Working Paper 264

Food Security in Maharashtra: Regional Dimensions

Nitin Tagade

ISBN 978-81-7791-120-6

Institute for Social and Economic Change (ISEC) is engaged in interdisciplinary research in analytical and applied areas of the social sciences, encompassing diverse aspects of development. ISEC works with central, state and local governments as well as international agencies by undertaking systematic studies of resource potential, identifying factors influencing growth and examining measures for reducing poverty. The thrust areas of research include state and local economic policies, issues relating to sociological and demographic transition, environmental issues and fiscal, administrative and political decentralization and governance. It pursues fruitful contacts with other institutions and scholars devoted to social science research through collaborative research programmes, seminars, etc.

The Working Paper Series provides an opportunity for ISEC faculty, visiting fellows and PhD scholars to discuss their ideas and research work before publication and to get feedback from their peer group. Papers selected for publication in the series present empirical analyses and generally deal with wider issues of public policy at a sectoral, regional or national level. These working papers undergo review but typically do not present final research results, and constitute works in progress.

FOOD SECURITY IN MAHARASHTRA: REGIONAL DIMENSIONS

Nitin Tagade [1]

Abstract

Regional disparities along with food security have remained an issue of debate in Maharashtra ever since its inception as a State in 1960. Several studies have examined economic development as well as food security issues at the regional level, but there has been no systematic attempt made to analyse food security comprehensively taking into account its four elements viz. availability, accessibility, sustainability and utilisation. The circular argument that disparities in investment leads to underdevelopment and consequently food insecurity is a part of our larger argument. Therefore, an attempt is made in this paper to understand food security across regions of Maharashtra. The results reveal three major groups of regions in terms of food insecurity. While a certain regions experiences food deficit and lower poverty along with a higher level of nutritional status, the other regions exhibit higher levels of under-nutrition and poverty along with relatively higher and medium food sufficiency.

Key Words: Food Security, Nutrition Security, Region, Maharashtra, India.

Introduction

Maharashtra has not only been proclaimed as one of the economically developed States[1], but also has remained at the top among the States in terms of relevant economic indicators. The Net State Domestic Product (NSDP) and Per Capita Income (PCI) put the State among the top three economically forefront States. The NSDP of the State for 2004-05 worked out to ` 3,38,254 crore at current prices, which is higher than India's NSDP. In addition to this, PCI of the State has been constantly higher over the years as compared to the national average (GoI, 2006). Not withstanding this experience of growth, the issue of regional disparities in relation to development initiatives across regions of Maharashtra has occupied the centre stage of discussion for long (Dandekar Committee, 1984; and Vidwans, 1996). Among the recent studies, we have identified two sets of studies that broadly examine the issue of regional disparities in the State. While the first set analyses the state of economic development across regions (Prabhu and Sarker, 1992; and Shaban, 2006), the second set of studies focuses on the regional dimensions of well-being (Suryanarayana, 1996).

In the first set of studies, regional economic development aspect in the State has been examined based on the performance of all the three sectors of the economy; viz., primary, secondary and tertiary. These studies reveal that there have been regional disparities prevailing in terms of economic growth as well as agricultural, industrial and human resource development since the formation of the State of Maharashtra (Prabhu and Sarker, 1992). In addition, most of the districts from Vidarbha and Marathwada regions have remained underdeveloped (ibid., p-1935). Further, recent studies point to widening of the regional disparities in the State (Shaban, 2006). The geographical pattern of income generation not only indicates its concentration of developmental activities in a few

[1] Doctoral Student, Institute for Social and Economic Change (ISEC), Bangalore – 560 072. E-mail: nitintagade@gmail.com.

I am grateful to my Supervisor Prof. R S Deshpande for his comments and suggestions. However, usual disclaimers apply.

regions but also an increasing gravitation towards a few cities; for instance, more than 50 per cent share of the State's NSDP comes from four major cities in the State (ibid., p-1813-14). However, the above set of studies, while studying regional disparities in developmental activities, seems to have failed to look into the issue of regional disparities with respect to food security. Also, no systematic attempt has yet been made to understand the problems of regional disparity within the framework of food insecurity, malnutrition and poverty. A few among the second set of studies, though, have attempted to investigate food security aspect across regions in Maharashtra; these studies are, however, largely concerned with the physical and economic aspects (Suryanarayana, 1996).

In the recent years, the concept of food security[2] has been broadened by incorporating chronic food insecurity in the traditional temporal food insecurity. Further, the concept of food security has undergone major shifts in terms of focus across three phases between 1973 World Food Conference and 1994 World Food Summit (Hewitt de Alcantara (1993) cited in Maxwell, 1996). In the 1970s, the main focus was to understand food security at the aggregate level which later shifted to the individual level following Sen's entitlement approach. Sometime in the late 1980s, the issue of malnutrition gained prominence in the literature, with the experts arguing that under-nutrition is caused not only by food shortage but also due to other social, demographic and health related factors. Starting from the 1990s, the focus has totally shifted from the 'food first' perspective to `livelihood' perspective, where food and nutrition security are the subsets in the larger framework of livelihood security. This changed focus can be examined in terms of its four constituents, viz., availability, accessibility, sustainability and absorption of food. Thus, a holistic understanding of food security would require incorporating two other aspects of food security, namely, stability in availability and utilisation of food along with conventional measures of physical and economic aspects. The importance of incorporating these two elements for understanding the aggregate scenario of food security lies in the fact that stability in availability and accessibility of food are necessary because of their potential to combat both chronic as well as transitory food insecurity. The utilisation capacity of an individual is an important tool for assessing individual food insecurity. Further, understanding the dimensions of food security at the regional level is crucial. Such an analysis should consider the various issues related to economic development of the State with a particular emphasis on the agricultural sector as it is one of the major components of food supply. This should be followed by investigating different aspects of food security across regions of Maharashtra. Given this, in the paper we endeavor to examine the issue of food security across regions in Maharashtra. The paper is spread over five sections. In the second section, the methodology has been discussed following a discussion on the state of food security across regions in the third and fourth sections based on conventional and unconventional measures, respectively, while the major findings are concluded in the last section.

Methodology

This paper attempts to examine the issue of food security across regions taking its four elements into consideration (see Table 1). The first element of food security, *availability* of food, is a conventional measure that indicates physical access to food. At the aggregate level, the availability of food is determined mainly by three supply side factors viz., agricultural foodgrain production, imports and

subsidised foodgrain supply through Government agencies. However, the present study confines itself to the analysis of food availability based on the major sources of foodgrains as agricultural production. We are leaving foodgrain imports unanalysed as it comes under the Central Government and the related data on the same are not available at the State level. Besides, the region specific distribution of foodgrains through Government agencies at subsidised prices has not been examined due to the non-availability of data at the district level. Trends in per capita foodgrain production across regions, based on two major food crops i.e. cereals and pulses grown in the State, have been analysed. Since the endeavour is to understand the regional variations in foodgrain production, National Sample Survey Organisation (NSSO) classification of regions is taken for facilitating the comparison across elements of food security.[3]

Table 1: Indicators of Food Security

Sl. No.	Indicators	Description	Variables	Data Sources
1.	Availability of food	Indicates food supply through food production, import and food supply through Government agencies	Total and per capita Foodgrain production	Directorate of Economics and Statistics, EPWRF*; and Census of Maharashtra
2.	Accessibility to food	It implies economic and physical accessibility to foodgrains	Poverty ratio	NSSO unit level data for 50th, 55th and 61st round
3.	Sustainability or Stability of food	Incorporates stability in foodgrains availability and continued accessibility over time	Normative level of food availability over time and Carrying capacity of agricultural lands	Directorate of Economics and Statistics, EPWRF*; and Census of Maharashtra
4.	Absorption/ utilisation of Food	Connotes the capacity to absorb food which can be measured through the nutritional status of an individual	Nutritional status of children below six years of age	RCH-2 (2002-04)**

Source: Authour

Notes: * Refers to Economic and Political Weekly Research Foundation and ** Reproductive and Child Health

The second element is *accessibility* to food which depends upon the household purchasing power. The purchasing power depends on the income of household; however, the income related data is not easily available. Secondly, the distribution of subsidised foodgrains through Government agencies like the Public Distribution System (PDS) improves purchasing power of the poor. Nevertheless, the regional dimensions of food insecurity taking distribution aspect has not been analysed because the district level information is not available. In order to overcome this problem, poverty ratio is considered here for understanding purchasing power, as it indicates the state of well-being of the people. It is estimated based on Per Capita Monthly Consumption Expenditure (MPCE). This helps to understand the proportion of households that are unable to purchase the minimum required quantity of foodgrains due to the lack of purchasing power. This could also be understood from the network and coverage under

PDS. We have taken poverty ratio as an indicator of food insecurity in order to estimate the percentage of people unable to purchase the required quantity of food for a healthy life during a given period. The analysis has been carried out for three periods; viz., 1993-94, 1999-00 and 2004-05 based on NSS 50th, 55th and 61st round (Consumption Expenditure), respectively.[4]

The third element of food security is *sustainability* which indicates the stability of food supply in terms of availability over the period as continuous source of supply.[5] Sustainability here covers both the quantitative aspects of food availability and quality. Due to paucity of data on the quality of food at the aggregate level, we shall be focusing on the sufficiency of the quantity of food availability over the period as well as the carrying capacity of agricultural lands. The per capita availability of sufficient food has been used to estimate the quantity of pulses and cereals required for per person per year, using the norms recommended by the Indian Council of Medical Research (ICMR) in 1996. The ICMR recommends 146 kg of cereals and 25.55 kg of pulses per year as the food intake norm for a vegetarian adult (ICMR, 1996). The availability of the recommended quantity over years will be considered as the sustainable food availability. The second indicator of sustainability is the carrying capacity of agricultural lands, indicating the amount of pressure of population exerted on agricultural lands and changing occupational composition measured based on per hectare density of rural population and workers in agriculture sector, as also the variability of various indicators.

