

An economic assessment of food and nutritional security of West Bengal and India

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Received:09-09-2012, Revised:14-10-2012, Accepted:25-10-2012

ABSTRACT

Present food production in India is sufficient to provide everyone with calories enough for maintaining an active and healthy life. Global Hunger Index shows that hunger problem in India is alarming, ranks 67 out of 122 developing countries. The state West Bengal occupies 8th position in the lists of State Hunger. Impressive average growth ranging 8 to 9 per cent seems failed to take care of food and nutritional security of millions of Indians. The present study based of secondary data collected from various sources reveals that percentage of below poverty line people consuming less than recommended calorie norm (2400 Kcal per capita per day) is accelerating with varying magnitude and the dependence on cereals including cereals substitutes and food grains for supply of needed body energy and protein are marginally decelerating, although remains more than 75 per cent, over the periods under study in both rural and urban areas of West Bengal as well as India. Per capita per day consumption of total cereals, the main source of body fuel, is declined by 17.33 and 9.09 per cent in rural and urban India respectively whereas in West Bengal, over all cereals consumption remains stable though an increase in consumption is observed in periods 1986-87 and 1993-94 by magnitude of 7.14 per cent in rural areas and urban West Bengal witnesses an overall increase of 9.77 per cent.

Key words: Compound growth rate, food and nutritional security, hunger index

Food security is not guaranteed by self-sufficiency in food production and adequate supply of food does not ensure nutritional security even sufficient food intake may not assure adequate nutritional status for an individual. On the other hand, less intake of food may not cause nutritional deficiency. Nutritional security exists when all people enjoy the right to get physical, social and economical access to education, balanced diet, safe drinking water, sanitation and depends on fulfilment of four necessary criteria namely, food availability, accessibility, consumption and utilization. Production of sufficient quantities of food in a sustainable manner along with equitable distribution is the pre-requisite to keep the most of malnutrition related problems. But the present crisis facing the developing countries along with India is somewhat different. It is argued that present global food supplies are more than sufficient to provide everyone with sufficient food, yet there are several reports of hunger, death, widespread under-nutrition which is manifested in the form underweight and stunting growth of millions of children and women throughout the world. It was tragic enough for a agricultural economy not to be able to produce in the 1960s adequate quantities of foodgrains to meet the domestic consumption requirements of the population: it is perhaps systemic tragedy today that even when we are able to produce adequate quantities of foodgrains we are unable to ensure that foodgrains so produced do reach the needy (Majumdar and Kapila, 2007). According to FAO (News Release September, 2005), 925 million people worldwide do not have enough food to eat, out of which 98 per cent live in developing countries and

malnutrition contributes to five million deaths of children under five each year and women account for 60 per cent of the world's hungry people. Although, India becomes self sufficient in food production following Green revolution ; Global Hunger Index prepared by International Food policy Research Institute (IFPRI, 2011) reveals that India ranks 67th among 122 countries even lagging behind two neighboring countries namely, Srilanka (36th) and Pakistan (59th) which helps to understand the gravity of the alarming situation. Among 17 major Indian states, West Bengal occupies 8th position with state Hunger Index score of 20.97, although below all India average of 23.30. In West Bengal, 3.5 per cent of the population reported that they are not assured of even one meal a day and another 16.5 per cent face difficulties arranging two square meals for all months in a year. In all round 12 million rural people (around 2.5 million rural families) do not get two square meals a day through the year (Roy, 2008). Again, prevalence of calorie under nourishment is extremely alarming in spite of the fact that country is not facing acute food crisis. Hence malnutrition is not arising out of shortage of food, but due to poor diet i.e., low calorie content. Sufficient consumption of food does not guarantee adequate nutrition status and insufficient intake does not indicate calorie deficiency. Malnutrition is one of the largest factors, suppressing India's spectacular growth. An estimated 200 million (46%) children are under weight at any given time with more than 6 million of those children are suffering from worst form of malnutrition, severe acute malnutrition (IFPRI-2011). To meet optimum energy requirement for healthy and productive life,

