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Dr Ruth Kattumuri

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Dr Ruth Kattumuri

Co-Director of the Asia Research Centre and India Observatory at the London School of Economics.

Email: r.kattumuri@lse.ac.uk

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For further information, please contact:

Asia Research Centre (ARC)

London School of Economics & Political Science

Houghton Street

London

WC2A 2AE

United Kingdom

E-mail: arc@lse.ac.uk

www.lse.ac.uk/collections/AsiaResearchCentre

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Food Security and the Targeted Public Distribution System in India

Ruth Kattumuri

Abstract

Annual food production is enough to feed the 6.9 billion people in the world today. However, access and distribution of food in order that people do not have to die due to hunger continues to remain elusive even in the 21st century making food security one of the major global challenges. The Food and Agriculture Organisation (FAO), World Food Programme (WFP) and other organisations of the United Nations; World Food Convention (WFC); and other Non-Governmental Organisations are providing food in emergencies and helping save many people's lives. But their efforts to strengthen capacities of countries to reduce hunger have remained inadequate. Some country programmes, in particular China and Brazil, have been successful through the progress they have achieved in providing access to food for their people and reducing poverty. Targeted Public Distribution System (TPDS) in India, launched in 1997, seeks transparent and accountable distribution of food for the poor. If TPDS meets the challenges of efficient and accountable implementation, it can ensure people have regular physical and economic access to sufficient food to meet nutritional needs.

Introduction

Security (Food and Human) is one of the major challenges confronting the world today. Food security is inherently interlinked with other current global challenges of economy and climate change. Food security is said to exist when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO 2009).

The economic and environmental concerns in recent years have exacerbated global food security problems. A probable outcome of global warming suggests that a large part of the African continent will become drier and experience massive climatic fluctuations, which would have serious consequences for the region with over 70% of the population being dependent on agriculture (PACJA 2009). Climate change impacts fundamental aspects of food security such as availability, stability, access and utilization of food. The increased volatility of food prices together with the effect of climate change further increases the burden on the poor and slows progress (Braun 2008).

The impact of extreme weather in Pakistan, China, Russia, North Korea and India, during the 2010 monsoon season, ascribed to unusual distortions in the path of the jet stream, caused devastations to millions of lives and food supplies (BBC 2010a). According to Pakistan Food Minister Nazar Muhammad Gondal, significant amounts of sugarcane, pulses and rice harvests had been washed away from the northern province (BBC 2010b). Extreme weather events might increase as a result of climate change (Stern 2009). The uncertainty surrounding food production and distribution systems due to the adverse effects of extreme

weather would result in added pressure on food security, nutrition and livelihoods of entire communities.

China and India face the challenge and pressure to feed over one billion populations in each country. Research indicates that these countries hold about half of the world's reserves of wheat and the largest reserves of rice (Rice Market Monitor 2009). In order to combat fears of further food inflation corresponding with a tighter global supply, they are reluctant to sell their reserves. India experienced a bumper harvest this year, however, due to the lack of adequate storage facilities almost one third of food grains remained exposed and unprotected. The government decided to save rather than to sell the stocks (International Business Times 2010).

The UN stated that increases in world commodity prices created a 'new face of hunger' with annual food costs increasing around the world by around 40% together with the hike in fuel costs, and that budgets were inadequate to maintain food deliveries to tackle global malnutrition in 2008 (BBC 2008, Borger 2008). A temporary ban on exports of wheat, corn, barley, rye, and grain products from 15th August 2010 until the end of the year introduced by Russian premier Vladimir Putin due to "abnormally high temperatures" to cap domestic food prices and build its own reserves could be destabilising and lead to rising food prices, adding to inflation (Evans-Pritchard 2010). This ban triggered "agflation", as was evident in that wheat prices surged by their maximum daily limit of 60 cents to \$7.86 a bushel on Chicago's exchange. Transfer of land and grains to the production of bio-fuel, growth in demands from new middle classes in emerging economies, and climate changes are leading to lower reserves of food grains and protectionism thereby resulting in volatility in food prices.

The development of a systematic framework to manage global food security has become a priority for the global community. An extraordinary joint inter-sessional meeting of the Intergovernmental Group on Grain (IGG) and Rice was held on 24th September 2010 to discuss the global fears of recent price hikes and volatility. The aims of this meeting were to inform members of the latest supply and demand prospects for major cereals; provide information on how major production shortfalls, may influence medium-term supply and demand prospects; and provide an opportunity for exporting and importing countries to engage in discussions on appropriate reactions to current market situation and on the future of the world cereal economy, especially in an institutional context (FAO 2010). The IGG acknowledged the need to address the causes of unexpected price hikes and volatility, particularly, insufficient market transparency at all levels including in relation to futures markets; growing linkage with outside markets, in particular the impact of "financialization" on futures markets; unexpected changes triggered by national food security situations; and panic buying and hoarding, among threats to food security.

