CHANGING FOOD CONSUMPTION PATTERN AND NUTRITIONAL STATUS IN RURAL INDIA: A DISAGGREGATED ANALYSIS

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DEDICATED TO UNDERNOURISHED POPULATION OF INDIA

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CERTIFICATE

Certified that the dissertation entitled "**CHANGING FOOD CONSUMPTION PATTERN AND NUTRITIONAL STATUS IN RURAL INDIA: A DISAGGREGATED ANALYSIS**", is submitted by **"Abha Gupta"** in the partial fulfillment of the award of Master of Philosophy of Jawaharlal Nehru University is a bonafied and original work to the best of our knowledge and may be placed before the examiners for evaluation. This dissertation has not been submitted for the award of any degree of this university or of any other university.

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Acronyms

ACR	Agro Climatic Regions
A.P.	Andhra Pradesh
APL	Above Poverty Line
App.	Appendix
Ar. P.	Arunachal Pradesh
BMI	Body Mass Index
BPL	Below Poverty Line
FAO	Food and Agriculture Organisation
H.P.	Himachal Pradesh
ICMR	Indian Council of Medical Research
J&K	Jammu and Kashmir
M.P.	Madhya Pradesh
MPCE	Monthly Per Capita Expenditure
NFHS	National Family Health Survey
NSS	National Sample Survey
NSSO	National Sample Survey Organisation
OBC	Other Backward Class
PCPD	Per Capita Per Day
PCPM	Per Capita Per Month
SC	Scheduled Caste
ST	Scheduled Tribe
SED	Socio-Economic and Demographic
T.N.	Tamil Nadu
U.P.	Uttar Pradesh
W.B.	West Bengal

Chapter I

INTRODUCTION

CHAPTER I
Introduction

1.1 Introduction

Nutrition is a positive attribute of health. As health does not mean just an absence of disease but a positive state of well being, similarly nutrition does not mean just the absence of starvation or nutritional deficiency but a positive physiological state of well being. Broadly, there are two aspects of Nutrition: Under-nutrition and Malnutrition. Generally people use these words synonymously but in definitional terms both concepts are quite different. According to the United Nations Food and Agricultural Organization (FAO) Third World Food Survey, 'Under-nutrition is defined in terms of inadequacy of diet, that is, in calorie intake which, continued over a long period, results in either loss of normal bodyweight or reduction in physical activity or both'. But this definition is not appropriate for children because they require different calorie intake at different stages of growth (Sukhatme, 1961 cited in Kakwani, 1986). 'Malnutrition on the other hand is a broader term which is defined as "a pathological state", resulting from a relative or absolute deficiency or an excess in diet of one or more essential nutrients' (cited in Kakwani, 1986).

In the strictest sense, malnutrition denotes both under-nutrition and over nutrition. Under-nutrition is primarily due to inadequate intake of calories whereas malnutrition is caused by inadequacy of particular (or several) essential nutrients. Thus, a person who is undernourished is also malnourished because intake of calorie also ensures the availability of other nutrients. But a malnourished person is not necessarily being an undernourished one. The main reason for malnourishment is deficiency in calorie and protein intake. It is generally believed that there is positive association between calorie intake and intake of protein i.e. if a person is getting enough calories, then, it also ensures enough protein to him. However calorie is the main limiting factor, protein alone does not give a standard nutritional level. In fact, protein rich foods do not provide enough energy to maintain the nutritional standard. The focus of the present study is on under-nutrition which results from inadequate intake of calories.

One of the major challenges in front of researchers is estimating the under-nourished population. What should be the criteria to define undernourishment, which indicators should be taken and what standard should be adopted? These are few but difficult questions which are still debatable among researchers.

1.1.1 Measures of Nutrition

The nutritional status of an individual is often the result of many interrelated factors. It is influenced by adequacy of food intake both in terms of quality and quantity and also by disease pattern, sanitation conditions, drinking water facility, medical advancement etc. There are several indicators which are used to measure nutritional status among population. These can be categorized into two groups:

a. Food intakes (resultant calorie, protein and fat intakes)
b. Anthropometric measures

1.1.1a Food Intakes

Consumption of different food items ensures the intakes of calorie, protein, fat and other micronutrients. It is believed that our food consumption pattern is diversifying and it is resulting into change into nutrition intakes. There are various factors which affect consumption of food items such as production, prices, employment, per capita expenditure, taste, climate, decline in physical activity, improvement in health status, urbanization, increased awareness among consumers about food nutrients, access to safe drinking water, health care and environmental hygiene for effective conversion of food into energy (Kumar et al., 2007; WHO, 2003 cited in Nasurudeen et al., 2006; Martorell and Ho, 1984 cited in Golait and Pradhan, 2006; Bansil, 2003; Viswanathan, 2001).

However these factors are interrelated with each other. It is believed that per capita output of cereals is the main variable which explains interstate variations in calorie intake. Higher production leads to higher consumption and resultant higher calorie intake. But this does not fully explain the interstate variations in cereal consumption. For instance Punjab, Haryana which are agriculturally most developed states of India have lower cereal consumption and resultant lower calorie intake. The other important factors

which affect cereal consumption and resultant calorie intake are prices, composition of cereal basket and per capita expenditure. Since different types of cereals are required in different regions like rice and wheat in northern states, coarse cereals including jowar, bajra and millet in Gujarat, Maharashtra, Karnataka states. These cereals differ in many respects such as prices, quantity of calories etc. Generally prices of coarse cereals are lower than that of rice and wheat as a result in earlier period when coarse cereals accounted a major portion in total cereal consumption, the per capita calorie intake was high compared to those states where rice and wheat were the staple food grains. But in subsequent period when coarse cereals lost their importance either due to falling prices or year to year fluctuation, the states where coarse cereals constituted a major portion of cereal basket slipped down in per capita calorie intake. But this decline does not mean deterioration of nutritional level, it could be a qualitative improvement in the diet. In other words, it is believed that decline in calorie intake may reflect a shift from inferior foods to superior one thanks to rise in level of income.

As far as per capita expenditure is concerned, it suggests that during seventies a major part of expenditure in rural areas was on cereals while in urban areas only one third of total expenditure was on cereals and rest was on other food items. During nineties the share of cereals in total expenditure declined to 50 percent in rural areas and 25 percent in urban areas. Due to this decline in expenditure, the per capita cereal consumption is also declining. Average all India rural per capita consumption fell from 15.35 kg per capita per month (PCPM) in 1970-71 to 12.7 kg (PCPM) in 1993-94 while the urban consumption fell from 11.4 kg to 10.4 kg PCPM during the same period. This fall in consumption was higher among high expenditure class people in both rural and urban areas (Radhakrishna, 2006).

Changes in expenditure on food items and quantity of consumption reflect a drastic change in food basket in the country. Both the expenditure and quantity of consumption show that the share of cereals in the food basket has gone down especially in rural areas where improvements in infrastructure make other food items and non-food commodities easily available. The decline in cereal consumption particularly in rural areas and in general in urban areas is attributed by decline in coarse cereal consumption.

On the other hand the share of other food items particularly vegetables, fruits, meat/fish has increased (Ali, 2007; Nasurudeen et al., 2006; Golait and Pradhan, 2006; Giri, 2006; Singh et al., 2006; Atibudhi, 2006; Radhakrishna, 2006; Viswanathan, 2001; Shariff and Mallick, 1999; Radhakrishna and Reddy, n.d.). These changes have affected nutritional intake of the population. But this decline does not clearly indicate an increase or fall in consumer welfare.

Climatic factors also influence the per capita consumption of food grains, for instance, Himachal Pradesh and Jammu & Kashmir have lower income level both in rural and urban areas but because of cold climate, consumption of calories, protein and also fat is one of the highest in the country which shows that due to climatic conditions people are compelled to consume energy rich diets (Bansil, 2003). In another study done by Saraswat et al. (2006) in Himachal Pradesh, it is argued that quantity of calorie intake increases as the altitude rises. This is the reason why food security scenario is better in Himachal Pradesh.

Besides above factors, there are some socio-economic and demographic (SED) variables which also affect food consumption. For example the consumption of animal based food items depends on social belief. Meat is of course consumed by non-vegetarian population but within the non-vegetarian population there are segments of population who do not eat a specific variety of meat. Even the process of meat production i.e. *halal* may hinder consumption of meat by a particular segment of population. Pork consumption is prohibited among Hindus as cow is sacred to them. In Judaism, pig, rabbit and marine animals are restricted for consumption (Waibel, n.d.). Similarly, age and sex wise consumption pattern also differ. Older age people prefer to consume fruits and vegetables whereas younger age ones mainly eat exotic foods (Omann, 2008). Women headed household exhibit higher calorie intake because they spend more on cereals whereas there is low share of cereals in total consumption if head of the household is male (Basiotis et al., 1983).

However these SED factors affect consumption in a very limited manner but it is also reality that if these factors were not working then our food consumption pattern could have been different. In this study, the main emphasis will be on selected SED

variables. The factors for this decline are different but conclusion is same i.e. food consumption pattern is changing and it is resulting in a change in nutrition level. In the present study, the indicators for showing nutrition level will be calorie intake because it also ensures proper intake of protein. This study will take into account the population in rural areas because of its traditional character where SED variables may still affect consumption pattern of masses.

1.1.1b Anthropometric Measures

Besides calorie intake, there are other indicators through which one can measure nutritional level. There are intra individual (variation in the intake of given individual over a period of time) and inter individual (variation in intakes between individuals) variations. Calorie intake for men, women, pregnant women, children vary considerably. Similarly sedentary workers, casual workers, Industrial workers etc. demand different calorie intakes. To show the nutritional level of each and every person some anthropometric measures are used. Commonly used measures are following:

1. Height for age (stunted), 2. Weight for height (wasted) and 3. Weight for age (underweight).

These nutritional indicators are expressed in standard deviation units (Z-scores) from the median of the reference population. Each indicator provides different information about growth and body composition, which is used to assess nutritional status of children.

Height for Age Index: Children whose height-for-age Z-score is below minus two standard deviations (-2 SD) from the median of the reference population are considered short for their age (stunted) and are chronically malnourished. Children below minus three standard deviations (-3 SD) from the median of the reference population are considered to be severely stunted. Stunting reflects failure to receive adequate nutrition over a long period of time. Height-for-age, therefore, represents the long-term effects of malnutrition in a population (NFHS III Report, pp. 268-69).

Weight-for-Height Index: measures body mass in relation to body length and describes current nutritional status. Children whose Z-score is below minus two standard

deviations (-2SD) from the median of the reference population are considered thin (wasted) for their height and are acutely malnourished. Wasting represents the failure to receive adequate nutrition over a short period. Children whose weight-for-height is below minus three standard deviations (-3 SD) from the median of the reference population are considered to be severely wasted (NFHS III Report, pp. 268-69).

Weight-for-Age Index: is a composite index of height-for-age and weight-for-height. It takes into account both acute and chronic malnutrition. Children whose weight-for-age is below minus two standard deviations from the median of the reference population are classified as underweight. Children whose weight-for-age is below minus three standard deviations (-3 SD) from the median of the reference population are considered to be severely underweight (NFHS III Report, pp. 268-69).

These measures are mainly designed for showing nutrition level among children. In adulthood since they have stopped attaining height, indices of thinness are more appropriate. The indices used include Body Mass Index which is a weight in individual.

Body Mass Index: The height and weight measurements are used to calculate the BMI. The BMI is defined as weight in kilograms divided by height in metres squared (kg/m^2). A cut-off point of 18.5 is used to define thinness or acute under-nutrition and a BMI of 25 or above indicates overweight or obesity (NFHS III Report, pp. 303-04).

In the development of under-nutrition, the initial stage is reduction in dietary intake. This can be due to 'psychiatric illness, anorexia associated with infection, liver disease, neoplasia, drug interaction, nutrient deficiency, famine or starvation, upper intestinal disease, malabsorption or other losses from the body. This reduced dietary intake in turn leads to reduced mass, reduced requirement, reduced work, physiologic and metabolic changes, changes in body composition and loss of tissue reserve' (Maleta, 2007). Proper dietary intake is prerequisite for proper nutrition. Thus, in this study main emphasis is on dietary pattern in terms of different food consumption and resultant calorie intake.

Since in this study, calorie intake is taken as an important indicator of nutrition. Besides it all above discussed anthropometric measures will be compared with calorie level so that a general pattern of nutrition can be emerged.

1.2 Statement of the Problem

Since 1970s the consumption of food grains showed a declining trend in almost all states of India (except in Kerala, Maharashtra and West Bengal where there is rise in cereal consumption) in spite of a huge increase in food grain production. Reasons for this decline are complex. On the one hand a group of researchers like Radhakrishna and Reddy (n.d.), Ray (2005-10), Rao (2000) argue that due to increase in income, people prefer to spend more on superior quality goods like milk, meat, vegetables, fruits etc. Thus, with increase in income, taste and preferences for the food change and this change in food consumption is not a sign of human welfare deterioration.

On the other extreme is Patnaik (2004) who argues that a rise in income would not necessarily lead to a fall in food grain consumption. Food grains (wheat, rice, coarse cereals) are not only used for self consumption but they are also used for indirect uses like feeding the livestock so that milk, meat, egg can be produced. Without spending on food grains, how can one get milk, meat and other products? Thus consumption of food grains per head, because it is for all uses (both direct and indirect), always rises as a nation's per capita income rises. The recent trend of declining cereal consumption is abnormal not in terms of international experience but if we compare it with our own past experience. This decline is mainly attributed by decline in purchasing power of the people. Despite a decline in food production, our food stocks in go downs are increasing. Instead of providing this large stock to rural poor, our government is making plans to feed the foreigners through export or this large stock is being rotted in go downs.

More or less the debate is on relationship between income (per capita expenditure) and food grain consumption. However income is one of the most important factors shaping food consumption but besides income, there may be other factors which to some extent effect the food consumption. These factors include some SED characteristics of population.

The present study would aim to show a pattern of food habits (consumption of different food items) and resultant nutrition level (in terms of per capita per day calorie intake) across all SED classes including Agro Climatic Regions in rural areas and to analyze at what extent these factors affect the change in food consumption pattern and the resultant nutrition level.

1.3 Food Consumption Pattern and Calorie Intake in India: A Brief Overview

India has faced two major problems at the time of Independence. The first one was the threat of famine and resultant starvations due to low agricultural productions and lack of proper food distributions system. The other was energy deficiency due to 1) low dietary intake because of poverty and low purchasing power 2) high prevalence of infectious diseases as because of poor sanitation, drinking water and healthcare 3) poor utilization of resources due to low literacy and lack of awareness. India's rapid growing population was also a threat to the food security. This population pressure along with other factors caused introduction of Green Revolution in the late sixties (Golait and Pradhan, 2006). This revolution took the growth of food-grain productions far above the population growth in subsequent decades. The country has moved from shortages to an era of surplus and has started export of most of food items. Thus availability of food was ensured but in terms of accessibility India lagged behind.

However after economic reforms in early 1990s the per capita income of all population increased significantly. The Indian economy is now one of the fastest-growing economies in the world. Real GDP per head grew at 3.95 percent a year from 1980 to 2005, and at 5.4 percent a year from 2000 to 2005. It is two and a half times as large as per capita income in Kenya and Nigeria. Real per capita consumption has also grown rapidly, at 2.2 percent a year in the 1980s, at 2.5 percent a year in the 1990s, and at 3.9 percent a year from 2000 to 2005 (Deaton and Dreze, 2009). But at that time there appeared a confusing picture of India's progress on food and nutrition security. Instead of an increase, our consumption pattern and resultant total calorie intake showed a declining trend among all levels of population. The factors contributing to this trend are numerous and very complex. Some of them can be listed below:

1) Reduction in calorie requirements due to a more sedentary lifestyle among rural masses (Golait and Pradhan, 2006).
2) These changes are mainly due to increase in per capita income, urbanization, changes in lifestyle and dietary preferences (Ali, 2007; Bardhan, 2006; Ray, 2005; Radhakrishna and Ravi, 1992).
3) Factors like climate, price relationship between food-grains, non-food-grains and non-food items, improvement in health status which increases efficiency of conversion of food into energy (Saraswat et al., 2006; Bansil, 2003).
4) A possible explanation for this drift is that calorie requirements have declined, due to better health as well as to lower activity levels, expansions in the availability of safe water, vaccination rates, transport facilities, and the ownership of various effort-saving durables. However, this hypothesis is speculative, in the absence of direct evidence on activity levels and the associated calorie requirements (Deaton and Dreze, 2009).

Among the above factors, income effect often captured by per-capita expenditure is supported by most of the literature. Increase in income brings changes in lifestyle and dietary preferences. It has been found that the value of monthly per capita consumption expenditure on food items has declined from 63.8 percent to 54 percent in rural areas and from 56 percent to 42 percent in urban areas in the last one and half decade, on the other hand the expenditure on other food items has gone up (Singh, 2006; Atibudhi, 2006). Nasurudeen (2006) found that improvement in economic access to food, made possible by income growths, did not result in a high consumption of cereals but has increased the consumption of vegetables, fruits and nuts and livestock products especially meat and eggs. Due to this increase in expenditure on other food items, food consumption pattern has changed much.

As NSS 55th Round data shows that cereal consumption has declined much in urban areas as there is more expenditure on meat/fish/egg and fruits/vegetables which are more expensive sources of energy. The Engel food share in total expenditure registered a decline during this period especially in urban areas. This decline in consumption and resultant calorie intake has given birth to new controversy. On one hand a group of

researchers (Ray, 2005; Radhakrishna and Reddy, n.d.; Rao, 2000) in their studies argued that the decline in cereal consumption is attributed to changes in consumer taste and preferences towards superior food items as the income of the household increases. An important example can be seen from Punjab and Haryana which have shown a highest increase in per capita income. In these states there is diversification of food basket in favors of superior non-cereal foods particularly milk and milk products, vegetables and fruits etc. This reduction in the intake of food grains should not be taken as deterioration in human welfare. It is argued that rich are consuming fewer calories because of their choice and it is not a sign of poverty among them. We should not worry about the deficiency in calorie of the rich. Public policy should concentrate more on the bottom MPCE class people. It is of concern if their consumption of calorie is declining. In fact, different calorie norms for different states are needed as there are important interstate differences in terms of population structure, activity status, climatic and topographical conditions.

The National Sample Survey (NSS) Consumer Expenditure data shows a decline in per capita consumption of cereals and an increase in per capita consumption of other food items. This decline in consumption has been significant since the economic reforms in the country in the late 1980s and especially in most prosperous states of Punjab and Haryana where the decline is as much as about 6 kg per capita per month in rural areas (Dev, 2005). The reason behind this decline in Punjab is associated with changes in consumer tastes and preferences towards superior food items as the income of the household increases. This is mainly due to diversification of food basket in favor of non-cereal food items mainly milk and milk products, vegetables and fruits.

The most interesting point is that this decline is sharper in rural areas than in urban areas because of improvement in rural infrastructure which make other food and non-food items available to the rural households and further reduction in manual work due to farm mechanization may also resulted a less need of cereals (Rao, 2000). But decline in consumption of cereals and resulted low calories should not be taken as deterioration of human welfare. In fact, it is a sign of prosperity and increasing living standard. However rise in income is not the only factor causing declining cereal

consumption. A study of NSS data (50th Round) shows that per capita per day consumption of calories in rural areas of most prosperous state, Punjab, is lower than that in Jammu and Kashmir, Haryana and Rajasthan. Similarly this calorie consumption in urban Punjab is lower than that in 11 other states including Bihar and Orissa. Even in case of protein intake, Punjab is far behind from some other states. The intake of fat is highest in rural Punjab. This decline in consumption shows that decline in consumption is related to development, however, income is not the only factor causing this decline but there are other factors such as climate, food habits/tastes, nature of activities and easy availability of various consumption items in rural areas, price relationship between food grains, non-food grains and non-food items, change in energy requirement due to reduced manual labour and climatic variations, change in wage payment systems, improvement in health status and the resulting efficiency in conversion of food into energy all determine the average calorie consumption per person (Bansil, 2003).

One of the main reasons for declining cereal consumption is dietary diversification due to change in tastes caused by increase in income. Due to this changing consumption pattern, nutrition level is also changing. On an average in India the calorie intake has declined by 219 kcal per person during 2000-05. Similarly protein intake has reduced to 57 gm per person from 59 gm in the same period. Even the interstate differences are much higher. It is expected that the ratio of calorie supply of food grains, non-food grains and livestock products will change from 63:29:8 percent in 2000 to 48:36:16 percent by 2050. The important thing which can be noticed is that food grain consumption is declining much faster in rural areas than in urban areas. By the year 2050, food grain consumption per person will decline from 15.3 kg/month in 2000 to 13.8 kg/month in 2050 in rural areas whereas urban areas will experience a slight decline from 11.8 to 11.2 kg/month during same period (Amarasinghe et al., 2007).

However there is no consensus on the implication of dietary diversification on calorie intake, nutrition and food security. An example of international experience can be seen here. In China, a fast growing country, there is decline in cereal intake and its diet pattern is diversifying giving more weight to non-cereal items but this is resulting an increase in calorie intake and protein intake whereas in India, another fast growing

country, dietary diversification is leading to a decline in calorie and protein intake. Dietary diversification among rich group people is causing a major problem. In higher income groups where there is no economic constraint to consume food, people still show under-nutrition as there is decline in energy intake. Many studies show that young and child population in rich households eat more junk foods, spicy foods and readymade sweets which are not a good source of energy. This may be a reason of under-nutrition among rich people (Chand, 2007).

Bansil (2003) in his study explained that there is a limit beyond which total calories consumed by an average person will not increase in-spite of an increase in income. Chand (2007) gave evidence by using NSS data that with increase in per-capita expenditure (proxy for income) consumption of cereals initially increased and then leveled off and subsequently decline in high income groups.

On the other hand Patnaik (2004) makes an argument that as the consumer's average income rises, the absorption of food grains per capita is always found to rise not fall because Engel's law only refers to fall in the share of food expenditure for the direct consumption of grains as income rises and not to the total consumption of grains which includes both direct use as well as indirect use as feed for livestock (to produce milk, meat, egg and so on) and as industrial raw material. The recent trend in country that food consumption pattern is declining and it is a healthy trend is a misconception. It is abnormal not only in terms of international experience but also in comparison with our old past experience. Between 1950 and 1991 per capita consumption rose slowly from 152 kg to 177 kg as per capita incomes rose.

The per capita consumption slightly increased in four decades but this increase had been wiped out in just a decade of economic reforms. The consumption fell by 3 kg per head in seven years up to 1998. This massive decline is the result of 'an unprecedented decline in purchasing power in rural areas following directly from a number of deflationary policies at the micro economic level, combined with international price declines for the larger volume of export crops produced in India following trade liberalization...'(Patnaik, 2004). Thus, government is just filling the go downs with huge food stocks for feeding the foreigners. There are no such policies to reduce stocks by

implementing the large scale food for work schemes in all rural areas in order to generate employment and restore purchasing power to earlier levels.

Whether income has any impact on change in food consumption, is a debatable issue but most of literature shows that income (per capita expenditure) determines the food consumption pattern and resultant calorie intake. However there is another group of thought which emphasis the affects of socio-economic–demographic (SED) factors on food consumption pattern and resultant calorie and protein intake.

According to Fraser (2000) men eat meat, eggs, milk, and sugary foods more frequently, but fruit and vegetables less frequently than women in United Kingdom. As far as age of individuals is concerned, older people eat red meats and the saturated bread spreads more frequently but consumes less poultry and drinks less coffee than younger people. Similarly, the consumption of vegetables, fruits and meat increases with the age of the household head. Vegetable consumption of the oldest age group, for example, is more than twice that of the youngest age group (Omann, 2008, Austria). Within the category of vegetables, a strong tendency towards higher potato consumption with increasing age can be observed. Vegetable consumption of the 60+ age group is dominated by potatoes (51 percent) while younger age groups (below 30 years) have a higher share of fruiting and flowering vegetables (29 percent) and root vegetables (17 percent). One explanation for that trend is the time consuming preparation needed for potatoes, and the preference for foods which can be quickly prepared. Moreover, older consumers adhere more to traditional eating habits, which are characterized by a high relative intake of potatoes due to low price, nice taste and their satiating character.

Within meat consumption, pork consumption responds positively to increasing age, and constitutes a share of 26 percent in the 60+ group. On the other hand, the youngest age group consumes more than 40 percent of meat in the form of dried, salted and smoked meat, because of an increase in snack consumption and time restrictions for meal preparation. Concerning fruit consumption, older age groups have the highest shares for apples and pears, around 50 percent of their total fruit consumption, whereas younger groups have a higher share of exotic fruit consumption (around 45 percent) (Omann, 2008, Austria).

Regarding the education level, better educated subjects eat less meat and fewer cakes and sweet foods than those less educated (Morgan, 1986). Differences in consumed quantities of food categories by selected labour force status groups (Workers and employees in low, middle or high positions) demonstrate that the group of employees in middle and high positions has the lowest consumption figures for vegetables, fruits and meat. In contrast, high vegetable consumption occurs in employed households in low and middle position (Omann 2008, Austria). With respect to differences in consumed quantities of food categories by family type (single households, couples without children, families, single parents with children), it is found that family households consume less meat, vegetable and fruit (per capita in equivalence scale) than single or couple households without children (Omann 2008, Austria).

The work by Basiotis et al. (1983) is one of the few studies which has related household headship to dietary status. These researchers reported that dual headed households had significantly greater levels of calcium availability than single headed households. Households headed by a male only had significantly lower available levels of food energy, protein, calcium, iron, riboflavin, and thiamin than dual headed and female only headed households. Female headed households had significantly greater availability of food energy, protein, iron, riboflavin, thiamin, and vitamin than the other two categories.

Musaiger in his study (1993) of Arabian countries found that there are various factors which determine the dietary habits of the people in the Arab world. Food consumption pattern has changed in some Arab countries as a result of sudden increase in income from oil revenue. Socio-cultural factors such as religion, beliefs, food preference, gender discrimination, education and women's employment all have a noticeable influence on food consumption pattern in this region. Mass media especially televised food advertisement play an important role in modifying the dietary habits. (A detailed literature on SED factors affecting food consumption has been added in third chapter)

The above literature confirms that our dietary pattern is changing. This may have been caused by increase in income, urbanization, change in taste and preferences, lowering down activity level, climatic factors etc. There are also some socio-economic

and demographic (SED) factors shaping our food consumption pattern. Considering all above factors equally important, we can conclude that our food consumption especially cereal consumption is declining, highly in rural areas, and consumption of other food items particularly vegetables, fruits, meat, oil is rising which clearly shows that this change has led to change in calorie intake as foods are the main source of this nutrient and because of this change in calorie intake, our nutritional level is also changing. In India, calorie intake is the main criterion in estimating poverty, the decline in calorie intake is considered as an increase in poverty rate. However there is a debate on this issue whether decline in recommended calories leads to poverty or not. The subsequent paragraphs will briefly highlight the calorie-poverty debate.

1.3a A Brief Overview of Calorie Norm and Poverty Debate:

Food is one of the basic needs of a person for survival. Those who are unable to afford the adequate quantity of food are considered as poor. In developing countries like India, the extent of poverty is believed to be on rise despite the much acclaimed economic growth of the country. Since 1995, India remained the net exporter of cereals, and export of cereals for later years was as high as 8 million tons (Chand, 2007). India got self sufficiency in food grain production but on food and nutrition security front, it is largely suffering as most of the population is undernourished.

There are various methods which are used for the evaluation of nutrition level. However in this study, calorie intake method for assessing the nutritional status of population has been used. The calorie intake criterion is surrounded under great controversy (Deaton & Dreze, 2009; Patnaik, 2007 & 2010; Ray 2005-10, Radhakrishna, 2005 etc.). The initial requirement is formulation of calorie norm below which one can calculate level of undernourishment. The views of different nutrition experts and organizations such as FAO, Planning Commission of India and Indian Council of Medical Research (ICMR) differ. There is also difference of opinion in between eminent nutritionist such as Gopalan and Sukhatme. Generally, calorie norm is calculated as follows: The FAO/ WHO expert groups give the energy requirements of the FAO reference man and woman with given age, weight and activity level, and living in a given environment. 'The requirements are obtained by taking the average of the observed

intake of a group of reference-type men and women. Adjustments are made corresponding to differences in age, weight, activity level, and environmental temperature. The per capita requirements for a given population are, then, to be determined on the basis of its demographic and occupational structure' (Mehta, 1982). But this method of measuring nutritional norm is challenged by Sukhatme (1981a, b). According to him the average calorie intake does not take into account the variations which exist even in a group of reference type individuals (also see Osmani, 1987). Sukhatme points out that, in this very group, half the people have intake below the average, and yet they are healthy and maintain the same body weight and activity level. Therefore, it would be wrong to classify anyone with less than the average intake, in the rest of the population, as malnourished. There are large variations among population. This variation may be either inter-individual (because different individuals have different intakes), or intra-individual (because the intake of a given individual may vary even over short time periods), or both. This theory is popularly known as "The Theory of Auto regulatory Homeostasis".

In recent years there has been continuous debate on methodology designed for estimating poverty which takes into account the recommended calories. Those who fail to get recommended calories are considered as undernourished and poor. But the estimated poverty based on calorie norms give absurd results such as poverty in southern states being higher than in BIMORU states. Poverty in Tamil Nadu, Kerala, and Andhra Pradesh was more than 80 percent while in Bihar, Orissa it was less than 75 percent. These percentages are based on a fixed calorie norm and do not take into account other indicators like per capita income, health, education, sanitation etc. If we see directly 2400 calories per capita per day as recommended norm, almost 40 percent of people can be called as poor. In Tamil Nadu, as per the recommended calorie norm, 58 percent of rich category people fall under below poverty line. On the other hand, 23 percent of rich are below poverty line in Uttar Pradesh (Dev, 2005). If we believe these numbers, then all welfare programmes should be designed for southern states and more funds should be allocated in these states. But in reality these numbers look unreliable as we know Tamil Nadu is one of the developed states of India whereas Uttar Pradesh is still suffering from backwardness. A group of academician emphasis on inclusion of other nutrients in

estimation of poverty as only calorie criteria may give absurd results (Deaton and Dreze, 2009; Guruswamy, 2006; Radhakrishna, 2005; Gopalan, 1995). These researchers criticized calorie criterion and emphasized on proper sanitation, accessibility of drinking water, education, transport facility, vaccination rate etc. Other group of scholars argued that cereals are not only the source of calories but also protein and fat are derived from these cereals. Thus, a decline in cereals not only leads to decline in calories but also fall in protein, fat and probably some micronutrients (Shariff, 1999; Mehta, 1982).

In calorie poverty controversy, a major argument was made by Patnaik (2010, 2007, and 2004) saying that Planning Commission uses faulty price indices. The prices of all food and other items are quite high in reality which has been under estimated by Planning Commission. In reality, 84 percent population of India is living below poverty line against 27.3 percent estimated by Planning Commission for the year 2004-05.

The above calorie poverty debate is complex and inconclusive. It would be better to discuss this debate in detail in fourth chapter as this chapter focuses on calorie deprivation and poverty level in rural India using NSS unit level data.

1.4 Objectives

The objectives of the study are as follows:

- To examine the spatial-temporal changes in per capita per month consumption of different food items and per capita per day calorie intakes across states and correlate them with other indicators of deprivation such as children underweight, stunted and wasted, BMI of men and women.
- To show average per capita per month consumption (kg) of different food items and resultant average per capita per day calorie intake across all socio-economic (Education, Religion and Caste, Monthly per capita income class, Occupation type) and demographic variables (Age of household members, Sex of household head, Marital status of head and Household size) along with Agro Climatic Regions (ACRs) in rural areas.

- To examine change in average per capita per month consumption (kg) of different food items and resultant average per capita per day intake of calories across all socio-economic and demographic (SED) variables along with Agro Climatic Regions (ACRs) in rural areas.
- To show an effect of socio-economic and demographic (SED) variables along with Agro Climatic Regions (ACRs) on average per capita per month food consumption and also to assess probability of being calorie deprived across SED groups along with ACRs in rural areas.
- To exhibit a comparison between prevalence of under-nutrition (calorie deprivation) and poverty particularly among Occupation groups, Agro Climatic Regions (ACRs), MPCE classes and Social groups in rural areas.

1.5 Research Questions

- How far socio-economic and demographic (SED) factors affect food consumption pattern in rural India?
- Decline in which food item's consumption has caused a decline in calorie intake?
- Is level of under-nutrition and poverty same across Occupation groups, Agro Climatic Regions, MPCE classes and Social groups?

1.6 Data Source

This study is based on secondary data, mainly from National Sample Survey (NSS) and National Family Health Survey (NFHS). In order to achieve the above objectives, data from National Sample Survey (unit level) round 50th (1993-94), 61st (2004-05) & 64th (2007-08) and NFHS I (1992-93), NFHS II (1998-99) and NFHS III (2005-06) have been used. To show the percentage of undernourished, wasted, stunted children and BMI of men and women, data from NFHS I, II and III reports have been taken. In order to show affect of socio-economic and demographic (SED) variables on child under-nutrition, data from NFHS III, unit level has been used. For showing food consumption and nutrition level, NSS round 50th, 61st and 64th have been taken. A brief introduction of these data sources is given below:

NFHS is a nationwide household survey covering a wide range of issues on health, in particular, maternal and child health, fertility, contraceptive knowledge & use and desired family size. Three rounds of this survey have been carried out so far, NFHS I during 1992-93, NFHS II during 1998-99 and NFHS III during 2005-06. These surveys were conducted by the International Institute for Population Sciences (IIPS) Mumbai and Macro International along with number of research institutions and professional survey organizations.

NSS is also a large scale sample survey conducted under NSSO. This organization carries out survey on consumer expenditure quinquennially as part of its "rounds". 50^{th} round (July 1993- June 1994) was the fifth and 61^{st} round (July 2004- June 2005) was the seventh in the series. 64^{th} round (July 2007- June 2008) is based on small sample and thus is a thin round. Thus, comparable estimates have been presented on the basis of 50^{th} and 61^{st} rounds in this study. However 64^{th} round has been used for showing updated results. Consumer expenditure survey gives information on quantity and value of different goods with a reference period of last 30 days for each state/UT, all India and separately for rural and urban areas. These goods include 142 items of food, 13 items of fuel, 27 items of clothing, bedding and footwear, 17 items of educational and medical expenses, 52 items of durable goods and about 90 other items. This survey also focuses on conversion of different food items into calories, protein and fat based on standard units set in Nutritive Value of Indian Foods by C. Gopalan et al. (2009) National Institute of Nutrition, Hyderabad.

1.7 Methodology

In order to show affect of socio-economic and demographic (SED) variables on child under-nutrition, National Family Health Survey (NFHS) III data has been used as it is the most reliable source of information related to nutrition. A unit level data pertaining to IAKR50FL file (kids file) has been used for data purpose. In NFHS III there are mainly three indicators which are used to determine the nutrition among children. These are height for age (stunted), weight for height (wasted) and weight for age (underweight). Since weight for age is a composite index of height for age and weight for height, only weight for age variable has been taken to show under-nutrition among children under age

of 5. In order to show regional variations of under-nutrition among children, major Indian states have been grouped into six categories based on their geographical locations. These categories are:

Northern States: (Delhi, Haryana, Himachal Pradesh, Jammu & Kashmir, Punjab, Rajasthan, and Uttaranchal), Central States: (Chhattisgarh, Madhya Pradesh, Uttar Pradesh), Eastern States: (Bihar, Jharkhand, Orissa and West Bengal), North Eastern States: (Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura), Western States: (Goa, Gujarat and Maharashtra), Southern States: (Andhra Pradesh, Karnataka, Kerala and Tamil Nadu).

SED variables under consideration: Dependent Variable: children (HW71) has been recoded into 0 (not underweight) and 1 (underweight). Independent Variables: Current age of a child (B8), Size at birth (M18), Sex of a Child (B4), Education of Mother (V106), Anemia Level of mother (V457), Wealth Index (V190), Type of caste (S46), Religion (V130), Place of Residence (V025) and State (V024).

To assess the probability of having underweight children across SED groups in a regional parlance, a logistic regression analysis has been performed. The basic formula for logistic regression is:

$$\text{Logit}(P) = (\ln P/(1-P)) = Z \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where P = probability of Occurrence of event (Dependent Variable)

$$\text{And } Z = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots\ldots\ldots\ldots \beta_K X_K$$

Vector Parameters $\beta_0, \beta_1, \beta_2 \ldots\ldots\ldots\ldots\ldots, \beta_K$ and

Predictor variable $X_0, X_1, X_2 \ldots\ldots\ldots\ldots\ldots, X_K$

If Y is the response, then Y = 1; occurrence of the event, and P = Probability (Y = 1)

The probability of occurrence of the event is influenced by a set of predictor variables in the manner specified with $\beta_0, \beta_1, \beta_2 \ldots\ldots\ldots\ldots\ldots, \beta_K$ as the logistic regression coefficients.

The equation can be expressed as, P = exp (Z) / (1 = exp (Z))..... (2)

The quality P/ (1-P) is called the odds, hence the quality ln (1-p) is called as log odds or the logit of P.

In order to show affect of SED variables on consumption of different food items, following variables and food groups have been selected and a multiple regression analysis has been performed in which explanatory variables (regressors) have been made dummy.

Demographic Variables

- Age has been recoded into four groups to show food consumption among important age groups and to find out the most vulnerable groups in terms of food consumption pattern and change in that. The four groups are: Children (0-12 years), Teenagers (13-19 years), Adults (20-59) and Old (above 59).
- Sex includes male and female. Male category has been recoded as 1 and female as 2.
- Marital status includes single (never married), currently married and divorced/widowed/separated persons. In multiple regression analysis currently married and divorced/widowed/separated category has been grouped and coded as 1 whereas never married has been coded as 0.

Social Variables

- Household Size has been grouped into four categories: 1-4 members (small households), 5-6 members (middle size households) and 7-8 members and above 8 members (big households).
- Education has been recoded into four groups: illiterates, primary or below, secondary and higher education. In multiple regression these categories has been made as dummy variables and among them illiterates is the reference category.
- Religious Groups have been categorized into four: Hindus, Muslims, Christian and other religious groups which include Sikhism, Jainism, Buddhism,

Zoroastrianism and others. In multiple regression, all categories have been made dummy variables and Muslim category is the reference.