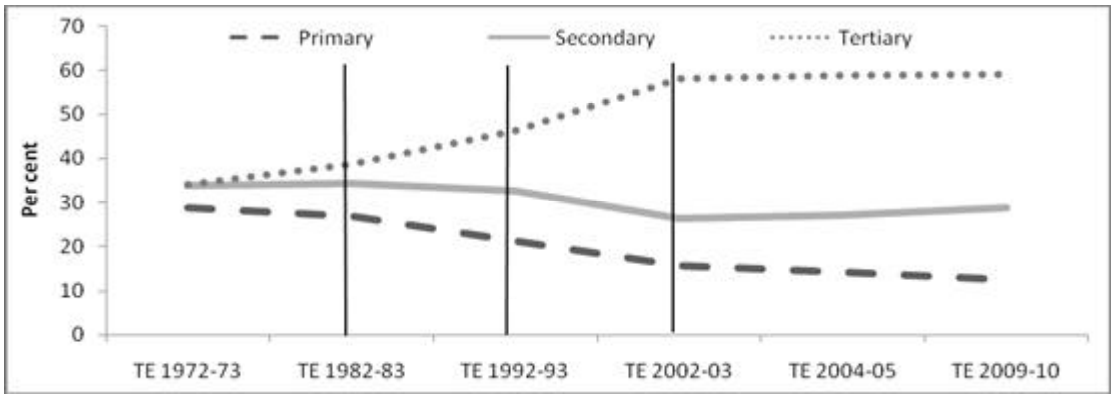
The next element in understanding food security is food *absorption* or *utilisation*. The ability of a person does not depend on the characteristics of goods (Sen, 1985; p-9); however, better absorption capacity together with other inputs improves the nutritional status. For example, frequent diseases and inadequate health care facilities result in deteriorating nutritional status, particularly among children, as they are the most vulnerable to changes caused by variations in either food intake or environmental factors. Therefore, the nutritional status of children has been taken as an indicator for examining the absorption capacity as well as the health status of the society at large.

Conventional Measures of Food Security in Maharashtra

A close examination of food availability in Maharashtra is taken up initially to draw attention to development process in the State, which is largely driven by the tertiary sector followed by secondary sector, due to the important role of agriculture sector in providing livelihood to a large number of people in the rural areas in spite of being one of the industrially developed States.[6] The sectoral composition of the State economy has undergone considerable changes over the period from TE 1972-73 to TE 2009-10 resulting in the tertiary sector scoring over the primary sector while keeping the secondary sector stagnant (see Figure 1). Over the period, the share of primary sector has declined from 29 per cent in TE 1972-73 to 13 per cent in TE 2009-10. During the same period, the share of secondary sector declined from 34 per cent to 29 per cent, whereas, the share of the tertiary sector rose from 34 per cent to 59 per cent. Therefore, augmenting foodgrain production is a crucial issue from the point of view of availability because the share of the primary sector has been declining over the years. Due to the comparative decline of the primary sector, the share of the tertiary sector increased remarkably during TE 1972-73 to TE 2002-03 with two major upward breaks in TE 1982-83 and TE 1992-93. On the other hand, the secondary sector has registered a decline during TE 1982-83 to TE 2002-03, particularly

after TE 1992-93. The breaks during TE 1982-83, TE 1992-93 and TE 2002-03 could be attributed to policy changes introduced by the Central Government and emulated by the State Government. The process of liberalisation initiated in the early 1980s, had effected only a few marginal changes in the composition and benefited mostly the tertiary sector over primary and secondary sectors of the State economy. However, the economic reforms initiated in the early 1990s have substantially influenced the composition, over time benefiting largely the tertiary sector due to its wide coverage that reflects a clear break from past policies during TE 1992-93. A substantial share of service sector in NSDP since TE 2002-03, along with a near stagnant contribution of the secondary sector and a gradual decline in the share of the primary sector indicate that there is not much opportunity for absorbing the surplus labour from the agriculture sector. In the prevailing circumstances, the agriculture sector is still one of the major sources of livelihood in Maharashtra and therefore, it has the major role to play. At the same time one needs to look into the growth behaviour of other sector because these help in correcting that crucial livelihood support system through employment. However, we keep aside the question of creation of employment and support to livelihood by the secondary and tertiary sector.

Figure 1: Sectoral Composition of Net State Domestic Product (NSDP) of Maharashtra



Sources: Authour's estimation based on Economic Survey of Maharashtra (Various years), GoM.
Notes: 1. Triennium Ending (TE) is a three year moving average.
2. For the TE 2002-03 and TE 2004-05, share of incomes are provisional figures.

1. Availability of Food

Food availability has been estimated based on per adult food supply through agricultural foodgrain production after reducing the wastages and seeds assuming that production is used only for consumption purpose.[7] Over the period, food availability has not only been declining in the State but also across regions as the per capita foodgrain production is declining over the period. For the period 1961 to 2001, the highest decline has been observed in the Inland Northern region from 286 kg to 109 kg per adult person and the lowest decline in the Coastal region from about 102 kg to 91 kg per adult person (Table 2). However, in 1971, per adult foodgrain production is found to have suddenly declined in all the regions, though rising subsequently in 1981, in regions excepting the Coastal region. This is mainly because of the implementation of the Green Revolution technology resulting in increased foodgrain availability across regions due to increased production and productivity during the 1970s. It is to be noted that on an average, per capita foodgrain production found lowest in the Coastal region and highest in the Inland Central region. In 1961 as well as in 2001, per capita foodgrain production is

found highest in the Inland Central region followed by the Eastern region; whereas, it is lowest in the Coastal region followed by the Inland Northern region.

Table 2: Per Capita Foodgrain Production and Population Growth across Regions of Maharashtra

(In Kg)

Regions	Per Capita Foodgrain Production (PCFP)					% Change in PCFP	Population Growth Rate
	1961	1971	1981	1991	2001	(1961 to 2001)	
Coastal*	101.88	104.34	89.78	64.98	91.25	-10.44	4.7
Inland Western	316.80	152.99	225.12	206.72	147.29	-53.51	3.3
Inland Northern	286.90	215.68	256.28	285.17	108.74	-62.10	3.4
Inland Central	451.93	187.42	311.33	328.53	282.24	-37.55	3.7
Inland Eastern	334.00	130.19	233.53	269.43	158.80	-52.46	3.2
Eastern	377.69	335.97	342.75	276.29	162.64	-56.94	2.9
Maharashtra	291.87	160.18	195.04	210.13	159.73	-45.27	3.6

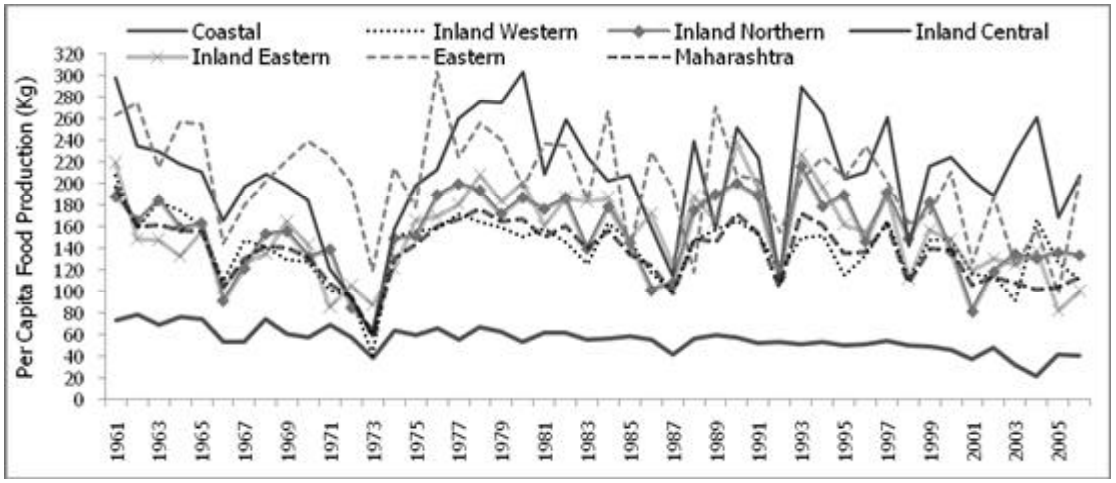
Sources: Authour's estimation based on Directorate of Economics and Statistics, GoM (Various years) and EPWRF (2004) and Maharashtra General Economic Tables, Census of India, GoI (Various years).

Notes: 1. * Indicates that the figures for Coastal region are estimated excluding Mumbai Suburban and Gr. Bombay/Mumbai.
2. The 12.5 per cent of the total foodgrain production has been deducted towards wastages and seeds.