The Groups recommended intensification of Food and Agricultural Organisation's (FAO) role for information gathering, dissemination and strengthening capacity in relation to monitoring planting intentions, crop development and domestic market information. It was suggested that additional work was to be undertaken for analyses of alternative approaches to mitigating

food price volatility to support policy decision-making; develop new mechanisms to enhance transparency and manage the risks associated with new sources of market volatility; and explore ways of strengthening partnerships between FAO and other relevant organizations working on these issues. Finally member countries “agreed to refrain from taking measures that are inconsistent with the WTO rules, with adverse impacts on global, regional and national food security”, as stated in the Declaration of the World Summit on Food Security 2009 (FAO 2010). The Groups agreed that increased investment in agriculture, new technologies and good policies, are key elements to ensure global food security.

This paper firstly presents the global food security scenario, which is followed by a brief summary of food programmes in some countries. We then analyse the hunger indicators and the public distribution system in India. We conclude with a discussion of some policy recommendations to enhance the public distribution system in order to improve food security and reduce hunger and malnutrition in India.

Global Food Insecurity

The agricultural policy throughout Europe in the 20th century focused on increasing productivity. Subsidies and grants supported intensive farming during late 1950s into the 1970s. Food commodities accumulated quickly in the EU producing first food mountains, which necessitated greater expenditure on storage and subsidising exports to other parts of the world and policies were changed in the 1980s; and new policies had been introduced since 1988 to control over production (ECIFM 2010).

In 2010, the earth is producing enough food for all the 6.9 billion people in the world; 3.05 billion tonnes of food had been produced in the first 7 months (Table 1). However distribution of food continues to be problematic and at least 25,000 people are recorded to be dying of hunger each day even in the 21st century.

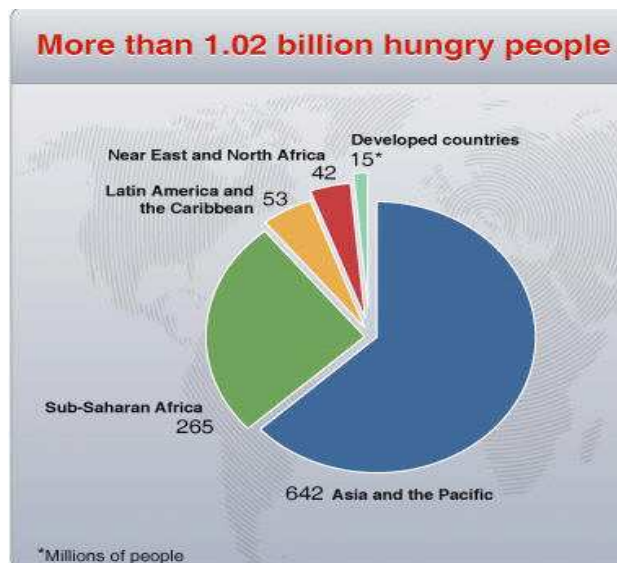
Table 1 World Food Scenario, 2nd October 2010

Food produced:	3.95 billion
Undernourished people in the world:	1.03 billion
Overweight people in the world:	1.15 billion
Obese people in the world:	343 million
People who died of hunger each day:	28,500

Source: Worldometer 2010

The progress to halve the proportion of people suffering from hunger, according to the millennium development goal (MDG 1, target 1C), and achieve the basic right to food by 2010 remains slow (MDG 2010). On the other hand hunger may have increased in 2009 as a consequence of global food and financial crises. There are also large regional differences in the distribution of hungry people in the world. According to Food and Agriculture organisation the highest number of 642 million hungry people live in Asia and the Pacific (Fig. 1).

Figure 1 Regional distribution of hungry people in the world



Source: FAO 2009

World Food Programme

The UN World Food Programme (WFP) was established in 1960 with the objectives of preparation for emergencies, restoration and rebuilding of lives after emergencies, reduction of chronic hunger and malnutrition, and help countries reduce hunger by capacity building (WFP 2010). Poverty, uneven food distribution, natural disasters, deforestation and low education levels are listed among the threats to food security by WFP. The programme is also focussed on reduction of child mortality, improvement of maternal health, control and eradication of diseases, and enabling environmental stability in agricultural operations.