- Social Group (Caste) includes Scheduled Tribe, Scheduled Caste and Others. In multiple regression, all groups have been made dummy variables and SC is the reference category.

Economic Variables

- Monthly per capita expenditure classes (MPCE, a proxy variable for income classes): 12 classes have been made given in NSS report for the concerned year. Since it is difficult to compare all classes so using the planning commission's poverty lines for 1993-94 and 2004-05 for all states, MPCE has been grouped into below poverty line and above poverty line groups.

- Occupation Type (Household Type): since this study is based on rural areas so rural occupation categories have been used. There are five type of rural occupation selected self-employed in non-agriculture, agricultural labour, other labour, self-employed in agriculture, others. In multiple regression, all categories have been made dummy and self employed in non-agriculture is the reference category.

Besides,

- Agro Climatic Regions (ACR): 15 agro climatic regions have been made out of 78 NSS regions to show the agriculture and climate's affect on food consumption pattern. However only 14 major ACR have been selected for analysis and island region has been dropped (see Appendix 1.1 for constituents and coding of ACRs). In multiple regression, all regions have been made dummy and central plateau and hill region is the reference category. State level food consumption has also been shown. The states such as Uttaranchal, Jharkhand and Chhattisgarh which were parts of Uttar Pradesh, Bihar and Madhya Pradesh have been merged in their respective states for comparison.

Food Groups

1) Cereals include rice, wheat, Jowar, Bajra, Maize, Barley, Small Millet, Ragi & their products and other cereals. 2) Wheat includes wheat and its products. 3) Rice includes rice and its products. 4) Coarse Cereals include Jowar, Bajra, Maize, Barley, Small Millet, Ragi & their products. 5) Pulses include all type of pulses covered by NSS. 6) Milk is in liquid and its consumption is in liters. 7) Vegetables include all vegetables covered by NSS excluding lemon. 8) Fruits: two categories of fruit have been made, one shows consumption of fruits in kilograms (include those fruits whose unit is in kg mentioned by NSS) and other includes number of fruits consumed (include banana, pineapple, coconut and orange). 9) Meat includes all type of meat excluding egg which is in numbers. 10) Edible oil includes all oil products (NSS 61st Consumer Expenditure Schedule 1.0).

The basic formula for multiple regression is:

$$Y_i = \beta_1 + \beta_2 D_{2i} + \beta_3 D_{3i} \ldots\ldots\ldots \beta_K D_{Ki} + u_i$$

Where, Y is the dependent variable, D_2, $D_3 \ldots D_K$ explanatory variables (or regressors), u the stochastic disturbance term and i the i_{th} observation. β_1 is the intercept term and it gives mean or average effect on Y of all the variables excluded from the model. The coefficients β_2 and β_3 are partial regression coefficient. In multiple regression when categories are m, then dummy variables are made by m-1 formula i.e. for each independent variable (regressor) the number of dummy variables introduced must be one less than the categories of that variable. The category for which no dummy variable is assigned is known as reference or omitted category.

In order to convert consumption of different food items into calorie intake, the standard units given in NSS nutrition reports itself (NSS 61st, Nutrition Report, pp. 29-33), have been multiplied by quantity of food. For converting household food consumption into per capita, household consumption is divided by household size. To get the per day consumption, monthly consumption is divided by 30. A recommended per capita per day intake of 2400 Kcal has been taken to show Prevalence of Under-nutrition and Calorie Deprivation (proxy indicator of poverty) in rural areas. Although nutritional

level can not only be judged on the basis of just calorie intake but since in India source of all major nutrients (particularly Protein) is same, a change in source of calorie intake would automatically lead to change in source of other nutrients. Hence, only calorie intake has been taken to show nutrition level in rural India. Different food items have been grouped (for showing calorie intake) into major food groups on the basis of methodology given in NSS nutrition reports (NSS 61st, Nutrition Report, pp. 26).

However, in chapter four, the constituents of these food groups are different from the food groups taken in chapter three but some food groups such as Pulse and pulse products, Oil and fat, Cereal and cereal substitutes, Meat, egg and fish are comparable with the previous chapter. Demographic variables such as age and sex have been dropped in this chapter as NSS only gives household level consumption. However to calculate individual level consumption is possible by applying 'Equivalent Weights' which has not been done, thus a limitation of this study. The official poverty level has been computed by using the Planning Commission's estimated poverty lines for each state for the year 1993/94 and 2004/05. In order to show probability of being calorie deprived across SED groups, a logistic regression has been performed whose formula we have discussed earlier.

1.8 Organization of Chapters

Chapter one introduces meaning and measures of nutrition, statement of the problem, objectives, research questions, data source, an overview of food consumption & calorie intake and methodology of the study. Chapter two highlights level and trends of food consumption and calorie intake in India as well as at regional level along with some anthropometric measures of nutrition. This chapter also focuses on determinants of child under-nutrition. Chapter three shows level and trends of consumption of different food items at India and regional level as well as across all socio-economic and demographic (SED) groups. This chapter also determines the effect of SED variables along with Agro Climatic Regions (ACRs) on food consumption pattern. Chapter four focuses on change in the share of calorie intake from major food items to total calorie intake and comparison of calorie deprivation and poverty level. Chapter five is summary and conclusion.

Chapter II

FOOD CONSUMPTION PATTERN, CALORIE INTAKE AND UNDER-NUTRITION IN INDIA

CHAPTER II
Food Consumption Pattern, Calorie Intake and Under-Nutrition in India

2.1 Introduction

India is one of the fastest growing countries both in terms of population and economy. On one hand, a higher proportion of population is living below poverty line (28.3 percent, according to Planning Commission estimate for the year 2004-05) but economic development on the other hand has opened many opportunities both in rural and urban areas. This economic development has shown two contrasting situations in the country. Firstly, despite the relatively robust growth in the past, India is one of the countries where under-nutrition is still high among the large masses especially among children.

According to World Food Programme (2009), India has the largest number of under-nourished children up to age of 5. This number is even higher than some African countries. Only 7 percent children under age of 5 are under-nourished in China and 28 percent in Sub-Saharan Africa as compared to 43 percent in India (WFP, 2009). This prevalence is even higher among some socio-economic groups and regions. One of the WHO's millennium development goal is to reduce the number of stunted, wasted and underweight children by 2015. Only few years are left to achieve this goal but in India still 38.4 percent children under the age of 3 are stunted, 19.1 percent are wasted and 46 percent children are underweight (NFHS III, 2005-06, Fact Sheets). There has been a sluggish decline in this percentage over a decade but this decline is unimpressive when compared across states and different socio economic groups.

Secondly, food consumption pattern in India has changed much over a decade from 1993/94 to 2004/05. Consumption and expenditure on cereal food items has recorded a decline whereas other food items (vegetables, fruits, meat/egg/fish, oil, milk) which are expensive foods have shown an increasing share in the diet of the population. This change in consumption has caused a decline in our calorie intake which is an important measure of nutrition. However this decline is not seen as deterioration of health but a sign of improvement resulted by an increase in income. Thus, above two points tells a different story of level of nutrition in India. On one hand under-nutrition among

children is high and on the other hand our diet is diversifying towards more expensive foods.

The present chapter aims to show performance of different measures of nutrition consisting of food consumption, calorie-protein-fat intake, percentage of stunted, wasted, underweight children and BMI of women and men in India and across states so that level of nutrition in India can be highlighted. This chapter also tries to answer whether all nutrition measures are related to one another or not. In general, several socio-economic and demographic factors play a dominant role in determining the prevalence of under-nourishment among children. In this chapter an effort has also been taken to show the extent to which these factors affect under-nutrition among children under age 5.

The second section (2.2) of this chapter shows food consumption and its trend, third (2.3) section emphasis on calorie-protein-fat intake and their trend, fourth section (2.4) shows measures of under-nutrition among children, women and men, fifth section (2.5) shows conceptual framework in which how socio-economic and demographic factors determine child nutrition is explained, section six (2.6) shows logit models highlighting the effect of selected variables on child under-nutrition both at country and regional levels.

2.2 Food Consumption Pattern and its Trends in India

Table 2.1 shows that during 2004-05, Indians both in rural and urban areas constitute cereals in their diet and average per capita per month cereal consumption is higher in rural areas (12.12 kg) than in urban areas (9.9 kg). Among cereals, rice is the most preferred food especially in rural areas (6.38 kg PCPM). In urban areas, there is little difference between rice and wheat consumption and thus their diet constituted both rice and wheat. As far as consumption of coarse cereals is concerned, they are preferred by rural masses (1.13 kg PCPM) and their consumption is quite low in urban areas (0.35 kg PCPM). Consumption of pulses, milk, meat, vegetables and fruits is much higher in urban areas than in rural areas which show varied dietary pattern of urban population whereas rural people depend only on cereals particularly rice for their nutritional requirements. Table 2.1 also shows a temporal change in per capita per month consumption of different food items in both rural and urban areas of India. Through this

table one can analyze that in rural and urban areas, consumption of cereals has declined much and this decline is much higher in rural areas. Rural cereal consumption declined by 0.68 kg PCPM during 1994-2000 whereas urban consumption fell by 0.20 kg PCPM during the same period. However, during 2000-2005, gap between rural and urban cereal consumption minimized as rural areas faced a higher 0.1 kg PCPM decline in cereal consumption than urban areas.

Table 2.1
Monthly Per Capita Consumption of Different Food Items

Food Items	Year	Per Capita Quantity (kg)	
		Rural	Urban
Rice	1993-1994	6.79	5.13
	1999-2000	6.59	5.10
	2004-2005	6.38	4.71
Wheat/Atta	1993-1994	4.32	4.44
	1999-2000	4.45	4.45
	2004-2005	4.19	4.36
Coarse Cereals	1993-1994	1.70	0.55
	1999-2000	1.20	.31 (excl. maize)
	2004-2005	1.13	0.35
All Cereals	1993-1994	13.40	10.6
	1999-2000	12.72	10.4
	2004-2005	12.12	9.90
All Pulses	1993-1994	0.76	0.86
	1999-2000	0.84	1.00
	2004-2005	0.71	0.82
Milk (litres)	1993-1994	3.94	4.89
	1999-2000	3.79	5.10
	2004-2005	3.87	5.11
Fish	1993-1994	0.18	0.20
	1999-2000	0.21	0.22
	2004-2005	0.20	0.20
Meat (Mutton and Chicken)	1993-1994	0.08	0.14
	1999-2000	0.11	0.16
	2004-2005	0.09	0.15
Vegetables	1993-1994	2.71	2.91
	1999-2000	3.30	3.49
	2004-2005	2.92	3.17
Fruits/nuts (apple, mango & groundnut	1993-1994	0.12	0.27
	1999-2000	.15 (excl. apple)	0.30
	2004-2005	0.17	0.35

Source: NSS, 61st round, Report no. 509 (61/1.0/2), Household Consumption of various goods & services in India, 2004-05.

Decline in coarse cereals particularly and rice and wheat consumption generally caused a reduction in cereal consumption. An interesting finding comes when we see change in consumption of food items at two different time period. During 1994-2005, consumption of cereals declined whereas consumption of other food items (Vegetables, fruits, meat, fish) increased but in the last five years (2000-2005) of this decade, consumption of both cereals as well as other food items declined which shows that in the last five years our consumption of all foods has declined drastically causing change in our nutritional pattern.

As far as regional variations are concerned (Table 2.2), Jammu and Kashmir is the state which showed a highest increase in rice consumption and highest decline in wheat consumption during 1994-2005. Its rice consumption increased from 4 kg to 9 kg per capita per month in rural areas and 4 kg to 8 kg in urban areas. Rural areas of all states show a decline in rice consumption except Arunachal Pradesh, Assam, Himachal Pradesh and U.P. which show an increase in rice consumption. All urban areas except that of Himachal Pradesh experienced a decline in rice consumption. U. P. is most affected as rice consumption declined from 9 kg per capita per month to 2 kg per capita per month.

As far as wheat consumption is concerned, Madhya Pradesh and Maharashtra show an increase in consumption whereas Jammu and Kashmir suffers from a decline in both rural and urban areas. Besides, all other states either show a decline in wheat consumption or remain same as they were during 1994-2000.

Regarding consumption of other food items, milk item shows a much increase compared to fish and meat items. However in rural areas of Punjab, Haryana and Uttar Pradesh milk consumption has declined much compared to other states during 1994-2005. In both rural and urban areas of Rajasthan and Uttar Pradesh meat consumption has been started. It has increased from 0 kg to 0.04 kg in rural areas and from 0 kg to 0.08 kg in urban areas of Rajasthan. In U.P., meat consumption in rural areas increased from 0 kg to 0.6 kg and in urban areas from 0 kg to 0.04 kg. Generally meat consumption increased in Maharashtra and southern states (Tamil Nadu, Kerala, Andhra Pradesh and Karnataka). Fish consumption has also showed a slight increase in both rural and urban areas.

Table 2.2

Monthly Per Capita Quantity of Consumption of Selected Commodities

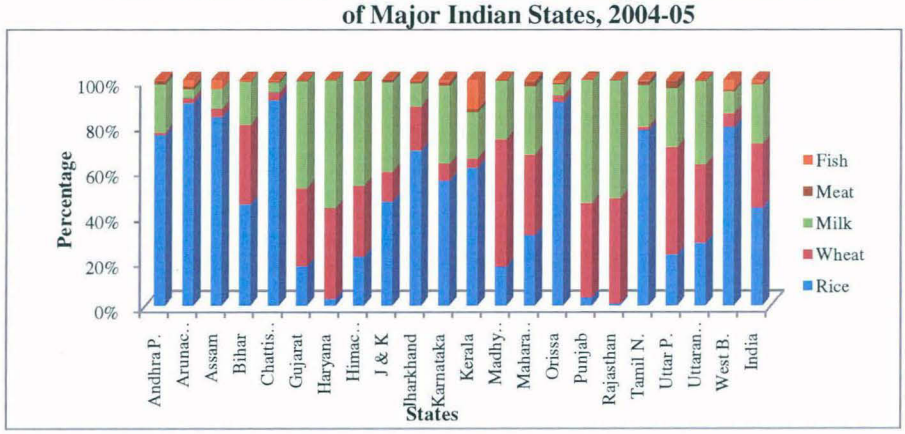
Major States	Rice (Kg)				Wheat (Kg)				Milk (Litre)				Meat (Mutton & Chicken) Kg				Fish (Kg)			
	Rural		Urban		Rural		Urban		Rural		Urban		Rural		Urban		Rural		Urban	
	1993-04	2004-05	1993-04	2004-05	1993-04	2004-05	1993-04	2004-05	1993-04	2004-05	1993-04	2004-05	1993-04	2004-05	1993-04	2004-05	1993-04	2004-05	1993-04	2004-05
A.P.	11.25	10.95	9.86	9.42	0.09	0.14	0.52	0.45	2.62	3.10	3.90	4.30	0.12	0.21	0.16	0.30	0.11	0.07	0.08	0.07
Ar. P.	11.46	13.30	12.34	10.90	0.43	0.32	1.86	1.18	0.43	0.60	2.40	1.40	0.13	0.19	0.18	0.62	0.29	0.41	0.48	0.42
Assam	12.12	12.21	10.40	10.38	0.57	0.53	1.02	1.02	1.20	1.30	1.60	1.90	0.08	0.00	0.12	0.20	0.43	0.58	0.54	0.68
Bihar	7.74	6.87	6.62	5.93	5.23	5.40	5.44	5.80	2.40	2.90	3.50	3.80	0.01	0.03	0.02	0.09	0.12	0.10	0.13	0.09
Chhattisgarh	n.a.*	12.60	n.a.	8.70	n.a.	0.48	n.a.	2.71	n.a.	0.60	n.a.	2.90	n.a.	0.08	n.a.	0.01	n.a.	0.09	n.a.	0.14
Gujarat	1.92	1.80	2.00	1.90	3.59	3.60	5.32	5.10	5.00	4.90	6.20	6.70	0.04	0.04	0.02	0.06	0.02	0.02	0.04	0.02
Haryana	0.73	0.67	1.52	1.16	10.20	9.40	8.55	7.70	14.00	13.10	9.10	9.50	0.02	0.04	0.00	0.06	0.00	0.00	0.00	0.01
H. P.	3.63	4.07	3.76	4.12	5.94	5.90	6.20	6.00	7.50	8.70	9.00	8.10	0.00	0.09	0.01	0.13	0.00	0.00	0.00	0.01
J & K	4.70	9.30	4.66	8.50	7.30	2.70	6.18	2.80	7.30	8.00	9.10	8.30	0.05	0.20	0.06	0.36	0.00	0.01	0.01	0.01
Jharkhand	n.a.	9.45	n.a.	6.05	n.a.	2.70	n.a.	5.50	n.a.	1.40	n.a.	3.90	n.a.	0.10	n.a.	0.20	n.a.	0.10	n.a.	0.20
Karnataka	5.25	5.12	6.17	5.44	0.60	0.70	1.02	1.10	2.90	3.20	4.40	4.80	0.08	0.14	0.13	0.25	0.14	0.10	0.14	0.10
Kerala	9.22	8.42	8.39	7.50	0.40	0.60	0.50	0.70	2.60	2.80	3.20	3.60	0.04	0.18	0.06	0.20	1.35	1.80	1.62	2.00
M. P.	5.93	2.28	3.52	2.04	5.54	7.50	6.89	7.70	2.70	3.40	4.00	4.30	0.02	0.04	0.02	0.08	0.06	0.02	0.04	0.03
Maharashtra	2.83	2.80	3.02	2.80	2.03	3.20	3.98	4.00	2.50	2.70	4.70	4.30	0.02	0.20	0.05	0.18	0.11	0.06	0.20	0.10
Orissa	14.69	12.70	10.72	10.50	0.31	0.40	1.41	1.70	0.77	0.70	2.20	2.20	0.02	0.07	0.04	0.16	0.29	0.20	0.30	0.30
Punjab	0.73	0.75	0.91	1.00	9.58	8.90	7.65	7.70	14.30	11.50	9.70	10.50	0.01	0.03	0.01	0.06	0.00	0.00	0.00	0.00
Rajasthan	0.22	0.17	0.57	0.52	8.97	8.40	9.90	9.40	10.40	9.40	7.50	7.30	0.00	0.04	0.00	0.08	0.00	0.00	0.01	0.01
T. N.	10.30	10.13	9.10	8.57	0.21	0.19	0.55	0.40	2.10	2.40	5.40	5.10	0.04	0.20	0.07	0.23	0.17	0.10	0.17	0.14
U. P.	2.57	4.00	9.10	2.70	8.87	8.40	7.96	7.80	5.40	4.60	5.60	5.10	0.00	0.60	0.00	0.04	0.04	0.04	0.02	0.02
Uttaranchal	n.a.	4.90	n.a.	4.30	n.a.	6.10	n.a.	6.30	n.a.	6.50	n.a.	6.30	n.a.	0.08	n.a.	0.10	n.a.	0.02	n.a.	0.05
W.B.	12.59	11.59	8.12	7.40	1.07	0.90	2.56	2.10	1.50	1.40	2.70	2.50	0.03	0.13	0.07	0.21	0.54	0.63	0.72	0.90
India	n.a.	6.30	n.a.	4.70	n.a.	4.10	n.a.	4.30	n.a.	3.80	n.a.	5.10	n.a.	0.10	n.a.	0.15	n.a.	0.20	n.a.	0.20

Note: * Not Available

Source: NSS Report no. 509 (61/1.0/2) 61st round, Household Consumption of various goods & services in India, 2004-05 and report no. 404, NSS 50th round, Consumption of some important commodities in India.

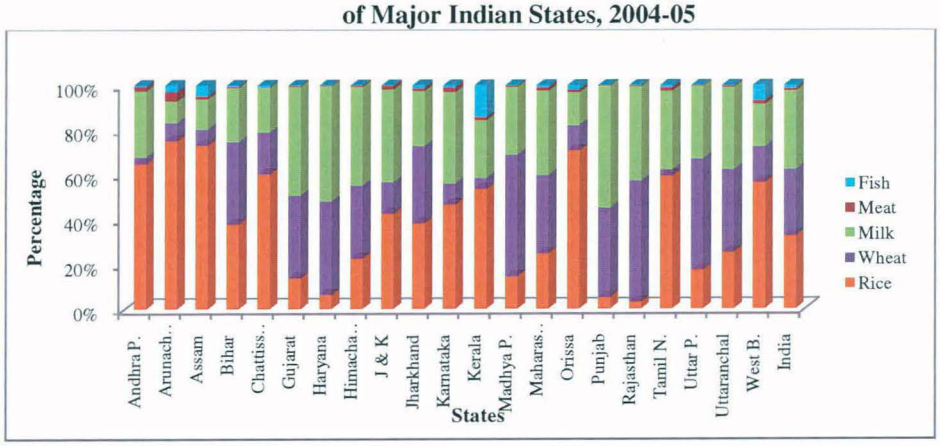
Figure 2.1 and 2.2 shows share of different food items in total consumption both in rural and urban areas. As far as rural areas are concerned rice is the staple food in almost all states except in Haryana, Punjab, Rajasthan, U.P. and M.P where wheat is the staple food. Milk consumption is highest in Haryana, Punjab, Rajasthan and Gujarat. All other foods have lower proportion in total consumption. Among them fish is mainly consumed in Kerala and Orissa and meat in U.P. and Maharashtra. In case of urban areas, though, rice and wheat are the staple foods yet their share in total consumption is less compared to rural areas. The share of other food items is comparatively high. Thus, it is concluded that the main source of calories in all states is rice and wheat. Although, their share has declined but they are still the staple foods in all states whereas consumption of all other food items (meat, milk and fish) has started increasing in the diet of Indian population.

Figure 2.1
Share of Different Food Items in Total Consumption in Rural Areas of Major Indian States, 2004-05



Source: Computed from Table 1.1

Figure 2.2
Share of Different Food Items in Total Consumption in Urban Areas of Major Indian States, 2004-05



Source: Computed from Table 1.1

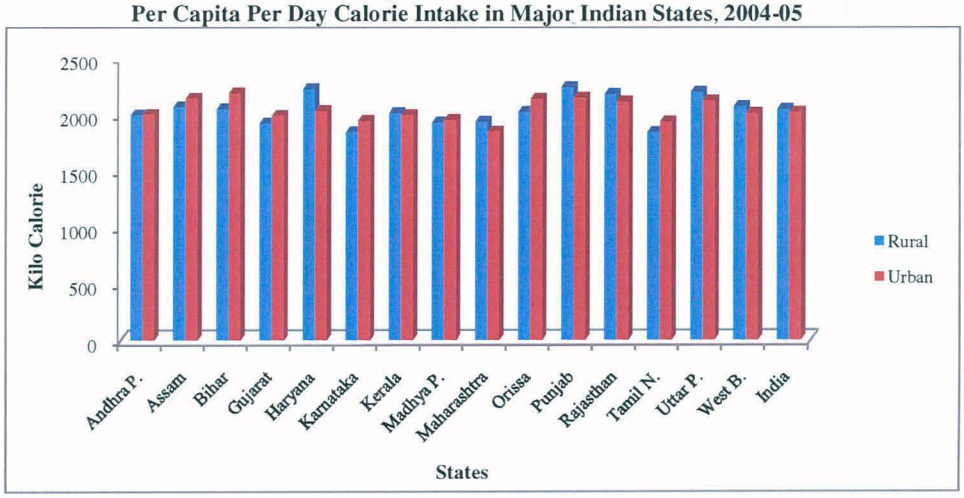
2.3 Calorie-Protein-Fat Intakes in India

An important indicator for showing nutritional level among population is calorie intake in particular and protein and fat intake in general. The main source of calories is cereals whereas proteins just balance the deficits in intake. The average calorie intake varies from rural to urban areas as there is more physical work done by rural people so they need more calories. The average calorie intake set by government for rural people is 2400 kcal per day and for urban people it is 2100 kcal per day. The various NSS rounds (Table 2.3 and Table 2.4) show that average calorie intake in India has declined from 2266 kcal in 1972-73 to 2047 kcal in 2004-05 in rural areas, a decline of 247 kcal within a three decades and from 2107 kcal to 2020 kcal in urban areas, a decline of 87 kcal in same period. This data shows that rural areas have seen a much larger decline in calorie consumption than the urban areas.

A state level analysis shows that among major states Tamil Nadu has lowest calorie intake (1842 kcal per capita per day) in rural areas whereas in Maharashtra urban people get lowest calorie (1847 kcal per capita per day) during 2004-05. All northern states such as Punjab, Haryana, Uttar Pradesh and Bihar have higher calorie intake than the national average but it is also true that these states except Bihar have also shown one of the highest decline in calorie intake during 1994-2005. Besides them, West Bengal, Orissa, Karnataka, Madhya Pradesh and Rajasthan have also shown a drastic decline in calorie consumption during 1994-2005.

Figure 2.3

Per Capita Per Day Calorie Intake in Major Indian States, 2004-05



Source: Computed from Table 1.3 and 1.4

Table 2.3

Per Capita Per Day Intake of Calorie, Protein and Fats (Rural)

State	Calorie (Kcal)					Protein (gm)					Fat (gm)				
	27th	38th	50th	55th	61st	27th	38th	50th	55th	61st	27th	38th	50th	55th	61st
	1972-73	1983	1993-94	1999-00	2004-05	1972-73	1983	1993-94	1999-00	2004-05	1972-73	1983	1993-94	1999-00	2004-05
A. P.	2103	2204	2052	2021	1995	53	56	50.8	49.4	49.8	21	24	27.2	29.5	33.5
Assam	2074	2056	1983	1915	2067	53	52	49.5	47.7	52.7	15	18	21	22.3	26.7
Bihar	2225	2189	2115	2121	2049	65	65	60.2	58.7	57.8	17	20	23	26.5	28.4
Gujarat	2142	2113	1994	1986	1923	58	59	55.6	54.2	53.3	40	44	47.4	53.8	50.9
Haryana	3215	2554	2491	2455	2226	90	78	78.4	75.3	69.6	47	47	53.6	59.1	55.4
Karnataka	2202	2260	2073	2028	1845	57	60	55.1	54.2	48.8	23	26	28.6	36.6	33.9
Kerala	1559	1884	1965	1982	2014	38	47	50.8	52.4	55.4	19	32	32.7	38.8	40.8
M. P.	2423	2323	2164	2062	1929	68	68	63	58.2	58.8	21	25	28.3	31.3	35.1
Maharashtra	1895	2144	1939	2012	1933	54	62	54.8	56.5	55.7	24	30	33.5	39.7	41.5
Orissa	1995	2103	2199	2119	2023	49	51	52.7	49.9	48.3	8	13	14.8	16.3	17.8
Punjab	3493	2677	2418	2381	2240	85	79	74.7	71.7	66.7	50	52	59.8	58.7	58.7
Rajasthan	2730	2433	2470	2425	2180	84	75	79.4	76.9	69.6	46	42	52.8	53.5	50.9
T. N.	1955	1861	1884	1826	1842	49	47	46.8	44.9	44.9	18	22	24.7	29.5	29.6
U. P.	2575	2399	2307	2327	2200	76	73	70.4	69.7	65.9	28	29	35.5	37.6	37.5
W. B.	1921	2027	2211	2095	2070	50	52	54.8	51.6	52	13	17	21.4	24.2	26.5
India	2266	2221	2153	2149	2047	62	62	60.2	59.1	57	24	27	31.4	36.1	35.5

Source: NSS 61st Round, Report No. 513(61/1.0/6), Nutritional Intake In India, 2004-2005

Table 2.4

Per Capita Per Day Intake of Calorie, Protein and Fats (Urban)

State	Calorie (Kcal)					Protein (gm)					Fat (gm)				
	27th	38th	50th	55th	61st	27th	38th	50th	55th	61st	27th	38th	50th	55th	61st
	1972-73	1983	1993-94	1999-00	2004-05	1972-73	1983	1993-94	1999-00	2004-05	1972-73	1983	1993-94	1999-00	2004-05
A. P.	2143	2009	1992	2052	2000	51	50	49.6	50.8	50.9	31	32	34.9	41.5	43.2
Assam	2135	2043	2108	2174	2143	56	52	53.5	56.5	55.9	25	25	30.8	38.7	36.8
Bihar	2167	2131	2188	2171	2190	61	61	61.4	61	62.2	25	26	32.7	34.2	40.4
Gujarat	2172	2000	2027	2058	1991	57	55	54.9	54.7	57.3	58	53	57.9	67	63.5
Haryana	2404	2242	2140	2172	2033	67	67	63.6	62.5	60.5	42	49	49.4	56.3	54.4
Karnataka	1925	2124	2026	2046	1944	46	55	53.1	53.5	52.2	32	36	37.6	45.1	43.3
Kerala	1723	2049	1966	1995	1996	44	51	52.4	55.2	56.7	27	38	37	42.9	44.9
M. P.	2229	2137	2082	2132	1954	61	62	59.8	60.6	58.2	34	36	40.3	43.5	43.4
Maharashtra	1971	2028	1989	2039	1847	55	56	55.5	55.9	52.1	41	45	47.9	52.6	50.1
Orissa	2276	2219	2261	2298	2139	55	56	57.2	57.8	55.2	23	24	28.1	27.4	28.3
Punjab	2783	2100	2089	2197	2150	70	63	61.8	64.8	63.4	52	49	53.7	57.9	61
Rajasthan	2357	2255	2184	2335	2116	70	69	66.5	70.4	64	47	47	51.6	61.5	56.4
T. N.	1841	2140	1922	2030	1935	44	45	48.7	51.7	49.2	23	29	33.9	43.2	41.1
U. P.	2161	2043	2114	2131	2124	62	62	63.2	62	65.1	35	34	41.2	45.5	46.1
W. B.	2080	2048	2131	2134	2011	58	55	56.6	55.5	55.1	31	31	34.2	40.2	39.1
India	2107	2089	2071	2156	2020	56	57	57.2	58.5	57	36	37	42	49.6	47.5

Source: NSS 61st round, Report No. 513(61/1.0/6), Nutritional Intake In India, 2004-2005

As far as a spatial distribution of calorie consumption in 2004-05 is concerned (Figure 2.3), it is slightly high in rural areas than in urban areas. States like Punjab, Haryana, Kerala, U.P, Rajasthan, Maharashtra and West Bengal show a higher consumption in rural areas as compared to urban areas. Other states have higher consumption in urban areas which shows that calorie consumption declined much in rural areas compared to urban areas over the NSS rounds.

If we see protein intake per day, we find that it has declined over NSS rounds. However there has been a slight increase in southern states but overall protein intake has declined in all states. In rural areas this decline is much sharp. Kerala is the only state where both in rural and urban areas protein intake per head has increased by more than 10 gms. The decline in calorie and protein intake can be blamed for rise in fat intake. In Punjab where both calorie and protein consumption has declined, fat intake has increased by 3 gms in 2004-05 in urban areas. Bihar is the only state where fat increased much more by 6 gms. An important finding to be noted is that fat intake increased more in rural areas than in urban areas (Table 2.3 and 2.4).

The above analysis shows that calorie intake is decreasing in those states where consumption of cereals has declined. For instance, in Kerala where consumption of cereals has increased over a period, the calorie and protein intake has shown an increase. On the other hand are Punjab, Haryana, Rajasthan, and Madhya Pradesh where cereal consumption has declined which lead to decline in calorie intake.

2.4 Under-Nutrition Level in India

Besides calorie and protein intake there are other indicators through which nutrition level in the country can be analyzed. These measures include Height for age (stunted), Weight for height (wasted), and Weight for age (underweight) measuring nutritional level among children and Body Mass Index among adults.

Table 2.5 shows the temporal change and spatial distribution of Body Mass Index (BMI) of men and women. The NFHS III (2005-06) survey reveals that 33 percent Indian women have BMI below normal but if we analyze a temporal change, the BMI of women has improved over 1998-99. The percentage of women whose BMI is below normal has

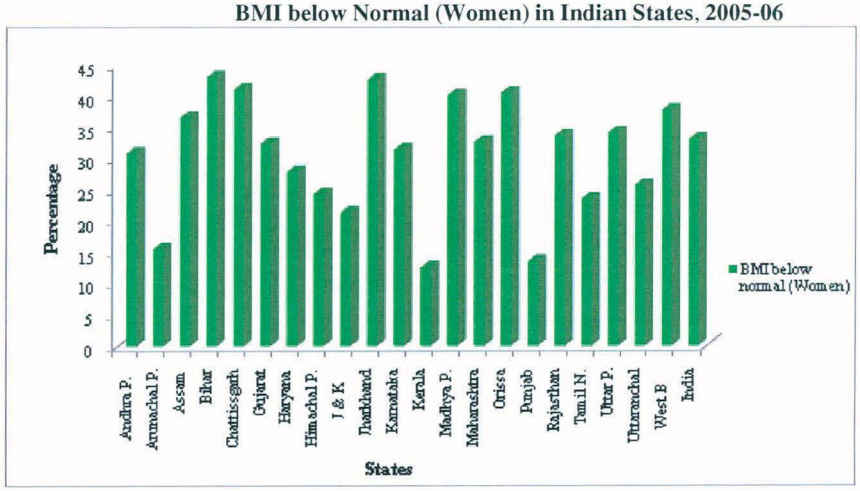
decreased from 36 to 33 percent during 1999-2006. If analyze state level data, the picture comes quite relaxing as in almost all states the percentage of women whose BMI is below normal has decreased except in Assam, M.P, Haryana and Bihar where it has increased.

Table 2.5
Percentage of Women and Men with BMI below Normal

States	BMI below normal (Women)		BMI below normal (Men)
	1998-99	2005-06	2005-06
A. P.	37.4	30.8	24.8
Ar. P.	10.7	15.5	13.6
Assam	27.1	36.5	33.4
Bihar	39.1	43	28.7
Chhattisgarh	48.1	41	31.8
Gujarat	37	32.3	28.2
Haryana	25.9	27.8	26.8
H. P.	29.7	24.3	19.8
J & K	26.4	21.3	19.9
Jharkhand	41.1	42.6	33.4
Karnataka	38.8	31.4	25.5
Kerala	18.7	12.5	11.9
M. P.	35.2	40.1	36.3
Maharashtra	39.7	32.6	24.9
Orissa	48	40.5	32.1
Punjab	16.9	13.5	12
Rajasthan	36.1	33.6	33.8
T. N.	29	23.5	18.5
U. P.	36.5	34.1	32.7
Uttaranchal	32.4	25.7	21.8
W. B.	43.7	37.7	31.6
India	36.2	33	28.1

Source: NFHS III, 2005-06, Fact Sheets.

Figure 2.4
BMI below Normal (Women) in Indian States, 2005-06



Source: Computed from Table 1.5

The worst condition is in poor states (Figure 2.4) like Orissa, Bihar and M.P where more that 40 percent women have low weight followed by U.P., West Bengal, Jharkhand and Assam. A comparison with men shows unsatisfactory condition. In Bihar the ratio of women to men whose BMI is below normal is 2:1 which shows that there are just double numbers of women who are unhealthy as compared to men. In all states women suffer from poor health conditions than men. However in rich states like Punjab, Haryana and Kerala this gap is low.

Table 2.6
Nutrition Level among Children (< 3)

States	Stunted			Wasted			Under weight		
	1992-93	1998-99	2005-06	1992-93	1998-99	2005-06	1992-93	1998-99	2005-06
A.P.	n.a.*	38.6	33.9	n.a.	9.1	12.7	45.0	37.7	36.5
Ar. P.	49.2	26.5	34.2	12.9	7.9	16.5	38.4	24.3	36.9
Assam	50.4	50.2	34.8	10.8	13.3	13.1	49.2	36.0	40.4
Bihar	n.a.	54.9	42.3	n.a.	19.9	27.7	n.a.	54.3	58.4
Chhattisgarh	n.a.	57.9	45.4	n.a.	18.5	17.9	n.a.	60.8	52.2
Gujarat	44.1	43.6	42.4	19.8	16.2	17.0	48.1	45.1	47.4
Haryana	42.9	50.0	35.9	5.7	5.3	16.7	34.6	34.6	41.9
H. P.	n.a.	41.3	26.6	n.a.	16.9	18.8	43.7	43.6	36.2
J & K	n.a.	38.8	27.6	n.a.	11.8	15.4	n.a.	34.5	29.4
Jharkhand	n.a.	49.0	41.0	n.a.	25.4	31.1	n.a.	54.3	59.2
Karnataka	40.4	36.6	38.0	19.5	20.0	17.9	50.6	43.9	41.1
Kerala	25.2	21.9	21.1	12.8	11.1	16.1	27.0	26.9	28.8
M. P.	n.a.	49.0	39.9	n.a.	20.2	33.3	n.a.	53.5	60.3
Maharashtra	40.9	39.9	37.9	23.1	21.2	14.6	51.4	49.6	39.7
Orissa	44.9	44.0	38.3	23.4	24.3	18.5	52.2	54.4	44.0
Punjab	38.0	39.2	27.9	21.1	7.1	9.0	46.0	28.7	27.0
Rajasthan	41.8	52.0	33.7	21.2	11.7	19.7	44.3	50.6	44.0
T. N.	n.a.	29.4	25.1	n.a.	19.9	25.1	45.7	36.7	33.2
U. P.	n.a.	55.6	46.0	n.a.	11.2	13.5	n.a.	51.8	38.0
Uttaranchal	n.a.	46.6	31.9	n.a.	7.6	16.2	n.a.	41.8	38.0
W. B.	n.a.	41.5	33.0	n.a.	13.6	19.0	54.8	48.7	43.5
India	n.a.	45.5	38.4	n.a.	15.5	19.1	51.5	47.0	45.9

*Note:** Not Available
Source: NFHS III, 2005-06, Fact Sheets.

Table 2.6 shows that in India 45 percent children are under-weight, means every second child does not get sufficient weight. This proportion varies from state to state. In M.P and Bihar more than 58 percent children are under-nourished. Punjab is the only state where a least proportion (27 percent) of children is malnourished. Another important finding is that over NFHS II survey, the proportion of children who are underweight has increased mainly in rich states like in Gujarat, Haryana and Kerala.

Haryana which is the main food producing state in India shows 7 percent increase in malnourished children whereas Uttar Pradesh a zone of poor people shows 14 percent decline in undernourished children which is highest in India. The percentage of wasted children has increased in India form 16 percent in 1998 -99 to 19 percent in 2005-06. A highest increase is shown by M.P. (13 percent) followed by Haryana, Bihar, West Bengal and Tamil Nadu. Maharashtra and Orissa show a decline in wasted children. The percentage of stunted population however has declined over NFHS II survey but still there are some states which show a high proportion of stunted children such as Bihar (42.3 percent), Gujarat (42.4 percent), M.P. (39.9 percent), Orissa (38.3 percent) and Karnataka (38 percent).

