating the government's implicit preference for lower risk (the government stocks higher levels of strategic reserves, used mainly to smoothen inter/intra year fluctuations, than required) even if that implies higher costs.

There are wider apprehensions that the Act will fail to deliver on the promises made. The bigger operational challenges include- ensuring the adequate supply of grains every year, lowering per person entitlement or population coverage particularly when the population is expanding, unpreparedness of the implementing states, slowing down the natural process of agricultural diversification by increasing the relevance of rice and wheat in the system.

Therefore, the immediate suggestion is not to hurry in the NFSA implementation process, especially not without satisfying its pre-conditions in each state. Explicit challenges that the continuation of the existing system pose on the system warrants one to devise an appropriate income policy instrument to substitute NFSA. Trying to achieve an equity objective (extending economic access to food for the poor) by using a price policy instrument is also inconsistent with the basics of economics. The answer going forward lies in substituting the present system of physically distributing grains with conditional/unconditional cash transfers.

JEL classification: *Q18, I 38, H42, E61*

Keywords: *Buffer stock, India, agriculture, National Food Security Act (NFSA), FCI, Cash Transfers*

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Disclaimer: The research leading to this publication is part of an ongoing ICRIER-ZEF research project titled "Stabilising food prices through buffer stocking and trade policies".

Executive Summary

The National Food Security Act (NFSA) 2013, seeks to deliver food security to targeted beneficiaries covering roughly 67 per cent of the country's population. It combines and expands the scope of some existing food-based welfare schemes like targeted public distribution system (TPDS), wheat-based nutrition programme (WBNP) of integrated child development services (ICDS) and mid-day meal (MDM) schemes and a conditional cash transfer scheme called the Indira Gandhi Matritva Sahyog Yojana (IGMSY). It will be distributing raw rations, meal(s) and/or cash depending on the scheme under which the beneficiary is covered. Besides these, the Act recommends targeted efforts to identify and support malnourished children across states.

It gives a legal character to per person entitlement. In the case of non-supply of the entitlement, the centre commits to giving a *food security allowance*. Based on population coverage and the distribution commitment, TPDS forms the largest component of the NFSA. There are two types of TPDS beneficiaries under NFSA – namely Antyodaya (AAY or the poorest-of-poor) and priority – who are entitled to 35 kg/family/month and to 5 kg/person/month of grain respectively. Rice, wheat and coarse cereals are to be distributed at the central issue prices (CIPs) of Rs 3/2/1 per kg respectively.

State-wise number of NFSA beneficiaries are determined and communicated to states by the centre. The states are advised to use the results of an on-going extensive household-level survey called Socio-Economic and Caste Census (SECC), to identify these beneficiaries. Approximately 81.35 crore persons or 16.57 crore households are to benefit under the TPDS, more than 10 crore children under the MDM and about the same number of women and children under the ICDS. Annual food grain requirement to feed these schemes is estimated at 61.43 million tonnes. The annual food subsidy implication of implementing the NFSA at 2014-15 costs is estimated to be around Rs. 1.31 lakh crore, against which Rs. 1.15 lakh crore has been provided in the budget for the current year (2014-15). However, after accounting for pending food subsidy bills of about Rs. 50,000 crore, the true cost of food subsidy in FY 2015 is likely to be around Rs 1.65 lakh crore.

A legal distribution commitment of 61.4 million metric tonnes (MMTs) of grains annually has implications on the annual grain operations of the country and thus, on buffer stocking norms. The paper determines the annual procurement target to meet this distribution commitment under two scenarios – one for a base year with zero stocks at the beginning of the procurement season and one for each of the subsequent years, which start with some carry forward stocks from the previous year. By empirically mapping the distribution commitments of the government with the procurement pattern of rice and wheat for each quarter, the paper estimates the operational stocking norms.

The finding was that to meet an annual distribution commitment of 61.4 MMTs, the country needs to procure 71.7 MMTs in the base year (zero grain stocks) and for each successive year, the procurement targets freeze at the distribution commitment of **61.4 MMTs** due to

stocks being brought forward from the previous year. In addition to this, the paper proposes the creation of 10 MMTs of stock as strategic stock – five MMTs procured and stored from the domestic market and the remainder to be procured from the international market on a need basis. By re-introducing an old concept of *fungibility* between the operational and strategic stocks, the paper shows that the 61.4 MMTs of annual grain procurement is sufficient to meet not just annual operational (TPDS and OWSs) needs but also the five MMTs of strategic stock needs, where the latter are maintained for smoothening inter/intra-year supply fluctuations.

According to the estimates generated in the paper, the July 1 stock norm of rice and wheat needs to be raised to 36.8 MMTs as against the earlier norm (from 2005-2014) of 31.9 MMTs. Similarly, the October 1 stock norm needs to be increased from 21.2 MMTs to 24.1 MMTs. The norms for the quarter beginning January and April can be revised downwards compared to earlier norms. Upon comparing these calculated norms with the CCEA approved revised norms, we find that the latter are somewhat on the higher side, indicating the government's implicit preference for lower risk (the government stocks higher levels of strategic reserves, used mainly to smoothen inter/intra year fluctuations, than required) even if that implies higher costs. However, if one used the concept of fungibility between operational and strategic stocks, there could be a clear case for reducing the new CCEA approved norms by at least four MMTs, particularly for quarters beginning October and July.

States were required to identify the beneficiaries and implement the provisions of the Act latest by July 4, 2014. Within this stipulated time, only 11 Indian states/ UTs implemented the Act provisions, *completely or partially*. Three months' extension was given to the remaining states that was later extended until the end of the present financial year, i.e. March 31 2015. However, given the present level of unpreparedness and uncorrected systemic inefficiencies of the state PDS machinery, the likelihood of states defaulting on even the extended deadline is high. There are wider apprehensions that the Act will fail to deliver on the promises made, or will deliver at a huge cost, which may not be worth the price. The bigger operational challenges include ensuring the adequate supply of grains every year, lowering per person entitlement or population coverage particularly when the population is expanding, unpreparedness of the implementing states, and slowing down the natural process of agricultural diversification by increasing the relevance of rice and wheat in the system.

Therefore, the immediate suggestion is not to hurry the NFSA implementation process, especially not without satisfying its pre-conditions in each state. Although a growth-focused model of poverty alleviation is the right strategy, it will take a lot of time to deliver. Hence, there is a need to devise an appropriate income policy instrument to substitute NFSA, which is essentially trying to achieve an equity objective (extending economic access to food for the poor) by using a price policy instrument. The answer lies in substituting the present system of physically distributing grains with conditional cash transfers, based on the platform created by the *Aadhaar* unique identity (UID) scheme. A scheme of cash transfers will mean larger savings and lesser leakages. Such saving when ploughed back into agriculture as investments

in irrigation, agricultural research and development, rural roads, etc., can immensely benefit Indian agriculture and provide sustainable food security to the people of this country.

The National Food Security Act (NFSA) 2013- Challenges, Buffer Stocking and the Way Forward

Shweta Saini and Ashok Gulati*

I. Background

India today has the largest mass of poor and malnourished people in the world. The country has one-sixth of the world's people and one-third of the world's poor. India's share of the world's poor in 2010 (33 per cent) was higher than it was 30 years ago in 1981 (22 per cent) (World Bank, 2013). One in every three malnourished children in the world is from India (HUNGaMA, 2011). According to the Global Hunger Index (2010), India is home to 42 per cent of the world's underweight children.

Globally, poverty is defined as a state where people live on less than $1.25 per day.[1] Dearth of financial resources results in lower or no economic access to sufficient and nutritious food, leading to food insecurity and malnutrition. Lack of proper sanitation, limited or no access to safe drinking water and high levels of female illiteracy amplify the problem. Ensuring food security for its large and growing population has always been a high priority for Indian policy makers.

The concept of food security encompasses not only making enough quantities of food available in the market at all times but also making it economically affordable for the poor. Sticky double-digit food inflation (CPI- food averaged 11.5 per cent between 2011-12 and 2013-14) has made affordability a daunting challenge for the vast segment of the country's poor. For decades, policy makers have been devising targeted food-based welfare programmes aimed at food security.

The public distribution system (PDS) or the targeted public distribution system (TPDS)[2] is an important medium through which the government has been delivering food (primarily wheat and rice) at the micro-level since the 1950s. The government, *via* the Food Corporation of India (FCI),[3] procures and stocks food grains (called the *operational stocks* of FCI), for release every month for distribution by state agencies to the identified poor under various

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[1] Indian definition of poverty is based on consumption expenditures. For 2011-12, for rural areas, the national poverty line using the Tendulkar methodology is estimated at Rs. 816 per capita per month and Rs. 1,000 per capita per month in urban areas. According to this Report, poverty in India in 2011 was only 22 per cent.

[2] The PDS, until the 1990s, distributed rationed subsidised grains to everyone in the country. In 1997, the system was reoriented to 'target' only the poor under the scheme. Due to this targeting focus, the system was now called the TPDS.

[3] The Corporation is the main agency responsible for executing the food policies of the Indian government. The functions of FCI primarily relate to the purchase, storage, movement, distribution and sale of food grains on behalf of the GoI.

food-based welfare schemes. FCI also stocks grains to smoothen any inter/intra-year supply fluctuations of grains called *strategic stocks*.

The grain is distributed by the FCI at central issue prices (CIPs)[4] through the PDS network of 5.15 lakh[5] fair price shops (FPSs) spread across the country. The Department of Food and Public Distribution (DFPD) uses a state-wise estimate of the number of below-poverty-line (BPL) (including Antyodaya (AAY)) families[6] to allocate food grains (rice and wheat) to them under the TPDS. This estimate is the lower of the two numbers – the number of BPL families based on the 1993-94 poverty estimates of the Planning Commission (using the March 1, 2000 population estimates from the Registrar General of India (RGI)), or the number of such families as identified by states/union territories (UTs) based on the number of ration cards issued.[7] According to the PDS (Control) Order, 2001, state/UT governments are to review the lists of BPL/AAY families every year to delete ineligible families and include eligible ones.

Under the existing system, there are 6.52 crore BPL families (including 2.5 crore AAY families) identified in the country, who are eligible to get 35 kilograms of food grains per family per month at highly subsidised rates. In addition to theses BPL families, 11.5 crore above-poverty-line (APL) families also benefit under the scheme. TPDS has been subject to massive criticism due to various operational and economic inefficiencies like inclusion and exclusion errors, grain damage, pilferage and leakage of grain. (Saini and Kozicka, 2014)

Apart from TPDS, both the central and the state governments have devised other welfare schemes centred on the theme of food security. These schemes identify people based on their nutritional and societal vulnerabilities – age, and gender among others. They deliver rations and/or cooked meal(s) to identified beneficiaries.

The food security policy of the government has been expanded through the recently enacted National Food Security Act (NFSA). The Act combined and expanded a few of the existing welfare policies centred on subsidised food distribution. It involves the distribution of highly subsidised or free rations or pre-cooked (and heated meals) or freshly cooked meals and/or cash, to various categories of beneficiaries. The Act expands the TPDS a step further by expanding the coverage and by granting people the legal right to receive subsidised food grains as an entitlement. This legal entitlement is provided to 67 per cent of India's population of 1.21 billion. The Act delinks subsidised food grain distribution from poverty levels. Several experts have expressed strong apprehensions about the capability of the programme to deliver on its ambitious objectives given numerous operational and systemic challenges.

[4] CIPs for the BPL families are always lower than the market prices.
[5] As per Food grains Bulletin, September 2014
[6] This was a scheme launched by GoI in 2000, directed towards the poorest-of-the-poor people of the country. AAY families are identified from amongst the BPL families in the country.
[7] Rajya Sabha question (2014) – Unstarred question No. 2530. Ministry of Consumer Affairs, food and public distribution, GoI

It is against this backdrop that we proceed to look at the various provisions of the Act in some detail in the Section II of the paper. In Section III, we will estimate the total annual grain required by the country after all-India implementation of the NFSA. With these estimates of grain needs, Section IV evaluates the implications on buffer stocking norms and estimates the revised norms. Section V details the operational and financial challenges associated with the Act implementation. Synthesising the analysis, Section VI presents the way forward and also looks at alternative options that could help achieve the same food-security ends at a much lower cost and with much less distortions to agricultural markets than are likely to result from the implementation of this Act.

2. The National Food Security Act (NFSA), 2013

The National Food Security Ordinance (NFSO),[8] 2013 was promulgated on July 5, 2013, and the National Food Security Act (NFSA) was enacted on September 10, 2013.

Following a life-cycle approach, NFSA will deliver food security to identified people from various age groups, financial backgrounds and nutritional needs. Besides the entitlement to food grains under the TPDS, the Act also entitles pregnant women and lactating mothers, and children up to fourteen years of age to meals under the wheat-based nutrition programme (WBNP) of the integrated child development services (ICDS) and mid-day meal (MDM) schemes among others. The Act also includes an existing conditional cash transfer scheme called the Indira Gandhi Matritva Sahyog Yojana (IGMSY).

The Act is the biggest experiment in the world history of food-based welfare schemes[9] by any government. By ensuring that a majority of the Indian population has access to adequate quantity of food at affordable prices, the Act is seen as a vital conduit to address the persistent problems of food and nutritional security of the Indian population.

The central government framed the Act and the respective scheme details, leaving it on the state governments to implement and monitor the scheme. States got 365 days to identify the beneficiaries, improve delivery systems and implement the provisions of the Act. Within this time, only 11 Indian states/ UTs implemented the Act, completely or partially.

The estimate is that the food subsidy for a full-year roll-out of the NFSA will cost roughly Rs 1.31 lakh crore as food subsidy,[10] which is close to 1.15 per cent of the current GDP (gross domestic product) of the country, and nearly 15 per cent of the total tax revenue collected by the central government in 2013-14.[11] The budgeted figure for food subsidy, for FY 2015, is Rs 1.15 lakh crore. In addition, the Food Ministry estimates an outstanding amount of Rs. 50,000 crore needed to settle pending food subsidy bills. So, the true cost of food subsidy in

[8] The National Food Security Bill (NFSB) was tabled in Parliament for discussions in December 2011.
[9] Gulati A. and Jain S. (2013), Buffer Stocking policy in the wake of NFSB: Concepts, Empirics and Policy Implications. Discussion paper No.6. CACP. GOI
[10] Rajya Sabha question (2014), Unstarred question No. 2522 Ministry of Consumer Affairs, food and public distribution, GoI
[11] According to the budget documents of the Government of India and Finance Accounts, total tax revenue of the central government in 2013-14 was Rs. 8,84,078 crore.

FY 2015, is likely to be about Rs 1.65 lakh crore, which is about 1.45 per cent of GDP in FY 2014[12].

Given the widespread objectives and implications, and the mammoth financial commitment involved, it becomes important to understand the various provisions of the major schemes under the NFSA. This is taken up below.

2.1 Targeted Public Distribution System (TPDS)

Based on the quantum of grain-distribution commitment, the coverage and the expected impact, the TPDS forms the largest component of NFSA, 2013. The TPDS entitles the persons belonging to eligible households to receive food grains (mainly rice, wheat and coarse cereals) at highly subsidised prices. (See Annexure 1 for a snapshot of the history of TPDS) The new system is likely to benefit 81.35 crore people or about 16.57 crore households,[13] which are entitled to receive 5 kilograms of grains per person per month. The total grain need after the all-India implementation of NFSA, as estimated by the Ministry of Consumer Affairs, Food and Public Distribution, is 61.43 million metric tonnes (MMTs).[14] Close to 55 MMTs of this is needed to feed the TPDS alone.