The programme uses food as an incentive to help the poor to gain education, provide healthcare and work to build assets. For example, WFP assists approximately four million food insecure people in Pakistan annually. In India WFP aims to combat malnutrition and invest in human resources; help improve immediate food security for selected target groups (specifically poor women, especially mothers; at-risk children; and poor forest-dependent populations); maximize the active participation of women in projects; advocate joint forest management; help strengthen distribution channels for locally produced food grains; increase agricultural production and create employment (WFP 2010).

Global Hunger Index

The target to halve the number of undernourished people by 2015 was affirmed at the World Food Summit in 2009 (FAO 2009a). However, efforts to meet this goal have been inadequate and the number of undernourished people in the world has increased from 824 million in 1990 to 1.02 billion in 2009. Over a billion people are undernourished in the world today; on the other hand 1.15 billion are overweight and 343 million are obese, which is problematic for health security (Tab. 1). FAO estimated that 80% of malnourished children living in the developing world produce food surpluses (Gardner and Halwiel 2000). Further many people in food rich nations are underfed. The existence of malnutrition is related to problems of food distribution and purchasing power rather than food shortage since there has been sufficient food to feed the entire population of the world (Sen 1981). Even in Africa and South Asia where hunger is most severe, there is enough food to feed all the people in the country.

The Global Hunger Index (GHI) was developed by International Food Policy Research Institute (IFPRI) to measure the progress and failures in the global fight against hunger. It was first published in 2006 and is updated annually by IFPRI and its partners (Grebmer et al. 2009). This statistical tool is calculated as follows:

$$\text{GHI} = \frac{\text{PUN} + \text{CUW} + \text{CM}}{3}$$

PUN is the proportion of the population that is undernourished; CUW is prevalence of underweight children under five and CM is proportion of children dying before the age of five. The data used for the 2009 GHI are for the period from 2002 to 2007. The data for PUN are based on UN Food and Agriculture Organization for 2003-2005; CUW is based on World Health Organisation (WHO) and Demographic Health Survey (DHS) data; and CM data are from UNICEF. The index ranks countries on a 100 point scale, with 0 being the best score, values less than 4.9 reflect "low hunger", values between 5 and 29.9 are "alarming", and values exceeding 30 are "extremely alarming" hunger problem.

In 2009, GHI included 121 developing countries and countries in transition and the focus was on the connection between hunger and gender equality (Grebmer et. al. 2009). The impact of the financial crisis on the hunger situation was also analysed. GHI has reduced only by a quarter between 1990 and 2009. Southeast Asia has reduced hunger significantly in the last decade. There has been some progress in South Asia, however GHI still remains to be alarmingly high (Appendix 1).

Country Food programmes

Several countries around the world have been implementing food programmes for reduction of hunger and poverty. Some countries have been successful in implementing their national programmes and reducing hunger in the last decade.

Table 2 Global Hunger Index (GHI) for some Countries, 1981 - 2009

GHI Rank (2009)	Country	1981	1992	1997	2003	2009
N/A	<i>Brazil</i>	10.43	8.50	6.70	5.43	<5
N/A	<i>Russian Federation</i>	.....	.....	3.80	2.93	<5
5	<i>China</i>	20.10	12.57	8.57	8.23	5.70
65	<i>India</i>	41.23	32.80	25.73	25.73	23.90
35	<i>Sri Lanka</i>	24.90	22.40	21.87	16.63	13.70
55	<i>Nepal</i>	43.30	27.77	27.77	24.50	19.80
58	<i>Pakistan</i>	33.60	25.97	23.60	21.77	21.00
67	<i>Bangladesh</i>	44.40	36.50	35.73	28.27	24.70
N/A	<i>Egypt</i>	13.63	6.63	7.00	5.17	<5
14	<i>South Africa</i>	.....	7.46	7.32	7.66	7.00
38	<i>Uganda</i>	24.63	21.83	21.73	18.63	14.80

Source: Wiesmann, Doris 2006

China has been successful in increasing agricultural productivity and lifting many out of poverty through introducing right agricultural policies, investments and entrepreneurship. China has achieved significant progress to manage its challenges of food security and been able to halve its global hunger index between 1990 and 2009 (Table 2). Decades of war in China had led to food shortages. However, by the end of 1950, initiatives such as promotion of grain production, reduction of hoarding and speculation and strengthening grain organizations, enabled the grain market to be brought under control (Zhou and Wan 2006). Research also indicates that urbanization and holding poverty constant in both urban and rural areas resulted in almost a quarter of poverty reduction between 1981 and 2001 (Ravallion and Chen 2007). China has also developed technical and scientific skills in agricultural innovations such as developing plant varieties resistant to pathogens and promoting productivity (SAIN 2010).