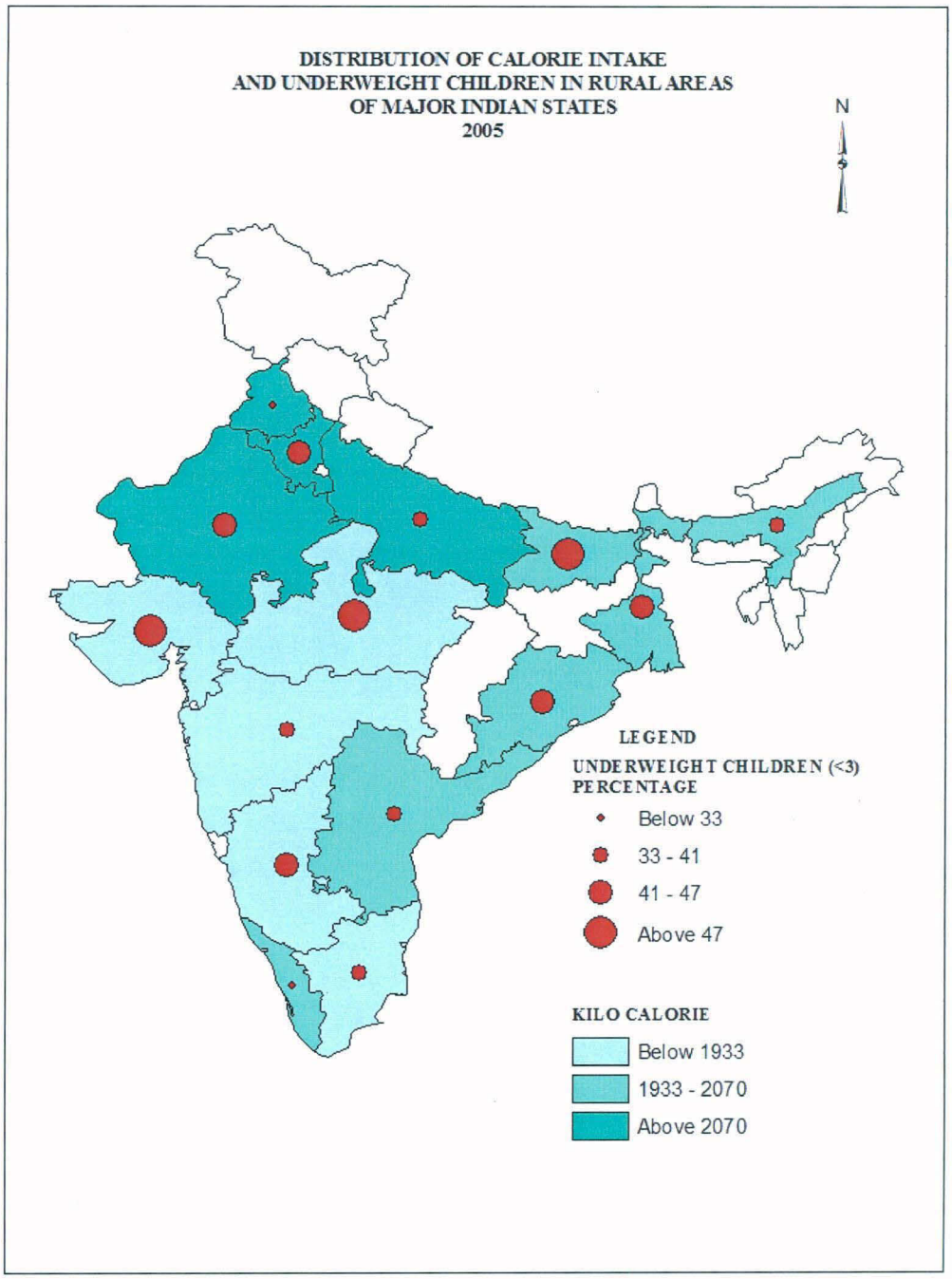
Overall in India, most of the children are under-nourished which leads to a high percentage of under-weight, stunted and wasted children. However, the percentage of under-nourished children has declined in many states but it is still high covering more than 40 percent children unhealthy. One important fact to be noted here is that these are the poor states recovering from high percentage of under nourished children and showing a decline where as in rich states the percentage of under-nourished children is increasing.

If we see a relationship between calorie intake and underweight children in rural areas (Map 2.1), we find that there is no clear cut relationship between them. However, to some extent number of underweight children is less in rural areas of those states (Punjab, U.P, Rajasthan) where calorie intake is high. In urban areas consumption of calorie does not have much effect on underweight children (Map 2.2). In urban areas since health system and other dietary substitutes are easily available, probability of being underweight among children is low. For example, in spite of low calorie intake in Maharashtra, Kerala, Tamil Nadu, Karnataka and Andhra Pradesh number of underweight children is low which shows that these southern and western states do not need higher calorie level for lowering down underweight children.

Thus, it is difficult to correlate calorie intake and anthropometric measures of nutrition. On one hand, the higher calorie intake states also have higher percentage of underweight children such as Haryana, Rajasthan, Bihar and Orissa; on the other hand lower calorie intake areas such as Tamil Nadu, Maharashtra and Karnataka have lower

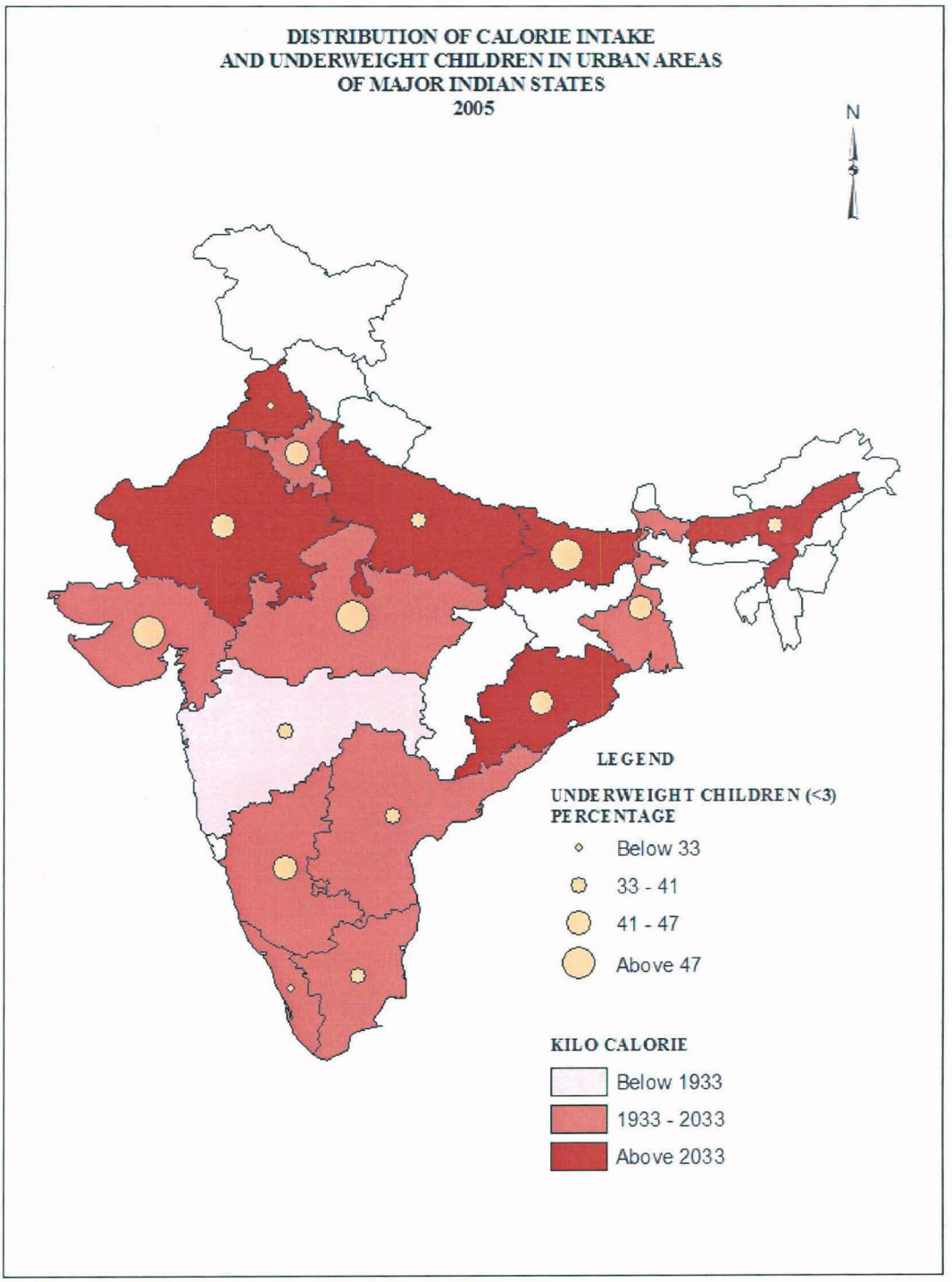
percentage of underweight children. Higher calorie intake states (Punjab, Kerala) also have lower undernourished children and lower calorie intake states (Madhya Pradesh and Rajasthan) have higher percentage of underweight children. Hence, it is difficult to conclude where the calorie intake and anthropometric measures are perfectly correlated.

Map 2.1



Source: Computed from Tables 1.3 and 1.6

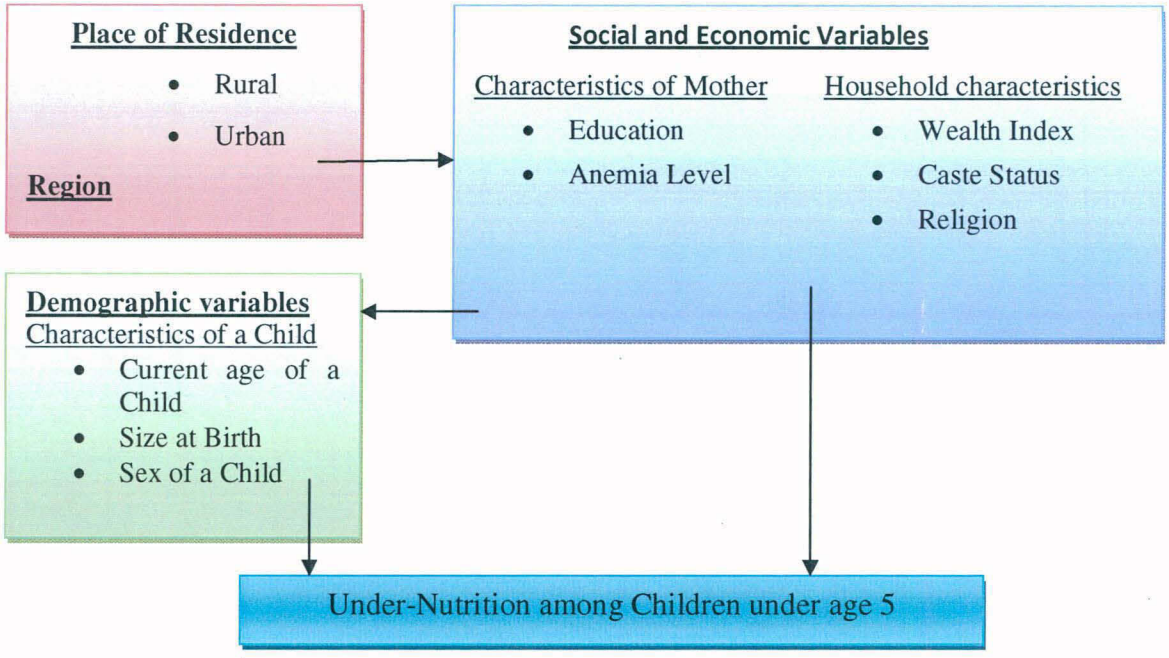
Map 2.2



Source: Computed from Tables 1.4 and 1.6

2.5 Conceptual Framework Showing Determinants of Child Under-Nutrition

Figure 2.5



Source: based on Kanjilal et al. (2010) study

The above framework (Figure 2.5) depicts that under-nutrition among children under age 5 is interplay of many socio-economic and demographic variables. Studies show that maternal education is the most important factor in determining child under-nutrition (Biswas et al., 2011; Meshram et al., 2011; Subramanyam et al., 2010; Gulati, 2010; Chen and Li, 2009; NFHS Report, 2005-06; IIPS Report, 2000; Defo, 1996; Kumar, n.d.).

Educated mothers are more likely to have healthier children because they have better knowledge of child care and nutrition, proper sanitation and provide healthy and safe environment to their children. Generally probability of being healthy is high among educated mothers which genetically leads to better health among their children (Chen and Li, 2009; NFHS III, 2005-06; Rao et al., 2004). As Defo (1996) also argues 'education creates aspirations for upward social mobility and the accumulation of wealth, enhances the likelihood of outside female employment, reduces the perceived economic utility of

children and increases accessibility to health care services and availability of high quality foods made possible by increased income'. Thus better education leads to improved health among mothers which in turn determines child health. However a study conducted by Ray et al. (2001) also confirms that only improvement in mother's education does not help in child health until or unless father is also literate. Thus emphasis should also be given on father's education along with mother's literacy in making and implementation of any policy (also supported by Bharati et al., 2010).

Besides parental education, there are other social and economic variables determining child nutrition. Several studies reveal that religion and caste are significantly related to child under-nutrition. Children belonging to Hindu or Muslim backgrounds in India tend to be more under-nourished than those from Sikh, Christian and other religious communities. Children belonging to households of scheduled castes, schedules tribes, or other backwards castes are also at increased risk of under-nutrition. In particular, children of scheduled tribes have the poorest nutritional status and the highest wasting. It is found that prevalence of under-nutrition is high among the children of Muslims and lower caste people (SC,ST,OBC) because education level among these groups is low resulting lack of awareness about nutritional requirements of their child (Biswas et al., 2011; Subramanyam, 2010; Das, 2008; Gragnolati et al., 2005; NFHS III Report, 2005-06).

The economic status of households also affects child nutrition but this affect is not as high as other social factors. For instance, Kumar (n.d.) argued that a majority of Sub-Saharan African countries have lower per capita level than India and yet child malnutrition level is low in these countries. Even within India, Gujarat and Uttar Pradesh have same proportion of underweight children (47 percent) even though per capita income in Gujarat is several times higher than in Uttar Pradesh (also supported by Mandelson, n.d; Deolaikar, 2005 cited in Das, 2008).

However in other studies, wealth index is significantly related to child under-nutrition. Wealthier parents can afford better medical care and expensive nutritious food and provide better and healthier environment to their children. Thus, as standard of living increases, proportion of underweight children declines (Subramanyam et al., 2010; Chakrabatty et al., 2010; Kanjilal et al., 2010; Chen and Li, 2009; Gragnolati et al.,

2005). Evidences also show that rural children are at a greater risk of under-nutrition than their urban counterparts (Gragnolati et al., 2005; Smith et al., 2004; Shastry, 1997; Defo, 1996). Urban children have better nourished mother who are more likely to receive prenatal and birth care facilities which reduce several diseases among children. Thus, children are born with adequate size and less likely at a risk of early mortality and morbidity (Smith et al., 2004). Another study conducted by Shastri (1997) in Brazil confirms that rural children are likely more undernourished than urban children because of less availability of clean water, sanitation services, electricity and public planning.

2.6 Factors Affecting Child Under-Nutrition

All India Level

Table 2.7 shows that the selected socio-economic and demographic variables have a significant effect on the prevalence of under-nourishment among children under age 5. All the variables are significantly related to the underweight children at 1 percent level. The logistic table shows that as age of child increases, probability of being underweight also increases probably because with growing age, requirement of nutrients also increases. In fact, childhood is the only stage in life when body grows at its fullest speed (Das, 2008). With the size of a child at birth, under-nourishment among children declines. Generally size at birth of a child is determined by mother's health. Better maternal health ensures better child health. Mother's education has a direct effect on underweight children. Children belonging to more educated mothers tend to show a lower prevalence of underweight. Similarly anemic mothers' children suffer more from under-nourishment. Female children are more prone (odd ratio 1.018) to become underweight than the male children.

As far as wealth index is concerned, children belonging to poor households are worst affected. There is 42 percent less likelihood of being underweight among the children of rich people than the poor children. As income increases percentage of underweight children reduces. The odds ratio for religion shows that the probability of being underweight is higher among Muslims and lower among other religious groups than the Hindus. Similarly ST's children are 1.15 times more prone to being underweight than the SC population. OBC category children enjoy good health compared to SC

population. The prevalence of underweight children is less in southern and north eastern states as compared to northern states. Other regions have higher proportion of underweight children in comparison with northern ones. Map 2.3 also shows that children of poor people are more prone to be underweight as compared to rich ones. For example Bihar, Chhattisgarh, M.P, Orissa and Jharkhand where proportion of poor is high, number of underweight children is also high. On the other hand in southern states such as Kerala, Maharashtra and Goa where rich people are more, underweight children are less. Thus in India wealth index has a significant impact on child nutrition. Place of residence is also significantly related to underweight children as results at India level show that the probability of being underweight is 1.01 times higher in rural areas than in urban areas.

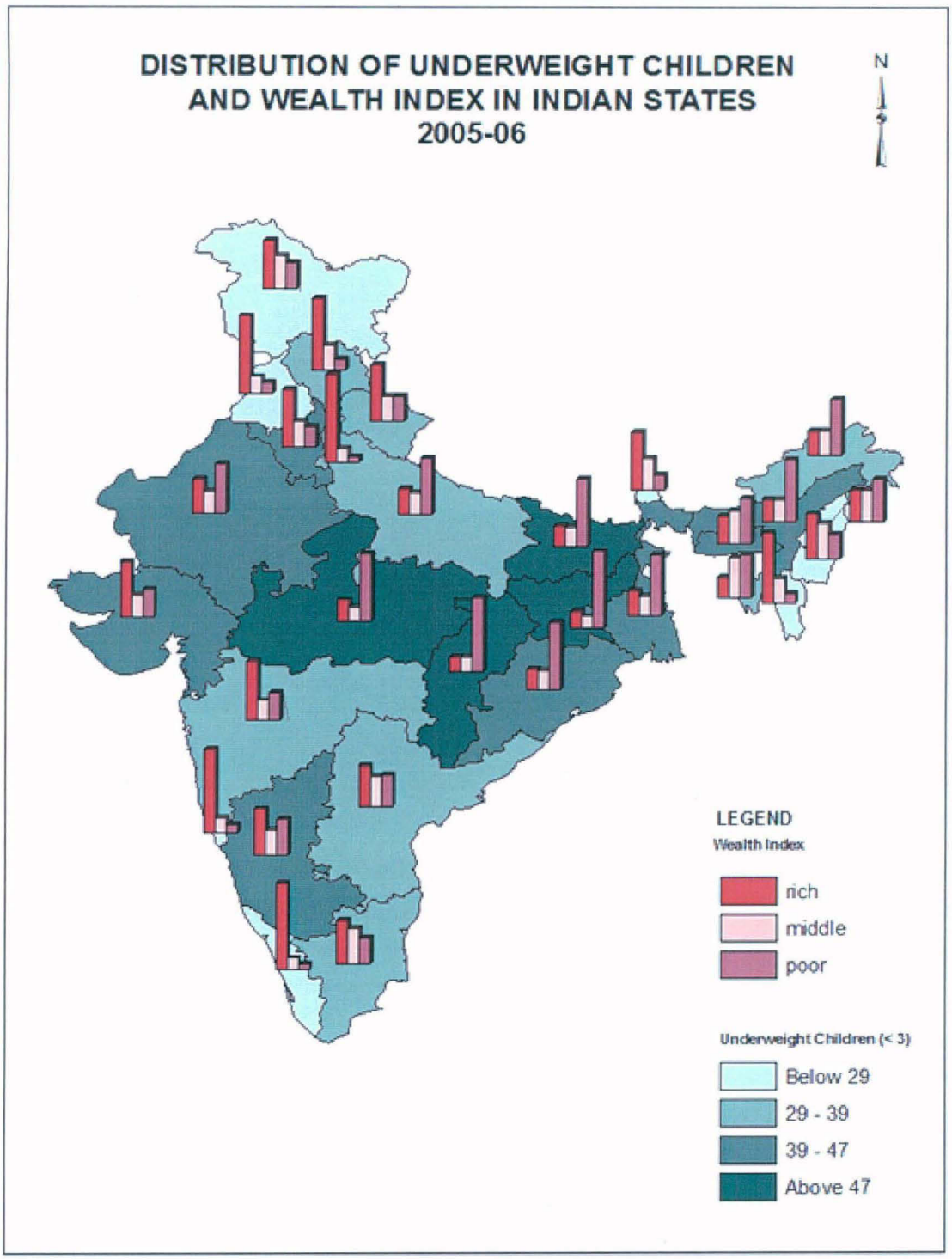
Table 2.7

Factors Affecting Child Under-Nutrition: All India

Explanatory Variables and their Categories		Beta	Sig@	Exponential Beta
Child Age	Below1(Ref)*		0.000	1
	1-2	0.542	0.000	1.719
	2-3	0.605	0.000	1.831
	3-4	0.666	0.000	1.947
	Above 4	0.626	0.000	1.870
Size of a Child	Very small (Ref)		0.000	1
	Small	-0.154	0.000	0.857
	Average/larger	-0.578	0.000	0.561
Sex of a Child	Male (Ref)		0.000	1
	Female	0.018	0.000	1.018
Mother's education	No education (Ref)		0.000	1
	Primary	-0.199	0.000	0.819
	Secondary	-0.372	0.000	0.690
	Higher	-0.999	0.000	0.368
Anemia level of	Severely (Ref)		0.000	1
Mother	Moderately	-0.120	0.000	0.887
	Not anemic	-0.235	0.000	0.791
Wealth Index	Poor (Ref)		0.000	1
	Middle	-0.276	0.000	0.759
	Rich	-0.601	0.000	0.548
Caste Status	Scheduled Caste (Ref)		0.000	1
	Scheduled Tribe	0.138	0.000	1.148
	OBC	-0.110	0.000	0.896
	Others	-0.327	0.000	0.721
Religion	Hindu (Ref)		0.000	1
	Muslim	0.027	0.000	1.028
	Others	-0.172	0.000	0.842
Place of Residence	Urban (Ref)		0.000	1
	Rural	0.013	0.000	1.013
Region	North (Ref)		0.000	1
	Central	0.239	0.000	1.270
	East	0.331	0.000	1.393
	North East	-0.252	0.000	0.777
	West	0.290	0.000	1.337
	South	-0.105	0.000	0.900
	Constant	0.180	0.000	1.197

Note: @Significance level, ≥ 0.01= 1 percent, 0.02-0.05= 5 percent, 0.06-0.1= 10 percent
*Reference Category
Dependent Variable is children underweight, (<5) 1 shows underweight and 0 not underweight
Source: Computed from NFHS III (2005-06) unit level data

Map 2.3



Source: Computed from NFHS III, 2005-06, unit level data and Table 1.6

Regional Level

Northern Region

Table 2.8 is showing the effect of some selected socio-economic and demographic variables on the prevalence of under-nourishment among children in northern states. If we study these variables at regional level, they are still as much dominant as in the case of India level. All selected variables are significantly related to children underweight variable in northern states. The higher age children are more prone to become underweight as compared to lower age children. Similarly if size of a child at birth is average or more than that, the probability of being underweight is much less. With mother's education and her anemic level, the probability of being underweight declines. Educated mothers are more concerned about their children, take care the needs of their infants as a result children are less vulnerable to become undernourished.

Table 2.8
Factors Affecting Child Under-Nutrition in Northern Region

Explanatory Variables and their categories		Beta	Sig@	Exponential Beta
Child Age	Below1(Ref)*		0.000	1
	1-2	0.693	0.000	1.999
	2-3	0.672	0.000	1.959
	3-4	0.86	0.000	2.363
	Above 4	0.714	0.000	2.042
Size of a Child	Very small (Ref)		0.000	1
	Small	-0.072	0.000	0.931
	Average/larger	-0.483	0.000	0.617
Sex of a Child	Male (Ref)		0.000	1
	Female	-0.064	0.000	0.938
Mother's education	No education (Ref)		0.000	1
	Primary	-0.19	0.000	0.827
	Secondary	-0.444	0.000	0.641
	Higher	-0.98	0.000	0.375
Anemia level of	Severely (Ref)		0.000	1
Mother	Moderately	-0.107	0.000	0.899
	Not anemic	-0.069	0.000	0.933
Wealth Index	Poor (Ref)		0.000	1
	Middle	-0.305	0.000	0.737
	Rich	-0.571	0.000	0.565
Caste Status	Scheduled Caste (Ref)		0.000	1
	Scheduled Tribe	-0.305	0.000	0.737
	OBC	-0.297	0.000	0.743
	Others	-0.236	0.000	0.79
Religion	Hindu (Ref)		0.000	1
	Muslim	0.037	0.000	1.038
	Others	-0.597	0.000	0.551
Place of Residence	Urban (Ref)		0.000	1
	Rural	0.079	0.000	1.082
	Constant	0.028	0.000	1.028

Note: @Significance level, ≥ 0.01= 1 percent, 0.02-0.05= 5 percent, 0.06-0.1= 10 percent
*Reference Category
Dependent Variable is children (<5) underweight, 1 shows underweight and 0 not underweight
Source: Computed from NFHS III (2005-06) unit level data

There is a transfer of poor health from an anemic woman to an underweight child. In northern region, females are less vulnerable (odd ratio 0.93) to become underweight than the males. In rural areas again the probability of being underweight is higher (odd ratio 1.08) than the urban areas. Muslim children show a higher chance of being underweight compared to Hindu children. In northern states since the proportion of ST population is less than the SC population as a result children belonging to ST category show lower probability of being underweight as compared to ST. Standard of living of households also positively affect the under-nutrition among children.

Central Region

Table 2.9 shows the socio-economic and demographic factors affecting under-nutrition among children in Central States. The odd ratios for the age of a child and size of a child at birth show that demographic characteristics determine the under-nutrition level among children.

Table 2.9
Factors Affecting Child Under-Nutrition in Central Region

Explanatory Variables and their categories		Beta	Sig@	Exponential Beta
Child Age	Below1(Ref)*		0.000	1
	1-2	0.584	0.000	1.792
	2-3	0.510	0.000	1.665
	3-4	0.500	0.000	1.648
	Above 4	0.556	0.000	1.743
Size of a Child	Very small (Ref)		0.000	1
	Small	-0.187	0.000	0.829
	Average/larger	-0.766	0.000	0.465
Sex of a Child	Male (Ref)		0.000	1
	Female	0.060	0.000	1.061
Mother's education	No education (Ref)		0.000	1
	Primary	-0.141	0.000	0.869
	Secondary	-0.268	0.000	0.765
	Higher	-0.883	0.000	0.414
Anemia level of	Severely (Ref)		0.000	1
Mother	Moderately	-0.082	0.000	0.921
	Not anemic	-0.241	0.000	0.786
Wealth Index	Poor (Ref)		0.000	1
	Middle	-0.230	0.000	0.795
	Rich	-0.535	0.000	0.585
Caste Status	Scheduled Caste (Ref)		0.000	1
	Scheduled Tribe	0.503	0.000	1.653
	OBC	-0.090	0.000	0.914
	Others	-0.389	0.000	0.678
Religion	Hindu (Ref)		0.000	1
	Muslim	-0.029	0.000	0.971
	Others	0.053	0.000	1.054
Place of Residence	Urban (Ref)		0.000	1
	Rural	-0.085	0.000	0.919
	Constant	0.600	0.000	1.822

Note: @Significance level, ≥ 0.01= 1 percent, 0.02-0.05= 5 percent, 0.06-0.1= 10 percent
*Reference Category
Dependent Variable is children (<5) underweight, 1 shows underweight and 0 not underweight
Source: Computed from NFHS III (2005-06) unit level data

With an increase in age, children become more vulnerable to under-nutrition. The probability of being underweight is lower among those children whose size at birth is average or more than that as compared to those who are born with very small size. Mothers' characteristics are very important as far as under-nutrition among children is concerned. With education of mother and her anemic level, the probability of being underweight decreases. Females in central region show higher probability (odd ratio 1.06) of being underweight than males. Place of residence is showing contrasting result as in central region, rural areas have lower likelihood of having children underweight. Other social and economic factors are same as they work in northern states.

Eastern Region

Table 2.10 represents the effect of some selected socio-economic and demographic factors affecting underweight children in Eastern states.

Table 2.10

Factors Affecting Child Under-Nutrition in Eastern Region

Explanatory Variables and their categories		Beta	Sig@	Exponential Beta
Child Age	Below1(Ref)*		0.000	1
	1-2	0.572	0.000	1.772
	2-3	0.757	0.000	2.131
	3-4	0.701	0.000	2.015
	Above 4	0.583	0.000	1.791
Size of a Child	Very small (Ref)		0.000	1
	Small	-0.114	0.000	0.892
	Average/larger	-0.396	0.000	0.673
Sex of a Child	Male (Ref)		0.000	1
	Female	0.097	0.000	1.102
Mother's education	No education (Ref)		0.000	1
	Primary	-0.414	0.000	0.661
	Secondary	-0.474	0.000	0.623
	Higher	-1.025	0.000	0.359
Anemia level of	Severely (Ref)		0.000	1
Mother	Moderately	-0.162	0.000	0.850
	Not anemic	-0.422	0.000	0.656
Wealth Index	Poor (Ref)		0.000	1
	Middle	-0.350	0.000	0.705
	Rich	-0.583	0.000	0.558
Caste Status	Scheduled Caste (Ref)		0.000	1
	Scheduled Tribe	-0.072	0.000	0.930
	OBC	0.016	0.000	1.016
	Others	-0.513	0.000	0.598
Religion	Hindu (Ref)		0.000	1
	Muslim	0.215	0.000	1.240
	Others	0.394	0.000	1.482
Place of Residence	Urban (Ref)		0.000	1
	Rural	0.189	0.000	1.208
	Constant	0.257	0.000	1.293

Note: @Significance level, ≥ 0.01= 1 percent, 0.02-0.05= 5 percent, 0.06-0.1= 10 percent
*Reference Category
Dependent Variable is children (<5) underweight, 1 shows underweight and 0 not underweight
Source: Computed from NFHS III (2005-06) unit level data

Table 2.10 shows that all variables are significantly related to the under-nutrition among children at 1 percent level. As age of a child increases probability of becoming underweight also rises. The odd ratio for child age (2-3 years) is 2.13 times higher than the reference category of below 1 year old. Similarly among average and larger size children at birth, likelihood of being underweight is lower than the very small size children at birth. There is lowest probability of being underweight among those children whose mothers have got a higher educational degree. As education of a mother increases, children become less vulnerable at the risk of being underweight. The probability of being underweight is 0.65 times lower among those children whose mothers are not anemic as compared to the children with severely anemic mother.

Female children in eastern region have higher probability of being underweight than the male children. As far as caste status is concerned, in eastern region, OBC children have higher probability (odd ratio 1.01) of having underweight children than the SC children. ST children enjoy good health compared to SC children. As far as wealth index is concerned percentage of underweight children decreases with increasing standard of living. The probability of being underweight is 0.705 times (29.5 percent) lower among middle income group and 0.56 times (44 percent) lower among the rich people children as compared to poor people children. Rural areas have higher probability (odd raio1.20) of having underweight children than the urban areas. However all the socio-economic and demographic factors are interrelated to each other and thus together they influence the under-nutrition among children.

Western Region

Table 2.11 shows socio-economic and demographic factors affecting child under-nutrition in Western states. Table 2.11 shows that all socio-economic and demographic variables are significantly correlated to underweight children. As the age of child increases, prevalence of underweight among children tends to increase at the same speed.

The probability of being underweight is 45 percent (odd ratio 0.55) lower among those children whose size at birth is average or larger than average as compared to those whose size at birth is very small. As far as mother's education is concerned, the probability of being underweight is 2 percent (odd ratio 0.979) lower among those

children whose mothers are primary pass, 23 percent (0.771) lower for secondary pass mothers and 66 percent (odd ratio 0.344) lower for higher educated mothers as compared to illiterate mothers. Regarding type of caste is concerned, the probability of being underweight is higher for children belonging ST category compared to SC population. OBC and other category children show lower under-nutrition compared to SC category children.

Table 2.11
Factors Affecting Child Under-Nutrition in Western Region

Explanatory Variables and their categories		Beta	Sig@	Exponential Beta
Child Age	Below1(Ref)*		0.000	1
	1-2	0.529	0.000	1.697
	2-3	0.677	0.000	1.967
	3-4	0.941	0.000	2.562
	Above 4	0.844	0.000	2.325
Size of a Child	Very small (Ref)		0.000	1
	Small	-0.193	0.000	0.825
	Average/larger	-0.602	0.000	0.548
Sex of a Child	Male (Ref)		0.000	1
	Female	-0.071	0.000	0.931
Mother's education	No education (Ref)		0.000	1
	Primary	-0.021	0.000	0.979
	Secondary	-0.260	0.000	0.771
	Higher	-1.068	0.000	0.344
Anemia level of	Severely (Ref)		0.000	1
Mother	Moderately	-0.070	0.000	0.932
	Not anemic	-0.084	0.000	0.920
Wealth Index	Poor (Ref)		0.000	1
	Middle	0.015	0.000	1.015
	Rich	-0.620	0.000	0.538
Caste Status	Scheduled Caste (Ref)		0.000	1
	Scheduled Tribe	0.378	0.000	1.459
	OBC	-0.075	0.000	0.928
	Others	-0.165	0.000	0.848
Religion	Hindu (Ref)		0.000	1
	Muslim	-0.163	0.000	0.850
	Others	-0.172	0.000	0.842
Place of Residence	Urban (Ref)		0.000	1
	Rural	-0.116	0.000	0.890
	Constant	0.209	0.000	1.232

Note: @Significance level, ≥ 0.01= 1 percent, 0.02-0.05= 5 percent, 0.06-0.1= 10 percent
*Reference Category
Dependent Variable is children (<5) underweight, 1 shows underweight and 0 not underweight
Source: Computed from NFHS III (2005-06) unit level data

Income level also affects child under-nutrition. In western states children of middle income people have higher probability (odd ratio 1.015) of having underweight than the poor category children. females in this region show better nutritional status than the male children as probability of being underweight is lower 0.931 points lower among females than male, though, this probability is only 6 percent lower. In rural areas, there is

less likelihood (odd ratio 0.890) of having underweight children than the urban areas. Among religion categories, in western states, Muslims enjoy lower probability of having underweight children the Hindu people.

Southern Region

Table 2.12 shows factors affecting under-nutrition in southern states. In southern states, all socio-economic and demographic variables are significantly related with underweight children at one percent level. The prevalence of underweight among children increases with increasing age of a child. The probability of being underweight is low among 2-3 age children, lower among 3-4 age children and lowest among 4 and above age children compared to below 1 year old child. Similarly, size of children at birth does matter a lot in determining under-nutrition among children.

Table 2.12

Factors Affecting Child Under-Nutrition in Southern Region

Explanatory Variables and their categories		Beta	Sig@	Exponential Beta
Child Age	Below1(Ref)*		0.000	1
	1-2	0.375	0.000	1.454
	2-3	0.523	0.000	1.687
	3-4	0.650	0.000	1.916
	Above 4	0.706	0.000	2.026
Size of a Child	Very small (Ref)		0.000	1
	Small	-0.465	0.000	0.628
	Average/larger	-0.902	0.000	0.406
Sex of a Child	Male (Ref)		0.000	1
	Female	-0.084	0.000	0.919
Mother's education	No education (Ref)		0.000	1
	Primary	0.016	0.000	1.016
	Secondary	-0.312	0.000	0.732
	Higher	-1.033	0.000	0.356
Anemia level of	Severely (Ref)		0.000	1
Mother	Moderately	-0.177	0.000	0.838
	Not anemic	-0.159	0.000	0.853
Wealth Index	Poor (Ref)		0.000	1
	Middle	-0.346	0.000	0.708
	Rich	-0.619	0.000	0.538
Caste Status	Scheduled Caste (Ref)		0.000	1
	Scheduled Tribe	-0.078	0.000	0.925
	OBC	-0.276	0.000	0.759
	Others	-0.228	0.000	0.796
Religion	Hindu (Ref)		0.000	1
	Muslim	-0.083	0.000	0.920
	Others	-0.309	0.000	0.734
Place of Residence	Urban (Ref)		0.000	1
	Rural	0.031	0.000	1.031
	Constant	0.516	0.000	1.675

Note: @Significance level, ≥ 0.01= 1 percent, 0.02-0.05= 5 percent, 0.06-0.1= 10 percent
*Reference Category
Dependent Variable is children (<5) underweight, 1 shows underweight and 0 not underweight
Source: Computed from NFHS III (2005-06) unit level data

The probability of being underweight is 37 percent (odd ratio 0.628) lower among small size at birth children and 59 percent (odd ratio 0.406) lower among average/large size at birth children compared to very small size at birth children. As far as mother's education is concerned, with mother's education the prevalence of underweight among children decreases. Wealth index is also important in determining the underweight among children. Rich people tend to have lower percentage of underweight among children compared to poor people. Female, Muslim and ST children in southern states are less likely to become underweight than their respective group reference category children. In southern states rural areas are showing higher probability of having underweight children than the urban areas.