one needs to consume balanced diet composed of cereals, pulses, fruits and vegetables, a milk and animal protein. Due to lack of access to high valued nutrient rich food items, most of the people of the country as well as of the state West Bengal, specifically, those living below poverty line and depends largely on food grains, particularly, cereals for maintaining energy level are suffering from calorie deficiency. Present slow growth of economy particularly in the agriculture sector, crop diversification of land towards cash crops, diversion of farm land to setup industries, rapid urbanization along with high population growth is further exacerbating the crisis in terms of sustainability. Climate change could adversely impact food security of rural populations through reduced crop yields, geographical shifts in optimum growing conditions, reduced water resources for agriculture and human consumption, loss of crop lands and yields through floods, droughts and sea-level rise and increased rate of adverse health outcomes including diarrhoeal diseases and malnutrition (Contaltonieri *et al.*, 2007). The number of people affected will be largest in the mega- deltas of Asia and Africa, while small islands are especially vulnerable (Nicholds *et al.* 2007). Under this back ground, the paper proposes to assess the food and future nutritional security with special reference to people below poverty line of India and two state West Bengal from the view point of recommender calorie intake norm required for maintain an active and healthy life and at the same, an attempt will also be made to project future requirement of food crops for the same purpose at both level using projected population.

MATERIALS AND METHODS

The study uses secondary data collected from various printed data book published by state and central government organizations namely, Statistical Abstract, Govt of West Bengal and NSSO Report (various issues), Govt of India. For analysis of decade wise growth rate of area, production and productivity of major food crops, compound growth rate formula is used. Simple tabular and percentage analysis technique are employed for the present study.

RESULTS AND DISCUSSION

At the outset we will discuss the dismal picture of India and West Bengal in the front of food and energy consumption.

Extent of under-nourishment in India and West Bengal

Table 1 indicates that percentages of population consuming fewer calories are 20 and 18.5 per cent in India and West Bengal respectively.

Table 1: Hunger index in India and West Bengal

Indices	India	West Bengal
Prevalence of calorie under nourishment	20.0	18.5
Proportion underweight among children<5(%)	42.5	38.5
Under five mortality rate (death per 100)	7.4	5.9
Position	66.0	8.0

Source: IFPRI, (2011)

In regard to malnutrition of children in the age group of six month to six years, the government of India introduces Intensive Child Development Scheme (ICDS) in the year 1975 to provide nutritional support to children mostly after the age of three. After thirty-five years of its existence, the scheme achieves success in reaching only 12.5 per cent of children leaving much more in distress (NSSO, 2005). The proportion of underweight children with age below 5 years accounts 42.5 and 38.5 per cent and the mortality rate for this same age group of children is observed to be 7.4 and 5.9 per cent respectively for India and West Bengal. The success rate of West Bengal in terms of these parameters are looking better compared to all India average. High growth rate of India economy is supposed to make a little mark on food and nutritional security of a vast majority of its population. The recent IFPRI report (2008) remarks that these indicators are closely aligned with poverty, there is little association with the state level economic growth. High levels of hunger are seen even in states that are performing well economically, such as Gujarat and Karnataka with hunger index rank 13 and 11 respectively. Presently foodgrains stock is spilling over warehouses, the calorie consumption of the bottom half of the population has been consistently decreasing since 1987 (Planning Commission, 2006), the percentage of underweight children has remained stagnant between 1998 and 2006, more than half of India's women and three quarters of its children are anaemic, endemic hunger continues to afflict a large proportion of the Indian population (IFPRI, 2010). India is suffering from alarming hunger (IFPRI, 2008). So, increase in per capita availability of food is not sufficient condition for ensuring access to food.