Brazil's 'Bolsa Familia' (family grant) or Zero Hunger Programme for eradicating food insecurity and eliminating hunger through an integrated set of policies has been backed by a strong political agenda (Belik and Del Grossi 2003). President Lula da Silva prioritised the expansion of this programme since 2002. It mobilized different areas of Government (federal, state, municipal and local) and civil society, unions, church groups, private sector, and international NGOs. President Lula invited a FAO-led multi-agency mission to Brazil in December 2002 to lay the foundations for the implementation of the Zero Hunger Programme. An FAO Technical Cooperation Programme grant funded 3 projects (of approximately US\$1.1 million) for background studies; policy formulation; developing a monitoring and evaluation system; and working on participatory methodologies for reaching the most vulnerable groups in the northeast of Brazil. Based on results attained by these projects, the Government of Brazil and FAO

signed a US\$5.8 million agreement in December 2003 (FAO 2004, Economist 2010).

'Bolsa Familia' involves conditional cash transfers (CCT) to the poorest families in situations of food insecurity. The programme has improved the lives and nutritional intake and has about 12.4 million families enrolled. It has been referred to as a 'model of effective social policy' by a former World Bank president. The programme allows children to miss about 15% of classes; if a child gets caught missing more than that, payment is suspended for the entire family. Small investments have produced large benefits for the country. The payments are \$12 per child a month, with a maximum payment of about \$113, so that the programme costs only 0.5% of GDP. Since 1992, proportion of rural children in primary education has caught up with that of city children and rural enrolment in secondary schools has increased faster than the urban rise. Rural malnutrition among children fell from 16% to 5% since 1996. Family benefit is given to the head of the household (most often the mother). Every household gets a debit card and the ministry of social protection runs a database with every transaction. As a result the number of Brazilian families with income below \$440 a month has fallen more than 8% every year since 2003. The Gini index fell from 0.58 to 0.54 based on the improvements in bottom-level wages (Economist 2010).

This scheme provides stipends and food to the poorest if they meet certain conditions, such as that children attend school, or babies are vaccinated. These were few small-scale programmes ten years ago, which proved beneficial to improve income distribution and have become more wide-spread, and have since been introduced even in New York city. According to Belik and Grossi (2003), these programmes do not cost a lot (Brazil's, the biggest such programme, cost 0.5% of GDP), make the difference to the poorest and help the future generation by making them healthier and better educated than their parents. However, this scheme seems to work better in rural than in urban areas. In cities in Brazil the problem of poverty is compounded by violence, drugs, family breakdown and child labour, which require additional interventions by law and order. The success of this programme benefits from co-ordinated implementation involving multiple groups through strong political and administrative involvement of the state, as well as the involvement by commerce and religious organisations, and civil societies. As the children grow into adults they will continue to be supported for vocational training.

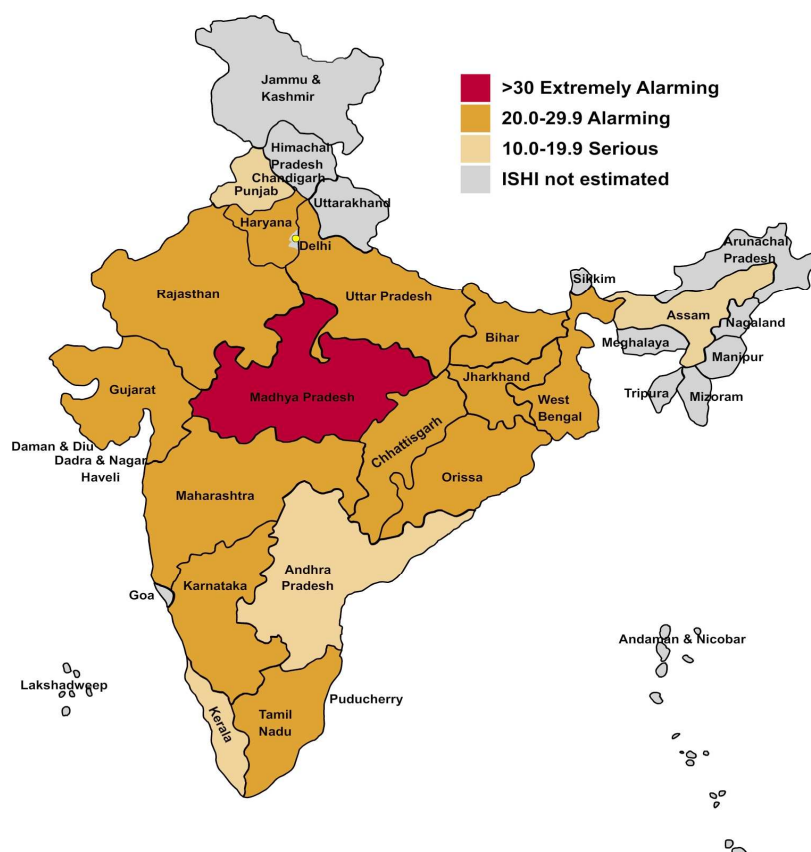
The Food Products Procurement Programme was also introduced in Brazil to ensure a market and reasonable price for products from small-scale farmers. This programme involved direct procurement of products at harvest for maintaining local food security stocks; advanced procurement of products at planting time; local procurement by local governments to be used in school feeding programmes; and a programme supporting milk production and consumption, benefiting producers with limited production and bargaining power (FAO 2010a).