North Eastern Region

Table 2.13

Factors Affecting Child Under-Nutrition in North Eastern Region

Explanatory Variables and their categories		Beta	Sig@	Exponential Beta
Child Age	Below1(Ref)*		0.000	1
	1-2	0.542	0.000	1.719
	2-3	0.692	0.000	1.997
	3-4	0.721	0.000	2.057
	Above 4	0.626	0.000	1.871
Size of a Child	Very small (Ref)		0.000	1
	Small	-0.574	0.000	0.563
	Average/larger	-0.629	0.000	0.533
Sex of a Child	Male (Ref)		0.000	1
	Female	0.124	0.000	1.132
Mother's education	No education (Ref)		0.000	1
	Primary	-0.211	0.000	0.810
	Secondary	-0.402	0.000	0.669
	Higher	-0.976	0.000	0.377
Anemia level of	Severely (Ref)		0.000	1
Mother	Moderately	-0.087	0.000	0.916
	Not anemic	-0.183	0.000	0.833
Wealth Index	Poor (Ref)		0.000	1
	Middle	-0.231	0.000	0.794
	Rich	-0.887	0.000	0.412
Caste Status	Scheduled Caste (Ref)		0.000	1
	Scheduled Tribe	-0.930	0.000	0.394
	OBC	-0.475	0.000	0.622
	Others	-0.526	0.000	0.591
Religion	Hindu (Ref)		0.000	1
	Muslim	0.664	0.000	1.943
	Others	0.730	0.000	2.075
Place of Residence	Urban (Ref)		0.000	1
	Rural	-0.020	0.000	0.980
	Constant	0.157	0.000	1.170

Note: @Significance level, ≥ 0.01= 1 percent, 0.02-0.05= 5 percent, 0.06-0.1= 10 percent
*Reference Category
Dependent Variable is children (<5) underweight, 1 shows underweight and 0 not underweight
Source: Computed from NFHS III (2005-06) unit level data

Table 2.13 shows socio-economic and demographic factors affecting under-nutrition among children in north eastern states. In this region covering north eastern states of India, all socio-economic and demographic variables are significantly related to the underweight children. As size of a child at birth, mother's education and wealth index rises, probability of having underweight children declines. The prevalence of under-nutrition increases with age of a child and females in north eastern states are more susceptible of being underweight than the male children.

The prevalence of underweight children is 2.07 times higher among those children belonging to other category religious group and 1.94 times higher among Muslims belonging children than the Hindu group belonging children. Regarding type of caste, underweight among children is lower among ST (odd ratio 0.394), OBC (odd ratio 0.622) and other caste children (odd ratio 0.591) than the SC children. As far as income is concerned, children belonging to middle class and rich class have lower underweight (odd ratio 0.79, 0.412 respectively) compared to poor children.

Thus, the above discussion shows that all socio-economic and demographic factors govern child under-nutrition in different parts of the country. It can be concluded from the above analysis that female children are more prone to be underweight than the male children in all regions except northern, western and southern regions where females are having lower probability of being underweight, however the gap between male and females under-nutrition is low in these regions. In rural areas except north eastern, western and central states the probability of having underweight children is higher than the urban areas. Muslim children enjoy worst nutrition level as probability of being underweight is higher among them than the reference Hindu children. However in southern and western states nutritional conditions of Muslim children is much better. As compared to children living in poor households, those living in rich households are nutritionally better off. All other socio-economic and demographic variables are significantly related to underweight children equally in all regions.

Chapter III

TREND AND PATTERN OF FOOD CONSUMPTION IN RURAL INDIA: A DISAGGREGATED ANALYSIS

CHAPTER III
Trend and Pattern of Food Consumption in Rural India: A Disaggregated Analysis

3.1 Introduction

After the economic reforms in 1990s, India not only experienced rapid economic transformations but also substantial changes in its diet pattern. These changes, however, are not uniform, rather they vary across various socio economic and demographic (SED) groups which have resulted inequalities among these groups in terms of nutrition intake, leading inequalities in health. There are large variations between individuals in terms of type of food consumed. However consumption of food is not only affected by prices and production but it is an interplay of many other factors including socio-economic and demographic characteristics (Education, religion, caste, income, gender, age, occupation, marital status etc.), behavioral and lifestyle factors, knowledge and attitude related to diet and health (Estevez et al., 2000). By studying the food consumption pattern and its change across various socio economic demographic (SED) groups, one can easily find out the less privileged and weaker section of the society on which government health policies can focus.

The present chapter describes trend and pattern of consumption of food items across SED groups and affect of them on food item consumption in rural areas. The aim of this chapter is to show whether socio-economic and demographic groups differ in their food consumption, which food items have recorded a major change and among which groups, and finally to what extent socio-economic and demographic factors affect food consumption pattern in rural India. For this purpose, in second section (3.2) we will see meaning of change in diet pattern from traditional to modern food items, section three (3.3) attempts to examine trend and pattern of different food item consumption across SED groups along with ACRs, section four (3.4) determines extent of affect of SED factors on food intake and finally section five (3.5) shows results from 64th NSS thin round on food consumption pattern at all India level.

3.2 How important is shift from Traditional to Modern Food Items

Internationally, it is seen that people tend to change their food consumption pattern from cereal based to modern food items. In most of the western countries there is shift from cereal diet to more alcohol, vegetables and fruit consumption which are considered as modern foods. In India, people's diet mainly constitutes cereals, pulses and dairy products (traditional food items) and with increasing 'modernization' there is shift from traditional to modern foods which include fruits, vegetables, meat and oil. According to Roos et al. (2001) modern foods are those whose consumption is increasing. Higher class people prefer more modern foods whereas low class people follow traditional foods (Smith, 1992). A study on consumption of various food items conducted in France between 1965 to 1991 shows that people belonging to higher social class consume more modern food items as trend of traditional food consumption is declining among them whereas lower class people tend to consume these traditional food in larger quantities than their higher social class counterparts (Prattala, 2003). Similarly, a research based on 15 European countries show that in the regions with higher educated people, fruit and vegetable consumption is on rise compared with lower educated regions (Roos et al., 2001). Because of the shift from traditional to modern food types, nutrition pattern in India is significantly changing as we can see in declining calorie and protein intake and increasing fat intake (NSS, 2005).

Cereals are the best source of energy and they also provide important nutrients to the body but they lack some micro nutrients such as Vitamin A, Vitamin B, Iron etc. The insufficiency of these micronutrients in the body may increase risk to several diseases. In fact, the disease pattern has changed much mainly in developed countries and its increasing risk in developing countries. The incidence of cardiovascular diseases, cerebrovascular diseases, obesity, metabolic syndrome, diabetes and cancer have risen significantly (Deshmukh, 2007; Ruel et al., 2004; Groth et al., 2001; Yang, 1998; Sztainer et al., 1996). Increase in consumption of fruits and vegetables are important to protect against the CVD and other chronic diseases (Prattala, 2006; Giskes, 2002; Johansson et al., 1999). WHO/FAO also recommends per day consumption of fruits and vegetables more than or equal to 400 gms. Nutrition guidelines around the world also

recommend eating more vegetables and fruits to increase the intake of protective factors in the body. Since consumption of these food items vary among various socio economic groups so the risk of several diseases also vary among these groups. Generally lower socio-economic class people experience greatest morbidity and mortality from chronic diseases. Differences in dietary intake contribute to some extent in these inequalities (Giskes, 2002). All public health policies and programmes should aim to decreases SED inequalities in food consumption as dietary factors are believed to play a substantial role in vulnerability of any disease.

3.3 Food Consumption Pattern and Its Change

An Indian Scenario

In India, rural people's diet constitutes cereals particularly rice followed by wheat and coarse cereals, vegetables, milk and fruits (Table3.1).

Table 3.1
Food Consumption Pattern and its Change in Rural India, (Monthly Per Capita in kg*), 1994-2005

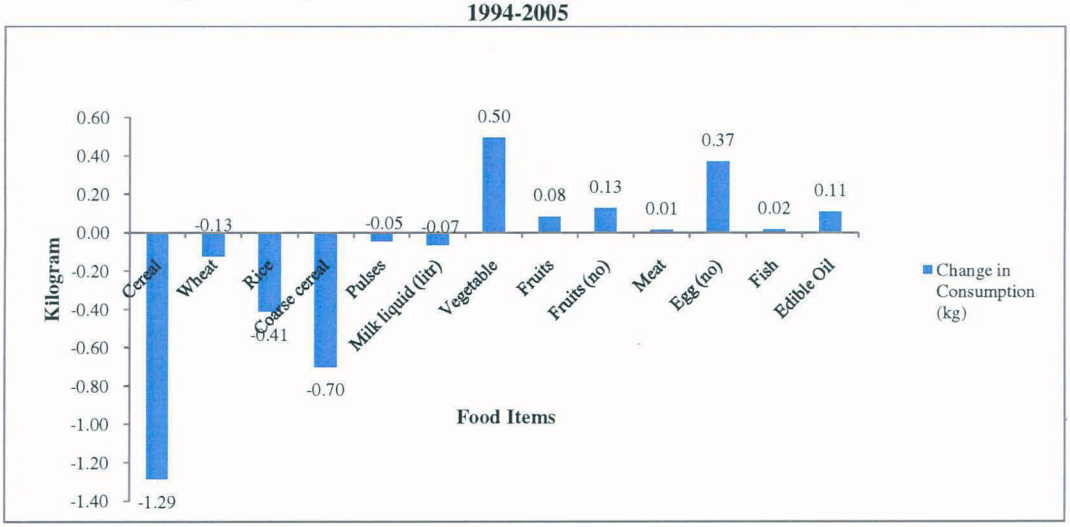
Food Items	Year		Kg Change
	1993-94	2004-05	
Cereal	13.40	12.11	-1.29
Wheat	4.32	4.19	-0.13
Rice	6.79	6.38	-0.41
Coarse cereal	1.97	1.27	-0.70
Pulses	0.76	0.71	-0.05
Milk liquid (liter)	3.94	3.87	-0.07
Vegetable	4.75	5.25	0.50
Fruits	0.22	0.30	0.08
Fruits (no)	2.71	2.84	0.13
Meat	0.12	0.14	0.01
Egg (no)	0.64	1.01	0.37
Fish	0.18	0.20	0.02
Edible Oil	0.37	0.48	0.11

Note: unit in kg unless otherwise specified in brackets after food item name
Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule

However biggest decline is experienced by cereal consumption from per capita per month (PCPM) intake of 13.40 kg to 12.11 kg, a 1.29 kg decline. This decline is caused by the fall particularly in coarse cereal consumption (0.70 kg) followed by rice consumption (0.41 kg) and wheat consumption (0.13 kg) decline. Pulse and milk

consumption declined slightly from PCPM intake of 0.76 to 0.71 kg and 3.94 to 3.87 liters respectively. As far as change in consumption of other food items (vegetables, fruits, meat and edible oil) is concerned, highest increase is found in vegetable consumption (0.50 kg). Other food items recorded a slight increase in their consumption (Figure 3.1).

Figure 3.1
Change in Per Capita Per Month Intake of Various Food Items in Rural India, 1994-2005



Source: Computed from Table 3.1

Age Groups

Age is an important demographic attribute. Variations in food consumption among different ages show vulnerable groups in the society. There is significant correlation between age and all other food items. The likelihood of consuming cereals, pulses, milk, vegetables, fruits and oil increases as the age increases but meat consumption declines with the increasing age (Table 3.2).

There is little variation in PCPM intake of cereals among various age groups and also both genders of different age groups. Negligible or very little variation is found in consumption of different food items between male and female of different ages. Consumption of cereals is lowest among children under 12 year's age (11.62 kg PCPM) (App. 3.1). Highest consumption of cereals is found among the teenagers (12.58 kg) and elders (12.46 kg) during 2004-05. As far as change in cereal consumption from 1994 to 2005 in rural areas is concerned, elderly people show a highest decline (1.44 kg)

particularly due to decline in coarse cereal consumption (0.76 kg). However highest increase in 'other food items' is also found among the elderly people (Table 3.2). An important point to be noted is that cereal consumption declined in all ages particularly due to decline in coarse cereal consumption. Rice and wheat consumption recorded a slight fall in all ages. Pulse and milk consumption increases as the age increases and their highest decline is found among teenagers and children. The increase in the consumption of other food items is highest among elders followed by adults, teenagers and lowest increase is seen among children. Meat and meat products consumption is low among elderly population and high among adults and teenagers.

A study based on eating habits of older people in Greece found that older people show various ways of food preparation which help them eating most food types. For example they cut meat into small pieces so that it can be easily chewed, they cook the vegetables and greens in the oil, they prefer seasonal foods which can be easily chewed, and they eat apples by peeling. Older people consume less frequently meat and more frequently cereals, dairy products, vegetables, fruits and oil. On the other hand younger people eat out more frequently as a result consumption of other food items is less among them excluding meat and meat products (Kossioni, 2011; Tucker et al., 1995). Halcomb (1995) and Dynesen et al.'s (2003) studies in Kansas and Denmark also show that older people do not have lower consumption of foods compared with younger ones even consumption of fruits, vegetables and oil is larger than the young participants. One possible explanation may be, older persons are mainly retired persons and they are most likely to eat at home and prefer more nutritional services.

In another studies (Louk et al., 1999; Kinley, 1994), it is confirmed that older people tend to have more nutrient rich diet as they do not have children living in home. So vegetables, fruit consumption is higher among them as children prefer more milk and snack foods. A study conducted by Omann et al. (2008) in Austria shows that vegetable consumption is high among elderly because they adhere more to traditional eating habits which are characterized by higher intake of potatoes due to low prices and better taste and their satiating character. Thus, through this analysis one can easily point out that children are worst affected as the cereal consumption has declined among them and at the

same time consumption of other food items has not substantially increased (also found in Riediger's study in Canada, 2007) whereas older people enjoy best healthy life as consumption of cereals is still highest among them despite a highest decline and consumption of other food items recorded a highest increase within a decade.

Gender

Gender differences in food consumption also prevail, however the differences are not much (Subramaniam and Deaton, 1991). Women in general tend to eat more healthy food than men (Deshmukh, 2007). In contrast it is true that Indian women suffer from under nutrition, anemia, lower BMI and unhealthy conditions. However food beliefs affect the dietary conditions of women. Gittelsohn (1997) found in his study in rural Nepal that different dietary guidelines are there which she has to follow throughout her life span. At the time of childhood though she is given equal weightage in terms of food intake as given to male child but as she approaches towards adulthood, food distinctions emerge between man and women. Men are given variety of food as they are the bread earners in the family. When a women marries, she has a low status and is expected to do hard physical work. Even at the time of breastfeeding, she has to adopt some dietary guidelines such as avoidance of certain food as it is perceived that quality of food will be passed on to the children through breast milk. Avoidance of certain foods may cause disbalances in nutrient intake among women resulting in unhealthy conditions.

Gender though is significantly associated with cereal consumption yet there is little variation in cereal consumption between male (12.17 kg PCPM) and female (12.06 kg PCPM) during 2004/05 (App. 3.2). Consumption of pulses, milk, vegetables, fruits, and oil is positively and significantly related to gender (Table 3.7). Though there is little variation in consumption of both staple and other food items between man and women, yet males overpass females in almost all food items probably due to different body requirements or gender biasness. Decline in cereal consumption is seen in both sexes but highest fall is recorded by males (1.30 kg PCPM) due to decline in coarse cereals (0.69 kg PCPM) from 1993/94 to 2004/05. Vegetable and fruit consumption increased slightly more among females than males (Table 3.2).

Several studies (Prattala et al., 2006; Kiefer et al., 2005; Fraser et at., 2000; Louk et al., 1999; Roos et al., 1998) show that women consume more fruits and vegetables and consumption of cereals is high among males. Food consumption is related to beliefs and norms. Some foods are considered as masculine such as meat consumption, some others such as fruits and vegetables are labeled as feminine (Prattala et at., 2006; Sobal, 2005). Women prefer to be vegetarian. They are more health conscious. Sometimes they eat less to work out on their weight whereas for men sports and exercise are important for health rather than cutting down in their eating (Kiefer, 2005).

Marital Status Groups

The food behavior of married persons is more with dietary guidelines as their consumption of almost all food items is slightly higher than single and widowed/divorced/separated people. There are little or no variations in food consumption pattern between married man and woman. It is studied that married man has a greater health than married woman probably because women are responsible for controlling the health of other family members especially their husbands (Roos, 1998). Another study done by Eng et al. (2005) in United States shows that married persons have lower risk for mortality and enjoy better physical and mental health than the unmarried persons. Even when married persons get divorced or become widowed, their health starts declining and risk of mortality among them increases. Generally married persons have healthier lifestyles than unmarried persons as data (App. 3.3) also shows that married persons enjoy higher consumption of both staple and other food items than single or never married persons and even differences in the consumption of these items between married male and female are minimal whereas among unmarried and widowed/divorced/separated people there is much variation in almost all food item consumption between men and women. This shows that women are more vulnerable to unhealthy conditions when they are unmarried or become widowed/divorced/separated.

As far as change in food consumption pattern is concerned, cereal consumption fell mainly among widowed/divorced/separated groups and even consumption of other food items increased substantially in this group from 1993/94 to 2004/05 probably because this group mainly constitutes higher age people among which as we have already

Table 3.2

Change in Average Monthly Per Capita Consumption of Commodities (Kg)^ between 1993/94 and 2004/05 among Age, Sex, Marital Status and Household Size Groups

SED Groups	Sex of Individuals/Food Items	Cereal	Wheat	Rice	Coarse cereal	Pulses	Milk liquid (litre)	Veg.*	Fruits	Fruits (no)	Meat	Egg (no)	Fish	Edible Oil
Age Group														
Children	Male	-1.14	-0.08	-0.38	-0.64	-0.05	-0.13	0.47	0.08	0.04	0.02	0.32	0.01	0.1
(0-12)	Female	-1.14	0.06	-0.42	-0.73	-0.04	-0.18	0.49	0.07	0.08	0	0.31	0.01	0.1
	Total	-1.14	-0.02	-0.4	-0.68	-0.04	-0.15	0.48	0.07	0.06	0.01	0.32	0.01	0.11
Teenagers	Male	-1.43	-0.16	-0.49	-0.73	-0.07	-0.29	0.46	0.08	-0.1	0.01	0.34	0.02	0.1
(13-19)	Female	-1.34	0.01	-0.65	-0.65	-0.07	-0.22	0.5	0.07	-0.12	0.01	0.32	-0.01	0.11
	Total	-1.39	-0.09	-0.56	-0.69	-0.07	-0.26	0.48	0.08	-0.11	0.01	0.33	0.01	0.11
Adults	Male	-1.39	-0.17	-0.48	-0.7	-0.06	-0.02	0.47	0.09	0.16	0.02	0.41	0.02	0.12
(20-59)	Female	-1.34	-0.18	-0.41	-0.72	-0.05	0	0.5	0.08	0.22	0.02	0.42	0.03	0.11
	Total	-1.37	-0.17	-0.44	-0.71	-0.06	-0.01	0.49	0.09	0.19	0.02	0.42	0.02	0.12
Elders	Male	-1.5	-0.4	-0.27	-0.78	-0.06	0.07	0.49	0.1	0.22	0.01	0.35	0.03	0.13
(Above 59)	Female	-1.37	-0.33	-0.24	-0.75	-0.04	0.05	0.46	0.1	0.31	0.01	0.4	0.03	0.14
	Total	-1.44	-0.37	-0.26	-0.76	-0.05	0.05	0.48	0.1	0.26	0.01	0.37	0.03	0.13
Sex of Individuals														
Male		-1.3	-0.16	-0.42	-0.69	-0.05	-0.07	0.48	0.09	0.1	0.02	0.37	0.02	0.12
Female		-1.26	-0.09	-0.41	-0.72	-0.05	-0.07	0.51	0.08	0.16	0.01	0.37	0.01	0.11
Marital Status														
Never	Male	-1.22	-0.05	-0.46	-0.66	-0.05	-0.12	0.51	0.08	0	0.02	0.34	0.01	0.11
Married	Female	-1.09	0.1	-0.45	-0.7	-0.04	-0.16	0.53	0.08	0	0.01	0.32	0.01	0.11
	Total	-1.16	0.01	-0.45	-0.68	-0.04	-0.14	0.52	0.08	0	0.02	0.33	0.01	0.11
Currently Married	Male	-1.39	-0.27	-0.37	-0.72	-0.06	-0.02	0.46	0.09	0.22	0.01	0.41	0.03	0.12
	Female	-1.38	-0.26	-0.35	-0.72	-0.06	-0.03	0.48	0.08	0.24	0.02	0.41	0.03	0.12
	Total	-1.38	-0.27	-0.36	-0.72	-0.06	-0.03	0.47	0.09	0.23	0.01	0.4	0.03	0.12
Widow/	Male	-1.51	-0.38	-0.33	-0.76	-0.11	0.15	0.49	0.06	0.26	-0.01	0.34	0	0.12
Divorce	Female	-1.44	-0.09	-0.5	-0.79	-0.03	0.17	0.5	0.08	0.5	0.02	0.5	0.04	0.14
/Separated	Total	-1.47	-0.2	-0.44	-0.78	-0.05	0.16	0.49	0.07	0.45	0.01	0.46	0.03	0.13
Household Size														
1-4		-1.57	-0.37	-0.47	-0.7	-0.07	0.08	0.36	0.08	0.35	0.02	0.58	0.03	0.14
5-6		-1.06	-0.09	-0.22	-0.71	-0.04	-0.13	0.62	0.09	0.15	0.02	0.34	0.02	0.12
7-8		-1.17	0.12	-0.58	-0.67	-0.04	-0.15	0.5	0.06	-0.11	0	0.25	0	0.09
Above 8		-1.42	-0.04	-0.59	-0.72	-0.06	-0.14	0.37	0.09	-0.12	0	0.17	0.01	0.09

Note: *Vegetables, ^unit in kg unless specified after food item name

Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule

discussed earlier consumption of other food items has increased. This group shows a transition from traditional food consumption to modern food consumption. Even milk consumption only increased in this group (0.16 liter PCPM) as other marital status category people show a decline in milk consumption (Table 3.2). Cereal consumption among unmarried and currently married has also declined whereas consumption of all other food items has slightly increased. Currently married persons show better food consumption pattern than the unmarried group. If we see food consumption pattern among all marital status category people, then, there is not much variation but if we analyze it by gender then marital status affects mainly women's food consumption pattern. The unmarried and widowed/divorced/separated women suffer from lower consumption of different food items than their respective marital status male counterparts.

Household Size Groups

A study conducted by Reul et al. (2004) in Sub Saharan Africa shows that household size is negatively associated with the demand for fruits and vegetable consumption in most of the African countries i.e. larger households spent lower portion of their income on fruit and vegetable consumption primarily because these households are dominated by adults whose taste preferences differ from older and children. In our study family size is significantly but negatively related to cereal consumption. As size of household rises, per capita per month cereal consumption declines. However in bigger households, wheat and coarse cereal consumption is highest whereas small families prefer rice consumption. Pulse consumption also declines with increasing family size. There is no clear pattern of milk consumption among different household size groups in rural India. In larger households milk consumption is highest (4.09 liter PCPM) probably because of more number of children in these households. Consumption of all other food items including fruits, vegetables, meat, oil decreases as household size rises (App. 3.4).

In small families cereal consumption declined mainly from 3.96 kg to 2.39 kg, a 1.57 Kg fall (Table 3.2) in a decade from 1993/94 to 2004/05. This decline is attributed by decline in coarse cereal consumption (0.70 kg PCPM) followed by rice (0.47 kg PCPM). Pulse consumption recorded a slight higher decline (0.07 kg PCPM) in small

families. Fruit, meat and oil consumption has increased in small families whereas vegetable consumption mainly increased in middle size families (Table 3.2). One can easily draw a conclusion from this analysis that a shift from traditional to modern food items is seen in small families. The probability of consumption of cereal, pulse, milk, vegetables, fruit, meat and oil decreases as the household size increases. This probability is high in vegetable consumption. A unit change in household size results 0.106 units decline in vegetable consumption (Table 3.7).

Education Groups

Education is one of the most important factors affecting nutritional status of population. Well educated persons choose their food in a more informal way (Dynesen et al., 2003; Groth et al., 2001; Yang et al., 1998). They receive more nutritional messages and are more aware of their diets. Those who are better educated have different attitudes towards their health and healthy foods. Sometimes more educated persons over report their food intake in order to maintain their social status (Roos et al., 2001; Estevez et al., 2000). In a study conducted by Roos et al. in northern and Southern Europe (2001), it was found that higher educated people tend to consume more vegetables and fruits than low educated people. In our study also, an increase in education level is found to be associated with an increase in the likelihood of consuming fruits, vegetables, pulses and milk. The likelihood of consuming cereal is positively associated with secondary class educated people (0.029) but it is negatively related with higher class educated persons by 0.007 points (Table 3.7). Probability of consuming vegetables is highest among secondary class educated people (odd ratio 0.023) whereas fruit consumption increases highly by 0.033 points among highly educated persons.

In a study done by Reul (2004) in Sub Saharan Africa shows that in African countries vegetable consumption is low among secondary educated persons primarily because majority of secondary class pass were women who used to work outside home as a result they preferred processed food as vegetables require more preparation time. Thus women's education has more impact on food consumption pattern than men's education. If we increase primary education by one percent, the meat consumption will increase by 0.004 percent but it decreases by 0.002 percent if we increase higher education to one

percent. This analysis shows that milk consumption is common among middle class educated people and generally avoided by highly educated people. The probability of oil consumption increases with increasing education but it is highest when we increase secondary education (odd ratio 0.036).

In rural India there is little variation in cereal consumption among different education groups during 2004/05. Cereal consumption is quite high among primary and secondary class educated persons, coarse cereal consumption is high among illiterates and highly educated persons prefer wheat, pulses, meat and all other food items. Even the consumption of these food items increases as the education level rises. However variation in cereal consumption among males and females is low yet males surpass females in cereal, pulses, milk and vegetable consumption whereas women who are secondary pass surpass their male counterparts in fruits, meat and oil consumption (App. 3.5).

There is not a clear pattern of rise or fall of consumption of different food items among different education groups over a decade. However highest increase in fruit consumption is found among highly educated people whereas vegetable consumption is high among primary pass and illiterates. The high consumption of vegetables among illiterates and primary pass could be due to the effect of potatoes as they are cheap vegetable for lower class people (Giskes, 2002). Coarse cereals recorded a highest decline during 1993/94 to 2004/05 among illiterates and lowest among highly educated probably because consumption of coarse cereals is already low among them (Table 3.3).

Religious Groups

Various religions forbid the consumption of certain types of food for example Islam divides food into *haram* (forbidden) and *halal* (permitted). Jains follow religious rules to be vegetarian. Hindus however do not have any specific prescriptions but they apply the concept of *ahimsa* (non-violence) and consider vegetarianism as ideal. However those (Hindus) who consume meat also follow some religious guidelines such as they abstain from beef consumption as cow is sacred among Hindus. Muslims forbid consumption of pork (Waibel, 2011). Joel Giltelsohn (1997) describes Hindu food system as having both materialistic and emic-cultural components. It is based on certain set of beliefs and rules 'including ways that food (and individuals) can become polluted, food

classification systems, local explanatory models of illness (where food is perceived either as a causal agent or as a treatment) and normative patterns of favoring/disfavoring household members based on their age and gender...' Among different religions, food consumption pattern is quite different for man and woman. Women at the time of fasting do not prefer meat consumption. Intra-household food distribution favors man over women in Hindu societies (Thomson, 1985). In Hindu societies women are viewed as polluting (particularly during menstruation) and are regarded as threat to patrifocal system. Hindu man avoids meat consumption on Tuesday and Thursday because of some religious beliefs.

In rural India all religious groups are statistically significantly correlated with all major food items (Table 3.7). Cereal consumption is highest among Hindus (12.21 kg PCPM) both among males and females followed by Muslims (11.91 kg PCPM), Christians (11.24 kg PCPM) and lowest among other religious groups (10.79) during 2004/05. Even the highest decline in cereal consumption is also seen among Hindus (1.33 kg PCPM) mainly because of decline in coarse cereal consumption (0.73 kg PCPM). Pulse and milk consumption is also higher among Hindus whereas meat and meat products consumption is high among Christians (0.51 kg PCPM) followed by Muslims (0.32 kg PCPM). Lowest meat consumption is seen among other religions (0.10 kg PCPM) and Hindus (0.11 kg PCPM). Very little or no variation in consumption of all food items is found between men and women (App. 3.6). Even there is no clear picture of rise or fall of food items among religion groups (Table 3.3).

Social Groups

Gittelsohn et al. (1997) describes that caste system affects allocation of food among people. Higher caste eats decreased variety of food and pass through a greater risk of certain nutrient deficiencies. However caste is interwoven with wealth. Higher caste people because of wealth shift their eating pattern from traditional to modern food as a result their diet lacks certain nutrients. In rural India, cereal consumption is highest among Scheduled Tribes (12.19 kg PCPM) as their intake of coarse cereal is highest (2.34 kg PCPM) in 2004/05. Scheduled caste people prefer more consumption of wheat whereas other class people's intake of all cereal types is less.

Table 3.3

Change in Average Monthly Per Capita Consumption of Commodities (Kg)^ between 1993/94 and 2004/05 among Education, Religion and Social Groups

SED Groups	Sex of Individuals	Cereal	Wheat	Rice	Coarse cereal	Pulses	Milk liquid (litre)	Veg.*	Fruits	Fruits (no)	Meat	Egg (no)	Fish	Edible Oil
Education Group														
Not Literate	Male	-1.36	-0.22	-0.35	-0.75	-0.06	-0.07	0.45	0.08	0.25	0	0.36	0.01	0.11
	Female	-1.31	-0.12	-0.39	-0.76	-0.06	-0.11	0.45	0.08	0.22	0	0.34	0.01	0.1
	Total	-1.33	-0.16	-0.37	-0.76	-0.06	-0.1	0.45	0.08	0.23	0	0.35	0.01	0.11
Primary or below	Male	-1.26	0	-0.51	-0.68	-0.06	-0.36	0.46	0.05	-0.26	0.04	0.33	0.01	0.1
	Female	-1.06	0.28	-0.7	-0.53	-0.06	-0.36	0.47	0.04	-0.55	0.01	0.28	-0.02	0.09
	Total	-1.19	0.09	-0.57	-0.63	-0.06	-0.35	0.47	0.05	-0.36	0.02	0.32	-0.01	0.1
Secondary	Male	-1.4	-0.32	-0.57	-0.43	-0.09	-0.4	0.35	0.07	-0.38	0.01	0.26	0.01	0.1
	Female	-1.08	0.04	-0.77	-0.26	-0.06	-0.55	0.45	0.06	-1.09	0.03	0.14	-0.03	0.08
	Total	-1.33	-0.26	-0.61	-0.39	-0.08	-0.45	0.37	0.07	-0.55	0.02	0.24	0	0.09
Higher	Male	-1.08	0.04	-0.74	-0.25	-0.08	-0.51	0.18	0.42	-1.27	0.02	0.19	0.01	0.09
	Female	-0.9	0.33	-0.92	-0.2	0.01	-0.68	0.16	0.12	-0.38	0.01	0.29	0.03	0.06
	Total	-1.12	0.02	-0.75	-0.27	-0.06	-0.52	0.18	0.36	-0.88	0.02	0.28	0.03	0.09
Religion														
Hindu	Male	-1.36	-0.09	-0.49	-0.71	-0.06	0.01	0.42	0.08	0.14	0.02	0.32	0.01	0.11
	Female	-1.3	-0.02	-0.48	-0.74	-0.06	0.01	0.46	0.07	0.2	0.01	0.33	0.01	0.11
	Total	-1.33	-0.06	-0.49	-0.73	-0.05	0.01	0.44	0.08	0.17	0.01	0.32	0.01	0.11
Muslim	Male	-1.11	-0.68	-0.03	-0.41	-0.04	-0.11	0.72	0.11	-0.12	-0.04	0.74	0.09	0.12
	Female	-1.09	-0.63	-0.06	-0.4	-0.04	-0.08	0.6	0.1	-0.08	-0.04	0.71	0.1	0.12
	Total	-1.1	-0.65	-0.05	-0.4	-0.04	-0.09	0.66	0.11	-0.1	-0.04	0.72	0.09	0.12
Christian	Male	-0.67	-0.06	-0.4	-0.3	0.04	0.14	1.1	0.09	1.04	0.15	0.49	0.18	0.14
	Female	-0.83	-0.06	-0.56	-0.28	0.05	0.1	1.2	0.12	0.91	0.15	0.45	0.2	0.14
	Total	-0.76	-0.06	-0.48	-0.29	0.05	0.12	1.15	0.1	0.97	0.15	0.47	0.19	0.14
Others	Male	-0.78	-0.07	0.05	-0.75	-0.02	-1.69	0.74	0.14	-0.82	-0.01	0.08	-0.03	0.17
	Female	-0.87	-0.02	0.03	-0.85	-0.03	-1.74	0.69	0.14	-0.89	-0.01	0.06	-0.03	0.16
	Total	-0.82	-0.05	0.04	-0.8	-0.02	-1.72	0.72	0.14	-0.85	-0.01	0.07	-0.03	0.16
Social Group														
Scheduled Tribe		-1.23	0.18	-0.6	-0.74	-0.08	-0.14	0.34	0	0.09	0.02	0.48	0	0.1
Scheduled Caste		-1.12	0.1	-0.42	-0.73	-0.01	0.09	0.51	0.1	0.33	0	0.39	0	0.13
Others		-1.33	-0.25	-0.38	-0.68	-0.06	-0.12	0.51	0.09	0.06	0.02	0.35	0.03	0.12

Note: *Vegetables, ^unit in kg unless specified after food item name
Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule

The consumption of pulses, milk and all other food items varies among SC, ST and other category people. The consumption of these food items is lowest among ST population followed by SC and it is highest among other class people (App. 3.7). The consumption of cereals substantially declined in other class people (1.33 kg PCPM) mainly due to decline in coarse cereals (0.68 kg PCPM). The wheat consumption slightly increased among SC and ST population (0.10 kg and 0.18 kg PCPM respectively) over a decade from 1993/94 to 2004/05 but overall consumption of cereals declined in all classes. The highest increase in fruit, vegetable and oil consumption from 1994 to 2005 is recorded by SC population followed by other category people. Among the ST population lowest increase (0.34 kg PCPM) is found in vegetable consumption, 1.10 kg PCPM increase in oil consumption and no increase in fruits consumption. Except SC population milk consumption declined in ST and other class people (Table 3.3).

If we see the association between social groups and all food items, it is found that ST population diet mainly constitutes cereals. There is increasing trend of other food item consumption among the SC population. The other category people though already have higher consumption of other food items show a lower increase in these foods. As multiple regression analysis shows that a percent increase in ST population increases the probability of consuming more cereals by 0.021 percent whereas 0.012 percent decline is likely if we increase SC population by one percent. The likelihood of consumption of pulses, vegetables, fruits and edible oil declines with an increase in ST population whereas this probability increases with remaining classes (Table 3.7).

Monthly Per Capita Expenditure (MPCE) Classes

On an average higher income class people are associated with healthier dietary pattern which includes fruits, vegetables, oil and meat consumption. The higher income class people consume more these food items than their lower class counterparts probably because with higher income, socio-economic status (high education) increases which results into more knowledge and awareness of health and healthy food items (Deshmukh et al., 2007; Villegas et al., 2003; Prattala et al., 2003; Giskes, 2002; Bhandari and Smith, 2000; Yang, 1998; Roos, 1998). However it is not clear that lower income class people do not enjoy these 'modern' foods because of lack of financial resources to purchase

fruits and vegetables or lack of motivation to consume a healthy diet. It is also not clear that this is due to non availability or non accessibility of these items (Sztainer et al., 1996). In another studies (Roos et al., 1998; Dittus et al., 1995; Hupkens et al., 2000), it is found that unemployed have less money to spend on food and thus low income becomes a barrier in the purchase of fruit and vegetable consumption.

In rural India, with higher income class, consumption of cereals increases. The bottom five MPCE classes (having lower income) which cover India's 40 percent rural population have cereal consumption less than national average (12.11 kg PCPM). Consumption of rice varies little among different MPCE groups but consumption of wheat is high among high income groups and low among low income groups (App. 3.8). Coarse cereal consumption is high in middle income groups and low both in higher income and lower income groups. Consumption of pulses, milk and all other food items except vegetables increases with higher income classes.

As far as rate of decline in consumption of different food items from 1993/94 to 2004/05 is concerned, it is found that total cereal consumption declined in all MPCE classes including lowest classes (except 5 percent bottom rural population) however this decline is highest in higher MPCE classes consisting of India's 50 percent rural population and this decline is attributed by decline in coarse cereal consumption (Table 3.4). In middle income classes, fall in rice consumption contributed in cereal consumption decline. The wheat consumption has increased much in lower 60 percent rural population. There is not much consistent variation in vegetable consumption among different income groups probably because potatoes are consumed by both higher income and lower income groups. Pulse consumption declined in almost all income groups but milk consumption slightly increased among 70 percent rural population from the bottom. The shift to meat and meat products and oil increases with higher income groups. There is no clear pattern of change in fruit consumption.