State-wise coverage of population and households is substantially more than the coverage under the BPL category under the earlier TPDS in all states/UTs.[15] In a country with 22 per cent of the population living below the poverty line (as per Tendulkar Committee), coverage of 67 per cent under the Act clearly shows the intentions of the government to extend the benefit also to the population above the poverty line.

The key provisions of TPDS under the Act are as follows:

- *Types of Beneficiaries*: Unlike the earlier TDPS system, where beneficiaries are identified under three broad categories – poorest of poor (Antyodaya or AAY), BPL and APL – there are only two categories under the Act's TPDS, namely, priority and AAY. The AAY beneficiaries, under the existing TPDS system, are retained under the NFSA.

- *Entitlements*: Persons belonging to eligible households are entitled to receive 5 kilograms of food grains (rice, wheat, and coarse grains) per person per month at subsidised prices or CIPs; provided that existing AAY households, which constitute the poorest of the poor, will continue to receive 35 kilograms of food grains per household per month. This compares to the earlier entitlement of 35 kg/card/month for all beneficiaries under TPDS.

  The Act supports the state governments in distributing wheat flour in lieu of the entitled quantity of food grains.

[12] GDP at market price is Rs. 113.55 lakh crore for the year 2013-14

[13] Rajya Sabha question (2014), Unstarred question No. 1125 Ministry of Consumer Affairs, Food and Public Distribution, GoI

[14] Lok Sabha Questions (2014), Starred question No. 343, Answered on 18.02.2014. Ministry of Consumer Affairs, Food and Public Distribution, GoI

[15] Except in the case of Andaman and Nicobar Islands, according to Rajya Sabha question (2014), Unstarred question No. 1125, Ministry of Consumer Affairs, Food and Public Distribution, GoI

- *Central Issue Prices (CIP)*: NFSA freezes the issue prices for all identified beneficiaries at Rs 3/2/1 per Kg of rice/wheat/coarse cereals for **three years**.

  This is a huge change from the earlier TDPS system, where the three categories of beneficiaries received grains at different prices.[16]

- *Enforceable by Law and Force Majeure*: In case of non-supply of grains, the Act provides for supply of a food security allowance as a substitute. The central government will provide for the allowance. In case of non-provision, the central or state government will be liable to meet the claim by the entitled person under the Act. However, in situations of force majeure (like war, fire, drought, flood, cyclone, and earthquake), where regular supply of food grains/meals is adversely affected, the liability does not apply.

- *Coverage of population*: Under the NFSA, the coverage under TPDS has been delinked from poverty estimates and extended at the all-India level to cover up to 75 per cent of the rural population and up to 50 per cent of urban population. Based on the Census 2011 population figures, the number of persons eligible for subsidised food grain under the Act is estimated at 81.35 crore, which is 67 per cent of the total population or about 16.57 crore total households in the country.

  Until the next Census figures are available, the Act fixes the Census 2011 population figures as the base for the beneficiary identification process and for calculating the grain allocation commitments.

- *Identification of beneficiaries*: While the poverty estimates from the Planning Commission will form the base of the state-wise number of beneficiaries under the Act, the Socio-Economic and Caste Census (SECC) survey will help identify these beneficiaries in each state.

  Planning Commission determines this state-wise coverage by using the *NSS Household Consumption Survey* data and census population data for 2011-12 and estimates the number of people falling below a state-wise threshold level. Using these estimates, the Commission provides the state-wise inclusion ratios.[17] The SECC survey collects and estimates household level data to identify beneficiaries. The survey lays emphasises on capturing residential, social and occupational vulnerabilities. Processing the data against pre-determined indicators, the survey will be used to identify beneficiaries.[18](Annexure 6)

  However, the use of SECC by states is not binding. States could devise their own methodology to identify beneficiaries. If they decide to use the survey, they get the

[16] TPDS distributed grains to the BPL families at the subsidised rates of Rs. 4.15/kg for wheat and Rs. 5.65 /kg for rice; to AAY families at Rs. 2/kg for wheat and Rs. 3/kg for rice and to APL families at Rs. 6.10/kg for wheat and Rs. 7.95/kg for rice.

[17] Inclusion ratio is defined as the percentage of beneficiaries under the NFSA 2013 as a proportion of the total population of a state/UT.

[18] After conducting the SECC survey for districts in each state, a draft list is created and publicly displayed for disputes, if any, to be raised. Once the draft lists are ready and displayed, the final lists are created.

freedom to choose the relevant indicators and customise the survey. However, the total number of beneficiaries cannot be different from that fixed by the Centre.

- *Tide-over allocation*: For some states/UTs, the allocation of food grains based on the coverage so determined and entitlements prescribed in the Act was estimated to be less than the allocation under existing TPDS. Consequently, the Act has a provision that protects the annual allocation of food grains of such states/UTs to the extent of their average annual off-take under normal TPDS during the last three years (2010-11 to 2012-13). This compensatory allocation is called tide-over allocation in the Act and is made to the states at the APL prices of Rs. 8.30 and Rs. 6.10 per kg for rice and wheat respectively.[19] Interestingly, this additional allocation is understood to be available to states/UTs only until they implement the NFSA, after which the centre will discontinue this protection.

- *Extension of TPDS by States/UTs*: Driven by socio-political, moral, and economic motivations and pressures, different states/UTs have devised extensions of the centre's food-based welfare schemes like TPDS. These extended schemes are designed to complement and not substitute the schemes already introduced by the centre. The NFSA permits states to continue doing so.

- *Reforms in TPDS under NFSA*: The NFSA contains measures for reforms in the TPDS, to be undertaken progressively by the central and state governments. These reforms include, *inter alia.* doorstep delivery of food grains to TPDS outlets, application of information and communication technology (ICT) tools, diversification of commodities distributed under the PDS over a period of time, etc. The Act also includes provisions for transparency and accountability in TPDS that include disclosure of records of TPDS, conduct of social audit and setting up of vigilance committees at the state, district, block and fair price shop levels. The Act also provides for the establishment of the grievance redressal mechanisms at the district and state levels. In fact, the option of advance lifting and distribution of up to six months' ration under TPDS is also applicable under NFSA, 2013. The reformed TPDS machinery is supposed to form the basis of NFSA implementation.

  Nine-point Action Plan to Reform TPDS: In 2006-07 (later formalised in 2012), the centre evolved a nine-point action plan,[20] for ensuring the smooth functioning of the TPDS functioning. In addition to this, the government took up a plan scheme on end-to-end computerisation of TPDS operations during the 12th Five Year Plan.[21] The TPDS reform agenda has been carried forward into the NFSA.

[19] Rajya Sabha question (2014), Unstarred question No. 2525, Ministry of Consumer Affairs, Food and Public distribution, GoI

[20] These nine points study the status of implementation of various features of TPDS, like computerisation of TPDS operations, review of lists of beneficiaries, ensuring door step delivery of grains, taking action against the guilty charged for leakages under TPDS, etc.

[21] Under the scheme, financial assistance is provided to states/UTs, on cost-sharing basis, for the computerisation of the TPDS machinery.

- *Deadline extension for implementation of NFSA by States/UTs*: According to the Act, all the Indian states/UTs were given 365 days (revised upwards from 180 days given earlier according to the National Food Security Bill, 2011) from the commencement of the Act on July 5, 2013, to identify eligible households as per the guidelines framed under the Act. The states were to update their lists of eligible households, place the list in public domain and undertake stated reforms (end-to-end computerisation, door-step delivery to FPSs etc.) in the TPDS within this period.

  Based on the preparedness and identification of beneficiaries under TPDS reported by states/UTs, allocation of food grains under the Act has started for 11 states (Bihar, Rajasthan, Madhya Pradesh, Delhi, Punjab, Haryana, Chhattisgarh, Karnataka, Chandigarh, Himachal Pradesh and Maharashtra), which together account for close to 44 per cent of the total number of beneficiaries under the Act. For the remaining states, the 365-day deadline that was to have expired in July 2014 was extended to October 2014, and further to March 31, 2015. A proposal for implementation of the Act was recently received from the government of Uttarakhand.[22]

As mentioned before, apart from TPDS, there are two other major categories of existing schemes under the ambit of NFSA, 2013, namely the two 'other welfare schemes' *(OWSs) (MDM and WBNP-ICDS)* and the 'conditional cash transfer scheme'. These are elaborated upon below.

2.2 Other Welfare Schemes under NFSA 2013

The Act contains entitlements of meal(s) for pregnant women and lactating mothers and for children up to 14 years of age, through the ongoing integrated child development services (ICDS) and mid-day meal (MDM) schemes. These schemes benefit more than 10 crore people each.

The MDM scheme provides hot cooked meals to all children (10.54 crore children in 2011-12) attending Classes I-VIII in government and government aided-schools, Education Guarantee Scheme/Alternative and Innovative Education Centres (EGS/AIE). This scheme is run primarily with a view to enhancing enrolment, retention, attendance and to improve nutritional levels among primary school students.

The wheat-based nutrition programme (WBNP), run under the ICDS, is implemented by the Ministry of Women and Child Development, providing nutritious/energy food to children below the age of six years and to pregnant/lactating women. Even though the scheme is referred to as a wheat-based nutrition scheme, more than 30 per cent of grains allocated to this scheme are in terms of rice.

[22] Rajya Sabha question (2014), Unstarred question No. 1116. Ministry of Consumer Affairs, Food and Public distribution, GoI

Before coming under the NFSA umbrella, the MDM and WBNP were part of a group of schemes called the other welfare schemes (OWSs).[23] Annexure 3 gives an overview of all the existing OWSs.

2.3 Conditional cash-transfer scheme

The NFSA also brings under its ambit the conditional cash transfer centre-run scheme called the Indira Gandhi Matritva Sahyog Yojana (IGMSY).[24] The scheme is now universalised in accordance with the provisions of NFSA, 2013. According to the Act, every pregnant woman and lactating mother is entitled to receive a maternity benefit of not less than Rs.6,000 per pregnancy.

Overall, the Act addresses the issue of food security by taking a life-cycle approach: it addresses the needs of individuals at different stages of their life through a range of food schemes and cash transfers.

It must be acknowledged that the Act does not intend to provide for the total grain needs of identified individual or families. It will provide for meeting only consumption/nutrition needs only partially. However, by offering price support on a part of their consumption purchase, the scheme endeavours to augment the real incomes of the beneficiaries.

Legally enforceable entitlements together with the massive rate of subsidisation suggest that the off take under the Act should be close to 100 per cent in the future (in 2013-14, the off take under TPDS was 88.9 per cent of the total allocation). This has implications for annual grain operations in the country.

3. Grain Commitments under NFSA

Government estimated[25] that 61.2 MMTs of grains will be required annually after implementation of the NFSA; 54.7 MMTs of this will be used to feed the TPDS scheme and 6.5 MMTs to meet the other grain needs. The estimate was later revised slightly upwards to 61.4 MMTs after the census 2001 figures used for the earlier calculations were replaced with census 2011 population figures.

In what follows, we try to gauge the accuracy and adequacy of the estimate – 61.4 MMTs – to meet the demand for grain emanating from the various food-based welfare schemes of the country, namely TPDS, OWSs and ad-hoc, and from the requirement for strategic needs and excess state entitlements.

[23] By identifying beneficiaries based on age, gender and caste-related vulnerabilities, the centre runs seven food based welfare schemes, referred to collectively as the Other Welfare Schemes (OWSs), where the "other" schemes reflect food-based welfare schemes other than TPDS.

[24] The IGMSY scheme, before coming under the NFSA ambit, was run by the centre on a pilot basis in 53 districts of the country. The scheme distributed cash, not exceeding Rs.4000/-, directly to pregnant and lactating mothers.

[25] http://pib.nic.in/newsite/PrintRelease.aspx?relid=95441

i. Targeted Public Distribution System (TPDS)

Based on the 2011 population figures, the annual grain requirement of TPDS is estimated at 54.9 MMTs. This estimate includes a tide-over allocation of close to three MMTs. Between 2011 and 2014, the population according to the 2011 census shows an increase of close to three crore people.[26] If the 2011 census population projections for 2014 were to be used instead to estimate the grain needs under the Act, then our calculations show that the TPDS and tide-over estimate increases from 54.9 MMTs to 55.7 MMTs. However, given that the Act fixes the grain allocations to states based on the available relevant census figures (i.e., census 2011), an increase in population would imply a *lower real entitlement* per person or a *lower coverage* than the 67 per cent envisaged in the Act or both.

ii. *Other Welfare Schemes (OWSs):* As mentioned earlier, from an existing cluster of seven schemes, collectively called the OWSs, two schemes, namely the mid-day meal (MDM) scheme and the WBNP under the ICDS, have been brought under the ambit of NFSA. On an average, the government allotted 5.3 MMTs of food grains (rice and wheat) to its OWSs between 2010-11 and 2012-13. More than 80 per cent of this was allotted to these two schemes.

Apart from this, the centre at any time also issues *additional/ad-hoc grains* to states. This grain is issued mainly because of grain needs arising out of exigencies like droughts, famines, floods or when extra amounts of grain are needed to be released to meet festival demands. Close to 1.3 MMTs was allocated as additional allocation to states/UTs in 2013-14.[27]

iii. Strategic Reserves

In addition to the operational stocks above, the central government is required to hold a stock of food grains at all times to ensure food security during periods when production falls short of normal demand and during times when an increased grain supply in the open market is needed to stabilise prices (strategic stocks). FCI today maintains five MMTs of grain (3 MMTs of wheat and 2 MMTs of rice) as strategic stocks in its granaries. We next try to estimate an optimal level of strategic stock that the country would normally need for the purpose.

Production fluctuates mainly on account of fluctuations in rainfall. Good rains in India (mainly monsoons[28]) are associated with robust agricultural production and bad rains imply lower than normal agricultural production. This is because Indian agriculture is still largely rain-fed and only about 35-40 per cent of India's gross cropped area is

[26] As per Census 2011, the population in India in 2011 was 1.21 billion people and the projected population in 2014 is 1.24 billion.

[27] Such grain is released at either the economic cost or the MSP (price at which the grain was procured) or the OMSS price (price at which the last OMSS(D) trade tender for the grain was opened), depending on the type of need.

[28] The June-Sept rains (or Monsoon) rains account for nearly 76 per cent of the annual rains received by India.

under assured irrigation. Since the 1980s, India has faced a drought every five years and two months and every three years and nine months the production fell by more than 4 per cent. A one per cent variation in the rainfall index brings about a 0.36 per cent change in the agricultural production level (Gulati, Saini and Jain 2013). An optimal level of strategic stock, maintained by the FCI at any point in time, thus should be enough to support supplies in a year of bad monsoon.

Between 1990-91 and 2013-14, India faced three drought years: 2002-03, 2004-05 and 2009-10. The drought year of 2002-03, amongst the three, hit the production and procurement of rice and wheat the most. While rice and wheat production fell by 28.53 MMTs, procurement fell by 8.9 MMTs. The year 2009-10 was the third worst drought year faced by the country in the last 100 years; while production fell by less than 10 MMTs, the reduction in procurement was less than 5 MMTs. This presumably indicates the growing resilience of Indian agriculture to fluctuating rains. However, the country still needs to stock grains to hedge against any such exigencies. The question is, how much?

