

FOOD GRAINS CONSUMPTION IN INDIA
An Analysis of Trends and Patterns

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CENTRE FOR DEVELOPMENT STUDIES

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Degree of Master of Philosophy in Applied Economics of the Jawaharlal
Nehru University*

Arun C. Adatte
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I hereby affirm that the work for this dissertation, *Food Grains Consumption in India: An Analysis of Trends and Patterns*, being submitted as part of the requirements of the MPhil Programme in Applied Economics of the Jawaharlal Nehru University, was carried out entirely by myself. I also affirm that it has not been part of any other programme of study and has not been submitted to any other University for award of any Degree.

June 2010



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Certified that this study is the bona fide work of Arun C. Adatte, carried out under our supervision at the Centre for Development Studies.



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Arun C. Adatte

Abstract of the Dissertation

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Centre for Development Studies, Thiruvananthapuram*

Indian food basket has been predominantly occupied by food grains/cereals. During 2004-05, an average rural Indian spent one third of his/her total food expenditure on cereals alone. Moreover, cereals contributed nearly 67 per cent of total energy to the person in the same period. Being so crucial in Indian diet, food security in the country, in one sense, means food grains security. In this study, our attempt was to examine the changes occurred in food grains/cereals consumption basket in India, particularly in rural areas, since 1990s and analyse the supply and demand factors that influenced food grains/cereals consumption. Except for bottom 20 per cent expenditure class, in all other expenditure classes in rural areas there is a decline in cereals consumption since 1990. In bottom 20 per cent, cereals consumption, in fact, increased in most of the states. One of the reasons for this decline in total cereals basket was the fall in the consumption of coarse cereals and the inadequate offsetting by superior cereals consumption such as rice or wheat. This decline in cereals consumption has an important bearing on nutritional intake of the people. There is a notable decline in total calorie intake among all expenditure classes, except bottom 20 per cent, where it either declined marginally in case of some states or increased marginally in case of some other states. Despite a larger decline in the calorie intake, higher expenditure classes enjoy better energy level. On the contrary, we find insufficient levels of energy intake for lower expenditure classes, including the very bottom class. In 2004-05, the number of calorie deficient people in the country has increased in rural India in comparison to 1993-94. Owing to the comfortable position of calorie level, the decline happened in the cereals and calorie intake of higher expenditure classes can be viewed as a voluntary decision of diet diversification, by which people moves away from cheaper calories (cereals) to dearer calories (non-cereals). Owing to the inadequacy of minimum required energy, the decline we have observed in the cereals and calorie intake of lower expenditure classes cannot be attached to a voluntary decision of diet diversification.

This necessitates an examination of supply and demand aspects of food grains consumption in India. The declining trends in per capita food grains production and per capita net availability during post-1990s reflect the supply constraint in the economy. In addition to these supply constraints, the system of subsidized distribution of food grains through Public Distribution System (PDS) also entails several problems during the same period. The criterion used for targeting under targeted PDS (TPDS) resulted in type I error, by which eligible people are often excluded from the benefits of subsidized provision of food grains. From the demand side, we examined the levels of employment and wage rates in India. The growth rate of employment and real wages, which are vital in raising the purchasing power of lower income classes, registered a decline in post-1990s. Rather than the rich, it is the poor who are adversely affected by these changes. This can be seen from their reduced consumption of food grains/cereals and deepening calorie deficiency. It is to be remembered that raising cereal consumption is the cheapest way to combat calorie deficiency. And, while analyzing the regional disparity in cereal consumption during 2004-05, we understood the instrumentality of augmenting domestic food grains production in each state in increasing the cereal consumption of people, especially in the milieu of TPDS.

CONTENTS

	Title	Page No.
	<i>List of Tables</i>	viii
	<i>List of Figures</i>	ix
	<i>List of Appendix Tables</i>	ix
Chapter 1	Introduction	1-13
	1.1 Causes and Implications of Decline in Cereals Consumption: Two Different Views	2
	1.2 Statement of the Problem	6
	1.3 Objectives of the Study	6
	1.4 Approach of the Study	7
	1.5 Data Sources and Methodology	11
	1.6 Structure of the Study	13
Chapter 2	Trends and Pattern of Cereal Consumption in India	14-27
	2.1 Significance of Cereals/Food Grains in Indian Diet	14
	2.2 Trends in Direct Consumption of Cereals: Spatial Aspect	15
	2.3 Trends in Direct Consumption of Cereals: Class Aspect	20
	2.4 Summary	27
Chapter 3	State of Nutritional Intake in India	28-45
	3.1 Association between Cereal Consumption and Total Calorie Intake	29
	3.2 Spatial Aspect of Nutritional Intake in India	31
	3.3 Class Aspect of Nutritional Intake in India	38
	3.4 Decline in Cereals and Calorie Intakes in Rural India: A Preliminary Observation	43
	3.5 Summary	44
Chapter 4	Supply Aspects of Food Grains Consumption	46-67
	4.1 Production of Food Grains in India	46
	4.2 Net Food Grain Availability and Food Policies in India	51
	4.3 Public Distribution of Food Grains in India	57
	4.4 Summary	66
Chapter 5	Demand Aspects of Food Grains Consumption	68-83
	5.1 Employment Scenario	68
	5.2 Regional Disparity in Cereals Consumption: An Earlier View	75
	5.3 Regional Disparity in Cereals Consumption: A New View	77
	5.4 Summary	82
Chapter 6	Conclusions	84-89
	6.1 Trends and Pattern of Cereals Consumption in India	84
	6.2 State of Nutritional Intake in India	85
	6.3 Factors Influencing Cereals Consumption in India	86
	Bibliography	90-100
	Appendices	101-112

LIST OF TABLES

Table No.	Title	Page No.
2.1	Importance of Cereals in Indian Food Basket (All India)	14
2.2	Total Cereal Consumption in India	16
2.3	Rural – Urban Disparity in Cereal Consumption	16
2.4	Composition of Cereal Basket in Rural and Urban (All India)	18
2.5	Composition of Cereal Basket in Rural India	19
2.6	Rate of Change in Cereal Consumption across Expenditure Classes during 1993-94 to 2004-05 (Rural)	21
2.7	Consumption of Food Grains in Different Occupational Groups (Rural)	26
3.1	State Level Association between Cereal Consumption and Total Calorie Intake in 2004-05	29
3.2	Correlation between per capita Cereal Consumption and per capita Total Calorie Intake in 2004-05	30
3.3	Recommended Dietary Intakes of Proteins and Energy for Indians	34
3.4	Classification of States According to Calorie Categories (Rural)	35
3.5	Rate of Change in Macronutrient Intake (Rural)	35
3.6	Classification of States According to Calorie Categories (Urban)	36
3.7	Rate of Change in Macronutrient Intake (Urban)	38
3.8	Percentage of Population below Calorie Norm	39
4.1	Annual Growth Rate in Area, Production and Yield of Major Food Grains in India	47
4.2	Compound Annual Growth Rate of Food Grain Production and Population	49
4.3	Per capita per annum Food Grains (Cereals) Production in Indian States	51
4.4	Net Food Grain Availability and its Components	54
4.5	PDS and Open Market Sales in Net Food Grain (Cereals) Availability (NFA)	61
4.6	Allocation to and Offtake from PDS (Rice and Wheat)	61
4.7	Errors in Targeting in 2004-05 (All India)	63
4.8	Central Issue Price in PDS	64
4.9	Annual Compound Growth Rate of Central Issue Price in PDS	65
5.1	Annual Compound Growth Rate in Employment (Work Participation Rate), based on Usual Principal and Subsidiary Status	69
5.2	Annual Compound Growth Rate in Sectoral Employment in Rural India	70
5.3	All India (Rural) Sectoral Distribution of Rural Workers by the Nature of Employment (UPS)	71
5.4	Real Wages of Agricultural Labour (Men) and its Annual Growth Rate	73
5.5	Share of Lower Expenditure Classes in Total Self Employed in Agriculture, Agricultural Labour and Other Rural Labour	74
5.6	Regression Results for Rural India, 2004-05	80
5.7	Correlation Matrix	82

LIST OF FIGURES

Figure No.	Title	Page No.
1.1	A Frame work to Understand Food Security	10
2.1	Rate of Change in per capita Cereals Consumption in Rural and Urban Areas during 1993-94 to 2004-05	17
2.2	Percentage Composition of Cereals Basket across Expenditure Classes (All India-Rural)	23
3.1	Rate of Change in Calorie Intake during 1993/94 to 2004/05 according to the Expenditure Classes (Rural)	41
3.2	Rate of Change in Calorie Intake during 1993/94 to 2004/05 according to the Expenditure Classes (Urban)	42
4.1	Per capita per annum Production of Food Grains (Three Year Moving Average)	50
4.2	Trends in per capita per annum Production and Availability of Food Grains in India (Three Year Moving Average)	52
4.3	Total Stocks of Food Grains, Procurement, Offtake	54
4.4	Share of Offtake of Food Grains from PDS by Different Card Holders	62
5.1	Annual Growth Rates of Real Wages per Day in Rural Sector-All India (1983 prices)	72
5.2	All India (Rural) Distribution of Average Monthly per capita Cereals Consumption (in kg) among Major 15 States in Different Years	77

LIST OF APPENDIX TABLES

Table No.	Title	Page No.
A1.1	Share of Cereals Expenditure in Total Food Expenditure	101
A1.2	Share of Cereals Calories in Total Calories	101
A1.3	Per capita Monthly Consumption of Different Cereals since 1993-94 in Major Indian States (Rural)	102
A1.4	Per capita Total Cereals Consumption across Expenditure Classes during 1993-94 and 2004-05 (Rural)	106
A1.5	Relative Importance of Different Cereals (quantity consumed) in Total Cereal Diet	107
A2.1	Calorie Contribution of Various Food Items in 2004-05 (Rural)	108
A2.2	Calorie Contribution of Various Food Items in 2004-05 (Urban)	108
A2.3	Trends in Macronutrients Intake (Rural)	109
A2.4	Trends in Macronutrients Intake (Urban)	109
A2.5	Trends in Calorie Intake according to MPCE Classes (Rural)	110
A2.6	Trends in Calorie Intake according to MPCE Classes (Urban)	110
A3.1	Minimum Support Price (MSP) and Procurement of Food Grains	111
A3.2	Coverage and Utilisation of PDS Food Grains in 2004-05	111
A3.3	Distribution of Agricultural Labour Households by Ration Card Type in 2004-05	112

CHAPTER I

INTRODUCTION

Ever since the origin of mankind, one of the primary challenges confronted by humans was to obtain sufficient food for survival. Food security has been imperative both for an individual and for the economy. For an individual, adequate food is essential for reproducing his/her life and labour power. For the economy, food surpluses are vital in the process of industrialization, capital formation and other material progress. In our discussion of food security, we are largely concerned with food and individual life, and the related issues of hunger, poverty and undernourishment. It is intriguing to learn about the recent status of these issues in Indian scenario, which has been experiencing several economic and social transformations. Indian food consumption basket has been predominantly occupied by cereals/food grains-type of food¹. However, the recent National Sample Survey data on Consumer Expenditure reveals the diminishing importance of cereals and rising importance of non-cereals in an average Indian diet. Among these changes, diminution of cereals in the diet is, often, a matter of concern owing to its nutritional significance. Cereals being the cheap sources of energy to Indians (they contribute nearly three fourth of the total energy to an average Indian), any decline in its consumption have important implications over the nutritional status of the people. This can be manifested as hunger, food insecurity and ultimately poverty. Therefore, in this study, we analyse the changes happened in cereals consumption during the past decade according to the expenditure classes, which is rather more intuitive than studying the issue at aggregate level, since 1990s. Further in this study we shall examine the various supply and demand factors that influenced cereals consumption in India.

¹ In the study, we use 'food grains' and 'cereals' interchangeably.

1.1 Causes and Implications of Decline in Cereals Consumption: Two Different Views

Changes in food grains/cereals consumption in India are viewed seriously owing to its instrumentality in ensuring food security and thus combating the poverty in the country. Several studies have equally observed the decline in cereals consumption in India for past few years. However, these studies are less unanimous regarding its perceptions and implications. In this section, we briefly review those debates pertinent to our study.

1.1.1 Improvement in Living Standard and Weakening Importance of Calorie Norm

Shroff and Jayanti (2008) observed that structural shift has occurred in Indian food consumption pattern, from food grains to non-food grains. They assess very low or near zero income elasticity of demand for cereals for the population as whole and suspect positive income elasticity for low-income households, which they have not verified. Mittal (2006) is of the opinion that a rise in per capita income and decline in prices of food items which are substitutes for cereals play key roles in reducing the cereals consumption, even for the low income groups in the country. Bardhan et al (2008) viewed the diet diversification occurring in India from food grains to non-food grains, in the context of similar diversification happening in other developing countries. Their study is a cross country comparison, during 1970 to 2003, in which they found that the growth rate of consumption of non-cereal items was faster in developing countries than in developed countries. Hence they endorse the thesis of convergence in consumption of diets in different nations across time. Kalamkar (2008) identified a fall in total calorie intake along with food basket diversification. For him this could be due to the emergence of sedentary life style and change in tastes and preferences of people. The study of Rao (2000) also follows similar lines. In his opinion, the reduction of cereals consumption and calorie intake in rural India is because of the improved living conditions, which demands fewer calories. These improvements are in terms of the reduction in physical labour of workers, reduced dependence of wage payments in kind and development of market

infrastructure in rural areas etc. In short, the study viewed the decline in cereals consumption and calorie intakes in relation to improvement in living standard.

Moving in similar lines, there are studies that doubt over the significance of using calorie norms itself as an indicator of food insecurity. It is to be noted that this doubt has not arisen out of any objective scientific considerations; rather it emanates from the lack of consistency of calorie trend with the trends in poverty estimates and health outcomes. Suryanarayana (2009) and Dev (2005) suspect the use of calorie norm as an indicator of food security because often it confounds with the trends in recent health outcome indicators. Sen (2005) also holds similar opinion; adopting a consistency check with official poverty estimates, he describes the decline in cereals consumption as a change in consumer's choice set. After making 'necessary adjustments for calorie intake to account for age-sex composition', Suryanarayana (2007) found that 'the estimates of monetary measures of poverty by sectors at the national level exceed or tally with those for food insecurity'. Hence, according to him, 'any shortfall in cereal consumption/calorie intake could be by choice and doesn't call for policy measures for income transfers by subsidized food distribution'. Besides, the study found convergence in calorie intake among different expenditure decile classes due to the larger decline of calorie intake by the higher expenditure classes.

1.1.2 Importance of Calorie Norm

Contrary to the above views, studies have examined recent changes in Indian food consumption pattern after recognizing the instrumental role of minimum calories in determining the nutritional status of a person. Using NSS data until 50th round (1993-94), Meenakshi (2000), arrived at the result that the per capita consumption of cereals has declined not just on average, but also among poorest 25 per cent of rural population. A class wise analysis of rural India, using 55th round (1999-00) NSS data, was conducted by Srinivasan (2007) and found that budget share of food is high for poor households, whereas the rich households have more diversified diet. Regarding calorie intake, the study observed that the poor are consuming less than the desired amount of calories and their calorie

intake is highly elastic to income rise. Qadeer and Priyadarshini (2005) recognized the vulnerability of the poor in terms of their energy intake and cautioned about the lowering of minimum calorie norms without adequate scientific reasoning. According to Radhakrishna (2005) the poor started diet diversification even before their energy requirements are fulfilled. However, he expressed concern to the prevalence of poverty, malnutrition among children and emphasized pro-poor policies to counter this chronic food insecurity. But he hardly goes into the factors behind the recent changes in food consumption pattern. Kumar et al (2007) call the recent diet diversification in India as a 'puzzle' because it is accompanied by worsening nutritional status. Nevertheless, they count recent economic changes such as rise in income, urbanisation, diversification in food supply, consumers' changing perception of food quality and safety to be the reasons for such a diversification. For Deaton and Dreze (2009) also the worsening calorie level seems to be a 'puzzle' since it occurs along with a rise in the real per capita expenditure. It is to be noted that this study has not only considered calories to be important, but also points out the limitation of using it as the sole indicator of undernourishment. Calorie intakes need to be examined with respect to other outcome indicators such as anthropometric indicators. While suggesting the need of anthropometric indicators, the study is equally concerned with the problems of data from National Family Health Survey (NFHS), National Nutrition Monitoring Bureau (NNMB) and limitations of using it.

Saha (2000) writes in response to the arguments made by Rao (2000). The study points out that voluntary decision to reduce cereals consumption is less likely to happen because; (i) consumption of cereals are insensitive to relative prices of cereals and urban goods due to unmet subsistence (ii) food deficiency is still persisting. Patnaik (2003) criticized the argument of voluntary diet diversification in all segments of population. She distinguishes between the diversification associated with falling average nutrition and diversification accompanied by rising average nutrition. The poor in India, experiencing the former type of diversification, could be due to the 'sharply worsening income distribution plus institutional denial of food access to the poor owing to

targeting'. She views diversification as a necessary condition, not a sufficient condition for inferring improvement in welfare at the average level. Using the minimum calorie norm, Patnaik (2007, 2010) also pointed out the methodological problems involved in the official poverty estimates of the country, which diverges from the calorie norm.

1.1.3 Summary of Two Views

The first position understands declining cereals consumption and calorie intake since 1990s as a part of diet diversification, which occurs when per capita income rises. In other words, fall in cereals consumption is perceived vis-à-vis economic progress. The fact of declining total calories, accompanied with the decline in cereals consumption, is conceived as follows. It is argued that the idea of attainment of a given level of calories (fixed as 2400 Kcal for rural areas and 2100 Kcal for urban areas by 1979 the Task Force on Projection of Minimum Needs and Effective Consumption Demand) for a healthier life of a standard individual has become obsolete. A downward revision in this level of calorie is possible with the progress of the economy, because the progress of a society implies an improvement in general health and sanitation situation and a change in physical activity levels in favour of less physical labour. Calorie norm has to be deemed less important, according to this view, also due to its inconsistency with the health outcome indicators.

The second position gives importance to the attainment of minimum calorie norm for a healthy life and cautions over the unscientific reduction of the minimum norm. From this point of view, the decrease in cereal consumption and consequent decline in calorie intake is a matter of concern, especially for the lower income classes whose nutritional level is very low. Pointing out the inadequacy of the argument of voluntary diet diversification, a few studies (viz; Patnaik, 2003, 2007, 2010) have attempted to view the fall in cereals consumption and calorie intake as part of certain macroeconomic changes happened in the economy (declining food availability, fall in the development expenditure of the state, poor growth rate of agriculture etc.) since 1990s, which have become unfavourable to large sections of people in the country.

1.2 Statement of the Problem

The explanation of voluntary diet diversification may be consistent with the experience of falling cereals consumption among certain higher expenditure classes. But it may be inadequate if we extend it to explain the experience among lower expenditure classes because of their nutritional vulnerability and poor living standards. Different expenditure classes have different nutritional status and food consumption pattern. This distinction is vital in validating the notion of diet diversification. In order to recognize these distinctions and related implications, one has to examine the changes in cereals/food grains consumption and consequent changes in calorie intakes according to expenditure classes. This is to identify the classes for whom voluntary diet diversification becomes an appropriate explanation for their change in food grains consumption and for whom the explanation becomes inappropriate.

More than the behavioral factors, there are other factors that influence food grains consumption in India. These are the supply and demand aspects of food grains consumption. Since 1990s, along with the other changes in the economy these factors also have undergone several changes. These changes are suggestive of the transformation happened in the macro food security situation and possibly, this might have influenced the cereals consumption in India. However, the relevance of these factors and its changes after 1990s, have not been utilized adequately in order to understand the recent changes in food grains consumption in India. Given this background, the present study examines the following aspects.

1.3 Objectives of the Study

- 1) To study the trends and pattern of food grains/cereals consumption in India particularly since 1990s in accordance with spatial and class aspects.
- 2) To examine the changes in nutritional intake in India (viz; calorie intake) particularly since 1990s in accordance with spatial and class aspects.

3) To analyse the supply and demand factors that influence food grains/cereals consumption in India.

1.4 Approach of the Study

1.4.1 Understanding the Dynamics of Food Consumption Pattern by Income Classes

The food basket that people consume comprises a mix of commodities, i.e. different types of food. Broadly, this mix of commodities can be categorized as food grains and non-food grains. Food grains refer to cereals and pulses, while non-food grains refer to livestock products, viz; meat, milk and egg, and processed food (for simplicity we don't consider fruits and vegetables in non-food grains category). The demand for former is direct and the demand for latter is indirect in nature. Livestock products are produced via feeding the livestock with food grains, while in the processed food industry food grains often become the input. Hence, human consumption of livestock products and processed food imply indirect consumption of food grains. Therefore, it is clear that demand for food comes from two sources: direct and indirect. So the total demand for food (specifically food grains) is the sum total of direct and indirect demand for food grains.

The relative importance of food grains (direct use) and non-food grains (indirect use) in an individual's food basket are likely to change with a rise in his/her level of income. The income elasticity of food grains (direct use) demand declines, while that of non-food grains (indirect use) increases when per capita income rises. In other words, the individual prefer non-food grains to food grains with an improvement in his/her economic status. This can be viewed as diet diversification and the two principles in this regard are the following;

(i) Bennett's Law:

M.K. Bennett argues that the ratio of starchy-staples (cereals, pulses and root crops) to total food consumed is inversely related to per capita income. When income rises, the ratio of starchy- staples to total food consumed declines; consequently calories derived from them declines as well. To put it in another

way, people prefer dearer sources of calories to cheap sources of calories (starchy- staples) with a rise in per capita income (Grigg, 1996).

(ii) Engel's Law:

According to this principle, the income elasticity of demand for total food declines at higher levels of income. In other words, the proportion of one's budget expended on food declines with rise in income. It is to be noted that the law is no way suggestive of absolute decline in food consumption.

Utilizing these behavioural principles to explain the changing food consumption pattern involves a fallacy of aggregation. This fallacy arises when we overlook the income class hierarchy prevailing in the society and analyzing food consumption pattern disregarding the income differences. Population in any society is a non-homogeneous group consisting of rich and poor, whose food basket (mix of commodities) vary and respond differently to the improvement in their income levels. Cereals being the cheap sources of nutrition, the poor will prefer cereals to non-cereals. Since the nutritional needs of the poor remain unmet, it is reasonable to expect that their cereals consumption will increase with a rise in their income level. In case of poor, Bennett's and Engel's principles are hardly applicable. In contrast to the poor, the relative importance of cereals is less in the food basket of the rich. Since the food needs of the rich are satiated and they have better nutritional status, it is likely that diet diversification will occur in their food basket in favour of more non-cereals, when their income improves. In this case, Bennett's and Engel's principles of food preferences are consistent with the behaviour of the rich. As a matter of fact, it is to be noted that the Bennett's and Engel's laws are conditioned by the attainment of a threshold level of income and nutrition (Streeten, 1995, Grigg, 1996). Grigg (1996) observed the prevalence of '*threshold level of nutrition*' before the turning point (from starchy-staples to livestock products). Studying the FAO data during 1961-63 to 1990-92, he observed that majority of countries with total calorie intake of less than 3000 calories per capita per day in 1990-92 had experienced either an increase or little change in their calorie consumption. Countries with over 3000 calories (mostly developed countries) per capita per day and having a starchy-staple

consumption of less than 1400 calories have registered a decline over the period. Before the thresholds, the experience of declining importance of cheap sources of calories in the food basket can hardly suggest the operation of Bennett's principle.

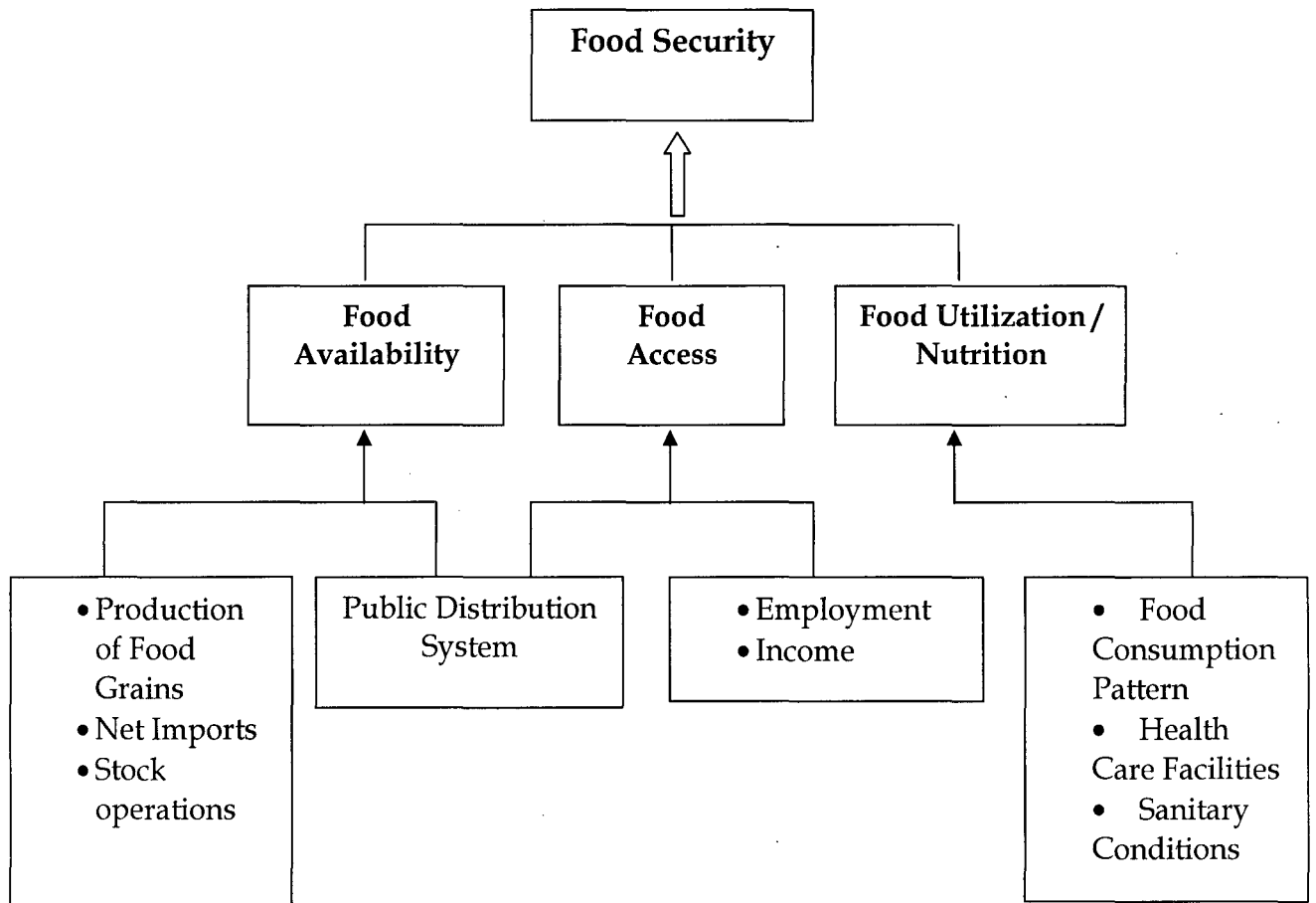
Taking cue from the above understanding, we employ an expenditure class (as a proxy for income) approach to examine the issue of decline in cereals/food grain consumption and consequent changes in levels of nutrition. Such an analysis of the experience of different income/expenditure classes would circumscribe the explanatory expanses of behavioural principles such as Engel's or Bennett's law to certain classes, especially higher expenditure classes. Food security framework, which is suggestive of different supply and demand aspects of food consumption, can widen our understanding of changes in food grains consumption besides the appreciation given by behavioural explanations.

1.4.2 Concept of Food Security and Food Security Framework

Food and Agriculture Organisation (2009)² defines food security as follows- "food security exists when all people, at all times have access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life". By this definition, food security is a broad and complex concept that is determined by agro physical, socioeconomic and biological factors (Chung et al., 1997). The idea of food security, thus, consists of three aspects namely (i) availability of food (ii) access to food (iii) utilization of food. While the aspect of availability is reflective of the food supply condition, the access to food is more or less suggestive of the demand situation prevailing in the economy. Lastly, the utilization of food refers to the nutritional dimension of the issue. These triadic dimensions of food security and its determinants can be surmised in the following frame work (See Figure 1.1).