If we categorize classes into two groups poor (Below poverty line, BPL) and non poor (Above poverty line, APL) based on Planning Commission's poverty lines, then BPL groups are worst affected as their consumption of all food items is lower than APL classes (App. 3.9) and also their total cereal consumption has declined (0.96 kg PCPM)

Table 3.4

Change in Average Monthly Per Capita Consumption of Commodities (Kg)^ between 1993/94 and 2004/05 among MPCE Classes, Poverty and Occupation Groups

SED Groups	Cereal	Wheat	Rice	Coarse cereal	Pulses	Milk liquid (litre)	Vegetables	Fruits	Fruits (no)	Meat	Egg (no)	Fish	Edible Oil
MPCE Groups (%)													
5	0.14	-0.16	2.05	-1.76	0.02	0	0.52	0.13	0.05	0.01	0.18	0.02	0.08
10	-0.42	0	0.59	-1.03	-0.02	0.1	0.46	0.11	0.14	-0.01	0.18	0.02	0.07
20	-0.7	0.06	-0.06	-0.69	-0.03	0.08	0.51	0.03	0.18	0	0.32	0	0.11
30	-0.93	0.4	-0.57	-0.75	-0.03	0.1	0.46	0.05	0.17	0	0.27	0.01	0.11
40	-1.22	0.35	-1.06	-0.48	-0.03	0.29	0.49	0.06	0.27	-0.01	0.31	0	0.12
50	-1.17	0.06	-0.79	-0.44	-0.04	0.11	0.63	0.08	0.22	0	0.34	0.01	0.12
60	-1.35	0.16	-0.84	-0.57	-0.05	0.3	0.51	0.08	0.19	0	0.31	0	0.11
70	-1.46	-0.02	-0.85	-0.52	-0.05	0.11	0.54	0.07	0.1	0.01	0.38	0.01	0.13
80	-1.63	-0.36	-0.5	-0.7	-0.08	-0.14	0.55	0.1	0.05	0.01	0.58	0.02	0.13
90	-1.87	-0.79	-0.26	-0.77	-0.07	-0.42	0.42	0.09	-0.07	0.08	0.48	-0.01	0.1
95	-2.21	-0.61	-0.84	-0.67	-0.12	-0.38	0.41	0.1	-0.15	0.02	0.51	0.04	0.15
100	-2.28	-1.34	-0.09	-0.8	-0.13	-1.72	0.46	0.2	0.47	0.09	0.62	0.22	0.16
Poverty Group													
BPL	-0.96	-0.04	-0.13	-0.77	-0.04	-0.19	0.24	0.06	-0.07	-0.01	0.21	0.01	0.08
APL	-1.67	-0.28	-0.66	-0.66	-0.1	-0.51	0.42	0.07	-0.11	0.01	0.36	0.01	0.11
Occupation Type													
Self Employed in non Agriculture	-0.78	0.18	-0.57	-0.37	-0.02	0.12	0.53	0.09	-0.13	0.01	0.36	0.01	0.12
Agricultural Labour	-1.02	-0.11	-0.24	-0.66	-0.01	-0.02	0.35	0.06	0.38	0.01	0.47	0	0.13
Other Labour	-0.88	0.03	-0.24	-0.64	-0.05	0.1	0.31	0.05	0.01	0	0.39	0.07	0.07
Self Employed in Agriculture	-1.72	-0.53	-0.47	-0.64	-0.08	-0.17	0.49	0.09	0.08	0.02	0.3	0.01	0.12
Others	-1.16	-0.05	-0.73	-0.34	-0.05	-0.31	0.42	0.13	-0.26	0.01	0.33	0.04	0.1

Note: ^unit in kg unless specified after food item name
Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule

from 1993/94 to 2004/05 because of decline in coarse cereal consumption (0.77 kg PCPM) but consumption of other food items has not increased much whereas APL group recorded substantial increase in vegetables, egg and oil consumption (Table 3.4). The likelihood ratio also shows that a unit increase in MPCE classes would lead to 0.194 units increase in cereal consumption. As MPCE classes increases from lower to higher income groups, the probability of consuming pulses, milk, vegetables, fruits, meat and edible oil increases whereas likelihood of coarse cereal consumption declines (Table 3.7).

Occupation Groups

Type of occupation is significantly associated with all food items. A study based on food consumption pattern among different occupation categories shows that men from highest occupation level spend more money to eat fruits and vegetables whereas this is negatively related to occupation among women (Estaquio, 2008). However present study does not focus on men and women of different occupations rather it highlights the overall scenario of food consumption across different occupation groups.

The likelihood of consumption of all staple and other food items increases with a positive change in self employed in agriculture i.e. consumption of all food products increases with an increase in self employed agricultural farmers whereas agricultural labourers and other labourers show lower probability of consuming both cereals (except coarse cereals) and other food items than the employed in non-agricultural activities. Other occupation category people enjoy higher intake of other food and lower intake of cereals than the reference category (Table 3.7).

Cereal consumption across all occupation categories in rural areas is highest among self employed in agriculture (12.67 kg PCPM) (App. 3.10) but at the same time highest decline after 10 years (1993/94 to 2004/05) is also seen by this group (1.72 kg PCPM) primarily because of coarse cereal and wheat consumption decline. Consumption of other food items (Vegetables, fruits, meat and meat products, edible oil) is quite high among those who are not engaged in agriculture and 'other' category people. Lower consumption of these items is found among agricultural labourers and other labourers. However rice and coarse cereals are the staple food for these groups. Increase in vegetables and fruits consumption is quite low among agricultural labourers and other

labourers whereas other remaining categories enjoy substantial increase in fruit and vegetable consumption (Table 3.4). There is little variation in rise or fall of consumption of other food items across occupation groups.

Agro Climatic Regions

Consumption of various food items depends to some extent on the agricultural and climatic conditions. Planning commission on the basis of these conditions divided India into 15 major Agro Climatic Regions. These 15 regions are unique in terms of agricultural and climatic characteristics.

Study of food consumption pattern across Agro Climatic Regions is essential as these regions are not only important from production perspective but they also show different food culture and dietary habits in terms of eating, preparation and conservation of different food items, for instance, in coastal regions of India (covering states of Kerala, Tamil Nadu, Andhra Pradesh, Maharashtra etc.) it is natural to assume that meat consumption would be high. Similarly, in cold areas such as Jammu and Kashmir, Himachal Pradesh and Uttaranchal, in order to escape from chilled environment, foods which are rich with energy such as cereals and alcohol are preferably consumed.

There has been a historical link between food consumption pattern and agro climatic conditions, for instance, meat consumption is high among people living in north eastern states because there this food item has been a part of people's diet. Besides, Agro Climatic Regions also provide livelihood to large mass of population and thus also govern level of income which ultimately affects food consumption pattern. Thus, in the following paragraph food consumption pattern and its trend is discussed which would give a general picture of food consumption pattern in different Agro Climatic Regions (ACRs).

All ACRs which fall in northern India (covering areas of Lower Gangetic, Upper Genetic and Middle Gangetic Regions) show higher cereal consumption than the national average (12.11 kg PCPM) (App. 3.11 & 3.12)). There are some regions which are not agriculturally productive as well as have lower per capita income also have higher cereal consumption than national average. These regions include Central Plateau and Hill

(Madhya Pradesh, Eastern Rajasthan and Southern Uttar Pradesh), Eastern Plateau and Hill (Chhattisgarh, Jharkhand, Eastern Maharashtra, and Orissa) and Western Dry Region (western Rajasthan) probably of cereal based food culture and lower prices of food items. On the other hand are Western plain (Goa, Karnataka, Maharashtra and Tamil Nadu), Gujarat plain (Gujarat, Daman and Diu, Dadra and Nagar Haveli) and Trans-Gangetic plain (Punjab, Haryana, Chandigarh and Delhi) where cereal consumption is lowest probably because these regions cover highly developed states (Punjab, Haryana, Kerala, Western Maharashtra and Gujarat) in terms of per capita income. This pattern shows that cereal consumption is low in highly developed states and high in less developed states (Map 3.1 & 3.1a).

Wheat consumption is high in 'wheat belt region' (Upper Gangetic, Middle Gangetic, Trans Gangetic and Central Plateau and Hill Regions) (Map 3.2 & 3.2a) and rice consumption is dominant in 'rice producing belts' (Lower Gangetic, East Coast and East Himalayan Regions) (Map 3.3 & 3.3a). Coarse cereal consumption is highest in western dry region (6.66 kg PCPM) which is agriculturally productive for coarse cereal production (Map 3.4 & 3.4a). Pulses consumption is more or less same in rural India, however, Western Plateau and hill region (Inland Maharashtra and Malwa region of Madhya Pradesh.) and West Himalayan region (Jammu & Kashmir and Himachal Pradesh) show a higher consumption of pulses (Map 3.5 & 3.5a).

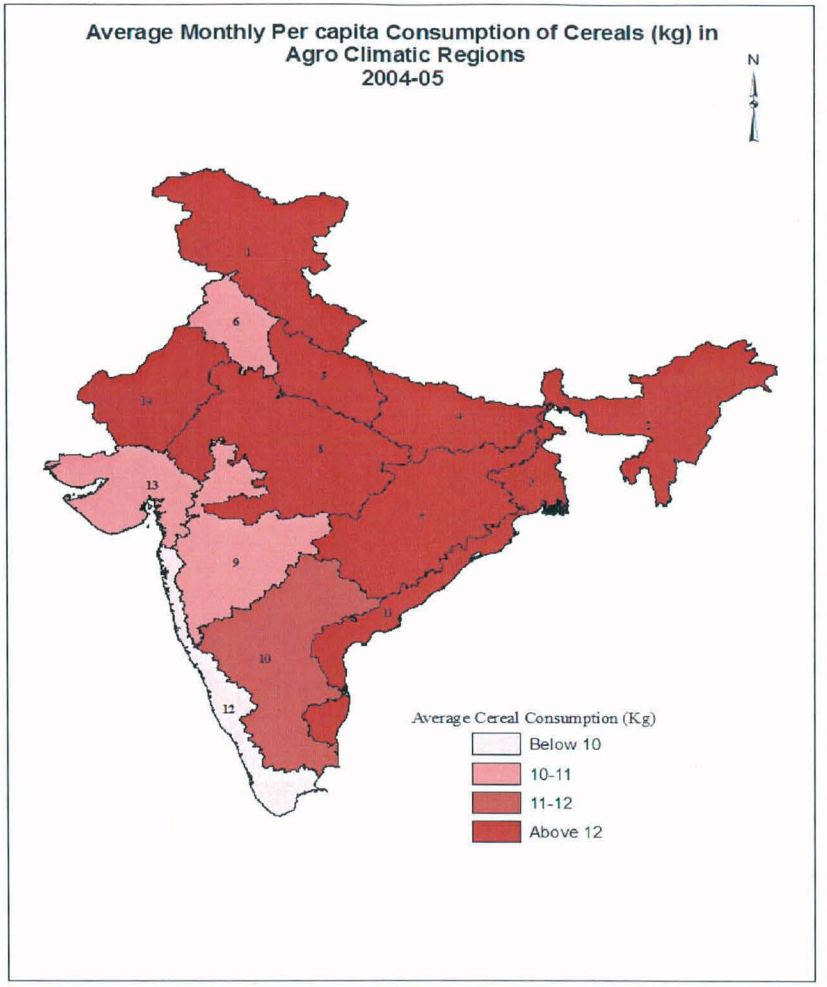
Vegetable consumption is high in Lower Gangetic Plain and East Himalayan, Middle Gangetic and upper Gangetic Plain Region and low in all other regions (Map 3.6 & 3.6a). As far as milk consumption is concerned, out of 14 ACRs, 8 regions have lower than national average (3.87 liter PCPM). Trans Gangetic Region, (Punjab, Haryana, Chandigarh and Delhi) although showing declining trend in consumption of milk, (1.71 liter PCPM) is still the leading region in milk consumption (App. 3.11 & 3.12). Milk consumption is low in eastern and southern parts of India and high in northern and western parts (Map 3.7 & 3.7a).

As far as fruit consumption is concerned it is low in those regions which are not agriculturally productive and cover less developed states of India such as Eastern Plateau and Hill Region (Chhattisgarh, Jharkhand, Eastern Maharashtra, and Orissa), Central

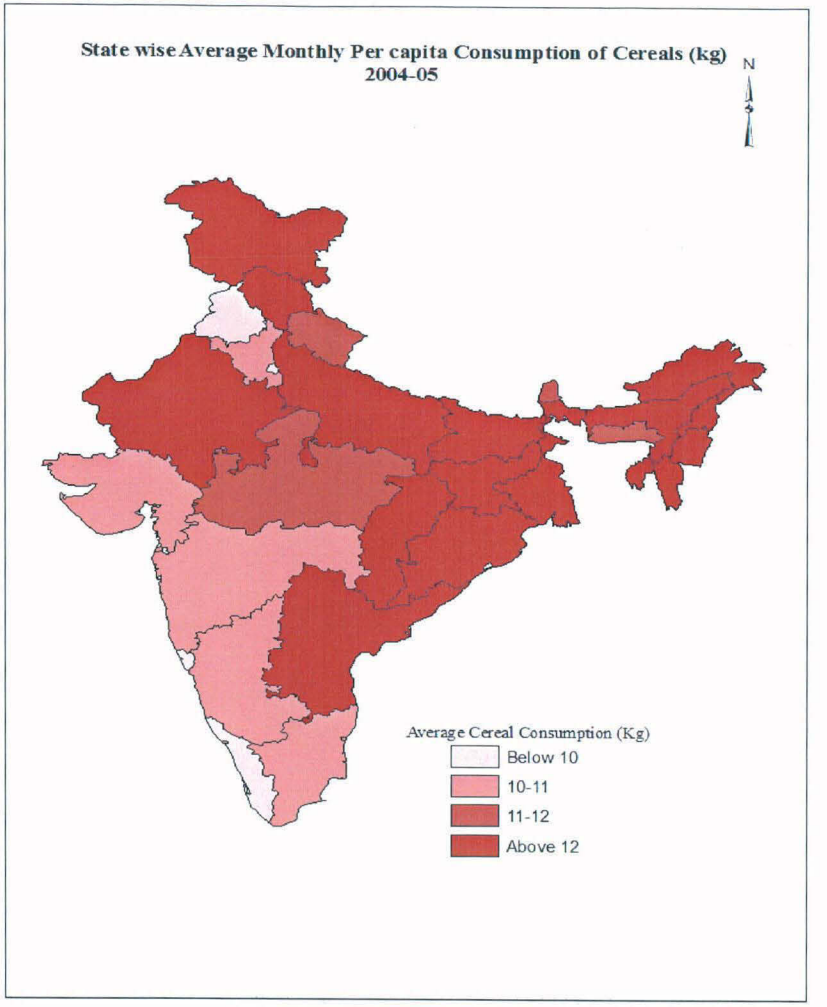
Plateau and Hill Region (Madhya Pradesh, Eastern Rajasthan and Southern Uttar Pradesh) and Southern Plateau and Hill Region (Inland Andhra Pradesh, Karnataka and Tamil Nadu) (Map 3.8 & 3.8a). Meat consumption is high in north eastern and southern regions and low in other parts (Map 3.9 & 3.9a).

Although all ACRs are showing a declining trend in cereal consumption yet fruit and vegetable consumption have increased in almost all regions. The fall in cereals and rise in vegetable and fruit consumption is however not same and it varies from region to region (Table 3.5 and 3.6). There are Central Plateau and Hill, Eastern Plateau and Hill and Western Dry regions where cereal consumption decline is maximum (2.28, 1.67, 1.76 Kg PCPM respectively) show little increase in vegetables, fruit, meat and edible oil consumption.