The reasons for declining food availability over time and the large variations across regions can be explained by examining productivity that in turn depends on various exogenous and endogenous factors. To begin with, trends in per capita foodgrain production across regions have been estimated by taking into account the entire population that includes all age groups (Figure 2).[8] In the State, per capita foodgrain production is declining gradually from 1960 to 2006. This is because of growth in population exceeding that in the foodgrain production in the State. However, food production is observed to have increased at the high rate after 1973-74, due to the adoption of new technology. In addition to this, watershed programmes in Maharashtra have had a significant impact on foodgrain production, as it was found that the comparisons between beneficiaries and non-beneficiaries households in watershed regions in Maharashtra have shown significantly higher level of foodgrain production among former households as compared to that of latter (see Deshpande and Rajshekharan, 1997). In the State, per capita foodgrain production has shown a large year to year fluctuation across regions excepting the Coastal region, corresponding to the large variations in rainfall, as large geographical areas in the State fall under drought prone conditions (Dev and Mungekar, 1996), and therefore, are susceptible to vagaries of monsoon confronting phases of growth and stagnation affirmatively (Sawant *et al,* 1999). The visitation of droughts and famine over large parts of the State every three to four years indeed worsens the process (DHMJ Drought Forum, 2008). Over the years, per capita foodgrain production has declined, i.e., during 1973, 1987, 1992 and 2002, because of droughts during these years.[9] The Coastal region of the State has had the lowest per capita foodgrain production

over the period as compared to other regions, whereas foodgrain production has experienced relatively better trends in the Eastern region. The lowest per capita foodgrain production in the Coastal region, despite the region's higher productivity as compared to other regions (Table 3), could be attributed to lower share of land under cultivation. Share of both Net Sown Area (NSA) and Gross Cropped Area (GCA) are lowest in the Coastal region, accounting for about 32 and 34 per cent, respectively (Table 4). On the other hand, the Eastern region, a predominantly rice producing area, has shown the highest per capita foodgrain production, because of the high rainfall here, even though soil fertility of the region is either medium or low (Sawant *et al,* 1999, p-14) and low population growth in the region (see Table 2). The higher output variability in foodgrain production in Nagpur division is explainable due to high rainfall variability and/or low irrigation facility (Mitra 1990, p-A 153). However, Nagpur division has two NSSO regions viz., Inland Eastern and Eastern regions, and of the two, the latter region has lower output variability as compared to the former region because the Eastern region comes under medium and high rainfall, lower variation and medium soil fertility. The other three regions, namely, Inland Eastern, Inland Western and Inland Northern regions are close to each other in terms of per capita foodgrain production, though, the soil fertility and level of rainfall differ across these regions. Deshpande (1988) examined the relation between growth and instability in Maharashtra and found varying relationship pre-new technology (1951-52 to 1971-72) and post-technology (1973-74 to 1981-82) period, drought prone (DP) and non-drought prone (NDP) districts; and different group of crops. The major finding shows that the negative and strong relation between growth and instability in pre-new technology period changed to significantly positive largely due to high growth and high instability in pulses because of higher pursuit of the commercialization of agriculture in terms of changing cropping pattern in the State. However, this relation does not hold at the district level. Large number of DP districts has emerged with preferable combination of high growth and low instability as against the not preferable combination of low growth and low instability in NDP districts.

Figure 2: Per Capita Foodgrain Production during 1961-2006



Sources: Authour's estimation based on Directorate of Economics and Statistics, GoM (Various years) and EPWRF (2004) and Maharashtra General Economic Tables, Census of India, GoI (Various years) and UNFPA (2009).

Table 3: Yield of Total Foodgrains Production

(In kg/hectare)

Regions	TE 1965-66	TE 1975-76	TE 1985-86	TE 1995-96	TE 2005-06
Coastal	1092.11	1377.19	1599.11	1956.01	2211.48
Inland Western	576.95	762.65	889.80	1041.37	710.40
Inland Northern	480.34	598.82	634.58	969.18	1070.37
Inland Central	427.25	443.94	552.04	818.14	774.21
Inland Eastern	472.13	619.75	861.51	970.06	840.02
Eastern	596.83	765.39	836.40	1056.02	1061.67
Maharashtra	474.14	582.19	688.73	896.54	887.40

Sources: Authour's estimation based on EPWRF, 2004; and Directorate of Economics and Statistics, Ministry of Agriculture, GoM.

Table 4: Net Sown Area and Gross Cropped Area and Cropping Intensity

(In Per cent)

Regions	Coastal	Inland Western	Inland Northern	Inland Central	Inland Eastern	Eastern	Maharashtra
Net Sown Area (NSA)*							
TE 1965-66	30.49	70.11	57.91	73.34	62.38	29.58	59.11
TE 1975-76	28.13	66.42	56.87	76.80	65.56	30.71	30.78
TE 1985-86	28.35	66.25	58.07	75.20	64.07	30.78	58.91
TE 1995-96	32.00	63.86	57.23	76.61	64.88	29.17	58.76
Gross Cropped Area (GCA)*							
TE 1965-66	31.49	73.71	61.95	77.50	63.08	33.94	62.14
TE 1975-76	29.24	71.58	61.68	81.93	67.91	35.98	63.57
TE 1985-86	29.27	73.07	63.50	84.82	69.15	35.35	64.86
TE 1995-96	33.67	74.23	66.36	94.32	76.53	37.21	69.65
Cropping Intensity**							
TE 1965-66	103.29	105.14	106.99	105.67	101.12	114.77	105.13
TE 1975-76	103.97	107.77	108.46	106.68	103.58	117.19	107.05
TE 1985-86	103.25	110.30	109.34	112.80	107.93	114.88	110.10
TE 1995-96	105.24	116.24	115.96	123.12	117.96	127.56	118.53

Sources: Authour's estimation based on EPWRF, 2004.

Notes: * Indicates share of NSA and GCA to the total Gross Area (TGA).

** Cropping Intensity is percentage of the gross cropped area to the net sown area.

On the whole, food availability in the State has not only been declining over the years but also across regions. The large fluctuations in the availability of foodgrains from year to year due to frequent occurrences of droughts and varying rainfall across regions are a major challenge to food security. Per

capita foodgrains availability in the Coastal region is lowest despite higher productivity in foodgrain production. In contrast, per capita food availability is highest in the Inland Central region. The Coastal region's lower foodgrain production could be attributed to the lower share of land under cultivation as it is a predominantly a hilly region, as also due to the lower cropping intensity of the region. Since productivity in the Coastal region is relatively higher than other regions, we can assume that the production is lower due to less land being under cultivation as compared to the lower use of modern technology. In addition to this, on an average, per capita food availability over the period has been higher in the Inland Central region despite low productivity of the region. It is because share of land under cultivation is substantially high in the region, which increased from 77.5 per cent in TE 1965-66 to 94 per cent in TE 1995-96. Thus, higher per capita food availability in the region could be attributed to higher land utilisation for cultivation. Having larger area under drought prone zone and consequent fluctuations in agricultural production, so also the relatively undesirable agricultural growth performance in NDP districts have resulted in an additional burden on the Government for food supply. Therefore, it is clear that fluctuations in the foodgrain production could affect the physical accessibility to food due to higher dependence on the agriculture sector, and thereby, affecting stability in the availability and access to food.

2. Accessibility to food

Food availability has been declining in various degrees across regions of Maharashtra. However, the state of food security can not be determined mainly on the basis of supply side indicators, but accessibility to food is a necessary condition and this depends on the purchasing power as also the welfare programmes like supply of subsidised food. As stated earlier, data on district level food distribution and household income is not available, and therefore, poverty has been used to examine the well-being of the people. Poverty ratio indicates the proportion of population subsisting on food intake below certain norms of calorie intake.[10] We have not taken access to PDS as another indicator specifically due to higher level of errors of inclusion and exclusion in Maharashtra (see Mahamallik and Sahu, 2011; and Dev, 1996). Besides, poverty ratio is more robust representative of access to food.

Poverty Ratio

Poverty ratio, also known as head count ratio, is a result of the lack of entitlement or purchasing power. Income is an important criterion to assess the purchasing power, which is determined by various factors like the type of employment, skill, education and social status. However, household income data on these factors is not readily available. Therefore, poverty has been estimated based on MPCE from NSSO quinquennial surveys[11] taking official poverty line.[12] Recently a Committee was constituted under the Chairmanship of Prof. Suresh Tendulkar for reviewing the methodology for poverty estimation. This was in response to the severe criticism that official poverty estimates for rural areas were lower as compared to urban areas. The committee suggested the inclusion of expenditure on education and health care in the 'household expenditure' in view of the declining Government subsidies for education and health sector, and estimated afresh the poverty ratio based on NSS 61st round for 2004-05.[13] In this paper, the analysis is based on the official poverty line (earlier estimates) as the focus here is to

understand food accessibility across regions rather than poverty as such and therefore inclusion of expenditure on education and health may not yield the purpose. The second reason for not considering the new poverty line, as recommended by Tendulkar Committee, is that the process of declining subsidy for education and health care is not quantifiable and also it is not comparable over time. Last, poverty line has been provided only for 50th and 61st round; and do not provide the same for 55th round which is necessary for understanding the trend.

In Maharashtra, accessibility to food has improved over the period as evidenced by the fact that the proportion of the poor declined in both the rural and urban areas during 1983 to 2004-05, from 46 per cent to 30 per cent in the rural areas and from over 41 per cent to about 33 per cent in the urban areas (See Table 5). Compared to the national averages, the poverty ratio in the State was higher for the both rural and urban areas except in 1983 despite an impressive economic development registered in the State during the period under review. The rural-urban differences narrowed down during 1993-94 to 2004-05; differences were quite high in 1993-94, but declined significantly by 2004-05. In the rural areas of the State, the proportion of people living below the poverty line was 30.5 per cent in 1993-94 which declined to 19.7 per cent by 1999-00, but again increased to 25 per cent in 2004-05. Similarly, the poverty ratio in the urban area was 26.9 per cent in 1993-94, 19.7 per cent in 1999-00 and 25.5 per cent in 2004-05. Thus, even the most recent poverty estimates indicate that one-fourth of the people in both the rural and urban areas of Maharashtra are unable to meet their basic needs. The strange experience of Maharashtra where both rural and urban poverty ratio in the State has declined with lower margin compared to India as a whole, but the decline in urban poverty is much lower than the corresponding decline at India level.