² The State of Food Insecurity in the World, FAO, 2009

Figure 1.1: A Framework to Understand Food Security



Chung et. al. (1997) have presented these triadic dimensions of food security in a framework. Following their line we have modified the framework so that we can present our case clearly. Food availability is a supply aspect, which presents an idea over total available food in a country for consumption. The most important determinant of food availability in India is the domestic food production³. Besides domestic production, net imports (imports-exports) and changes in the buffer stock of food can also influence food availability. Through Public Distribution System (PDS) food grains are not only supplied, but supplied with subsidies. This gives PDS in India both supply and demand dimensions. Since PDS insulates the lower income classes from the vagaries of market by ensuring the provision of subsidized food grains, the institution of PDS works in a line that makes food grains affordable to the poor. Level of income is the other major

³ Since food grains are the staple food in India, from a food security perspective, by food availability we largely mean food grains availability.

factor that influences food access or food demand of the people. The level of income, in turn, is affected by the level of employment, asset position, wages in case of wage labourers (wages also holds relation with the price of the product in whose production he/she has participated) and prices of the produce in case of producers. Consumed food is utilized by the human body and generates energy and nutrition for pursuing healthy life. In this sense food security implies nutritional security as well and is influenced by the amount and composition of food intake, general health situation, access to health services, general sanitary conditions in which a person lives etc. In short, the framework we presented above is suggestive of the hypothesized casual relationships holding between these various determinants of food security. Hence, food security of any society can be perceived as an outcome of these above mentioned determinants.

Food insecurity can be experienced either in the above three dimensions together or felt in one or two dimension/s alone. For instance, it is quite likely that people experience food insecurity, despite an adequate food availability or supply, owing to the constraints felt from the demand side alone. Similarly, food insecurity can be manifested in nutritional terms alone - in spite of adequate food supply and demand - owing to high morbidity, poor sanitation conditions, unfavourable composition of food consumption basket, lack of access to health services etc. existing in the society. Viewing the issue of hunger using this framework is helpful in identifying the front of food insecurity and suitably targeting them with an objective of ensuring food security.

1.5 Data Sources and Methodology

To analyse the cereals/food grain consumption in India we use National Sample Survey Organisation's (NSSO) major thick sample rounds of Consumption Expenditure Surveys (CES). This study is largely concerned with the changes happened in cereals consumption, with an emphasis on rural India, since 1990s (post-liberalization period) and used unit level data of NSS CES of 50th (1993-94) and 61st (2004-05) rounds. Disaggregated study of regions and expenditure

classes is conducted and analysed for this time period⁴. Nevertheless, we have used NSS consumer expenditure data from 27th (1972-73) and 38th rounds (1983) whenever we examine the long term trends of cereals consumption. Normally NSS consumer expenditure surveys are carried out over an agricultural year (1st July to 30th June) in order to obtain unbiased estimates of averages and to take into account seasonal variations in income and consumption in a monsoon dependent agricultural economy. However, certain CES rounds we consider to understand the long term trends in cereals consumption have not spread over the full agricultural year and this can be source of biasness⁵. They are 27th round and 38th round. The former was conducted during Oct 1972- Sep 1973 and the latter was done during a calendar year (Jan-Dec 1983). But the NSS CES rounds we consider (50th and 61st) to study about the changes in cereals consumption since 1990s are quite comparable and are conducted in agricultural year. Besides, we abstain from the use of NSS CES of 55th round (1999-00) for our comparative analysis, because of changes in the methodology adopted to perform the survey in that particular round which made the round less comparable with the earlier and later rounds of NSS CES⁶.

For examining the changes happened in nutritional intake in India, especially since 1990s, we have used the data from NSSO reports on nutritional intake in India, which is computed on the basis of recent CES. The nutritional intake data we used are based on the 50th and 61st CES rounds. Similar to cereals consumption, to learn about the long term changes in nutritional intake we consider the nutritional data based on NSS 27th and 38th rounds CES. To

⁴ The data on cereals consumption for Uttar Pradesh, Madhya Pradesh and Bihar during 2004-05 includes Uttaranchal, Chattisgarh and Jharkhand respectively.

⁵ Despite these non-sampling errors NSS data is reliable and accurate because of its less sampling errors. The sampling errors of the NSS estimates of private consumption are very small at all India level, since the estimates are based on very large samples. "Even at the state level, the relative standard errors of total expenditure in bigger states vary between 2 and 3 per cent; whereas for expenditure on food the relative standard errors are less than 2 per cent" (Minhas, 2005).

⁶ "Official estimates before 55th round were based on data using uniform 30 day reference period for all items (URP). But no URP estimates are available from 55th round.....The resulting 30-365 days mixed reference period (MRP) is not comparable to URP of previous rounds" (Sen, and Himanshu, 2004).

understand the factors influencing cereals consumption in India, we consider various supply and demand aspects of food security in the country, which we have obtained from multiple sources. Cereals production figures are obtained from Agricultural Statistics at Glance, published by Directorate of Economics and Statistics, Department of Agriculture and Cooperation, Ministry of Agriculture; population figures are obtained from Statistical Abstract India published by CSO and Population Projections published by Census India. Various Issues of Economic Survey is also used for obtaining data, particularly in regard to food grains availability and food policies. For the figures on employment we have used the data from thick sample rounds of NSS of Employment and Unemployment Surveys. Data pertaining to wage and real wage rates are computed using the Rural Labour Enquiry Reports. The rest of the data sources we used in this study are mentioned in the respective chapters.

We have used comparative analysis to conceive the food security in India. Different statistical tools are also employed in the analysis, which we described in the respective chapters. While analyzing the regional disparity in cereals consumption in India, we have used a linear multiple regression method to single out the important factors influencing cereals consumption in India. The method is explained in detail in the chapter.

1.6 Structure of the Study

In chapter 2, we examine the trends in cereals consumption in post liberalization period, according to expenditure classes. In chapter 3, we analyse the changes in nutritional status of people that accompanies the changes in cereals consumption. Chapter 4 and 5 are attempts to explain the changes in cereals consumption. For that purpose, in chapter 4 we explore the changes happened in food grain supply and distribution situation in the economy in post liberalization era. In chapter 5, we seek explanation from demand side as well. Also in that chapter we study the regional disparity in cereals consumption in India during 2004-05 and its proximate determinants. Chapter 6 concludes the study.

CHAPTER 2

TRENDS AND PATTERN OF CEREALS CONSUMPTION IN INDIA

Cereals are the staple food of Indian population. Data shows that cereals consumption has been undergoing change in India. Due to the nutritional significance of cereals, the changes in cereals consumption have also become an important area of attention. According to Bennett's law, when income increases people prefer dearer sources of calories to cheap sources of calories. At first, the shift takes place within cereals category, from coarse grains to fine grains and later on the shift is from cereals to non-cereals. In this chapter we examine the changes happened in food grains/cereals consumption basket in India, since 1990, across different expenditure classes. Later in the next chapter (chapter 3) we analyse the nutritional implications of this change.

In section 2.2 we broadly present the importance of food grains/cereals in Indian food basket. The regional picture of the recent changes happened in the consumption of cereals is examined in section 2.3. Following this, in section 2.4 we study the class aspects of this change.

2.1 Significance of Cereals/Food Grains in Indian Diet

Food grains/Cereals security has often become a synonym to food security in Indian context (Chand, 2005) owing to its importance in Indian food basket. In terms of share in total food expenditure and contribution to total calorie intake, cereals hold a vital role in Indian diet.

Table 2.1: Importance of Cereals in Indian Food Basket (All India)

(in per cent)

Sectors	Share of Cereals Expenditure in Total Food Expenditure		Share of Cereals Calorie in Total Calorie Intake	
	1993-94	2004-05	1993-94	2004-05
Rural	38.32	32.72	71.01	67.54
Urban	25.68	23.66	58.52	56.08

Source: NSSO Report on Level and Pattern of Consumer Expenditure, 50th and 61st round

In 1993-94, in rural India, out of total food expenditure nearly 38 per cent was expended on cereals by an average Indian; in urban areas the share of cereals

expenditure in total food expenditure was 25 per cent in the same period. While examining the contribution of cereals to total calories, its significance will be more evident. For an average rural Indian, cereals contributed almost 70 per cent of the total calories during 1993-94. In case of an urban Indian, the cereals contribution to total calories was 58 per cent in the same period. However, over the past one decade, we observe a decline in the importance of cereals in rural and urban areas, both in terms of share of cereals expenditure in total food expenditure and the share of cereals in total calorie intake (Table 2.1). Yet in rural and urban India, they contribute more than half of the total energy.

The relative importance of cereals in total food expenditure and total calorie varies at the state level¹. In rural areas of Gujarat, Haryana, Punjab and Kerala, during 2004-05, the share of cereals expenditure is not more than one fourth of total food expenditure. But in other rural Indian states, the cereals expenditure share is more than one third of total food expenditure in the period. In states where relative importance of cereals is less in total food expenditure, their contribution to total calories is also less. Although the share of cereals expenditure in total food expenditure is coming down in all states during 2004-05 in comparison to 1993-94, the share of cereals contribution of calories remain fairly substantial.

2.2 Trends in Direct Consumption of Cereals: Spatial Aspect

Looking at the recent past, since 1972-73, we could observe that the per capita direct consumption for cereals has been on decline both in rural and urban areas. In rural India, in majority of states there was a secular decline in cereal consumption since 1983, except for Kerala, Orissa and West Bengal, where cereal consumption started declining only from 1993 onwards. In urban India across all states, we observe a decline in cereal consumption since 1983 itself and the trend continued in the decade of 1990s as well.

High amount of cereals consumption in rural areas in the 1970s is associated with wide interstate disparity as reflected by the Co-efficient of Variation (CV). As it

¹ See Appendix I Tables Nos. A1.1 and A1.2

can be seen from Table 2.2, in states like Rajasthan, Haryana, cereals consumption was high (18.17 and 17.57 respectively), whereas in the case of some other states for example in Kerala it was minimal (7.97). In the 1980s, a more equitable trend can be noticed. This trend is more or less true for urban areas also. Afterwards, both in rural and urban areas inter-state variation is again increasing.

Table 2.2: Total Cereal Consumption in India
(in kg per capita per month)

States	Rural				Urban			
	1972-73	1983	1993-94	2004-05	1972-73	1983	1993-94	2004-05
Andhra Pradesh	15.25	15.37	13.27	12.06	12.68	11.95	11.3	10.51
Assam	14.81	14.23	13.17	13.04	12.55	12.78	12.05	11.92
Bihar	15.58	15.77	14.31	13.28	13.49	13.44	12.82	12.72
Gujarat	13.32	12.56	10.66	10.06	10.77	9.61	8.96	8.29
Haryana	17.57	14.54	12.92	10.65	11.86	11.59	10.46	9.15
Karnataka	15.63	15.03	13.15	10.73	11.32	11.69	10.87	9.71
Kerala	7.97	10.01	10.11	9.53	8.17	10.12	9.46	8.83
Madhya Pradesh	17.28	15.83	14.2	11.76	12.88	12.32	11.32	10.35
Maharashtra	12.6	13.79	11.39	10.5	8.95	9.95	9.37	8.39
Orissa	15.22	15.61	15.93	14.16	13.77	14.19	13.36	12.92
Punjab	15.38	13.52	10.78	9.92	10.71	9.94	9.01	9.01
Rajasthan	18.17	17.19	14.85	12.69	13.21	12.95	11.52	10.84
Tamil Nadu	14.53	13.05	11.72	10.89	11.12	10.39	10.05	9.48
Uttar Pradesh	16.83	15.47	13.91	13.13	12.24	11.66	11.08	11.62
West Bengal	13.64	14.28	14.96	13.19	10.53	11.8	11.64	10.38
All India	15.26	14.8	13.4	12.12	11.24	11.3	10.63	9.94
CV in %	16.05	11.52	12.99	12.17	13.53	11.60	11.90	14.11

Source: NSSO Reports on Level and Pattern of Consumer Expenditure, Various Rounds

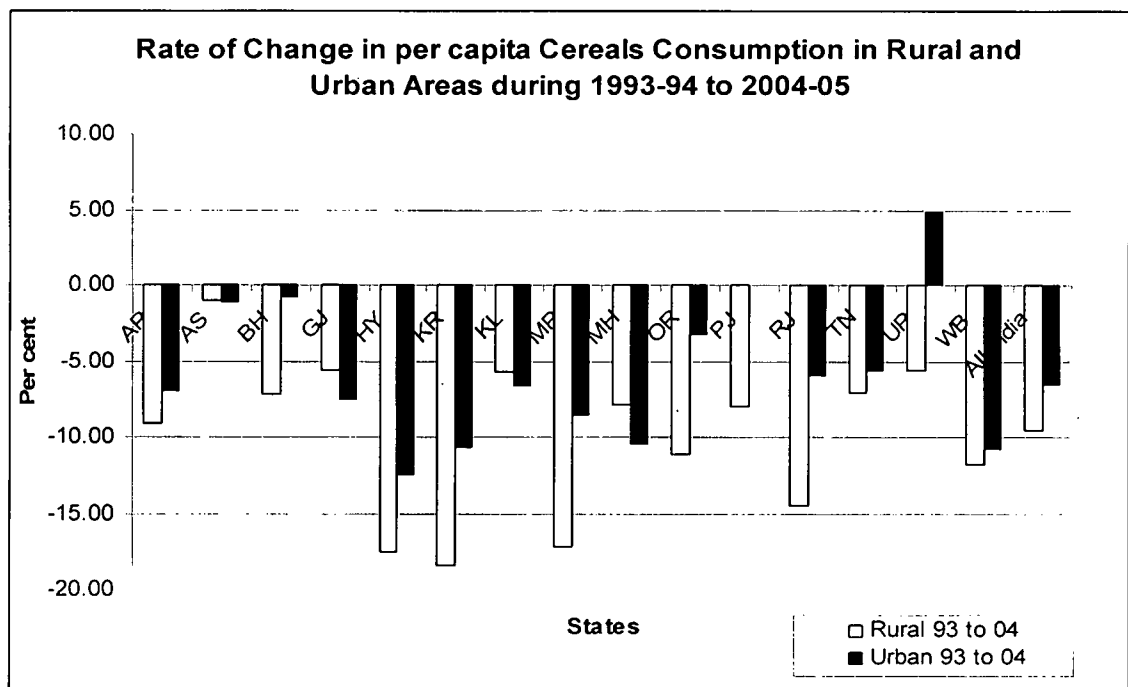
Table 2.3: Rural - Urban Disparity in Cereal Consumption

States	1972-73	1983	1993-94	2004-05
Andhra Pradesh	1.20	1.29	1.17	1.15
Assam	1.18	1.11	1.09	1.09
Bihar	1.15	1.17	1.12	1.04
Gujarat	1.24	1.31	1.19	1.21
Haryana	1.48	1.25	1.24	1.16
Karnataka	1.38	1.29	1.21	1.11
Kerala	0.98	0.99	1.07	1.08
Madhya Pradesh	1.34	1.28	1.25	1.14
Maharashtra	1.41	1.39	1.22	1.25
Orissa	1.11	1.10	1.19	1.10
Punjab	1.44	1.36	1.20	1.10
Rajasthan	1.38	1.33	1.29	1.17
Tamil Nadu	1.31	1.26	1.17	1.15
Uttar Pradesh	1.38	1.33	1.26	1.13
West Bengal	1.30	1.21	1.29	1.27
All India	1.36	1.31	1.26	1.22

Note: Disparity is measured by taking the ratio of rural and urban quantity consumption of cereals
Source: NSSO Reports on Level and Pattern of Consumer Expenditure, Various Rounds

In order to understand the rural-urban disparity in cereals consumption, we have calculated the ratio of rural and urban quantity consumption of cereals, which is shown in Table 2.3. It is evident that the rural - urban disparity in cereals consumption has been declining since 1980s. This ratio was 1.36 in 1980s and which declined to 1.26 in 1990s and then to 1.22 in 2004-05. This may be due the fact that rural areas consumption declined faster than that of urban areas. In order to understand it clearly, we have calculated the growth rate of cereal consumption in rural and urban areas separately.

Figure 2.1: Rate of Change in per capita Cereals Consumption in Rural and Urban Areas during 1993-94 to 2004-05



Source: Depicted Using the NSSO Reports on Level and Pattern of Consumer Expenditure, Various Rounds

From the figure 2.1, it is very clear that the decline in rural areas is greater than the decline in urban areas in majority of the states. Only in Assam, Gujarat and Kerala the decline in urban consumption is greater. The rural decline in cereals consumption is significantly high in states like Bihar, Karnataka, Madhya Pradesh, Orissa, Punjab, Rajasthan and Uttar Pradesh in comparison to the their respective urban areas. Owing to the larger decline felt in rural areas than the urban, a particular attention is given to the happenings in rural areas in regard to cereals and energy consumption in our further analysis, though we illustrate the changes in urban areas as well.

2.2.1 Composition of Cereal Basket: Spatial Aspect

The shift towards expensive sources of energy and nutrition, according to Bennett's law, in fact, initiates within the cereals basket. Afterwards only, it works as a shift between cereals and non-cereals. Food grains/cereals are broadly classified into two: superior/fine and inferior/coarse grains. Rice and wheat are finer varieties and constitute superior cereals and they are the expensive sources of nutrition. Maize, bajra, jowar, ragi, barley and small millets are coarse cereals and are the cheap sources of nutrition². With the improvement in the standard of living, the shift in diet, at first, works as a shift from coarse grains to finer grains. Here our attempt is to examine the changes occurred in the composition of cereal basket in order to understand the shift occurred within the cereals basket.

Table 2.4: Composition of Cereal Basket in Rural and Urban (All India)

Share of Different Cereals	Rural (in per cent)			Urban (in per cent)		
	1983	1993-94	2004-05	1983	1993-94	2004-05
Rice	44.80	52.39	54.04	47.50	49.67	48.79
Wheat	30.14	32.84	35.40	43.04	44.40	46.78
Coarse	25.07	14.78	10.56	9.46	5.93	4.43
Total	100	100	100	100	100	100

Source: NSSO Reports on Level and Pattern of Consumer Expenditure, Various Rounds

From Table 2.4 it is clear that the share of superior cereals is rising and share of coarse cereals is declining in total cereal basket for the last three decades, both in rural and urban areas. Fall in the share of coarse cereals is notable in rural areas, where they constituted one-fourth of total cereal intake in the year 1983 (Table 2.4). However in absolute terms, in rural, the consumption of rice declined by 2004-05 and that of wheat remained more or less constant; while coarse cereal consumption showed a significant reduction, especially in rural areas (See Table 2.5). In almost all states, the reduction in coarse cereal consumption is inadequately compensated by a marginal rise in the consumption of either rice or wheat. As a result total cereals consumption has declined in those states. This is evident in those states where coarse cereals used to be one of the major staple diet; especially in Gujarat, Karnataka, Madhya Pradesh, Maharashtra and

² Coarse cereals are as calorie-rich as superior cereals. For instance while jowar gives 3490 Kcal per kg, rice gives 3460 Kcal per kg. The calorie content per kilo gram of maize is 3420 Kcal, barley is 3360 Kcal and ragi is 3280 Kcal (Nutritional Chart, NSSO Report No. 513)

Rajasthan. In other states, the fall in total cereal consumption is owing to a decline, if not large, in superior cereal consumption.

Table 2.5: Composition of Cereal Basket in Rural India
(in kg per capita per month)

States	Rice			Wheat			Coarse Cereals		
	1983	1993-94	2004-05	1983	1993-94	2004-05	1983	1993-94	2004-05
Andhra Pradesh	11.79	11.57	11.06	0.12	0.19	0.28	3.46	1.51	0.72
Assam	13.56	12.53	12.43	0.67	0.64	0.61	0	0	0
Bihar	8.99	7.95	7.2	5.3	5.58	5.45	1.48	0.78	0.51
Gujarat	1.93	2.01	2.03	2.81	3.98	3.66	7.82	4.67	4.38
Karnataka	5.32	5.44	5.31	0.53	0.85	1.02	9.18	6.86	4.4
Kerala	9.4	9.29	8.61	0.61	0.82	0.92	0	0	0
Madhya Pradesh	6.41	6.03	2.31	5.4	5.81	7.66	4.02	2.36	1.79
Maharashtra	2.69	2.97	2.97	1.59	2.21	3.41	9.42	6.21	4.12
Orissa	13.8	15.24	13.29	1.08	0.38	0.53	0.73	0.31	0.16
Punjab	0.99	0.74	0.76	11.63	9.87	8.99	0.9	0.17	0.24
Rajasthan	0.29	0.22	0.18	7.6	9.44	8.5	9.3	5.19	4.01
Tamil Nadu	8.6	10.32	10.17	0.41	0.34	0.34	4.05	1.06	0.39
Uttar Pradesh	3.82	4	4.09	10.2	9.16	8.6	1.45	0.75	0.22
West Bengal	11.73	13.73	12.21	2.45	1.18	0.98	0.1	0.05	0
All India	6.63	7.02	6.55	4.46	4.4	4.29	3.71	1.98	1.28

Source: NSSO Reports on Level and Pattern of Consumer Expenditure, Various Rounds

The reduced rural consumption for cereals in Andhra Pradesh, Karnataka, Tamil Nadu, Maharashtra, Madhya Pradesh, Gujarat and Rajasthan is largely due to the diminished consumption of coarse cereals. A notable decline in rice consumption is observed in Kerala, Bihar and Madhya Pradesh. In West Bengal, Uttar Pradesh, and Punjab, the shortfall in rural consumption of cereals is due to the decline in wheat consumption.

In most of the Southern and Eastern states- where rice has been the dominant item in diet- rice consumption either declined or remained stagnant. Only in Tamil Nadu, rice consumption increased in 2004-05 in comparison to 1993-94. While in central region (and in some parts of Andhra Pradesh and Karnataka) - where coarse cereals have been prominent in the diet- consumption of coarse cereals has diminished substantially. Though wheat consumption in central region has increased it was not able to offset the fall in coarse cereal consumption and consequently there was a fall in total direct food grain consumption. The decline in coarse cereals is a major contributing factor behind the fall in total consumption of cereals in most of the Indian states.

Coarse cereals are grown mainly for self consumption by subsistence farmers. In recent times the production and distribution of coarse cereals have largely been impaired in coarse cereals producing regions. In Karnataka, commercial crops divert land from coarse cereals and it entails a shortfall in production there (Rao and Deshpande, 2003). In distributional front, Public Distribution System (PDS) supplies only commodities that are likely to be consumed by the poor, not the commodities that are historically preferred by local people (Sarap and Mahamallik, 2003). Larger demand for coarse cereals, which are often local staples, comes from the poor and its exclusion from PDS could possibly affect them. The reduced availability of coarse cereals, higher absolute prices of superior cereals (Suryanarayana, 1997), exclusion of coarse cereals from PDS, lowering gap between open market price and PDS issue price, poor quality of grains distributed through PDS, reduced distribution of grains through PDS due to leakages, government policies etc. (Nair, 2000, Indrakant and Harikishan, 2003) together might have reduced the total consumption of cereals.

In short, at all India level for aggregate population, we observed that coarse cereals consumption declines and superior cereals consumption doesn't increase substantially to offset the reduction in coarse cereals consumption. As a result the total cereals consumption comes down and the trend is less suggestive of a shift within the cereals basket.

2.3 Trends in Direct Consumption of Cereals: Class Aspect

In this section our attempt is to examine the above aggregate picture at disaggregated level across different expenditure classes, because of the distinction involved in food preferences across different income groups. For instance, the consumption of superior cereals (rice and wheat) is positively related to the level of consumption expenditure; i.e. greater quantities of superior cereals are consumed by people at higher levels of consumption expenditure. While the consumption of coarse cereals is negatively related to the level of consumption expenditure: i.e. coarse cereals are preferred by people at lower

expenditure classes.³. Considering cereals basket as a whole, its consumption is positively associated with the levels of expenditure.

Table 2.6: Rate of Change in Cereal Consumption across Expenditure Classes during 1993-94 to 2004-05 (Rural)

(in per cent)

States	Bottom 20 per cent	20-40 per cent	40-60 per cent	60-80 per cent	Top 20 per cent
Andhra Pradesh	5.47	-5.69	-6.98	-13.52	-13.98
Assam	9.00	1.17	-4.47	-6.11	-8.63
Bihar	-0.08	-14.60	-15.91	-16.78	-22.73
Gujarat	11.77	2.48	-4.87	-13.62	-18.68
Karnataka	2.62	-16.07	-21.89	-27.48	-26.81
Kerala	17.84	0.60	1.33	-4.34	-10.69
Madhya Pradesh	0.81	-12.56	-17.88	-23.09	-24.55
Maharashtra	2.17	-7.79	-8.71	-12.40	-22.52
Orissa	-5.86	-12.73	-16.90	-17.14	-17.37
Punjab	9.64	3.93	-2.55	-6.11	-11.20
Rajasthan	4.36	-8.87	-15.88	-19.73	-19.94
Tamil Nadu	16.99	-4.05	-11.10	-15.79	-17.83
Uttar Pradesh	4.05	-7.33	-11.07	-15.40	-16.12
West Bengal	-1.92	-11.83	-12.64	-12.75	-16.15
All India	2.36	-8.65	-10.94	-12.84	-15.52

Source: Computed from NSSO unit level data for 50th and 61st rounds Consumer Expenditure Survey

Note: Please also see Appendix I Table No. A1.4 for details on absolute numbers

In order to give emphasis on income levels and consumption pattern, we calculated cereals consumption across monthly per capita expenditure (MPCE) classes during the last one decade. From the Table 2.6, it is very clear that people at higher expenditure classes reduced their cereal consumption much more than that of the reduction made by lower expenditure classes. However, in sharp contrast to the experience of other expenditure classes, we observe an increase in the cereal consumption among bottom 20 per cent of the population in majority of the Indian states. Only in Bihar, Orissa, West Bengal and Madhya Pradesh cereal consumption has either declined or stagnated among bottom 20 per cent. Having observed an increase in the cereal consumption among bottom expenditure groups; then it is evident that the general decline of cereals consumption at average level is very likely due to the reduced cereal consumption of higher expenditure classes. At all India level, while bottom 20 per cent have raised their cereal consumption by 2.36 per cent within a decade,

³ See Appendix I Table No. A1.3

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higher expenditure classes have reduced their cereal consumption by 8.65 per cent, 10.94 per cent, 12.84 per cent and 15.52 per cent respectively (Table 2.6). As we move to the higher MPCE classes, we observe an increase in the rate of decline in cereal consumption. Among the term 'higher expenditure classes' we include certain lower expenditure classes just above bottom 20 per cent, viz. 20 to 40 per cent, as well. We find that their total cereals consumption is also declining and it is a matter of concern because that may reduce their nutritional intakes, which is already at low levels⁴. Also, the increased cereals intake of bottom 20 per cent is not necessarily a matter of relief. This would be clear when we analyse their nutritional status also. Besides that, it is to be noted that even after the greater reduction in cereals consumption, higher expenditure classes are still consuming higher quantities of cereals⁵.

2.3.1 Composition of Cereal Basket in Rural India: Class Aspect⁶

Having seen the changes in total cereals consumption across quintile classes, we shall examine the changes that happened in the composition of cereal basket across these classes.

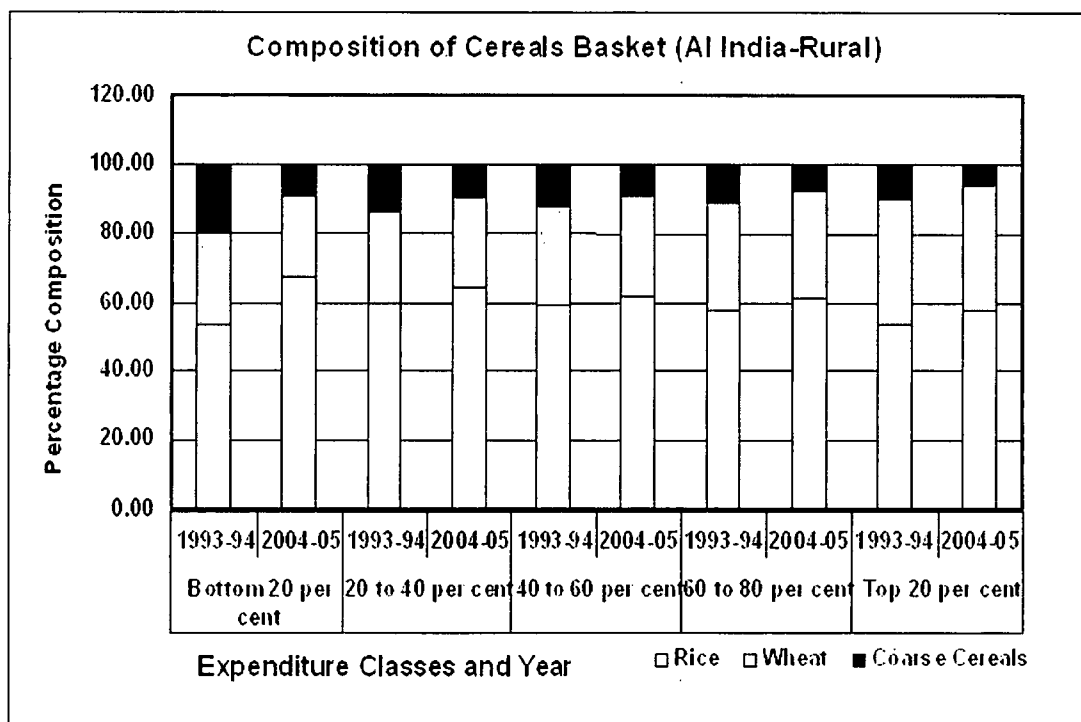
From the figure 2.2, it can be seen that in both periods, in total cereals basket across all classes the share of rice is much higher; more than 50 per cent. Wheat comes next and coarse cereals occupy the remaining portion across all the MPCE classes. The data shows that the share of rice consumption has increased across all classes, especially for bottom 20 per cent. But the share of wheat almost stagnated across all classes, except for the bottom 20 per cent; for them it declined. Also it is very evident from the figure 2.2 that, during the past one decade, the share of coarse cereals in total cereal basket has reduced across all expenditure classes. And the reduction is quite large in bottom 20 per cent, who consume relatively large amounts of coarse cereals.