If one considered 2002-03 an exceptionally bad year and looked at the production and procurement fluctuations in the next three worst years in recent history (Table 1), one finds that the worst average fall in production and procurement was to the tune of 10.1 MMTs and 8.9 MMTs respectively[29].

Table 1: Highest fall in the procurement and production of rice and wheat, historically

	Annual Production Deviation	**Annual Procurement Deviation**
Years with highest annual fall	2000-01, 2004-05, 2009-10	1995-96, 2009-10, 2012-13
Average Fall in the three years (MMTs)	10.1	8.9

Source: Agriculture Statistics at a Glance

This implies that to hedge the country against such production and procurement fluctuations at least 95 per cent of the time, it would be prudent to have about 10 MMTs of grains as strategic reserves at most times.

iv. Additional grain commitments and demands by states/UTs

As mentioned before, driven by socio-political, moral and economic considerations and pressures, different states/UTs have devised welfare schemes centred on food (raw and/or processed), in addition to what is provided for by the central government. Such schemes imply an extension of central schemes like TPDS, or may imply devising new

[29] If the worst year of 2002-03 was included, then the average fall in production increases to 16.6 MMT and average fall in procurement rises to 9.7 MMTs.

state-specific schemes.[30] All this has implications on the annual grain needed nationally to feed various food-based schemes.

If one looked closely at these state-level extensions, particularly of the TPDS, one finds that the extensions mainly manifest in four ways – greater coverage of the population, greater entitlement per beneficiary, lower CIPs and/or a diversified distribution basket. For example, Chhattisgarh universalises the 35 kg/month/family grain entitlement, which is pegged exclusively for AAY families under the centre's scheme; Tamil Nadu, Chhattisgarh and J&K among others expand the coverage of the centre's scheme to more than 90 per cent and sometimes 100 per cent of their populations. States like Tamil Nadu and Chhattisgarh do both, i.e. cover a greater percentage of the population and give a higher entitlement. Some states diversify the entitlement basket (ex. Andhra Pradesh, Chhattisgarh, Rajasthan, West Bengal etc., encouraging the subsidised selling of more commodities than rice, wheat, coarse cereals and kerosene from the PDS outlets) and some others offer a greater rate of subsidisation on the entitlement. For example, rice is sold at Re.1/kg in NFSA implemented states like Chhattisgarh, Karnataka, MP and Rajasthan and in other states like Kerala, Andhra, Jharkhand and Odisha. States like Sikkim, Tripura and WB sells it at Rs.2/kg and Tamil Nadu and Puducherry distributes it free.[31] Many states employ some or all of these extensions. Some also deploy policies of distributing processed food at a marginal cost or free of cost to identified beneficiaries or universally to all. The NFSA permits states to continue doing so and to expand as desired. All such scheme extensions invariably increase the need for grain needed to meet the distribution commitments of states.

Even though such state-level commitments have a huge bearing on the national production and procurement pattern, the topic is still a state issue and the centre's involvement in meeting such grain needs, in excess of the TPDS and OWS needs, is limited to what we earlier mentioned, the *additional allocations*.

We thus can see that the country will need about 71 MMTs of grains annually. Close to 55 MMTs would be required to feed the TPDS (original and the tide-over based on Census 2011 populations), 6.6 MMTs for meeting OWS and additional needs and around 10 MMTs as strategic stock of grains, which comes in handy to meet any supply shortfalls inter/intra-year.

To meet such a mammoth grain commitment, the government will have to procure and maintain commensurate quantities of grains. Meeting a grain commitment of close to 71 MMTs (where 61.5 MMTs is for operational needs and 10 MMTs for strategic needs) of grains annually should not appear daunting in a surplus year like 2012, when FCI granaries boasted a stock of 82.3 MMTs of rice and wheat as on June 1. However, for every exceptional year like 2012, there could be a year like 2006, when FCI stocks (as

[30] So, while there are these states extending the Centre's TPDS provisions, there are also states like Madhya Pradesh, Karnataka and Odisha, which offer a lower per card entitlement to its BPL beneficiaries than is offered by the centre.

[31] As per data complied on June 30, 2014, Source: DPFD

on June 1) plummeted to less than 22 MMTs. Falling procurement has a direct bearing on FCI's ability to meet the requirements of food schemes. Hence, one of the key functions of the central government (DFPD/FCI) is to ensure that procurement flows match distribution flows in a manner that is not only economically efficient but also provides reasonable security. It is in this context that the issue of buffer stocking assumes importance. Depending upon its commitments, the government needs to fix periodically the buffer stocking norms to be followed by FCI.

4. Revised Buffer Stocking Norms

The government fixes buffer stock norms prescribing the minimum quantities of food grains (wheat and rice) to be maintained in the central pool at the beginning of each quarter, namely for January, April, July and October. As already mentioned, government procures, stocks and distributes grains to meet operational needs and to maintain strategic stocks.

4.1 Process of calculating norms

A Technical Group, chaired by the Secretary of the Ministry of Food, with representations from the Ministry of Agriculture, FCI, Planning Commission and Ministry of Consumer Affairs, periodically evaluates both the levels and composition of buffer stocks of food grains, (rice, wheat and coarse cereals), to be maintained through the year with both the central pool (with FCI) and with the states. The process of evaluating the norms involves synchronisation of the seasonal and stochastic character of production (and thus supply) with the reasonably predictable nature of food grain consumption. At any point in time, it is the FCI practice to hold four-months'[32] TPDS (and OWSs) grain distribution requirements as operational stocks, with the residual stocks being treated as strategic (CAG 2013 and Saini and Kozicka 2014).

4.2 History of the buffer stocking models

Historically, methods for determining "optimal" amounts for storage have been under discussion since Gustafson (1958). From mapping the PDS needs with the procurement pattern in a year (GoI's 1975 Technical Group) to econometrically modelling buffer stocking operations to minimise variations in price, farm income and consumption levels (Cummings 1969b and Ray 1973), history offers a significant body of literature on buffer stocking models that were suggested/used to induct economic sense into the Indian buffer stocking operations. A brief overview of some of these models is given in Annexure 5.

4.3 Earlier and Revised norms – operational and strategic

The government has prescribed the following quarterly buffer stocking norms for FCI to implement (Table 2). The GoI had suggested the present norms in April 2005.

[32] This characterisation is based on the 2013 report of the CAG.

Table 2: FCI's Buffer stocking of food grain norms (2005-2014) (MMT)

	Rice				Wheat				Total			
Type of stock/Quarter beginning	January	April	July	October	January	April	July	October	January	April	July	October
Operational	11.8	12.2	9.8	5.2	8.2	4	17.1	11	20	16.2	26.9	16.2
Strategic	2	2	2	2	3	3	3	3	5	5	5	5
Total	13.8	14.2	11.8	7.2	11.2	7	20.1	14	**25**	**21.2**	**31.9**	**21.2**

These quarterly stock levels are as on the 1st day of the month.

Source: FCI

As an operational rule, the granaries are said to have the lowest stock levels in the quarters beginning April (for the incoming rabi wheat harvest) and October (for the incoming kharif paddy/rice harvest). Apart from the operational stock reserves, the government has prescribed that a stock of five MMTs (3 MMT of wheat and 2 MMT of rice) be held as strategic stock at all times. This means that for the quarter beginning, say July 1 every year, FCI should have a total rice and wheat stock of 31.9 MMTs. Of this, 26.9 MMTs will be required to meet the quarter's TPDS grain needs and the remaining five MMTs is the strategic stock.

More recently (January 2015), the Cabinet Committee on Economic Affairs (CCEA), approved a revision of these norms,[33] in the wake of the expanded grain commitments under NFSA. The table below gives the details.

(MMTs)

	2005-2014 Norms	Revised CCEA Norms	Change
1-Apr	21.2	21.04	-0.16
1-Jul	31.9	41.1	9.2
1-Oct	21.2	30.7	9.5
1-Jan	25	21.4	-3.6

The revised norm hikes stocks for the months of July and October, while reducing the norms for April and January. In the following section we endeavour to estimate these norms. By mapping commitments with supply, we calculate these quarterly norms, keeping in mind the revised food grain distribution commitment mainly on account of the NFSA.

Before we proceed to estimate the revised norms, there is a need to mention two points.

First, an annual TPDS (and OWSs) need of 53-55 MMTs, translates to 4.4-4.6 MMTs of monthly and thus close to 14 MMTs of quarterly grain needs. The given operational norm for every quarter is clearly above that level. The excess of operational norm above the quarterly need under TPDS is explained by the nature of procurement, which spikes in particular months (e.g., wheat procurement spikes during April-June and paddy during October to February), and this necessitates keeping those stocks until the next round of procurement

[33] http://pib.nic.in/newsite/PrintRelease.aspx?relid=114704

starts. It also depends upon the turn-around-time (TAT) of the FCI's inventory operations, moving grain from surplus to deficit states. Our discussions with relevant officers in DFPD/FCI revealed that a turn-around-time of 2 months is sufficient, if operations are carried out efficiently and the railways provide rakes in time.[34]

The second relates to the implied physical demarcation between operational and strategic stocks. Deducing from the design of the buffer stocking operations and norms, it appears that even though both – operational and strategic- stocks of rice and wheat are maintained by FCI in the same granaries, their treatment appears to be done in isolation. Stocks kept as excess operational stocks cannot be counted towards strategic stocks and, likewise in a quarter, strategic stocks cannot be used towards meeting the operational needs. This non-fungibility between grains creates obvious redundancies in the system. Such a dilemma was faced by Indian policy makers back in 1970s, and then on account of ease in inventory turnover, the demarcation between the "operational" and "buffer/strategic" stocks was removed in 1978 (Khusro, 1973). The concept returned more recently because of the food crisis (domestic and global) in 2007-08 that led to the decision to maintain *separate* strategic stocks at all times.[35]

The principles of inventory management emphasises the need to re-introduce fungibility between the two stock types. There is a no need to create separate physical spaces for the two types of stock; rather, at any point in time, the existing total stock of grain should be understood as a combination of the two stock types and overall inventory management should be governed by best practices in the field of operations' management. By scientifically mapping the difference between procurement and operational needs, one can conveniently maintain the desired strategic stock in a year. Likewise, proximity to a procurement season gives one the policy space to utilise strategic stocks to feed operational needs. This way the purpose of each is satisfied and it will also result in financial savings. We try to induct this concept of fungibility after evaluating the buffer stocking norms in the section below.

4.4 Buffer stocking norms in wake of NFSA[36]

The introduction of the NFSA and the consequent change in the level of food grain distribution commitment demands that existing buffer stocking norms be revisited. A paper by Gulati and Jain (2013) is notable in this regard. The paper rationalises the calculation of the operational stock levels of the FCI in the wake of the National Food Security Bill (NFSB). It maps food grain distribution requirements with food grain procurement patterns. Given that grain distribution needs are uniformly spread through the year but grain procurement is highly concentrated (99.6 per cent wheat is procured in the quarter beginning 1st April and close to 80 per cent of rice is procured in the two quarters beginning October

[34] In addition to this, states are given additional standing instructions, periodically, about the levels of stocks to be maintained by them at all times. The present norms are that states have to maintain stocks equivalent to twice the average off-take of food grains during the last three months.(Source: DFPD)

[35] From what appears of the existing FCI operations, there seems to be a clear physical and conceptual demarcation between the treatment of the two stock types in the granaries.

[36] Even though the Act has provisions for distributing coarse grains to beneficiaries, the norm calculations in the section is restricted to calculations for rice and wheat. This practice is rooted in the existing stocking norms prescribed by the government, which defines the quarterly stock norms only for rice and wheat.

and January), the paper maps and then synchronises the demand and supply of grains in the central granaries. Using a statistical method, the paper develops quarterly norms for efficient inventory management of operational stocks. We deploy the same method but we introduce certain variations in the process.

Mathematical calculations to empirically map operational and strategic stock requirements

Following the methodology from Gulati and Jain (2013), we first map the procurement patterns of rice and wheat in a year. (Table 3)

Table 3: Trend of food grain procurement

Quarter beginning	Rice	Wheat
1-Oct	**45.60%**	**-**
1-Jan	**33.10%**	**-**
1-Apr	**15.10%**	**99.60%**
1-Jul	**6.20%**	**0.40%**

By examining the average annual pattern in monthly procurement for TE 2013, we find that more than 99 per cent of the annual wheat procurement happens in the three months of April, May and June. Rice procurement is relatively more spread out in the year – about 45 per cent takes place in the three months of October to December and 33 per cent in the quarter beginning January. This average pattern of procurement over the last three years is assumed as the pattern of inflow in each quarter for our analysis.

Next, the procured grain (supply) needs to be aligned with the off-take (demand) in a year. While the former is concentrated, the latter is uniformly distributed through the year. We begin the mapping by first collating existing information and relevant facts.

1. Total annual food grain requirement after NFSA implementation is 61.43 MMTs. This implies a monthly requirement of 5.12 MMTs of grain. Based on a rice to wheat ratio of 55:45 (which is calculated on the basis of the ratio in total procurement during 2008-09 to 2012-13 which was 54.5 per cent (rice) and 45.5 per cent (wheat)), the monthly needs of rice and wheat become 2.82 MMTs and 2.3 MMTs and annual requirement becomes 33.8 MMTs and 27.6 MMTs, respectively.

2. Following the discussions before, FCI's high TAT implies that two months' TPDS requirement of the grain will have to be maintained (Scenario 2) at the beginning of the procurement season (April for rabi wheat and October for kharif rice). In addition, as done in Gulati and Jain's (2013) paper, we also look at two more scenarios – namely one where the FCI inventory management becomes efficient and needs extra grain for only one month apart from the quarterly needs (Scenario 1) and the second where the system worsens and FCI needs extra grain for three months (Scenario 3). We call these the *reserve stocks*.

3. Annual procurement requirements are thus calculated by aggregating the annual requirement of rice and wheat (Table 4).

Table 4: Annual Grain Requirements under NFSA - Scenarios

(MMTs)

	NFSA Requirement		Reserve Stocks requirement			Total annual requirement		
	Col.1	Col.2	Col.3	Col.4	Col.5	Col.6	Col.7	Col.8
	Annual	Monthly	1 month	2 month	3 month	1 month	2 month	3 month
NFSA Total Requirement	61.43	5.12	5.12	10.24	15.36	66.55	71.67	76.79
- Rice	33.79	2.82	2.82	5.63	8.45	36.60	39.42	42.23
- Wheat	27.64	2.30	2.30	4.61	6.91	29.95	32.25	34.55

4. The quarterly outflow of grain under NFSA is constant at 8.4 and 6.9 MMTs of rice and wheat respectively.

   The annual needs under the three scenarios are a sum of the NFSA needs and the reserve needs. If the present scheme of operations continues (i.e., with scenario 2) , then the above calculations imply that FCI will need 71.67 MMTs (sum of Col. 1 and Col. 4) of annual procurement (in the year with zero stocks).

   With this base, we continue to the critical step of systematically mapping the procurement of rice and wheat with the outflows under NFSA. We begin the mapping with a base case, where the country does not have any grain stocks to begin with. Subsequently, we proceed to calculate values of stock norms for the second year, where the country begins with "some" carryover stocks from the previous year. We detail the methodology for Scenario 2 here.