Table 5: Poverty in India and Maharashtra

(In Per cent)

Year	Rural		Urban	
	India	Maharashtra	India	Maharashtra
1983	46.5	45.9	43.6	41.1
1987-88	39.0	40.9	38.7	40.5
1993-94	37.2	37.9	32.6	35.0
2004-05	28.7	30.0	25.9	32.8

Source: Himanshu, 2007 (Table 1 and 2), p-498.

Note: The poverty estimates are based on Uniform Reference Period (URP). The estimates are not used for 1999-2000 because of non-comparability to the other NSSO rounds.

While looking at the regional dimensions of poverty, a sharply skewed concentration of poverty is visible in a few regions (see Table 6). The situation can be summarised under three major observations: One, poverty is relatively high in the rural and urban areas of Eastern, Inland Eastern, Inland Central and Inland Northern regions as well as in the urban areas of Inland Western region. Two, poverty increased during 1993-94 to 2004-05 in the rural areas of Coastal, Inland Eastern and Eastern regions, but declined by the year 1999-00. Three, poverty in both rural and urban areas of Coastal region has been showing an increasing pattern even though, it is lowest across regions. In contrast to

this, the poverty ratio increased in the rural areas and declined in the urban areas of the Inland Eastern and Eastern regions. This implies that poverty is higher across regions except in the Coastal and Inland Western regions.

Table 6: Poverty Ratio across Regions in Maharashtra during 1993-94 to 2004-05

Regions	Rural			Urban		
	1993-94	1999-00	2004-05	1993-94	1999-00	2004-05
Coastal	11.3	15.8	20.3	7.0	6.9	9.2
Inland Western	19.2	8.3	7.0	33.4	20.9	31.2
Inland Northern	38.7	23.7	30.3	52.2	31.0	41.5
Inland Central	43.2	22.6	38.4	53.4	46.4	56.8
Inland Eastern	39.7	25.7	40.8	46.6	43.2	41.4
Eastern	39.7	37.0	40.8	39.3	25.9	34.8

Sources: Authour's estimation based on unit level Consumer Expenditure data of NSS 50th (1993-94), 55th (1999-2000) and 61st (2004-05) rounds.

Note: The poverty estimates based on the NSS 55th (1999-2000) round are not comparable to other rounds because of the changes made in the recall method.

Unconventional indicators of Food Security in Maharashtra

A discussion on a few conventional indicators of food security in the earlier section has brought out regional variations in physical availability and economic access to food over the period. We found a few of the regions are food secure in terms of availability, whereas, some others are food secure in terms of accessibility. However, a higher proportion of the poor in a few regions may worsen with a marginal fluctuation in the food economy, leading to chronic food insecurity. The chronic food insecurity, on the other hand, eluded through the sustainable availability and accessibility to food. However, these alone dose not result in better nutritional outcomes, but determine by improved absorption capacity of the individual that depends on various non-food consumption. These unconventional indicators are examined to understand the temporal and individual food security in this section.

1. Sustainability of Food

Food insecurity could be of two types, viz., temporal and transitory (FAO, 2006). Temporal food insecurity exists when there is inadequate food intake over a long period of time, while transitory food insecurity exists when there is inadequate food intake either due to seasonal or cyclical causes. It is to be noted that temporal food insecurity is largely found among poor households; transitory food insecurity, on the other hand, however affect even the non-poor. The problem of inadequate food availability and accessibility among the poor due to seasonal and cyclical causes might be more devastating for the poor households worsening their condition severely. Therefore, neither temporal nor transitory food insecurity can be avoided without ensuring a sustainable access to adequate food. Lopsided food supply due to either cyclical or seasonal factors also could lead to food insecurity. Further, stable food access depends on the purchasing power since the poor can not have ready access

to food in the absence of purchasing power, and therefore, poor households are more susceptible to fluctuations in food prices. Thus, sustainable food availability can be defined as stable access to food over a long period of time. Therefore, it is imperative to examine sustainable foodgrain production and its availability in greater detail. In order to examine the sustainability of food production over time, the Coefficient of Variations (CVs) have been estimated for identifying regions that are vulnerable to food insecurity. In addition, deficits in the availability of cereals and pulses have also been estimated across regions over the period based on ICMR norms.

The CVs are estimated for the total foodgrain production, yield of total foodgrain production and per capita foodgrain production across regions for the period 1960-61 to 2005-06 and also for the pre and post Green Revolution (GR) period (Table 7).[14] CV is a measure of instability and it incorporates the systematic as well as the random components of variation. We are more concerned here with the random component of variation, as higher the level of CV in per capita foodgrain production, lower is the sustainability of food, and therefore, lower the degree of food security. Conversely, lower the CV in production, higher is the degree of food sustainability. In Maharashtra, the quotient of variability in the total foodgrain production is higher as compared to the indicator of per capita foodgrain production, followed by the quotient of yield of foodgrain production. The higher instability in the total foodgrain production could be attributed to exogenous factors rather than endogenous factors. The exogenous factors such as erratic rainfall and severe droughts could not be avoided but mitigated. These tend to constrain optimum land utilisation, and thereby, affect production. On the other hand, endogenous factors such as use of modern technology and inputs though can be controlled, could impact output negatively either due to the lack of or low utilisation of inputs. In Maharashtra, during 1980-93, the significance of variability in terms of yield is low and in terms of area is high in explaining output variability as compared to 1967-80 (see Sawant *et al* 1999, p-102). In the Inland Central region, variability in total foodgrain production and per capita foodgrain production is highest, as can be seen from Table 7, because of low soil fertility as well as low to medium intensity rainfall (ibid, p-13). On the other hand, the instability in yield levels of total foodgrain production is highest in the Inland Northern region because of medium soil fertility and low rainfall in the region, whereas, instability is lowest in the Eastern region which could be attributed to better soil fertility and medium rainfall in large parts of this region. Variability in respect of total foodgrain production and per capita foodgrain production is lowest in the Coastal region. The comparison of variability in terms of all these three indicators across pre and post Green Revolution period reveals a higher variability during the post-Green Revolution period as compared to the pre-Green Revolution period. Apparently this is indicative of a decline in the sustainability of food across regions. It is to be noted here that CV is not the sole indicator of sustainability, and that the trend based variations also play a role in the process.

Table 7: Average Level and Variation in Foodgrains Availability across Regions in Maharashtra (1960-61 to 2005-06)

Regions	Total Foodgrain Production (00' MT)						Yield of Total Foodgrain Production (Kg/Hectare)						Per Capita Foodgrain Production (Kg/Hectare)					
	Pre-GR*		Post-GR*		Total		Pre-GR*		Post-GR*		Total		Pre-GR*		Post-GR*		Total	
	Average	CV (%)	Average	CV (%)	Average	CV (%)	Average	CV (%)	Average	CV (%)	Average	CV (%)	Average	CV (%)	Average	CV (%)	Average	CV (%)
Coastal	6727	12.6	10049	15.3	9239	23.2	1113	14.5	1714	17.8	1540	25.3	67	18.7	52	21.0	55.8	15.0
Inland Western	17158	15.5	26329	18.9	23670	28.6	424	14.3	654	17.9	582	27.2	149	15.6	138	20.9	140.1	24.5
Inland Northern	8270	15.8	14873	23.4	13114	34.9	471	16.2	796	24.7	697	33.8	150	21.0	157	23.4	153.7	20.6
Inland Central	14493	15.5	26218	27.1	22985	38.3	429	17.6	666	25.4	589	33.5	206	22.2	211	25.9	207.1	24.0
Inland Eastern	10624	20.6	19866	22.0	17532	33.9	508	19.6	878	19.5	768	30.8	142	22.6	160	24.7	154.2	26.3
Eastern	6397	16.2	8965	21.4	8312	26.0	628	14.5	903	21.0	820	25.3	225	23.7	197	23.1	203.6	18.6
Maharashtra	64027	12.5	106737.4	17.7	95265	29.1	497	12.5	784	17.6	696	27.2	145	17.3	137	20.0	138.1	20.0

Sources: Authour's estimation based on EPWRF, 2004, and Directorate of Economics and Statistics, Ministry of Agriculture, GoM.
Note: * Pre-Green Revolution (Pre-GR) period covers the years from 1960-61 to 1970-71, while post-Green Revolution (Post-GR) period covers the years from 1973-74 to 2005-06

Stability in food availability over time is determined by various endogenous factors and their impact increased particularly during post-GR period resulting in higher output variability. As earlier discussed the relation between growth and instability in Maharashtra, our results resemble with Deshpande (1988). The major concern however in this paper is to understand the impact of output variability on the food security. The output variability could result in reduced food availability in the absence of adequate food supply, as the population size is increasing. In order to examine, we have estimated the share of per capita food availability to the required cereals and pulses for an adult in a given year, recommendate by ICMR. The estimates are drawn following three step procedure. One, per adult per year cereal and pulses requirement is obtained from ICMR (1996). Two, actual per adult per year cereals and pulses availability are estimated based on cereals and pulses production to the total adult population for that year. Lastly, the share of per adult cereals and pulses availability to per adult ICMR norm is estimated. The results for cereals reveal a declining share over time across regions (Table 8). In terms of cereal availability, Maharashtra was food secure State in 1961 across regions, except in Coastal region. A drastic decline is observed in the share of cereals availability to 96 per cent in 1971 in the State as a whole from 174 per cent in 1961; so also increasing trend in deficit in the cereal availability is evident at regional level. In 1961, only Coastal region was found food insecure in terms of cereals availability that has increased to three regions including Inland Western and Inland Eastern regions in 1971. The declining share of cereals could be attributed to the severe drought during 1972-73. The share of cereal availability increased in 1981 and 1991 as a whole, but again it has declined in 2001 with deficit in three regions. The declining sustainable food security is visible in the State as a whole and also across regions, as the share of cereal availability has declined over the period. Availability of cereals decline is prominent in three regions, viz. Coastal, Inland Western and Inland Eastern regions. In Inland Eastern region, declining share of cereal availability, particularly from 1991 to 2001 has deteriorated the food security which could also be attributed to the farmer suicides in the region, as the recent studies have shown that area under cultivation has shifted from cereals (particularly jowar) and cotton towards soyabean and to a lesser extent pulses in Vidarbha as a whole; and in Amravati division in particular that falls under Inland Eastern region (see Mishra, 2006, p-153).