⁴ We elaborate this point in chapter 3

⁵ See Appendix I Table No. A1.4

⁶ The data used to form this section is presented in Appendix I Table No. A1.3

Figure 2.2: Percentage Composition of Cereals Basket across Expenditure Classes (All India-Rural)



Source: Depicted using the data from NSSO unit level for 50th and 61st rounds of Consumer Expenditure

In addition to the changes depicted regarding the share of different cereals, we have also examined the changes happened in the absolute level of different cereals consumed across different expenditure classes⁷.

Rice eaters in India are largely located in the Southern and Eastern parts, where rice constitutes more than half of the cereal basket. In Andhra Pradesh, Kerala, Tamil Nadu, Orissa, Assam and West Bengal, rice constitutes nearly 90 per cent of total cereal intake⁸. Since 1993-94, in Tamil Nadu and Assam, people at bottom 20 per cent and 20 to 40 per cent expenditure classes have increased their rice consumption. But in Andhra Pradesh, Kerala and Bihar, rice consumption has increased only among bottom 20 per cent of people. In the same class, rice consumption has stagnated in West Bengal and declined in Orissa. Excluding these rising trends, rice consumption has either stagnated or declined in higher expenditure classes in these Southern and Eastern Indian states.

⁷ See Appendix Table I No. A1.3

⁸ See Appendix Table I No. A1.5

The predominant cereal type consumed in Western and North-Western regions, and some extent in Central Region, is wheat. In Haryana and Punjab, its share in total cereal diet is not less than 90 per cent, whereas in Gujarat, Rajasthan, Bihar and Uttar Pradesh it constitutes more than 40 per cent⁹. In Madhya Pradesh and Maharashtra, apart from rice, wheat is also an important cereal for consumption. In Gujarat, Maharashtra and Madhya Pradesh, people at bottom 20 per cent and 20 to 40 per cent classes have raised their wheat consumption. But in Punjab and Rajasthan, its' consumption has increased only among bottom 20 per cent class. In Uttar Pradesh, Haryana and Bihar wheat consumption either declined or stagnated among bottom 20 per cent expenditure class. In other higher expenditure classes, in all these states, wheat consumption showed a clear trend of decline. In other states, especially Southern and Eastern states, where wheat consumption is trivial, the demand for wheat from poor class remained more or less constant.

As we mentioned earlier, coarse or inferior cereals are considered to be the grains largely consumed by poorer sections. Unlike rice and wheat, the consumption of coarse cereals is negatively related to level of income. In other words, people who survive at lower levels of expenditure, consumes greater quantity of coarse cereals. This picture is discernible in coarse cereals consuming states of India, viz, Gujarat, Rajasthan, Maharashtra, Madhya Pradesh and Karnataka. Here, nearly 50 per cent of the cereal diet is catered by coarse cereals¹⁰. A little importance for coarse cereal consumption can be seen in states like Andhra Pradesh, and Tamil Nadu. In all these states, coarse cereals consumption has diminished since 1993-94 among all quintile expenditure classes. The decline is sharp in Karnataka and Maharashtra.

In a nutshell, we can say that, since 1993-94, the rise in the total cereal consumption among bottom 20 per cent in majority of Indian states is due to the increase in their superior cereals consumption. But, among bottom 20 per cent, total cereals consumption has declined in Bihar, Orissa and West Bengal,

⁹ See Appendix I Table No. A1.5

¹⁰ See Appendix I Table No. A1.5

stagnated in Madhya Pradesh and registered a small rise of 2 per cent in Maharashtra and Karnataka. In Madhya Pradesh, Maharashtra and Karnataka - the coarse cereals consuming states - this decline in total cereal consumption has occurred due to the greater fall in coarse cereals consumption, which was not offset by either a marginal rise or constancy in the consumption of superior cereals. Similarly in West Bengal, Orissa and Bihar - the rice and wheat consuming regions - the fall in total cereals consumption among bottom 20 per cent is owing to the stagnancy or decline in the consumption of their respective habituated cereal. For other higher expenditure classes, in every state, it is very clear that the decline in their total cereal consumption is due to the fall in the absolute consumption of rice and wheat because the relative importance of coarse cereals is very low in their diet. Though we subsumed 20 to 40 per cent expenditure class - the class next to bottom 20 per cent and whose nutritional status is also at risk - in a single category of 'other higher expenditure classes', we need to pay particular attention to the trends in their food grain consumption owing to their vulnerability towards undernourishment. From the above analysis, we found that the absolute consumption of both superior and inferior cereals of this class have been falling in almost all states in India, with certain exceptions. This may impair their nutritional status and make them undernourished. Although a decline in cereals consumption and calorie intake is felt among higher expenditure classes, unlike bottom 20 per cent and 20 to 40 per cent, their calorie intake may still be at required level and this will keep them nutritionally secure. Implications of changes in cereals consumption on nutritional front are necessary for a normative appraisal regarding recent shift in food consumption in India and is carried out in chapter 3.

2.3.2 Cereal Consumption across Occupational Groups in Rural India

Agricultural labourers in rural areas and casual labourers in urban areas are considered to be the backward sections among different occupational groups. They are drawn mostly from the socially and economically deprived sections of these areas and hence they are disadvantaged and vulnerable. Majority of them are small and marginal landholders and they may become wage labourers often

due to failure of monsoon or due to poor quality of their small piece of land that do not yield them enough to sustain the household (Unni, 2007). Similarly there are evidences of increasing casualisation of work in urban areas since liberalization also. The following Table 2.7 represents the consumption of food grains/cereals of people belonging to these occupational categories, especially in rural areas.

Table 2.7: Consumption of Food Grains in Different Occupational Groups (Rural)
(in kg per capita per month)

States	Agricultural Labour			Other Rural Labour			Self Employed In Agriculture		
	1983	1993-94	2004-05	1983	1993-94	2004-05	1983	1993-94	2004-05
Andhra Pradesh	15.11	13.31	12.58	14.19	12.79	12.03	16.76	14.80	13.20
Assam	13.18	12.55	13.06	12.31	11.68	12.72	14.88	13.90	13.29
Bihar	14.76	14.16	12.86	14.11	13.66	12.72	16.96	15.70	13.71
Gujarat	12.08	10.79	10.63	12.16	10.28	10.02	13.47	11.87	10.62
Haryana	14.19	11.45	10.36	12.86	12.89	10.45	15.33	14.51	11.32
Karnataka	14.26	13.04	11.00	13.15	11.70	10.73	16.41	14.98	11.45
Kerala	9.26	9.93	9.92	8.84	9.59	9.39	11.14	11.30	11.00
Madhya Pradesh	15.21	14.21	12.47	14.93	14.02	12.25	16.34	15.20	13.07
Maharashtra	13.56	11.61	10.84	12.31	11.03	10.13	14.88	12.38	11.04
Orissa	14.58	15.96	13.93	15.1	15.47	13.30	16.17	17.04	14.64
Punjab	12.4	10.48	9.80	11.95	10.61	9.54	15.02	12.00	11.06
Rajasthan	16.42	14.61	12.53	17.09	14.66	12.75	17.64	16.03	13.31
Tamil Nadu	12.65	12.27	11.48	12.07	11.70	11.03	14.92	13.72	12.07
Uttar Pradesh	14.83	13.80	12.61	13.75	13.64	12.70	16.05	14.95	13.41
West Bengal	12.44	14.86	13.10	12.9	13.57	12.88	16.92	16.73	14.25
All India	13.77	13.25	12.03	12.84	12.46	11.54	15.91	14.71	13.02

Source: Depicted using the data from NSSO unit level for 50th and 61st rounds of Consumer Expenditure

It is fairly clear that, in comparison to 1983, at all India level, an average agricultural labourer reduced his/her monthly consumption of cereals from 13.77 kg to 12.03 kg by 2004-05. Larger decline was felt in states like Haryana, Punjab, Rajasthan, Madhya Pradesh, Maharashtra and Karnataka. While in Assam, Orissa and Kerala, the cereal consumption hasn't shown much decline. In the categories of self-employed and other rural labour also, the per capita consumption of cereals has diminished by 2004-05 in almost all states. We observe that it is in the category of self-employed in agriculture, the decline of cereals consumption is larger. At all India level, while agricultural and other rural labour have made nearly 1.74 kg and 1.30 kg reduction respectively in their

cereal consumption, self-employed in agriculture has made a reduction of nearly 3 kg of cereals per month.

2.4 Summary

This chapter attempted to learn the spatial and class aspect of direct consumption of food grains/cereals in India, especially after liberalization during post -1990s. Our study shows that both rural and urban cereals consumption has declined; but the decline in the former is greater than that of the latter. This larger reduction in rural consumption reduced the cereals consumption disparity between rural and urban areas. However the regional inequality in cereals consumption among states in rural and urban areas hasn't shown any clear sign of reduction.

In rural India, the share of rice and wheat in the cereal basket has increased since 1983. But in absolute terms, their consumption has not increased notably, especially after 1990s. On the contrary, coarse cereal consumption recorded considerable decline in rural India. In Central Indian states, the overall decline in total cereals consumption is due to the absolute reduction in the coarse cereals consumption. In Southern, Eastern and North-Western states, the absolute consumption of superior cereals has not shown notable increase during the last decade. Consequently, the total cereals consumption has fallen in those states. Among occupational categories in rural India, agricultural and other rural labourers have lesser quantities of cereal consumption. But over time, the larger decline in cereal consumption is experienced among self employed people.

One of the prime concerns of our study is to identify the expenditure class/es that experienced reduction in cereals consumption. The study shows that the fall in cereals consumption has experienced in higher expenditure classes, rather than bottom 20 per cent expenditure class. In bottom 20 per cent, cereals consumption has, in fact, increased in almost all states. But, it declined in Bihar, Orissa and West Bengal, stagnated in Madhya Pradesh and registered a small rise of 2 per cent in Maharashtra and Karnataka. It is alarming to know that, 20 to 40 per cent expenditure class - a lower expenditure class, just above bottom 20 per cent class -has also reduced their cereals consumption in almost all states since 1990. These changes in cereals consumption have important nutritional implications, which often make people at lower rungs of the expenditure classes calorie or protein deficient and we examined those issues in chapter 3.

CHAPTER 3

STATE OF NUTRITIONAL INTAKE IN INDIA

Human body requires regular supply of energy for performing different activities, voluntary as well as involuntary. The energy need is dependent on the amount required for (i) internal body process (ii) growth of the body (iii) daily activities and (iv) utilization of food (McDivitt, M.E. and Mudambi, S.R., 1973). This energy requirement is met through the daily consumption of food, which provides human body with essential macro and micro nutrients. Carbohydrates, proteins¹ and fats² are the major macronutrients that supply bulk of energy to the human body. Proteins normally supply 10 - 12 per cent of total energy; it is also desirable that the energy from the fat should not exceed 30 per cent and the rest may be derived from carbohydrates (NSSO Report No. 513, 2004-05). Cereals being the rich and cheap source of carbohydrates and proteins, people in India mostly prefer cereals for obtaining adequate energy³. In 2004-05, in rural India nearly 70 per cent and in urban areas nearly 56 per cent of the total energy is obtained from cereals. Hence it is very likely that changes in cereal consumption will affect the levels of calorie intake in such a way that a decline in former will effect a decline in latter and vice versa. In this chapter we examine the changes occurred in total calorie intake, especially since 1990s when the average cereal consumption registered a declining trend, and its implications.

In the subsequent section, we will be examining the association between cereals consumption and calorie intake, the spatial and class aspect of macronutrient intakes in India, especially calories, over time.

¹ Though proteins provide energy, its primary function is to provide amino acids for building and repairing body tissues.

² Besides being a concentrated source of energy, fats play an important role in regulating the metabolic activities of human body and help in the utilization of macronutrients.

³ The quantitative food requirements are usually estimated in terms of energy. The unit of measuring energy is calories, which is the amount of heat necessary to raise the temperature of one kg of water by 1 °C from 14.5 °C to 15.5 °C (NSSO Report No. 513).

3.1 Association between Cereal Consumption and Total Calorie Intake

Since cereals contribute bulk of the energy consumed by an average Indian, any decline in cereal consumption can bring about a decline in total calorie intake, unless it is offset by adequate calorie intake from non-cereal consumption. Generally we can expect a positive association between per capita cereals consumption and per capita total calorie intake. For instance, states that consume higher levels of cereals have higher levels of calorie intake and vice versa. This section is devoted to seek the existing association between these two variables in India.

Table 3.1: State Level Association between Cereal Consumption and Total Calorie Intake in 2004-05

Rural			
Categories		Per capita Cereal Consumption	
		Below*	Above*
Per capita Total Calorie Intake per diem	Below*	GJ,MH, KR, KL, TN	AP, MP, OR
	Above*	HY, PJ	AS, BH, WB, RJ, UP
Urban			
Categories		Per capita Cereal Consumption	
		Below*	Above*
Per capita Total Calorie Intake per diem	Below*	GJ,MH, KR, KL, TN	AP, MP, WB
	Above*	HY, PJ	AS, BH, OR, RJ, UP

Note: Below and Above* mean below and above the national average of corresponding variables*

Source: Formed using the data from NSSO reports on level of consumer expenditure and nutritional intake in India (NSSO report no. 508 and 513)

From the table 3.1 it can be seen that most of the states in both rural and urban India follow our expected positive association between cereals consumption and total calorie intake. It implies that states whose per capita cereal consumption is above/below the national average of cereals consumption have total calorie intake above/below the national average of calorie intake as well. Most of the South and Central Indian states are below the national average; whereas most of the North-Western and Eastern Indian states are above the national average. A few states are seemed to be exceptions to this general association. In Haryana and Punjab (both rural and urban), though cereals consumption is below the national average, their total calorie intake is above the national average. On the contrary, Andhra Pradesh, Madhya Pradesh, Orissa (only in rural areas) and West Bengal

(only in urban areas) have above the national average level of cereals consumption, but are placed at below the national average category as far as total calorie intake is concerned. A correlation exercise is conducted to examine this positive association between cereals consumption and total calorie intake in detail.

Table 3.2: Correlation between per capita Cereal Consumption and per capita Total Calorie Intake in 2004-05

Categories	Correlation Coefficient
Urban	0.65***
Rural	0.10
Rural Modified#	0.70**

Note: # denotes rural figures excluding outliers

**** means the correlation coefficient is significant at 1 per cent level.*

*** means the correlation coefficient is significant at 5 per cent level.*

Source: Computed using the data from NSSO reports on level of consumer expenditure and nutritional intake in India (NSSO report no. 508 and 513).

The above correlation analysis proves that there exists a significant positive correlation between per capita cereal consumption and per capita total calorie intake in urban areas. On the contrary, the positive association between the variables is rather weak in rural areas. We found that this is due to the presence of certain outliers states. In order to avoid the influence of those states, we conducted correlation exercise by not including them. We then found that the positive association in rural areas is also significant (see rural modified in Table 3.2). Positive association between per capita cereals consumption and total calorie intake is an expected outcome and is true for urban and majority of states in rural areas as well. However we need to examine the nature of food consumption in those states where the association is not as expected. The states of this genre are Punjab, Haryana, Andhra Pradesh, Madhya Pradesh and Orissa.

If the low level of cereals consumption is compensated by the consumption of calorie rich non-cereal items⁴, it is always possible that calorie intake will be at higher levels when cereals consumption is at low levels. In states like Punjab and Haryana cereals contribution to the total calorie intake are only 50 per cent and 54 per cent respectively; whereas in Andhra Pradesh, Madhya Pradesh and

⁴ Milk products, edible oils, nuts like ground nut, cashew nut, walnut etc have higher calorie content than cereals.

Orissa the share are 69 per cent, 69 per cent and 79 per cent respectively⁵. This implies that people in Punjab and Haryana rely more on non-cereals for their calorie. On the contrary, people in Andhra Pradesh, Madhya Pradesh and Orissa rely more on cereals for their calorie. Yet they settle at lower levels of energy intake and this may be because of the low consumption of calorie rich non-cereals items which can supplement to their total energy intake.

3.2 Spatial Aspect of Nutritional Intake in India

Cereals are not only important in the calorie intake, but in protein intake as well. In rural India 66 per cent of proteins are from cereals; while in urban India cereals' share in total protein contribution is 56 per cent. Therefore, two forms of malnutrition are associated with the fall in cereal consumption: (i) energy/calorie malnutrition (ii) calorie - protein malnutrition. Since larger part of proteins comes from cereals also, the latter form follows from the former form of malnutrition. There is an unavoidable association between calorie and protein malnutrition⁶. Any reduction in cereals consumption not only diminishes calorie intake but also protein intake of the person. In addition, it is a fact that a part of dietary protein will be burned for the energy and therefore will not be available to perform its distinctive functions in supporting growth and tissue repair, if calorie intake is inadequate (Mellor and Johnston, 1984). Besides providing necessary energy, adequate calorie level is, thus, equally important in permitting the proteins to perform its prime function of body maintenance. These facts underscore the vitality of keeping adequate calorie level within a human body.

From the previous chapter we observed a decline in the average cereals consumption across all states both in rural and urban areas. As the cereals contribute a major share of calories and proteins, this will possibly reduce these

⁵ See Appendix II Table Nos. A2.1 and A2.2

⁶ Gopalan (1992) has pointed out that "..... If the habitual cereal-legume dietaries of poor Asian population groups were consumed at levels adequate to meet the full caloric needs (and here we are talking of caloric needs as conforming to present international recommended mean levels of intake, and not of M-2SD level), then protein needs would be automatically met"

macronutrient intakes⁷. However, the reduction in calories and proteins is a matter of concern only when they fall below the required minimum and result in undernourishment. When we examine the trends in macronutrient intakes, either across space or classes, this would be one of our major criteria.

3.2.1 Energy Requirement

Energy or calorie malnutrition/ deficiency has been identified with reference to a minimum required daily allowance (RDA) of energy. The minimum RDA, be it national or international, is the energy required by a standard individual (adult male) to perform any sedentary work. Therefore in the study of malnourishment and poverty, the enquiry regarding the accomplishment of this minimum RDA is a considerable point. But the fixation of a norm level of calorie and its relation to healthy living are issues of disputation in nutritional literature⁸. Nevertheless, Patnaik (2007) points out that 'low calorie intake is a necessary but not a sufficient index of poverty....While poverty will necessarily lead to low intake, from low intake alone poverty cannot be inferred'⁹.

⁷ The National Nutrition Monitoring Bureau had informed us that "the NNMB has consistently confirmed in successive surveys that the main bottleneck in the dietaries of even the poorest Indians is energy and not proteins as was hitherto believed.....the data also indicate the measurement of the consumption of cereals can be used as proxy for total energy intake. This observation is of considerable significance as it helps to determine rapid, though approximate estimates of energy intakes at household level" (Patnaik, 2007)

⁸NSS Report on Nutritional Intake in India (61st round) points out that, "Speaking about determination of calorie requirement of a person in terms of age and/or sex is a simplification of the real situation, since the role of various other conditions such as body weight, height, nature of work, state of health and so on can not be overlooked as determinant cofactors. Thus requirement of calorie per consumer unit in reality is not a fixed amount but a variable depending upon all these factors. Nutritionists, attempting to assess calorie requirements per consumer unit, differ in their approaches to the problem, some specifying calorie requirement as function of body weight, while others assign requirements depending on nature of work (sedentary/moderate/heavy)."Gopalan (1992) argues in favour of fixed calorie norm; while Srinivasan (1992), P.V. Sukhamte, Philip Payne, Seckler argue in favour of the reduction in fixed level of calorie. See Osmani (1992a, 1992b) for details.

⁹ Lower calorie intake doesn't necessarily mean poor health outcomes and higher calorie intake also doesn't necessarily mean better health outcomes. Besides calorie intake, the better health depends upon several crucial factors: epidemiological environment, activity levels, age, birth weight, mother's education, breast feeding practices, the composition of diet, micro nutrient intakes at certain stages of life (especially childhood) etc (Deaton and Dreze, 2009).

In India, The Task Force on Projection of Minimum Needs and Effective Consumption Demand, 1979 stipulated 2400 Kcal and 2100 Kcal per capita per day as minimum RDA for rural and urban areas correspondingly. Later in 2009, the Expert Group to Review the Methodology for Estimation of Poverty, after surveying the debates associated with the poverty estimation, “consciously moved away” from the calorie anchor of poverty line level of income. Considering ‘urban living standard as better than and preferable to its rural counter part’ the Expert Group has recommended to use the mixed reference period- equivalent private consumer total expenditure of Rs.538.6, underlying the all India urban poverty estimates of 25.7 per cent, as new poverty line income for measuring poverty in both rural and urban areas after making adequate state specific, sector specific price adjustments. However, it is to be noted that the new recommended poverty line expenditure is capable of providing only 1776 Kcal per capita per day, which is 324 Kcal less than required calorie norm in urban areas of 2100 Kcal¹⁰. Hence we find a lowering of minimum RDA in newly recommended poverty line expenditure. Many studies have questioned this particular revision due to the loose grounds on which the suggestion is based, (Swaminathan, M, 2010, Ramkumar, T, 2010, Patnaik, U. 2010). The minimum RDA suggested by FAO for India in 2004-05 is 1770 Kcal, which is lower than the suggestion made by the Expert group. Nevertheless, an examination over time reveals that FAO has been continuously upgrading the minimum dietary intake for all countries over the years. For India also they follow similar approach of upgrading¹¹ -though the norm is indeed less than Indian standards. Unlike FAO, in India we observe a downgrading of the minimum RDA norm. Nevertheless, we rely over the references from scientific circles regarding the sense of minimum requirement of essential macronutrients. Indian Council of Medical Research (ICMR) has stipulated certain levels as the daily minimum RDA of calories and proteins for Indians.

¹⁰ See the Report of the Expert Group to Review the Methodology of the Estimation of Poverty (2009) for details

¹¹ The minimum RDA for India, according to FAO was 1740 Kcal, 1750 Kcal, 1760 Kcal, 1770 Kcal for the years 1990-92, 1995-97, 2000-02 and 2004-07 respectively.

For men who do sedentary jobs need 2400 Kcal daily for healthy survival and for women in the same category require 1900 Kcal daily (see Table 3.3). Then it follows that the calories needed to perform any moderate or heavy jobs in both sex are even more than the calorie needed to perform sedentary work. This is very clear from the stipulations of ICMR; if a person performs heavy jobs his calorie requirement is much higher than the requirement he/she needs when he/she performs sedentary or moderate works. So, minimum RDA is the energy requirement associated with the performance of sedentary work.

Table 3.3: Recommended Dietary Intakes of Proteins and Energy for Indians

Category	Net Calories (Kcal)	Proteins (in gms)	Protein-Calorie (per cent)
Men			
Sedentary Work	2400	55	9.2
Moderate Work	2800	55	7.9
Heavy Work	3900	55	5.6
Women			
Sedentary Work	1900	45	9.5
Moderate Work	2200	45	8.2
Heavy Work	3000	45	6
During Pregnancy	2500	59	9.4
Lactation	2750	70	10.2

Source: ICMR data from Gopalan, C. (1992)

3.2.2 Rural India

We follow the calorie requirement norm suggested by the Task Force on Projection of Minimum Needs and Effective Consumption Demand, 1979, for our analysis; i.e. 2400 Kcal per day for an average individual residing in rural India. Further we classify major Indian states, according to the energy they intake, into three categories: *category I* - less than 2100 Kcal (below 88 per cent of the norm level of 2400 Kcal), *category II* - in between 2100 Kcal and 2400 Kcal and *category III* - above 2400 Kcal (above 100 per cent) and a comparative study over time is carried out in this regard (see Table 3.4).

During 1993-94, major Southern and Central states were in category I and most of the Eastern states were in category II; while states in North-Western region afforded a location in category III. Though there was pervasive decline in energy intake during the decade since 1993, most of North-Western states managed a

place in category II. Except Uttar Pradesh the states which were in category II during 1993-94, have downgraded to category I, burgeoning the count of energy deficient states in rural India by 2004-05. Most of these states were South, Central and Eastern states. From the table 3.4, it is fairly clear that, by 2004-05, in most of the Indian states calorie intake has declined; in few of the states it showed a mild increase. For the protein intake also we find similar experience.

Table 3.4: Classification of States According to Calorie Categories (Rural)¹²

Categories	2004-05		
	< 88 per cent (less than 2100 Kcal)	Between 88 and 100 per cent (between 2100 and 2400 Kcal)	> 100 per cent (above 2400 Kcal)
1993-94			
< 88 per cent (less than 2100 Kcal)	AP, AS, GJ, KR, KL, MH, TN		
Between 88 and 100 per cent (between 2100 and 2400 Kcal)	BH, MP, OR, WB	UP	
> 100 per cent (above 2400 Kcal)			HY, PJ, RJ

Note: Norm being 2400 Kcal per capita per day

Source: NSSO Reports on Nutritional Intakes in India, 50th and 61st Round

Table 3.5: Rate of Change in Macronutrient Intake (Rural)
(in per cent)

States	Calorie		Protein		Fat	
	1983 to 1993-94	1993-94 to 2004-05	1983 to 1993-94	1993-94 to 2004-05	1983 to 1993-94	1993-94 to 2004-05
Andhra Pradesh	-6.90	-2.78	-9.29	-1.97	13.33	23.16
Assam	-3.55	4.24	-4.81	6.46	16.67	27.14
Bihar	-3.38	-3.12	-7.38	-3.99	15.00	23.48
Gujarat	-5.63	-3.56	-5.76	-4.14	7.73	7.38
Haryana	-2.47	-10.64	0.51	-11.22	14.04	3.36
Karnataka	-8.27	-11.00	-8.17	-11.43	10.00	18.53
Kerala	4.30	2.49	8.09	9.06	2.19	24.77
Madhya Pradesh	-6.84	-10.86	-7.35	-6.67	13.20	24.03
Maharashtra	-9.56	-0.31	-11.61	1.64	11.67	23.88
Orissa	4.56	-8.00	3.33	-8.35	13.85	20.27
Punjab	-9.68	-7.36	-5.44	-10.71	15.00	-1.84
Rajasthan	1.52	-11.74	5.87	-12.34	25.71	-3.60
Tamil Nadu	1.24	-2.23	-0.43	-4.06	12.27	19.84
Uttar Pradesh	-3.83	-4.64	-3.56	-6.39	22.41	5.63
West Bengal	9.08	-6.38	5.38	-5.11	25.88	23.83
All India	-3.06	-4.92	-2.90	-5.32	16.30	13.06

Note: Rate of change refers to simple percentage changes between two time periods

Source: NSSO Reports on Nutritional Intakes in India, Various Rounds

¹² See Appendix II Table No. A2.3 for absolute level of macronutrient intakes

To study the trend in macronutrient intake in rural India, we considered two periods: period before and period after liberalization. We have taken the period from 1983 to 1993-94 as the first period and 1993-94 to 2004-05 as second. In general, there has been a decline in both calorie and proteins in both pre and post-liberalisation periods in most of the Indian states. Only fat intake has shown an increase; but in the second period the increase was smaller in comparison to the first period at all India level. Except in Assam and Kerala, calorie and protein intake has declined in all other states in the second period. But the increase in Kerala is smaller in the second period. In Orissa, West Bengal, Rajasthan and Tamil Nadu, in the first period, calorie intake has shown an increase; however in the second period in these states calorie intake has registered an absolute decline. In Karnataka, Madhya Pradesh, Uttar Pradesh and Haryana the decline in calorie is greater in the second period in relation to first period. In the remaining few states calorie decline was more in the first period. Except for Assam, Kerala and Maharashtra, in all other states protein intake also has declined in absolute terms. These declining trends in calorie and protein intakes have made most of the states in rural India nutritionally deficient. By 2004-05 only North-Western states in the country had managed to maintain their calorie intake even above 2100 Kcal¹³.