India Hunger Indicators

Although India grows enough food (food stock of 50 million tonnes projected in 2009) and its GDP has more than doubled since 1991, it is home to about 25 percent of the world's hungry poor (FAO 2009, Hindustan Times 2009). Forty eight percent of children under the age of five years are malnourished in India, which is over a third of the world's 150 million malnourished under-fives. Also over half of all women aged between 15 and 49 years are anaemic, and 30% of children are born underweight. It is estimated that 3% of GDP is lost by physical impairments caused by malnutrition in Asian countries (Economist 2010a).

India ranked a high of 65 in 2009 with a global hunger index of 23.9, which is higher than many countries in sub-Saharan Africa including Sudan (Table 2). The India State Hunger Index (ISHI) score was calculated for 17 major states and covering over 95 percent of the population (Menon et al 2009). ISHI has been computed using calorie undernourishment cut off of 1,632 kcals per person per day.

Figure 2 India State Hunger Index (ISHI)



Source: Menon et al 2009

Madhya Pradesh has been categorised as extremely alarming based on ISHI (Fig. 2). Jharkhand, Bihar and Chhattisgarh performed badly with a hunger index

score exceeding 25 (Table 3). Punjab, Kerala, Andhra Pradesh and Assam had the lowest scores. All other states had a hunger index score exceeding 20.

The under-five mortality was below five deaths per hundred children only in Kerala and Tamil Nadu; Uttar Pradesh, Orissa, Chhattisgarh, Jharkhand and Madhya Pradesh had under-five mortality rate exceeding nine deaths per hundred children. Proportion of underweight children under age-five was below 30 percent only in three states – Punjab, Kerala and Tamil Nadu. Prevalence of calorie under-nourishment was over 25 percent among the southern states of Maharashtra, Kerala, Tamil Nadu, Karnataka; this might perhaps be attributable to the diet and climate of these states.

Thus India has a long way to go before it can attain a desired global hunger index of <5.

Table 3 India State Hunger Indicators

State	Prevalence of calorie undernourishment (%)	Proportion of underweight among children <5 years (%)	Under-five mortality rate (deaths per hundred)	India State Hunger Index Score	India State Hunger Index Rank
<i>Punjab</i>	11.1	24.6	5.2	13.63	1
<i>Kerala</i>	28.6	22.7	1.6	17.63	2
<i>Andhra Pradesh</i>	19.6	32.7	6.3	19.53	3
<i>Assam</i>	14.6	36.4	8.5	19.83	4
<i>Haryana</i>	15.1	39.7	5.2	20.00	5
<i>Tamil Nadu</i>	29.1	30.0	3.5	20.87	6
<i>Rajasthan</i>	14.0	40.4	8.5	20.97	7
<i>West Bengal</i>	18.5	38.5	5.9	20.97	8
<i>Uttar Pradesh</i>	14.5	42.3	9.6	22.13	9
<i>Maharashtra</i>	27.0	36.7	4.7	22.80	10
<i>Karnataka</i>	28.1	37.6	5.5	23.73	11
<i>Orissa</i>	21.4	40.9	9.1	23.80	12
<i>Gujarat</i>	23.3	44.7	6.1	24.70	13
<i>Chhattisgarh</i>	23.3	47.6	9.0	26.63	14
<i>Bihar</i>	17.3	56.1	8.5	27.30	15
<i>Jharkhand</i>	19.6	57.1	9.3	28.67	16
<i>Madhya Pradesh</i>	23.4	59.8	9.4	30.87	17

Source: Menon et al. 2009

Public Distribution System in India

Public Distribution System (PDS) is said to have existed from before independence in India, and was initially intended to protect consumers from food shortages and producers from price fluctuations (Tarozzi 2002). It was originally started at a few urban centres, but was extended in the 1980s as a measure for food security and poverty alleviation (DFPD 2010). Wheat, rice, sugar and kerosene are provided to a target of 330 million people estimated to be nutritionally at risk through 499,000 ‘fair price shops’. Central and state governments jointly manage PDS with the centre being responsible for procurement, storage, transportation and allocation. The states are responsible for

the distribution through fair price shops; as well as for identification of families below poverty line (BPL), issuing cards, supervision and monitoring.