Similarly, the estimates of share of pulses availability indicate declining over the period in the Coastal region followed by the Inland Western and Eastern regions (see Appendix I). The Eastern region is found to have experienced a lower and declining availability of pulses, particularly after 1971, except in 1991. However, it is to be noted that Inland Central and Inland Eastern regions have registered increasing share of pulses availability during last three decades in particular.

Table 8: Share of Per Adult Per Year Cereals Availability to ICMR Norms

Regions	1961	1971	1981	1991	2001
Coastal	68.55	70.80	61.06	43.73	61.17
Inland Western	201.10	95.93	144.08	132.59	44.70
Inland Northern	164.06	124.92	156.28	167.70	113.56
Inland Central	277.72	105.93	188.30	198.54	136.47
Inland Eastern	170.64	66.71	140.86	144.78	67.61
Eastern	232.77	213.41	225.57	175.60	166.58
Maharashtra	174.38	95.99	121.95	126.90	90.28

Sources: Authour's estimation based on EPWRF, 2004 and Directorate of Economics and Statistics, GoM

The carrying capacity of agricultural lands is another indicator employed to measure sustainable food availability across regions. It signifies the capacity of agricultural lands to support the population dependent on it for earning their livelihood.[15] Since the population has been growing steadily and the land being a scarce resource, the land to population ratio will increase over time in the agriculture based economy and thereby, pressure on the carrying capacity of a agricultural lands. Further, the pressure exerted on land could increase due to various reasons such as increasing population or diversion of land to non-agricultural purposes. The excess burden on the carrying capacity of land could be reduced either through the transformation of agriculture based economy to one of non-agriculture based economy or by employing modern inputs and techniques and increasing irrigation facilities. The increasing density of agricultural workers on land may lead to inadequate access to food availability and become a hurdle in the path of ensuring stable access to adequate food.

The carrying capacity of cultivable land can be assessed by looking at the changes in the share of cultivated land and changes in the proportion of workforce dependent on agriculture for their livelihood. Therefore, what is attempted here is an assessment of the pressure being exerted on the cultivable land due to the increase in population dependent on agriculture for their livelihood. Towards this end, we have estimated density of rural population and agricultural workers per hectare as also a percentage change in the share of cultivators and agricultural labourers (see Table 9 and 10). The density of rural population is substantially higher than in the agriculture in the State as a whole with increasing density over years during 1961-2001. In the Coastal region, both density of rural population and agricultural workforce per hectare are found higher than in other regions with the former increasing over time from 9.82 in 1961 to 27.93 in 2001, while the latter declining gradually from 1.74 in 1961 to 0.56 in 1991, but increasing again to 2.10 by 2001. The density of rural population per hectare is determined by various factors such as the size of population, in/out migration and the proportion of land under cultivation. In contrast, density of agricultural population per hectare depends on employment opportunities in non-agricultural sector and in/out migration.

Table 9: Per Hectare Rural Population and Agricultural Workforce

Regions	Rural Population					Agricultural Workforce				
	1961	1971	1981	1991	2001	1961	1971	1981	1991	2001
Coastal	9.82	14.87	17.81	20.55	27.94	1.74	1.73	1.64	0.56	2.10
Inland Western	1.91	2.58	2.94	3.43	4.05	0.61	0.55	0.67	0.16	1.02
Inland Northern	1.94	2.48	2.86	3.36	3.78	0.81	0.66	1.00	0.20	1.09
Inland Central	1.15	1.38	1.83	2.32	2.48	0.40	0.39	0.47	0.08	0.76
Inland Eastern	1.77	2.09	2.50	2.69	3.11	0.63	0.58	0.70	0.10	0.82
Eastern	2.16	2.67	3.25	3.62	4.80	0.95	0.86	0.94	0.43	1.56
Maharashtra	2.13	2.69	3.20	3.61	4.35	0.69	0.61	0.74	0.16	0.98

Sources: Authour's estimation based on EPWRF, 2004, www.indiastat.com, and Directorate of Economics and Statistics, GoM.

In the Coastal region, the reason for higher as well as increasing density of rural population could be attributed to higher share of population and a lower proportion of land under the cultivation. However, the decline in density of agricultural workforce could be due to improving non-agricultural activities and rural to urban migration. The density of rural population and agricultural workforce are lowest in the Inland Central region because the proportion of land under cultivation is relatively high. In the region, share of NSA in the TE 1965-66 is found to be 73 per cent, while increased to 76 per cent in the TE 1995-96; and similarly GCA is about 78 per cent and 94 per cent, respectively, during the same period (See Table 4). Over the years 1961 to 1991, the share of workforce in agriculture sectors in most of the regions is found to have declined with the Inland Northern region being an exception (Table 10). The highest decline is observed for the Coastal region, followed by the Inland Western and Inland Eastern regions, whereas, the lowest decline is seen in Inland Central and Eastern regions. The higher proportion of agricultural workforce found in the Coastal region could be due to a lower proportion of land under cultivation. On the contrary, the relatively lower proportion of agricultural workforce in the Eastern region could be due to the lower size of population in the region. The pace of declining dependency on agriculture sector in the Eastern region is found increasing after 1991, while in most other regions increasing during the previous decade. This could be due to the impact of new economic reforms that resulted in enhanced employment opportunities in other sectors. It is interesting to note that the proportion of workforce dependent on the agricultural sector increased during 1981-91 in two regions viz., Coastal and Inland Western. This could be attributed to the economic crisis of 1990-91. Added to this, the workforce declined after the crisis got over as can be seen from the reduced workforce in the agricultural sector over the period 1991-2001 (Table 10).

Table 10: Per cent Change in the Share of Cultivators and Agricultural Labourers

Regions	1961-1971	1971-1981	1981-1991	1991-2001	1961-2001
Coastal	-2.35	-9.2	17.44	-24.5	-18.61
Inland Western	-1.65	-0.58	6.76	-10.79	-6.26
Inland Northern	5.18	8.63	-4.15	-7.73	1.93
Inland Central	-8.47	1.03	1.6	-5.65	-1.47
Inland Eastern	-0.03	0.67	-0.78	-3.79	-3.93
Eastern	-0.90	13.00	-3.89	-10.18	-1.97

Sources: Authour's estimation based on Census of India (Various Years)
Note: Share of cultivators and agricultural labourers includes both main and marginal worker to the total workers.

On the whole, an increase in population accompanied by a marginal decline in the proportion of agricultural workforce points to a trend of declining sustainability of food supply in most regions of Maharashtra. However, a declining density of agricultural workforce is a pointer to the process of change from agriculture to non-agriculture sector. What is visible is a decline in sustainable food access and availability over time in most of the regions. To conclude, food security is declining over the period, however it depends not only on food availability but also on food utilisation, which in turn, depends on the consumption of non-food items too.

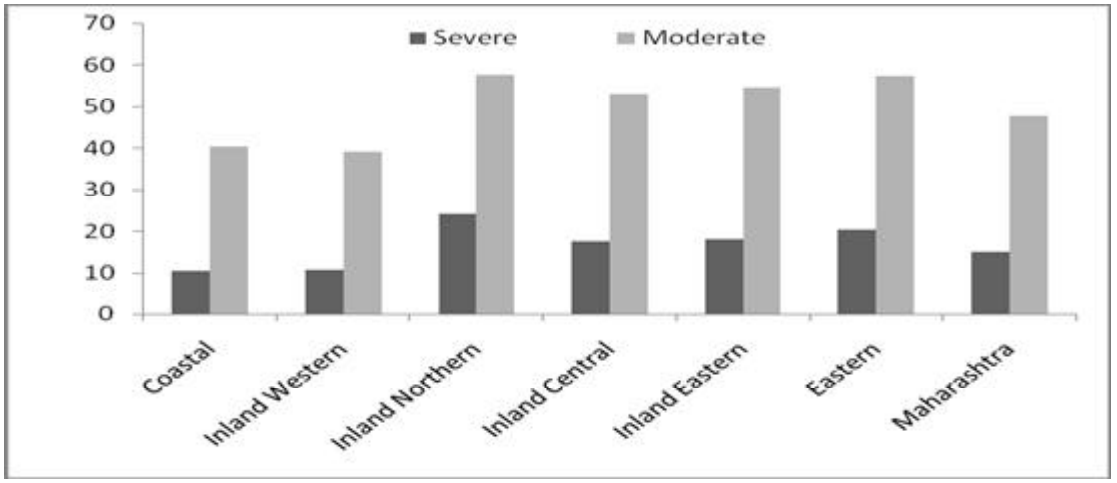
2. Absorption Capacity

In Maharashtra, as a whole as well as across regions, share of cereals and pulses availability, increasing pressure on carrying capacity of agricultural land and output variability reveals deteriorating food security over the period. These indicators reflect implications on the calorie intake which determines nutritional status of the individual along with non-food consumption. The inadequate non-food consumption could result in the negative outcome in terms of lower nutritional status. Nutritional status is an indicator of measuring individual food insecurity which encompass not only food intake but also the impact of environmental factors.[16] It could be lower even when food intake is adequate. Frequent occurrences of diseases and the consumption of contaminated drinking water impact food absorption capacity (Mortorell and Ho, 1984). And a lower absorption capacity of an individual inevitably leads to declined nutritional status. Therefore, absorption capacity of an individual hinges on her/his health and hygiene status. Thus, it is considered as one of the important indicators for assessing health of the society, and has greater implications as compared to the incidence of poverty.