Quarterly Operational Norms for Wheat – Base year

Wheat is an interesting case, where the harvest and thus the procurement are clustered in the months of April-May-June; 99.6 per cent of the annual procurement of wheat by FCI happens during these months. The remaining procurement happens in the month of July. Now when the annual requirement of wheat after NFSA implementation is 32.25 MMTs (as per the Table 4 Col.7), 32.1 MMTs of it will be procured in the quarter beginning April.

As per the operational thumb rule, wheat stock levels should be the least beginning April. So, the level of stocks on April 1, or at the beginning of the wheat procurement season, should be equal to the off-take in two months (reserve stocks), i.e., 4.61 MMTs. However, in our case, as the calculations begin with a base year with no stocks, we start with zero stock levels as on April 1. Roughly 65 per cent (Gulati and Jain 2013) or 21 MMTs of wheat procurement happens in the month of April, which will be enough to kick-start the NFSA allocation process for the month of April and May. The quarter cumulatively procures 32.1 MMTs, which can then be put into distribution from June onwards. The off-take during the quarter will be 6.91 MMTs. Therefore, by the end of this quarter, there will be a carryover stock of 25.2 MMTs. (i.e. 32.1MMT- 6.9MMT).

The second quarter (July-September) starts with 25.2 MMTs. July receives 0.4 per cent of the annual procurement, i.e., 0.13 MMTs. With a quarterly outflow of 6.9 MMTs, the carryover stock of wheat becomes 18.4 MMTs (i.e. 25.2 + 0.13 – 6.9) at the beginning of quarter three.

There are no inflows in the subsequent quarters. However, the quarterly outflows are easily met from the carryover stocks of 18.4 MMTs.

At the end of quarter four (January-February-March), which is also the beginning of the next procurement season, i.e. April, there will be a carryover stock of 4.61 MMTs (25.2- 6.8 - 6.9-6.9). This means that as on April 1, in the following year, the country would already have 4.6 MMTs of wheat relating to two months' off-take during April-May. As desired by FCI's inventory management, the April 1 stock levels are the least in a year and are equal to the two-months' requirements under the NFSA. This creates a flowchart directing FCI to stock just enough to feed the system.

This calculation of mapping the needs (NFSA) with the supplies (procurement), gives us the desired efficient levels of stocks at the end or the beginning of each quarter. Thus, we get the desired wheat stock norms for each quarter. Table 6 illustrates the process.

Quarterly Operational Norms for wheat – Subsequent year

April 1 of the subsequent year starts with a brought forward wheat stock of 4.6 MMTs. While the first year's procurement target was 32.25 MMTs, this year's procurement target will get reduced by 4.6 MMTS (which already exist in the FCI granaries) to 27.6 MMTs.

The process of procurement and outflow continues with each quarter as before, with each April 1, beginning with 4.6 MMTs, enough to feed the two months' NFSA needs.

Quarterly Operational Norms for Rice – Base Year

Rice procurement, as mentioned before, is spread through the year. However, the main months of procurement are October to March. Using the quarterly procurement pattern of rice as given in Table 3, and the methodology as used in the case of wheat, we begin mapping rice procurement with the requirements of rice under NFSA.

Close to 46 per cent or 18 MMTs out of 39.42 MMTs, which is the annual requirement of rice after NFSA implementation (Table 4 Col.7), is estimated to be procured in the quarter beginning October. Therefore, the level of stocks on October 1 or at the beginning of the rice procurement season should be lowest compared to other quarters and should equal to the off-take in two months (reserve stocks), i.e., 5.63 MMTs. However, as the calculations begin with a base year with no stocks, we start with zero stock levels as on October 1. The month of October accounts for 22.8 per cent (Gulati and Jain 2013) or 8.9 MMTs of rice procurement and another 4.5 MMTs is procured in November, which will be enough to kick-start the NFSA allocation process for two months. The quarter cumulatively procures 18 MMTs. The off-take during the quarter will be 8.5 MMTs. Therefore, by the end of this quarter, there will be a carryover stock of 9.5 MMTs (i.e. 17.97 – 8.45).

During the second quarter (January-February-March), 33.1 per cent of the annual procurement is undertaken. With this inflow of 13.05 MMTs, the carryover stock of 9.5 MMTs and a quarterly outflow of 8.5 MMTs, the carryover stock at the end of March or the beginning of April will be 14.13 MMTs (9.5+ 13.05- 8.4).

About 15.1 per cent of the annual rice procurement target or 5.95 MMTs is procured in the April-May-June quarter. The carryover stocks at the end of this quarter then becomes 11.63 MMTs (14.13 + 5.95-8.45). At the end of quarter four and the beginning of the next procurement season, with an inflow of 6.2 per cent, i.e., 2.4 MMTs, a carryover stock of 5.63 MMTs (11.6 + 2.44 - 8.45) is left. As in the case of wheat, this base year ends precisely with the level of stocks that the FCI requires at the beginning of the procurement season as reserve stocks. This calculation of mapping needs with supplies gives the desired efficient rice stock norms for each quarter. Table 5 illustrates the process.

Quarterly Operational Norms for Rice – Subsequent Year

Just like in the case of wheat, the second marketing year in rice procurement starts with two months' rice stocks. Consequently, the rice procurement target reduces from 39.42 MMTs in the first year to 33.8 MMTs in the subsequent. With these targets, the procurement and allocation process resumes.

Table 5: Quarterly mapping of rice procurement and off-takes in a marketing year

(million tonnes)

Rice	1 month	2 months	3 Months
1 month requirement as on October 1	2.82	5.63	8.45
Annual procurement requirement	36.60	39.42	42.23
Oct-Dec			
Inflow@ 45.6% of total Procurement	16.69	17.97	19.26
Outflow	8.45	8.45	8.45
Carryover as on Jan 1 (inflow - outflow)	8.24	9.53	10.81
Jan-March			
Inflow@ 33.1% of total Procurement	12.12	13.05	13.98
Outflow	8.45	8.45	8.45
Carryover as on April 1 (Carryover Jan 1 + inflow-outflow during Jan-March)	11.91	14.13	16.34
Apr-June			
Inflow@ 15.1% of total Procurement	5.53	5.95	6.38
Outflow	8.45	8.45	8.45
Carryover as on July 1 (Carryover April 1 + inflow-outflow during Apr-Jun)	8.99	11.63	14.27
July-September			
Inflow@ 6.2% of total Procurement	2.27	2.44	2.62
Outflow	8.45	8.45	8.45
Carryover as on Oct 1 (Carryover 1st July + inflow-outflow during Jul-sep)	2.82	5.63	8.45

Table 6: Quarterly mapping of wheat procurement and off-takes in a marketing year

(million tonnes)

Wheat (million tonnes)	1 month	2 months	3 Months
1 month requirement as on April 1	2.30	4.61	6.91
Annual procurement requirement	29.95	32.25	34.55
Apr-June			
Inflow@ 99.6% of total Procurement	29.83	32.12	34.42
Outflow	6.91	6.91	6.91
Carryover as on July 1 (inflow - outflow)	22.92	25.21	27.51
July-September			
Inflow@ 0.4% of total Procurement	0.12	0.13	0.14
Outflow	6.91	6.91	6.91
Carryover as on Oct 1 (Carryover July 1 + inflow-outflow during Jul-sep)	16.13	18.43	20.73
Oct-Dec			
Outflow	6.91	6.91	6.91
Carryover as on Jan 1 (Carryover 1st Oct – outflow during Oct-Dec)	9.21	11.52	13.82
Jan-March			
Outflow	6.91	6.91	6.91
Carryover as on Apr 1 (Carryover Jan1– outflow during Jan-March)	2.30	4.61	6.91

Table 5 and Table 6 give the level of operational stocks, for rice and wheat, which are required to be held at the beginning of every quarter. Adding the two would give us an estimate of the total operational stock requirements under the alternative assumptions of 1/2/3 months' requirement as detailed in Table 7.

Table 7: Quarterly desired operational stocks under NFSA (MMT)

	1 Month	2 Months	3 Months	Earlier operational + strategic norm(2005-14)
1st July	31.8	36.8	41.7	31.9
1st Oct	18.9	24.0	29.1	21.2
1st Jan	17.4	21.0	24.6	25.0
1st Apr	14.2	18.7	23.2	21.2

Scenario 2, with a two- month requirement of stocks, appears the most feasible in the present scheme of things in FCI, partly because two months is an optimal time for turnaround of fresh procured stocks.

According to Table 7, once the NFSA is implemented, the FCI will need, for example, 36.8 million metric tonnes of operational stocks of rice and wheat as on July 1. The last column in the table gives the existing quarterly buffer stocking norms, according to which the country is required to stock 31.9 MMTs as on July 1. This latter number includes five MMTs of strategic stocks, which are maintained every quarter. Logically, adding the 5 MMTs of *strategic* need to the estimated numbers of 36.8 MMTs should give us the final quarterly norm level. However, by introducing the concept of fungibility, we prove below that our estimated quarterly numbers (Table 7) would suffice to meet both the operational and strategic needs of the country.

Buffer stocking norms for strategic reserves

As discussed under the section "Grain commitments under NFSA", in order to hedge against 95 per cent of the adverse production and procurement fluctuations, the government should hold at least 10 MMTs of grains as strategic stocks. We suggest that these should not be created completely out of domestic sources. While five MMTs can be procured and maintained from the domestic market, the country should rely on the international market for any requirement in excess of this.

A study by Krishna and Chhibber (1983) showed that the annual cost of government's wheat operation could be reduced by 30-35 per cent if the government rationalised small amounts of imports that may be required in some years, and cuts average inventory down to about 1/4th of its present size. We suggest the option of imports not for creating operational stocks, but for meeting partial emergency requirements (strategic stocks). The country boasts of comfortable foreign exchange reserves (which was US$ 294.5 billion as on January 2015); and its agriculture is increasingly becoming resilient to the vagaries of weather (Gulati, Saini and Jain, 2014). Hence, we can easily rely on the international market to meet five MMTs (3 MMT wheat and 2 MMT rice) of grain needs as and when required. The size of the world market for wheat is around 140-150 MMT and that for rice is around 38-40 MMT; this additional demand by India would not create any pressure on global prices.

This leaves us with the question of arranging five MMTs of strategic stocks, which have to be maintained at all times, and are to be created from domestic supply. Let us look at the Tables 5 and 6 again, this time with the objective to understand better the **carryover stock** levels, and one can spot that the procurement-outflow mapping conveniently absorbs the strategic grain needs of the country at any point in time. We elaborate on this below.

Fungibility between operational and strategic stocks of FCI

The first question that arises is in what proportion the government wishes to hold these five MMTs of strategic stocks. Either these can be maintained in the ratio of 55:45, i.e., 2.8

MMTs rice and 2.3 MMTs wheat (the ratio followed in the paper) or the existing buffer stocking norms as 2 MMTs rice and 3 MMTs wheat could be used. We retain our methodology from above and devise method to maintain 2.8 MMTs of rice and 2.3 MMTs of wheat at all times. Table 8 below brings forward the estimated carry-over stocks of rice and wheat from the Tables 5 and 6. We are using the estimations for the most likely scenario where the FCI holds 2 months' stocks at the beginning of the procurement season.

Table 8: Mapping strategic stock – rice and wheat – needs with operational stock levels (MMT)

	Carryover stocks from Scenario 2	NFSA 2 Months' needs	Excess of stocks	Strategic Stock Requirement
	Col.1	Col.2	Col.3 (Col.1 – Col. 2)	Col.4
Rice stocks as on,				Rice
January 1	9.5	5.6	3.9	2.8
April 1	14.1	5.6	8.5	2.8
July 1	11.6	5.6	6	2.8
October 1	5.6	5.6	0	2.8
Wheat stocks as on,				Wheat
April 1	4.6	4.6	0	2.3
January 1	11.5	4.6	6.9	2.3
October 1	18.4	4.6	13.8	2.3
July 1	25.2	4.6	20.6	2.3

Column 1 in the Table 8 represents the quarterly carryover stock levels of rice and wheat, as calculated by the mapping process under the most feasible scenario of two-month reserve grain needs. Column 2 represents grain needs to meet the two-month NFSA distribution commitment. Even if stocks are set aside from carry-over stocks to meet the NFSA commitments for subsequent two months, excess stocks (Col. 3) are still more (except in the case of wheat for April 1 and rice for October 1) than the required strategic stocks (Col. 4). Availability will be similar even if one takes the earlier norms of holding two MMTs of rice and three MMTs of wheat.

As mentioned above, the quarter beginning October for rice and April for wheat are two exceptions to the above. However, given that these quarters also mark the beginning of the procurement seasons for the respective crops, the substitutability between strategic and operational stocks become logical and thus does not raise alarm bells.

Thus, we can see that mapping procurement outflow conveniently absorbs the strategic grain needs of the country at any point in time. The proposed buffer stocking norms in the wake of the NFSA, 2013, are thus the same as given in Table 7. The table below details the stock norm for rice and wheat separately, under the most likely Scenario 2:

Table 9: Proposed Buffer Stocking Norm for Rice and Wheat

(in MMTs)

	Rice	Wheat	Total*	Earlier Norm (2005-2014)
1st July	11.6	25.2	36.8	31.9
1st Oct	5.6	18.4	24.1	21.2
1st Jan	9.5	11.5	21.0	25.0
1st Apr	14.1	4.6	18.7	21.2

*Corresponds to the most feasible scenario with two- month requirement

CCEA's New Approved Buffer Stocking Norms

As mentioned before, the Cabinet Committee on Economic Affairs (CCEA) recently approved a revision of the existing buffer stocking norms.[37] (Table 9)

Table 10: Comparison between the Calculated and the CCEA revised Buffer stocking Norms (MMT)

	Calculated in the Paper			2005 Norms	CCEA approved
	Scenario 1	Scenario 2*	Scenario 3	Earlier Norm	Revised Norms
1st July	32.0	36.8	41.8	31.9	41.12
1st Oct	19.0	24.1	29.2	21.2	30.77
1st Jan	17.5	21.0	24.6	25.0	21.41
1st Apr	14.2	18.7	23.3	21.2	21.04

*Most feasible Scenario

All norms include strategic and operational reserves

We still await the methodology followed behind the revised norm calculations. However, the upward revision of the July 1 and October 1 norm levels while reducing the effective stock levels as on April 1 and January 1 is in line with the suggestions under the most likely scenario in the paper.

Clearly, the CCEA norms appear to be more on the liberal side. In particular, the July 1 and October 1 stock levels under the revised norm appear to be closer to the figures calculated under the 3 months scenario in the paper. Alternatively, for the two quarters beginning July and October, the revised norms appear to be a scaled-up version of the scenario 2, with an explicit adjustment for the strategic stock need of five MMTs.

With the methodology used in the paper one can work out that the buffer stock requirement, particularly for quarters beginning April, October and July, could be much lower than those approved by the CCEA.

April 1 marks the beginning of the wheat procurement season and thus the incoming of the fresh wheat crop. With 99.6 per cent of the annual wheat procurement happening in this quarter, the need to stock separate strategic reserves of wheat at this time does not arise. All

[37] http://pib.nic.in/newsite/PrintRelease.aspx?relid=114704

that the FCI should stock on April 1 is the operational requirement of two months (where the April 1 stock norm is already mapped to meet the quarterly stock requirement with the incoming crop). The comfortable grain position in the quarter, due to the incoming crop, lets one substitute the operational reserves of wheat for strategic purposes, if the need arises.