3.2.3 Urban India

Table 3.6: Classification of States According to Calorie Categories (Urban)¹⁴

Categories	2004-05		
	< 90 per cent (less than 1890 Kcal)	Between 90 and 100 per cent (between 1890 and 2100 Kcal)	> 100 per cent (above 2100 Kcal)
1993-94			
< 90 per cent (less than 1890 Kcal)			
Between 90 and 100 per cent (between 1890 and 2100 Kcal)	MH	AP, KR, KL, MP, TN	GJ, PJ
> 100 per cent (above 2100 Kcal)		WB	AS, BH, HY, OR, RJ, UP

Note: Norm being 2100 Kcal per day per capita

Source: NSSO Reports on Nutritional Intakes in India, 50th and 61st Round

¹³ See Appendix II Table No. A2.3

¹⁴ See Appendix II Table No. A2.4

Compared to rural people, the calorie intake of people in urban areas is lower. Even the required minimum daily allowance for urban is also lower, i.e. 2100 Kcal per capita per day for an average urban Indian according to the Task Force on Projection of Minimum Needs and Effective Consumption Demand, 1979. A similar classification as of rural India is made on calorie intake in urban India as well. Those are three categories: *category I* - less than 1890 Kcal (below 90 per cent of the norm level of 2100 Kcal), *category II* - in between 1890 Kcal and 2100 Kcal and *category III* - above 2100 Kcal (above 100 per cent) and a comparative study over time is carried out in this regard (see Table 3.6).

During 1993-94, most of the North-Western and Eastern states were consuming calorie above the minimum RDA of 2100 Kcal. None of the state was there in category I (category where calorie intake is less than 90 per cent of the minimum requirement norm). But by 2004-05, Maharashtra became the most calorie deficient state in urban India and occupied a place in category I. While West Bengal was relegated to category II from category III, Gujarat and Punjab upgraded their positions to category III from category II. Generally, we have seen that Southern and certain Central Indian states are calorie deficient states in urban India by 2004-05. However most of the North-Western and Eastern states continue to be calorie sufficient states. In contrast with the experience in rural India, the number of calorie deficient states has in fact declined by 2004-05 in urban India (see Table 3.6).

We have taken two time periods to understand the changes occurred in macronutrient intakes (see Table 3.7). The first period is pre-liberalisation period, from 1983 to 1993-94 and the second is post-liberalisation period, from 1993-94 to 2004-05. The results are shown in Table 3.7. In Andhra Pradesh, Kerala, Tamil Nadu and Punjab, calorie intake has slightly improved in second period. Though calorie intake has grown in Bihar, Assam and Uttar Pradesh during the second period, it has only been less than that in the first period. In Haryana, Madhya Pradesh, Maharashtra, Orissa and West Bengal the decline in calorie intake was greater in the second period than in the first period. In almost half of the states in urban India there experienced an absolute decline in calorie intake in the second

period. Regarding protein intake, at all India level, we find a declining trend after 1993. However, in the second period we find a rising trend in protein intake in some of the states, viz. Andhra Pradesh, Assam, Bihar, Gujarat, Kerala, Punjab and Uttar Pradesh. Fat intake in urban India follows the rising trend in both periods; though the increase is less in the second period (see Table 3.7).

Table 3.7: Rate of Change in Macronutrient Intake (Urban)¹⁵
(in per cent)

States	Calorie		Protein		Fat	
	1983 to 1993-94	1993-94 to 2004-05	1983 to 1993-94	1993-94 to 2004-05	1983 to 1993-94	1993-94 to 2004-05
Andhra Pradesh	-0.85	0.40	-0.80	2.62	9.06	23.78
Assam	3.18	1.66	2.88	4.49	23.20	19.48
Bihar	2.67	0.09	0.66	1.30	25.77	23.55
Gujarat	1.35	-1.78	-0.18	4.37	9.25	9.67
Haryana	-4.55	-5.00	-5.07	-4.87	0.82	10.12
Karnataka	-4.61	-4.05	-3.45	-1.69	4.44	15.16
Kerala	-4.05	1.53	2.75	8.21	-2.63	21.35
Madhya Pradesh	-2.57	-6.15	-3.55	-2.68	11.94	7.69
Maharashtra	-1.92	-7.14	-0.89	-6.13	6.44	4.59
Orissa	1.89	-5.40	2.14	-3.50	17.08	0.71
Punjab	-0.52	2.92	-1.90	2.59	9.59	13.59
Rajasthan	-3.15	-3.11	-3.62	-3.76	9.79	9.30
Tamil Nadu	-10.19	0.68	8.22	1.03	16.90	21.24
Uttar Pradesh	3.48	0.47	1.94	3.01	21.18	11.89
West Bengal	4.05	-5.63	2.91	-2.65	10.32	14.33
All India	-0.86	-2.46	0.35	-0.35	13.51	13.10

Note: Rate of change refers to simple percentage changes between two time periods

Source: NSSO Reports on Nutritional Intakes in India, Various Rounds

3.3 Class Aspect of Nutritional Intake in India

In the previous section we have seen that, by 2004-05, majority of states in rural India are calorie deficient; while among the urban states the incidence of calorie deficiency is relatively less as majority of the states are either above the norm or more than 90 per cent of the norm. However, calorie deficient individuals are pervasive in each state irrespective of whether the state is calorie deficient or sufficient¹⁶. In this context, two issues become relevant for our analysis: (i) what is the magnitude of calorie deficient people in the country in recent times? and (ii) to which expenditure classes do the calorie deficient people belong?

¹⁵ See Appendix II Table No. A2.4 for absolute level of macronutrient intakes

¹⁶ It is also possible that the magnitude of calorie deficiency experienced by people may be large in calorie deficient states than that of the calorie sufficient states.

We begin with the first issue regarding the calorie deficient people. By the term 'calorie deficient' we refer to those people in rural and urban areas who consume less than the required calories.

Table 3.8: Percentage of Population below Calorie Norm

States	Rural (less than 2400 Kcal)		Urban (less than 2100 Kcal)	
	1993-94	2004-05	1993-94	2004-05
Andhra Pradesh	84	79.5	63	75.5
Assam	93	87.5	49	47
Bihar	73	84	47.5	65.2
Gujarat	83.5	89.5	57	67
Haryana	55	63.5	49	66.4
Karnataka	75.5	95	57	75.5
Kerala	84	75	67	87
Madhya Pradesh	72.5	90.5	52.5	67.5
Maharashtra	89.5	95	52.5	85
Orissa	70	82.5	32	48.5
Punjab	52.5	68	51.5	68.8
Rajasthan	46	76	36	69.5
Tamil Nadu	87	94	69	70.5
Uttar Pradesh	65.5	72.5	55	46
West Bengal	72	83	49	67.5
Jharkhand	NA	80.5		
Chhattisgarh	NA	88.5		
Uttaranchal	NA	60		
All India	74.5	87	57	64.5

Source: Estimates from Patnaik (2007, 2010)

In almost all states in rural and urban India, the percentage of population surviving below the calorie norm has increased in 2004-05 than 1993-94. In rural areas, only Andhra Pradesh, Assam and Kerala have shown a decline in the percentage of calorie deficient people. Assam is an exception in urban areas as well. By 2004-05, in rural areas, the highest percentage of undernourished is in Karnataka and Maharashtra, and lowest percentage is in Uttaranchal and Haryana. And in urban areas, the highest percentage of calorie deficient people is in Maharashtra and Kerala and the lowest is in Uttar Pradesh and Assam. In spite of the energy deficient or sufficient status, in all states in the country, the share of calorie deficient people exceeds half of the total population is indeed disturbing.

Fall in the cereals consumption contributed to a great extent for such a decline in energy intake and this, in turn, raised the size of calorie deficient people in India. However, from chapter 2, we have clearly observed that, in rural India, the

decline in cereals consumption is not universal for all expenditure classes; rather it increased among the bottom 20 per cent expenditure class in most of the states. Correspondingly it is likely that their calorie intake also might have gone up. But this increase in energy was insufficient to push them above the minimum required norm of 2400 Kcal. Owing to the decline in cereal consumption, the energy levels of most of the lower expenditure classes (especially 20 to 40 per cent MPCE class) have come down even below the required minimum. Hence the magnitude of calorie deficient people in the country has increased.

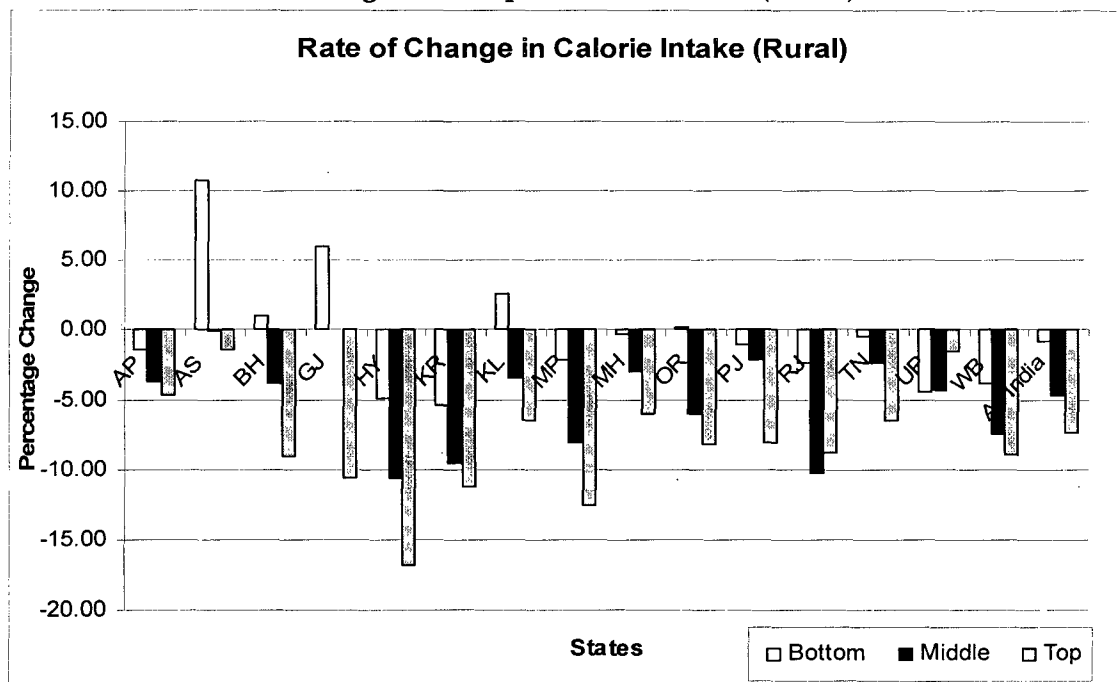
To address the second issue, we have to examine the energy intakes of different expenditure classes. It would be rather difficult to replicate the quintile expenditure classification we followed in chapter 3 (for studying the class aspect of cereals consumption) here to study the class aspect of macronutrient intake. This is because of the form in which macronutrient data are readily available from NSSO reports¹⁷; they are meticulously computed by NSSO in 12 expenditure classes, which the organization followed in their Consumer Expenditure Surveys. Due to the lack of precision entailed while transforming thus given macronutrient data into data according to our own quintile expenditure classification, we don't attempt to perform that. Besides that, it would be messy if we present those data as exactly as given by NSSO for all states in the country for two time periods with a distinction of rural and urban areas. Nonetheless, we do conduct a class-wise analysis of macronutrient intakes, especially calorie intake¹⁸. We calculated the simple average of calorie intake of lower 4, middle 4 and top 4 expenditure classes from the data on calorie intake expressed in 12 expenditure classes in NSSO reports. Though this expression of calorie intake data in 3 expenditure classes doesn't exactly represent the quintile classes in chapter 3, it is consistent with the results we have obtained for quintile classes in regard to cereals consumption.

¹⁷ Nutritional Intake in India, NSSO Report No. 405 and Nutritional Intake in India, NSSO Report No. 513

¹⁸ This has been carried out to signal changes happening across different expenditure classes in regard to calorie intakes.

3.3.1 Rural India

Figure 3.1: Rate of Change in Calorie Intake during 1993/94 to 2004/05 according to the Expenditure Classes (Rural)



Note: The detailed data used for the depiction of this chart is presented in the Appendix II Table A2.5
 Source: NSSO Reports on Nutritional Intakes in India, 50th and 61st Round

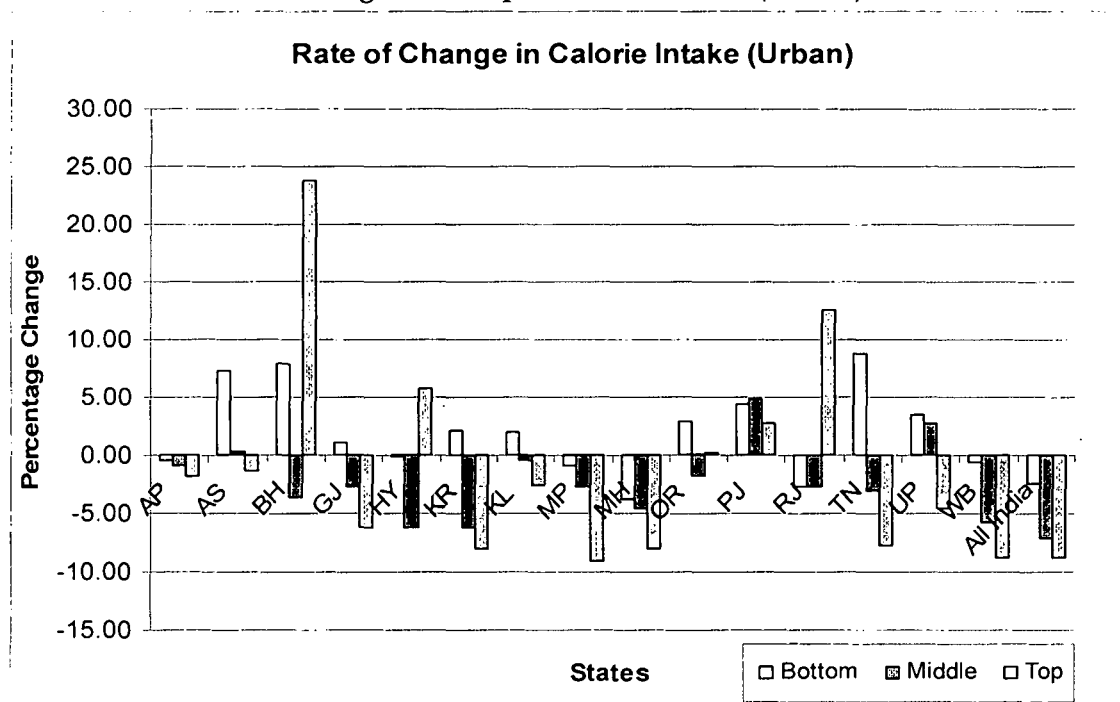
It is clear from the Figure 3.1 that people in the top expenditure classes have reduced their calorie intake in greater magnitudes than that of the middle and bottom expenditure classes. The fall in calorie intake for bottom expenditure classes is small in majority of the states and marginal in few other states. Even though calorie intake increased among bottom 20 per cent expenditure class in Assam, Bihar, Gujarat and Kerala, their calorie intakes are still below the norm. The trend in calorie intake among different expenditure classes corroborates with the picture we derived in chapter 3 for cereals consumption. It is the higher expenditure classes that largely reduced their cereals consumption in comparison to the lower expenditure classes. Further we have observed that bottom 20 per cent in majority of the states has even increased their cereals consumption, but this small or marginal rise in cereals or calorie intake hardly helped them to overcome the energy deficiency. Since middle expenditure classes are also not so calorie sufficient¹⁹, any shortfall in their energy intake can make them vulnerable

¹⁹ The absolute levels of calorie intake for these 3 expenditure classes in two time periods are presented in Appendix II Table A2.5

to calorie deficiency. This may be the reason why the percentage of people below the calorie norm has increased by 2004-05. It is to be noted that even after the greater decline in calorie intake, top expenditure classes are able to maintain their energy sufficiency.

3.3.2 Urban India

Figure 3.2: Rate of Change in Calorie Intake during 1993/94 to 2004/05 according to the Expenditure Classes (Urban)



Note: The detailed data used for the depiction of this chart is presented in the Appendix II Table A2.6.
Source: NSSO Reports on Nutritional Intakes in India, 50th and 61st Round

Urban India gives a picture of calorie intake, dissimilar to the rural trend (Figure 3.2). In most of the states bottom expenditure class has increased their calorie intake; while middle expenditure class has reduced it. We even find a rise in calorie intake among top expenditure class in Bihar, Haryana, Punjab and Rajasthan unlike a declining trend experienced in other states. It is to be noted that bottom expenditure classes in all states are still calorie deficient, irrespective of the overall improvement in some states²⁰. Except a few states (Bihar, Uttar Pradesh, Rajasthan), middle expenditure classes in other states becomes

²⁰The absolute levels of calorie intake for these 3 expenditure classes in two time periods are presented in Appendix II Table A2.6

vulnerable to calorie deficiency. Needless to say, the overall decline seldom affected the intake among rich classes in regard to norm level of calories.

3.4 Decline in Cereals and Calorie Intakes in Rural India: A Preliminary Observation

Except in lower income classes, in most of the middle and higher expenditure classes both cereals consumption and calorie intakes have undergone significant reduction during 1993-94 to 2004-05. In fact the rate of reduction is positively linked to the level of expenditure. Higher the expenditure class higher will be the rate of decline in cereals consumption and calorie intake and vice versa.

The substantial decline experienced among higher expenditure classes may be due to the following reasons. Firstly, the taste and preferences of the rich might have shifted in favour of non-cereal items, viz; animal products, fruits and vegetables etc, as a response to the rise in their income level. Since they are at comfortable nutritional levels (often uncomfortable due to excess nutrition and related health problems) the shift away from cereals doesn't worsen their nutritional status even though his/her nutritional level has declined. Besides, the shift in favour of expensive sources of energy/ nutrition would diversify their diet. Hence the changes we observe in the consumption pattern of the rich seem to follow Bennett's law, which points out the changes in food basket in response to the rise in income levels. Secondly, there is a problem involved in the recording of cereal intake of the higher expenditure classes. NSSO itself cautions us that, 'cooked meals received as perquisites is recorded in the expenditure of donor household (usually upper MPCE classes) rather than the expenditure in recipient households (usually lower MPCE)'. So we will get an overestimated figure for the food consumption of the rich and vice versa for the poor. In the tabulation of calorific value also we may get similar inflated figures for the rich and deflated figures for the poor. Compared to 1950s and 1960s, greater monetization has occurred in most parts of the country. As a result, wage payment in-cash may have replaced wage payment in-kind, which mostly took the form of food. The food provided by employer (rich households) to employee (poor households), which was earlier recorded in the account of former is

virtually absent at present (Suryanarayana, 2000). This could possibly result in the larger decline in the levels of cereal consumption and calorie intake among the rich.

The decline in the cereal consumption of middle expenditure classes (people belong to these classes are neither poor in absolute sense nor rich; but their condition is always amenable to absolute poverty in case of any socio economic changes) may not be attributed to the above reasons. Firstly, it won't be nutritionally justifiable to argue that people at lower rungs of MPCE resort to voluntary diversification of food basket in favour of expensive food stuffs due to their change in their tastes and preferences. Since nutritional adequacy is scarcely ensured for these expenditure classes owing to their insufficient food intake, we find less nutritional justification for the argument of voluntary diet diversification, which often works after a certain level of income and calorie levels. Secondly, the problem of underestimation of food consumption of the poor during 1950s and 1960s might have reduced due to increased monetization happened in the recent past. In other words, when money is paid as wages *in lieu* of food, unlike in earlier times, it is likely that the wage earners could improve their food consumption and hence calorie intake owing to their increased income levels. Given these facts, we observed that the people in lower expenditure classes aren't increasing their food grain consumption substantially (which could make them nutritionally secure) and people in middle expenditure classes are reducing their food grain consumption.

3.5 Summary

In this chapter we studied the changes happened to the nutritional status among Indian population since 1990s as a result of the changes occurred in their food consumption pattern. We have seen that cereals consumption has an important bearing on the nutritional intake (viz. in calories and proteins) of the people. A decline in cereals consumption can possibly reduce total calorie and protein intake, unless the decline is compensated by an adequate rise in the consumption of non-cereals, which should be rich in calories and proteins. It is very clear that the calorie and protein intake of majority of the states in India have started

coming down since 1972 itself. Hence, the number of calorie deficient states in rural and urban India has increased by 2004-05; though the number is relatively less in urban areas. By 2004-05, in rural India, Southern, Central and Eastern Indian states become calorie deficient; while in urban areas, Southern and Central Indian states become calorie deficient. This trend of declining calorie and protein intakes and increased incidence of calorie deficiency among Indian states are quite consistent with the obvious trend of decline in cereals consumption in all states. Also, the number of people surviving below the norm level of calorie has increased in India by 2004-05. This happened because of the insufficient calorie intake of bottom expenditure classes and the decline in calorie intake of middle expenditure classes. Despite a greater decline in the calorie intake of higher expenditure classes, whose cereals consumption has also declined in greater quantities, they maintained adequacy in their calorie intake. In case of bottom expenditure classes, in rural areas, it is to be noted that their calorie intake hasn't declined considerably. Rather it increased in some states, remained stagnant in certain others and declined only marginal in rest of the states. And this is consistent with the rising trend in cereals consumption among bottom 20 per cent expenditure class. However, the nutritional status of people belonging to this class is indeed worrisome. In addition, in rural areas, we find a declining trend in calorie intake among middle expenditure classes, whose nutritional state is also at peril. And we find a declining trend in cereal consumption of expenditure classes belongs to 20 to 40 per cent and 40 to 60 per cent. The larger decline in cereals consumption and calorie intake among the higher expenditure classes may partly be due to the changes in their tastes and preferences and partly be due to the increased monetization (and consequent reduction of the overestimation of their calorie intake) happened in the economy. Considering the calorie deficiency, which has been on rise, we extended our enquiry of proper reasoning for the decline in cereals consumption of lower expenditure classes beyond the behavioural explanations. The subsequent chapters move in this line.

CHAPTER 4

SUPPLY ASPECTS OF FOOD GRAINS CONSUMPTION

We conceived food security as a triad of concepts: food availability, food access and food utilization or the nutritional aspect (see chapter 1). Troubling signals in any of these three aspects can be deemed as food insecurity. In this sense rising calorie deficiency in India, as we have observed from chapter 3, is a form of food insecurity. It is also possible that this form of insecurity can arise from the constraints in other aspects of food security, viz. food supply and food access. Therefore, an examination of food security in India as far as these aspects are considered is important to understand the decline in food grains consumption and calorie intake in India. In this chapter we examine the changes occurred in food supply situation, in food policies of government and in the institution of Public Distribution System (PDS) since liberalisation.

4.1 Production of Food Grains in India

The production of food grains is directly influenced by two factors: area of food grains cultivation and yield/productivity of the cultivation. Any decline in either of these factors will adversely affect crop output, unless it is offset by a compensating increase in other factor. For instance, any reduction in the land area under cultivation of a crop can result in the shortfall of its production, unless the yield of cultivation is adequately improved. In recent decades diversification is happening in Indian agriculture. Diversification in agriculture refers to the shifting of land area from less profitable crops or enterprises to more profitable crops or enterprises¹.

¹ Diversification in agriculture can also mean the following; (i) shift from farm to non-farm activities and the shift is largely related to the transition of rural economies (ii) use of resources in diverse but complementary activities (Vyas, 1996).

Table 4.1: Annual Growth Rate in Area, Production and Yield of Major Food Grains in India

(in per cent)

	1970/71 to 1979/ 80	1980/ 81 to 1989/90	1990/ 91 to 1999/' 00	2000/ 01 to 2005/' 06
Rice				
Area	0.53	0.55	0.63	-0.47
Production	0.03	3.57	2.11	1.55
Yield	-0.50	3.01	1.48	2.03
Wheat				
Area	2.19	0.59	1.44	0.58
Production	3.27	3.58	3.69	-0.09
Yield	1.05	2.97	2.21	-0.67
Coarse Grains				
Area	-1.16	-1.14	-2.34	-0.82
Production	-1.38	2.03	-0.83	1.85
Yield	-0.22	3.20	1.55	2.68
Total Food grains*				
Area	0.08	0.01	-0.42	0.09
Production	0.13	3.13	1.95	1.17
Yield	0.05	3.12	2.37	1.07

Note: * Pulses are also included

Source: Calculated from *Agricultural Statistics at Glance, Various Issues*

Before 1980s much of the increase in food grains production has been through the extension of area, but 1980s witnessed a shift towards rise in yield as the major factor contributing to the increased output (Table 4.1). However, during post-1990s there has been a decline in the yield growth rates of food grains. Major reasons seem to be the fall in public investment in irrigation and non-availability of yield raising, cost-reducing new technology (Bhalla and Singh, 2009). There is also an absolute reduction in the area under food grains cultivation during post 1990s². Food grains, which accounted for 74.7 per cent of the gross cropped area in 1962-65 declined to 63.7 per cent by 2003-06 (Bhalla, and Singh, 2009). As a result, the growth rate of food grains production has considerably reduced from 3.13 per cent during 1980s to 1.95 per cent during 1990s (Table 4.1). In comparison to the previous decades, during post 1990s, the area under rice and

² The total area under food grain cultivation (kharif and rabi cultivation) undergoes a decline from 124.81 million hectares (mha) in the decade 1970-79 to 120.47 mha in 2000-05. In spite of an increase in the area under rabi cultivation, this occurred owing to the larger decline in the area under kharif cultivation. In 1970-79, the area under kharif food grain production was 81.46 mha and it declined to 73.07 mha by 2000-05. But the area under rabi food grain production gained from 43.35 mha to 47.40 mha in the same period (*Agricultural Statistics at Glance, Various Issues*). 'Higher yields and consequent improvements in farm income, greater stability in crop production due to irrigation etc might have paved the way for increasing rabi crop cultivation rather than kharif. Also the shift to rabi crops meant a shift towards higher value crops or higher yields of same crop (Vyas, 2002).

wheat cultivation has registered an increase. This resulted in the increased annual growth rate of wheat output in the period, despite a small decline in its yield growth rate. In case of rice, increase in the growth rate of area under rice cultivation was not able to increase the growth rate of rice output due to the reduced growth rate in rice yield during 1990s (Table 4.1). As far as coarse cereals are concerned, we have observed that during 1970s, 1980s and 1990s, there has been an absolute reduction in the area under coarse cereals cultivation. In post-1990s, we found an absolute decline in its yield also. Consequently, the production of coarse cereal in India has declined. From the above picture it is clear that a shift has occurred in cropping pattern in favour of superior cereals (rice and wheat) away from coarse cereals. In percentage terms, the shift is as follows. Out of total food grain area cultivated, rice and wheat alone constituted 47 per cent in 1970-79 and this increased to 57 per cent by 2000-05. Correspondingly, the area under the different coarse cereals cultivation has declined from 43.3 per cent to 29.2 per cent during the same period (Agricultural Statistics at Glance, Various Issues). Coarse cereals, and to some extent, pulses have remained low yield, low value crops for some time. While superior cereals, esp. rice and wheat, have higher yields and are combined with subsidized inputs and remunerative price regimes. This could have made the cultivation of superior cereals more profitable than the cultivation of coarse cereals or pulses (Bhalla, and Singh, 2009). Also, it is to be noted that the decline in area and production of coarse cereals, which are mostly cultivated for self consumption by the small farmers may adversely affect their consumption (George, 2002, Deshpande, et al, 2004).

There is a regional dimension for this shift in cropping pattern. In North-Western India³, the share of rice and wheat in total gross cropped area has increased from 35.5 per cent in 1962-65 to 60.3 per cent by 2003-06; while that of coarse cereals has reduced from 23.3 per cent to 9.6 per cent in the same period. In Eastern India⁴, there has been a marginal rise in the share of area under superior cereal cultivation, from 59.6 per cent in 1962-65 to 62.3 per cent in 2003-06. Here coarse

³ Haryana, Himachal Pradesh, Jammu & Kashmir, Punjab, Rajasthan and Uttar Pradesh.