The proportion of underweight children below three years of age, over the period 1992-93 to 2005-06 across Indian States reveals that it has declined over the years (Appendix II). Maharashtra's ranking among Indian States in this respect seems to have improved from fourth in 1992-93 to sixth in 1998-99, and further to fourteenth in 2005-06. Nevertheless, the per cent of underweight[17] children is still high in Maharashtra, accounting almost 40 per cent in 2004-05. In order to determine the health status of the population in Maharashtra, here we attempts to understand the food utilisation capability based on nutritional status of children below six years, particularly underweight children as it is a

reliable proxy for the general health status of the society. In addition to food availability, food utilisation depends on non-food aspects such as child care, health services, knowledge of food preparation etc., which also impact nutritional status. Hence, a sufficient quantity of quality food, though an essential element for ensuring food security, alone would not be able to ensure a better nutritional status in the absence of non-food consumption. This is better revealed from our analysis of nutritional status in the State that the proportion of children who are severely and moderately underweight is low in the Coastal and Inland Western regions though these regions suffer from food deficit (see Figure 3). On the other hand, nutritional status is lower among substantially large proportion of children in the other four regions despite being relatively food sufficient.

Figure 3: Proportion of Severe and Moderate Underweight Children below Six Years of Age across Regions in Maharashtra



Source: Authour's estimation based on RCH 2: 2002-04 (IIPS, 2006).

Conclusions

The main focus of this paper is to examine food security across regions in Maharashtra considering its four elements. From the availability point of view, two regions in Maharashtra viz., Coastal and Inland Western are food deficit, while the other four regions fall under higher and medium levels of food sufficiency. The lower food availability in the Coastal and Inland Western regions can be attributed to the lower proportion of land under cultivation and the higher density of population, respectively. Surprisingly, these two regions constitute a lower proportion of child under-nutrition which could be due to a relatively better purchasing power of the people. It is worth noting that the number of poor in these regions is less, which in turn points to the inclusion of more non-food items in their consumption basket. Further in these regions, per capita food availability and per capita cereals and pulses availability have been declining over the period and relatively lower than the State average. In the Coastal region, the proportion of poor has been increasing over the period, even though that is lower than the other regions. On the other hand, the proportion of poor has been showing a declining trend in the Inland Western region. In addition, these two regions exhibit a lower proportion of underweight children below six years of age, indicating a relatively better utilisation capacity. Although these two regions are food deficit, the nutritional status of children in these regions is better than in other regions.

The remaining regions are relatively less food deficit even though the per capita food availability and share of cereals and pulses availability to the ICMR norm in these regions have been declining over the period. The Inland Northern region is food deficit in terms of per capita foodgrains and share of pulses and cereals availability. Also this region has a higher proportion of poverty and relatively poor nutrition when compared with the State average. Inland Central, Inland Eastern and Eastern regions show relatively better food availability as compared to other regions; however, these regions experience a higher proportion of child malnutrition.

On the whole, three situations emerge from the discussion based on the food sufficiency and outcome indicators: First, the situation of food deficit along with better outcome indicators in terms of lower level of poverty and under-nutrition. Second situation is the self-sufficiency in foodgrain availability along with higher level of poverty and under-nutrition. And third situation is of medium level of self-sufficiency along with higher level of poverty and under-nutrition. The Coastal and Inland Western regions come under the first situated described above. In these regions, per capita food availability has been low since the inception of the State. In addition, the excess burden on the carrying capacity of agricultural lands has been declining over time as the rate of decline in workforce dependence on the agricultural sector is substantially higher than the rate of decline in land under cultivation. In the Coastal region, the lower food availability could due to the lower proportion of land under cultivation. On the other hand, the workforce dependence on agriculture in this group has been declining over the period, which would be possible only if the employment opportunities are available in other sectors. In the second situation, Inland Eastern and Eastern comes. These regions are relatively better in terms of food availability as compared to other regions, but the proportion of poor and child malnutrition here is relatively higher than the State average. Inland Northern and Inland Central regions fall under the third situation. These regions are having medium level of food sufficiency along with a relatively higher proportion of poor and child malnutrition. Food availability in the regions falling under second and third situation are relatively better than the regions falling under first situation, but these regions have shown higher proportion of poor as also higher level of child malnutrition. In these regions, the pressure over carrying capacity of the agricultural land has been either increasing over time or the rate of decline has been lower than regions falling under first situation. In regions falling under second and third situation, decline in workforce dependence on agriculture is slower than regions falling under first situation, and at the same time, the land under cultivation has been declining over time.

Notes

[1] Maharashtra came into being as a State on 1st May of 1960 as a Marathi speaking areas from the then Bombay, Madhya Pradesh and Hyderabad States.

[2] The conceptual understanding of food security has remarkably changed from food availability to accessibility during the last three decades, i.e., from World food Summit 1974 to World Food Summit 1996. The World Food Summit (1996) defines food security as, "*...when all people, at all time, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life"* (World Food Summit, 1996).

[3] The districts are classified into six regions based on 61st NSSO survey instead of administrative regions because of comparability between various indicators. These are: 1. Coastal region consisting of six districts namely Thane, Mumbai Suburban, Mumbai, Raigarh, Ratnagiri and Sindhudurg. 2. Inland Western region which comprises six districts viz., Pune, Ahmadnagar, Solapur, Satara, Kolhapur and Sangli. 3. Inland Northern region

consists of four districts namely, Nandurbar, Dhule, Jalgaon and Nashik. 4. Inland Central region comprises eight districts viz., Nanded, Hingoli, Parbhani, Jalna, Aurangabad, Bid, Latur and Osmanabad. 5. Inland Eastern region constitutes seven districts namely Buldana, Akola, Washim, Amravati, Wardha, Nagpur and Yavatmal, and 6. Eastern region comprises four districts viz., Bhandara, Gondiya, Gadchiroli and Chandrapur.

[4] The poverty estimates based on 55th NSSO round are not directly comparable to other NSSO rounds because of the changes made in the recall method. In this round, the information on consumer expenditure was collected using 30 days and 365 days recall method, whereas, other rounds are based on 30 days recall method (see Deaton, 2005).

[5] The concept of sustainability with respect to development, as defined by Bruntland Commission (1987), is 'developments which satisfy the needs of present generation without compromising the needs of future generation'. In the same way, sustainability of food indicates a similar meaning, as the stability of food supply over the period will take care of the food security of one generation to other.

[6] In the rural areas, around 61 per cent of the total workers were dependent on agriculture and allied activities for their livelihood in the early 1990s (Dev and Mungekar, 1996, p-A38); however, after accounting for main and marginal workers, about 83 per cent of the rural population was engaged in the primary sector as either cultivators or agricultural labourers in 1991, which slightly declined to about 81 per cent by 2001 (Deshpande *et al* 2007, p-423).

[7] The availability of foodgrains has advantages over foodgrain production because it is measured based on the required food intake norm for the adult population. Adult population is the population of 15 years of age and above, whereas population below 15 years of age is the pre-adult or child population.

[8] Per Capita Foodgrain Production has been estimated based on the proportion of total foodgrain production to total population in a given region. The size of population for each year between two census years is derived using exponential method. In order to estimate Per Capita Foodgrain Availability across regions, the population of Mumbai Sub-urban and Gr. Bombay/Mumbai is excluded from the estimation because the population in these districts does not depend on own produced foodgrains.

[9] See Dhanagare (1992), Dyson and Maharatna (1992) and DHMJ Drought Forum (2008) for details on droughts in Maharashtra.

[10] In India, the earliest attempt to define poverty line dates back to July 1962 by fixing it at ` 20 MPCE to meet the minimum needs of life (Dandekar, 1981). It was further modified in 1973-74 by the Task Force of Planning Commission (GoI, 1979). It estimated poverty line at ` 49.19 for rural areas and ` 56.64 for urban areas based on MPCE at 1973-74 prices based on calorie intake and adjusted for increase over time.

[11] The NSSO has been conducting large scale surveys every five years on a regular basis since 1973-74 for collecting information on consumption expenditure, known as "Quinquennial Survey".

[12] The official poverty line for rural Maharashtra was ` 146.21, ` 334, ` 478 and for urban Maharashtra ` 328.56, ` 539.71 and ` 637 for the period of 1993-94, 1999-00 and 2004-05, respectively.