Similarly, October 1 marks the beginning of the kharif procurement season. More than 45 per cent of the annual rice/paddy procurement happens in this quarter. Thus, there is no need to maintain separate strategic stocks of rice at the beginning of this quarter. The operational stocks of rice can be fungible and thus can be used towards the strategic reserves.

As for the July 1 norm, it has been established that owing to the massive wheat procurement (and some rice procurement) in the quarter ending July, the stock levels of grains are the highest in the FCI granaries on this day. By scientifically mapping annual procurement with the quarterly distribution commitments (Table 5 and Table 6) and by ensuring a strategic reserve of five MMTs (Table 8), the July 1 norm of 36.8 MMTs more than suffices for the two purposes.

Hence, it is suggested that food grain stocks should be demarcated into operational and strategic stocks only conceptually and not physically. As all these are perishable stocks of grains and are subject to deterioration, stock operations should uniformly follow the principle of first-in-first-out (FIFO). If one accepts this principle of fungibility between operational and strategic stocks, then the required buffer stocking norms (Scenario 2) for beginning of each quarter will be as follows: January – 21 MMTs, April – 18.7 MMTs, July – 36.8 MMTs and October – 24 MMTs.

5. NFSA's operational challenges

There are apprehensions that the NFSA may fail to deliver on the promises made, or will deliver at a huge cost, which may not be worth the price. The big question today is will implementation of such an Act, in its present form, result in reducing and eventually eradicating hunger and malnutrition from the country? What will be the implications of this in terms of the fiscal expenditures involved, the market distortions it will cause, and the overall efficiency losses and welfare gains in managing India's biggest ever food security programme? The section elaborates on that.

The biggest challenge faced by the country in terms of implementing the NFSA is to **ensure an adequate supply** of grains every year. Today, India has surplus cereal stocks with public agencies. Will there be ample cereal supply from domestic production in the years to come? Climate change is likely to pose challenges to Indian agriculture. Indian agriculture is still largely rain-fed, and it experiences a drought almost every 4-5 years (Gulati, Saini and Jain, 2013). With climate change the expectation is that the frequency and intensity of extreme weather events like droughts will increase. Under such circumstances, production and procurement can fluctuate widely. Take, for instance, the case of the 2002-03 drought, when food grain production dropped by 38 MMTs (and rice and wheat dropped by 28 MMTs) over the previous year. Where would India go to buy 38 MMTs of grains to keep its PDS running

at full steam? The global rice market is around 38-40 MMTs, and if India were to enter the market with even a demand for 10 MMTs, international rice prices would shoot up.

In case of procurement, even as late as 2013-14 wheat marketing season, the government had fixed a target of procuring 44 MMTs on April 1, 2013, which was scaled down to 38 MMTs after a month; however, real procurement was only 25 MMTs. With such uncertain production and procurement pathways, how can one be sure of delivering a legally enforceable commitment of 61.4 MMTs of food grains every year through the PDS?

The **ambitious coverage** of the Act has also invited wide criticism. In a country where less than 22 per cent people are below the poverty line,[38] the coverage of 67 per cent of the population is not only unnecessary but also highly inefficient. However, it is to be borne in mind that the coverage of people under the Act is lower than the existing coverage in many states/UTs under TPDS. As per the DFPD (*Food grains Bulletin* August 2014), the total number of beneficiaries under the NFSA has been estimated at 81.35 crore people. However, based on the number of the ration cards issued under the existing TPDS, there are already 119.5 crore people[39] benefiting from the TPDS scheme (several of these cards are fake and need to be weeded out).

The fact that the total number of beneficiaries under TPDS is greater than under NFSA implies **changes in the welfare** of many of those involved. While some TPDS beneficiaries will get covered under the new regime, others will be left out; some will be better off and some worse off. Since, AAY beneficiaries are retained under the NFSA as they are under TPDS, their welfare and food expenditures are likely to stay unchanged.

Using back-of-the-envelope calculations, we make a rough estimate of the extent of welfare change of those involved. The total number of NFSA beneficiaries is fixed at 81.34 crore and 11.9 crore[40] of these are the poorest of the poor or AAY. The remaining 69.4 crore beneficiaries accommodates as many of the BPL and the APL members from the TPDS. Obviously the first right to inclusion should go to BPL families and the residual, if any, to the APL families. On this basis, 41.5 per cent of the APL families would also get covered under the NFSA (Annexure 4). How does their welfare change? All BPL cardholders benefit from lower CIPs but lose owing to a smaller entitlement. Under the TPDS, a BPL card holder is entitled to 35 kilograms of grains per month but under NFSA, a family of five is to get only 25 kilograms per month. As for the APL families, the ones *covered* are clearly better-off (owing to the lower CIPs) than the one who are "*uncovered*".

[38] This is as per the Tendulkar Committee Report for 2011-12. After lot of controversy, the Rangarajan Committee was appointed to look into the definition of poverty. Rangarajan Committee has estimated the poverty at 30 per cent in 2011-12.

[39] Upon multiplying the total number of issued ration cards, (24.3 crore, which are issued on a per family basis) with an average Indian family size of 4.9), we see that more than 119 crore beneficiaries are entitled for benefits under the existing TPDS.

[40] There are 2.43 crore AAY ration cards and multiplying it with 4.9 (average Indian HH size as per Census 2011), we get 11.9 crore AAY beneficiaries.

Next, to identify beneficiaries and estimate grain allocations the Act has used the population numbers according to 2011 Census figures. Unless the next Census results are made available, these numbers will form the base for estimating entitlements under the Act. This implies that for states whose population has increased since 2011 will have to make do with either **lower entitlement per person or a lower proportion of their population being covered under the scheme or both**. None of the alternatives is in accordance with the provisions and objectives of the Act. Lowering the per person entitlement will be more iniquitous than lowering the coverage because the former will adversely affect the poorest people but the latter, if done by eliminating the relatively higher income bracket families, will actually improve the system.

As mentioned earlier, there is also the **issue of states extending the central schemes** by distributing highly subsidised food to an even larger proportion of the population in their states. Some of their extra grain needs are acknowledged and are grandfathered under the NFSA as tide-over allocation. However, this extra allocation by the centre to the state should end once the state implements NFSA. If history[41] is anything to go by, then such grandfathering is likely to continue well into the future. This puts the onus of distributing not only 61.4 MMTs of food grains by the centre, but a little more, may be even up to 65-66 MMTs. In order to do this in a sustainable manner in the face of fluctuating production and procurement as explained above, the government will have to keep large buffer stocks (strategic reserves of say 10-15 MMTs) to take care of any such exigency. This will lead to increasing government intervention in grain markets, procuring 65-75 MMTs of food grains, and greater controls on the operation of free grain markets, which will push up the costs of operation.

Such large-scale public procurement also has the impact of **strangling private trade** (as has been the case in Punjab, Haryana and now Madhya Pradesh and Chhattisgarh) (CACP, 2014). Of the total market arrivals of wheat and rice in these states, 70-90 per cent is bought by the government, indicating a de-facto state take-over of grain trade. It may be worth noting that the cost of a simple departmental labour (loader) in the FCI is 7 to 8 times the cost of contract labour doing the same job. With government monopsony likely to remain in the future, these costs are only going to escalate, making the entire operation of NFSA a very high cost one. Bringing back the private sector into grain trade should thus be high on the government's agenda.

The monopolisation of the grain market by the government, where increasingly lower quantities of grains are available in the open market, also leads to the problem of **support reversal**. The average cereal consumption in India is 10.6 kgs per person per month (NSSO, 2011), and NFSA supplies nearly half of it (5 kgs per month per person, except for those under the AAY who have a family entitlement of 35 kgs per month). People go to the open market to buy their remaining cereal requirements. However, with the government mopping

[41] In order to smoothen the transition between PDS and TPDS, and to avoid the sudden withdrawal of the benefits accruing to the APL families under the old system, states were provided with 'transitory allocation' of 10.3 MTs. Eventually, this additional allocation was inducted into the calculations permanently.

up the supply of cereals, the open market is left with less causing an upward stickiness in prices. The idea of a welfare programme like NFSA was that by supporting half the total cereal requirement through the Act, it would deliver income support to identified beneficiaries. The savings from subsidised grain purchases meant greater income availability to meet other needs. However, high grain prices in the open markets neutralise some of the intended subsidy. The beneficiaries get food subsidy from one hand through NFSA, but are taxed due to high cereal prices in the open market, from the other hand.

However, the new government has to be lauded for taking the decision to offload 15 MMTs of grains from FCI stocks (5 MMTs of rice and 10 MMTs of wheat) to dampen inflationary trends in cereals. Nevertheless, what remains a mystery is the cycle of government procuring more than their needs, squeezing open market supplies and exerting an upwards pressure on prices and later releasing it when prices rise beyond a threshold. One of the reasons leading to excessive procurement lately is the bonus given by some states on top of the MSP announced by the centre for wheat and paddy. Realising this, the government has sent off a letter to states saying that centre will not accept all the grain procured by a state if it was giving an extra bonus. Only time will tell how these irrational and inefficient practices are brought under control.

Another problem of larger government procurement and stocking of grains is that it will result in **slowing the natural process of diversification in agriculture** in line with changing demand patterns in favour of high value products. A few states like Punjab, Haryana, Andhra Pradesh, and now even Chhattisgarh and Madhya Pradesh, which have built a strong procurement machinery and without whose help the centre cannot run its NFSA, can start imposing more taxes and charging higher commissions on procurement of grains by the centre. Given that these taxes, etc., are within the jurisdiction of the states, the centre cannot do much in this regard. Already, for example, Punjab, Andhra Pradesh and Haryana charge exorbitant taxes and fees, which go as high as 14.5 per cent in case of Punjab. These taxes can go further up as the centre locks itself in NFSA, and states find it easier to 'milk the centre', all in the name of food security for the poor. This will lead to a ballooning of the food subsidy bill very soon, making the whole process financially very inefficient and unsustainable.

The Act has another very unlikely impact on the economy. Under normal circumstances, most farming families, on an average, retain about one-third of cereal production for self-consumption at home (NSSO, 2009-10). Small and marginal farmers generally retain a larger percentage for self-consumption. Now, with the NFSA covering 75 per cent of rural population, most of whom would be small and marginal farmers, they would expect the government to give them at least half of their cereal needs at highly subsidised prices. This is leading to a peculiar situation of **re-circulation of food grains**. Small and marginal farmers are bringing a larger proportion of their production to the government for procurement, and expect the same grain to be given back to them at Rs 3 or Rs.2 per kilogram. Take the example of a typical wheat producer. Except for the AAY families, an NFSA *priority* beneficiary is entitled to get 5 kg of grain per month, say wheat, at Rs.2/kg. So a farmer

producing a subsistence crop earlier would take all their wheat produce to sell to the government at a minimum support price (MSP) of Rs 14/kg, and expect the government to give them back the same wheat at Rs 2/kg, thus getting an effective subsidy of Rs 12/kg for 5 kg of wheat per person/per month. The result will be excessive procurement by the government. This is already happening in many states. The problem arises from the implied increased logistical and financial burden on an already creaking and leaky system. When state agencies procure at the MSPs (plus high taxes/levies imposed by many states), store and distribute wheat back to the farming community, the cost of operation increases from Rs. 14/kg (MSP) to Rs 22/kg (economic cost including the cost of carrying the buffer). If the system delivered the intended benefits to the intended beneficiaries, such an expense could have been defended. However, the vehicle through which identified benefits or entitlements under NFSA are delivered is the **archaic Public Distribution System** (PDS). The system is plagued by inefficiencies and leakages. According to researches, 40 to 50 per cent grains leaked from the system in 2011-12.

Next is the **ironical withdrawal of NFSA provisions** under *force majeure*. The provision says that the government may not be responsible to give food when extreme events of nature (like droughts, flood, cyclone, earthquake etc.) occur. Through this provision, the government absolves itself of the responsibility to provide food-security to the needy at a time they are likely to need it the most. This dilutes the objective of the Act of ensuring food security for the poor, who are the worst affected by droughts, floods, etc.

Unpreparedness of implementing states: Interestingly, as on August 1, 2014, hundred per cent identification of beneficiaries has been completed only in six – Chhattisgarh, Haryana, Karnataka, Maharashtra, Punjab and Rajasthan – out of the 11 NFSA implementing states. The identification is still partial in the remaining five states – Bihar (87 per cent), NCT of Delhi (44 per cent), HP (73 per cent), MP (88 per cent) and Chandigarh (40 per cent).[42]

The SECC final list of survey results is ready for just eleven states – Assam, Goa, Karnataka, Meghalaya, Mizoram, Chandigarh, Lakshwadeep, Nagaland, Sikkim, Manipur and West Bengal. The draft list (released before the final list), however, is ready for 22 states.[43] Interestingly, out of the 11 implementing states, Delhi is one state that still has not published its draft list of identified beneficiaries. Eight of these 11, though, have the draft list ready but do not yet have the final SECC results ready. Karnataka and Chandigarh are the two states that have implemented the NFSA and have the final SECC results ready for all districts. All this indicates that states have been implementing the NFSA with old TPDS beneficiaries being rechristened as NFSA beneficiaries instead of undertaking fresh surveys/efforts to identify beneficiaries. This is undesirable and does not confirm to the reform process initiated under the new system.

[42] Rajya Sabha question (2014). Unstarred question No. 2525, Ministry of Consumer Affairs, Food and Public Distribution, GoI

[43] Source- Socio Economic and Caste Census 2011 (www.secc.gov.in/state). Accessed on January 9, 2015

As on June 30, 2014, barring 12 states/UTs[44] who have undertaken some action on all the nine-steps, the remaining states continue the struggle (Annexure 2). As far as progress by states/UTs under the plan scheme for end-to-end computerisation of the various TPDS operations is concerned, - as on September 30, 2014, 33 of the 35 states[45] have completely digitised the FPS data; 17 have digitised ration card data; nine (Andhra Pradesh, Chhattisgarh, Delhi, Gujarat, Karnataka, MP, Odisha, TN and Maharashtra) states have implemented online-allocation and only four (Delhi, Chhattisgarh, TN and Karnataka) have implemented the computerisation of the supply-chain management (Source: DFPD). The progress on the TPDS improvement initiatives is both slow and below expectations.

With the present state of unpreparedness of the states/UTs and the delay in SECC results, it is quite likely that many states will be unable to implement the provisions of the NFSA even by the extended deadline.

Financial Implications of the Act: The current estimate is that the direct cost of the food subsidy for a full-year roll-out to distribute 61.4 MMTs of grain will cost the government Rs.1,31,086 crore at 2014-15 costs,[46] and there are pending costs such as those arising from FCI costs being under-accounted etc, ranging between Rs. 47,000-50,000 crore. According to a Ministry of Finance report (Mishra 2013), the food subsidy with NFSA implementation is estimated to increase to Rs. 1,40,192 crore and Rs. 1,57,701 crore in 2014-15 and 2015-16 respectively. Government estimates, however, do not yet include additional investment expenditures, annual increases in the MSPs (required to sustain and better the farmer incentive to produce more), which even though the NFSA document identifies but does not quantify. These expenditures and investments are critical for revitalising agriculture, creating logistic support, etc.