Source of energy and protein

As the foods are not equally distributed among people, specifically those living below poverty line millions of food insecure people are suffering from malnutrition related problems. Again, insufficient

calorie consumption is not guaranteed by adequate intake of food, if the diet does not contain required amount of fat, proteins and micro-nutrients. Micro-nutrient related under-nourishment can be treated as an infringement on human rights to adequate food which implies availability and accessibility of food in quality sufficient to satisfy the dietary needs of every one (UNCESCR, 1999). Consumption of deficit calories is more prevalent in people living in both the country as a whole and the state of West Bengal compared to other states. Taking calorie norm 2400 kcal per person per day, on an average 85.36 per cent below poverty line population intakes less than recommended norm in 1993-94 and continues to

increase in successive round of survey in rural India and in case of West Bengal, percentage of below poverty line people consuming less calorie constitutes 87.96 per cent in 1993-94 and becomes 93.67 per cent in 2004-05 in rural areas. Although, both the country and state follow same trend, the corresponding figures are marginally higher in the state compared to India. In urban India, proportion of people with low calorie intake is higher than rural area at the beginning and is drastically reduced to 83.05 per cent in 2004-05 showing a deceleration of 6.33 per cent whereas West Bengal experiences an upward movement although remains lower comparable to rural area.

Table 2: Percentage of BPL population consuming less than recommended calorie norm (2400 Kcal capita⁻¹ day⁻¹) and percentage of calorie and protein received from cereals and cereal substitutes and food grains during periods 1993-94, 1999-2000 and 2004-05

Country/ State	Year	% population		% calorie and protein intake of			
		Rural	Urban	Rural		Urban	
				Cereals and cereal substitutes	Food grains	Cereals and cereal substitutes	Food grains
India	1993-94	85.36	89.38	79.93	86.97	72.90	82.80
	1999-00	90.28	90.30	77.99	87.02	69.00	80.94
	2004-05	92.75	83.05	77.92	85.17	71.35	80.6
West Bengal	1993-94	87.96	70.28	84.10	84.51	77.68	81.68
	1999-00	94.75	97.67	79.09	82.55	74.32	78.80
	2004-05	93.67	81.17	80.23	79.92	74.84	77.73

Source: Estimated using NSSO Survey data (various issues)

Again cereal and cereal substitutes and pulses play an important role in supply of much needed calorie requirement for calorie deficit people. Although dependence on cereals and food grains for body energy shows a declining trend in successive period, still more than 75 per cent of recommended calorie norm is supplied by these food items in rural areas of India and percentage of protein intake from foodgrains is above 85 per cent and the deceleration rate is very marginal. Poor people of West Bengal depend much on foodgrains for fulfilling energy requirement than that of rural India and shows similar pattern of movement. The magnitude of dependence on food grains for protein intake level is less in rural West Bengal. The dependence on cereals and food grains to meet calorie norms and protein intake (2400 Kcal/ per capita / per day) is much less in urban area India accounts 9.09 per cent over entire study period (Table 3).

Table 3: Percentage change in per capita per day consumption of total cereals during 1983-84 to 2004-05 (base period-1983-84)

Year	India		West Bengal	
	Rural	Urban	Rural	Urban
1986-87	-6.67	0.00	7.14	8.33
1993-94	-15.34	-3.64	-2.86	-3.33
1999-	-10.67	-5.45	7.14	6.67
2004-05	-17.33	-9.09	0.00	9.17

of both India and West Bengal and drops down in successive period with varying magnitude.