[13] Tendulkar Committee submitted its report on November 2009 to the Planning Commission arguing that the existing poverty line needed to be enlarged, so as to mitigate the effect of changing food habits and increasing expenditure on private essential goods such as education and health services caused by declining subsidies (GoI, 2009). Since the Committee has enlarged the scope of food basket including expenditure on health and education, the poverty ratio has increased substantially for India as well as across States, particularly in the rural areas because expenditure on education and health services had not been included in the then existing poverty line, due to the provision of Government subsidies. However, with the changing role of Government after the implementation of new economic reforms, subsidies for various welfare schemes are being rolled back systematically. The new poverty ratio for India has increased from 28.5 per cent to 41.8 per cent in the rural areas and declined marginally from 25.9 per cent to 25.7 per cent in the urban areas. The figures for Maharashtra have increased substantially from 30 per cent to 59.3 per cent for the rural areas and 25.9 per cent to 30.3 per cent for the urban areas (ibid., p-35, Table 2).

[14] Green Revolution, despite being introduced in India during mid-1960s, took more than six years to record its adoption in Maharashtra (Deshpande *et al* 2007). Therefore, the period before 1970-71 has been considered as a pre-GR period, while the coefficient of variance for post-GR has been analysed for 1973-74 to 2005-06, because agricultural production has increased in the State with the adoption of new technology only after the shock of the drought in 1972-73.

[15] The carrying capacity of land has been measured in Deshpande *et al* (2007) by mensuration of land over changes in the workforce burden on agricultural sector.

[16] However, Sukhatme (1981) argues that environment variation is not the only cause of under-nutrition (p-1034).

[17] Underweight is considered an indicator for both chronic and transitory malnutrition (Mortorell and Ho, 1984).

References

Bruntland, G (1987). *Our Common Future: The World Commission on Environment and Development*. Oxford: Oxford University Press.

Dandekar Committee (1984). *Report of the Fact Finding Committee on General Issues Relating to Backward Areas Development*. Mumbai: Planning Department, Government of Maharashtra.

Dandekar, V M (1981). Measurement of Poverty. *R R Kale Memorial Lecture*. Pune: Gokhale Institute of Politics and Economics.

Deaton, Angus (2005). Adjusted Indian Poverty Estimates for 1999-2000. In Angus Deaton and Valerie Kozel (eds), *The Great Indian Poverty Debate*. New Delhi: MacMillan: 239-48.

Deshpande, R S (1988). Growth and Instability in Maharashtra. *Artha Vijnana*, Vol. XXX, No. 4, December: 317-39.

Deshpande, R S and N Rajasekaran (1997). Impact of Watershed Development Programme: Experience and Issues. *Artha Vijnana*, Vol. XXXIX, No. 3, September: 374-90.

Deshpande, R S, Nitin Tagade and A Naryanamoorthy (2007). Koradvahu Maharashtratil Krishi Sansadahnancha Visham Vikash (Uneven development of Agricultural Resources in Rainfed Maharashtra). *Samaj Probhodhan Patrika*, 180 (October-December): 422-31.

Dev, S Mahendra and B L Mungekar (1996). Maharashtra's Agricultural Development: A Blueprint. *Economic and Political Weekly*, XXXI (13): A38-A48.

Dhanagare, D N (1992). 1992 Drought in Maharashtra: Misplaced Priorities, Mismanagement of Water. *Economic and Political Weekly,* XXVII (27): 1421-1925.

DHMJ Drought Forum (2008). *Combating Drought in Maharashtra*. Published by InfoChange for the Poorest Areas Civil Society (PACS) Programme supported by the UK Government's Department for International Development (DFID).

Dyson, Tim and Arup Maharatna (1992). Bihar Famine, 1966-67 and Maharashtra Drought, 1970-73: The Demographic Consequences. *Economic and Political Weekly,* XXVII (26): 1325-32.

EPWRF (2004). *District-wise Agricultural Data Base for Maharashtra: 1960-61 to 1997-98*. Mumbai: EPW Research Foundation.

FAO (2006). *Food Security.* Policy Brief, Issue 2. FAO's Agriculture and Development Economics Division (ESA).

GoI (1979). *Report of the Task Force on Projections of Minimum needs and Effective Consumption demand*. New Delhi: Planning Commission, Government of India.

———— (2006). *Economic Survey of India 2006-07*. New Delhi: Planning Commission, Government of India.

———— (2009). Report of the Expert Group to Review the Methodology for Estimation of Poverty. New Delhi: Planning Commission, Government of India.

———— (Various years). *Census of India*. New Delhi: Government of India.

———— (Various years). *General Economic Tables*. Maharashtra: Census of India.

GoM (2002). *Maharashtra Human Development Report, 2002*. Mumbai: Government of Maharashtra.

———— (2006). *Economic Survey of Maharashtra 2005-2006*. Mumbai: Planning Department, Government of Maharashtra.

———— (Anonymous year). *The Drought of 2002-03: State Level Efforts, Final Copy of Documentation*. Mumbai: Department of Relief & Rehabilitation Revenue & Forests Ministry, Government of Maharashtra.

———— (Various Years). *Economic Survey of Maharashtra.* Mumbai: Directorate of Economics and Statistic, Government of Maharashtra.

———— (Various Years). *Statistical Abstracts of Maharashtra*. Mumbai: Directorate of Economics and Statistics. Government of Maharashtra.

———— (Various Years). *Handbook of Basic Statistics of Maharashtra State*. Mumbai: Directorate of Economics and Statistics, Government of Maharashtra.

Himanshu (2007). Recent Trends in Poverty and Inequality: Some Preliminary Results. *Economic and Political Weekly,* XLII (6): 497-508.

ICMR (1996). Some common Indian Recipes and other Nutritive Value. Hyderabad: National Institute of Nutrition.

IIPS (2006). *Reproductive and Child Health: District Level Household Survey (RCH-DLHS):2002-04*. International Institute for Population Sciences, Mumbai.

Mahamallik, Motilal and Gagan Bihari Sahu (2011). Identification of the Poor: Errors of Exclusion and Inclusion. *Economic and Political Weekly,* February, XLVI (9): 71-77.

Maxwell, Daniel G (1996). Measuring Food Insecurity: The Frequency and Severity of Coping Strategies. *Food Policy*, 21 (3): 291-303.

Mishra, Srjit (2006). Farmers' Suicides in Maharashtra. *Economic and Political Weekly*, April: 1538-1545.

Mitra, Ashok (1990). Agricultural Production in Maharashtra: Growth and Instability in the Context of New Technology. *Economic and Political Weekly*, 25 (52): A146-A164.

Mortorell, R and T J Ho (1984). *Malnutrition, morbidity and mortality*. Population Development Report, Vol. 10 pp 49-68.

Nair K R G (2007). Malnourishment among Children in India: A Regional Analysis. *Economic and Political Weekly*, XLII (37): 3797-3803.

Prabhu, Seeta K and P C Sarker (1992). Identification of Levels of Development: Case of Maharashtra. *Economic and Political Weekly,* XXVII (36): 1927-1937.

Radhakrishna, R and C Ravi (2004). Malnutrition in India: Trends and Determinants. In S Irudaya Rajan and K S James (eds), *Demographic Change Health Inequality and Human Development in India.* Hyderabad: Centre for Economic and Social Studies.

Sawant S D, B N Kulkarni, C V Achuthan and K J S Satuasai (1999). Agricultural Development in Maharashtra Problems and Prospects. *Occasional Paper*. Mumbai: NABARD.

Sen, Amartya (1985). Commodities and Capabilities. *Professor Dr P Hennipman Lectures in Economics*. New York: Oxford University Press.

Shaban, Abdul (2006). Regional Structures, Growth and Convergence of Income in Maharashtra. *Economic and Political Weekly*, XLI (18): 1803-15.

Sukhatme P V (1981). Measuring the Incidence of under-nutrition: A Comment. *Economic and Political Weekly*, XVI (23): 1034-36.

Suryanarayana M H (1996). Poverty, Food Security and Levels of Living: Maharashtra. *Journal of Indian School of Political Economy,* XI (1): 77-100.

Vidwans, S M (1996). *Regional Disparities: A New Approach*. Pune: Indian School of Political Economy.

World Food Summit (1996). *Report of the World Food Summit*, Rome: Food and Agriculture Organization of the United Nations. (http://www.fao.org/wfs/index_en.htm).

Appendix I

Per cent of Per Adult Pulses Availability to ICMR Norms

Regions	1961	1971	1981	1991	2001
Coastal	7.06	3.81	2.50	4.44	7.82
Inland Western	90.75	50.53	57.78	51.43	57.68
Inland Northern	185.43	130.31	110.03	157.79	86.35
Inland Central	216.02	144.17	161.37	165.63	251.01
Inland Eastern	332.07	128.28	109.11	227.22	302.30
Eastern	148.14	95.43	52.34	77.97	52.65
Maharashtra	145.88	78.40	66.51	97.29	130.25

Sources: Authour's estimation based on EPWRF, 2004 and Directorate of Economics and Statistics, GoM

Appendix II

Proportion of Underweight Children below Three Years of Age across Indian States

States	NFHS-1 (1992-93)	NFHS-2 (1998-99)	NFHS-3 (2005-06)	Per cent Change	
				1992-93 to 1998-99	1998-99 to 2005-06
Bihar*	62.5	54.4	58.4	-12.96	7.35
West Bengal	54.8	48.7	43.5	-11.13	-10.68
Orissa	52.4	54.4	44.0	3.82	-19.12
Maharashtra	51.4	49.6	39.7	-3.50	-19.96
Karnataka	50.6	43.9	41.1	-13.24	-6.38
Assam	49.2	36.0	40.4	-26.83	12.22
Madhya Pradesh*	48.5	55.1	60.3	13.61	9.44
Gujarat	48.1	45.1	47.4	-6.24	5.10
Uttar Pradesh*	47.2	51.7	47.3	9.53	-8.51
Punjab	46.0	28.7	27.0	-37.61	-5.92
Tamil Nadu	45.7	36.7	33.2	-19.69	-9.54
Tripura	45.2	42.6	39.0	-5.75	-8.45
Andhra Pradesh	45.0	37.7	36.5	-16.22	-3.18
Meghalaya	44.4	37.9	46.3	-14.64	22.16
Rajasthan	44.3	50.6	44.0	14.22	-13.04
Himachal Pradesh	43.7	43.6	36.2	-0.23	-16.97
Delhi	40.9	34.7	40.4	-15.16	16.43
Arunachal Pradesh	38.4	24.3	36.9	-36.72	51.85
Haryana	34.6	34.6	41.9	0.00	21.10
Goa	34.1	28.6	29.3	-16.13	2.45
Mizoram	28.4	27.7	21.6	-2.46	-22.02
Nagaland	27.5	24.1	29.7	-12.36	23.24
Kerala	27.0	26.9	28.8	-0.37	7.06
Manipur	26.8	27.5	23.8	2.61	-13.45
India	51.5	47.0	45.9	-8.74	-2.34

Source: Nair (2007) and last two columns are Authors' estimates.