Another aspect of the financial implications comes from the fact that the National Food Security Act, 2013 fixed the CIPs at Rs.3/2/1 for three years since the commencement of the Act. This means that the government will have to face the decision of revising the CIPs in July 2016. Historical political experience vis-a-vis extension of egalitarian policies like these indicates to a high probability of political economy overshadowing the need for economic efficiency. Thus, in most likelihood, the existing CIPs will continue well into the future. Thus, in a situation where the government incentivises farmers by annual MSP increases, if the CIPs continue to be at the same low levels the fiscal burden is only going to get bigger for the government thus indicating to the possible under-estimation of the existing cost estimates that the exchequer will have to incur in case of the Act implementation. This underlines the likely fiscal impact of the growing conflict between the objectives of farm income stabilization and price stabilization of the vast majority of the Indian population.

[44] Lakshwadeep, UP, Tamil Nadu, Rajasthan, Punjab, Odisha, Karnataka, HP, Gujarat, Delhi, Chhattisgarh and Andhra Pradesh

[45] Andhra Pradesh includes the numbers for the newly formed state of Telangana

[46] Rajya Sabha question (2014), Unstarred question No. 2522, Ministry of Consumer Affairs, Food and Public Distribution, GoI

Another issue relating to the Act is the **missing focus on the nutrition and the absorption** aspect of food security. The Act focuses on the related issues of availability, access, and affordability; the issue of health and nutrition gets side-lined in the whole debate. By focusing on the calorie intake, the issue of under-nutrition and stunting is being addressed and it should be maintained. However, the issue of the health impact on the long-term earning capacity of under-nourished children has not been addressed. While the broad concepts under the Act do loosely include social and cultural themes, such as gender empowerment, which are seen to be highly relevant, the issue of absorption of micronutrients, and particularly the important role played by safe sanitation, is overlooked or under-emphasised.

In essence, what NFSA is trying to achieve is an equity objective (extending economic access to food for the poor) by using a price policy instrument, instead of an income policy instrument. So, there is a high probability that it will fail to deliver on the promises made, or will deliver at a huge cost, which may not be worth the price.

These are broadly the key challenges of NFSA, 2013. The last section now explores possible alternative policy options, which could accomplish the same objectives but at a much lower cost, and with less market distortion.

6. Way Forward

A growth-focused model is the right strategy for alleviating poverty. However, this needs time to deliver. Therefore, the policy makers devised a more direct method to alleviate food security issues of the poor. They created a platform called the PDS in 1950s, through which food (mainly rice and wheat) were supplied to those in need at highly subsidised prices. Since then the system has expanded both in terms of its coverage and in terms of depth. Last government enacted NFSA in 2013 that was essentially an improved version of the existing PDS or the TPDS. Using a rights-based approach, the system is to supply subsidised food directly in the hands of 81.35 crore people.

The paper raises questions on the ability of the new system under NFSA to deliver on the set objectives. It questions both the efficiency and the efficacy of the system. Upon evaluating the preparedness of the implementing states, there appears lesser probability that even by the end of the current financial year, the Act will be implemented in its true spirit by all the 36 states/UTs. However, if the centre does 'force' states to implement the Act provisions, without satisfying the various pre-conditions, it will be doing a great disservice to the country. By pouring more grain, this time with a legal entitlement, into an already leaky (estimates of leakage range between 40 to 50 per cent) and an inefficient TDPS basket is only likely to drain the system of already scarce financial resources. After evaluating the enormous inefficiencies in existing FCI operations, a recently released report by a high-level committee (HLC) on FCI (2015) suggested shelving of some of the provisions under the NFSA. The report seems to suggest that if such provisions are implemented without, first, fixing the system, the laxity in the system will only multiple further.

What is the way forward in that case? On the operational front, first there is an immediate need today to fix the delivery system under the PDS. For this, the centre has to warrant 100 per cent implementation of the nine-point action plan and has to ensure a transparent and an integrated end-to-end computerisation system in all the 36 states/UTs. Second, there is a need to revisit the targeted number of beneficiaries under the Act. As mentioned earlier, in a country where 22 to 30 per cent of people live below poverty, coverage of 67 per cent sounds extravagant and this extended coverage if results in reducing the family entitlement of the real poor, then there surely are problems that need immediate correction. The HLC report recommends reducing the coverage under NFSA to 40 per cent and increase the allocation of priority house hold from five to seven kgs/person/month. One of the points under the nine-point action plan requires the states to regularly "review the AAY/BPL lists". The policy makers can use these reviewed lists to revise the final list of beneficiaries under the Act.

On the procurement front, first the government has to encourage states like Bihar, Odisha (with natural resource endowments favourable to agriculture) to produce and feed themselves rather than import grains from states like Punjab, Haryana etc. This was also voiced in the HLC report. Second, concerted efforts are needed today by the government to abolish additional levies imposed by states like Punjab and Haryana. The government may look at the MSP to be the final price, inclusive of the levies/taxes etc., so that there are no systemic market distortions at the state level.

Apart from these, there is need felt today to revisit the age-old policy drive of attaining *complete* self-sufficiency in production of all agricultural commodities. This policy has, explicitly and implicitly, made the policy makers attempt policies ignoring global dynamics. However, shrinking resources, evolving and expanding consumer demands in the present times highlight the growing inter-dependence amongst the countries of the world. As India today has attained food security at the national level, in terms of ample food supplies annually, there is a growing need to question and move away from the undisputed adage of the need to attain complete self-sufficiency. Instead, the country should adopt the need to *maximise* self-sufficiency / reliance, which is consistent with economic efficiency. Expanding agricultural production is a necessity for India and now with legally enforceable distribution commitment under the NFSA, the need is further reinforced. But to efficiently meet challenges from changing consumption patterns, fluctuating supplies, expanding populations, a modicum of openness has to be maintained for accessing global agri-markets.

Overall, the suggestion under NFSA is not to hurry with the implementation of the Act, especially not without satisfying its pre-conditions in each state. This time should be used to carefully re-visit the objectives of the Act and provisions looking for efficient ways to attain them. After all, the art of economic policy making is to achieve its objectives at the lowest possible cost.

The big question remains: how can one achieve economic access to food more efficiently? The answer lies in eventually substituting the present system of physically distributing grains with conditional cash transfers, based on the platform created by the *Aadhaar* unique identity (UID) scheme. As this system would require fingerprints of all those drawing benefits from

the government and the direct deposit of cash to a beneficiary's bank account, leakages can be reduced dramatically.

The idea of cash transfers is mainly to reduce physical handling of grain and to give greater autonomy to the beneficiaries to choose their consumption basket. It should be noted that by no measure should the entire physical grain distribution mechanism be substituted with cash, as there still will be stocking of grains needed to meet the strategic reserve requirements of the country and for feeding food-deficit and difficult areas of states like Jammu and Kashmir, NMMT, etc. The idea is to slowly start by offering a choice between cash and grains. A study by the Government of Delhi and SEWA, under the GNCTD-UNDP project, tested the effects of substituting PDS rations by cash transfers for BPL families in a west Delhi region in the year 2011. It found that the consumption of the studied food items did not fall, and interestingly, the consumption of items like pulses, eggs, fish and meat went up. Contrary to expectations, alcohol consumption did not increase; the efficiency of PDS shops increased. However, this shift from grains to cash should be a gradual process. The lack of financial inclusion, even in urban areas, is a bottle-neck. However, the process can start with farmers in food surplus states and large cities with a population of more than 1 million. The payments to farmers selling their produce to the government procurement machinery are made by cheque, implying that all these farmers have bank accounts. As highlighted earlier, the NFSA provisions lure food producers to sell their produce they would otherwise have retained for self-consumption to the government and fulfil their own consumption needs via the PDS route. Offering income transfers to these farmers to begin with would invest simple economic sense into the system. Rather than waiting for financial inclusion to happen at the national level, if the government can leverage the UID platform, it will not only save on huge logistics costs but will also test the response of the system to cash transfers.

The government of Andhra Pradesh has successfully moved to direct benefit transfer via UID- linked bank accounts in its social programme payments (under NREGS and SSP) in the last two years. The roll-out was implemented in 158 sub-districts and affected 19 million people of the state. A study (Muralidharan 2014) shows that the new system of cash transfer, delivered faster, was more predictable, and less corrupt and did not adversely affect programme access. India can learn from the success.

The government has to be lauded for rejuvenating the idea of financial inclusion by introducing a more aggressive version of the existing policy drive in the regard. The government launched the Pradhan Mantri Jan-Dhan Yojana (PMJDY) on August 15, 2014, which promised Rs. 1 lakh insurance coverage to anybody who opened the account under the drive. By January 2015, banks have been able to open more than 10 crore accounts under PMJDY. The fertiliser subsidy is to be delivered to the farmers directly through this platform. Apart from this, PAHAL[47] – the direct benefits transfer for LPG consumers is already underway. After these, food-subsidy-cash-transfer is an evident policy graduation sought by all.

[47] PAHAL was launched earlier in June 2013 by the Ministry of Petroleum and Natural Gas and recently re-launched in November 2014

Switching about 50 MMT of physical distribution of grains to cash transfers can lead to savings to the tune of Rs. 33,087 crore annually to the government exchequer without giving up on its equity objectives of helping the poor to have 'economic access' to food. These detailed calculations under different scenarios have been made under a separate paper by Gulati and Saini (2015). Suffice it is to say here that the future design of policy needs to shift from physically distributing highly subsidised grains to cash transfers, i.e., to shift from price policy to income policy as a tool to achieve equity. It will be less market distorting and would be much more efficient than what is envisioned under the NFSA.

Besides cash transfers being the best international practice, the conditional cash transfer (CCT) scheme would also imply greater efficiency of the domestic grain market by reducing government's intervention levels. This also gives the consumers greater autonomy in deciding their diet plans. The success of the CCT scheme is demonstrated well by studies on Brazil, Mexico and many other countries. Brazil is a classic case – the *Bolsa Familia* programme is the world's largest conditional cash transfer program that lifted more than 20 million Brazilians out of acute poverty, besides promoting education and health care. Lately, even Pakistan has dismantled its fair price shops and moved on to income support to the poor under its Benazir Bhutto Income Support Programme in 2008.

Lastly, it must be recognised that the problem of malnutrition is multi-dimensional, and cannot be solved by just giving 5 kg of grains on a per person per month basis. Malnutrition in children is not affected by food intake alone; it is also influenced by access to health services, quality of care for the child and pregnant mother as well as by good hygiene. Global and Indian research have revealed that at least three factors are critical to control malnutrition amongst children: (a) nutritious food (b) access to better sanitation and hygiene, especially safe drinking water and toilets and (c) better female education. Without making a dent on these three factors, the problem of malnutrition is likely to stay with us for a long time.

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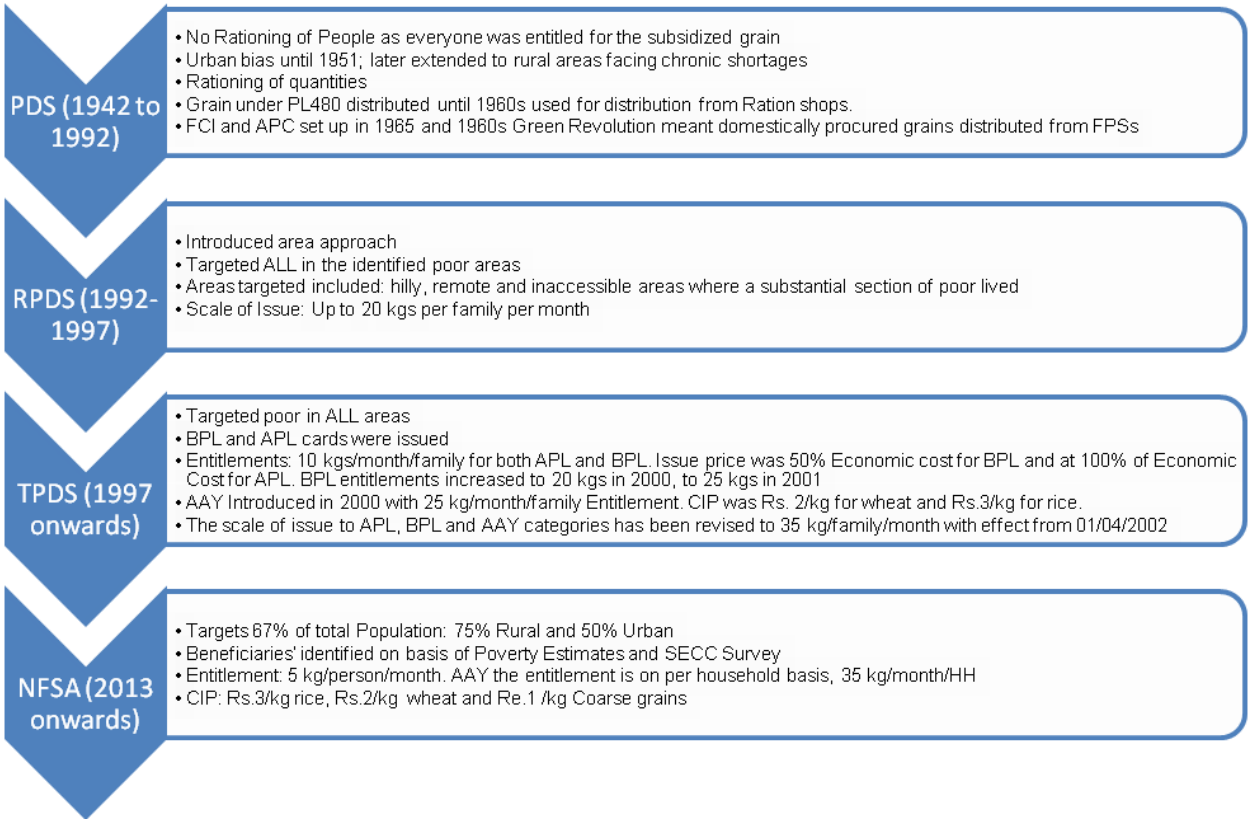
Annexure 1: Summary of the evolution of PDS in India



Annexure 2: Reforms in the TPDS

Since 1997, when the TPDS was introduced, the government has initiated several measures and reforms to streamline and strengthen the system. The process of improvement included measures undertaken to improve the monitoring mechanism and vigilance, increase transparency in the functioning of the system, adopt a revised model citizen's charter, use of information and communication technology (ICT) tools and improve the efficiency of the FPS operations. Besides these measures, specific orders requesting states/UTs to review the BPL and AAY lists, to ensure timely delivery of PDS commodities to FPSs etc., are also regularly issued.