Map 3.1

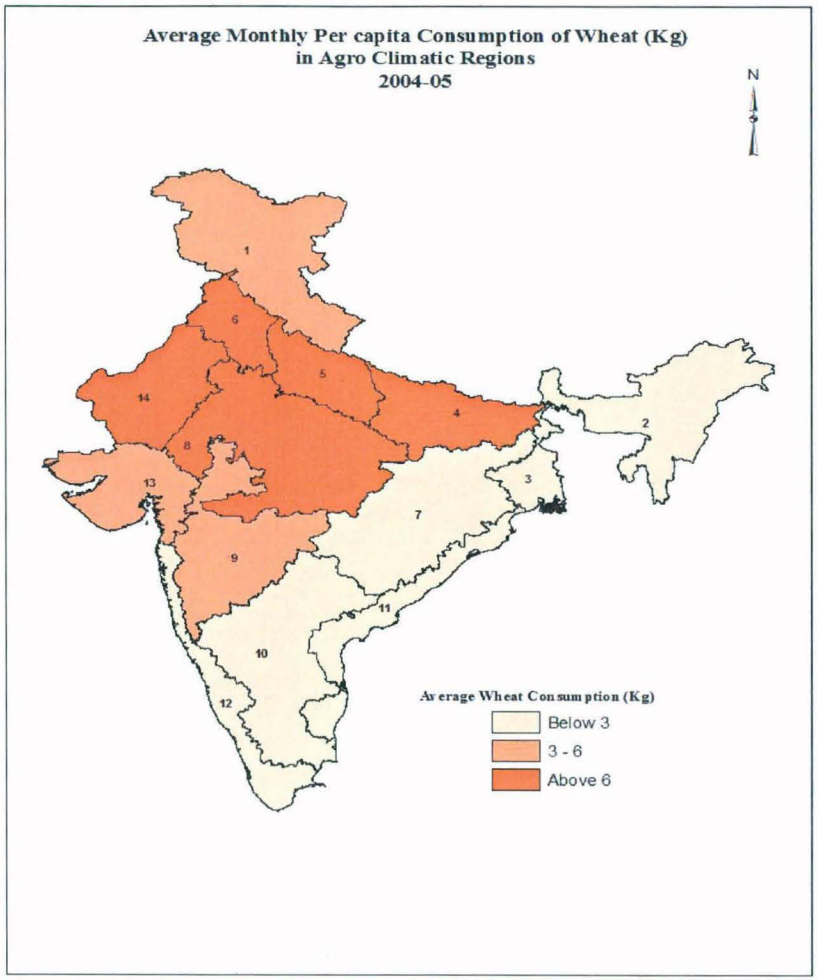


Map 3.1a

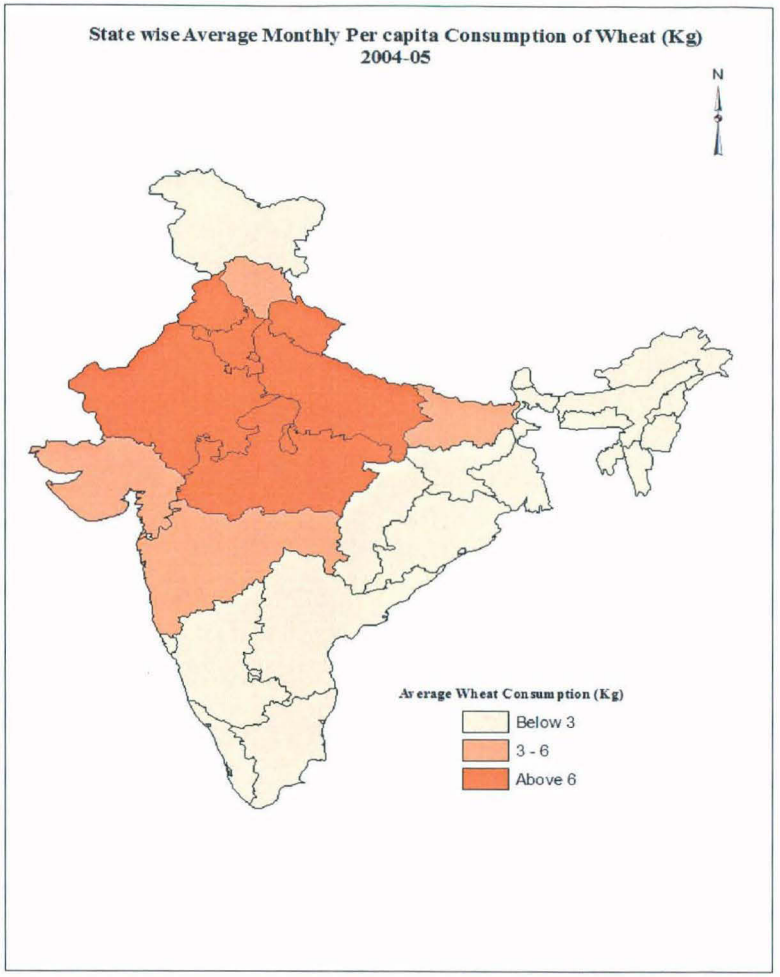


Source: Computed from Appendix 3.11 and 3.12

Map-3.2

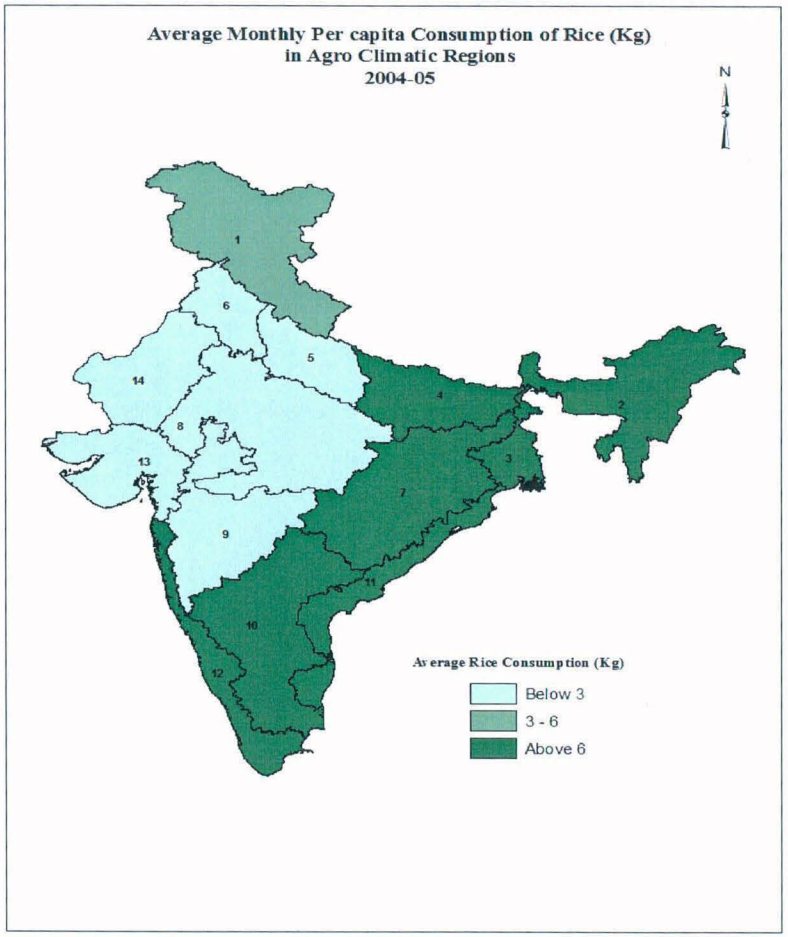


Map 3.2a

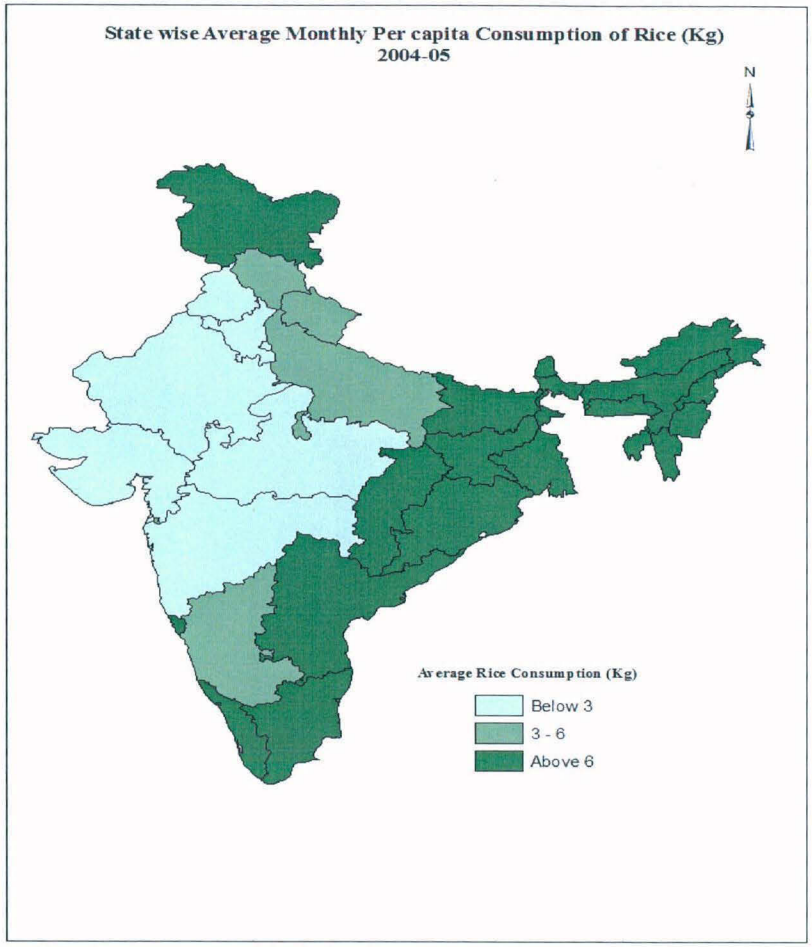


Source: Computed from Appendix 3.11 and 3.12

Map 3.3

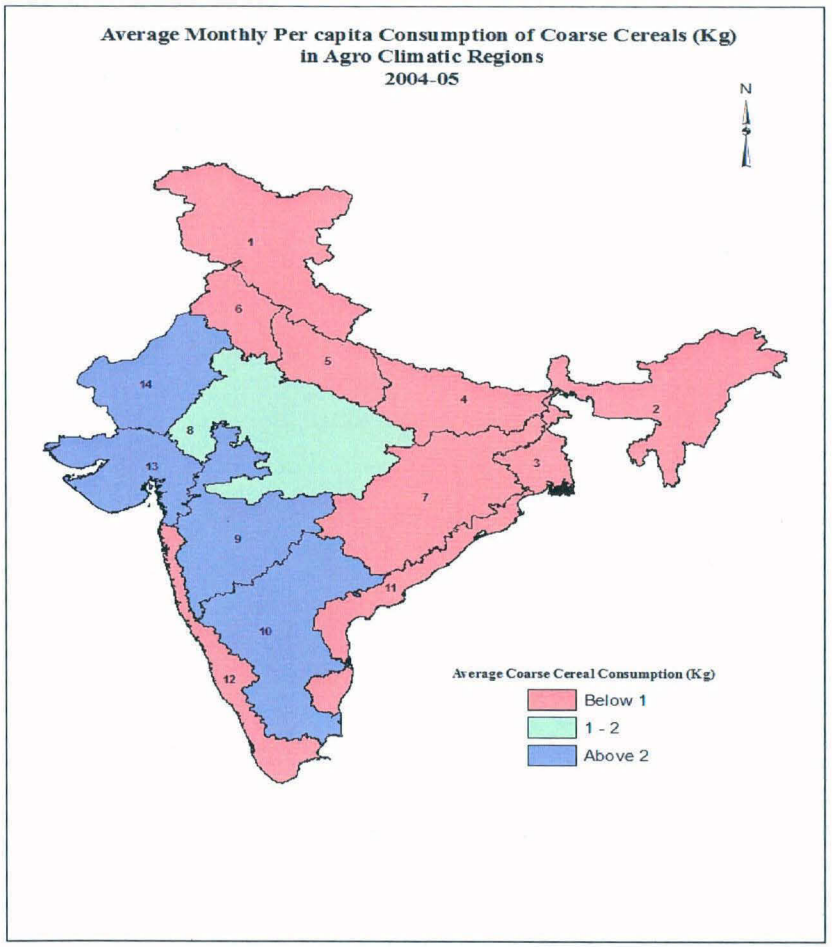


Map 3.3a

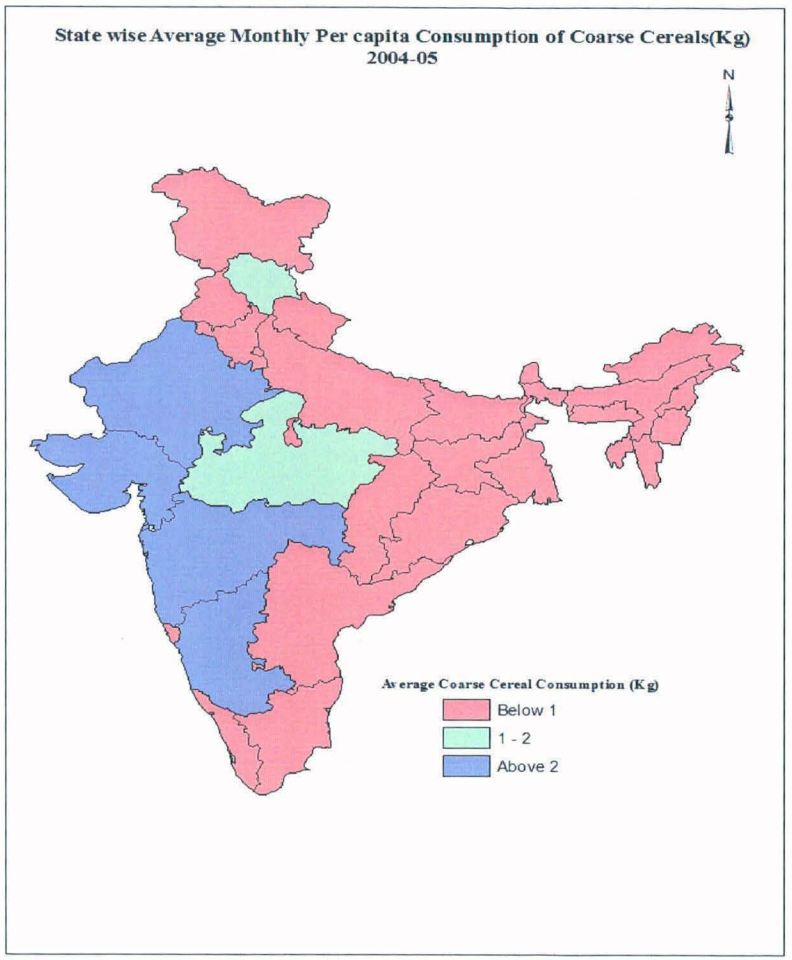


Source: Computed from Appendix 3.11 and 3.12

Map 3.4

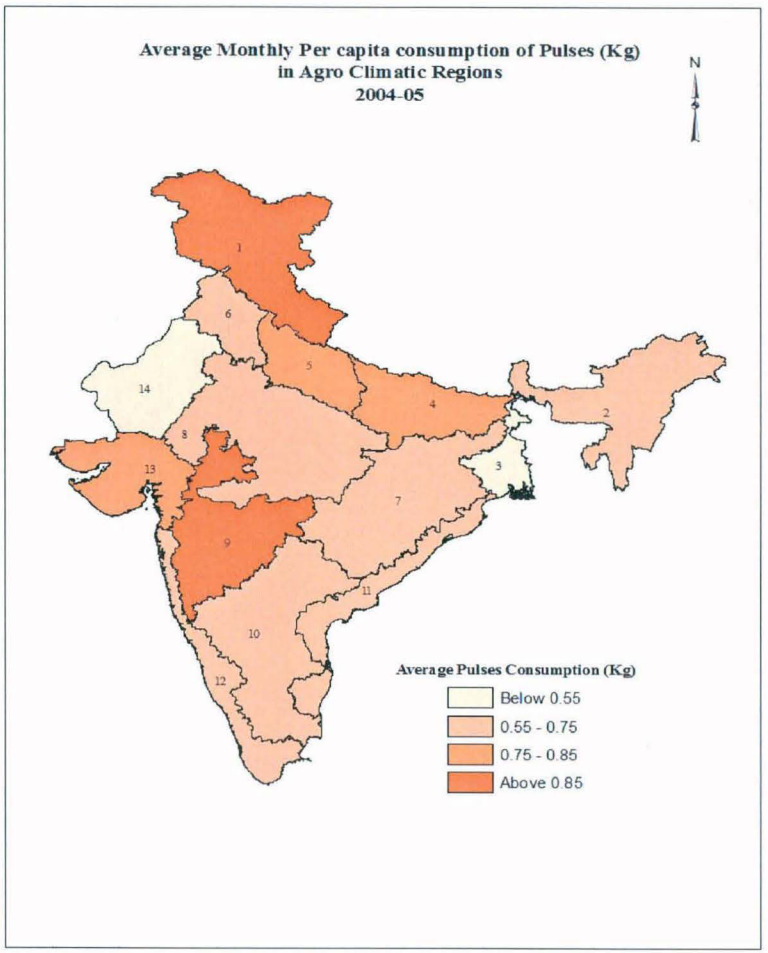


Map 3.4a

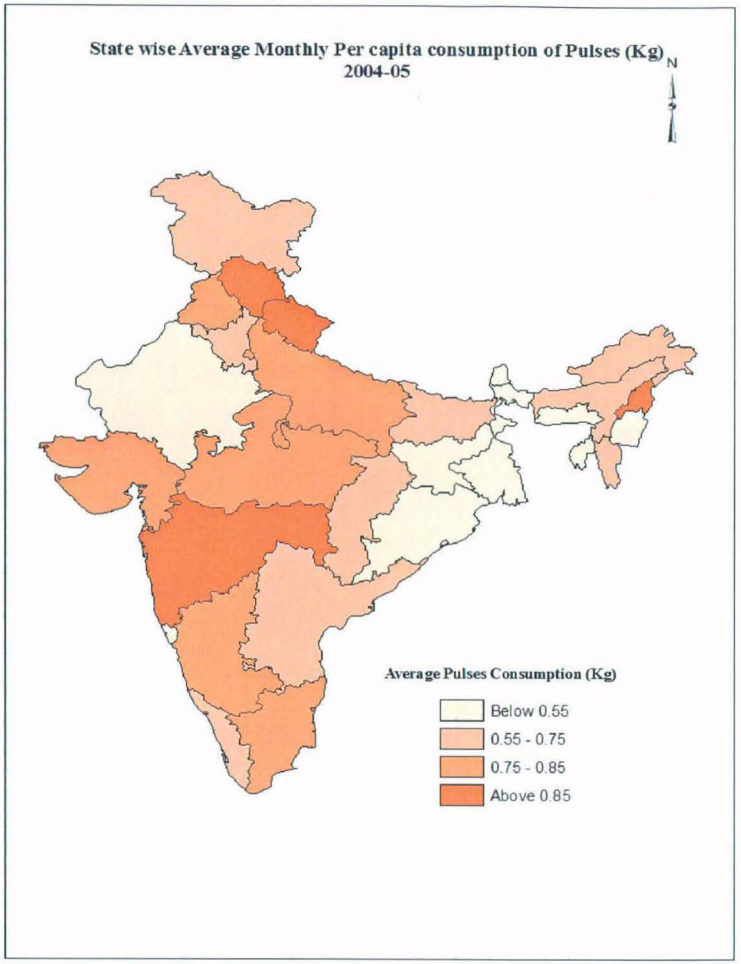


Source: Computed from Appendix 3.11 and 3.12

Map 3.5

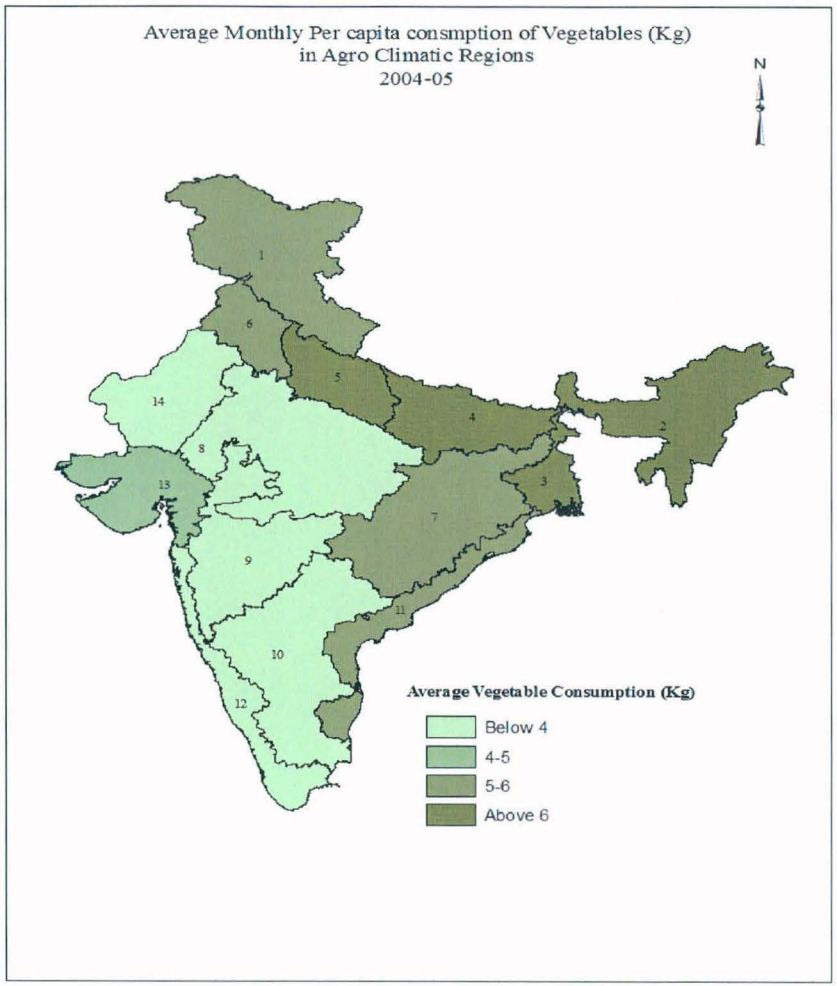


Map 3.5a

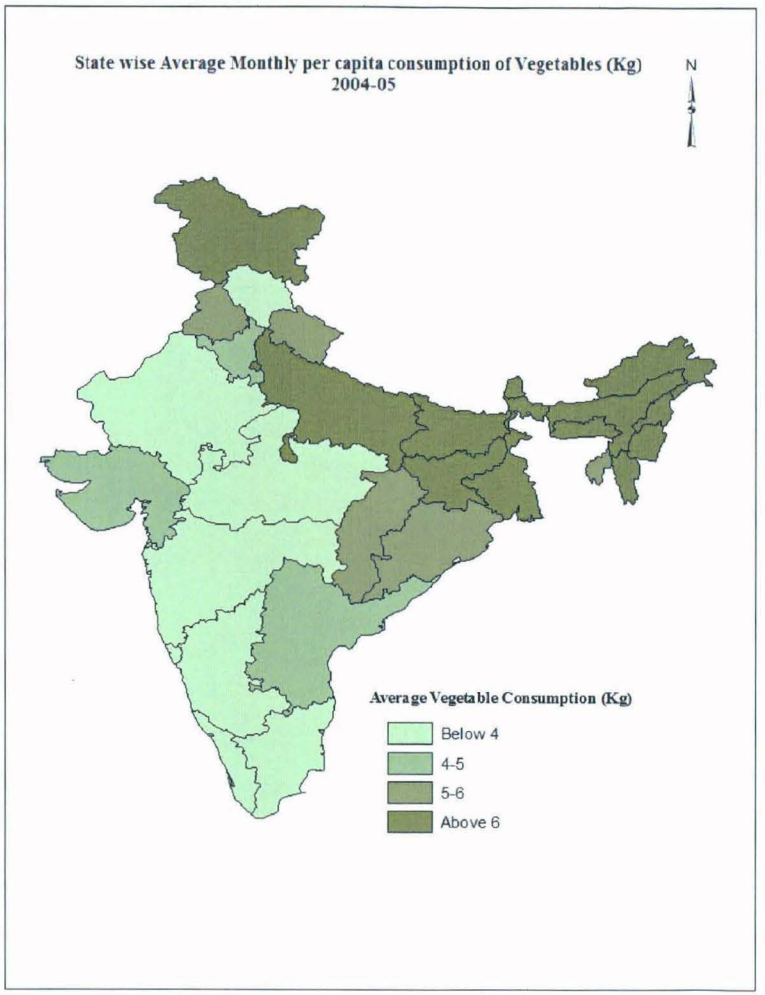


Source: Computed from Appendix 3.11 and 3.12

Map 3.6

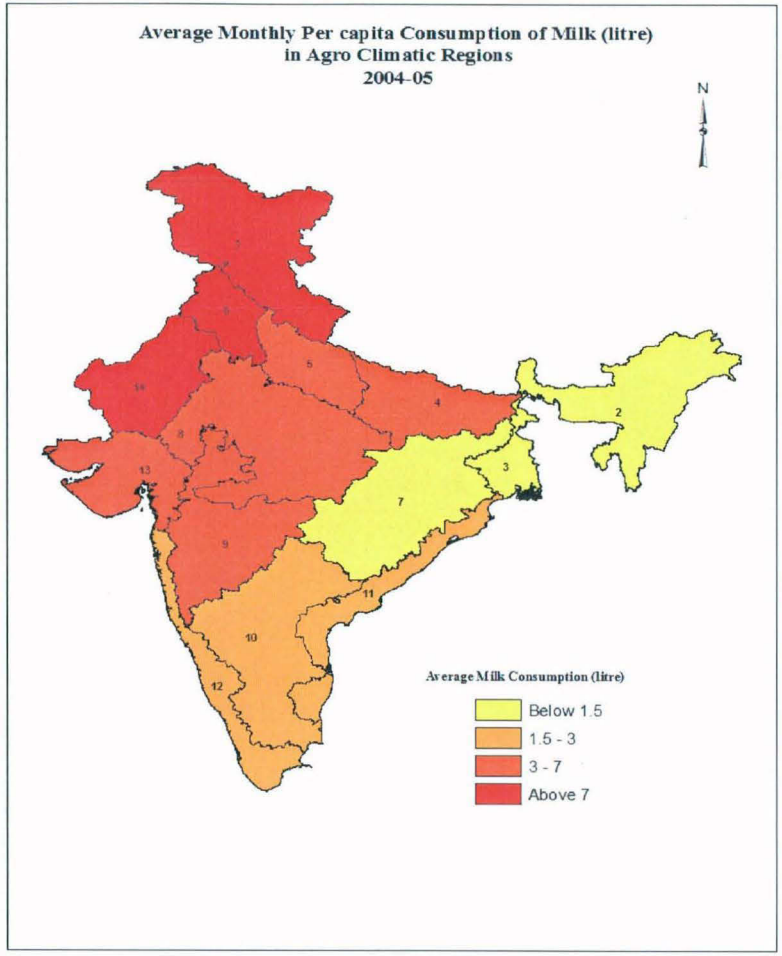


Map 3.6a

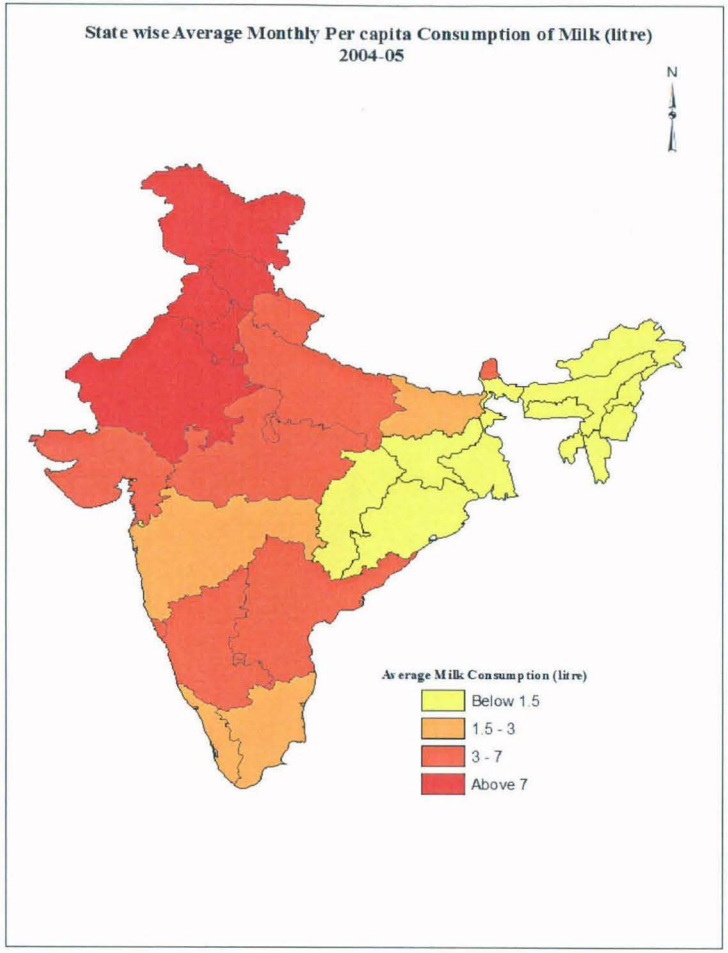


Source: Computed from Appendix 3.11 and 3.12

Map 3.7

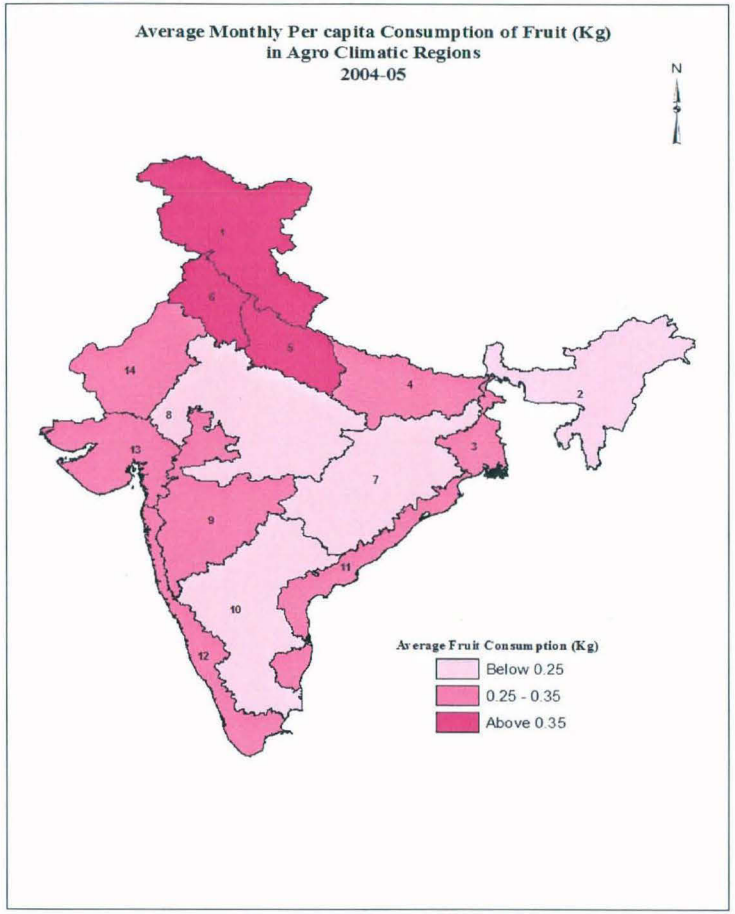


Map 3.7a

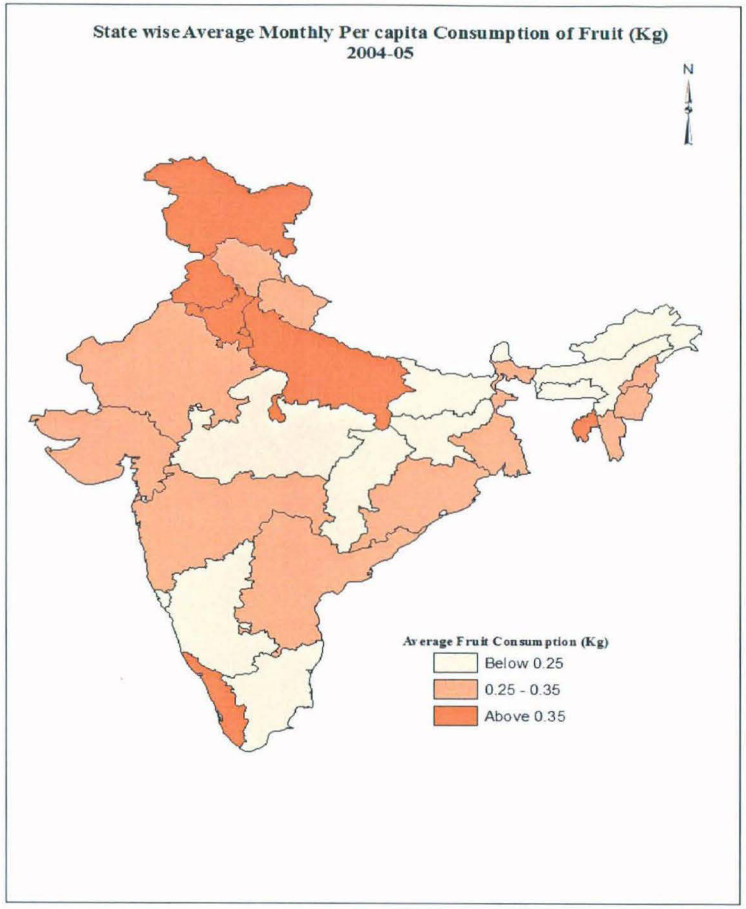


Source: Computed from Appendix 3.11 and 3.12

Map 3.8

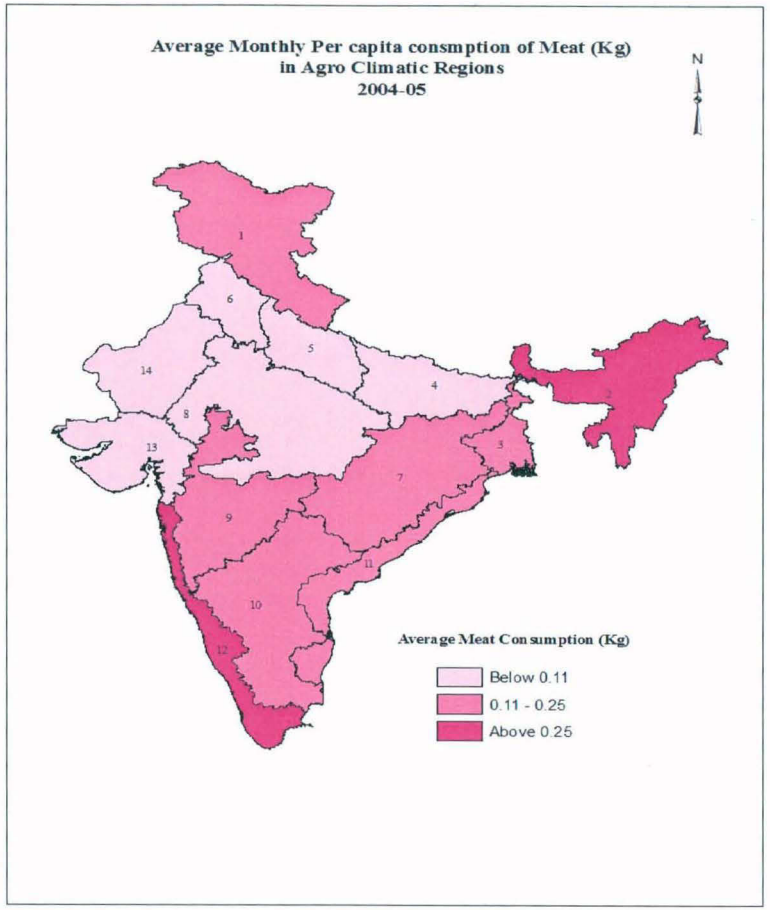


Map 3.8a

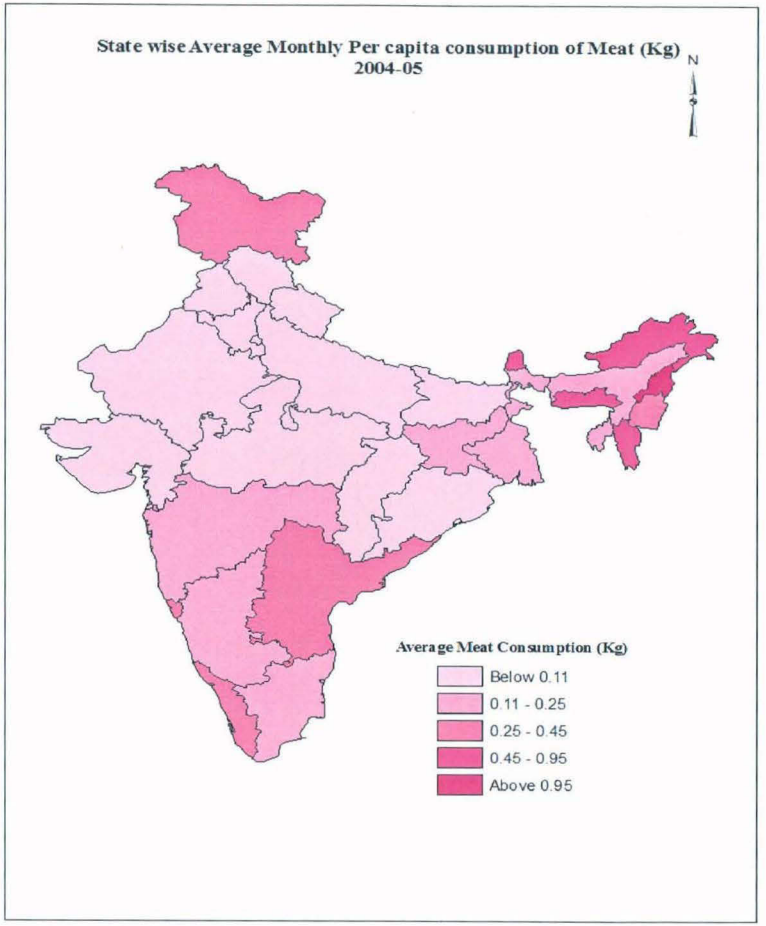


Source: Computed from Appendix 3.11 and 3.12

Map 3.9



Map 3.9a



Source: Computed from Appendix 3.11 and 3.12

Table 3.5

Agro Climatic Regions Wise Change in Average Monthly Per Capita Consumption of Commodities (Kg)^ between 1993/94 and 2004/05

Agro Climatic Regions/Food Items	Cereal	Wheat	Rice	Coarse cereal	Pulses	Milk liquid (litre)	Veg.*	Fruits	Fruits (no)	Meat	Egg (no)	Fish	Edible Oil
West Himalayan	-1.3	-1.44	1.41	-1.49	-0.16	0.29	0.41	0.11	0.16	0.11	0.36	0	0.14
East Himalayan	-0.72	-0.3	-0.25	-0.07	0.08	0.06	1.4	0.06	-0.8	0.09	1.27	0.1	0.15
Lower Gangetic Plain	-1.59	-0.08	-0.89	-0.05	-0.03	-0.12	0.27	0.09	-0.15	0.05	0.97	0.1	0.13
Middle Gangetic Plain	-1.02	-0.85	0.05	-0.25	-0.07	-0.2	0.39	0.13	-0.06	-0.01	0.18	0.01	0.11
Upper Gangetic Plain	-1.05	-0.67	0.11	-0.55	-0.14	-0.9	0.14	0.05	0.04	-0.05	0.24	0	0.07
Trans Gangetic Plains	-1.52	-1.52	-0.04	0.08	-0.05	-1.71	0.26	0.09	-1.11	-0.02	0.23	0	0.12
Eastern Plateau and Hill	-1.67	0.26	-1.49	-0.37	-0.08	0.04	0.28	0	0.05	0.01	0.31	-0.01	0.08
Central Plateau and Hill	-2.28	-0.57	-0.27	-1.4	-0.2	-0.08	0.31	0.05	0.68	-0.01	0.19	0	0.07
Western Plateau and Hill	-1.07	1.14	0.18	-2.46	-0.09	0.27	0.82	0.1	0.64	0.06	0.2	0	0.17
Southern Plateau and Hill	-0.92	-0.94	1.75	-1.73	-0.06	-0.48	0.07	0.06	0.5	0.06	0.68	-0.05	0.04
East Coast Plain and Hill	-1.03	0.1	-0.73	-0.44	0.13	0.45	1.33	0.14	1.22	0.04	0.83	-0.05	0.16
Western Plain and Ghat	-0.82	0.03	-0.91	0.04	0.12	0.52	0.67	-0.03	0.67	0.08	0.37	0.2	0.12
Gujarat Plain and Hill	-0.22	1.52	-2.75	2.85	0.06	3.2	1.13	0.23	0.74	-0.08	-0.23	-1.47	0.27
Western Dry	-1.76	-1.93	-0.03	0.19	-0.08	-1.71	-0.13	0.23	0.31	-0.01	0.01	0	0.04

Note: *Vegetables, ^unit in kg unless specified after food item name
Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule

Table 3.6

State Wise Change in Average Monthly Per Capita Consumption of Commodities (Kg)^ between 1993/94 and 2004/05

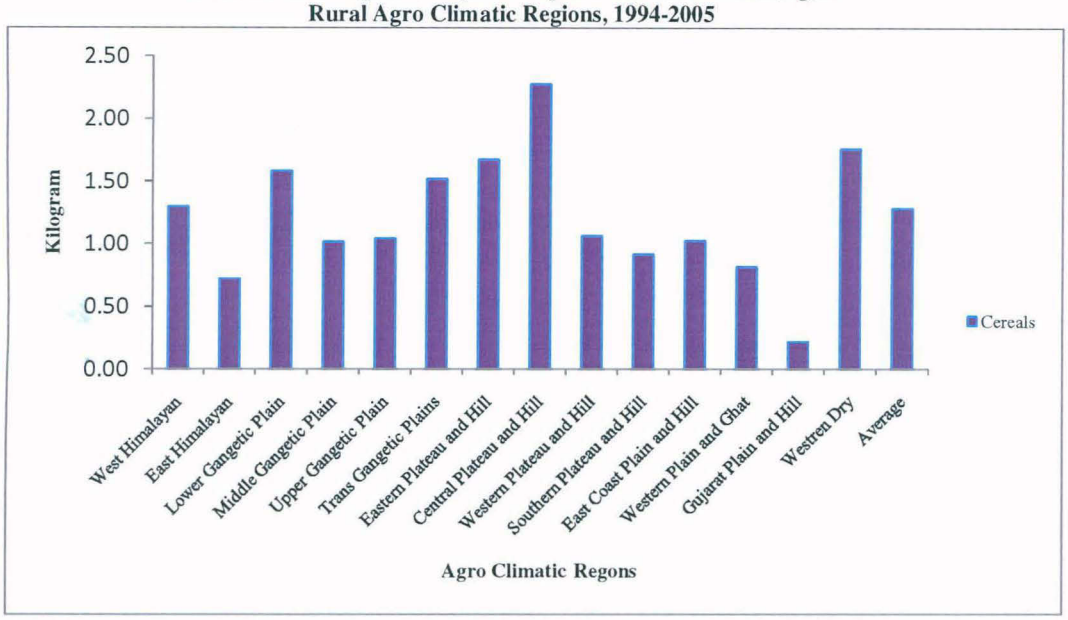
States/Food Items	Cereal	Wheat	Rice	Coarse cereal	Pulses	Milk liquid (litre)	Veg.*	Fruits	Fruits (no)	Meat	Egg (no)	Fish	Edible Oil
Andhra Pradesh	-1.24	0.02	-0.31	-0.8	0	0.43	0.78	0.1	1.18	0.02	0.81	-0.03	0.15
Arunachal Pradesh	-0.53	-0.12	1.84	-2.1	-0.02	0.2	1.81	0.14	0.39	-0.07	1.41	0.1	0.34
Assam	-0.12	-0.08	0.09	0	0.11	0.1	1.62	0.02	-0.49	0.05	1.2	0.15	0.15
Bihar	-1.23	-0.77	-0.27	-0.3	-0.05	0.23	0.48	0.11	0.1	-0.01	0.16	0.02	0.11
Goa	-0.53	-0.69	-0.01	0.27	-0.34	0.6	0.37	-0.58	-2.73	0.05	-2.23	0.27	0.08
Gujarat	-0.59	-0.34	-0.11	-0.28	-0.09	-0.09	0.02	0.18	0.45	-0.01	0.1	-0.01	0.13
Haryana	-2.26	-2.32	-0.06	0.16	-0.03	-0.69	0.48	0.13	-0.59	-0.01	0.58	0	0.11
Himachal Pradesh	-1.31	-0.21	0.45	-1.59	0.12	1.2	0.33	0.04	0.07	0	0.17	0	0.15
Jammu & Kashmir	-1.66	-4.84	4.6	-1.97	-0.45	0.76	2.41	0.14	0.48	0.31	0.77	0.01	0.18
Karnataka	-2.42	0.13	-0.13	-2.5	-0.03	0.42	0.24	0.1	0.39	0.03	0.39	-0.03	0.15
Kerala	-0.58	0.06	-0.8	0.01	0.16	0.21	0.94	0.03	1.28	0.12	0.42	0.53	0.12
Madhya Pradesh	-2.52	-3.18	1.12	-0.64	-0.31	1.26	0.83	0.03	2.28	0.11	1.27	0.22	0.14
Maharashtra	-0.9	1.19	0.02	-2.09	-0.05	0.23	0.82	0.05	0.58	0.07	0.25	-0.05	0.19
Manipur	-0.24	0.01	-0.16	-0.14	-0.04	0.05	1.96	0.15	-0.76	0	0.49	0	0.39
Meghalaya	-0.95	-0.13	-0.83	0.05	-0.07	-0.55	0.43	0.1	-0.33	0.12	0.69	0.16	-0.01
Mizoram	0.02	0	0.97	-0.71	-0.32	-0.29	3.78	-0.23	-3.39	0.21	0.71	-0.08	0.13
Nagaland	-2.56	0	-2.62	-0.03	0.3	0.04	0.97	-0.53	-0.83	0.77	1.05	-0.03	-0.02
Orissa	-1.95	0.12	-1.89	-0.16	0.05	0.01	0.54	0.12	0.16	0.02	0.45	-0.03	0.06
Punjab	-0.86	-0.85	0.02	0	-0.05	-2.79	0.17	0.09	-0.98	-0.02	-0.06	0	0.16
Rajasthan	-2.16	-0.94	-0.05	-1.17	-0.13	-0.91	0.21	0.13	0.68	-0.01	0.02	0	0.07
Sikkim	-0.19	-0.23	0.41	-0.33	-0.01	0.8	1.52	0.03	-0.77	-0.01	-0.43	0.04	0.1
Tamil Nadu	-0.83	-0.04	-0.17	-0.67	0.1	0.36	0.38	0.02	-0.05	0.04	0.53	-0.05	0.11
Tripura	0.3	-0.02	0.42	0	-0.11	-0.36	-4.37	0.43	-4.25	0.08	0.16	-0.21	0.03
Uttar Pradesh	-1.04	-0.73	0.14	-0.47	-0.13	-0.71	0.22	0.09	-0.07	-0.03	0.22	0.01	0.08
West Bengal	-1.78	-0.21	-0.99	-0.05	-0.01	-0.09	0.55	0.09	-0.17	0.06	1.15	0.09	0.13
A&N Island	-1.39	-0.79	-0.57	0	-0.19	-0.18	1.25	0.03	-3.97	-0.09	0.82	-0.2	0.1
Chandigarh	-0.14	-0.01	0.14	-0.1	0.23	-0.46	1.51	-0.07	-3.02	0.01	0.25	0	0.08
Dadra & Nagar	-2.16	-0.79	0.6	0.14	0.27	-0.21	0.43	0.17	1.11	0.07	0.18	-0.24	0.18
Daman & Diu	-4.18	-0.38	-3.36	-1.06	0.15	0.2	-0.41	0.47	2.84	-0.06	0.26	-3.24	0.03
Delhi	-1.28	-0.76	-0.34	-0.01	-0.3	-2.15	-0.65	-0.51	-10.75	-0.18	-0.24	0.01	-0.05
Lakshadweep	-2.06	-0.14	-1.93	0	0.16	-0.07	1.19	-0.47	-3.09	0.51	3.76	0.25	0.17
Pondicherry	-1.54	0.07	-1.61	0.01	0.1	-0.07	1.15	0.15	1.3	0.03	1.55	-0.44	0.23

Note: *Vegetables, ^unit in kg unless specified after food item name

Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule

Figure 3.2

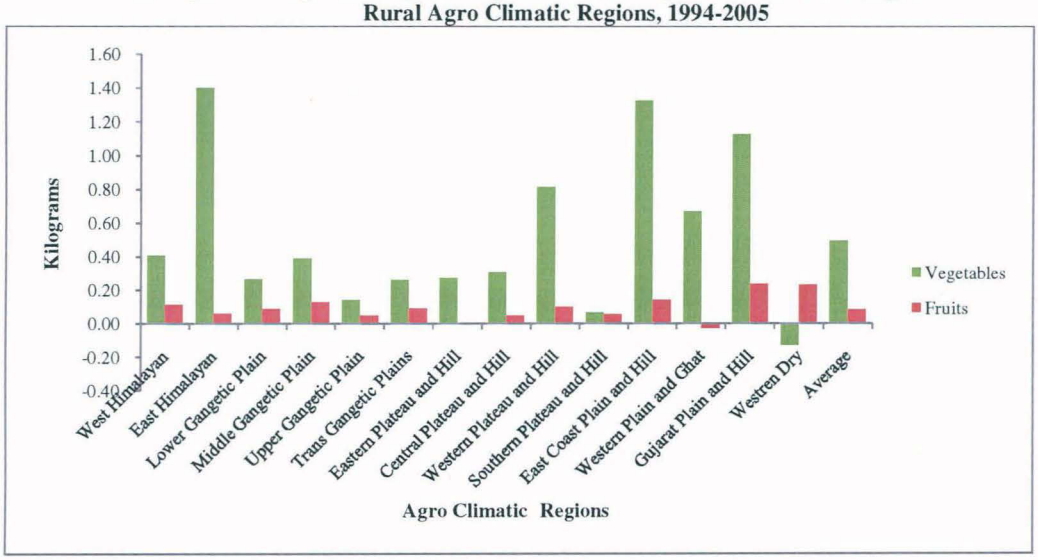
Decline in Average Monthly Per Capita Intake of Cereals (Kg) in Rural Agro Climatic Regions, 1994-2005



Source: Computed from Table 3.5

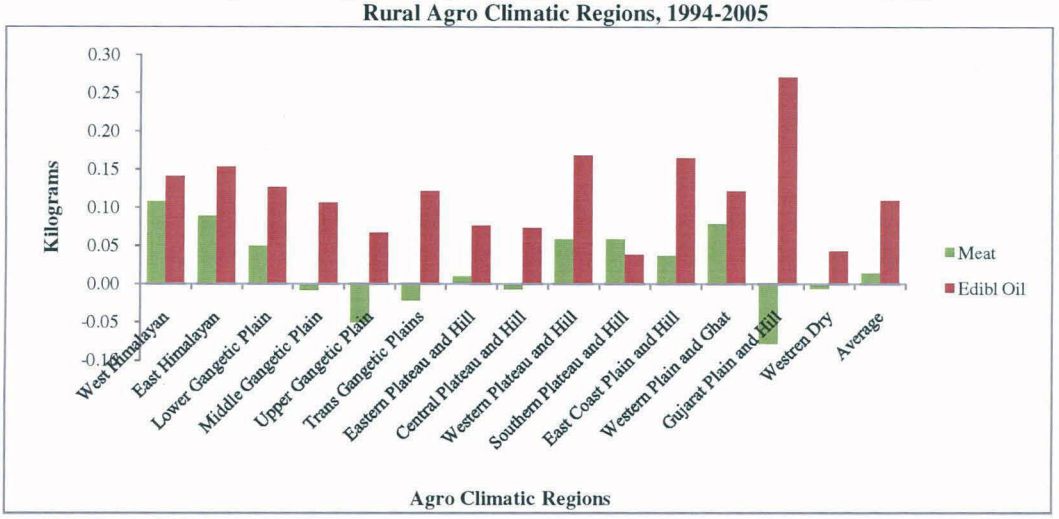
Figure 3.3

Change in Average Monthly Per Capita Intake of Vegetables and Fruits (Kg) in Rural Agro Climatic Regions, 1994-2005



Source: Computed from Table 3.5

Figure 3.4
Change in Average Monthly Per Capita Intake of Meat and Edible Oil (Kg) in Rural Agro Climatic Regions, 1994-2005



Source: Computed from Table 3.5

On the other hand is Gujarat Plain and Hill Region which emerge as showing lowest decline in cereal consumption (0.22 Kg PCPM) (Figure 3.2) experience one of the greatest increases in Vegetable and Fruit consumption (Figure 3.3). This region also shows maximum increase in edible oil consumption and maximum decline in meat consumption. East Himalaya, East Coast Plain, Western Plain and Western Plateau are the regions which show lower decline in cereal intake and one of the highest increase in other food consumption (meat, vegetables, fruits and edible oil) (Figure 3.4).

Thus, Eastern, Central Plateau and Western Dry Regions covering states of Chhattisgarh, Jharkhand, Eastern Maharashtra, Orissa, Madhya Pradesh, Eastern and Western Rajasthan and Southern Uttar Pradesh are worst affected as consumption of cereals has declined whereas intake of other food items has not substantially increased showing food insecure conditions in these regions. Other remaining regions show little decline in cereal consumption but an increase in other food items in the diet.

All ACRs are statistically significant with all food items. The likelihood of decline in cereal consumption is highest if there is any increase in the area of Trans-Gangetic Plain, Gujarat Plain, West Coast Plain and West Plateau Region, all covering developed states of India. However vegetable and fruit consumption are negatively

related to almost all regions including agriculturally developed ones but this negative relation is quite low (Table 3.7).

3.4 Factors Affecting Food Consumption Pattern

A multiple regression analysis shows affect of socio-economic and demographic (SED) variables on consumption of different food items (Table 3.7). Through this table it is found that SED variables more or less determine our food consumption pattern. Among all food items, coarse cereals are much influenced by these variables (42 percent) among which Agro Climatic Regions (ACRs) such as Western Dry, Gujarat Plain, Western and Southern Plateau regions have higher probability of consuming coarse cereals than the North Himalayan Region. These regions are also productive in terms of coarse cereals and it is the staple food for most of the population in these regions which may be a reason for higher consumption of coarse cereals in these regions. All other SED variables are significant but have lower influence on consumption of coarse cereals. An interesting point comes when we see affect of MPCE class (a proxy to income). It is found that MPCE class is the only variable which affects consumption of almost all food items except coarse cereals. Similarly cereal consumption are affected by regional and income factors as coefficients of them are higher than other SED variables which shows that the characteristics of ACRs and income level determine consumption of cereals among population. Besides, age of an individual also affect cereal consumption (15.4 percent). Fruit and meat consumption is little affected by selected SED variables. However MPCE class, Education level and Occupation type increases the likelihood of consumption of fruits whereas MPCE class and ACRs such as East Himalayan (north eastern states), Western Plateau (western Madhya Pradesh and Maharashtra), Eastern Plateau (Orissa, Chhattisgarh, Jharkhand) and Southern Plateau (Andhra Pradesh, Karnataka and Tamil Nadu) determine meat consumption. Edible oil, vegetable and milk consumption are particularly influenced by MPCE class and in general by ACRs. The probability of pulse consumption increases as the MPCE class rises. MPCE is the only factor affecting pulse consumption.

Table 3.7

Multiple Regression Analysis for showing effect of SED Variables on Consumption of Food Items

Explanatory Variables		Standardized Coefficients/ Dependent Variables								Sig.^
		Cereal	Pulse	Milk	Vegetables	Fruits	Meat	Edible Oil	Coarse Cereal	
Age of Individual	Age of individual	0.154	0.054	0.028	0.039	0.001	-0.003	0.034	0.003	0.000
Sex of Individuals	Sex	0.000	0.005	0.006	0.003	0.000	-0.004	0.003	-0.008	0.000*
Marital Status	Married	-0.083	-0.018	0.000	-0.009	0.001	0.001	-0.002	-0.007	0.000
Household Size	Household Size	-0.062	-0.060	-0.040	-0.106	-0.008	-0.004	-0.088	0.027	0.000
Occupation Type	Agriculture labour	0.036	-0.027	-0.047	-0.032	-0.022	-0.014	-0.043	0.052	0.000
	Other labour	-0.009	-0.020	-0.045	-0.024	-0.015	-0.005	-0.026	0.002	0.000
	Employed Agriculture	0.084	0.051	0.149	0.022	0.007	0.003	0.011	0.064	0.000
	Other Household	-0.063	0.000	0.022	0.004	0.011	-0.003	0.000	-0.019	0.000
Education Level	Primary	0.024	0.022	0.023	0.011	0.000	0.004	0.019	-0.027	0.000
	Secondary	0.029	0.039	0.063	0.023	0.016	0.000	0.036	-0.028	0.000
	Higher	-0.007	0.018	0.046	0.008	0.033	-0.002	0.012	-0.016	0.000
Religious Groups	Hindu	0.040	0.032	0.082	0.007	-0.015	-0.067	0.010	0.020	0.000
	Christian	-0.008	-0.016	0.023	-0.002	0.000	0.008	-0.002	-0.017	0.000
	Other religion	-0.001	0.047	0.058	0.021	-0.006	-0.029	0.044	-0.006	0.000
Social Group	Scheduled Tribe	0.021	-0.015	0.002	-0.014	-0.003	0.009	-0.024	0.080	0.000
	Other Class	-0.012	0.016	0.135	0.009	0.005	-0.013	0.020	0.002	0.000
MPCE Classes	MPCE	0.194	0.212	0.189	0.119	0.075	0.069	0.199	-0.026	0.000
Agro Climatic Regions@	West Himalayan	-0.050	0.011	0.117	-0.055	-0.003	0.007	0.025	0.043	0.000
	East Himalayan	-0.035	-0.089	-0.079	0.022	-0.020	0.028	-0.006	-0.029	0.000
	Lower Gangetic	0.005	-0.175	-0.069	0.047	-0.012	0.016	0.011	-0.026	0.000
	Upper Gangetic	-0.036	-0.021	0.141	-0.028	0.040	0.004	0.016	0.011	0.000
	Trans Gangetic	-0.186	-0.081	0.334	-0.075	0.003	-0.010	-0.019	0.017	0.000
	East Plateau	-0.021	-0.087	-0.093	-0.040	-0.009	0.010	-0.031	-0.034	0.000
	West Plateau	-0.198	0.003	-0.002	-0.144	-0.004	0.026	0.085	0.446	0.000
	South Plateau	-0.160	-0.044	-0.015	-0.174	-0.021	0.042	0.009	0.243	0.000
	East Coast	-0.073	-0.063	-0.032	-0.073	-0.006	0.022	0.006	-0.005	0.000
	West Coast	-0.254	-0.096	-0.043	-0.158	-0.018	0.023	-0.046	0.027	0.000
	Gujarat Plain	-0.196	-0.022	0.069	-0.088	0.004	-0.005	0.142	0.307	0.000
	Western Dry	-0.018	-0.069	0.205	-0.088	-0.002	-0.005	-0.016	0.347	0.000
	Adjusted R Square	0.167	0.107	0.388	0.091	0.014	0.013	0.098	0.428	0.000

Note: ^ Significance, *There is 0.029 points (5 percent) significance between sex and total cereal consumption, all other variables are significant at 1 percent level

@Middle Gangetic Plain is the Excluded Variable

Source: Computed from NSS 61st Consumer Expenditure Schedule.

Besides, MPCE and ACRs, if we see probability of consuming different food items among selected SED groups, we find that as age of individuals increases consumption of meat declines whereas consumption of all other food items especially cereals, milk, vegetables, pulses rises. The Table 3.7 shows that bigger the household size, higher is the consumption of coarse cereals and lower is the consumption of all other foods. Similarly, agricultural labourers and other labourers show lower probability of consuming all food items except coarse cereals than the employed in non-agricultural activities. With higher education level, consumption of all food items except coarse cereals increases. Scheduled tribes consume lower intake of pulses, vegetables, fruits and edible oil than the scheduled caste people.

The above analysis shows that MPCE class and ACRs are dominant factors in determining consumption of different food items. All other SED factors have little influence on food consumption. However, it is also true that if this little affect was not working, then our consumption pattern could have been different. Thus all SED factors are as important as MPCE classes and ACRs.

3.5 Food Consumption Pattern and Its Change in 2007-08 using NSS thin round (64th Round)

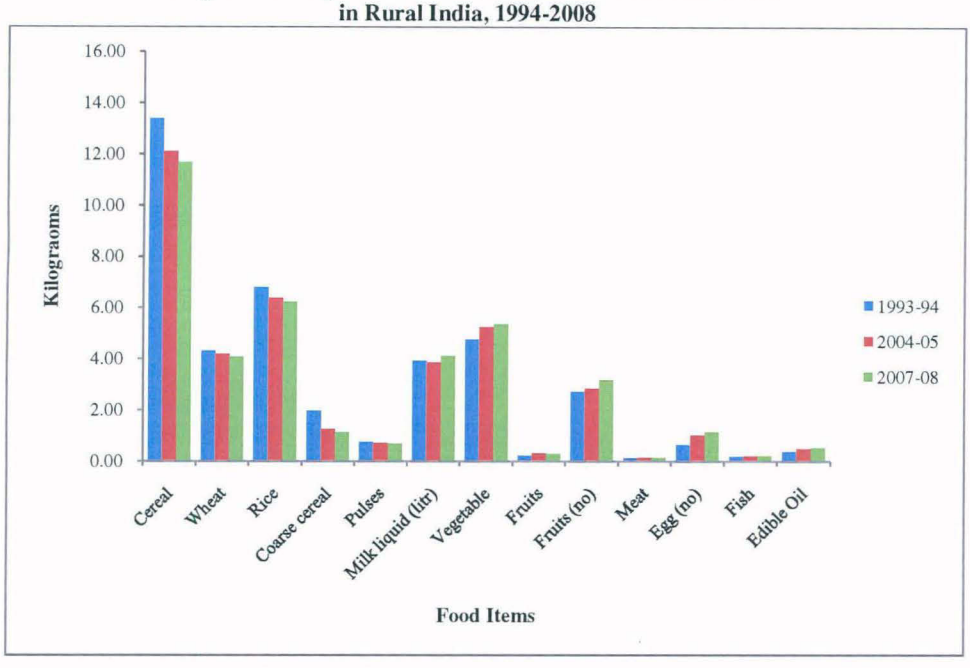
During 2007-08, cereals still hold the highest place among all food items as its consumption is 11.68 Kg PCPM mainly because of higher rice consumption (6.23 Kg PCPM) (Table 3.8).