The misuse of resources and mismanagement of the programme was widespread and became well known. Consequently, the government re-launched PDS as the Targeted Public Distribution System (TPDS) in 1997. TPDS as its name suggests targets the population into above and below poverty line categories and aims to reach a target of 60 million families below poverty line with 20 kg grains each month. It also introduced a dual price system, with the BPL price for grain set at 50% of the economic cost. These price change have been criticised for the likelihood of increasing malpractices and information issues resulting in confusion among customers about the appropriate prices to be paid (Rajagopalan 2010).

Mid-day meal schemes in States

This additional public distribution scheme was first introduced in 1925 in Madras Presidency and provided cooked meals to children in corporation schools. Chief minister K Kamaraj set up a 'poor feeding' programme in *Tamil Nadu* in 1956 following an encounter with a small boy in a village in Tirunelveli. When he asked the boy, who was with cows and goats with other boys, why he was not in school instead, the boy queried in return with "if I go to school, will you give me food to eat? I can learn only if I eat" (educationforallindia.com 2010). In 1982, M G Ramachandran then chief minister renewed efforts in Tamil Nadu state, to enable children and improve their nutrition through the 'Nutritious noon-meal programme'. A study by Rajan and Jayakumar (2010) in the Kanyakumari district in Tamil Nadu indicated that the drop out rate reduced from 40% to 22% and showed that the enrolment of children from minority communities had increased. Tamil Nadu has continued to improve the nutritional value of the meal by providing rice, vegetables, eggs and vitamin tablets. More recently the social welfare department in charge of the nutritious meal programme has engaged a local master chef to train cooks at school centres to make more tasty meals and introduced pulav rice to the menu (Karthikeyan 2009).

The programme gained momentum and Gujarat and Kerala introduced the mid-day meals programme in the 1980s. In 1995, following from the case of Tamil Nadu, then Prime Minister, Narasimha Rao introduced the "National Programme for Nutrition Support to Primary education" across the country.

Each State introduces its own initiatives to the mid-day meal programme. *Karnataka* launched the scheme in 2002 initially for seven backward districts and extended it to the remaining 20 districts in 2003. The government of *Karnataka* involves nutritional experts to plan menus; participation by mother's supervising committee and local communities to donate utensils, appliances and vegetables to the kitchen centres; NGOs are also involved in the supply of food; the scheme provides employment to widows and disadvantaged communities and enables social equality (Srinivas 2008). School Development Monitoring Committees also regulate school infrastructure; teachers are encouraged to participate by tasting food and educating students on nutrition and hygiene; some schools also plant fruit and vegetable gardens and fruits, which are given as supplements to children. Initiatives such as use of gas cookers to reduce

emissions and rainwater harvesting to maintain ground water levels have also been introduced in this programme.

Delhi initiated the programme in 2003 and benefits several first generation learners from a range of economic backgrounds including carpenters/masons; workers in factories and industries; officials from government offices; and housemaids (Diwan 2010). Research suggests that students are provided micronutrients like iron and vitamin-A. Kitchens have adopted modern technology steam boilers, pulverizing machines and grinders to ensure healthy and hygienic preparation of food; eco-friendly waste management systems. New initiatives include ensuring a minimum of 450 calories and 12 grams of protein, including green leafy vegetables and no item shall be repeated on the menu. As reported by Diwan (2010), the mid-day meal scheme is served for approximately 190 days in a year, however there are fluctuations based on sealing drives and weather conditions.

The mid-day meal scheme was launched in *Punjab* in 1995. Committees have been appointed at the state, district, block and village level to monitor the scheme. Mother Self Help Groups (SHGs) also help monitor quality of food being served; all women cooks at various schools help provide employment for women. According to Chugh (2010a) many schools use open fire to cook the meals in spite of having been provided with funds for gas cookers; monitoring and evaluation does not exist at all schools and the nutritional levels of the food provided is often compromised; timely access to funding comprises a problem when schools are not paid in advance and sometimes the cooks are not paid on time.

Andhra Pradesh introduced the scheme in 1982, however there was not much progress due to financial constraints. The government revamped the initiative in 2001. Studies show that there have been improvements in school attendance in urban and rural districts, especially of girls, reduction in social inequality and teacher absenteeism (Yazali and Raju 2008). Parent groups and NGOs help monitor implementation of the mid-day meal scheme. The government has introduced IT projects for monitoring and evaluation, such as Bodh Tree Consulting Ltd., a software-consulting agency has developed software, which monitors attendance through electronic kiosks.