Measures to strengthen monitoring and vigilance of the TPDS

A nine-point action plan was evolved in July 2006 by the government after due consultation with states/UTs in this regard. These points gave nine action points to be implemented by the state and UT governments. The latest position of action taken on these issues is as follows:

Table A 1: Implementation Status of states/UTs against the Nine-point action Plan

S. No.	Action Point	Status as on 30 June 2014
1	Undertake a campaign to review the BPL/AAY list to eliminate ghost/bogus ration cards	Implementation of this action in 30 states has resulted in elimination of 3.4 crore bogus ration cards.
2	To ensure leakage free distribution, punish the guilty	33 states reported having taken action against the guilty in this regard
3	For sake of transparency: • Involve elected Panchayati Raj Institutions (PRI) in distribution under TPDS • Give preference to self-help groups (SHGs), gram panchayats, co-operatives etc.	• 29 states have involved PRIs in vigilance committees to monitor FPSs • 31 states have reported FPS being run by SHGs, co-operatives etc. Close to a quarter of operational FPSs are run by such organisations
4	Display of BPL and AAY lists by FPSs	32 states/UTs have displayed the list
5	For public scrutiny, display list of allocation of PDS commodities – FPS-wise and district-wise – on websites and/or prominent places	22 states/UTs have reported to do that.
6	To reduce leakages during transportation of grains and to ensure economic viability of FPS owners, PDS commodities are to be delivered to the FPS door-step	20 states/UTs have reported to being doing this.
7	Timely availability of food grains at FPS level and fixed dates of distribution to ration card holders should be ensured	32 states have taken action regarding this.
8	Training of vigilance committee members	27 states/UT governments have taken up training programs for FPS level vigilance committees.
9	Computerisation of TPDS operations	29 states/UTs have completely computerised FPS data, 27 have computerised godown data, 13 have completely digitised ration card data, 13 have completely or partially implemented online allocation of PDS commodities, 7 have partially or completely computerised supply chain management. 18 states/UTs have online grievance redressal mechanism in place

Measures to increase transparency in the functioning of TPDS

Adoption of model citizens' charter: With the passage of the Right to Information Act, 2005, the model citizens' charter had to be revised to make TPDS operations more transparent and amenable to public scrutiny; hence, a revised charter was issued in July 2007. By December 2013, 34 states/UTs had adopted and implemented the revised charter. This charter requires each state to declare the person(s) responsible, processes to be followed, and data sources for each service/transaction under their respective TPDS operations.

Allocation of ration up to six months at one go: To improve system efficiency and transparency, the state/UT governments are permitted to lift and distribute up to six months'

ration under TPDS in one go, subject to the condition that there is no compulsion on the beneficiaries.

Apart from these, there are directions issued to states/UTs to introduce monthly certification of delivery of food grains at FPS and their distribution to ration card holders. So far, this has been reported to have been implemented in 23 states. To strengthen TPDS operations by encouraging greater public scrutiny, states/ UTs have been sanctioned funds to run publicity-cum-awareness campaigns on TPDS.

Measures to improve efficiency of FPS Operations

The distribution of wheat flour/fortified wheat flour under TPDS: With a view to improve the nutrition levels of targeted beneficiaries, states/UTs were encouraged to distribute wheat flour/fortified wheat flour instead of whole wheat under the TPDS. As on December 31, 2013, 17 states/UTs have reported distributing wheat flour/fortified flour under TPDS.

Sale of non-PDS items in FPS: In view of high transaction costs and low commission margins for FPS owners, the government advised state/UT governments to allow FPS licensees to enlarge the basket of commodities by allowing sale of non-PDS items for daily use according to local requirements. This would also improve the viability of FPS operations. At present, all states distribute rice, wheat, coarse cereals, sugar and kerosene oil as PDS items. Fourteen states/UTs have reported selling items in excess of the PDS, through the existing PDS machinery. The table below details these.

Table A 2: Sale of non-PDS items (As on 31 December, 2013)

Items	States
Edible Oils (Palm, Mustard etc.)	Andhra Pradesh, Himachal Pradesh, Maharashtra, Tamil Nadu, West Bengal, Daman and Diu
Pulses	Andhra Pradesh, Chhattisgarh, Himachal Pradesh, Punjab, Rajasthan, Tamil Nadu, Daman and Diu
Gram	Chhattisgarh, Himachal Pradesh,
Salt	Andhra Pradesh, Assam, Chhattisgarh, Gujarat, Himachal Pradesh, Madhya Pradesh, Rajasthan, Tripura, West Bengal
Other spices like chillies, turmeric, coriander etc.	Andhra Pradesh, Rajasthan, West Bengal
FMCG like washing/toilet soap, biscuits, papad, books, tea, toothpaste, matchbox etc.	Rajasthan, West Bengal, Daman and Diu

Source: DFPD

Several other initiatives have been undertaken by states/UTs towards strengthening and streamlining TPDS operations. Some of these initiatives involve timely distribution of TPDS commodities, ensuring community participation in monitoring TPDS, grievance redressal mechanism, best practices in selection of FPS dealers, etc.

Annexure 3: Overview of the OW Schemes and the Quantum of Grain involved

	Scheme Name (On behalf of)	Year of launch	Beneficiary	Entitlement	Price at which the Centre Releases grains	Total Scheme Grain Allocation (A)/Off-take (O) for 2012-13 (lakh tonnes)	Average allocation for 3 years since 2010/11 to 2012/13 (lakh tonnes)
1	Annapurna (Ministry of Rural Development)	2001	Those aged 65 years and above not getting pension under NOAPS	10 kg/person/month- Free of Cost	BPL Rates	A: 0.96, O:0.73	1.02
2	Mid-day meal Scheme (Ministry of Human Resource Development)	1995	Covers students of Class I-VIII of government and government-aided schools, Education Guarantee Scheme/Alternative and Innovative Education Centres (EGS/AIE)	3 kgs rice/wheat/month at rate of 100gms/day	BPL Rates	A:28.5, O:24.97	28.50
3	Wheat-Based Nutrition Program(ICDS) (Ministry of Women and Child Development)		Children below 6 years of age and expectant/lactating women		BPL Rates	A: 14.54, O:11.8	14.87
4	SABLA (Ministry of Women and Child Development)	2010	Adolescent girls in the age group 11-18 years	100 grams of grains per beneficiary per day for 300 days in a year	BPL Rates	A:2.12, O: 0.97	2.43
5	Emergency Feeding Programme (Orissa Government)	1995-96	2 lakh beneficiaries in 8 districts of Odisha		BPL Rates	A:0.18, O:0.18	0.18
6	SC/ST/OBC hostels (states/UTs)	1994	Residents of hostels having 2/3rd students belonging to SC/ST/OBC are eligible	15 kg/resident/month	BPL Prices	A: 0.71, O: together with Welfare	1.15
7	Welfare Institutions (States/UTs)		Charitable institutions such as beggar homes, nari niketans and other similar welfare institutions not covered under TPDS or under any other welfare schemes	Not exceeding 5 per cent of the BPL allocation made to states/UTs. 5kg/person/month	BPL Prices	A:3.08, O: 2.85 (includes SC/ST/OBC)	3.00
8	World Food Program				BPL Rates		0.18
9	Defence				Economic Cost		1.61

Source: DFPD

Annexure 4: Beneficiary Coverage under NFSA v/s TPDS

	TPDS		NFSA	
Ration Card type	Ration Cards Issued (crore)	Beneficiaries (crore)	Beneficiaries (crore)	Coverage (%)
	1	2=1*4.9^	3@	4=3/2
AAY	2.43	11.9	11.9	100%
RBPL	8.71	42.7	42.7	100%
TBPL	11.1	54.6	54.6	100%
APL	13.14	64.5	26.7	41.50%
Total	24.28	119.1	81.3	68.30%

Authors' Calculations

AAY: Antyodaya Anna Yojana

RBPL: Remaining Below Poverty Line

TBPL: Total Below Poverty Line. It is the sum of AAY and RBPL

APL: Above Poverty Line

** As on September 30, 2013. Source: Food grains Bulletin October 2013.*

^ By multiplying the number of ration cards with 4.9, i.e. the average household size in India, we get the number of beneficiaries/persons benefitting under TPDS.

Annexure 5: Modelling buffer stocks in India – Historical Review

Methods to determine amounts that are "optimal" for storage have been under discussion since Gustafson(1958).[48] He calculated the "storage rule" instead of a statutory level of stocks to be maintained over the years, and calculated the "rule" based on a maximisation function, where the objective was to "maximise the sum of the discounted expected net gains to the public". The *total benefit* was calculated as the area under the demand curve, out of which the *storage costs* of the stock was deducted to calculate the *net benefit*. Economic literature on the model has come a long way since then.

A public storage programme may have a single objective or multiple objectives. Even the approach to evaluating the levels of buffer stock to be maintained depends largely on the way we define the objectives. S.K. Ray (1973) looked at buffer stocking operations as a technique to influence variations in price, farm income and consumption. These were also foreseen as the goals that the government wished to achieve through buffer stock operations, i.e., through

[48] Gustafson, Robert L. (1958), Carryover Levels for grains, Technical Bulletin No. 1178, United States Department of Agriculture, 1958

timely release and withdrawal of food grains so as to *stabilise prices* around a pre-specified level, and reduce *variability of farm income and consumption*.

Interestingly both Khusro (1973) and Ray(1973) highlighted the *non-complementarities* between the stated objectives that buffer stocking operations sought to achieve. What this means is that whenever the government tries to stabilise the farm prices, there is an inherent implication for farmer's income. Efforts towards price stabilisation would save their incomes from falling in a good harvest time but would eliminate the farmer's opportunity to earn extra incomes in times of low supplies. According to Ray (1973), "complete stabilisation of farm incomes will result in price instability and hurt consumer interests; the reverse will follow if the consumer interests are completely protected." The solution he proposed to reconcile conflicting interests was in the realms of welfare economics, "*with the objective of maximising net social welfare.*"

A Fox report (USA, 1954)[49] by an anonymous author stated that alternate storage rules for the corn price support programme in the US, and highlighted the fact that "in all storage decision rules except that based on the free-market demand curve, a policy maker is required to state his preference for a particular degree of consumption and price stabilisation."

The heart of the problem in estimating the level of buffer stocking needed is thus the *objective that the policy* has set out to achieve.

As stated earlier, the distinction between buffer and operational stocks was abolished in 1978. However, conforming to international practice and to the logic of evaluating stock levels commensurate with the objectives to be served, we retain the demarcation of buffer v/s operational stocks.

So while a "buffer" stock is needed only to deal with inter-seasonal fluctuations in production and in a normal situation, the recommended size of the buffer stock ought to be made available at the beginning of each crop year; the "operational stock" was understood to be meant for the smooth running of the PDS and its size was to be determined with reference to the volume of public distribution, which would be different in different months of the crop year.

Study of Pipeline/Operational stocks

We give below the two prominent models for estimating the likely level of stocks to be maintained by the FCI to meet the food grain needs under the TPDS and the OWSs.

Study 1: A.M. Khusro (1973) using Baumol's Theory of Pipeline inventories: As consumption is a steady stream while agriculture supplies come in seasonal jumps, there is a greater need to hold supplies to ensure a uniform level of consumption needs being met through a year. The book uses **W.J. Baumol's theory of pipeline inventories** to answer the

[49] USA,1954. United States Government, Long Range Farm Program, Technical studies by the United States Department of Agriculture Relating to selected farm price support proposals for the Committee on Agriculture of the House of Representatives, 83rd Congress, Second Session, Washington, March 1954

question of how much the government needs to hold at a point in time as operational/pipeline reserves.

The formula used for that calculation is:

D = Square root ((2* a*Q)/K),

where

D= volume of stocks' delivery ordered each time (or the pipeline/operational stocks)

Q = Annual sales or food grain requirement

Q/D = number of food grain deliveries each year

D/2= Average stock to be held across the year (so the choice was of the government to either order the annual supply once or maintain an average food grain stock of D/2)

K = holding cost per ton (i.e. interest rates, godown charges etc.)

a= fixed re-ordering cost

The resultant learning regarding the quantity of the pipeline stocks to be held across the year was the following.

1. The volume of delivery, D, does not increase proportionately but less than proportionately to sales. If there are two states, A and B, and A has twice the annual sales or food grain requirement of B, then according to Baumol's formula, "D" for A will not be twice that for B. In fact, relative to the annual sales, the "D" value of A will be lower than that for B.
2. Food grain requirement will be sensitive to the cost of holding/carrying the stock, "K"; so whenever interest rates go up, pipeline stocks will need to be reduced and vice versa.
3. If the fixed re-order cost (which needs to be made each time a request for food grain off-take is made) increases, then this should lead to an increase in the pipeline or operational stocks.

This study highlighted a very vital and pivotal lesson, highly relevant even in today's time, that *the volume of stocks to be withheld by the government cannot be a fixed number, independent of changing cost , but should be a dynamic number responding to changing endogenous and exogenous factors.*

Study 2: GoI's Technical Group 1975: This technical group, constituted in December 1975, presented an alternative methodology to evaluate the stocking numbers for the government. The group was formed under the Chairmanship of the then food secretary. Among the many terms of reference for the group, the main was to suggest the optimal size of the buffer and operational stocks and the right grain-mix.

According to this group, *operational stocks were defined as the minimum quantities required for running the PDS until quantities procured from the new crop become available for distribution*. They calculated the size of the operational stocks for two marketing seasons, namely the level of stocks on April 1, the beginning of the rabi marketing season and on November 1, which marks the beginning of the kharif marketing season.

We present below the methodology the group proposed to calculate the minimum operational stocks to be maintained as on April 1.

Wheat: **Two** months' requirements of public distribution will be required to be maintained on the date, enough to take care of any delay in harvesting, marketing, procurement and transport, etc., of the new wheat crop.

Rice: **Six** months' distribution requirement should be maintained. This was calculated as follows: As on April 1, stocking is done for a 7-month period; the new kharif season should start with at least two months' minimum stock (to safeguard against risks of delays as mentioned above in case of wheat!). So this makes the total of rice operational stock to be a minimum of **nine** months' food grain requirement for distribution. But as rice quantities are also procured out of the summer and the autumn crops during the April-October time, and these procured quantities are seen to be adequate to meet distribution requirements for about **three** months, the minimum (net) operational stock of rice at the beginning of April was to be equal to **six** months' distribution requirement.

Coarse grains: **Six** months' distribution requirement. As was noted earlier, there is no fixed pattern of their supply through the PDS, and therefore, the stock requirement calculation was to be made using the same approach as that for rice.

<u>Study of Buffer stocks</u>

Study 1: A.M. Khusro (1973): According to Khusro (1973), "***no one can fix its (buffer stock's) size initially through some statistical estimation alone"*** *and* ***"in a situation of rapidly changing demand and supplies, the appropriate size of buffer stocks will also be a matter of some trial and error***".

With this disclaimer, Dr. Khusro looked at the factors that govern the size of a buffer stock:

1. *Statistics* – Find estimates based on variations in food grain output and attempt to stabilise total grain supplies along the trend line of total demand.
2. *Sync the variations of marketed surplus rather than just the variations in final production or output*- It is known that variations in the marketed surplus are greater than those of production, since farmers try to protect their consumption and allow their marketed surplus to take the impact of any output change,
3. Contingencies owing to *transportation bottlenecks*, owing to transfer of reserves from surplus states to deficit states etc.