Note: *Bihar, Madhya Pradesh and Uttar Pradesh are not comparable over the period due to the bifurcation of these into two States.

Recent Working Papers

203 Changing Child Population: Growth, Trends and Levels in Karnataka
C M Lakshmana

204 Awareness About HIV/AIDS Among Karnataka Woment: An Analysis of RCH 2002-04 Data
K S Umamani

205 The Microfinance Promise in Financial Inclusion and Welfare of the Poor: Evidence from Karnataka, India
Naveen K Shetty

206 Structure of Central Himalayan Forests Under Different Management Regimes: An Empirical Study
Sunil Nautiyal

207 Poverty and Natural Resources: Measuring the Links (Some Issues in the Context of Karnataka)
K G Gayathri Devi

208 Federalism and Decentralisation in India: Andhra Pradesh and Tamil Nadu
V Anil Kumar

209 Capital, 'Development' and Canal Irrigation in Colonial India
Patric McGinn

210 Gender, Ecology and Development in Karnataka: Situation and Tasks Ahead
K G Gayathri Devi

211 Greenhouse Gases Emission and Potential Corbon Sequestration: A Case Study of Semi-Arid Area in South India
Lenin Babu and K V Raju

212 Emerging Trends in Managing Drinking Water – Case Studies of Coastal Villages in Karnataka
Manasi S, Latha N and K V Raju

213 Spatio-Temporal Analysis of Forests Under Different Management Regimes Using Landsat and IRS Images
Sunil Nautiyal

214 Traditional Knowledge System (Medicine): A Case Study of Arakalgud Taluk, Karnataka, India
B K Harish, K Lenin Babu

215 Tribal Movement in Orissa: A Struggle Against Modernisation?
Patibandla Srikant

216 Technological Progress, Scale Effect and Total Factor Productivity Growth in Indian Cement Industry: Panel Estimation of Stochastic Production Frontier
Sabuj Kumar Mandal and S Madheswaran

217 Fisheries and Livelihoods in Tungabhadra Basin, India: Current Status and Future Possibilities
Manasi S, Latha N and K V Raju

218 Economics of Shrimp Farming: A Comparative Study of Traditional Vs. Scientific Shrimp Farming in West Bengal
Poulomi Bhattacharya

219 Output and Input Efficiency of Manufacturing Firms in India: A Case of the Indian Pharmaceutical Sector
Mainak Mazumdar, Meenakshi Rajeev and Subhash C Ray

220 Panchayats, Hariyali Guidelines and Watershed Development: Lessons from Karnataka
N Sivanna

221 Gender Differential in Disease Burden: It's Role to Explain Gender Differential in Mortality
Biplab Dhak and Mutharayappa R

222 Sanitation Strategies in Karnataka: A Review
Veerashekharappa and Shashanka Bhide

223 A Comparative Analysis of Efficiency and productivity of the Indian Pharmaceutical Firms: A Malmquist-Meta-Frontier Approach
Mainak Mazumdar and Meenakshi Rajeev

224 Local Governance, Patronage and Accountability in Karnataka and Kerala
Anand Inbanathan

225 Downward Dividends of Groundwater Irrigation in Hard Rock Areas of Southern Peninsular India
Anantha K H

226 Trends and Patterns of Private Investment in India
Jagannath Mallick

227 Environmental Efficiency of the Indian Cement Industry: An Interstate Analysis
Sabuj Kumar Mandal and S Madheswaran

228 Determinants of Living Arrangements of Elderly in Orissa: An Analysis
Akshaya Kumar Panigrahi

229 Fiscal Empowerment of Panchayats in India: Real or Rhetoric?
M Devendra Babu

230 Energy Use Efficiency in Indian Cement Industry: Application of Data Envelopment Analysis and Directional Distance Function
Sabuj Kumar Mandaland S Madheswaran

231 Ethnicity, Caste and Community in a Disaster Prone Area of Orissa
Priya Gupta

232 Koodankulam Anti-Nuclear Movement: A Struggle for Alternative Development?
Patibandla Srikant

233 History Revisited: Narratives on Political and Constitutional Changes in Kashmir (1947-1990)
Khalid Wasim Hassan

234 Spatial Heterogeneity and Population Mobility in India
Jajati Keshari Parida and S Madheswaran

235 Measuring Energy Use Efficiency in Presence of Undesirable Output: An Application of Data Envelopment Analysis (DEA) to Indian Cement Industry
Sabuj Kumar Mandaland S Madheswaran

236 Increasing trend in Caesarean Section Delivery in India: Role of Medicalisation of Maternal Health
Sancheetha Ghosh

237 Migration of Kashmiri Pandits: Kashmiriyat Challenged?
Khalid Wasim Hassan

238 **Causality Between Energy Consumption and Output Growth in Indian Cement Industry: An Application of Panel Vector Error Correction Model**
Sabuj Kumar Mandaland S Madheswaran

239 **Conflict Over Worship:A Study of the Sri Guru Dattatreya Swami Bababudhan Dargah in South India**
Sudha Sitharaman

240 **Living Arrangement Preferences of the Elderly in Orissa, India**
Akshaya Kumar Panigrahi

241 **Challenges and Pospects in the Measurement of Trade in Services**
Krushna Mohan Pattanaik

242 **Dalit Movement and Emergence of the Bahujan Samaj Party in Uttar Pradesh: Politics and Priorities**
Shyam Singh

243 **Globalisation, Democratic Decentralisation and Social Secutiry in India**
S N Sangita and T K Jyothi

244 **Health, Labour Supply and Wages: A Critical Review of Literature**
Amrita Ghatak

245 **Is Young Maternal Age A Risk Factor for Sexually Transmitted Diseases and Anemia in India? An Examination in Urban and Rural Areas**
Kavitha N

246 **Patterns and Determinants of Female Migration in India: Insights from Census**
Sandhya Rani Mahapatro

247 **Spillover Effects from Multinational Corporations: Evidence From West Bengal Engineering Industries**
Rajdeep Singha and K Gayithri

248 **Effectiveness of SEZs Over EPZs Structure: The Performance at Aggregate Level**
Malini L Tantri

249 **Income, Income Inequality and Mortality An empirical investigation of the relationship in India, 1971-2003**
K S James and T S Syamala

250 **Institutions and their Interactions: An Economic Analysis of Irrigation Institutions in the Malaprabha Dam Project Area, Karnataka, India**
Durba Biswas and L Venkatachalam

251 **Performance of Indian SEZs: A Disaggregated Level Analysis**
Malini L Tantri

252 **Banking Sector Reforms and NPA: A study of Indian Commercial Banks**
Meenakshi Rajeev and H P Mahesh

253 **Government Policy and Performance: A Study of Indian Engineering Industry**
Rajdeep Singha and K Gayithri

254 **Reproduction of Institutions through People's Practices: Evidences from a Gram Panchayat in Kerala**
Rajesh K

255 **Survival and Resilience of Two Village Communities in Coastal Orissa: A Comparative Study of Coping with Disasters**
Priya Gupta

256 **Engineering Industry, Corporate Ownership and Development: Are Indian Firms Catching up with the Global Standard?**
Rajdeep Singha and K Gayithri

257 **Scheduled Castes, Legitimacy and Local Governance: Continuing Social Exclusion in Panchayats**
Anand Inbanathan and N Sivanna

258 **Plant-Biodiversity Conservation in Academic Institutions: An Efficient Approach for Conserving Biodiversity Across Ecological Regions in India**
Sunil Nautiyal

259 **WTO and Agricultural Policy in Karnataka**
Malini L Tantri and R S Deshpande

260 **Tibetans in Bylakuppe: Political and Legal Status and Settlement Experiences**
Tunga Tarodi

261 **Trajectories of China's Integration with the World Economy through SEZs: A Study on Shenzhen SEZ**
Malnil L Tantri

262 **Governance Reforms in Power Sector: Initiatives and Outcomes in Orissa**
Bikash Chandra Dash and S N Sangita

263 **Conflicting Truths and Contrasting Realities: Are Official Statistics on Agrarian Change Reliable?**
V Anil Kumar

Price: Rs. 30.00 ISBN 978-81-7791-120-6

INSTITUTE FOR SOCIAL AND ECONOMIC CHANGE
Dr V K R V Rao Road, Nagarabhavi P.O., Bangalore - 560 072, India
Phone: 0091-80-23215468, 23215519, 23215592; Fax: 0091-80-23217008
E-mail: lekha@isec.ac.in; Web: www.isec.ac.in