Trends in consumption of total cereals

So, it is expected that low body fuel consumption and that to mostly from cereals will affect the per capita per day consumption of cereals over time. Over time percentage change in per capita per day consumption of total cereals in rural and urban areas of India and West Bengal is presented in table 3. It reveals that people in both rural and urban India are consuming less and less quantity of cereals as we move from 1983-84 towards 2004-05. In 1986-87, per capita per day consumption is declined by 6.67 per cent in comparison to 1983-84 and steadily decreases with different magnitudes and the ultimate deceleration is 17.33 per cent in 2004-05 in rural India whereas the percentage reduction in urban regions of

Source: Estimated using NSSO Survey data (various issues)

The state West Bengal represents opposite picture. Over all rise in per day per capita consumption of cereals is increased by 7.17 per cent excepting period 1993-94 when the state experiences a consumption reduction of 2.86 per cent in rural areas and in urban West Bengal, the percentage increment in cereals intake is 9.17 per cent over whole period with the exception of 1993-94 which is marked by a deceleration in consumption of 3.33 per cent. Summarily, low intake of energy coupled with heavy

dependence on food grains for supply of calorie and much needed protein is the basic cause of high incidence of malnutrition particularly in West Bengal and India in general. This is specifically true for people living in people poverty line in both the state and the country.

Trends in area, production and productivity of foodgrains in India

The declined rate of cereals consumption may be attributed to recent spiraling of food prices

that limits the access of low income earners to adequate food. So, increase in availability through augmentation of food production is pre-condition for achieving food security. Again, it is argued that growth of food production must rise at a rate higher than population growth, at least be equal to feed ever growing population of the country, Besides, the performance of agriculture sector plays a crucial role in eradicating food and nutritional insecurity and achieving economic growth in a sustainable manner.

Table 4: Annual compound growth rates of major crops of India and West Bengal during different periods (% Year⁻¹)

Crops/ Population	Period I (1980-81 – 1990-91)			Period II (1991-92 – 2000-01)			Period III (2001-02 - 2007-08)		
	Area	Yield	Production	Area	Yield	Production	Area	Yield	Production
Rice	0.41	3.18***	3.61***	0.68***	1.33***	2.02***	-0.14	1.78	1.63
Wheat	0.45	3.09***	3.57***	1.71***	1.81***	3.56***	1.12**	-0.39	0.72
Total cereal	-0.28	3.13***	2.84***	0.05	2.14***	2.19***	0.02	1.24	1.23
Total Pulses	-0.09	1.59**	1.49*	-0.54	1.21**	0.66	1.92**	1.37	3.34*
Total Food grains	-0.23	2.93***	2.73***	-0.05	2.14***	2.09***	0.45	1.5**	2.01*
Population	2.34			2.15			1.76		

Note: ***, **, * indicate statistically significant at 1,5,10 per cent level respectively.

Table 4 represents trends in food grains production and population growth of India. During period 1981-91, food grains production growth is observed to be 2.75 per cent which can be attributed to better performance of total cereals (2.84%), particularly rice (3.61%) and wheat (3.57%). Higher productivity of rice and wheat and to some extent pulses is responsible for registering high production growth which is just above population growth rate during same period. Rise of production experiences a deceleration in successive periods, as a result of continuous declining trend of major constituents of food articles except wheat in period 1990-01. But marginally higher population growth during period 1990-01 and 2002-08 seems an impending threat of staple food security of India. The growth rate of food grain production during 1990 has been close to the annual population growth rate which implies a stagnant per capita production (Rao, 1997 Sawant, 1997). As the scope of horizontal expansion for production augmentation is bleak due to diversion of fertile farm land to commercial farming, for growing high valued cash crops, rapid industrial growth, major emphasis should be given on the enhancement of yield through technology change (Kumar, 2001). Sustaining a steady growth rate of yield would require efficient and optimal use of land, surface and ground water, genetic resources, greater attention to cropping system than individual crops, revamping the research and extension system towards varieties improvement for dry land crops, strengthening adaptive local

research, emphasis on bio-diversity and ecological balances, improving rural infrastructure including processing, marketing and storage, education and access to mass media and development of rural financial markets (Vaidyanathan, 1994). To meet the growing need of food supply, the management of in-field variability in soil fertility and crop conditions for improving crop production and minimizing the environmental impact are the crux of precision farming (Maheswari, et al,2008).