The mid-day meal scheme was launched in *Maharashtra* in 2003, covering children enrolled in public and private education and education guarantee schemes centre. A study by Chugh (2010) found that children from different social backgrounds sit together during lunch, which encourages equality. The government has monitoring committees for better implementation. The cooking is allocated to various women's groups, thus providing a source of employment for women. Members of village committees and parent groups supervise the quality of food. Efforts are made to ensure accountability and better implementation through maintaining registration and involvement of NGOs. Research indicated that many schools actively utilize the allowance provided towards learning aids, purchasing charts and other materials. Chugh (2010) also reports that gas connection has not been provided in all schools in Maharashtra and a few schools continue to use a *chullah*.

Research indicates that the introduction of the mid-day meal scheme in 2005 in *Harayana* increased the demand for education and the enrolment of girls (Narula 2008). Women, particularly widows and those from schedule castes, are given employment as cooks. Teachers are trained in nutrition, hygiene, conversion of water etc, which are then taught to the children.

Uttar Pradesh introduced the mid-day meal scheme in 1995. Research indicates that the percentage of girls enrolled in schools has increased with a majority of girls being from Muslim and backward communities. According to Wizarat (2008), school health programmes are improving; height charts and weighing machines are supplied and dieticians are appointed. The programme supplies micronutrients, Vitamin-A, de-worming medicines; drinking water facilities and toilets for girls are being provided. Mid-Day-Meal Authority is responsible for monitoring and evaluation. Participation by NGOs has been inadequate in this state and the programme can benefit by greater involvement of NGOs.

The mid-day meal scheme is proving to be beneficial and is enabling improvements in school enrolment, particularly by girls; social equality; and providing employment to women. There are variations between states in implementation and monitoring and evaluation. Some states are showing commitment to succeed through innovative schemes such as introduction of energy saving methods and using IT for monitoring.

Research suggests that problems of implementation and misuse of funds continues. Misappropriation had been evident in a state-wide survey we conducted in Tamil Nadu in 1984. There have been many improvements across states. On the other hand, misuse continues at some levels as evidenced during a survey in 2009 of Palanpur, a village in *Uttar Pradesh*. This suggests that implementation and accountability is poor in rural centres even after twenty-five years. The involvement of mothers and other monitoring processes might influence accountability. Sharing best practises between states and between centres within states; greater monitoring and evaluation; increasing involvement by NGO's, civil society organisations and religious groups can enhance implementation.

Discussion and Conclusions

At the global level there has been a renewed commitment by world leaders to eradicate hunger sustainably at the earliest (FAO 2009a). However progress toward eradicating hunger remains slow. Countries in South Asia are underperforming in reducing their hunger indices (Table 2). According to a World Bank report, physical impairments caused by malnutrition in low income Asian countries knocks off GDP by 3% as malnourished children cannot reach their full potential in schools, physically and mentally (IMF and World Bank 2008).

A forum was convened by FAO on how to feed the world in 2050, by which time there would be over 9 billion people in the world (FAO 2009b). According to this forum the problems to be resolved include: will we be able to produce enough food at affordable prices or will rising food prices drive more people in

the world into poverty and hunger? How much spare capacity in terms of land and water do we have to feed the world in 2050? What are the technologies available to help us use resources more efficiently? Will new technologies be available to the poor? How much do we need to invest to help agriculture adapt to climate change, and how much can agriculture contribute to mitigating extreme weather events? The challenges to global food security continue to increase with rise in demand, protectionism and market volatility.

The benefits of PDS are recognised for emerging economies. Public distribution schemes in Bangladesh, Cambodia and Pakistan have helped to get more girls into education (Ahmad et al. 2007). There are increasing calls for reform rather than elimination of the Egyptian food subsidy system (Youssef 2010). Brazil's 'Bolsa Familia', while not a panacea, has a record of attaining its target better than most CCT schemes. Brazil's success, possible through strong political commitment, might be adaptable for State level implementations in India.

Indian Prime Minister Manmohan Singh, in the 63rd Independence Day speech on 15th August 2010, stated the concerns of food security in India. He mentioned the positive steps taken to ensure agricultural sustainability such as - developing new and improved variety of seeds; the establishment of the Borlaug Institute of South Asia; increase in the support prices to farmers in the last six years to enable competitive prices and increase production (India Digest 2010). He also recognised that these measures had a negative impact of increase of food prices in the open market. He reiterated that India continues to be plagued with poor health and various diseases due to lack of provision of nutritious food, poor hygiene and lack of sanitation. Dr Singh referred to the new challenges in agriculture sector such as climate change, deterioration in the quality of soil and declining levels of ground water, and lack of technology.