⁴ Assam, Bihar, West Bengal and Orissa

cereal cultivation has declined from 6.7 per cent to 3.7 per cent during this period. In Central India⁵, where coarse cereals dominate the food grain production front, its area of cultivation has reduced substantially from 36.1 per cent in 1962-65 to 22.3 per cent by 2003-06. And the share of area under rice and wheat cultivation has, in fact, stagnated at 19 per cent. Similarly in Southern India⁶, the share of area devoted to coarse cereal cultivation got reduced from 35.2 per cent to 18.5 per cent and that of rice and wheat stagnated (Bhalla, and Singh, 2009). In short, we observe a universal reduction in the area under coarse cereals cultivation across all regions in the country, of which the experience of Central and Southern India are notable. But, in case of rice and wheat cultivation, the increase in the share of area under cultivation has occurred regionally, viz, in North-Western India.

4.1.1 Production of Food Grains and Population Growth

The demand for food increases by two ways; (i) population growth (ii) income growth. Given the level of income, if food grains production lags behind population growth there will be increasing pressure on the available food. This may affect the food grains consumption of the poor in two ways. One, since the rich are able and willing to pay higher prices for food grains, there is a greater likelihood that the available food grains will be diverted to the market for them creating inadequate availability in the market for the poor. Two, higher the food grain prices lower will be the purchasing power of the poor and they may force to demand less food grains. This would be accentuated if income distribution in the country worsens.

Table 4.2: Compound Annual Growth Rate of Food Grain Production and Population

Time Periods	Compound Annual Growth Rates (in per cent)	
	Food Grain Production	Population
1951-52 to 1961-62	4.27	1.99
1962-63 to 1972-73	2.91	2.23
1973-74 to 1983-84	3.06	2.23
1984-85 to 1994-95	2.06	2.05
1995-96 to 2005-06	0.43	1.81

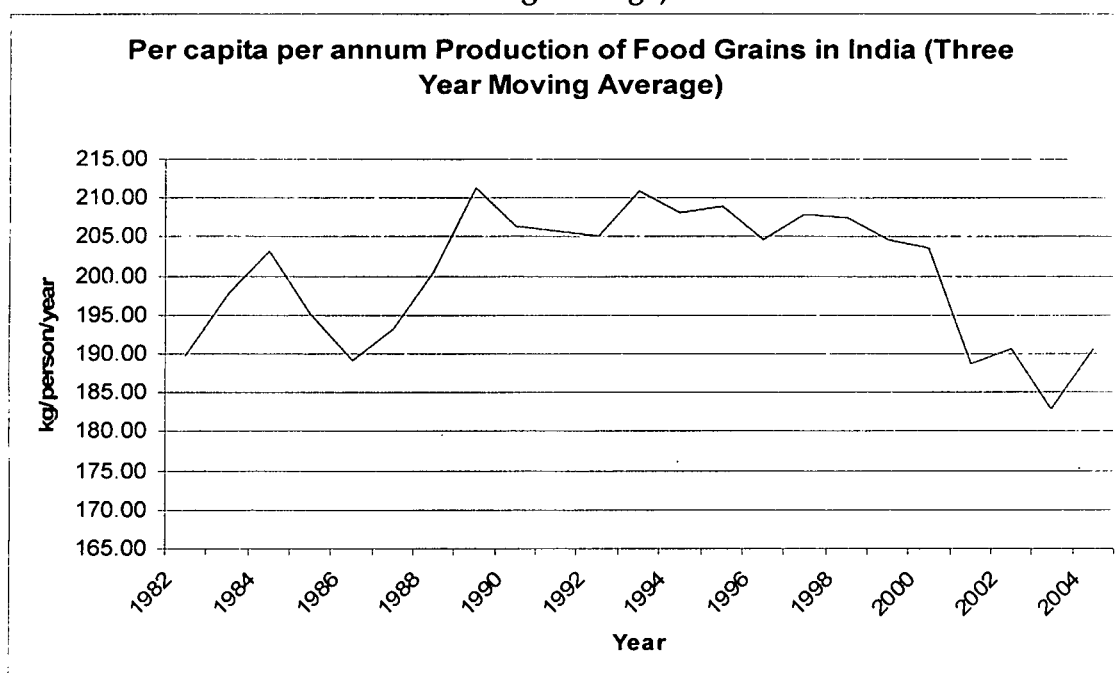
Source: *Economic Survey, Various Issues*

⁵ Gujarat, Madhya Pradesh and Maharashtra

⁶ Andhra Pradesh, Karnataka, Tamil Nadu and Kerala

From the table 4.2 we could see that, till early 1980s, food grain production in the country had been growing at a higher rate than the population growth rate. However, from mid-1980s onwards (till mid-1990s) annual growth rates of both food grain production and population are more or less similar (2.05 and 2.06 per cent per year), keeping per capita food grain production at constant level. Since mid-1990s annual growth rate of food grain production has been lagging behind the growth rate of population. As a result per capita food grain production in the country has been declining (Figure 4.1).

Figure 4.1: Per capita per annum Production of Food Grains (Three Year Moving Average)



Source: *Economic Survey, Various Issues*

In the early 1990s per capita food grain production in the country was more or less stagnant between 205 and 210 kg/person/year. But it begins a declining trend since mid-1990s and continues to be so in the early 2000s as well. The figures at state level show a more detailed picture of this trend.

From the table 4.3, it is evident that, in most of the Indian states, per capita food grain production has declined by 2004-05 in comparison to the figures in 1983-84. In most of the Southern⁷ and Central Indian states⁸, per capita food grain production has shown a clear decline over last 3 decades. The per capita food

⁷ Andhra Pradesh, Karnataka, Tamil Nadu and Kerala

⁸ Madhya Pradesh, Maharashtra and Gujarat

grain production in North Western states⁹ has increased substantially, except in Rajasthan where it stagnated. Among Eastern states, only in Assam and West Bengal per capita food grain production goes up during 1983-84 to 2004-05. However, in Orissa per capita food grain production declined and in Bihar it stagnated during the period. In short, most of the North-Western and Eastern states in India continued to be the major producers and providers of food grains in the country for the past 3 decades.

Table 4.3: Per capita per annum Food Grains (Cereals) Production in Indian States
(in kg/person/annum)

States	Per capita Annual Production (in kg) - Triennial Average ending in		
	1983-84	1993-94	2004-05
Andhra Pradesh	195.41	161.78	144.76
Assam	122.54	146.06	135.2
Bihar	104.86	112.57	100.14
Gujarat	128.89	85.68	86.89
Haryana	448.66	548.49	564.37
Karnataka	160.38	166.2	130.95
Kerala	48.54	35.09	19.66
Madhya Pradesh	202.57	206.7	173.43
Maharashtra	138.68	126.52	84.88
Orissa	170.93	198.18	147.41
Punjab	790.91	967.67	964.56
Rajasthan	189.54	168.41	185.4
Tamil Nadu	117.86	137.99	74.65
Uttar Pradesh	207.78	234.05	211.26
West Bengal	121.76	178.69	187.45

Source: Calculated using the food grains production data from *Agricultural Statistics at Glance, Various Issues* and state wise population data from *Statistical Abstract India, Various Issues*

4.2 Net Food Grain Availability and Food Policies in India

Net food grains availability is different from net food grains production. The former is not only influenced by the latter but by the net imports of food grains (imports-exports) and change in the stock of food grains also. In one sense per capita net availability of food grains can more accurately indicate national food security than the figures of per capita production. Net food grain availability is derived from an accounting identity, which comprises of levels of domestic food grains production, changes in stock and trade balance of food grains (Net

⁹ Haryana, Punjab and Uttar Pradesh

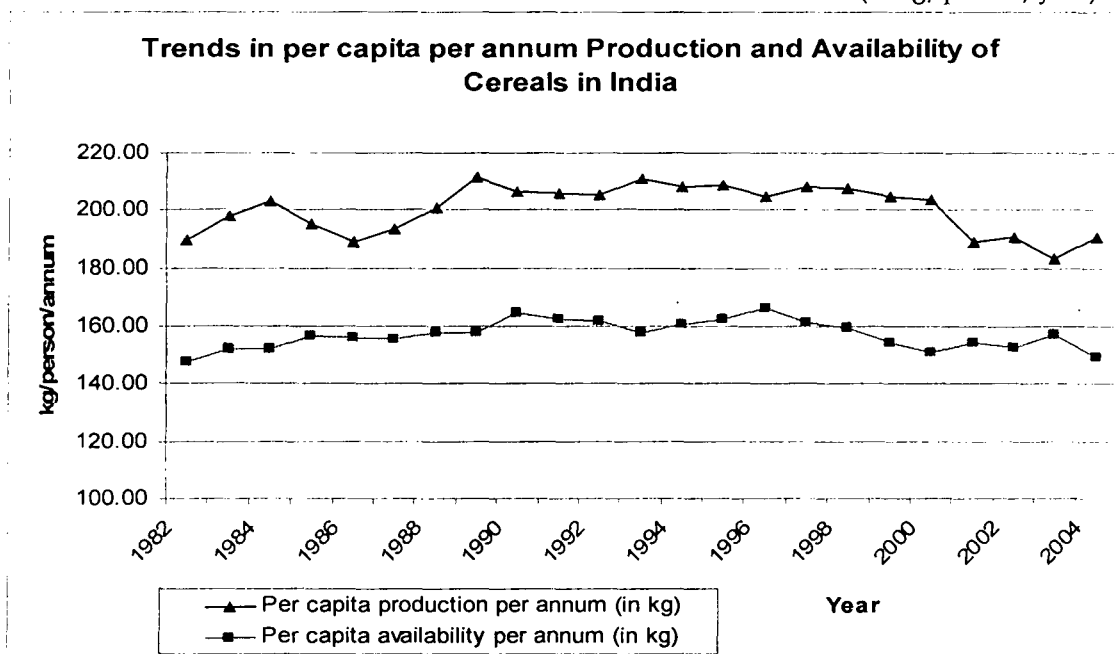
Imports = Imports - Exports). Net availability of food grain (NAF) is given as follows¹⁰:

$$NFA = GP - SFW - e + i + s$$

where NFA is net food grains availability, GP is gross production of food grains, SFW is seed, feed and wastages of food grains, 'e' is export of food grains, 'i' is import of food grains and 's' is reduction in stock of food grains.

Figure 4.2: Trends in per capita per annum Production and Availability of Food Grains in India (Three Year Moving Average)

(in kg/person/year)



Source: Economic Survey, Various Issues

From the Figure 4.2, it is clear that both per capita per annum food grain production and availability have been rising in India since 1980s. But from mid-1990s onwards we find that along with a decline in per capita food grain production, per capita food grain availability of the country is also falling. Per capita per annum food grains availability also provides good estimates of total food grain consumption (total food grain absorption) in the country (George, 2002, Patnaik, 2007). Total food grain absorption or consumption includes both direct and indirect consumption of food grains. The former implies direct intake of food grains as staple food and the latter implies indirect intake of food grains through the consumption of animal products (food grains as feed) and processed

¹⁰ Agricultural Statistics at Glance

foods (food grains as inputs for the processed food industry). In an economy with an ever rising per capita income, it is expected that total absorption of food grains will also show a rising trend and will be accelerated by the shift in consumption basket towards indirect consumption of food grains¹¹. However, in India it is to be noted that per capita food grain availability (total absorption of food grains) shows an alarming trend of decline since mid-1990s¹². Patnaik (2007) argues that 'this declining trend of food grains absorption in India is consistent only with worsening of income distribution....'

4.2.1 Changes in Food Policies

To analyse the functioning of food policy in recent times, we have examined the changes happened in net food grain availability through the trends in its components, which includes production of food grains (see previous section), net imports and change in government stocks.

From the table 4.4 we can observe that India has been a net exporter of food grains since 1995, reaching its top during early 2000s when net exports of the country reached 8.5 million tones in 2002-03. Besides net exports, food grains stock in the country has also accumulated during late 1990s and early 2000s. Net exports and accumulation of food grains are the factors that reduce the availability of food grains in a country and create supply constraints. We shall examine the issue of stock accretion and its impact on net food grains availability.

The stocks in a country can increase over time either due to an increase in production and procurement of food grains or a decrease in net imports or a combination of both of these. If actual buffer stock keeps depleting or rising for a couple of years successively, it has serious implications, particularly for food availability, fiscal resources, future production and trade (Chand, 2005).

¹¹ In developing economies the income elasticity of demand for animal products and processed food (indirect consumption) is around 1.6 (Patnaik, 2007).

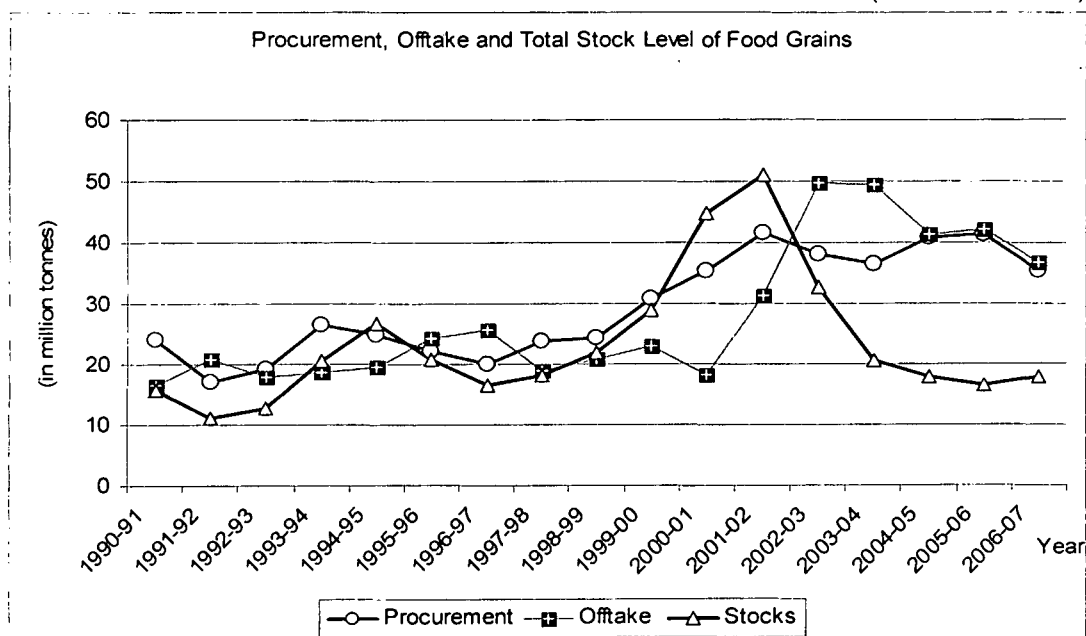
¹² High income developed countries like USA absorbed 850 kg of food grains per head annually. China absorbed 325 kg, Mexico absorbs 375 kg, Japan and Europe absorbs nearly four times of food grains than that of India, whose per capita absorption of food grains is below 200 kg (Patnaik, U. 2007).

Table 4.4: Net Food Grain Availability and its Components

Year	1	2	3	4 (1+2+3)	5	6
	Net Production (in million tonnes)	Net Imports (million tonnes)	Change in Government Stocks (in million tonnes)	Net Availability (million tonnes)	Population (million)	Per capita net availability per day (in gms)
1990	138.4	0	(+)6.2	132.3	832.6	435.3
1991	141.9	(-)0.6	(-)4.4	145.7	851.7	468.5
1992	136.8	(-)0.7	(-)1.6	137.7	867.8	434.5
1993	145.8	2.6	(+)10.3	138.1	883.9	427.9
1994	149.6	0.5	(+)7.5	142.6	899.9	434
1995	155.3	(-)3.0	(-)1.7	154	922	457.6
1996	147.1	(-)3.5	(-)8.5	152.1	941.6	442.5
1997	162	(-)0.6	(-)1.8	163.2	959.8	466
1998	156.9	(-)2.9	(+)6.1	147.9	978.1	414.2
1999	165.1	(-)1.5	(+)7.5	156.1	996.4	429.2
2000	171.8	(-)1.4	(+)13.9	156.6	1014.8	422.7
2001	162.5	(-)4.5	(+)12.3	145.6	1033.2	386.2
2002	174.5	(-)8.5	(-)9.9	175.9	1050.6	458.1
2003	143.2	(-)7.1	(-)23.2	159.3	1068.2	408.5
2004	173.5	(-)7.7	(-)3.3	169.1	1085.6	426.9
2005	162.1	(-)7.2	(-)2.4	157.4	1102.8	390.9
2006	170.8	(-)3.8	(-)1.8	168.4	1119.8	412.8
2007	177.7	(-)7	(+)1.7	168.9	1136.5	407.4

Source: Economic Survey, Various Issues

Figure 4.3: Total Stocks of Food Grains, Procurement, Offtake
(in million tonnes)



Note: Total stock of food grains include coarse cereals also. The stocks shown here are at end of the March. Offtake of food grains not only include offtake through PDS but also through welfare schemes and subsidized open market sales

Source: Economic Survey, Various Issues

Procurement and offtake are the most proximate determinants of total food grain stocks in a country. In a particular year, suppose the quantities of both procured and offtaken food grains are happened to be equal, then there won't be any addition to the total stocks of food grains. And if the former is greater than the latter, there will be accumulation of stocks and vice versa. This has important implications as far as net food grains availability is concerned. Since 1998-99 (immediate year after the introduction of targeted public distribution system), till 2001-02 we could see that, total food grains stock in India had been rising significantly (see Figure 4.3). The net availability of food grains declined to 147.9 kg/year in 1998-99 in comparison to 163.2 kg/year in 1997-98; it increased to 156.6 kg/year in 1999-00 and remained stagnant in 2000-01 as well. But, in 2001-02, the net availability of food grains declined to 145.6 kg/year¹³ (see table 4.4). In these years, it is to be noted that total offtake of food grains was, in fact, lagging behind the increasing procurement of food grains (see Figure 4.3). But in 2002-03 and 2003-04, when offtake of food grains rose above the procurement levels, food grains stocks recorded a steep depletion. Correspondingly, in 2002-03, net availability of food grains increased¹⁴; but in 2003-04 it recorded a considerable decline due to shortfall in domestic food grains production (see Table 4.4). In short, the accumulation of stocks during late 1990s and early 2000s is largely due to the increase in the procurement of food grains and lagging offtake in those years. This has adversely affected the net food grains availability in India. The increased offtake and more or less stagnant procurement led to the depletion in the stocks after 2001-02.

The accumulation of food grains stocks is partly contributed by the increased food grains procurement by Food Corporation of India (FCI). The rising

¹³ The share of open market sales for export market in total offtake of food grains increased from 7.9 per cent in 2000-01 to 17.88 per cent in 2001-02. And the net exports of food grains increased 1.4 million tones during 2000-01 to 4.5 million tones in 2001-02. This might have contributed to the fall in net food availability of food grains (Economic Survey, Various Issues).

¹⁴ In 2002-03, more quantities of food grains are offtaken through PDS, other welfare schemes and also the open market sales. In 2003-04, except for open market sales, in other categories food grains offtake has increased. In order to raise the PDS offtake, government took several measures including increasing the quantum of subsidized food grains allocation to BPL and AAY categories, reduction in the central issue prices of food grains allocated to APL etc. in these years.

administered support prices¹⁵ for rice and wheat, fixed by FCI, played a major role in the increased procurement of rice and wheat in the country¹⁶. Increasing level of FCI procurement has two implications: (i) accumulation of stocks, given lower offtake of food grains (ii) lesser participation of private traders.

Notwithstanding the fact that stock accumulation is indispensable in stabilizing food grains prices at the time of scarcity by depleting the stocks, it also involves some cost, especially the maintenance cost. Jha and Srinivasan (2001) pointed out that in the total economic cost involved in the food management in India the component of storage cost showed higher growth rate in recent years. This is a direct consequence of accumulation of stock which is kept away from distribution.

Another implication is the lesser participation of private traders in food grain market due to the dominance of government agencies. Chand (2005) observes that share of private traders in the procurement of marketable surplus of food grains has been coming down. For instance, in case of wheat procurement, in 1995-96, 56 per cent of procurement of marketable surplus was carried out by private traders and the rest by government agencies; but 2000-01 the procurement by private traders declined to 22 per cent and government agencies rose to 78 per cent. According to Chand (2005) this is because of four reasons: (i) lower rate of increase in retail prices compared to procurement and wholesale prices (ii) huge buffer stock with government, which will force the government to deplete it and in that case it will dampen the prices and affect the private traders who stored food grains before this happens (iii) there was an opportunity to buy some quantity of food grains at lower prices during lean season compared with

¹⁵ Detailed table on minimum support prices is given in Appendix Table No. A3.1

¹⁶ In case of wheat, the procurement price has mostly acted as a support price whereas for rice it is a levy on the rice millers. This administered pricing of procurement, often, influences the procurement of food grains by private traders as well. Sometimes traders are not being allowed to bid in the procurement season until the FCI achieved its procurement target (Jha and Srinivasan, 2001). As a matter of fact, FCI dominates in the procurement of food grains. With ever rising procurement prices, FCI's procurement of food grains is also rising over time. In the years when stock accumulated (1998-99 to 2001-02) and per capita net food grains availability declined the share of procurement in production has increased from 15 per cent to 25 per cent.

harvesting season¹⁷ (iv) private traders find it cheaper to buy food grains from government rather than from the market¹⁸.

Besides the increased procurement, we have observed that there has been a problem of lesser offtake of food grains in India during late 1990s and early 2000s. PDS being instrumental in food grains offtake in India, in order to understand the situation of lagging offtake, in the next section we shall examine the recent functioning of PDS in India.

4.3 Public Distribution of Food Grains in India

The public distribution system or PDS is a rationing mechanism that entitles¹⁹ households to specified quantities of selected commodities at subsidized prices (Swaminathan, 2000). Along with food grains the selected commodities include sugar, edible oil, kerosene etc, which are essential for a household. The system has been instituted so as to achieve the following objectives (Bapna, 1990);

- To maintain price stability
- To increase the welfare of the poor by providing them access to basic food at reasonable prices.
- To keep a check on private trade
- To ration during the situations of scarcity

Besides these objectives, PDS has also been viewed as a major instrument in combating the problem of poverty (Swaminathan, 2000).

4.3.1 Public Distribution System under a Targeted Regime

Significant changes were made in the functioning of PDS in India since 1991 as a part of structural adjustment programme. Retreating from the principle of universality, new principles of targeting were introduced. This was to address the food needs of poor in a more precise manner, thus reducing the leakages and

¹⁷ The private sector normally buys during the harvest period and sells in subsequent months, and doesn't withhold the produce from the market for more than a year (Chand, 2005)

¹⁸ During 2001-02 government sold nearly 55 million tones of food grains in open market; for wheat was offered for sale at Rs. 650/quintal in the north, Rs. 695 in the west, Rs. 720 in the south and Rs. 705 in the east zone (Department of Food and Public Distribution, 2002)

¹⁹ Entitlement of a household refers to the quantity, prices and range of commodities.

fiscal burden of huge food subsidies. Revamped PDS in 1991 that involved the targeting of specific geographical areas paved way for Targeted PDS (TPDS) in 1997²⁰. Targeted PDS differs from earlier programmes in the following ways;

(i) Targeting

Based on the poverty line specified by the Planning Commission, the beneficiaries of PDS have been divided into two groups: above poverty line (APL) and below poverty line (BPL) population. Differential treatments are extended to these two groups in terms of quantities of commodities distributed and price charged and in turn the food subsidies itself. In order to address the food needs of the bottom 5 per cent of population (poorest of the poor), who are devoid of two square meals a day, government introduced Antyodaya Anna Yojana (AAY) on December 2000. For them food grains are charged a price which is even less than that of the BPL families (Annual Report, Department of Food and Public Distribution, 2004-05).

Any form of targeting policies has two types of errors; Type I and Type II errors. Type I error refers to the exclusion of genuinely poor or deserving households from a programme, i.e. wrong exclusion. Type II error refers to the inclusion of non-eligible persons or households in a programme, i.e. wrong inclusion (Cornia and Stewart, 1993). The costs associated with type I and type II errors are welfare costs and fiscal profligacy respectively. In TPDS, whose primary objective is the provision of cheap food to the poor, type I error can possibly dominate the scene by excluding a section of the poor people and targeting only a few. This exclusion happened in India when the targeting is carried out on the basis of official poverty line. Scholars have expressed serious doubts over the methodology which has been employed to arrive at poverty estimates. Poverty line income was, in fact, conceptualized and constructed on the basis of minimum required calorie intake, during 1979. The poverty line income, according to the Task Force

²⁰ 'The failure of universal PDS (UPDS) to serve the population below poverty line due to its perceived urban bias, limited coverage in states with higher concentration of poor, and the government streamlined the PDS by issuing special cards to below poverty line families aimed to provide food grains at subsidized rates with effect from June 1997' (Annual Report, Department of Food and Public Distribution, 2004-05).

of 1979, is the minimum level of income required to purchase a food basket that provides minimum necessary energy of 2400 Kcal per day in rural areas²¹. Over time divergence has taken place between calorie intake and poverty line income when poverty line income was upgraded using price indices. As a result, the present poverty line income offers only an underestimate of the actual number of poor, because using present poverty line income a poor Indian can only buy a food basket which gives him/her less than the minimum calorie level of 2400 Kcal per day. Considering these methodological issues, the Expert Group to Review the Methodology for Estimation of Poverty, 2009, reconsidered the poverty line income and offered higher estimates of poverty in both rural and urban India during 2004-05 against the official poverty estimates of the Planning Commission. But the new estimates also diverge from the calorie norm and thus provide underestimates. Several studies have questioned this particular revision in regard to the loose grounds on which these estimates have been based (Swaminathan, 2010, Ramkumar, 2010, Patnaik, 2010). For a targeting programme like PDS, these underestimate of poverty has important effects. These effects are often adverse as there is a likelihood of exclusion of several people who are actually poor from the benefits of targeted programmes.

(ii) Entitlements

Ration scales are typically defined in terms of certain quantities per person or per unit (with an adult equivalent to two units and a child equivalent to one unit). In TPDS *in lieu* of per person, the entitlement is defined in terms of per household, irrespective of its size and needs (Swaminathan, 2008). In 1997, only 10 kg of food grains were allotted to a BPL household. Later the quantum has been raised to 20 kg and 35 kg per month during 2000 and 2002 respectively. For APL and Antyodaya families also the quantity has been increased to 35 kg per month from April 2002. And differential pricing has been followed according to the categories. In the category of AAY, Rs. 2 and Rs. 3 per kg have been charged for rice and wheat respectively (Annual Report, Department of Food and Public

²¹ In India, The Task Force on Projection of Minimum Needs and Effective Consumption Demand, 1979 stipulated 2400 Kcal and 2100 Kcal per capita per day as minimum RDA for rural and urban areas correspondingly.

Distribution, 2004-05). In March 2000, it was announced that the central issue price will be set at half the economic cost incurred by FCI for BPL households and at the full economic cost for APL households. As a result the gap between APL and BPL prices has widened and that of APL and market prices has reduced. This might get reflected in their offtake also (Swaminathan, 2008).

(iii) Centre-State Controls

Earlier state governments (who designs and manages their own PDS) demand certain allocations from the central pool, based on certain criteria, and central government allocates it to them. Under TPDS, the size of the BPL population and the entitlements for the BPL population are decided by the central government. Additional allocations done by the state governments usually incur higher costs²² (Swaminathan, 2008).

4.3.2 Public Distribution System in Recent Times

In 1992-93 only 11 per cent of food grains available in the country had been distributed through PDS. Since the inception of TPDS in 1997, the share registered a decline from 11.71 per cent to 8.82 per cent by 2001-02 (Table 4.5). But it improved significantly to 16.18 per cent by 2004-05 due to increased offtake of food grains through PDS under different categories after 2001. When stocks were accumulated during late 1990s (especially after the introduction of TPDS) and early 2000s, government has taken several measures, including higher allocation to BPL and APL categories, reduction of central issue price for APL categories, in order to raise the consumption through PDS and thus reduce the stock level.

PDS works along with open markets, through which large share of food grains are made available. Compared to 1990s, the share of open market has come down after 2003-04 because of the greater allocation made by government in the category of PDS and greater offtake of food grains through PDS (see Table 4.5

²² "Additional allocations under TPDS over and above the normal TPDS allocations of food grains are made by the Department of Food and Public Distribution on its own if so desired by the state governments at economic cost or open market sales rates time to time....." (Annual Report, Department of Food and Public Distribution, 2004-05)

and 4.6). Although government has made greater allocations through PDS, we find that the offtake by people hasn't improved proportionately.