Projection of minimum nutritional targets for West Bengal and India

India is currently producing food grains sufficient to feed the population and even surplus because of uneven distribution and lack of purchasing power of a section of people. Besides this, agricultural sector needs to grow at least at the rate of 4 percent to achieve targeted economic growth of the country i.e. 9-10 percent. But the present dismal performance is alarming, since in 2005-06 the growth of agriculture was merely 2.2 percent which is feared to go even negative next year (Mittal, 2007). Under this situation, a projection of future food requirement seems essential for framing policies regarding food and nutritional security of the country. Generally, demand projection is estimated by taking into account economic growth, expenditure elasticity, population growth, base period demand. Here forecasting of future food demand is calculated from the view point of nutritional requirement encompassing intake of

calorie, protein, fats, essential micronutrients i.e. all elements of balanced diet required to maintain an active and healthy life and at the same time, it will take care of food security of the nation. For this purpose, projected population by age and sex as on

March 2001-26 (Census of India, 2001) is converted into calories co-efficient for man units of consumption based on the methods suggested by Dr. Aykroyd (Health Bulletin, No.-23 issued by Indian Research Fund Association).

Table 5: Projected minimum food requirement for India and West Bengal for 2011, 2016, 2021 and 2026 in million tonnes (as proposed by P. V. Sukhatme, 1977)

Food crops	India				West Bengal			
	2011	2016	2021	2026	2011	2016	2021	2026
Cereals	206.51	222.29	236.37	248.65	15.71	16.70	17.50	18.10
Starchy roots	20.06	21.60	22.96	24.16	1.51	1.61	1.69	1.74
Sugar	19.37	20.85	22.17	23.32	1.46	1.55	1.63	1.68
Pulses	46.35	49.89	53.05	55.81	3.53	3.75	3.93	4.07
Fruits and vegetables	59.50	64.04	68.10	71.64	4.51	4.79	5.02	5.19
Meat	2.42	2.61	2.77	2.92	0.18	0.20	0.21	0.21
Fish	5.88	6.33	6.73	7.08	0.45	0.48	0.50	0.52
Egg	0.69	0.74	0.79	0.83	0.05	0.06	0.06	0.06
Milk and milk products	69.53	74.84	79.58	83.72	5.29	5.62	5.89	6.09
Fats and oils	6.92	7.45	7.92	8.33	0.53	0.56	0.59	0.61
Total food	436.1	470.64	500.44	525.13	33.22	35.32	37.02	38.37

The minimum nutritional target is estimated using per day per capita requirement of all constituents of balanced diet to meet 2375 kcal per day per adult unit as proposed by Sukhatme (1965) and V.K.R.V. Rao (1982) for India and West Bengal. Table -5 depicts that India requires 206.51, 222.29, 236.37 and 248.65 million tones of total cereals in 2011, 2016, 2021 and 2626 respectively. Based on the production in 2008, total cereals production needs grow at the rate of 1.36 per cent over the entire period to ensure nutritional and food security of India in respective period. Demand for total foods including

fruits, vegetables, fish, meat, milk and other commodities is required to rise more or less at equal proportion as that of total cereals. Total cereals requirement for West Bengal are estimated to be 15.71, 16.70, 17.50 and 18.10 million tonnes for projected periods. Rise in cereals production at the rate of 2.24 per cent is essential for securing food and nutritional security for people of West Bengal in the same count.

Table 6 Estimates of minimum nutritional targets for India and West Bengal using per capita per day food requirement norm proposed by V.K.R.V.