4. *Substitutability between rice and wheat* (which is positive but close to zero) would imply lower stocks than calculated

Study 2a: Government of India's Technical Group, 1975: The technical group of 1975 proposed a model for calculating needed buffer stock levels. It studied the figures of gross production for the period 1960-61 to 1975-76 and, after allowing for seed, feed and wastage and income elasticity of demand, arrived at the requirements for human consumption. **Mean plus one S.D. was calculated to arrive at the quantum required to meet the shortfall in supplies in two out of three years. Mean plus two S.D. represented the quantum needed to cover the deficit in 19 out of 20 years.**

Assuming normal increases in population and income, the group had projected the demand for 1978-79 as 102.6 MMTs – this was the terminal year of the Fifth Plan. The size of the buffer stock was accordingly worked out as:

I. Mean + 1 S.D. 12.4 MMTs

II. Mean + 2 S.D. 18.6 MMTs

Study 2b: Government of India's Technical Group, 1975, an Alternate Method: The group also presented an **alternate method** to calculate the levels of buffer stocks, namely, through the gap between the PDS requirements and procurement. It noted that the average public distribution of food grains during 1973, 1974 and 1975 worked out to around 11MMTs. After considering the effects of an increase in population and the need to contain prices, the normal annual commitment for PDS was estimated at between 12 and 13 MMTs in the next few years. It then estimated the distribution requirements in a poor crop year to be substantially higher – up to 18 MMTs – while procurement in such a crop year was taken to be around 6 to 7 MMTs of rice and wheat. Thus they calculated the gap between procurement and the public distribution requirement in a bad year to be as much as 10 to 12 MMTs. To meet the demand in such a year, the group concluded a buffer stock of 12 MMTs would be called for. In case of two consecutive bad years, a buffer stock of a still larger size (18 MMTs) would be needed.

But given the cost likely to be incurred in acquiring, storing and maintaining grain of such a large magnitude, it was concluded that a buffer stock of only 12 MMTs should be built by the end of the Fifth Plan to meet a situations of normal shortages.

Interestingly, the technical group was asked to evaluate **the possibility of substituting the physical buffer stocks with foreign exchange reserves**. The group noted that in the wake of a steep rise in the international price of food grains (they were referring to the international grain movements between March 1972 and March 1975) and escalating problems in timely availability of food grain in the international market, the buffer stock of 12 mt should be maintained fully in physical terms within the country. They recommended the earmarking of enough forex reserves to cover the import of six million tons of cereals to meet abnormal situations of scarcity.

Study 3: Cummings (1969b): Cummings had formulated a buffer stock model to minimise variations in prices, farm income and consumption levels. This is depicted in Table A3.

Table A 3: Inter- relationship of Instruments in Buffer Stocks

Distribution: $QD_t = Q(RFM)_t + Q(I\&M)_t + Q(FPS) + f(PM_t - P_t)$

Minimum turnover $<= QD_t <= QB_{t-1} + QP_t$

Procurement: $QP_t = f(P_t - PS_t) + R$

$R = QD_t - \{QB_{t-1} + f(P_t - PS_t)\}$, $P_t >= PS_t$

Buffer Stocks: $QB_t = \sum_{1}^{n} QP_t - \sum_{1}^{n} QD_t$, $0 <= L <= QB_t <= U$

QD_t	*Quantity distributed*	$Q(RFM)$	*Quantity to roller flour mills*
$Q(I\&M)$	*Quantity to institutions and military*	$Q(FPS)$	*Quantity to low-income groups(Fair Price Shops)*
PM_t	*Maximum Price*	P_t	*Market price*
QB_t	*Quantity in buffer stock*	QP_t	*Quantity procured*
PS_t	*Support Price*	R	*Remainder to be procured (i.e. by open market purchase)*
L	*Lower limit*	U	*Upper limit*

Source: Cummings (1969b)

Quantity distribution (**QD_t**)**:** The equation has four components, and the first two are small, fairly stable and easily measurable and controllable factors, and as they do not have much relevance to the buffer stocking agenda, these are not elaborated upon. Of the distribution programme, the more crucial and difficult to operate are the remaining two variables, namely the Q(FPS) and the $f(PM_t - P_t)$. They are more flexible and depend on policy decisions.

The third variable, namely the quantity distributed to the low-income groups through fair-price shops Q(FPS), has an explicit welfare objective – to distribute food grains at below market prices to identified group of people. The value under this head depends on the population growth rates and the changes in income distribution and largely, on the way the "target group" is defined and identified.

The fourth term in the "quantity distribution" equation is the amount of food grains distributed for the "price stabilisation" objective.

In the procurement function, the first variable represents the procurement under the price support scheme, and is inversely related to the differences between the market and support prices – the lower the difference between the two prices, the greater the grain availability for

procurement. The second term of the equation represents the residual amount of procurement, which is done by the agencies from the open market.

The whole system of the first two equations is flexible but bounded by two choice parameters, namely the lower and the upper limit of the buffer stock size. The idea is to make the earlier inelastic supply curve more elastic, where the supply response will be limited by the stock size. Thus, the buffer stocking scheme is operated based on the choice parameters of the policy makers.

Study 4: SK Ray's Buffer Stock modelling: Ray's buffer stock modelling exercise observes that the buffer stock operations are effective only in the case when

1. fluctuations in the prices (food), farm income and consumption are due to fluctuations in supply or output. The model goes to the extent of saying that *"buffer stock operations can be justified if the fluctuations in supply are more pronounced than demand."*
2. both the demand and the supply functions of food grains are *inelastic*
3. one *does not* foresee achieving simultaneous stabilisation of prices, farm income and consumption through such buffer stocking operations

The model treated (1) and (2) above as necessary and sufficient conditions for making a buffer stocking programme "*meaningful*".

The Model:

The model organises strategies for the operations of a "buffer stock" with an agenda to influence farm prices, farm incomes and consumption, while realising the non-complementarities of these objectives, – the pursuance of one could potentially conflict with the pursuance of another. So the model solution aims to not only stabilise price around a specified level but also reduce the variability of farm income and consumption from their expected growth curves over a future period of 15 years (ending in 1983-94 as the study was released in 1973)

On the assumptions of complete autarky, the model develops two simultaneous equations for the demand and supply of a commodity; where the former changes are assumed to be due to changes in income and population growth and the changes in the latter are attributed to changes in the growth of domestic production.

The demand and supply functions specified in the model are:

$$\mathbf{Log\ D_t = Log\ A_t - \eta\ Log\ P_t,\ \eta > 0,}\ \boldsymbol{\eta}\ \textbf{\textit{is the price elasticity of demand}}$$

$$\mathbf{Log\ S_t = Log\ B_t + \varepsilon\ Log\ P_t,\ \varepsilon > 0,}\ \boldsymbol{\varepsilon}\ \textbf{\textit{is the price elasticity of supply}}$$

From these equations, the model solves for price (P) and quantity (Q) and then the value of farm income (R) is calculated from it.

The rates of change in the price (P_t), quantity (Q_t) and the farm income (R_t) from one period to another are then calculated and given below:

$$\dot{P}_t = (\mathring{A}_t - \dot{B}_t)/ (\eta + \varepsilon)$$

$$Q^\circ_t = \mathring{A}_t - [\eta/ (\eta + \varepsilon)] (\mathring{A}_t - \dot{B}_t) \text{ and}$$

$$\dot{R}_t = 1/(\eta + \varepsilon) [(1 + \varepsilon) \mathring{A}_t - (1- \eta) \dot{B}_t]$$

Now $\dot{P}_t$ represents the rate of change in farm prices, Q°_t reflects the changes in consumption levels and $\dot{R}_t$ represents the rate of change in farm income.

Evidently, the growth rates in supply and demand cause fluctuations in the prices, farm incomes and consumption levels around their expected growth curves. So the next step was to calculate the magnitude of these variations, which is done as follows:

$$V(\dot{P}_t) = 1/(\eta+\varepsilon)^2 [V (\mathring{A}_t) + V(\dot{B}_t)- 2 Cov (\mathring{A}_t , \dot{B}_t)]$$

$$V(Q^\circ_t) = 1/ (\eta+ \varepsilon)^2 [\varepsilon^2 V (\mathring{A}_t) + \eta^2 V(\dot{B}_t) + 2 \eta \varepsilon Cov (\mathring{A}_t \dot{B}_t)]$$

$$V (\dot{R}_t) = 1/ (\eta+ \varepsilon)^2 [(1+\varepsilon)^2 V (\mathring{A}_t) + (1-\eta)^2 V(\dot{B}_t) – 2 (1+\varepsilon) (1- \eta) Cov(\mathring{A}_t ,\dot{B}_t)]$$

The conclusions derived from the calculations above were as follows. As a long-term policy instrument, buffer stock alone will fail to stabilise price unless the expected rate of growth in demand and domestic supply are equal. This also became the necessary condition for price stabilisation through buffer stocks. The equalisation of the expected growth rates in demand and supply can come about when a buffer stocking policy is combined with other policy measures. The model also highlighted the relevance of the "mean price level around which stabilisation is desired" in ensuring the efficacy of the buffer stocking policy.

Buffer stock operations were justified only "*if the fluctuations in supply were more pronounced than demand*". Hence, for a meaningful buffer stock programme

- Both demand and supply functions *must* be inelastic,
- Simultaneous complete stabilisation of farm prices, farm income and consumption through buffer stock operation is *not possible*; and
- While undertaking buffer stocking operations, the "quantum of sale and purchase (needed) for complete farm income stabilisation will always be less than for complete price stabilisation."

Ray concluded added that even with these conditions/learning applied, the extent of relative stabilisation of price and farm income will depend upon the operational strategy of the buffer stock agency (FCI in case of India).

Study 5: Wheat buffer stock modelling by Raj Krishna and Ajay Chhibber (1983): Developed by **Krishna, Raj and Ajay Chhibber (1983),** the study was called "Policy

Modeling of a dual-grain market: The case of wheat in India". The model developed in the report contains 6 relations, including 5 equations and one identity. The equations determine output (Q), total absorption (demand, D), concessional sales (issues, IS as under the PDS and OWSs), government purchases (procurement, PR), and total imports (IM).

$$SO + PR + IM = IS + SC$$

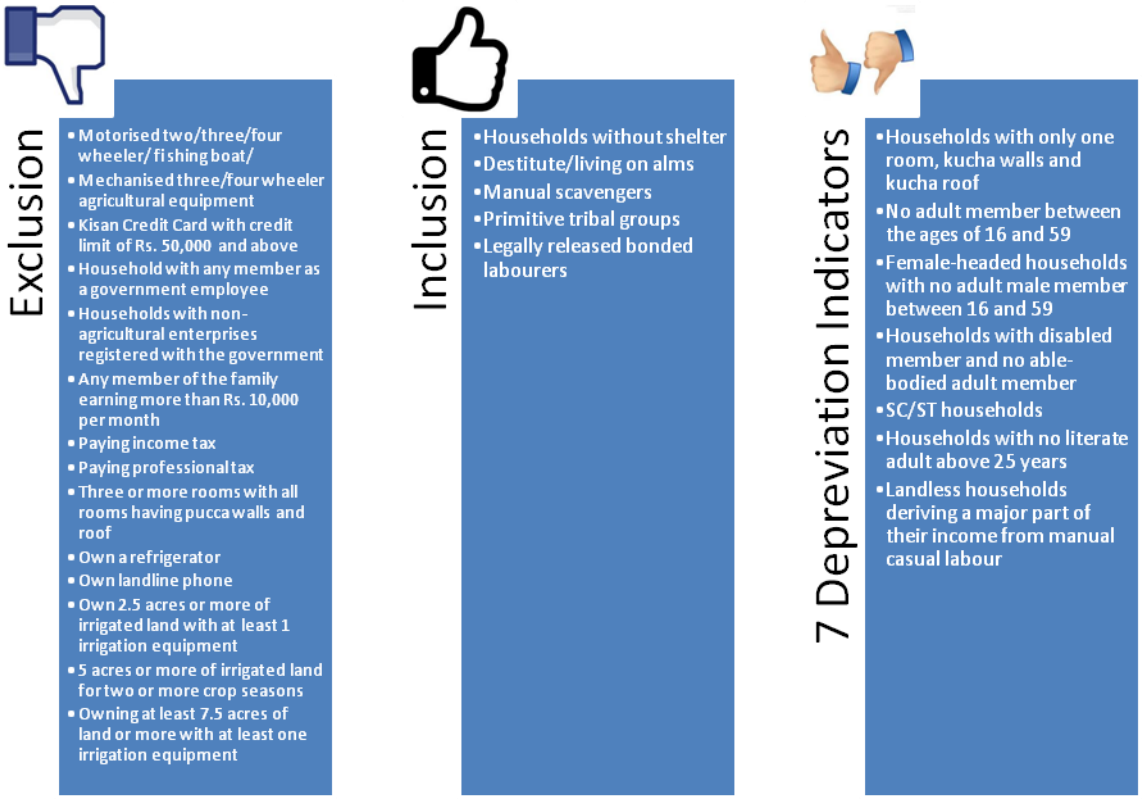
The identity for the government's wheat operations equates the sum of the opening stocks (SO), procurement and imports with the sum of issues and the closing stock (SC). The identity, given in Table 4, is used to determine the closing stock (or buffer stock!) of wheat. This model of simultaneous equations calculates that, given prevailing production and price trends, the annual cost of wheat operation can be reduced by 30-35 per cent if the government rationalises the small amounts of imports that may be required in some years, and cuts average inventory down to about one-fourth of its present size.

This was and is a path-breaking inventory management model as this highlighted the extent to which India could rely on the international market without increasing its risk exposure. Interestingly, after Gustafson, it was this model which used scientific methods and strategies for cost rationalisation of buffer stocking operations.

Table A 4: Five Equations used in the Model by Raj Krishna and Ajay Chhibber (1983)

Output	**Absorption**	**Concessional Sales**	**Procurement**	**Imports**
Q= f_2 (PW21, PBG21, RAW, IRW, Q1), where PW21 = the wholesale price of wheat deflated by the general WPI, lagged by a year; PBG21 = the price index of major production substitutes of wheat, barley and gram, deflated by the general WPI, lagged one year; RAW= the wheat-specific rainfall index (with wheat-share weights for rainfall in different rainfall regions); IRW= the ratio of gross irrigated area in wheat to gross total wheat area, and Q1= lagged wheat output	D= f_3(WAP, PCS, X), where D= total absorption, defined as the sum of net output, net imports, and government inventory depletion; WAP= weighted average of the market wholesale price of wheat, weighted by the production of commercial absorption in total absorption, and concessional price of wheat, weighted by the proportion of concessional absorption in total absorption; the average is deflated by general WPI; PCS= the price index of the consumption substitutes of wheat- i.e. cereals other than wheat, deflated by general WPI; X= aggregate real consumption expenditure	IS = f_4(PW2, PILL2, X) where IS = concessional sales (issues); PW2= the wholesale price of wheat deflated by general WPI, and PILL2= the issue price deflated by the general WPI	PR= f_5(Q, PP2, PW2) where PP2= the official procurement price deflated by the general WPI	IM = f_6(PMM, DEFM, ADU) where PMM= the import price of wheat, deflated by UVIM, the unit value index of all Indian imports; and ADU = total foreign aid utilised during the year.

Annexure 6: Criterion for inclusion/exclusion under SECC



The final selection of these indicators for ranking of households at the state and the sub-state level will be decided by an expert group to be appointed by the Ministry of Rural Development.

Process of identification: Under the SECC, household level data is collected and processed using the three levels above. Once the total household data for a district has been documented, the process to identify the NFSA beneficiaries will begin. The first step is to exclude the people satisfying the "exclusion" criterion above. Then, from the not-excluded group of people, the second step identifies the ones fulfilling the "inclusion" criterion. One thus has the first layer of the NFSA beneficiaries identified. The remaining people, who were not-excluded-not-included yet, are ranked now based on the "seven deprivation indicators".

The total number of beneficiaries given by the Planning Commission forms the basis of the number of people thus identified.

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