Hunger and malnutrition continue to remain high in India. About twice as many children in rural areas are likely to be underweight in comparison with children in urban areas (Unicef 2010). There are variations in the levels of malnutrition by gender and caste (Mendelson and Chaudhuri 2010). Girls from lower castes are likely to have higher levels of malnutrition. On the other hand, children from wealthy families can also be under nourished due to poor feeding practices and food shortages. Malnutrition is associated with half of all child deaths and a quarter of cases of diseases in India. Hence the need for public distribution systems remains.

The targeted public distribution system (TPDS) and the mid-day meal scheme (approximately 120 million children are signed up) are two large government food distribution schemes in India. Problems of misappropriation of resources and mismanagement of these programmes continue and the government is unable to achieve its goals. As a result of the inefficiencies of operations and entrepreneurial abilities of implementers to siphon funds, majority of beneficiaries of the resources invested by the government are not the target population. According to Montek Singh Ahluwalia, Deputy-Chairman of the Planning Commission of India, only 16% of the resources allocated towards India's food subsidized distribution scheme reach the poor (Economist 2010a).

The criticisms of TPDS include the exclusion of a large number of deserving households due to problems associated with identification and exclusion (Saxena 2010). According to Rajagopalan (2010), only 18 out of 31 states had been surveyed to identify below poverty line (BPL) families; in some states where surveys had been conducted, BPL families have been missed out; performance of TPDS is considered to be poor in states with high number of BPL families; also lack of co-ordination between national and village level further impede its performance. Implementation of TPDS across states is also wrought with misappropriation; Tamil Nadu had issued BPL cards to the entire population of the state by considering everyone to be below poverty line; the number of BPL cards issued in Andhra Pradesh exceeded the numbers registered below poverty in this state (Outlook Business 2009, Tritah 2003).

The need to improve implementation of TPDS is generally acknowledged. MS Swaminathan, a well-known agricultural economist in India, suggests that food security is based on continuous reform of PDS, effective storage of food grains and a sustained effort to increase agricultural productivity. Jean Dreze suggests the introduction of a 'quasi-universal system' based on specific inclusion criteria; as well as a system of food coupons which possess a unique identification number and hologram, extensively used in Tamil Nadu is another method to track PDS grain to the household level (Sebastian 2009). Integrating community involvement and decentralized procurement have also been suggested for reducing corruption. Saxena (2010) recommended the introduction of technology such as digital cameras to monitor fair price shops and storage facilities; development of an effective redressal mechanism by the provision of a toll free number in order to register complaints; and the use of banking and information technology into PDS operations to ensure transparency.

Performance of PDS not only varies across states but more so between rural and urban centres. Involvement from parents and other groups in some centres contributes toward better performance, however efforts are not co-ordinated or uniform across state and urban-rural public distribution systems. Scaling up involvement of multiple stakeholders including teachers, parents, civil societies, private organisations and religious communities would enhance accountability and performance of PDS in India. Student volunteers, who might be empowered to voice any concerns, from across the country could be provided with opportunities to participate in the programme to enable regular monitoring and better implementation.

The government has prioritised the development of technology, such as the unique identity card, in order to tackle misuses of the system and effective implementation of the scheme. The government is also planning the introduction of Global Positioning Systems and Radio Frequency Identification Devices in the 11th five-year plan to track food grains and reduce leakages. Availability of PDS documents in the public domain; introduction of computerised records, biometrics and smart cards are being developed for enabling monitoring and evaluation. The e-Public Distribution Monitoring system (e-PDMS) has also launched for enhancing transparency, efficiency and accountability (Rao, Sultan and Siddiqui 2008). This program aims to cover the entire food supply chain under PDS including Food Corporation of India (FCI), State Civil Supplies Corporation, State Warehousing Corporation and Lead societies.

Technology-based schemes will improve monitoring as well as communication and co-ordination of the programme. While there are many benefits from technology, some people's resistance against Aadhaar-UID apart, there are possibilities that Indian entrepreneurial skills might develop new methods for the misuse and misappropriation of public resources for personal needs and gains across all levels may continue, albeit to a lesser degree. Research and innovation are required for better understanding and to ensure regular development of the programmes.

The hierarchical system, in the case where the person at the top is corrupt, creates a model of malpractices becoming a norm across various ranks and of varying degrees; it also disallows those located under corrupt governance to rectify the system. An explanation often given is that when people are poorly paid they are tempted into misappropriation. Empowering people through information and communication, providing a minimum wage, and creating greater awareness about corruption could help reduce malpractices. Strong political will and administrative commitment for efficient implementation, greater monitoring and evaluation and regular reform, can help keep ahead of schemes to offend and improve performance of the public distribution systems. Ensuring efficient implementation of TPDS is essential to enable the fundamental right to food.

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