Table 3.8
Food Consumption Pattern (Kg)* in Rural India during 2007-2008

Food Items	2007-08
Cereal	11.68
Wheat	4.08
Rice	6.23
Coarse cereal	1.11
Pulses	0.69
Milk liquid (liter)	4.12
Vegetable	5.36
Fruits	0.29
Fruits (no)	3.17
Meat	0.15
Egg (no)	1.14
Fish	0.21
Edible Oil	0.52

Note: *unit in kg unless specified after Food item
Source: Computed from NSS 64th Consumer Expenditure Schedule.

Figure 3.5
Change in Per Capita Per Month Intake of Various Food Items in Rural India, 1994-2008



Source: Computed from Table 3.1 and 3.8

However cereal consumption still continue to decline but it has been lower (0.43 Kg PCPM) during 2005-08 compared to a decline during 1994-05 (1.29 Kg). The consumption of wheat, rice and coarse cereals shows a little decline. As far as consumption of other food items (Vegetables, fruits, meat and edible oil) is concerned, a very little increase is seen in these food items' consumption (Figure 3.5).

Thus, the above discussion shows that food consumption pattern has changed in rural India. There is decline of cereal consumption particularly coarse cereal consumption which has caused a fall in total cereal intake from1993/94 to 2004/05. However, rice and wheat intake has slightly declined which have little effect on cereal intake decline.

This fall in cereal consumption varies from person to person, for instance, widowed/divorced/separated, currently married, elders, small households, christians and other religion groups, other caste people, higher MPCE classes, self employed in agriculture and other occupation groups, Lower Gangetic (West Bengal), Middle Gangetic (Bihar and Eastern U.P.), Upper Gangetic (Western and Central U.P.), Trans Gangetic (Punjab, Delhi, Chandigarh and Haryana) regions have shown a higher decline

in cereal consumption and also an increase in consumption of other food items such as vegetables, fruits, oil, meat and meat products. On the other hand are groups such as teenagers, illiterates, agricultural labourers and other labourers, scheduled tribes, Central Plateau, Western Plateau, and Western Dry Regions which show a higher decline in cereal consumption as well as lower rise in intake of other food items. These groups and regions are vulnerable to food insecurity and worse health conditions. Thus, government food and health policies should emphasis on the upliftment of these groups and regions.

As far as effect of all socio-economic and demographic variables along with agro climatic regions on consumption of different food items is concerned, all the selected variables are significantly related to all food items at 1 percent level. From the above discussion, it is found that monthly per capita expenditure and agro climatic conditions are most important factors determining our food consumption pattern. Fruit and meat consumption are less affected by these selected variables and their effect is maximum on coarse cereal and milk consumption. These variables have 10-16 percent dominance on cereal and pulse consumption.

Chapter IV

CHANGING CALORIE PATTERN AND PREVALENCE OF UNDER-NUTRITION: A DISAGGREGATED ANALYSIS

CHAPTER IV
Changing Calorie Pattern and Prevalence of Under-Nutrition: A Disaggregated Analysis

4.1 Debate on Calorie Intake and Poverty

Food is one of the basic needs of people without it no one can imagine life to be sustained. An adequacy of food ensures a healthy life as it fulfills the energy and other nutrient requirements of the body and increases immune power to protect from several diseases. A number of studies (World Food programme, 2009; Deaton and Dreze, 2009; Radhakrishna, 2005) have shown a poor nutrition status of the Indian Population using anthropometric measures. According to WFP, India has largest number of undernourished children up to age 5 and this number is comparable with some Sub African countries. As FAO (cited in Radhakrishna, 2005) also shows that around 225 million Indians are chronically malnourished. National Nutrition Monitoring Bureau results show that during 2000-01 half of rural children suffer from malnutrition and 40 percent adults are chronically energy deficient. NFHS III (2005-06) results depict a high level of stunted, wasted and underweight children up to age 3.

These results from different data sources show a very poor condition of nutrition in India. This has been a puzzle to all economists and nutritionists as economic development particularly after economic reforms has not led to improvement in nutrition measures, even these measures have become more worsened. This high percentage of malnutrition and under nutrition is generally considered prevalent among the poor section of the society. Thus in India, average recommended calorie intake (a proxy variable of nutrition) has officially been taken to show magnitude of deprivation, hunger and poverty. However this criterion is not accepted by all and it remains a contested question (Patnaik, 2010, 2007; Deaton and Dreze, 2010, 2009).

Dandekar and Rath (1971) were among the first economists who applied this criterion to measure poverty level in India. They found that 46 percent population were consuming less than average energy requirements and thus were undernourished and below poverty line. Later they were criticized of taking the same energy requirements

(2250 kcal per head) to all population ignoring the variation between and within the individuals. Sukhatme (1978, 1980, and 1982) criticized Dandekar and Rath by arguing that if 46 percent were eating below the average requirement and were considered undernourished then remaining 54 percent should be considered taking excess energy than requirement. The main problem of India is thus obesity and not under-nutrition.

A new approach emerged with Sukhatme and in connection with the debate of poverty and calorie norm that there are inter-individual (variation in intake between individuals) and intra individual (variation in intake in an individual over a period of time) variations. Regarding the inter individual variations he argued by taking example of Widdowson's study (1962) that individuals having similar body weight and occupation differ in their energy intake but an individual's body can adapt easily in case of lowering down of energy intake without change in body weight. Explaining intra individual variations are complex but important as energy intake of individuals engaged in similar work varies from day to day and week to week. But intake of energy lower than average, may not harm unless it is too low to run the regular body mechanism. Individual's body can adjust with low level of energy (however not too low) without changing the body weight. This mechanism is called 'Auto-regulatory Homeostatic'.

This theory was criticized by contemporary researchers such as Mehta (1982) who argued that lower energy intake than recommended would lead to malnutrition in long run as buffer stock in the body would be unable to provide sufficient energy to the body organs which results in low body weight and malnutrition. Thus those who have small height and lower weight suffer from lower energy intake and not because of genetic differences.

In India poverty line is measured (using consumer expenditure data of NSSO) on the basis of fixed consumption basket of 1973-74. After the Dandekar and Rath paper (1971) Task Force set up by Planning Commission in 1979 attempted to measure poverty level on the basis of required calorie norm. These norms were fixed on the basis of age-sex-occupation structure of the rural and urban population using 1971 Census data and their energy requirements were fixed by Nutrition Expert Group using Indian Council of Medical Research data (1969). These norms were fixed at 2435 kcal per capita per diem

(2400) for rural areas and 2095 (2100) per capita per diem for urban areas. The calorie norm was higher for rural areas because of more physical work done by rural labourers and workers and it was set lower for urban areas as little work is done by urban persons (Suryanarayana, n.d.). Based on these requirements, the NSS 28th round (1973-74) on consumption expenditure was used to estimate poverty. There are two methods to estimate poverty using the NSS data (Patnaik, 2007, pp. 3135- 38):

1. **Direct Method:** involves a procedure to define poor who are unable to meet the recommended calorie norm from their income. In other words, by using direct method, those who cannot get recommended calories with their present income level are considered as poor. In 1973, the rural and urban poverty were set at Rs 49 and Rs 57 per capita per month respectively which shows that in rural areas those who had above Rs 49 per person per month were able to get 2400 calories and were considered as above poverty line.
2. **Official (Indirect) Method:** involves adjustment in Consumer Price Index for Agricultural Labourers (CPIAL) and Consumer Price Index for Industrial Workers (CPIIW) to the base year poverty line (1973-74) for estimating rural and urban poverty respectively. Planning Commission uses this method for evaluating poverty level in India.

In 2009, Tendulakar Committee set up by Planning Commission to revise poverty line methodology submitted its report with some modifications such as use of mixed recall period rather than uniform recall period, making a reference poverty line basket to separate poor from noon-poor, use of updated Fisher price index. Based on these modifications, committee re-estimated poverty as 41.8 percent in comparison with official 28.3 percent in rural India during 2004-05.

Measurement of poverty using above methods gives different results. For example the poverty level in rural areas for 2004-05 was 80 percent using direct estimate, 28.3 percent according to Planning Commission's methodology of indirect estimation and 41.8 percent recommended by Tendulkar Committee. At least half of rural population (59 percent) is waiting for their inclusion in poverty group if we consider the direct method

as methodology for poverty estimation. Thus differences in poverty estimates given by above methods lead to a debate among academicians and government. The poverty and calorie norm debate is complex and inconclusive. Several issues have been raised by different authors giving this debate a higher level of complexity. Some broad issues have been listed here:

Debate on issue of Recommended Calorie Norm: Choosing a recommended calorie norm of 2400 Kcal and 2100 Kcal for rural and urban areas respectively has been criticized by researchers. K.T. Achaya (1983) put a question mark on utility of Recommended Calorie Norm and argued that these norms are applicable only when there are more homogeneous groups but as far as individuals are concerned, there are great variations in calorie needs of rapidly growing humans (children) and adults. A single figure of recommendation would not depict a true picture of nutrition level and would only give a magnitude of it.

Krishnaji (1981) also criticized of setting of calorie norm by arguing that present recommended calorie norms for population have been wrongly set up by ICMR as average nutrition requirements which do not only vary with age and sex but also with level of activity. The agricultural labourers and cultivators are different in their physical activity from those to the same age and sex but engaged in lighter work. He criticized Dandekar & Rath and Sukhatme for setting same calorie norm for all population without considering the level of activity as a determining variable. The same calorie norm would underestimate under-nutrition among labourers and cultivators and overstate among those engaged in lighter work.

FAO and ICMR differ in their methodology for setting average calorie norm. The per capita per day intake of 2110 Kcal is prescribed by FAO for South Asia (FAO 1996, cited in Meenakshi and Vishwanathan, 2003) which is 290 Kcal less than ICMR recommendation (2400 Kcal). For India, FAO uses different cut off of 1810 Kcal (FAO, 2000 cited in Meenakshi and Vishwanathan, 2003) which is 590 Kcal less than ICMR recommendation. However ICMR recommendation of 2400 Kcal shows an 'average' requirement whereas FAO's recommendation emphasizes on the 'minimum' requirement for survival.

Meenakshi and Vishwanathan (2003) using both FAO and ICMR's recommendation for calories came to conclusion that as choice of calorie norm changes, direction of deprivation also changes in rural areas so it would have become more essential first to evaluate the calorie norm- whether FAO's norm is 'too low' or ICMR's recommendation is 'too high'.

Another important contribution in the debate of the utility of recommended calorie norm is made by G.C. Manna (2007). He criticized the 2400 Kcal norm as measure of under-nutrition by arguing that this norm is based on the occupation level of 1973-74 which is too old to be considered and also since life style of individuals has changed much so ICMR's recommendation of 2400 Kcal based on 1969 period conditions is also unacceptable.

He used latest classification of occupation for the year 2000 and also latest age-sex-occupation based calories recommended by Expert Group of ICMR (ICMR, 1988 cited in Manna, 2007). Based on this latest information, he came out with the result of per capita per day intake of 2290 Kcal for rural areas and per capita per day intake of 2250 Kcal for urban areas. These new norms as criteria for estimating poverty show that 28.7 percent rural and 44.18 percent urban population is living below poverty line during 1999-2000. Thus Planning Commission underestimates urban poverty.

Thus, most of academicians and researchers questioned the calorie norm either too high or wrongly calculated, Dev (2005) also criticized use of officially calculated calorie norm (PCPD intake of 2400 Kcal in rural areas) in poverty estimation. According to him, if we take 2400 Kcal nom for rural poverty estimation then 40 percent of rich can be called as poor and all southern states are ranked poorer than the BIMORU states which show an 'absurd' result. Based on this direct poverty estimation, all centrally sponsored schemes from Ministry of Rural Development and grain from PDS should go for southern states compared to BIMORU states. One possible solution to this problem is to emphasis on setting of different calorie norms for different states as there are inter-state differences in terms of population structure, activity level, climate and topographical conditions etc.

It is also argued by Sen (2005) that mere consumption of adequate number of calories may not ensure a good health with all nutrients. There is a difference between net calorie intake and net calorie absorption. It is possible that a person is getting enough calories but due to gastro-intestinal disorders he may be malnourished and also it is possible that with lower calorie intake person is enjoying higher nutrient absorption. Thus, for setting a criterion for good health the level of absorption should also be taken into consideration (also supported by Radhakrishna, 2005).

Debate on importance of other nutrients in estimating under-nutrition and poverty besides calorie: In measuring under-nutrition and poverty, calorie intake is taken as one and only criteria avoiding other nutrients such as protein, fat and other micro-nutrients which are also important in shaping human's health. Gopalan in his study (1995) highlighted this problem by arguing that in India the most widespread nutritional deficiency disease is iron deficiency (anemia) which causes impairment of functional efficiency, immunocompetence and learning ability.

Women who are in their reproductive ages suffer badly from this deprivation even it is the prime cause of maternal mortality and morbidity. Besides it, incidence of vitamin B complex deficiencies is also higher among mothers and children. Vitamin A deficiencies are common among those generally avoid carotene rich foods (leafy vegetables). The study of these nutritional deficiencies is as much important as the study of calorie deficiency. In India, all the poor are not undernourished and all undernourished are not poor (Chatterjee, 1995 cited in Gopalan, 1995).

Similarly, Radhakrishna (2005, 2006) emphasized on micronutrient deficiency among people. Diets of about 80 percent of rural population constitute less than half of the normal requirements of Vitamin A. This deficiency leads to blindness among rural children. Iron deficiency is widely prevalent among women which results anemia and malnutrition among them.

According to Radhakrishna, there has been a substantial change in food consumption basket favoring non-cereal and non-food items which has resulted a decline in average calorie intake but this decline is justifiable if micronutrient deficiency is low

among population. He concluded that even with low energy intake higher nutritional level can be achieved by taking other factors into consideration such as level of education, health status, access to safe drinking water, better environmental sanitation and better personal hygiene which can minimize a gap between energy intake and nutritional level.

Criticizing calorie norm as a criterion to define poverty, Guruswamy (2006) pointed out that just looking at only calories is not enough, body also needs protein, fat, minerals, iron and vitamins which can minimize the nutritional deficiencies among population and thus a nutrient rich diet should be included in poverty line formulation.

Besides these nutrients, norm for non-food items such as housing, clothing, health care, education etc. should also be set as they are also the basic needs of the persons. Emphasis should also be given to setting norm for accessibility of water, shelter, sanitation, cost of fuel, accessibility of all weather roads and public transport, cost of travelling to the doctor, cost of utensils for cooking, stitching costs etc. By quantifying above needs into rupee value one can get the true poverty line.

After considering costs of food and non-food items, Guruswamy (2006) concluded that the poverty line for India should be Rs 840 per capita per month which indicates 69 percent population below poverty line. The situation in rural India is worse with over 84 percent of rural population below poverty line which is quite high from the official poverty line (28.3 percent).

Another supporting paper in criticizing calorie norm was presented by Deaton and Dreze (2009) highlighting that there is strong need of paying attention to other aspects of nutrition rather than focusing only on energy intake. There are multiple nutrient deficiencies in Indian diets so a shift from cereal based diets to more diversified diets would minimize the other nutrient deficiencies as cereals are poor source of micronutrients.

Sometimes cereal consumption has an adverse affect on consumption of micronutrients. For example, cereals are poor source of iron, and this may be a reason why anemia level is so widespread in India. Thus, sufficiency of calorie does not

guarantee healthy life but intake of other foods along with proper sanitation, accessibility of drinking water, education level, transport facilities, vaccination rates have a much impact on healthy living.

Debate on whether decline in calorie intake leads to deterioration in health and to rise in poverty: Main controversy among the academicians and government is surrounded on the issue that whether a decline in calorie intake from the norm leads to rising poverty and deterioration in health. Panikar (1980) showing inter-regional disparities in calorie intake concluded that average prices of coarse cereals are lower than the superior cereals (rice and wheat) in all states. Thus states consuming coarse cereals show a higher calorie intake because of low prices of these food items whereas superior cereal consuming states show a lower calorie intake which is yielded by high prices. Thus prices of food items play a major role in ensuring recommended calorie intake which is essential for maintaining nutritional level among population.

Indian diet consists of cereals which are believed to be a good source of calorie, protein and also of other nutrients. If we assume that our consumption pattern is diversifying then needs of sufficient calorie, protein and other nutrients cannot be met which leads to malnutrition. Thus decline in cereal consumption not only leads to fall in calorie intake but also fall in protein and other nutrients (Mehta, 1982).

Similar results have shown by Shariff (1999) stating that change in diets from cereal based food items to other food items which have caused not only a decline in calorie but also a drastic decline in other nutrients as cereals are the only source of these nutrients. Indians suffer from a problem of too much and too little. Lower stratum group people do not fulfill their minimum energy and other nutrients and higher class people achieve it twice.

In another of study (Mehta, 2000), it is pointed out that there has been an increase in expenditure on other food items but it does not ensure the increase in quantities as prices of other food items have drastically gone up. Even rural people have lost their common property resources which facilitated a free supply of other food items (vegetables, fruits, fish etc.). The prices of miscellaneous goods such as education, health,

transport, fuel, rents, toiletry goods etc. have increased. Rise in expenditure on these items does not show improvement in quality of life but rural people have no alternative choice but to spend on them for example, providing free health services is the responsibility of state but how many Primary Health centers and other health centers provide these facilities free of cost to rural people. Even they neither have doctors nor medicine. Rural mass is compelled to spend on health services leading cutting the consumption on food items and resultant lower calorie intake and malnutrition.

Other group of scholars argues that there is a shift in consumption of cereals to other food items. This shift comes from urbanization, change in taste and preferences and increase in income. However it is difficult to say the affect of this change on nutritional pattern but it is certain that prevalence of under-nutrition has increased substantially (Ray, 2005-10; Kumar et al., 2007).

Rao (2000) does not view declining calorie intake as deterioration in health. In fact, this fall in calorie intake is brought by change in food consumption pattern from cereal to other food items which became accessible to rural population because of development of rural infrastructure, mechanization, urbanization and changes in taste and preferences.

A similar argument is also supported by Deaton and Dreze (2009) that there is however uncertainty about the causes of calorie decline and it is also problematic to assess its impact on human welfare but it is certain that income level has increased substantially which moderated calorie decline among the poor. Calorie decline is higher among the richer group because of better health environment and reduction in burden of hard labour. An increase in income of the population has led to decline in cereal consumption as they become inferior goods. Both urban as well as rural people spend now more on pulses, milk, vegetables, fruits and meat which provide lower calories but balanced nutrients. Thus the strategy of government should be to increase the production of these non-cereal items (Verma, 2010).

A major contribution in calorie debate was made by Patnaik (2004, 2007, 2010) arguing how one can imagine decline in food consumption and resultant low calorie intake as a marker of better health and nutritional improvement without considering the facts that food grain production has become stagnant, rural unemployment has increased, bank credit to farmers declined and there are more and more cases of farmers' suicide. The actual prices of food grains have increased so much that they have not been adjusted in the official poverty line which gives absurd result of just 28 percent poverty level in rural areas.

In constructing the CPIAL, many items which are unavoidably important for poor rural workers such as transport cost, health and basic utilities have not been given proper weights. So, faulty price index has been used by the Planning Commission in estimating poverty which in reality is quite high. She also criticized Deaton and Dreze for taking consumer price index and cost of living index as same. According to her, consumer price indices have been unable to capture the change in actual cost of living and it deflates the real expenditure on different items (Patnaik, 2010).

However this argument of Patnaik has been criticized by Deaton and Dreze (2010) rejecting a link between calorie intake and nutrition level. According to them, calorie intake and nutrition is not simply the same thing. If we take calorie as a measure of deprivation then Kerala comes in one of the 'poorest' states category which is not true as Kerala is best in social indicators. 'A low intake of calorie in Kerala has little to do with under nutrition and taking it as poverty indicator would be highly misleading.' There are some poorer states where although calorie intake is high but on nutrition grounds they are far away.

Besides calorie poverty debate there are other issues which attracted researchers to work on them. Jensen and Miller (2010) took a different perspective to measure hunger and under-nutrition without using any calorie norm. According to them, if an individual is taking lower calorie than norm, this is physical discomfort to him as body is not getting sufficient nutrition. At this stage marginal utility of calories is high so to maximize its calorie utility, a consumer will choose those foods which are cheapest source of energy such as in Indian case coarse cereals and once he surpasses this subsistence level, he will

spend more on expensive superior food items. Thus a choice to switch away from cheapest source to expensive source of calories can be an indicator for nutritional sufficiency. A similar view was presented by Rao (1981) suggesting that proportion spent on food (PSF) by per capita expenditure class can be taken as measure of incidence of deprivation and poverty.

The debate on calorie and poverty does not only include issues of hunger and deprivation but also the authenticity of NSS data which is pivotal in providing consumption expenditure data has also been questioned. As NSS provides consumption data on 30 day recall period, it has been argued that this is such a long time for respondents to recall their expenditure especially on small items purchased. In 1999-2000, NSS collected consumption data on 7 day recall period but it was also criticized as it shows higher consumption and consequently low poverty line in India (Jones and Sen, 2001).

Considering recall period as debatable issue, NSS started to conduct a survey on people's own perception of adequate food intake since 1983. A question was asked to the head of the household that whether all members of household got two square meals a day during reference period. This question was criticized on two grounds, first the concept 'square meal' differs from person to person, secondly in traditional households generally head of the household do not concern on what women and children have eaten or even whether they have eaten anything. A new refined question was included in 1999-2000 on whether everyone in the household got 'enough food every day' (Mehta, 2000; Deaton and Dreze, 2009).

Recently Supreme Court has asked to Planning Commission to revise the poverty line using price index of May 2011 or any other suitable dates as Planning Commission was using Rs 15 per capita per day in rural areas and Rs. 20 per capita per day for urban areas for evaluating poverty level.

According to the Tendulkar Committee, using Price index of 2011, it is difficult to get per capita per day intake of 2400 Kcal from Rs. 15 in rural areas and per capita per day intake of 2100 Kcal from Rs. 20 in urban areas. Planning Commission has also been

criticized for distributing food grains on household rather than individual basis under PDS as family of 10 persons would get same amount as the family of 2 persons. In such cases small family would try to sell food grains in market and large families would buy them though both are below poverty line (The Hindu, 15th May, 2011). Reacting to Supreme Court's direction, union cabinet has given an approval to redefine poverty line. For this it has approved a BPL Census along with caste and religion censuses so that vulnerable groups across socio-economic classes could be identified.

In BPL census, vulnerable households would be identified on the basis of inclusion and exclusion criteria (The Hindu, 20th May, 2011). These criteria would differ from rural to urban areas. In urban areas BPL households would be identified based on three factors- place of residence, social vulnerability (illiteracy, disability etc.), an occupation vulnerability (people engaged in informal and least remunerative sectors). In rural areas, population would be divided into three categories:

a. Families owing Telephones, refrigerators and a credit limit of Rs. 50,000 would be excluded.
b. Families at the bottom such as destitute, manual scavengers and primitive tribal groups would be automatically included.
c. Those who are in between the above two categories would be judged on seven deprivation indicators such as only one room with kucha walls and roofs, female headed household, landless households deriving income from manual casual labour etc.

Union Cabinet on the basis of above methodology came to conclusion that households with annual earnings of more than Rs. 27,000 would be excluded from the BPL list (The Hindu, 21st May, 2011). Thus, Rs. 27,000 annually has been taken as a cutoff point to measure poverty line. However this methodology is still on papers and will take little more time to be implemented.

Thus, above calorie-poverty debate is complex and inconclusive as one group of researchers supporting it while other group is standing against it. It is difficult to say whether calorie norm should be taken as criterion to measure poverty level or not. Till

date, there is no new written approved methodology for evaluating poverty as Planning Commission is still taking calorie norm as poverty criterion and Tendulkar Committee's recommendation is yet to be adopted. So, in this chapter also per capita per day intake of 2400 Kcal has been taken to show Prevalence of Under-nutrition and Calorie Deprivation (proxy to poverty level) in rural areas.

This chapter focuses on the following issues:

- Showing percentage change in calorie share of different food items to total calorie intake across selected socio economic and demographic (SED) variables. By doing this one can analyze cause of decline in total calorie intake.
- To find out vulnerable groups and areas where calorie deprivation (also prevalence of under nutrition) and poverty level is high.
- To show the probability of getting recommended calories among SED groups.

The second section (4.2) of this chapter focuses on change in calorie share of various food items and level of calorie deprivation at rural India and disaggregated level, third section (4.3) shows probability of getting undernourished among different SED groups.

4.2 Change in Calorie Share of Various Food items and level of Calorie Deprivation

An Indian Scenario

In general, during 2004-05 the main source of calories in rural India was cereals and cereal substitutes (67.62 percent) among which rice recorded a highest share (54.59 percent) followed by wheat (35.25 percent) and coarse cereals (10.16 percent). Among all other food items, oil and fat contributes 7.37 percent followed by milk & milk products (6.42 percent) and pulses (4.48 percent) to total calorie intake. Meat, egg and fish group has lowest contribution (0.76 percent) in calorie intake (Table 4.1).

Table 4.1 also shows that in rural India during 1994-2005 total calorie intake declined from per capita per day intake of 2148 Kcal to 2044 Kcal, a 104 Kcal decline. In this total calorie intake decline, change in share of calories from food groups varied.

A change in share of calories from 1993/94 to 2004/05 was mainly brought by cereal and cereal substitutes (-3.59 percent) among which decline in coarse cereal calories was highest (-5.18 percent) whereas calories from other cereals such as rice and wheat increased. The calories from pulses and sugar & honey declined slightly and all other food groups marked their rising contribution in providing calories among which Oil and fat showed a highest increase (2.02 percent) followed by Vegetables and fruits (0.59 percent). Least increase was shown by Meat, egg and fish products (0.08 percent).

Table 4.1
Percentage Change in Calorie Share of Major Food Groups to Total Calorie Intake between 1993/94 and 2004/05 in Rural India

Major Food Items	1993-94	2004-05	Percent Change
Cereals and cereal substitutes	71.21	67.62	-3.59
Rice	74.30	80.73	6.43
Wheat	45.91	52.13	6.23
Coarse cereals	20.20	15.02	-5.18
Root and Tubers	2.65	2.95	0.30
Sugar and honey	4.81	4.79	-0.02
Pulses, nuts and oilseeds	4.94	4.48	-0.45
Vegetables and fruits	2.03	2.62	0.59
Meat, eggs and fish	0.68	0.76	0.08
Milk and milk products	6.16	6.42	0.26
Oils and fats	5.35	7.37	2.02
Misc. food, food products and beverages	2.17	2.98	0.81
Total (Kcal)	2148.01	2044.00	-104.01

Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule

If we see level of calorie deprivation and poverty in rural India (Table 4.1a), we find that around 72 percent rural population was not getting required calories (per capita per day intake of 2400 Kcal) during 1993-94 and this percent has increased to 80, a 8.4 percent increase whereas level of poverty has declined if we consider Planning Commission's estimate accurate. In 1993-94, the level of poverty was 37 percent which has declined to 28 percent in 2004-05. A gap between calorie poverty level and planning commission's poverty level has increased from 35 percent in 1993-94 to 52 percent in

2004-05, an 18 points increase. This mismatch between poverty and calorie intake continues to remain a contested issue among researchers.

Table 4.1a
Change in Calorie Deprivation and Poverty Level in Rural India between 1993/94 and 2004/05

Method of estimating poverty	1993-94	2004-05	Percent Change between 1993/94 & 2004/05
Percent Below 2400 Kcal	71.60	80.00	8.40
Percent Below Official Poverty Line	37	28.00	-9
Gap between Calorie Poverty and Official Poverty Line	34.6	52	18

Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule

Marital Status Groups

From demographic point of view, Marriage is a vital event in one's life. Generally it is considered married persons enjoy a healthy life than unmarried persons. In rural India Widowed/divorced/separated enjoy a higher calorie intake (2128 Kcal) followed by currently married (2080 Kcal) than the unmarried persons (2000 Kcal) (App. 4.1).

However a great change in total calorie intake from 1993/94 to 2004/05 is experienced by currently married (-113 Kcal) and widow/divorce/separated groups (-107 Kcal) and least decline is shown by never married group (95.09). The decline in calories in all marital groups is resulted by decline in cereal calories particularly coarse cereal calories.

This cereal calorie decline is higher among widowed/divorce/separated (-4.37 percent) group and lower in never married group (-3.30 percent), (Table 4.2). On one hand decline in cereal calories is higher among married groups, on the other hand increase in share of calories from other food items is also higher among this group. The calorie consumption pattern of never married persons has not changed much which indicates their low dietary diversification and lower intake of other nutrients besides energy. The calorie consumption pattern of married persons both currently married and widowed group has diversified much which to some extent has resulted a decline in calorie intake.

Table 4.2

Percent Change in Calorie Share of Various Food Items between 1993/94 and 2004/05 among Marital Status, Household Size, Social, Religion and Education Groups

SED Groups/Food Items	Rice	Wheat	Coarse cereals	Total Cereals	Root and Tubers	Sugar and honey	Pulses, nuts and oilseeds	Vegetables and fruits	Meat, eggs and fish	Milk and milk products	Oils and fats	Misc*. food, food products and beverages	Total Calories (Kcal)
Marital Status													
Never Married	0.82	3.43	-4.23	-3.30	0.33	-0.07	-0.44	0.52	0.07	0.12	1.91	0.86	-95.09
Currently Married	2.51	1.69	-4.19	-3.79	0.27	0.00	-0.48	0.64	0.10	0.35	2.12	0.79	-113.04
Widow/Divorced/Separated	2.50	2.00	-4.49	-4.37	0.27	0.19	-0.32	0.73	0.10	0.62	2.18	0.61	-107.07
Household Size													
1-4	3.18	0.75	-3.91	-4.69	-1.91	0.01	-0.39	0.77	0.12	0.48	2.14	1.35	-113.04
5-6	2.38	2.17	-4.53	-3.09	-1.90	-0.07	-0.57	0.61	0.08	0.11	1.95	0.65	-83.18
7-8	-0.50	4.58	-4.07	-2.58	-1.74	-0.07	-0.50	0.36	0.04	0.17	1.76	0.46	-116.82
Above 8	-0.41	4.73	-4.32	-3.39	-1.83	0.07	-0.29	0.39	0.05	0.26	2.22	0.39	-136.14
Social Group													
Scheduled Tribe	0.73	3.01	-3.70	-3.57	0.46	-0.02	-0.85	-0.09	0.05	0.09	1.79	2.15	-97.65
Scheduled Caste	0.71	4.08	-4.78	-3.78	0.38	0.23	-0.28	0.33	0.04	0.40	2.10	0.59	-74.57
Others	2.15	1.96	-4.09	-3.51	0.25	-0.10	-0.45	0.76	0.10	0.23	2.03	0.69	-114.98
Religious Group													
Hindu	1.10	3.17	-4.26	-3.58	0.28	0.01	-0.50	0.53	0.05	0.38	2.01	0.83	-111.11
Muslim	4.88	-2.13	-2.73	-4.08	0.39	-0.08	0.11	0.85	0.24	0.03	1.98	0.57	-62.65
Christian	1.80	0.39	-2.09	-7.04	-0.05	-0.22	-0.26	2.39	0.29	1.19	1.95	1.75	86.33
Others	1.92	4.18	-6.02	-0.81	0.40	-0.12	-1.00	0.04	-0.07	-1.63	2.68	0.51	-129.75
Education Group													
Not Literate	2.02	-1.13	-4.48	-3.43	0.37	0.08	-0.51	0.37	0.05	0.21	2.02	0.83	-115.70
Primary or below	0.11	0.72	-3.90	-2.20	0.32	-0.26	-0.66	0.46	0.05	-0.12	1.87	0.54	-131.35
Secondary	0.41	-1.87	-1.93	-2.52	0.02	-0.39	-0.53	0.94	0.04	-0.08	1.78	0.75	-148.96
Graduate or above	-1.81	0.03	-1.63	-2.00	0.09	-0.25	-0.55	1.04	0.11	-0.12	1.47	0.20	-134.15

Note: *Miscellaneous
Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule

Table 4.2a
Change in Recommended Calorie Intake (Percent) between 1993/94 and 2004/05 across Marital Status Groups

Marital Status	Below 2400 (Kcal)		Percent Change
	1993-04	2004-05	
Never Married	74.40	82.30	7.90
Currently Married	69.20	78.10	8.90
Widow/Divorced/Separated	66.60	75.40	8.80

Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule

One interesting point comes when we see calorie deprivation level among marital status groups. During 2004-05, 82 percent never married persons were unable to get recommended calories whereas this percentage was lowest among widowed/divorce/separated persons (75.40 percent), (Table 4.2a) but an increase in level of calorie deprived population has been almost same across all marital status group people which shows that never married are vulnerable people who have a higher percentage of undernourished persons and this percentage has increased with the same rate as of other married groups which show a lower level of under-nutrition.

Family Size Classes

If we see level of calorie intake across different household size classes, it is found that as number of members in the household increases the calorie intake declines. Small families tend to have higher calorie intake than the big families. At the same time small families get lesser intake of calories from cereals (64.37 percent) compared to bigger household size classes. Also the intake calorie from all other food items is higher among small families than the big families (App. 4.1).

As far as change in share of calories from different food items is concerned medium size households (5-6 members) show a lowest decline in total calorie intake (-83.18 Kcal) resulted by an increase in share of rice and wheat calories and also vegetables & fruits, oil & fat and miscellaneous food have contributed positively in total calorie intake so decline in overall calorie intake is not much high (Table 4.2). Small size families exhibit a declining total calorie intake (-113 Kcal) because of highest decline in cereal calories, however, calorie share from all other food items has increased much in

these families. Decline in cereal calories is not compensated by an increase in calories from other food items in small families but it does not explain worsening of nutrition level in these families. In fact, small families are showing diversification of food, consuming fewer calories from cereals and more nutrients from other food items. In big families, the overall calorie intake has declined much (-136 Kcal) between 1994 and 2005 which has been caused by higher decline in cereal calories and lower increase in calories from other food items. Thus, big families are more prone to become a centre for under-nutrition as their cereal calorie intake is declining and it is not compensated by calories from other foods.

Table 4.2b
Change in Recommended Calorie Intake (Percent) between 1993/94 and 2004/05 across Different Family Classes

Household Size	Below 2400 (Kcal)		Percent Change
	1993-04	2004-05	
1-4	62.40	70.60	8.20
5-6	75.10	82.30	7.20
7-8	75.90	85.30	9.40
Above 8	74.30	85.80	11.50

Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule

An analysis of calorie deprivation across all sizes of family indicates that big families have higher percentage of calorie deprived population (more than 85 percent) than the small families (71 percent). In fact the change in percentage of calorie deprived population is higher in big families (9 percent to 11 percent) than small families (8 percent), (Table 4.2b). In other words, the percentage of calorie deprived population has increased much in big families which show their worse conditions in nutritional terms.

Small families on the other hand enjoy calorie diversification and also lower increase in calorie deprived population indicating their better nutritional conditions. Big families are unable to feed its all members a sufficient quantity of food. In fact, they are also sufferers of faulty methodology of Planning Commission which gives subsidized food on a household basis rather than on individual basis. Thus, big families also get 35 kg rice from PDS as small families showing a disproportionate distribution of food under PDS scheme. This may be a reason why rice consumption among big families has decreased much from 1993/94 to 2004/05. A strong need is to distribute cereals on an

individual basis so that each member of large households gets sufficient quantity of cereals.

Social Groups

Socially backward groups are more vulnerable to under-nutrition. As scheduled tribes and scheduled caste people have lower calorie intake (1895 Kcal and 1948 Kcal respectively) than the other class people (2096 Kcal) in 2004-05 (App. 4.1). In fact, their calorie intake has declined from 1993-94 in 2004-05. Although this decline is not much high compared to other class people yet even a small decline has further worsened their conditions.

Table 4.2 shows that maximum decline in calorie consumption is recorded by other class people (-115 Kcal) primarily because of decline in cereal calories and lower increase in calories from other food items but it is difficult to say whether their nutrition level is worsening. On one hand this social group shows higher calorie intake from all food items especially from other cereals in 2004-05, on the other hand it also shows a trend of much decline in cereal calories and lower increase in other food calories from 1993/94 to 2004/05. Thus this group shows both conditions of higher nutritional level as well as worsening of nutritional conditions.

The lower decline in calories among scheduled tribes and scheduled caste is a result of increase in calories from rice and wheat. However these groups do not show dietary diversification as share of calories from other food items is not high. They fulfill their nutritional requirements mainly from cereals, oil & fat and miscellaneous foods. The conditions of scheduled caste people is improving compared to scheduled tribes as on one hand overall calorie intake has not decreased much, on the other hand calorie from all other cereal items has increased.