**Table 4.5: PDS and Open Market Sales in Net Food Grain (Cereals)
Availability (NFA)**

Year	Net Availability of Food Grains (in million tonnes)	PDS Distribution (million tonnes)	Open Market Distribution (in million tonnes)	PDS as a percent of NFA	Open Market as share of NFA*
1992-93	148.5	17.02	131.48	11.46	88.54
1993-94	149.8	14.78	135.02	9.87	90.13
1994-95	154.8	12.86	141.94	8.31	91.69
1995-96	166.7	15.56	151.14	9.33	90.67
1996-97	163.3	19.66	143.64	12.04	87.96
1997-98	176.2	16.98	159.22	9.64	90.36
1998-99	159.6	18.69	140.91	11.71	88.29
1999-00	169.4	17.07	152.33	10.08	89.92
2000-01	168.3	12.04	156.26	7.15	92.85
2001-02	157	13.84	143.16	8.82	91.18
2002-03	189.5	20.13	169.37	10.62	89.38
2003-04	170.1	24.19	145.91	14.22	85.78
2004-05	183.3	29.65	153.65	16.18	83.82
2005-06	170	31.39	138.61	18.46	81.54
2006-07	181.9	31.6	150.3	17.37	82.63

*Note: * We arrived at the share of open market in total food grains distributed as a residual of share of PDS in net food grains availability. It is not necessary that open market share follows the same figure in the Table 4.5, because in net food grain availability the production carried out for own consumption by food producing households also will be included, which may not arrive at market.*

Source: Economic Survey, Various Issues

**Table 4.6: Allocation to and Offtake from PDS (Rice and Wheat)
(in million tonnes)**

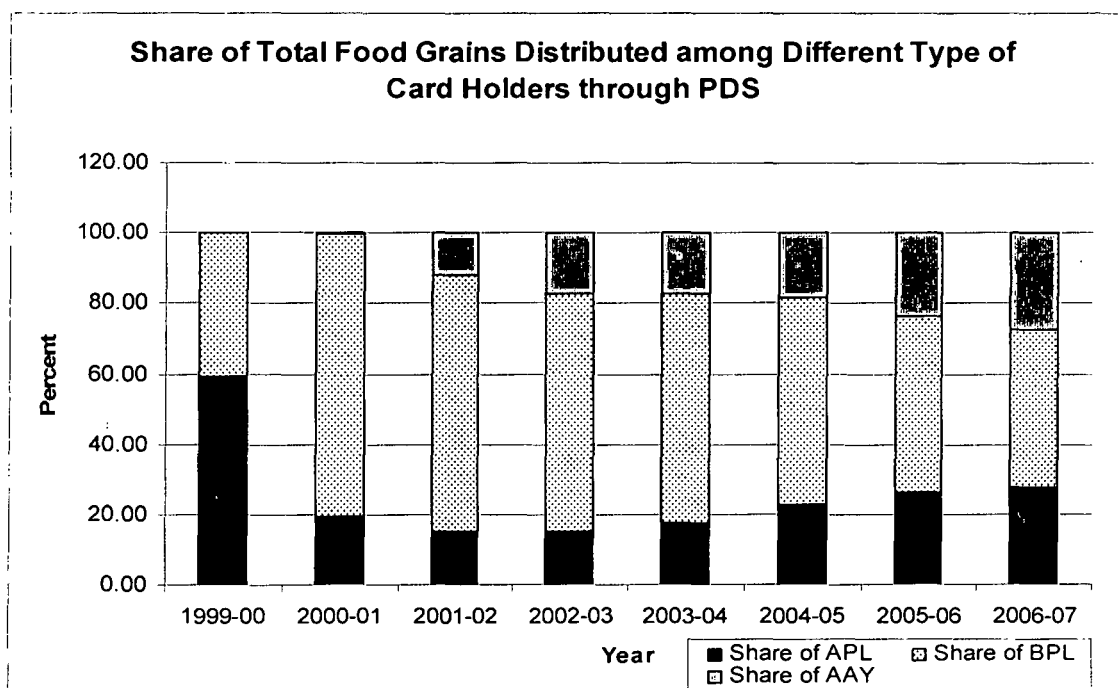
Year	Allocation (in million tonnes)	Off take (in million tonnes)	Gap between allocation and off take (in million tonnes)
1992-93	20.73	17.02	3.71
1993-94	21.97	14.78	7.19
1994-95	24.12	12.86	11.26
1995-96	25.93	15.56	10.37
1996-97	25.81	19.66	6.15
1997-98	22.94	16.98	5.96
1998-99	23.04	18.69	4.35
1999-00	24.26	17.07	7.19
2000-01	27.83	12.04	15.79
2001-02	30.37	13.84	16.53
2002-03	74.68	20.13	54.55
2003-04	71.57	24.19	47.38
2005-06	71.99	31.39	40.6

Source: Economic Survey, Various Issues

It is evident from the Table 4.6 that both the allocation to and offtake from PDS has been rising over time, but the gap between the two are also rising. In other words offtake is not rising proportionately as of allocation. The lower offtake is possibly in the APL category (see Figure 4.4). This can be due to two major reasons: (i) the errors involved in the targeting may exclude the poor from accessing cheap food grains. People who are genuinely poor, but categorized as APL, can't avail the benefits of subsidized food grain distribution. The central issue price has been set at half the economic cost incurred by FCI for BPL households and at the full economic cost for APL households. As APL prices are nearly equal to the market price, there is no incentive for a person to go fair price shop (ii) the poor quality of grains, diversion of grains to open market by illegal methods, high transaction cost, inadequate physical access due to the locational distribution of ration shops etc. can deter people from accessing cheap food through the PDS (Suryanarayana, 2008).

We shall also examine the share of different card holders (APL, BPL and AAY) in the total offtake from PDS to understand its utilization²³.

Figure 4.4: Share of Offtake of Food Grains from PDS by Different Card Holders



Source: Economic Survey, Various Issues

²³ For detailed picture of PDS utilization and coverage see Appendix Table No. A3.2

From the figure 4.4 it is clear that the offtake from PDS by BPL category is larger except for 1999-00. After 1999-00, the central issue price for wheat distributed in APL category has increased from Rs. 682 per quintal to Rs. 830 per quintal; for rice the increase was from Rs. 905 per quintal to Rs. 1130 per quintal and consequently APL share in total PDS offtake has come down. APL share after 2000-01 shows slow increase because of the reduction in central issue prices initiated in later years (Rs. 610 per quintal for wheat and Rs. 795 per quintal for rice). As a matter of fact, we understood that APL category was unable to access food grains when issue prices were higher. Apart from the problem of higher issue prices, vital flaws lies in the bifurcation of population into APL and BPL categories and targeting the benefits.

(i) Targeting Errors

Errors in targeting (especially errors of wrong exclusion) can bring a paradoxical situation in which higher allocations are not getting translated into higher offtakes. Suppose a sizeable section of the poor people possesses APL card, rather than an AAY or a BPL card, they may not be able to derive the benefits of subsidized provision of food grains, even though greater allocations are made. They are virtually excluded from the benefits of PDS because they possess APL card by which they are ineligible for food subsidies.

Table 4.7: Errors in Targeting in 2004-05 (All India)

Bottom 4 MPCE Classes		Top 4 MPCE Classes	
Type I Error (Wrong Exclusion)		Type II Error (Wrong Inclusion)	
Rural	Urban	Rural	Urban
51.2	66.6	23.8	4.1
55.7	71.7	19.8	2.2
59.2	73.6	15.2	1.5
61.7	80.1	12	0.9

Source: Calculated using data from Suryanarayana, (2008)

The bottom 4 expenditure classes in NSS surveys constitute the poorest 30 per cent of the population, who spend less than Rs. 365 and Rs. 580 per month in rural and urban areas respectively in 2004-05; while top 4 expenditure classes are richest 30 per cent of the population. From the above data, it is crucial to note that nearly more than half of the bottom 30 per cent households in rural areas do not

possess AAY or BPL cards, while in urban areas the exclusion is nearly 70 per cent. This shows the extent of Type I error of wrong exclusion. Surprisingly we observe that among rich 30 per cent, nearly 15 per cent of households in rural areas and nearly 2 per cent in urban areas hold AAY or BPL cards, which show the extent of Type II error of wrong inclusion. Surely the Type I error is greater than the Type II error, and it will have welfare costs as well. In the occupational categories, a section of agricultural labour households, who are generally poor and concentrated at the lower tails of expenditure classes, has also been excluded wrongly under this system. At all India level 52 per cent of the agricultural labour households don't have AAY or BPL cards. In the less developed Eastern regions, viz, Bihar, Orissa, Jharkhand etc the exclusion of agricultural labour households is more than 50 per cent. Such exclusion is least in Andhra Pradesh and Karnataka, 30 per cent²⁴.

(ii) Differential PDS Issue Prices

Table 4.8: Central Issue Price in PDS (Rs/quintal)

Year	Wheat		Rice	
	BPL	APL	BPL	APL
1990-91	234	234	289	289
1991 -92	280	280	377	377
1992-93	280	280	377	377
1993-94	330	330	437	437
1994-95	402	402	537	537
1995-96	402	402	537	537
1996-97	402	402	537	537
1997-98	250	450	350	700
1998-99	250	650	350	905
1999-00	250	682	350	905
2000-01	415	830	565	1130
2001-02	415	610	565	830
2002-03	415	610	565	795
2003-04	415	610	565	795
2004-05	415	610	565	795
2005-06	415	610	565	795
2006-07	415	610	565	795

Source: *Economic Survey, Various Issues*

²⁴ For detailed picture see Appendix Table No. A3.3

India followed universal PDS before 1997 in which all sections of people. Pointing out the fiscal burden caused by universal PDS, targeted PDS was introduced in 1997. Universal subsidy on food grains was removed under fiscal considerations and subsidy became more targeted. As we noted earlier, under TPDS people were bifurcated into APL and BPL categories and only BPL category was made entitled to subsidized food grains. While in APL category food grains were distributed at higher prices. The changes in central issue prices are shown in Table 4.8.

Before TPDS food grains were provided with same issue prices for APL and BPL category; Rs. 402/quintal of wheat and Rs. 537/quintal of rice. However, when targeted PDS was introduced in 1997, differential pricing was followed for both these categories. For wheat distributed in APL category central issue price was raised from Rs. 402/quintal to Rs. 450/quintal in 1997-98 further to Rs. 650/quintal in 1998-99. And in the category of BPL wheat price was reduced from Rs. 402/quintal to Rs. 250/quintal in the same period. Similar change has taken place in the issue price of rice also (see Table 4.8). When central issue prices for food grains have been reduced the offtake of people belong to APL category gradually increases. But it is to be noted that the reduced level of food grains issue prices, even for BPL category, are higher than that of the issue prices charged under a universal PDS.

Table 4.9: Annual Compound Growth Rate of Central Issue Price in PDS
(in per cent)

Time Period	Central Issue Price	
	Rice	Wheat
1990-91 to 1996-97	10.88 (NA)	9.44 (NA)
1997-98 to 2000-01	17.31(17.31)	22.64 (18.40)
2001-02 to 2006-07	-0.86 (0.0)	0 (0.0)
1990-91 to 2006-07	6.53 (4.28)	6.17 (3.65)

*Note: Growth rates in parenthesis are annual growth rate in CIP of BPL category.
Source: Calculate using Economic Survey, Various Issues*

From the above Table 4.9, it can be seen that during the initial years of TPDS (1997-98 to 2000-01) annual growth rate in the central issue prices (CIP) in APL and BPL categories were significantly higher compared to previous period. When the problem of stock accumulation occurred during late 1990s and early 2000s,

central issue prices were reduced to deal the situation. The annual growth rate in central issue price in both APL and BPL categories after 2001-02 recorded a negative trend.

4.4 Summary

During the past decade Indian agriculture has been witnessing a change in cropping pattern in favour of non-food grains. The area devoted to food grains cultivation has been declining in India. The yield growth rate has also shown deceleration especially in post 1990s. As a result the growth rate of food grains production has lowered in recent years. Within the food grains also, we could observe a shift in cropping pattern in favour of superior grains such as rice and wheat away from coarse grains. This resulted in an absolute decline in the output of coarse cereals. Since coarse cereals are often cultivated for self consumption, mostly by the lower expenditure classes, its decline in production can adversely affect the coarse consumption of those people. When comparing the growth rate of food grains production with that of population growth rate, we observed that, for the past one decade food grains production was lagging behind the population growth rate. Consequently, we have observed a decline in per capita food grains production. Besides per capita food grains production, per capita net availability of food grains also shows decline in the similar period. Net exports of food grains and the accumulation of food grains stocks during that period had often adverse impacts over net food grains availability. Stock accumulated during late 1990s and early 2000s was due to the increased procurement of food grains and lagged offtake of cereals. It is to be noted that the period was characterized by the functioning of targeted PDS, by which beneficiaries of PDS were categorized into above poverty line (APL) and below poverty line (BPL) groups. Subsidized provision of food grains was restricted to BPL category only and APL category was excluded from accessing subsidized food grains since they were charged with higher prices which are almost similar to the economic cost of FCI. As a result APL offtake from PDS declines and thus stock accumulation occurred. Later on issue prices were reduced for APL categories and gradually their offtake slowly started picking up. However, the gap between allocated and

offtake food grain from PDS is widening, indicating that APL categories are even finding it hard to access food at current issue prices, which are much higher than the prices in universal PDS. It is not necessary that people in APL category belongs to higher expenditure classes. In this chapter we have observed the extent of type I error in PDS (wrong exclusion of actual poor), by which a large section of lower expenditure classes are excluded from the provision of subsidized food grains. Hence these people may face higher food grains prices both at PDS and at open market. This can possibly constrain their food grains consumption. On the contrary, poor people who benefitted from the provision of subsidized food grains can possibly increase their food grains consumption owing to the greater allocations made by the government, especially since 2001-02, in BPL and AAY categories. This again is consistent with our results of small increase in cereals consumption the bottom-most expenditure class. In short, we find problems with the functioning of PDS under targeted regime in India, especially the problems associated with targeting. An error of wrong exclusion is higher in TPDS by which a sizeable lower income classes are excluded from the provision of subsidized food grains.

CHAPTER 5

DEMAND ASPECTS OF FOOD GRAINS CONSUMPTION

From a food security perspective, levels of employment and income are the prominent demand parameters which can determine the levels of individual food consumption. Any dearth in employment opportunities may constrain the consumption level of an individual, provided he/she has not been sufficiently insulated by any social security mechanisms or own accumulated assets. Often the discontinuous and erratic nature of employment, which may be characterized by poor quality and low wages, can adversely affect the consumption level and pattern of an individual. This could ultimately lead to poverty.

This chapter has two sections. In the first section we examine the recent changes in the level of employment and wages happened in India, which in turn affect the demand for food grains. In the second section, we shall study the issue of regional disparity in cereals consumption in India during 2004-05 as well.

Section I

5.1 Employment Scenario

Employment can be viewed in two ways: as one of the factors useful in production or as a social good. In the former sense, labour is useful only to the extent that it generates output for the market and profits for the enterprise. In the latter sense, employment is an end in itself which generates purchasing power to the poor and rescues them from the shackles of poverty (Bose, 2007). As a heavily populated developing country, whose labour force has been rapidly growing, India has endorsed the latter view regarding the employment since the early years of post-independence period¹. The withdrawal and employment of surplus labour from rural areas have also been given top priority (Vaidyanathan, 1994). When growth was unable to reduce the levels of unemployment and poverty,

¹ The Fifth Plan (1974-79) reoriented the pattern of growth in favour of employment intensive sectors (Fapola, T.S., 2007).

special programmes were initiated for that purpose. Needless to say, these programmes were not integrated to the development of agriculture and rural infrastructure (Radhakrishna, 2002). For the recent decades the employment elasticity of our economy has been declining. Papola (2007) has observed that the employment elasticity in Indian economy has declined from 0.61 in 1972-73 to 1977-78 to 0.15 in 1993-94 to 1999-00. More clearly, while output grows at impressive rates of 6 to 7 per cent, the employment has failed to keep pace.

Table 5.1: Annual Compound Growth Rate in Employment (Work Participation Rate), based on Usual Principal and Subsidiary Status

States	Rural (in per cent)		Urban (in per cent)	
	1983 to 1993/94	1993/ 94 to 2004/05	1983 to 1993/94	1993/ 94 to 2004/05
Andhra Pradesh	1.38	0.85	2.89	1.64
Assam	4.30	2.89	-2.76	1.71
Bihar	-0.01	-0.54	0.18	-2.43
Gujarat	1.70	2.24	0.35	2.88
Haryana	-2.09	3.14	3.39	2.12
Karnataka	1.63	1.57	0.37	2.71
Kerala	-1.03	2.90	4.08	1.90
Madhya Pradesh	1.54	-1.19	1.85	0.21
Maharashtra	1.21	1.89	3.16	3.62
Orissa	1.89	1.34	1.68	1.58
Punjab	-1.09	2.82	1.93	3.81
Rajasthan	0.91	2.32	0.36	3.87
Tamil Nadu	1.54	-0.72	2.12	1.21
Uttar Pradesh	1.14	1.71	2.55	2.78
West Bengal	1.55	1.66	1.40	3.08
All India	1.13	1.86	1.96	2.75

Source: Computed using the data from NSSO Reports on Employment and Unemployment, Various Issues

At all India level, there has been an increase in the annual growth rate of employment in post-1990s, both rural and urban areas. But it was confined to certain states only. In rural areas, the employment growth rate has declined in states like Andhra Pradesh, Assam, Karnataka, Madhya Pradesh, Orissa and Tamil Nadu. While in urban areas, the rate declined in Andhra Pradesh, Bihar, Haryana, Kerala, Madhya Pradesh, Orissa and Tamil Nadu.

Table 5.2: Annual Compound Growth Rate in Sectoral Employment in Rural India
(in per cent)

States	Agriculture		Non-Agriculture	
	1983 to 93	1993 to 04	1983 to 93	1993 to 04
Andhra Pradesh	0.64	0.45	1.02	4.25
Assam	3.52	1.35	3.27	3.92
Bihar	0.86	-0.30	0.26	3.58
Gujarat	0.87	1.61	4.79	2.37
Haryana	-3.17	0.86	-0.64	4.21
Karnataka	0.67	1.11	2.81	1.23
Kerala	-1.68	-0.26	0.97	5.14
Madhya Pradesh	1.61	-1.29	1.83	4.48
Maharashtra	0.91	1.47	3.20	3.06
Orissa	1.92	-0.32	0.78	5.68
Punjab	-0.49	0.73	3.92	4.26
Rajasthan	0.28	2.27	5.28	5.96
Tamil Nadu	0.70	-1.21	2.69	0.92
Uttar Pradesh	1.50	1.01	2.69	4.77
West Bengal	-0.11	1.50	4.70	1.74
All India		1.26		4.16

Source: Computed using the data from NSSO Reports on Employment and Unemployment, Various Issues

The decline in overall employment growth rate in certain states is due to the reduced employment growth rate in agricultural sector. Even the increased growth rate in non-agricultural employment was not able to raise the total employment in those states. In other states, where overall employment growth rate has increased is owing to the contribution from non-agricultural sectors, viz; construction, trade, transport etc. The declining growth rate of agricultural employment is quite consistent with the output performance of agriculture in the post-liberalisation period. The annual growth rate of output in agriculture and allied sectors during 2000-01 to 2004-05 was 2.02 per cent, the lowest annual growth rate recorded in the sector since 1980-81. In the same period we witness better performance of non-agricultural employment. This impressive trend of non-agricultural employment, when the corresponding situation in agriculture is murky, may be distress driven. When agricultural income diminishes, hitherto non-working population enters the labour market to supplement the household income (Abraham, 2008). Thus we witness the mounting female workforce and persistence of child workers in agriculture². The migration of workers (especially

² Nearly 66 per cent of total child workers are employed in agriculture in 2004-05 (NCEUS, 2007).

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Tamil Nadu	0.70	-1.21	2.69	0.92
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² Nearly 66 per cent of total child workers are employed in agriculture in 2004-05 (NCEUS, 2007).

male workers from the dry lands of Bihar, Orissa, Andhra Pradesh, Chattisgarh) from rural to urban areas fuels this situation (Radhakrishna, 2002, Abraham, 2008). Regarding employment the major query is whether the employment in non-agricultural sectors offers better employment, in terms of quality, wages, security etc, so as to survive decently?

5.1.1 Nature of Employment

A general trend regarding the nature of employment in post-liberalization period shows that, until 1999-00 there was a marked trend of rise in casual workers in India and later on the casualisation of workers has declined and self employed people has risen (Abraham, 2008). Casual workers are considered to be the most vulnerable section among the working class population, because their jobs are insecure, of low quality and consist of trivial remunerations. The incidence of poverty is higher among the casual workers while self employed workers are deemed to be relatively well-off with at least some land holdings (Hashim, 2000). But the general trend does not get replicated at the sectoral level.

Table 5.3: All India (Rural) Sectoral Distribution of Rural Workers by the Nature of Employment (UPS)

(in per cent)

Sectors	Year	Rural Male			Rural Female		
		Self Employed	Regular	Casual	Self Employed	Regular	Casual
Primary	1983	63.2	4.3	32.6	54.7	1.2	44.1
	1987-88	61.4	4.2	34.4	56.7	2.5	40.9
	1993-94	60.4	1.8	37.9	50.8	0.5	48.7
	1999-00	58.1	1.9	40.1	48.5	1	50.5
	2004-05	63.1	1.4	35.5	56.6	0.5	42.9
Secondary	1983	50.4	30.4	19.3	52.6	18.4	28.9
	1987-88	48.1	29	22.9	51.3	17.9	30.8
	1993-94	36.7	18.3	45	52.4	9.5	38.1
	1999-00	36.4	18.2	45.5	63.6	9.1	27.3
	2004-05	34.5	15.5	50	61.5	7.7	30.8
Tertiary	1983	NA	NA	NA	NA	NA	NA
	1987-88	NA	NA	NA	NA	NA	NA
	1993-94	54.9	34.1	11	56.3	31.3	12.5
	1999-00	52.4	34.5	13.1	50	37.5	12.5
	2004-05	57.7	32	10.3	50	44.4	5.6

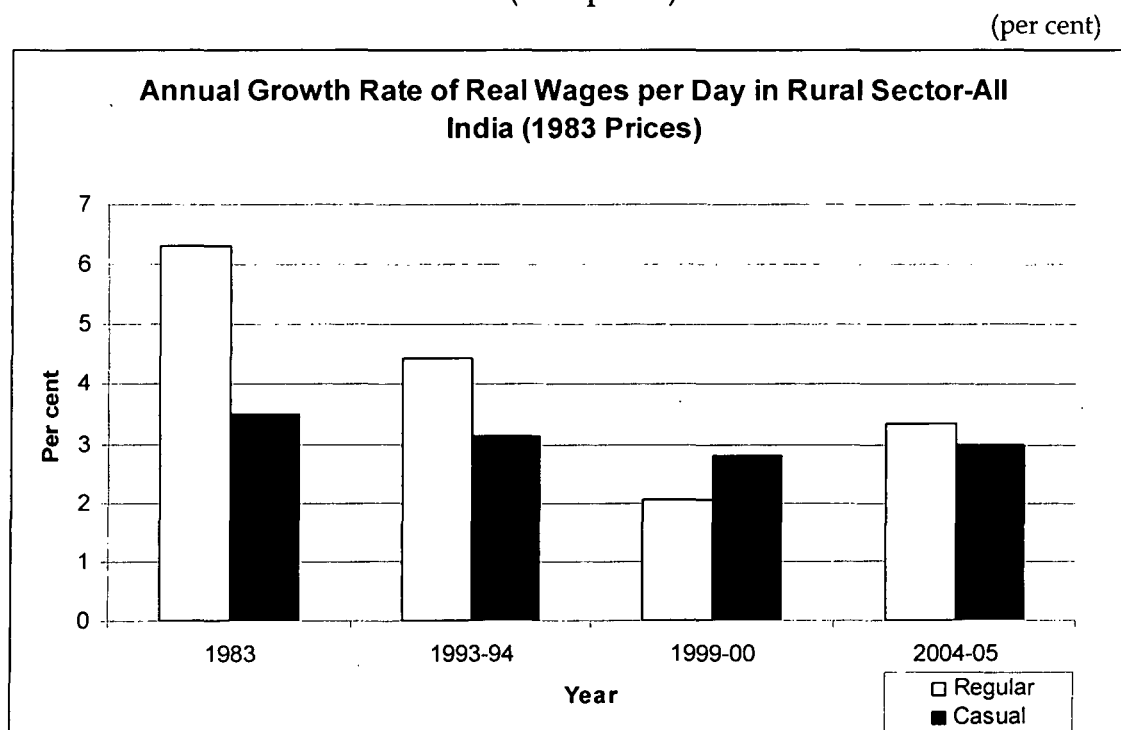
Note: For 1983 and 1987-88 the figures in secondary sector includes the tertiary sector as well.

Source: Abraham (2008)

In the primary sector the share of casual labour in total employment has in fact increased for rural males; from 32.6 per cent in 1983 to 35.5 per cent in 2004-05. However, the share of self employed workers has stagnated at 63 per cent. In case of rural females the casualisation of labour has declined slightly from 44.1 to 42.9 per cent in the same period. The problem of casualisation of labour is more evident in secondary sector, especially in post-1990s. Only 19 per cent of the rural male workers were casual labourers in 1983, but in 2004-05 casual male workers constitute nearly half of the total workforce. Among rural females the share of casual workers has stagnated at nearly 30 per cent. Therefore it is fairly clear that, the issue of casualisation of workers is much more pronounced in secondary sector in comparison to other two sectors. Self-employed workers are only one third of total rural male workers in 2004-05 in secondary sector. Being self employed in primary sector implies operating at tiny pieces of land as well as operating with large land holdings. Small holders are often vulnerable to shocks in agricultural sector, rather than large land holders.

5.1.2 Real Wage Rate

Figure 5.1: Annual Growth Rates of Real Wages per Day in Rural Sector-All India (1983 prices)



Source: Plotted using the data from Abraham, (2008)

The shrinkage of public sector employment, organized sector employment and the emergence of contractual form of work are often cited as the reasons behind the rise in the casualisation of work (Hashim, 2000). It is also to be noted that there has been a displacement of workers from large industries in urban areas, reducing regular workers to the status of casual workers (Papola, T.S., 2007).

Casualisation of work will make the conditions of workers more vulnerable. The real wage per day of a rural casual worker in 2004-05 was Rs. 13.23, while that of a rural regular worker was Rs. 38.73 (Abraham, 2008). From the figure 5.1 it is evident that the annual growth rate of real wages of a rural casual worker has, in fact, stagnated after 1990s at nearly 3 per cent. Meanwhile the wages for the regular worker has decelerated considerably after 1990s, from 6.3 per cent annual growth to 3.36 per cent by 2004-05. Abraham (2008) argues that the decline in the growth of rural wages has come about probably due to the decline in demand for casual workers owing to the farm yield diminution. Also the increased presence of female and child workforce, who have been paid less, in agriculture can depress the growth rate of wages there.

Table 5.4: Real Wages of Agricultural Labour (Men) and its Annual Growth Rate

States	Real Wages in Rs. (at 1983 prices)				Annual Growth Rates of Real Wage (in per cent)	
	1983	1987	1993-94	1999-00	1983 to 1993	1993 to 1999
Andhra Pradesh	4.57	6.99	8.45	10.92	6.34	4.37
Bihar	4.59	7.33	7.87	10.56	5.54	5.03
Gujarat	5.25	6.73	8.29	10.21	4.67	3.53
Karnataka	3.68	6.63	8.44	10.63	8.66	3.93
Kerala	10.06	13.83	17.54	24.79	5.71	5.94
Madhya Pradesh	3.47	5.96	7.39	8.05	7.85	1.44
Maharashtra	4.08	7	8.83	10.21	8.03	2.45
Orissa	3.81	6.98	8.98	9.44	8.95	0.84
Rajasthan	5.02	6.61	10.48	12.10	7.64	2.43
Tamil Nadu	5	7.96	12.15	15.58	9.29	4.23
Uttar Pradesh	3.96	6.67	8.46	9.64	7.89	2.20
West Bengal	4.85	9.58	11.21	13.09	8.74	2.61
All India	4.72	7.41	9.51	11.25	7.26	2.84

Source: Rural Labour Enquiry Report, Various Issues

Similar picture emerges from the study of real wages of male agricultural labour during the period 1983 to 1999-00. Kerala is the only state in India where annual growth rate of real wages has increased in post-liberalisation period in

comparison to pre-liberalisation period. In all other states in India, we can observe a substantial decline in the growth rate of real wages for male agricultural labour. At all India level, the annual growth rate of real wages was 7.26 per cent in pre-liberalisation period and in post-liberalisation period it declined substantially to 2.84 per cent.