Table 6: Projected food requirement (million tonnes) for India and West Bengal

Food crops	India				West Bengal			
	2011	2016	2021	2026	2011	2016	2021	2026
Cereals	200.37	215.69	229.34	241.26	15.25	16.20	16.98	17.56
Starchy roots	36.75	39.56	42.07	44.25	2.80	2.97	3.11	3.22
Sugar	19.22	20.69	22.00	23.14	1.46	1.55	1.63	1.68
Pulses	46.42	49.97	53.13	55.89	3.53	3.75	3.93	4.07
Fruits and vegetables	70.48	75.87	80.67	84.86	5.36	5.70	5.97	6.18
Meat, fish, eggs	8.99	9.68	10.29	10.83	0.68	0.73	0.76	0.79
Milk and milk products	69.53	74.84	79.58	83.72	5.29	5.62	5.89	6.09
Fats and oils	6.92	7.45	7.92	8.33	0.53	0.56	0.59	0.61
Total food	458.68	493.75	525.00	552.47	34.95	37.08	38.86	39.49

Source: V. K. R. V. Rao, 1982

Rao (1982) are almost equal with that of previous estimation in terms percentage growth over five years interval with the exception of total cereals and fruits and vegetable requirement in absolute terms. The projected demand for total cereals differs

from results of different scholar made at different times. Demand for total cereals in India in 2020 in 237million tonnes (Rosegrant, *et al.*, 1995). The projection made by Kumar (1998) is 223.7 million tonnes in 2020 whereas Bhalla (2001) predicts

that India needs total cereals production of 374.7 million tonnes in 2020. The estimate of Thamarajakshi (2001) of total cereals for 2020 is 274 million tonnes. The study of Hanchante and Dyson (2001) reveals that the total cereal requirement of India in 2026 is 217.6 million tones. According to more recent study made by Mittal (2008) based on the assumption of 9 per cent GDP growth suggests that India's cereals requirements for period 2011, 2021 and 2026 are 94.4, 96.8 and 102.1 million tonnes. The variations in the estimates among those past studies may be attributed to the difference in methodological applications and selection of base period. But deviation of the present estimate from previous results is due to the fact that it assumes an ideal socio-economic condition where food production is sufficient and easily accessible, people are educated, health conscious and have adequate knowledge regarding nutritive values of food, child care, nutrition. Viewing the problem absolutely from nutritional aspect assuming guarantee of nutritional security will take care of food security is another point of divergence of present estimates from previous studies.

India is currently producing sufficient food to meet essential calories requirement of everyone for an active and healthy life. Green Revolution enables India to achieve self – sufficiently in food grains, because of multi-fold rise in production of wheat and rice. Economic growth at the rate of 9-10 percent fails to take care of millions of hunger stricken people resulting in widespread malnutrition in the country. Explicit hunger is severe in rural Orissa, West Bengal, Kerala and Assam. The non-availability two square meals a day peaks in the summer months from June to September, with longer periods of suffering in West Bengal and Orissa (Mehta and Shah, 2001). The present crises in not the supply of sufficient quantities of food, but the problem of accessibility and utilization arising out of unequal distribution and lack of purchasing power of a larger section of our population, specifically those who live below poverty line in both rural and urban areas of West Bengal and India. To improve food and nutritional security, Government of India launches a number of food based programmes such as Public Distribution System (PDS), the Integrated Child Development Scheme (ICDS), Mid-day Meal Scheme in schools, Antyodaya Anna Yojana but proves inadequate to yield expected results. Introduction of Mahatma Gandhi National Rural Employment Guarantee Programme is expected to improve purchasing power of these down trodden people. The National Food Security Act, 2011 can be thought of a right move in right direction. Proper implementation of these programmes coupled with Universal PDS in place of targeted one with the mechanism of discouraging well-off people to get

benefit of PDS supported by target oriented region specific programmes with more emphasis on dry land areas for augmenting productivity of major food grains through extensive research and extension service, farm investment and infrastructural development may help the state as well as the country to overcome the curse of hunger.