Table 5.5: Share of Lower Expenditure Classes in Total Self Employed in Agriculture, Agricultural Labour and Other Rural Labour (in per cent)

States	Share of Lower Expenditure Classes* in Total		
	Self Employed in Agriculture	Agricultural Labour	Other Labour
Andhra Pradesh	39.04	57.87	43.21
Assam	34.60	61.75	60.11
Bihar	64.37	90.17	83.18
Gujarat	27.40	59.52	48.93
Haryana	17.05	40.72	44.31
Karnataka	52.68	76.04	50.05
Kerala	10.70	31.50	22.29
Madhya Pradesh	64.97	87.68	72.69
Maharashtra	43.48	72.37	51.95
Orissa	60.62	89.15	83.79
Punjab	14.30	36.87	23.80
Rajasthan	33.02	62.25	60.63
Tamil Nadu	33.23	65.99	44.97
Uttar Pradesh	54.07	70.91	70.00
West Bengal	39.13	67.96	53.28
All India	41.30	68.52	52.75

Note: * By lower expenditure classes we mean bottom 20 per cent and next 20 to 40 per cent expenditure classes

Source: Calculated from NSSO unit level data on Consumer Expenditure

Most of the labouring people in India belong to lower expenditure classes. From Table 5.5 we find that, at all India level in rural areas, out of total agricultural labourers 68.52 per cent people are from bottom 20 per cent and lower 20 to 40 per cent expenditure classes. In states like Madhya Pradesh, Orissa and Bihar the participation of lower expenditure classes in agricultural labour is even 90 per cent. The self employed people in agriculture from this quintile classes are small and marginal farmers, who are immediately vulnerable to the poor performance of agricultural sector. In the other rural labour category also we find the substantial participation of lower expenditure classes. Deceleration in the growth rate of real wages in agriculture is, therefore, a matter of concern for the lower expenditure classes.

In a nutshell, regarding the demand situations in India we find that the employment growth rate was less in several states in rural areas during post liberalization period. The rise in the growth rate of non-agricultural employment was not able to raise the growth rate of total employment due to the poor employment growth rate in agricultural sector in several states. Besides, the employment milieu of rural India has been characterized by increased casualisation of work and declining growth rate of real wages. From the above discussion, it seems that the demand conditions of lower expenditure classes have not increased adequately.

Section II

5.2 Regional Disparity in Cereals Consumption: An Earlier View³

A seminal study conducted by United Nations and Centre for Development Studies under the title '*Poverty, Unemployment and Development Policy: A Case Study of Selected Issues with Reference to Kerala*' (1975), dealt with the question of regional disparity in per capita food grain consumption in India during the year 1961-62. The issue was studied by analyzing the average per capita cereal calorie intake in different states and its likely relationship with factors such as per capita production of food grains, per capita income, unit prices of food grains and the inequality in the distribution of land.

Using a regression analysis, for all India, the study inferred that the most significant factor that influences calorie intake was the level of food grain production, rather than the per capita income and unit prices. It is to be remembered that the period was characterised by less restrictions in interregional food grain transfers. After 1957, the movement of food grains was restricted by zonal arrangements and it was removed during 1961-62. Further, the study enquired whether the above association existed in rural and urban contexts distinctly. A preliminary observation revealed that the per capita calorie intake in all states was higher in rural areas than urban, in spite of the fact that the

³ This section is based on the study conducted by UN and CDS (1975)

incomes⁴ and prices are generally higher in the latter. Unlike the result at all India level, in urban areas besides the per capita production, per capita income level also held a significant positive association with calorie intake. Thus it could be said that, per capita production and income are the major factors influencing the per capita calorie intake in urban areas. Since the income and prices in urban areas were higher than that of rural areas, the study argued that, the inter-state flows of food grains would take place in favour of urban areas.

In contrast to urban, the positive relationship between per capita (agricultural) income and calorie intake was not prevalent in rural areas. Regression analysis showed that about 73 per cent of per capita cereal consumption (or consequent calorie intake) was explained by two factors in rural areas: per capita food grain production and inequality in the distribution of land. With per capita food grain production the relation was positive and with inequality in the distribution of land the relation was negative. Including above two factors, about 88 per cent of changes in per capital cereal consumption is explained when the price factor (of cereals) was also considered. As urban prices and incomes were high, marketable surplus of food grains were likely to move in favour of urban areas. But the magnitude of this rural to urban movement would be restricted by the price factor. Due to the relatively lower share of urban population, the greater movement of this surplus might depress the price of food grains there and consequently income receipts of farmers. In such a context, within a higher food grain producing state certain marketable surplus would remain at rural areas and cater the needs of the people there. In rural areas, not only the landless non-food producers but also the small and marginal farmers were depending on market for food. It should also be noted that the land owning producers in rural areas were not dependent on the market for their food since they consume a part of their own produced output. This could imply that the distribution of land has important influence on the per capita consumption of food grains.

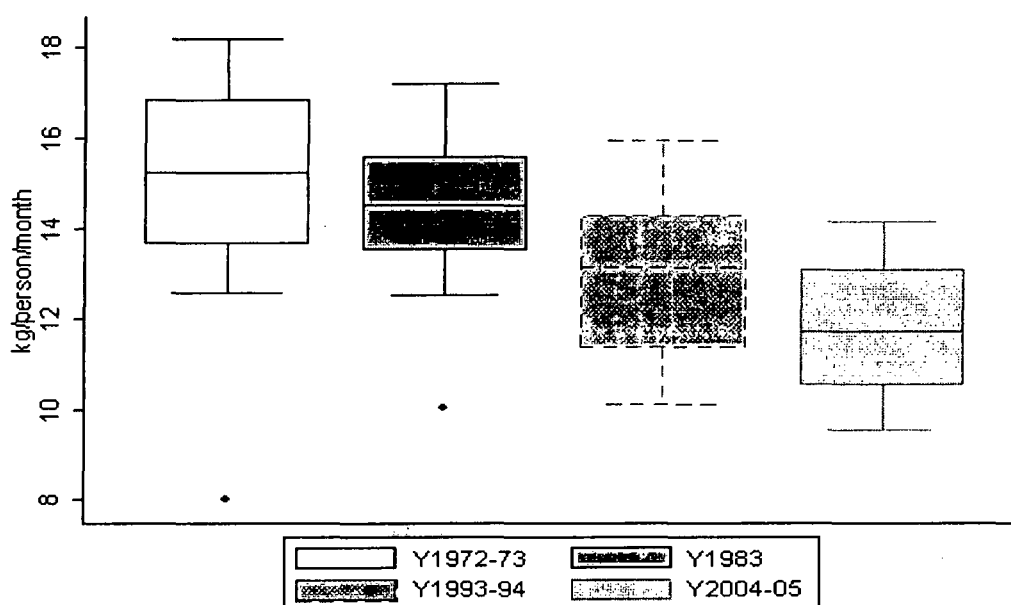
⁴ Owing to the want of separate income data on rural and urban areas, the study used the per capita agricultural and non-agricultural GDP as the incomes pertaining to rural and urban areas respectively.

Therefore, as a policy consideration, the study argued for increased production of food grains within each state (especially in deficit states) apart from the suggestions for wide public distribution of food grains. In addition, the reduction in the inequality in the distribution of land among rural population was equally endorsed by the study to tackle the problem of absolute poverty.

5.3 Regional Disparity in Cereals Consumption: A New View

The above picture regarding the regional disparity in food grain consumption had emerged before the institution of new food policies. Since 1965, the state intervened in the food grain economy through various procurement, storage and distribution policies. The remunerative prices fixed by government gave impetus for the cultivators to augment food grain production. Increased spread of public food grain distribution system across the country supports and supplements the food grain consumption of people. Post-1990s are another period of significant changes as far as the economy in general and food policies in particular are concerned. While examining the regional disparity in cereals consumption and its determinants we consider these changes as well⁵.

Figure 5.2: All India (Rural) Distribution of Average Monthly per capita Cereals Consumption (in kg) among Major 15 States in Different Years



Source: NSSO Reports on Level and Pattern of Consumer Expenditure, Various Rounds

⁵ In section I of this chapter and in chapter 5 we examine these changes in detail.

In comparison to 1970s the regional disparity in cereals consumption has declined in rural India by 2004-05, though the disparity is higher than that in 1983. Regional disparity can be lowered by raising the levels of cereals consumption in low cereals consuming states and that is an encouraging change. In contrast to it, in rural India, regional disparity is actually lowered by the universal reduction of cereals consumption in all states. This is evident from Figure 5.2 (See the median in the box plot), which shows the secular decline in cereals consumption in India, along with the reduction in regional disparity over the years. Examining the adverse effects upon nutritional status, decline in cereals consumption and consequent reduction in regional disparity cannot be viewed as encouraging sign, at least in case of the lower income classes in the Indian states.

5.3.1 Model

While examining the regional disparity in cereals consumption during 2004-05 in rural India we must seriously consider the recent changes happened in the economy. In chapter 4 and 5 we elaborated the transitions that happened to the food grains supply, distribution and demand aspects in order to understand the fall in cereals consumption in India. It is in this backdrop we initiate our linear multiple regression exercise to single out the factor/s that is/are relevant today in explaining the regional disparity in cereals consumption in rural India. The earlier study on regional disparity (1975) often consider regional disparity in calorie intake as a proxy for examining the regional disparity in cereals consumption due to the instrumental role of cereals consumption in deciding the total calorie intake. Though this instrumentality of cereals in total calorie intake persists even today (see chapter 3), for precision we consider cereals consumption as such in our exercise. The exercise is carried out for the year 2004-05 in rural areas. We have constructed a linear regression model including the following variables.

$$CON = f(PN, PDS, MPCE, WED, PR)$$

Where, *CON* is the monthly per capita cereals consumption in rural areas (in kg)

PN is per capita annual cereals production in rural areas

PDS is per household monthly consumption of cereals from Public Distribution System in rural areas

MPCE is nominal monthly per capita consumption expenditure in rural areas

WED is the annual days of wage employment without cultivated land in rural areas

PR is the unit prices of cereals in rural areas

The dependent variable is per capita monthly cereals consumption which is obtained from 61st round of NSSO consumer expenditure survey. It is to be noted that the value of dependent variable we used in the model is the average per capita monthly cereals consumption for the whole income groups in a state. We don't consider the cereals consumption of different income classes in each state distinctly in this model. Independent variables, considered in this model, are selected on the basis of their influence upon the cereals consumption from supply and demand side. Per capita annual production of cereals and per household monthly consumption of cereals from public distribution system (PDS) are the supply side factors. Assuming that most of the cereals production occurs at rural areas, we arrived at per capita annual production of cereals in rural areas by dividing aggregate cereals production of the state with the corresponding rural population. The data on production is obtained from Agricultural Statistics at Glance, Department of Agriculture and Cooperation, and rural population figures are from the population projections provided by Census India for 2004-05 on the basis of 2001 census. The data on per household cereals from PDS is obtained from the NSS report on Public Distribution System, 2004-05. From demand side, we have used monthly per capita consumption expenditure (MPCE) in rural areas and annual days of wage employment without cultivated land in each state. The former variable is taken as a proxy for per capita income and is obtained from 61st NSS CES. The latter is taken from Rural Labour Enquiry Report, published by Ministry of Labour on the basis of 61st round of NSS Employment and Unemployment Survey.

Table 5.6: Regression Results for Rural India, 2004-05

Explanatory Variables	Models				
	I	II	III	IV	V
Constant	12.09 (0.495)	13.29 (0.727)	15.97 (1.02)	20.18 (3.371)	18.97 (3.311)
PN	-0.0012 (0.001)	-0.0021* (0.001)	-0.00081 (0.0008)	-0.00052 (0.0008)	0.0004 (0.001)
PDS		-0.17* (0.081)	-0.137* (0.063)	-0.132* (0.061)	-0.12* (0.059)
MPCE			-0.0054*** (0.0017)	-0.007*** (0.0019)	-0.0087*** (0.0023)
WED				-0.015 (0.011)	-0.018 (0.0109)
PR					0.33 (0.225)
Prob >F	0.2573	0.085	0.008	0.011	0.0133
R square	0.10	0.34	0.65	0.70	0.75
N	15	15	15	15	15

Note: figures in parenthesis are standard errors

*** means significance at 1% level

** means significance at 5% level

* means significance at 10% level

Here we try to single out the most important factor/s influencing regional disparity in food grains consumption in India. In order to understand the extent of influence of each independent variable, we included them one by one in the model, to see the changes in corresponding value of R Square⁶ (see Table 5.6). In Model I, when per capita food grain production was taken as the independent variable, the value of R square was 0.10, which increased to 0.34 when we added PDS in Model II. When per capita monthly expenditure in rural areas (MPCE) has been added in Model III, the R square showed a notable increase, from 0.34 to 0.65. Similarly, when we include other variables such as, days of wage employment and unit prices of cereals in Model IV and V, the R square value has increased to 0.70 and 0.75 respectively. From the analysis, we observed that the per capita monthly expenditure and per household consumption of cereals from PDS are the most significant factors influencing the cereal consumption in rural India during 2004-05. The former is statistically significant at 1 per cent level and the latter at 10 per cent level.

⁶ R square shows the extent to which the independent variables explain the change in dependent variable.

The levels of per capita rural incomes (MPCE) hold negative relation with cereals consumption. In other words, cereals consumption is lower in states where per capita rural income is higher. This is a plausible result and can happen due to diet diversification or change in food consumption pattern. The relative importance of cereals in the diet will be reduced and pave way for non-cereals at higher levels of income. However, this phenomenon of diet diversification is likely to be restricted in the upper income classes in those states. From chapters 2 and 3 we found that the diet diversification becomes a plausible explanation for decline in cereals consumption only if the behaviour does not impair the nutritional adequacy of the person and that is true for the higher expenditure classes. At average level, in some of the low cereal consuming, high MPCE states (Punjab and Haryana) we found that the level of calorie intake is still above the required minimum.

The other statistically significant relation is the negative association between PDS and cereals consumption, which implies that in states where per household intake of cereals from PDS are low are likely to have higher average levels of cereals consumption. For explaining the relation, we need to relate PDS with levels of production. Suppose a state has higher level of per capita production of cereals, then the availability of cereals will be higher and prices will be lower. In such a situation, cereals will be available at low prices for consumption; and this is an outcome that is consistent with the objective of PDS: subsidized provisioning of cereals. Hence, in the absence of PDS also, people in those states can avail cereals at low prices. On the contrary, the states where per capita cereals production is very low, it is likely that cereals price can be higher owing to the constraints in cereals availability. At higher prices, people may find it difficult to raise cereals consumption. Besides the constraints in the availability in cereals in those states, the problems associated with targeted PDS (TPDS) can also make it difficult for people to raise consumption⁷. Because of type I error (exclusion of actually deserved or poor) in TPDS, a large section of population can't avail the subsidized food grains from PDS. As a result they will be facing the higher cereals prices in market as well. This may hinder people in raising cereals

⁷ See chapter 4 for detailed explanation of problems with targeted PDS

consumption, even though TPDS is active. In short, cereals production needs to be raised in order to raise cereals consumption in the era of TPDS. But in our regression exercise, though cereals production is positive (in model 5 in Table 5.5), it is not significant. This is because of the presence of outliers like Punjab and Haryana, where cereals production is excessively high and cereals consumption is low. Hence we attempted a correlation exercise by excluding these outliers and the results are as follows.

Table 5.7: Correlation Matrix

Variables	Consumption	Production	PDS
Consumption	1		
Production	0.5304*** (-0.3122)	1	
PDS	-0.5721*** (-0.3100)	-0.182 (-0.4252)	1

Note: figures in parenthesis shows the correlation coefficients including outliers Punjab and Haryana

**** means significance at 1% level*

*** means significance at 5% level*

** means significance at 10% level*

From the above Table 5.7, it is clear that production and consumption of cereals are positively related. The relationship is statistically significant at 1 per cent level. Although statistically insignificant, there is a negative association between PDS and production of cereals. Rather than PDS, in 2004-05, it is production that becomes a crucial factor in influencing cereals consumption in India via easing the availability constraints and thus providing cereals at cheap prices. In other words, under a targeted form of PDS, it is essential to raise domestic food grains production in each state in order to ensure the cheap availability of food grains.

5.4 Summary

This chapter looked into the demand aspects of food security, in addition to the supply aspects we discussed in chapter 4. Also, we have examined the factors that affect regional disparity of cereals consumption in India. In post-1990s, the growth rate of employment in agricultural sector was low in comparison to the previous period. The period is characterized by increasing casualisation of work and falling growth rate of real wages. These changes will not help much to maintain or raise the demand condition in an economy by improving the purchasing power of the people. Most of the wage earners in this country belong to lower expenditure classes; any shortfall in the wage income will affect their

purchasing power. From a food security point of view, lack of robust demand situation may oppose a rise in food intake. Coming into regional disparity in cereals consumption, we understood that it has declined in 2004-05 in comparison to three decades back. And this has achieved, not by raising the cereals consumption in different states, but by reducing the consumption universally across all the states. We attempted to single out the recent determinants in cereals consumption through a regression exercise. We obtained a negative significant relation between per capita income and cereals consumption, which is suggestive of the diet diversification occurring among some rich states in the country. However, we learnt from chapter 2 and 3 that the decline in cereals consumption due to diet diversification is manifesting among the richer income classes alone. We also obtained a negative relation between PDS consumption and total cereals intake, which is suggestive of higher levels of consumption in low PDS dependent states. In explaining the relation, we understood the importance of augmenting the domestic food grains production in providing cheap cereals to the people by raising the availability. The functioning of PDS in targeted system may not help in raising the cereals consumption in poor states, unless they increase their domestic food grains production.

CHAPTER 6

SUMMARY AND CONCLUSIONS

Food security is a wider concept and has three dimensions: supply, demand and nutritional dimension. We employ this understanding of food security while studying the recent changes that have been happening in Indian food grains consumption. Food grains have been the major staple diet of Indian population and they contribute lion's share of energy to an average Indian. Therefore in the deliberations of food security the consumption of food grains holds an inalienable place. Dwelling upon this significance we have studied the changing trends of food grain consumption and its nutritional implications in India since 1990s. For that purpose we have undertaken this study at disaggregated level across different regions and expenditure classes. Further, we analysed the influence of various supply and demand factors affecting food grains consumption in India.

6.1 Trends and Pattern of Cereals Consumption in India

In chapter 2 we attempted to learn the spatial and class aspect of direct consumption of food grains/cereals in India, especially after liberalization. Our study shows that both rural and urban cereals consumption has declined; but the decline in the former is greater than that of the latter. This larger reduction in rural consumption reduced the cereals consumption disparity between rural and urban areas.

In rural India, the share of rice and wheat in the cereal basket has increased since 1983. But in absolute terms, their consumption has not increased notably, especially after 1990s. On the contrary, coarse cereal consumption recorded considerable decline in rural India. In Central Indian states, the overall decline in total cereals consumption is due to the absolute reduction in the coarse cereals consumption. In Southern, Eastern and North-Western states, the absolute consumption of superior cereals has not shown notable increase during the last decade. Consequently, the total cereals consumption has fallen in those states.

Among occupational categories in rural India, agricultural and other rural labourers have lesser quantities of cereal consumption. But over time, the larger decline in cereal consumption is experienced among self employed people.

One of the prime concerns of our study is to identify the expenditure class/es that experienced reduction in cereals consumption. The study shows that the fall in cereals consumption has experienced in higher expenditure classes, rather than bottom 20 per cent expenditure class. In bottom 20 per cent, cereals consumption has, in fact, increased in almost all states. But, it declined in Bihar, Orissa and West Bengal, stagnated in Madhya Pradesh and registered a small rise of 2 per cent in Maharashtra and Karnataka. It is alarming to know that, 20 to 40 per cent expenditure class - a lower expenditure class, just above bottom 20 per cent class -has also reduced their cereals consumption in almost all states since 1990. These changes in cereals consumption have important nutritional implications, which often make people at lower rungs of the expenditure classes calorie or protein deficient and we examined those issues in the next chapter.

6.2 State of Nutritional Intake in India

In chapter 3 we studied the changes happened to the nutritional status among Indian population since 1990s as a result of the changes occurred in their food consumption pattern. We have seen that cereals consumption has an important bearing on the nutritional intake (viz. in calories and proteins) of the people. A decline in cereals consumption can possibly reduce total calorie and protein intake, unless the decline is compensated by an adequate rise in the consumption of non-cereals, which should be rich in calories and proteins. It is very clear that the calorie and protein intake of majority of the states in India have started coming down since 1972 itself. Hence, the number of calorie deficient states in rural and urban India has increased by 2004-05; though the number is relatively less in urban areas. By 2004-05, in rural India, Southern, Central and Eastern Indian states become calorie deficient; while in urban areas, Southern and Central Indian states become calorie deficient. This trend of declining calorie and protein intakes and increased incidence of calorie deficiency among Indian states are quite consistent with the obvious trend of decline in cereals consumption in all

states. Also, the number of people surviving below the norm level of calorie has increased in India by 2004-05. This happened because of the insufficient calorie intake of bottom expenditure classes and the decline in calorie intake of middle expenditure classes. Despite a greater decline in the calorie intake of higher expenditure classes, whose cereals consumption has also declined in greater quantities, they maintained adequacy in their calorie intake. In case of bottom expenditure classes, in rural areas, it is to be noted that their calorie intake hasn't declined considerably. Rather it increased in some states, remained stagnant in certain others and declined only marginal in rest of the states. And this is consistent with the rising trend in cereals consumption among bottom 20 per cent expenditure class. However, the nutritional status of people belonging to this class is indeed worrisome. In addition, in rural areas, we find a declining trend in calorie intake among middle expenditure classes, whose nutritional state is also at peril. And we find a declining trend in cereal consumption of expenditure classes belongs to 20 to 40 per cent and 40 to 60 per cent. The larger decline in cereals consumption and calorie intake among the higher expenditure classes may partly be due to the changes in their tastes and preferences and partly be due to the increased monetization (and consequent reduction of the overestimation of their calorie intake) happened in the economy. Considering the calorie deficiency, which has been on rise, we extended our enquiry of proper reasoning for the decline in cereals consumption of lower expenditure classes beyond the behavioural explanations.

6.3 Factors Influencing Cereals Consumption in India

Apart from the behavioural factors, diverse supply and demand factors still influence food grains consumption in India. In chapter 4 and chapter 5 we have examined supply and demand aspects of food grains consumption respectively. During the past few decades Indian agriculture has been witnessing a change in cropping pattern in favour of non-food grains. The area devoted to food grains cultivation has been declining in India. The yield growth rate has also shown deceleration especially in post 1990s. As a result the growth rate of food grains production has lowered in recent years. Within the food grains also, we could

observe a shift in cropping pattern in favour of superior grains such as rice and wheat away from coarse grains. This resulted in an absolute decline in the output of coarse cereals. Since coarse cereals are often cultivated for self consumption, mostly by the lower expenditure classes, its decline in production can adversely affect the coarse consumption of those people. When comparing the growth rate of food grains production with that of population growth rate, we observed that, for the past one decade food grains production was lagging behind the population growth rate. Consequently, there has been a decline in per capita food grains production. Besides per capita food grains production, per capita net availability of food grains also shows decline in the same period. Net exports of food grains and the accumulation of food grains stocks during that period had often adverse impacts over net food grains availability. Stock accumulated during late 1990s and early 2000s was due to the increased procurement of food grains and lagged offtake of cereals. It is to be noted that the period was characterized by the functioning of targeted PDS, by which beneficiaries of PDS were categorized into above poverty line (APL) and below poverty line (BPL) groups. Subsidized provision of food grains was restricted to BPL category only and APL category was excluded from the accessing subsidized food grains since they were charged with higher prices which are almost similar to the economic cost of FCI. As a result APL offtake from PDS declines and thus stock accumulation occurred. Later on issue prices were reduced for APL categories and gradually their offtake increased. However, the gap between allocated and offtake food grain from PDS is widening, indicating that APL categories are even finding it hard to access food at current issue prices, which are much higher than the prices in universal PDS. It is not necessary that all APL population belong to higher expenditure classes. In this chapter we observed the extent of type I error in PDS, by which a large section of lower expenditure classes are excluded from the provision of subsidized food grains. Hence these people may face higher food grains prices both at PDS and at open market. This can possibly constrain their food grains consumption. On the contrary, poor people who benefitted from the provision of subsidized food grains can possibly increase their food grains consumption owing to the greater allocations made by the government,

especially since 2001-02, in BPL and AAY categories. This again is consistent with our results of small increase in cereals consumption among the bottom 20 percent expenditure class. In short, we find problems with the functioning of public distribution system under targeted regime in India, especially the problems associated with targeting. An error of wrong exclusion is higher in TPDS by which a sizeable lower income classes are excluded from the provision of subsidized food grains.

In chapter 5 we looked into the demand aspects of food security. Also, we have examined the factors that affect regional disparity of cereals consumption in India. In post-1990s, the growth rate of employment in agricultural sector was low in comparison to the previous period. The period is characterized by increasing casualisation of work and falling growth rate of real wages. These changes will not help much to maintain or raise the demand condition in an economy by improving the purchasing power of the people considerably. Most of the wage earners in this country belong to lower expenditure classes; any shortfall in the wage income will affect their purchasing power. From a food security point of view, lack of robust demand situation may oppose a rise in food intake. Coming to the issue of regional disparity in cereals consumption, we found that it has declined in 2004-05 in comparison to three decades back. And this has achieved, not by raising the cereals consumption in different states, but by reducing the consumption universally across all the states. We attempted to single out the recent determinants in cereals consumption through a regression exercise. We obtained a negative and significant relation between per capita income and cereals consumption, which is suggestive of the diet diversification occurring among some rich states in the country. However, we learnt from chapter 2 and 3 that the decline in cereals consumption due to diet diversification is manifesting among the richer income classes alone. We also obtained a negative relation between PDS consumption and total cereals intake, which is suggestive of higher levels of consumption in low PDS dependent states. In explaining the relation, we understood the importance of augmenting the domestic food grains production in providing cheap cereals to the people by raising the availability. The functioning of PDS in targeted system may not help

in raising the cereals consumption in poor states, unless they increase their domestic food grains production.

Taking into account the nutritional implications of change in cereals consumption, one has to view the recent decline in cereals consumption and the consequent escalation of the number of calorie deficient people in India seriously. In the same period we have found that India experienced constraints in food grains production and problems in Public Distribution System. Also the growth rates of employment and real wages, which are vital in raising the purchasing power of the lower income groups, was less than that of pre 1990s. Rather than the rich, these changes become adverse for the poor, which can be seen from their reduced consumption of food grains/cereals and deepening of calorie deficiency. It is to be remembered that raising cereal consumption is the cheapest way to combat calorie deficiency. And, while analyzing the regional disparity in cereal consumption, we understood the instrumentality of augmenting domestic food grains production in each state in increasing the cereal consumption of people.

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APPENDIX I

Table A1.1: Share of Cereals Expenditure in Total Food Expenditure
(in per cent)

States	Share of Cereals Expenditure in Total Food Expenditure			
	Rural		Urban	
	1993-94	2004-05	1993-94	2004-05
Andhra Pradesh	41.17	35.15	33.26	29.43
Assam	48.57	37.61	33.72	27.50
Bihar	51.95	41.80	36.39	33.57
Gujarat	24.90	23.03	19.40	17.92
Haryana	21.19	17.79	19.17	16.67
Karnataka	36.83	29.61	29.36	25.72
Kerala	29.00	24.48	24.08	21.02
Madhya Pradesh	42.90	34.16	27.78	25.20
Maharashtra	30.02	28.08	21.36	20.83
Orissa	57.26	45.89	34.39	33.64
Punjab	18.18	17.89	16.95	16.90
Rajasthan	28.92	26.42	22.44	23.05
Tamil Nadu	39.33	29.78	29.93	24.17
Uttar Pradesh	35.22	32.79	25.26	25.25
West Bengal	50.69	39.95	30.52	25.96
All India	38.32	32.72	25.68	23.66

Source: Calculated from NSSO Reports on Level and Pattern of Consumer Expenditure, 50th and 61st round

Table A1.2: Share of Cereals Calories in Total Calories
(in per cent)

States	Rural		Urban	
	1993-94	2004-05	1993-94	2004-05
Andhra Pradesh	74.42	69.44	65.29	60.49
Assam	76.43	72.66	65.6	63.8
Bihar	77.5	73.58	67.09	64.11
Gujarat	59.6	58.2	49.89	46.99
Haryana	58.98	54.22	55.45	51.02
Karnataka	72.43	66.33	61.39	56.94
Kerala	59.19	54.41	55.3	50.82
Madhya Pradesh	75.03	69.49	62	60.26
Maharashtra	66.79	61.52	53.52	51.62
Orissa	83.29	79.47	67.83	70.33
Punjab	50.67	50.37	48.86	47.6
Rajasthan	67.11	64.58	59.73	57.84
Tamil Nadu	71.31	67.98	60.14	56.38
Uttar Pradesh	68.67	66.91	59.37	58.47
West Bengal	77.58	73.17	62.4	59.03
All India	71.01	67.54	58.52	56.08

Source: NSSO Reports on Nutritional Intake in India, 50th and 61st Rounds

Table A1.3: Per capita Monthly Consumption of Different Cereals since 1993-94 in Major Indian States (Rural)

(in kg per capita per month)

ANDHRA PRADESH								
MPCE Classes	Rice		Wheat		Coarse Cereals		Total Cereals	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
Bottom 20	8.82	10.63	0.04	0.16	2.15	0.82	11.01	11.62
20 to 40	11.18	11.13	0.08	0.25	1.49	0.65	12.75	12.02
40 to 60	12.3	11.82	0.16	0.38	1.39	0.69	13.85	12.88
60 to 80	13.41	11.72	0.28	0.56	1.18	0.58	14.87	12.86
Top 20	14.41	12.24	0.77	0.84	1.01	0.84	16.19	13.92
Total	11.98	11.34	0.26	0.37	1.45	0.72	13.69	12.42
ASSAM								
MPCE Classes	Rice		Wheat		Coarse Cereals		Total Cereals	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
Bottom 20	10.21	11.27	0.63	0.52	0	0.02	10.84	11.82
20 to 40	11.89	12	0.57	0.61	0	0	12.47	12.61
40 to 60	13.05	12.4	0.62	0.65	0	0	13.67	13.05
60 to 80	13.83	12.92	0.72	0.74	0	0	14.55	13.66
Top 20	14.23	13.09	0.95	0.79	0.01	0	15.19	13.88
Total	12.62	12.44	0.66	0.68	0	0	13.28	13.12
BIHAR								
MPCE Classes	Rice		Wheat		Coarse Cereals		Total Cereals	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
Bottom 20	6.58	8.04	4.63	3.92	1.15	0.38	12.36	12.35
20 to 40	8.25	8.11	6.07	4.33	0.71	0.4	15.03	12.84
40 to 60	8.79	8.21	6.73	4.96	0.68	0.46	16.2	13.63
60 to 80	9.25	8.25	7.09	5.37	0.47	0.37	16.81	13.99
Top 20	10.39	8.14	7.94	5.97	0.37	0.33	18.69	14.44
Total	8.02	8.14	5.93	4.7	0.81	0.4	14.76	13.23
GUJARAT								
MPCE Classes	Rice		Wheat		Coarse Cereals		Total Cereals	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
Bottom 20	1.25	2.02	1.85	3.45	5.88	4.57	8.99	10.04
20 to 40	1.57	2	2.99	3.48	5.53	4.85	10.08	10.33
40 to 60	1.93	2.15	4.06	3.68	4.92	4.56	10.91	10.38
60 to 80	2.17	2.13	4.78	4.16	4.66	3.73	11.61	10.03
Top 20	2.69	2.57	5.82	4.77	4.39	3.15	12.9	10.49
Total	2.03	2.18	4.21	3.93	4.95	4.15	11.19	10.26
HARYANA								
MPCE Classes	Rice		Wheat		Coarse Cereals		Total Cereals	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
Bottom 20	0.59	0.75	9.1	8.9	0.12	0.48	9.81	10.13
20 to 40	0.65	0.65	10.41	9.25	0.19	0.64	11.25	10.55
40 to 60	0.69	0.6	11.45	9.6	0.19	0.32	12.33	10.52
60 to 80	0.69	0.59	12.44	9.91	0.33	0.41	13.46	10.91
Top 20	0.74	0.69	14.08	9.99	0.48	0.43	15.3	11.12
Total	0.7	0.65	12.29	9.75	0.32	0.43	13.31	10.83

KARNATAKA								
MPCE Classes	Rice		Wheat		Coarse Cereals		Total Cereals	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
Bottom 20	2.7	5.64	0.63	1.06	7.21	4.11	10.54	10.81
20 to 40	4.81	5.45	0.71	1.01	7.25	4.26	12.77	10.72
40 to 60	6.44	5.39	0.85	1.1	6.56	4.33	13.85	10.82
60 to 80	7.89	6.09	1.18	1.12	6.42	4.02	15.49	11.23
Top 20	9.06	6.34	1.56	1.49	5.13	3.71	15.76	11.53
Total	6.07	5.68	0.97	1.11	6.56	4.14	13.59	10.93
KERALA								
MPCE Classes	Rice		Wheat		Coarse Cereals		Total Cereals	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
Bottom 20	6.62	7.75	0.35	0.47	0.01	0	6.98	8.22
20 to 40	8.34	8.26	0.61	0.75	0	0	8.95	9.01
40 to 60	9.04	8.83	0.5	0.83	0	0.01	9.54	9.67
60 to 80	9.71	8.98	0.74	1.01	0	0.01	10.46	10
Top 20	10.68	9.44	1.44	1.38	0	0.01	12.13	10.83
Total	9.61	8.94	0.94	1.04	0	0.01	10.54	9.99
MADHYA PRADESH								
MPCE Classes	Rice		Wheat		Coarse Cereals		Total Cereals	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
Bottom 20	5.25	6.69	3.74	4.66	3.25	0.99	12.24	12.34
20 to 40	6.97	5.78	5.31	5.41	1.96	1.27	14.24	12.45
40 to 60	6.97	5.33	6.43	6.09	1.88	1.13	15.28	12.55
60 to 80	6.32	5.42	7.9	6.1	2.04	0.99	16.27	12.51
Top 20	5.08	5.79	11.07	6.92	1.85	0.87	18	13.58
Total	6.09	5.94	6.23	5.59	2.33	1.06	14.65	12.59
MAHARASHTRA								
MPCE Classes	Rice		Wheat		Coarse Cereals		Total Cereals	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
Bottom 20	1.67	3.19	1.16	3.12	7.19	3.93	10.02	10.23
20 to 40	2.82	2.99	1.9	3.38	6.69	4.15	11.4	10.52
40 to 60	3.61	3.11	2.45	3.7	5.71	3.93	11.76	10.74
60 to 80	3.96	3.22	3.15	4.03	5.1	3.45	12.21	10.7
Top 20	5.08	3.14	4.57	4.62	4.45	3.18	14.11	10.93
Total	3.27	3.12	2.52	3.7	5.95	3.77	11.74	10.6
ORISSA								
MPCE Classes	Rice		Wheat		Coarse Cereals		Total Cereals	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
Bottom 20	13.02	12.4	0.14	0.21	0.57	0.31	13.73	12.92
20 to 40	15.96	13.88	0.32	0.47	0.23	0.06	16.51	14.41
40 to 60	17.2	13.97	0.53	0.9	0.19	0.02	17.92	14.89
60 to 80	17.57	13.84	0.74	1.41	0.11	0.01	18.42	15.27
Top 20	16.85	13.53	1.65	1.91	0.2	0.02	18.7	15.45
Total	15.37	13.21	0.46	0.65	0.33	0.15	16.16	14.01

PUNJAB								
MPCE Classes	Rice		Wheat		Coarse Cereals		Total Cereals	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
Bottom 20	0.37	0.84	8.17	8.48	0.02	0.06	8.56	9.39
20 to 40	0.41	0.59	8.68	8.82	0.04	0.09	9.14	9.5
40 to 60	0.63	0.66	9.19	8.9	0.12	0.13	9.95	9.69
60 to 80	0.69	0.73	9.99	9.29	0.16	0.16	10.84	10.18
Top 20	0.78	0.89	11.11	9.68	0.3	0.26	12.19	10.83
Total	0.69	0.78	10.21	9.29	0.2	0.18	11.11	10.25
RAJASTHAN								
MPCE Classes	Rice		Wheat		Coarse Cereals		Total Cereals	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
Bottom 20	0.18	0.13	6.37	8.87	5.79	3.87	12.33	12.87
20 to 40	0.21	0.17	8.02	7.97	5.49	4.36	13.72	12.51
40 to 60	0.15	0.19	9.49	8.63	5.44	3.86	15.07	12.68
60 to 80	0.26	0.2	11.32	8.76	4.43	3.89	16	12.85
Top 20	0.34	0.25	11.82	10	4.8	3.32	16.96	13.58
Total	0.24	0.19	9.93	8.9	5.07	3.83	15.24	12.92
TAMIL NADU								
MPCE Classes	Rice		Wheat		Coarse Cereals		Total Cereals	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
Bottom 20	8.15	10.63	0.1	0.18	1.42	0.5	9.68	11.32
20 to 40	10.22	10.48	0.22	0.31	1.16	0.34	11.6	11.13
40 to 60	11.37	10.61	0.32	0.45	1.04	0.26	12.73	11.32
60 to 80	12.32	10.57	0.43	0.64	0.88	0.27	13.63	11.48
Top 20	13.31	10.98	0.89	0.95	0.66	0.29	14.86	12.21
Total	11.05	10.62	0.39	0.41	1.04	0.36	12.48	11.39
UTTAR PRADESH								
MPCE Classes	Rice		Wheat		Coarse Cereals		Total Cereals	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
Bottom 20	3.57	4.44	7.99	7.97	0.68	0.33	12.25	12.75
20 to 40	4.25	4.31	8.64	7.98	0.7	0.3	13.59	12.59
40 to 60	4.23	4.26	9.59	8.24	0.64	0.35	14.46	12.86
60 to 80	4.66	4.33	10.01	8.4	0.76	0.33	15.43	13.06
Top 20	4.7	4.41	11.35	9.33	0.71	0.32	16.76	14.06
Total		4.35		8.42		0.33		13.09
WEST BENGAL								
MPCE Classes	Rice		Wheat		Coarse Cereals		Total Cereals	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
Bottom 20	11.06	11.05	0.99	0.87	0.11	0	12.16	11.93
20 to 40	13.29	11.75	1.09	0.97	0.05	0	14.43	12.72
40 to 60	14.35	12.57	1.18	1.02	0.04	0.01	15.56	13.6
60 to 80	14.98	12.9	1.3	1.33	0.04	0	16.32	14.23
Top 20	15.76	13.15	1.8	1.6	0.05	0.02	17.61	14.77
Total	13.89	12.21	1.25	1.12	0.06	0	15.19	13.34

ALL INDIA								
MPCE Classes	Rice		Wheat		Coarse Cereals		Total Cereals	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
Bottom 20	6.24	8	3.11	2.8	2.25	1.08	11.6	11.87
20 to 40	7.95	7.79	3.51	3.15	1.79	1.16	13.25	12.1
40 to 60	8.3	7.71	3.96	3.61	1.66	1.09	13.93	12.41
60 to 80	8.41	7.76	4.44	3.87	1.59	0.95	14.44	12.59
Top 20	8.34	7.55	5.51	4.64	1.53	0.8	15.38	12.99
Total	7.85	7.76	4.11	3.61	1.77	1.02	13.72	12.39

Source: Calculated from NSSO Consumer Expenditure Survey, Unit Level Data, 50th and 61st rounds

Table A1.4: Per capita Total Cereals Consumption across Expenditure Classes during 1993-94 and 2004-05 (Rural)
(in kg per capita per month)

States	Bottom 20 per cent		20-40 per cent		40-60 per cent		60-80 per cent		Top 20 per cent	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
Andhra Pradesh	11.01	11.62	12.75	12.02	13.85	12.88	14.87	12.86	16.19	13.92
Assam	10.84	11.82	12.47	12.61	13.67	13.05	14.55	13.66	15.19	13.88
Bihar	12.36	12.35	15.03	12.84	16.20	13.63	16.81	13.99	18.69	14.44
Gujarat	8.99	10.04	10.08	10.33	10.91	10.38	11.61	10.03	12.90	10.49
Karnataka	10.54	10.81	12.77	10.72	13.85	10.82	15.49	11.23	15.76	11.53
Kerala	6.98	8.22	8.95	9.01	9.54	9.67	10.46	10.00	12.13	10.83
Madhya Pradesh	12.24	12.34	14.24	12.45	15.28	12.55	16.27	12.51	18.00	13.58
Maharashtra	10.02	10.23	11.40	10.52	11.76	10.74	12.21	10.70	14.11	10.93
Orissa	13.73	12.92	16.51	14.41	17.92	14.89	18.42	15.27	18.70	15.45
Punjab	8.56	9.39	9.14	9.50	9.95	9.69	10.84	10.18	12.19	10.83
Rajasthan	12.33	12.87	13.72	12.51	15.07	12.68	16.00	12.85	16.96	13.58
Tamil Nadu	9.68	11.32	11.60	11.13	12.73	11.32	13.63	11.48	14.86	12.21
Uttar Pradesh	12.25	12.75	13.59	12.59	14.46	12.86	15.43	13.06	16.76	14.06
West Bengal	12.16	11.93	14.43	12.72	15.56	13.60	16.32	14.23	17.61	14.77
All India	11.60	11.87	13.25	12.10	13.93	12.41	14.44	12.59	15.38	12.99

Source: Calculated from NSSO Consumer Expenditure Survey, Unit Level Data

Table A1.5: Relative Importance of Different Cereals (quantity consumed) in Total Cereal Diet

States	As a per cent of Total Cereals Consumed					
	Rice		Wheat		Coarse Cereals	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
Andhra Pradesh	87.54	91.27	1.87	2.94	10.59	5.78
Assam	94.97	94.80	5.01	5.16	0.02	0.04
Bihar	54.32	61.52	40.20	35.49	5.49	2.99
Gujarat	18.10	21.23	37.59	38.31	44.22	40.46
Haryana	5.23	6.03	92.36	89.98	2.41	4.00
Karnataka	44.63	51.98	7.10	10.18	48.26	37.84
Kerala	91.11	89.48	8.87	10.43	0.03	0.09
Maharashtra	27.88	29.48	21.42	34.91	50.69	35.61
Madhya Pradesh	41.58	47.14	42.50	44.43	15.92	8.43
Orissa	95.11	94.28	2.85	4.62	2.04	1.10
Punjab	6.23	7.56	91.94	90.63	1.83	1.80
Rajasthan	1.56	1.51	65.16	68.84	33.29	29.66
Tamil Nadu	88.53	93.19	3.16	3.62	8.31	3.19
Uttar Pradesh	29.55	33.21	65.59	64.29	4.86	2.51
West Bengal	91.42	91.54	8.21	8.43	0.37	0.03
All India	57.19	62.64	29.93	29.16	12.88	8.20

Source: NSSO Report on Level and Pattern of Consumer Expenditure, 50th and 61st rounds

APPENDIX II

Table A2.1: Calorie Contribution of Various Food Items in 2004-05 (Rural)

States	% of intake of calorie from		% of total intake of protein from				
	Cereals	Other food	Cereals	Pulses	Milk and Milk Products	Egg, fish and meat	Other food
Andhra Pradesh	69.44	30.55	62.14	10.68	8.47	5.91	12.8
Assam	72.66	27.33	63.48	9.71	4.35	9.48	12.98
Bihar	73.58	26.4	72.18	9.62	6.98	2.04	9.16
Chattisgarh	78.17	21.82	71.18	12.77	1.96	2.74	11.35
Gujarat	58.2	41.77	65.1	11.09	12.6	1.06	10.04
Haryana	54.22	45.77	59.73	6.49	25.22	0.97	7.59
Jharkand	75.04	24.96	71.68	8.27	3.9	3.39	12.75
Karnataka	66.33	33.66	62.68	11.65	9.1	4.57	12
Kerala	54.41	42.49	45.19	7.98	7.8	22.08	15.44
Madhya Pradesh	69.49	30.45	73.2	9.89	7.78	0.95	8.16
Maharashtra	61.52	38.13	62.78	11.87	6.65	3.47	15.06
Orissa	79.47	20.52	73.89	7.98	2.44	4.33	11.35
Punjab	50.37	49.63	58.06	9.64	23.15	0.59	8.56
Rajasthan	64.58	35.42	69.31	5.64	18.32	0.49	6.24
Tamil Nadu	67.98	31.98	61.56	12.98	7.43	5.7	12.3
Uttar Pradesh	66.91	33.05	69.17	9.61	9.48	1.56	10.16
West Bengal	73.17	26.82	66.13	6.49	3.98	10.26	13.14
All India	67.54	32.31	66.37	9.47	9.28	3.98	10.84

Source: NSSO Report on Nutritional Intake in India, 50th and 61st rounds

Table A2.2: Calorie Contribution of Various Food Items in 2004-05 (Urban)

States	% of intake of calorie from		% of total intake of protein from				
	Cereals	Other food	Cereals	Pulses	Milk and Milk Products	Egg, fish and meat	other food
Andhra Pradesh	60.49	39.51	53.71	11.97	11.8	6.74	15.78
Assam	63.8	36.2	56.39	11.46	6.33	10.95	14.76
Bihar	64.11	35.89	64.02	11.02	8.56	2.17	14.18
Chattisgarh	65.09	34.91	62.79	13.72	7.61	3.99	11.89
Gujarat	46.99	53.01	51.39	12.3	15.99	1.43	18.86
Haryana	51.02	48.98	57.65	8.89	21.34	1.43	10.68
Jharkand	56.17	43.83	55.95	9.55	8.24	4.6	21.67
Karnataka	56.94	43.06	52.91	12.72	12.55	6.97	14.85
Kerala	50.82	49.18	41.46	8.56	9.24	23.05	16.98
Madhya Pradesh	60.26	39.74	65.45	11.23	10.04	1.84	11.36
Maharashtra	51.62	48.38	54.22	13.2	11.46	5.23	15.75
Orissa	70.33	29.67	64.44	9.7	7.21	6.76	11.9
Punjab	47.6	52.4	54.62	10.92	22.92	1.1	10.42
Rajasthan	57.84	42.16	66.03	6.12	15.47	1.22	11.17
Tamil Nadu	56.38	43.62	50.26	14.6	13.26	6.93	14.93
Uttar Pradesh	58.47	41.53	60.7	9.75	10.64	3.33	15.58
West Bengal	59.03	40.97	53.39	8.09	6.98	13.83	17.67
All India	56.08	43.92	56.16	11	12.33	5.47	14.98

Source: NSSO Report on Nutritional Intake in India, 50th and 61st rounds

Table A2.3: Trends in Macronutrients Intake (Rural)

(per capita per diem intake)

States	Calorie (in Kcal)				Protein (in gms)				Fat (in gms)			
	1972-73	1983	1993-94	2004-05	1972-73	1983	1993-94	2004-05	1972-73	1983	1993-94	2004-05
Andhra Pradesh	2103	2204	2052	1995	53	56	50.8	49.8	21	24	27.2	33.5
Assam	2074	2056	1983	2067	53	52	49.5	52.7	15	18	21	26.7
Bihar	2225	2189	2115	2049	65	65	60.2	57.8	17	20	23	28.4
Gujarat	2142	2113	1994	1923	58	59	55.6	53.3	40	44	47.4	50.9
Haryana	3215	2554	2491	2226	90	78	78.4	69.6	47	47	53.6	55.4
Karnataka	2202	2260	2073	1845	57	60	55.1	48.8	23	26	28.6	33.9
Kerala	1559	1884	1965	2014	38	47	50.8	55.4	19	32	32.7	40.8
Madhya Pradesh	2423	2323	2164	1929	68	68	63	58.8	21	25	28.3	35.1
Maharastra	1895	2144	1939	1933	54	62	54.8	55.7	24	30	33.5	41.5
Orissa	1995	2103	2199	2023	49	51	52.7	48.3	8	13	14.8	17.8
Punjab	3493	2677	2418	2240	85	79	74.7	66.7	50	52	59.8	58.7
Rajasthan	2730	2433	2470	2180	84	75	79.4	69.6	46	42	52.8	50.9
Tamil Nadu	1955	1861	1884	1842	49	47	46.8	44.9	18	22	24.7	29.6
Uttar Pradesh	2575	2399	2307	2200	76	73	70.4	65.9	28	29	35.5	37.5
West Bengal	1921	2027	2211	2070	50	52	54.8	52	13	17	21.4	26.5
All India	2266	2221	2153	2047	62	62	60.2	57	24	27	31.4	35.5

Source: NSSO Report on Nutritional Intake in India, 50th and 61st rounds

Table A2.4: Trends in Macronutrients Intake (Urban)

(per capita per diem intake)

States	Calorie (in Kcal)				Protein (in gms)				Fat (in gms)			
	1972-73	1983	1993-94	2004-05	1972-73	1983	1993-94	2004-05	1972-73	1983	1993-94	2004-05
Andhra Pradesh	2143	2009	1992	2000	51	50	49.6	50.9	31	32	34.9	43.2
Assam	2135	2043	2108	2143	56	52	53.5	55.9	25	25	30.8	36.8
Bihar	2167	2131	2188	2190	61	61	61.4	62.2	25	26	32.7	40.4
Gujarat	2172	2000	2027	1991	57	55	54.9	57.3	58	53	57.9	63.5
Haryana	2404	2242	2140	2033	67	67	63.6	60.5	42	49	49.4	54.4
Karnataka	1925	2124	2026	1944	46	55	53.1	52.2	32	36	37.6	43.3
Kerala	1723	2049	1966	1996	44	51	52.4	56.7	27	38	37	44.9
Madhya Pradesh	2229	2137	2082	1954	61	62	59.8	58.2	34	36	40.3	43.4
Maharastra	1971	2028	1989	1847	55	56	55.5	52.1	41	45	47.9	50.1
Orissa	2276	2219	2261	2139	55	56	57.2	55.2	23	24	28.1	28.3
Punjab	2783	2100	2089	2150	70	63	61.8	63.4	52	49	53.7	61
Rajasthan	2357	2255	2184	2116	70	69	66.5	64	47	47	51.6	56.4
Tamil Nadu	1841	2140	1922	1935	44	45	48.7	49.2	23	29	33.9	41.1
Uttar Pradesh	2161	2043	2114	2124	62	62	63.2	65.1	35	34	41.2	46.1
West Bengal	2080	2048	2131	2011	58	55	56.6	55.1	31	31	34.2	39.1
All India	2107	2089	2071	2020	56	57	57.2	57	36	37	42	47.5

Source: NSSO Report on Nutritional Intake in India, 50th and 61st rounds

Table A2.5: Trends in Calorie Intake according to MPCE Classes (Rural)
(in Kcal per capita per diem intake)

States	Bottom 4 MPCE Classes		Middle 4 MPCE Classes		Top 4 MPCE Classes	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
Andhra Pradesh	1510	1489	2001	1928	2616	2492
Assam	1419	1571	1959	1958	2524	2489
Bihar	1704	1722	2443	2349	3186	2895
Gujarat	1329	1409	1853	1855	2666	2382
Haryana	1473	1401	2103	1880	3192	2653
Karnataka	1533	1450	2063	1866	2697	2395
Kerala	1102	1131	1609	1554	2323	2171
Madhya Pradesh	1684	1647	2300	2112	2919	2553
Maharashtra	1514	1509	1927	1869	2559	2406
Orissa	1795	1799	2413	2267	3053	2802
Punjab	1362	1347	1837	1797	2696	2478
Rajasthan	1678	1637	2236	2007	3019	2753
Tamil Nadu	1343	1337	1853	1809	2458	2298
Uttar Pradesh	1763	1684	2262	2163	3009	2962
West Bengal	1600	1539	2167	2006	2878	2621
All India	1620	1608	2110	2012	2767	2564

Source: Calculated from NSSO Report on Nutritional Intake in India, 50th and 61st rounds

Table A2.6: Trends in Calorie Intake according to MPCE Classes (Urban)
(in Kcal per capita per diem intake)

States	Bottom 4 MPCE Classes		Middle 4 MPCE Classes		Top 4 MPCE Classes	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
Andhra Pradesh	1557	1549	2032	2012	2581	2536
Assam	1549	1661	2033	2041	2673	2636
Bihar	1790	1930	2334	2249	3002	3715
Gujarat	1395	1409	1960	1905	2578	2417
Haryana	1474	1472	2052	1925	2446	2585
Karnataka	1524	1556	2038	1910	2628	2415
Kerala	1302	1328	1869	1862	2611	2544
Madhya Pradesh	1673	1657	2126	2069	2651	2408
Maharashtra	1561	1501	1868	1784	2381	2191
Orissa	1820	1874	2291	2248	2830	2833
Punjab	1411	1474	1914	2007	2558	2627
Rajasthan	1661	1615	2197	2137	2650	2984
Tamil Nadu	1363	1482	1928	1868	2616	2415
Uttar Pradesh	1729	1791	2130	2187	2874	2742
West Bengal	1628	1617	2102	1980	2584	2356
All India	1675	1635	2136	1983	2725	2484

Source: Calculated from NSSO Report on Nutritional Intake in India, 50th and 61st rounds

APPENDIX III

Table A3.1: Minimum Support Price (MSP) and Procurement of Food Grains

Year	MSP (Rs/quintal)		Procurement (in million tonnes)			Net Food Grain Production (in million tonnes)	Procurement as a percent of Production
	Paddy Common	Wheat	Rice	Wheat	Total		
1990-91	205	225	12.92	11.07	23.99	138.4	17.33
1991-92	230	280	9.41	7.75	17.16	141.9	12.09
1992-93	270	330	12.72	6.38	19.10	136.8	13.96
1993-94	310	350	13.56	12.84	26.40	145.8	18.11
1994-95	340	360	13.12	11.87	24.99	149.6	16.70
1995-96	360	380	9.93	12.33	22.16	155.3	14.27
1996-97	380	475	11.88	8.16	20.04	147.1	13.62
1997-98	415	510	14.54	9.30	23.84	162	14.72
1998-99	440	550	11.55	12.65	24.20	156.9	15.42
1999-00	490	580	16.62	14.14	30.76	165.1	18.63
2000-01	510	610	18.93	16.36	35.29	171.8	20.54
2001-02	530	620	21.12	20.63	41.75	162.5	25.69
2002-03	530	620	19.00	19.03	38.03	174.5	21.79
2003-04	550	630	20.78	15.80	36.58	143.2	25.54
2004-05	560	640	24.04	16.80	40.83	173.5	23.53
2005-06	570	650	26.69	14.79	41.48	162.1	25.59
2006-07	580	750	26.30	9.23	35.53	170.8	20.80

Source: Economic Survey, Various Issues

Table A3.2: Coverage and Utilisation of PDS Food Grains in 2004-05

States	Coverage of PDS (in per cent)		Utilisation of PDS by a Household (Percentage of Consumption from PDS)			
	Possession of Any Type of Ration Card*		Rural		Urban	
	Rural	Urban	Rice	Wheat	Rice	Wheat
Andhra Pradesh	72	46	23.26	3.16	14.55	1.28
Assam	75	44	3.9	0.15	1.74	0.08
Bihar	77	48	0.54	1.08	0.61	1.35
Gujarat	87	76	13.35	14.81	3.24	3.07
Haryana	87	72	0.03	2.43	0.02	4.69
Karnataka	77	49	46.51	54.38	18.17	13.68
Kerala	87	81	20.18	26.67	15.99	21.74
Madhya Pradesh	72	57	15.71	11.97	5.05	7.02
Maharashtra	81	75	21.25	26.21	4.63	6.83
Orissa	67	42	7.01	0.56	2.94	0.94
Punjab	88	70	0.1	0.22	0.38	0.6
Rajasthan	96	85	0	10.49	0.16	1.73
Tamil Nadu	89	78	40.37	40.24	28.05	23.38
Uttar Pradesh	81	64	3.5	2.29	1.84	1.23
West Bengal	92	80	2.29	15.93	1.87	3.5
All India	81.3	66.9	13.16	7.32	11.24	3.82

Note: *Percentage of households having any type of ration card (Antyodaya or BPL or APL Card)

Source: NSSO Report on Public Distribution System, 2004-05

Table A3.3: Distribution of Agricultural Labour Households by Ration Card Type in 2004-05

States	With BPL or AAY Card	With APL or no Card	All
Andhra Pradesh	70.5	29.5	100
Assam	31.4	68.6	100
Bihar	29.1	70.9	100
Chattisgarh	54.3	45.7	100
Gujarat	62.4	37.6	100
Haryana	49.4	50.6	100
Jharkand	32.7	67.3	100
Karnataka	69.8	30.2	100
Kerala	52.6	47.4	100
Madhya Pradesh	50.8	49.2	100
Maharashtra	49.7	50.3	100
Orissa	59.8	40.2	100
Punjab	23.4	76.6	100
Rajasthan	32.4	67.6	100
Uttar Pradesh	27	73	100
Uttaranchal	43.2	56.8	100
West Bengal	47.2	52.8	100
All India	48	52	100

Source: Swaminathan, (2009)