REFERENCES

- Bhalla, G. S. 2001. Demand and supply of food and foodgrains by 2020. *In.Towards hunger free India*, M. D. Asthana and Pedro Medrano (Eds.) Manohar New Delhi.
- Census of India 2001. Population projections for India and States: 2001-2026, *Office of the Registrar General and Census Commissioner of India*, New Delhi.
- FAO 2002. *The State of food insecurity in the World 2001*, Rome, pp. 4-7.
- Hanchante, A. and Dyson, T. 2004. *Prospects for demand and supply*. Tim Dyson, Robert and L.Visaria(Eds)Oxford University Press.
- IFPRI 2008. *The state hunger index: Comparison of hunger across states.*, P. Menon, A. Deolalikarand A.Bhaskar (Eds), New Delhi, IFPRI,14 October.
- IFPRI 2010. The Global hunger index. *The Challenges of Hunger: Taming price hike and excessive food price volatility*”, Washington, D. C.
- Kumar, P 2001. In.Agricultural performance and productivity. *Indian Agricultural Policy at the Cross Roads*, S. S. Acharya and D. P. Choudhury (Eds), Rawat Publications, New Delhi,pp. 353-76.
- Kumar, P. 1998. Food demand and supply projectionfor India, *Agricultural economics policy paper* 98-01, IARI, New Delhi
- Maheswari, R, Ashok, K. R., Prahadeeswaran, M. 2008. *Precision Farming Technology, Adoption Decisions and Productivity of Vegetable in Resource Poor Environments*, AERR, **21** : 415-24.
- Majumdar, N. A. and Kpila, U. 2006. *Indian Agriculture in the New Millennium: Changing perceptions and development policy*, Vol.1 and 2, Academic Foundation, New Delhi.
- Mehata, A. K. and Shah, A. 2001. *Chronic poverty in India: Overview Study----Defining the nature of chronic poverty in India*, Chronic Poverty Research Centre, Mimeo, Manchester, UK.
- Mittal, S. 2007. Strengthening Indian agriculture: need for reform. *Proc. on US-India Knowledge Initiative* organized by ICRIE and Ministry of External Affairs, GOI,India Habitat Centre, New Delhi.

- Mittal, S. 2008. *Demand–supply trends and projections of food in India*. Working Paper No. 209, ICRIER, New Delhi.
- NSSO (various issues), *Level and Pattern of Consumer Expenditure in India*, NSSO, Ministry of Statistics and Programme Implementation, Government of India, New Delhi
- Rao, C. H. Hanumantha 1997. *Inaugural address, at the National Seminar on Agril. Dev. Perception for the Ninth Five Year Plan*, B. M. Desai (Eds.) Agricultural Development. Indian Institute of Management, Ahmedabad.
- Rao, V. K. R. V. 1982. *Food nutrition and poverty in India*, Vikas Publishing House Pvt Ltd Gaziabad, UP.
- Rosergrant, M. W., Agcaoili-Sombilla and Perez, N. D. 1995. *Global Food Projections to 2020: Implications for Investment, 2020*. Discussion Paper No. 5, Washington, D. C., IFPRI.
- Roy, R. 2008. Endemic Hunger in West Bengal *Economic and political Weekly*, 3rd May.
- Sukhatme, P. V. 1977. *Malnutrition and Poverty*. Lal Bahadur Shastri Lecture, Indian Agricultural Research Institute, New Delhi.
- Swant S. D. 1997. Foodgrains output growth : Emerging constraints perspectives for technology development policies B. M. Desai (Eds) *Agricultural Development paradigm for the Ninth Plan un der New Economic Environment*, Oxford and IBH Publishing Co Pvt Ltd, New Delhi.
- Thamarajakshi, T. 2001. *Demand and supply of foodgrains in 2020. Towards Hunger Free India* M. D. Asthana. and Pedro Medrano (Eds), New Delhi, Manohar.
- UNCESCR, 1999. *Substantive issues arising in the implementation of the international covenant on economic, social and cultural rights: The Right to Adequate Food (art.11)*, General Comment No. 12.
- Vaidyanathan, A. 1994. *Second India revisited: Food, Agriculture and Water*, Madras Institute of Development Studies, Madras.