Table 4.2c

Change in Recommended Calorie Intake (Percent) between 1993/94 and 2004/05 across Social Groups

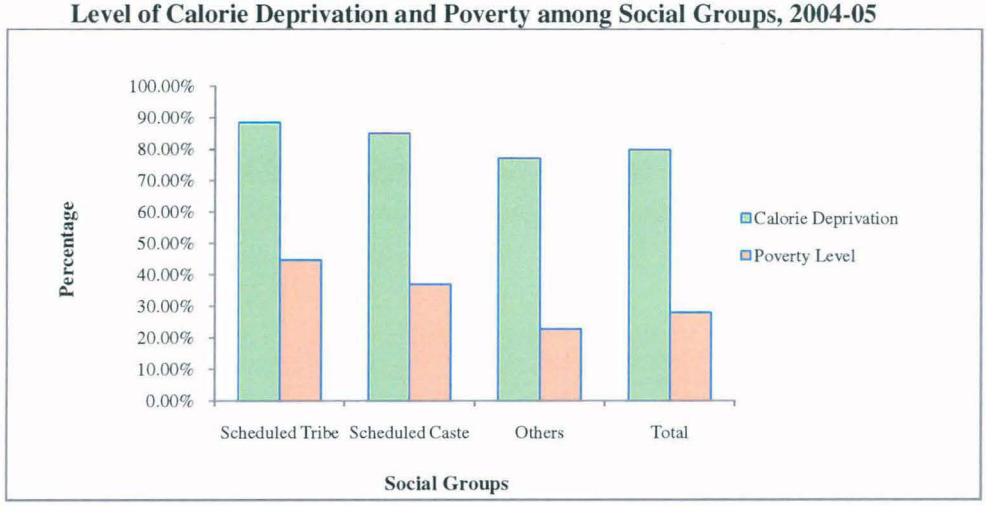
Social Group	Below 2400 (Kcal)		Percent Change	Below Poverty Line (2004-05)
	1993-04	2004-05		
Scheduled Tribe	80.10	88.50	8.40	44.70
Scheduled Caste	78.40	85.10	6.70	37.10
Others	68.10	77.10	9.00	22.70

Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule

Since it is difficult to draw a conclusion from the above analysis, it is better to compare poverty and calorie deprivation level so that vulnerable groups can be identified. Table 4.2c shows that most of the population below poverty line is concentrated in the groups of scheduled tribes (45 percent) and scheduled caste (37 percent) and at the same time calorie deprivation level is also high in these groups which highlight their poor conditions. Among them scheduled tribes are worst affected as calorie deprivation level has increased to 8 percent in a decade. On the other hand, other class group has both lower poverty and calorie deprivation level. Figure 4.1 clearly displays that that lower the social group, higher is the concentration of poverty and calorie deprivation or under-nutrition.

Figure 4.1

Level of Calorie Deprivation and Poverty among Social Groups, 2004-05



Source: Computed from Table 4.2c

Religious Groups

As far as various religious groups are concerned, in 2004-05 Muslims show a low calorie intake (1978 Kcal) followed by Hindu (2047 Kcal) and Christians (2075 Kcal). 'Other' religion groups have highest calorie intake (2176 Kcal). The share of cereals (69 percent) in Muslim's diet is much higher than the 'other' religion people (56 percent) whose consumption of other food products particularly milk & milk products, oil & fat and sugar & honey is maximum.

People of Hindu religion get their maximum calories from wheat (36 percent) and coarse cereals (11 percent) and minimum from meat & meat products (0.62 percent). Christians prefer to eat rice and all other non-cereal food items (App. 4.1). In fact, this is the only religion group whose intake of calories has increased by 86 Kcal. However, this group also showed the highest decline in cereal calories (-7 percent) yet there had been an increase in calories from other food items which have resulted an increase in overall calories. The decline in cereal calories is not compensated by lower increase in calories from other food items which have caused a high decline in total calories from 1993/94 to 2004/05 in 'Other' religion people (Table 4.2).

Thus, Christians enjoy a better nutritional level as on one hand their total calorie intake has increased and on the other hand share of calories from non-cereal items has increased in their diet which results dietary diversification with improving nutritional level. Other religion people also show better nutritional level but it is not clear whether their nutritional level is improving as they show both decline in cereal calories and also lower increase in calories from other food items. Muslims are worst affected and show a less diversified food, though their total calorie intake has not declined much due to rise in rice calories but share of calories from other food items has not increased to a required limit. Hindu group people show a high decline in cereal calorie intake and also low increase in other food calories resulting overall decline in calories.

Among all religion groups, Christians and other religion people show more diversified food followed by Hindus. Muslims are worst affected as their calorie intake is low as well as it has also declined over a decade.

Table 4.2d

Change in Recommended Calorie Intake (Percent) between 1993/94 and 2004/05 across Religious Groups

Religious Group	Below 2400		Percent Change
	1993-04	2004-05	
Hindu	70.90	79.70	8.80
Muslim	77.90	84.40	6.50
Christian	80.00	80.90	0.90
Others	63.00	69.70	6.70

Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule

The calorie deprivation level differs among various religion groups. Prevalence of under-nutrition is high (84 percent) among Muslims whereas low calorie deprivation is found among 'Other' religion people. In fact, the percentage increase in calorie deprived population is almost same in both groups (Table 4.2d) which shows worse conditions of Muslims. Christians however had 80 percent calorie deprived population in 1993-94 and this percent has only increased by 0.9 points in 2004-05 depicting a better health environment among the Christians. Hindus have shown a 9 points increase in calorie deprived population from 1993/94 to 2004/05 showing lowering of nutritional conditions.

Education Groups

With a rise in level of education, intake of calories increases. Higher education groups (Graduates and above) have average per capita calorie intake of 2383 Kcal, close to recommended norm whereas non-literates have much lower calorie intake (1973 Kcal) in 2004-05 (App. 4.1). Table 4.2 shows as level of education increases, share of calories from cereals declines and share of all other food items in total calories rises which results a higher decline in total calorie intake among the better educated groups and lower decline among the less educated people. Secondary class pass shows a highest decline in total calories (-149 Kcal) resulted by fall in cereal calories (-2.52 percent).

The most vulnerable group is non-literates whose consumption of cereals has declined much and rise in other food item calories has not increased to a sufficient level, however the decline in total calories is lower (-116 Kcal) compared to other educated groups and this lower decline has been caused by a little rise in rice calories, calories from oil & fat and miscellaneous food. Primary and secondary class pass persons enjoy a higher calorie share from fruits and vegetables, beverages and oil & fat whereas highly

educated people prefer to take meat & meat products, oil & fat and beverages. There is little transformation in the diet of primary pass and highly educated people between 1993/94 and 2004/05. The secondary pass people show a great diversification in their diet whereas negligible transformation is shown by non-literates.

Table 4.2e
Change in Recommended Calorie Intake (Percent) between 1993/94 and 2004/05 across Education Groups

Education Group	Below 2400		Percent Change
	1993-04	2004-05	
Not Literate	74.70	83.50	8.80
Primary or below	70.90	81.10	10.20
Secondary	61.80	72.60	10.80
Graduate or above	48.30	59.70	11.40

Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule

Table 4.2e shows that level of calorie deprivation declines as level of education rises in 2004-05 but a change in percentage of calorie deprivation population from 1993/94 to 2004/05 shows an increase with rising education level. In other words, on one hand during 2004-05, 83 percent non-literates and 60 percent highly educated people were not getting enough calories from the norm but the percent increase in calorie deprived population is higher among the latter group than the former one which shows dietary pattern of highly educated people is diversifying very rapidly.

The percentage of calorie deprived population among non-literate was 75 percent in 1993-94 which was highest compared to other education groups. In 2004-05 this percentage increased to 83 percent and is still high among this group which shows their poor and worsening social conditions.

Monthly Per Capita Expenditure (MPCE) Classes

If we see total calorie intake and share of calories from all food items in 2004-05 among different MPCE class people, we find that total intake of calories increases as level of MPCE rises. Calorie share from cereals is high among all groups but this share falls as MPCE class rises. As regard to calories from other food items is concerned, the higher MPCE classes get much of their calories from non-cereals whereas lower classes show little intake of calories from other food items.

If we group all MPCE classes into BPL and APL, the former one's main source of calories is cereals and it gets lower intake of calories from other food items and later gets its major portion of calories from cereals as well as from all non-cereal items (App. 4.2).

The change in share of calories from all food items from 1993/94 to 2004/05 shows that it is the higher MPCE and APL line group which exhibit a major decline in total calorie intake resulted by fall in cereal calories particularly coarse cereals. The lower MPCE and BPL line group show a little decline in cereal calories caused by decline in coarse cereal calories but rise in calories from wheat and rice has resulted a low overall decline in total calories. The other food items particularly Vegetables & fruits, Meat & meta products, Miscellaneous food items have recorded their highest share in total calories among upper MPCE class people whereas share of Roots & tuber, Oil & fat, Sugar & honey has increased in the diet of lower class people (Table 4.3).

Table 4.3

Percent Change in Calorie Share of Various Food Items between 1993/94 and 2004/05 among MPCE, Poverty and Occupation Groups

SED Groups/Food Groups	Rice	Wheat	Coarse cereals	Total Cereals	Root and Tubers	Sugar and honey	Pulses, nuts and oilseeds	Vegetables and fruits	Meat, eggs and fish	Milk and milk products	Oils and fats	Misc*. food, food products and beverages	Total Calories (Kcal)
MPCE Groups (%)													
5	20.37	-2.04	-18.30	-1.66	0.35	-0.21	-0.61	0.13	-0.04	-0.02	1.57	0.49	45.29
10	7.41	1.19	-8.58	-2.55	0.38	0.12	-0.45	0.18	0.02	0.21	1.46	0.64	-9.33
20	2.86	2.22	-5.07	-2.90	0.48	0.21	-0.57	0.09	0.04	0.23	2.01	0.41	-41.84
30	-0.71	5.76	-5.04	-3.78	0.45	0.19	0.07	0.20	0.02	0.40	1.92	0.53	-50.24
40	-3.47	5.89	-2.41	-4.11	0.40	0.38	-0.29	0.30	0.02	0.69	2.10	0.50	-83.06
50	-1.32	3.67	-2.33	-3.67	0.40	0.20	-0.44	0.40	0.04	0.43	2.03	0.60	-84.69
60	-1.70	4.79	-3.09	-3.57	0.30	0.13	-0.62	0.39	0.02	0.91	2.01	0.42	-112.83
70	-1.14	3.77	-2.62	-4.22	0.25	0.09	-0.43	0.46	0.05	0.51	2.74	0.56	-109.81
80	2.09	1.72	-3.79	-4.63	0.18	-0.12	-0.43	0.81	0.10	0.31	2.03	1.75	-118.29
90	4.45	-0.19	-4.24	-3.38	0.13	-0.32	-0.43	1.02	0.18	0.29	1.82	0.68	-208.19
95	1.04	2.23	-3.24	-4.48	0.11	0.06	-0.65	0.97	0.15	0.55	2.28	1.03	-227.97
100	6.64	-2.36	-4.26	-4.57	0.26	-0.64	-0.57	1.87	0.42	-0.88	1.96	2.15	-219.30
Poverty Line													
Below poverty Line	3.16	2.33	-5.47	-2.04	0.35	0.01	-0.37	0.08	0.00	-0.16	1.73	0.40	-98.09
Above Poverty Line	1.09	2.37	-3.45	-2.99	0.30	-0.21	-0.59	0.69	0.08	-0.08	1.96	0.84	-185.89
Occupation Type													
Self employed in non Agriculture	-1.27	3.84	-4.57	-3.30	0.32	-0.16	-0.16	0.53	0.04	0.33	1.84	0.57	-33.86
Agricultural Labor	2.70	1.35	-7.55	-3.32	0.17	0.28	-0.36	0.39	0.03	0.12	2.37	0.33	-74.41
Other Labor	1.61	2.80	-7.50	-2.84	0.22	0.02	-0.63	0.61	0.13	0.39	1.41	0.68	-65.80
Self employed in Agriculture	2.00	1.16	-6.86	-3.70	0.29	-0.01	-0.48	0.63	0.09	0.41	2.14	0.63	-166.63
Others	-1.06	3.27	-4.27	-4.30	0.22	-0.45	-0.51	0.67	0.08	-0.10	1.57	2.82	-64.08

Note: *Miscellaneous
Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule

Table 4.3a
Change in Recommended Calorie Intake (Percent) between 1993/94 and 2004/05 across MPCE Classes

MPCE Groups (percent)	Below 2400		Percent Change	Below Poverty Line 2004-05
	1993-04	2004-05		
5	99.50	99.70	0.20	100.00
10	98.40	99.00	0.60	100.00
20	96.60	98.40	1.80	96.30
30	93.40	95.90	2.50	69.10
40	86.90	92.70	5.80	11.00
50	81.50	89.30	7.80	2.00
60	74.00	83.80	9.80	0.40
70	63.90	77.20	13.30	Nil
80	53.10	67.60	14.50	Nil
90	42.00	57.40	15.40	Nil
95	30.30	43.00	12.70	Nil
100	22.40	32.80	10.40	Nil

Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule

Table 4.3a shows concentration of poverty and calorie deprivation among different MPCE class people. The lower MPCE classes have higher poverty line as well as higher percentage of calorie deprivation. In fact, there is no change in this percentage from 1993-94 estimates as still more than 90 percent population among lower MPCE classes is surviving below average recommended calorie norm. On the other hand, higher MPCE classes show zero poverty level as well as lower concentration of calorie deprived population, however, the percentage of calorie deprived population has increased much in these groups between 1993/94 and 2004/05 which may be due to lowering of cereal calories and increasing intake of calories from other food items. Thus, higher MPCE show much dietary diversification whereas lower income class people are still surviving on cereals.

Occupation Groups

As we know required calorie intake vary among different occupation groups. Those engaged in lighter work need lower intake of calorie than those engaged in manual and heavy work. In India, during 2004-05 Agricultural Labourers and 'other' labourers who require a higher calorie intake compared to other occupation groups get minimum calorie intake (1846 Kcal and 1892 Kcal respectively) in 2004-05 (App. 4.3). The self employed persons show high intake of calories (2180 Kcal) in 2004-05 and also a major decline (-167 Kcal) in it during a decade which is resulted by decline in cereal calories

particularly coarse cereals and increase in calories from other food items which has not compensated cereal decline. Those engaged in non-agricultural activities show a lower decline in cereal calories primarily because the share of wheat calories in their diet has increased much. Agricultural labour and 'other' labour show a low decline in calorie intake in spite of maximum decline in coarse cereal calories in their diet. The share of rice particularly wheat calories has substantially increased in their total calorie intake. As far as share of all other food items is concerned, Agricultural labourers and 'other' labourers exhibit a low dietary diversification, although, in their diet calories from wheat and rice have increased but other food items such as vegetables & fruits, milk & milk products, root & fiber and miscellaneous food have not shown a rise in their calorie intake.

The share of these food items in total calories is much higher in the diets of employed in agriculture and non-agriculture activities. The Agricultural employers on one hand show a highest decline in cereal calories caused by decline in coarse cereal calories and little rise in rice and wheat calories, on the other hand they show substantial rise in the calories from other food items but this increase is not so much to compensate the decline in cereal calories. This is why, this group shows a highest decline in total calories. The 'other' occupation group shows highest decline in total cereal calories and also an increase in share of calories from all other food items leading to lower decline in total calories (Table 4.3).

Table 4.3b shows level of poverty and calorie deprivation across different occupation groups. The concentration of poverty is high among agricultural labourers and 'other' labourers and also calorie deprivation is high among them which exhibit their poor conditions in terms of nutrition. The change in percentage of calorie deprived population among them is low because of increase in share of calories from wheat and rice but share of other food items has not increased much which may cause insufficiency of micronutrients among these groups.

Table 4.3b

Change in Recommended Calorie Intake (Percent) between 1993/94 and 2004/05 across Occupation Groups

Occupation Type	Below 2400		Percent Change	Below Poverty Line 2004-05
	1993-04	2004-05		
Self employed in non agriculture	76.80	81.60	4.80	23.80
Agricultural Labor	83.20	88.90	5.70	44.10
Other Labor	83.00	87.40	4.40	32.70
Self employed in agriculture	60.40	73.10	12.70	21.40
Others	67.00	73.80	6.80	14.30

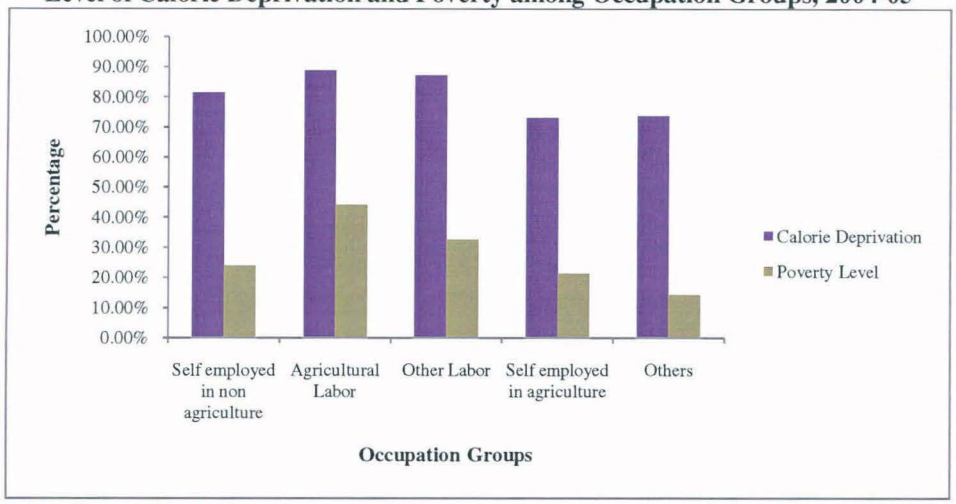
Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule

People who are self employed in agriculture show lowest poverty as well as calorie deprivation level, however, the percentage change in calorie deprived population is maximum among them probably due to fall in cereal calories and rise in consumption of other food items which are not a good source of calories. The pattern of poverty and calorie deprivation among occupation groups in rural areas in 2004-05 can also be seen at a glance in Figure 4.2 which depicts lower the level of occupation such as agricultural labour, 'other' labour, higher is the poverty and calorie deprivation level. Better occupation groups like 'other' occupation people, self employed in agriculture and non-agriculture enjoy both lower poverty and calorie deprivation level, however their calorie deprivation level has increased from 1993/94 to 2004/05 but this is due to fall in cereal calories and increase in calories from other food items which are not a good source of other micronutrients.

The above analysis shows that there is a broad correspondence between levels of poverty and level of calorie deprivation among occupation groups. Agricultural labourers and other labourers are thus worst affected groups as these groups mainly belong to below poverty line category and also level of total calorie intake is very low. These groups are not able to spend on other food items which are expensive foods to meet their nutritional requirement. Thus schemes should be made such to provide maximum benefit to these groups.

Figure 4.2

Level of Calorie Deprivation and Poverty among Occupation Groups, 2004-05



Source: Computed from Table 4.3b

Agro Climatic Regions

India has great variations in geographical, climatic and socio-economic conditions. These conditions have influenced the agricultural practices in India. Some areas are agriculturally productive like Punjab, Haryana and Western Uttar Pradesh because of better climatic and soil conditions while others such as Rajasthan, Madhya Pradesh and plateau areas are not agriculturally productive. Since India is an agriculture country and it provides subsistence to majority of population, variation in agriculture development leads to creation of inequalities in socio-economic development of the population. Those living in agriculturally developed areas have higher per capita income to those living in less productive areas. These variations cause creation of economically deprived pockets of population. Thus, in order to reduce regional inequalities in agriculture, Planning Commission and National Remote Sensing Agency divided the country into 15 agro-climatic regions.

The Central Plateau and Hill region (M.P, Rajasthan, and Southern U.P.) is agriculturally less productive and thus level of poverty is one of the highest in this region. Similarly, Eastern Plateau and Hill region (Jharkhand, Chhattisgarh and Orissa) does not have agriculturally suitable conditions and thus poverty level is around 50 percent. On the other hand, is the Trans Gangetic Plain (Punjab, Haryana, Chandigarh and Delhi) which is country's most developed part in agricultural terms shows lowest level of poverty (11 percent). It becomes an urgent need to show whether the regions having higher poverty

level also shows higher calorie deprivation. It is also important to explain if total calorie intake has decreased in these regions; to what extent share of calories from different food items have caused this decline.

Map 4.1 shows intake of calories is much higher in agriculturally developed regions such as Trans Gangetic Plain Region, Upper Gangetic Plain Region and West Himalayan Region which have total calorie intake much higher (above 2162 Kcal) than national average (2044 Kcal). On the other hand, Western, Eastern, Southern Plateau and Gujarat Plain and hill regions which are agriculturally less productive have lowest calorie intake (below 1956 Kcal). The calorie intake of Western dry region, Lower and Middle Gangetic Plain region ranges between 2033-2161 Kcal, second largest after Trans Gangetic Plain group regions. In spite of poor agricultural conditions, Western dry region has high calorie intake because of higher intake of coarse cereals. All other remaining regions have calorie intake below national average (App. 4.3). As far as change in intake of total calories from 1993/94 to 2004/05 is concerned, Gujarat Plain and Hill region, Western Dry region, Western Plain & Ghats region and East Coast & Hill region have shown an increase in total calorie intake (Figure 4.3). The share of calories from coarse cereals, wheat has increased on one hand and share of calories from other food items particularly vegetables & fruits, milk & milk products, sugar & honey has also increased which together has caused rise in total calories. A best example of this type is Gujarat Plain and Hill region where intake of wheat (16.67 percent) and coarse cereal (27.57 percent) calories has substantially increased and also consumption of calories from milk & milk products, oil & fat and sugar & honey has also shown a positive change (Table 4.4) which ultimately depicts that this region is including a variety of food in its diet without changing its traditional consumption pattern. Central Plateau and Hill region and Eastern Plateau and Hill region experienced a major decline (-271 Kcal and -166 Kcal respectively) in total calories which is resulted by decline in coarse cereal calories and low increase in calories from other food items. This decline in total calories is not good from nutritional point of view as these region cover highest number of population living below poverty line. Trans Gangetic Plain region (Punjab, Haryana, Chandigarh) show a higher decline in calorie intake (-244 Kcal), however reason for this decline is not clear

Table 4.4

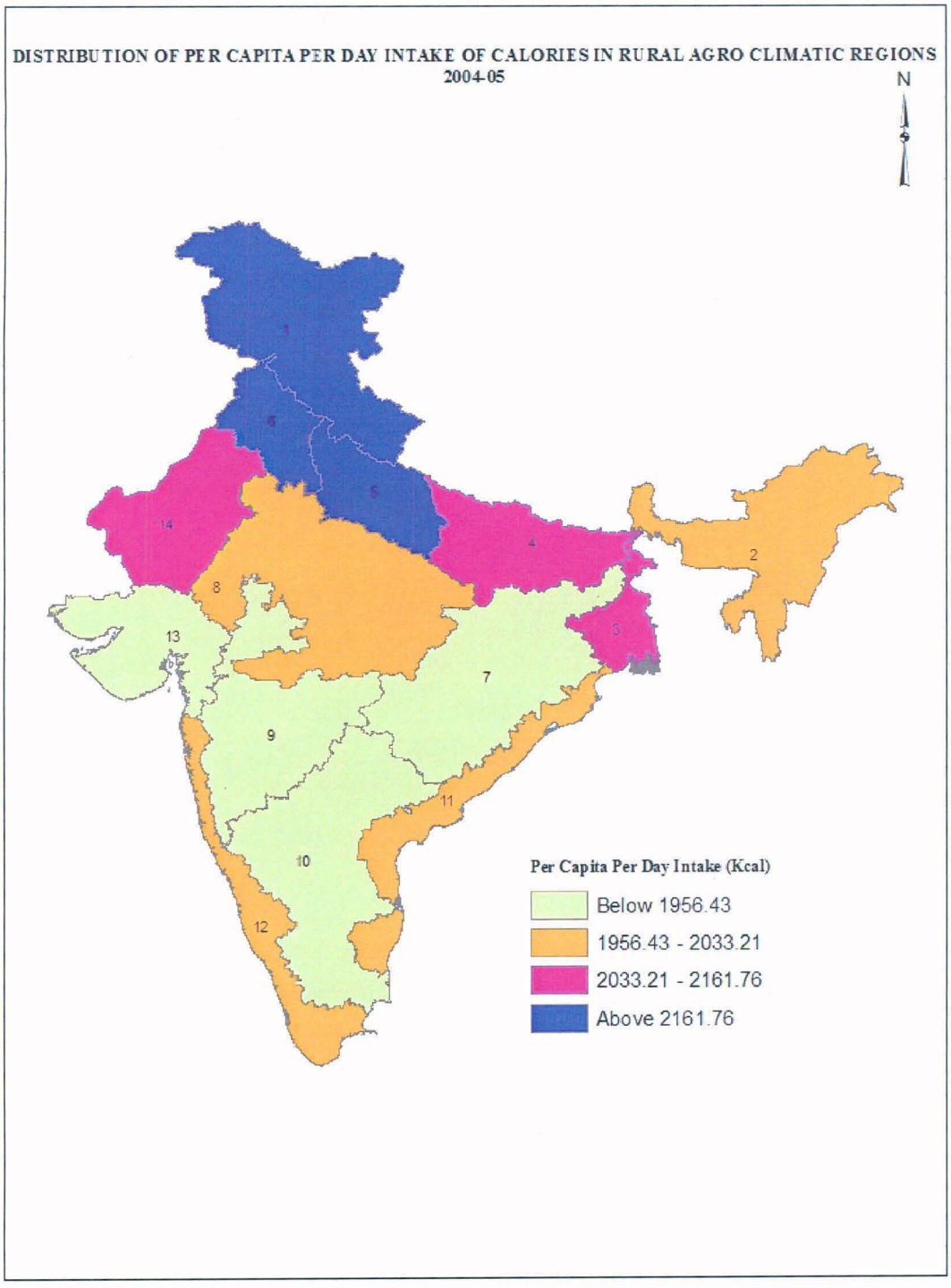
Percent Change in Calorie Share of Various Food Items between 1993/94 and 2004/05 across Agro Climatic Regions

Agro Climatic Regions	Rice	Wheat	Coarse cereals	Total Cereals	Root and Tubers	Sugar and honey	Pulses, nuts and oilseeds	Vegetables and fruits	Meat, eggs and fish	Milk and milk products	Oils and fats	Misc.* food, food products and beverages	Total Calories (Kcal)
West Himalayan	15.51	-5.67	-9.84	-3.94	0.08	0.12	-0.84	0.84	0.25	1.07	2.16	0.26	-89.34
East Himalayan	2.19	-1.69	-0.44	-4.76	0.74	-0.03	-0.14	0.06	0.38	0.70	2.40	0.65	16.17
Lower Gangetic Plain	0.08	0.24	-0.32	-3.48	0.73	0.13	-0.30	-0.16	0.46	-0.02	2.15	0.49	-138.61
Middle Gangetic Plain	4.20	-2.61	-1.57	-2.44	0.54	0.01	-0.49	0.29	0.05	-0.11	1.73	0.41	-88.64
Upper Gangetic Plain	2.68	0.90	-3.57	-1.62	-0.40	0.20	0.36	0.55	0.01	-0.79	1.08	0.61	-122.37
Trans Gangetic Plains	0.67	-1.59	0.93	-1.88	0.36	-0.22	-0.95	-0.09	0.01	-0.48	2.23	1.04	-244.68
Eastern Plateau and Hill	-0.94	3.13	-2.18	-2.98	0.48	0.21	-0.60	-0.08	0.04	0.22	1.62	1.08	-166.46
Central Plateau and Hill	0.27	7.32	-7.58	-3.22	0.25	0.31	-1.43	0.48	0.04	1.02	1.75	0.80	-271.55
Western Plateau and Hill	3.34	13.70	-17.04	-5.16	-0.02	-0.01	-0.36	0.50	0.07	0.60	3.82	0.55	-39.09
Southern Plateau and Hill	18.60	-6.78	-11.82	-0.75	-0.18	-1.36	-0.33	0.94	0.08	-0.53	0.87	1.26	-117.42
East Coast Plain and Hill	1.39	1.55	-2.94	-5.92	0.73	0.19	0.39	0.78	-0.05	0.77	2.52	0.60	3.54
Western Plain and Ghat	-1.88	1.33	0.69	-8.18	-0.90	-0.14	-0.19	3.71	0.09	0.87	1.64	3.08	106.11
Gujarat Plain and Hill	-44.25	16.67	27.57	-7.06	0.53	2.82	-1.60	0.33	-4.08	5.40	3.89	-0.22	118.00
Western Dry	-0.07	-7.35	7.42	-0.05	0.25	-0.59	-1.67	0.10	0.00	-0.14	1.30	0.81	-315.49

Note: *Miscellaneous

Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule

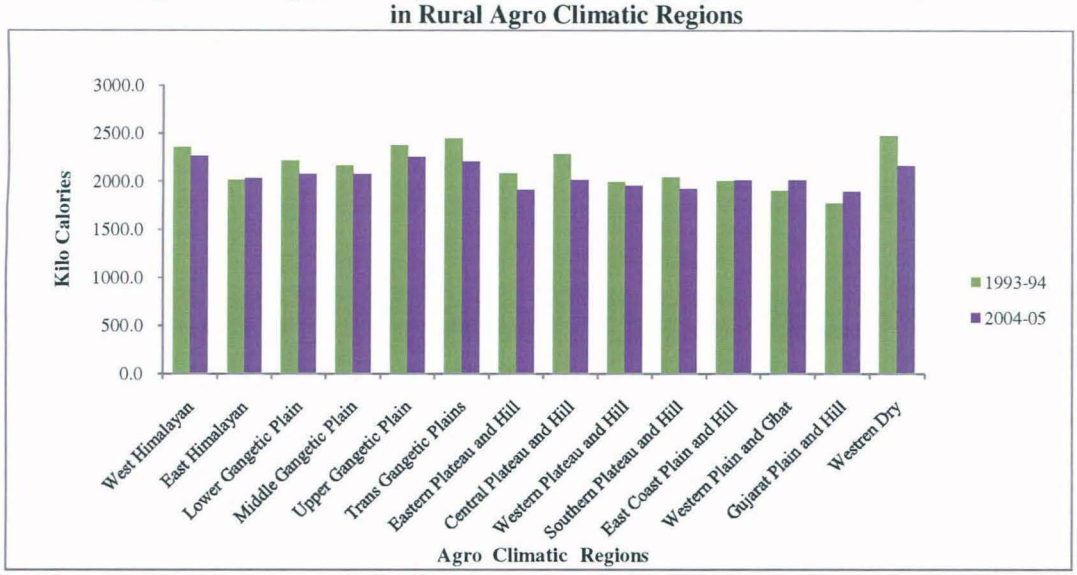
Map 4.1



Source: Computed from Appendix 4.5

as cereal calorie decline is not high and at the same time share of calories from all other food items has not increased much.

Figure 4.3
Change in Per Capita Per Day Intake of Calories (Kcal) between 1993/94 and 2004/05 in Rural Agro Climatic Regions

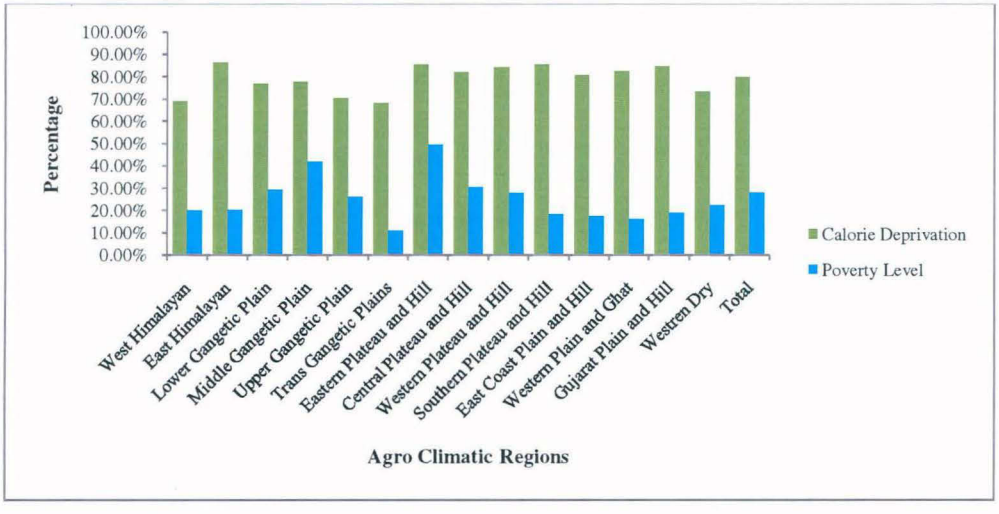


Source: Computed from Appendix 4.3

Figure 4.4 shows level of poverty and calorie deprivation among different agro climatic regions. The region where poverty level is high, level of calorie deprivation is also large. For example all the plateau regions (Eastern, Central and Western Plateau and hill region) have higher percentage of poor population (ranges between 27-49 percent) and also the calorie deprived population is above 82 percent whereas Trans Gangetic Plain which has lowest poverty level (11 percent) also has lower calorie deprivation level (68 percent). Gujarat Plain and Hill region, Western Plain and Ghats region, East Coast Plain and Hill region are the only regions which have low poverty level and also lowering down calorie deprivation level (Table 4.4a). Central plateau and Hill region and Eastern Plateau and Hill region are worst affected as their poverty level is high and also calorie deprivation level is increasing at a higher rate which shows their worsening conditions in terms of nutrition. As far as gap between the poverty level and calorie deprived population is concerned all southern regions (East and West Coast Plain & Hill region and Southern Plateau & Hill region) have higher gap between poverty and percentage of population living below recommended calorie which indicates that southern regions have

less poor population and high calorie deprived percentage. However, it is not clear whether the prevalence of under-nutrition is high due to change in taste and preferences or there are other hidden factors which need to be explored. On the other hand, there are Middle Gangetic Plain (Bihar, Eastern U.P.) and Eastern Plateau and Hill region (Jharkhand, Chhattisgarh, Orissa) where calorie deprivation is high with higher poverty indicates their worst conditions both in terms of nutrition and economic development.

Figure 4.4
Spatial Distribution of Calorie Deprivation and Poverty in Agro Climatic Regions, 2004-05



Source: Computed from Table 4.4a

Table 4.4a
Change in Recommended Calorie Intake and Poverty Level (Percent) between 1993/94 and 2004/05 across Agro Climatic Regions

Agro Climatic Regions	Calorie Deprivation (Below 2400 Kcal)		Percent Change	Below Poverty Line	Gap between official poverty line and calorie deprivation, 2004/05
	1993-04	2004-05		2004-05	
West Himalayan	58.00	69.10	11.10	20.00	49.10
East Himalayan	82.00	86.30	4.30	20.20	66.10
Lower Gangetic Plain	69.80	77.10	7.30	29.30	47.80
Middle Gangetic Plain	70.50	78.00	7.50	42.00	36.00
Upper Gangetic Plain	59.00	70.60	11.60	26.10	44.50
Trans Gangetic Plains	57.50	68.40	10.90	11.00	57.40
Eastern Plateau and Hill	75.20	85.80	10.60	49.60	36.20
Central Plateau and Hill	63.00	82.20	19.20	30.50	51.70
Western Plateau and Hill	79.50	84.40	4.90	27.80	56.60
Southern Plateau and Hill	77.20	85.70	8.50	18.40	67.30
East Coast Plain and Hill	78.30	80.90	2.60	17.60	63.30
Western Plain and Ghat	82.80	82.50	-0.30	16.20	66.30
Gujarat Plain and Hill	87.60	84.90	-2.70	18.90	66.00
Western Dry	51.90	73.30	21.40	22.50	50.80

Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule

4.3 Logistic Regression Showing Probability of Being Calorie Deprived among SED Groups along with ACRs

Table 4.5 shows the effect of Socio-economic and demographic variables on calorie intake. As far as marital groups are concerned, Widowed/divorce/separated have higher probability (0.680 odd ratios) of enjoying recommended calories than the never married persons. Similarly currently married have higher odd ratio for taking recommended calories than never married but lower than Widowed/divorce/separated group. Table also shows as the family size increases, the likelihood of consuming recommended calories declines which exhibits poor nutritional conditions of big households. Among the social groups, scheduled tribes are worst affected as the probability of consuming more than calorie norm is high among other social groups (0.755 odd ratios) whereas Scheduled caste category is not significantly related. If we take Hindu as reference category among religion groups, Muslims have higher probability of being calorie deprived than the Hindus whereas Christians (0.889 odd ratio) and other religion people (0.663 odd ratio) enjoy better calorie intake than the reference category. Regarding the education level, as its level increases, the likelihood of consuming calories from the norm also rises. Highly educated people show more chances of taking recommended calories than the other lower education group people.

Considering the probability of calorie intake among occupation groups, agricultural labourers and other laborers have lesser probability (1.19 and 1.28 odd ratios respectively) of consuming recommended calories than the employed in non-agriculture. Self employed in agriculture and other occupation groups may have more chances of becoming energy sufficient than the reference category. The probability of consuming recommended calories among agro climatic regions show that all the agro climatic regions except Upper Gangetic Plain have higher likelihood of becoming calorie deprived than the West Himalayan region (Jammu & Kashmir, Himachal Pradesh and Uttaranchal). In fact, all southern regions such as Western and Eastern Plateau (Andhra Pradesh, Karnataka, and Maharashtra), East Coast Plain (coastal Andhra Pradesh and Tamil Nadu) and West Plain and Ghat (Coastal Karnataka, Kerala and Maharashtra) show higher chances of being calorie deprived than the reference category. East Himalayan region (North Eastern States) also has higher probability of consuming

Table 4.5

Logistic Regression Analysis for Showing Probability of Getting Required Calories among SED Groups

Variables	Variable Categories	Beta	Sig.@	Exponential Beta
Social Group	Scheduled Tribe (Ref)^		0.000	1
	Scheduled Caste	0.000	0.673*	1.000
	Others	-0.281	0.000	0.755
Religious group	Hindu (Ref)		0.000	1
	Muslim	0.284	0.000	1.329
	Christian	-0.118	0.000	0.889
	Others	-0.411	0.000	0.663
Education Level	Not Literate (Ref)		0.000	1
	Primary or below	-0.129	0.000	0.879
	Secondary	-0.414	0.000	0.661
	Graduate or above	-0.734	0.000	0.480
Marital Status	Never Married (Ref)		0.000	1
	Currently Married	-0.111	0.000	0.895
	Widow/Divorced/Separated	-0.385	0.000	0.680
Family Size	1-4 (Ref)		0.000	1
	5-6	0.665	0.000	1.944
	7-8	0.911	0.000	2.487
	Above 8	1.124	0.000	3.076
Occupation Type	Self employed in non agriculture (Ref)		0.000	1
	Agricultural Labor	0.175	0.000	1.191
	Other Labor	0.248	0.000	1.282
	Self employed in agriculture	-0.533	0.000	0.587
	Others	-0.189	0.000	0.828
Agro Climatic Regions	West Himalayan (Ref)		0.000	1
	East Himalayan	1.132	0.000	3.100
	Lower Gangetic Plain	0.238	0.000	1.269
	Middle Gangetic Plain	0.021	0.000	1.021
	Upper Gangetic Plain	-0.177	0.000	0.838
	Trans Gangetic Plains	0.213	0.000	1.237
	Eastern Plateau and Hill	0.536	0.000	1.709
	Central Plateau and Hill	0.579	0.000	1.785
	Western Plateau and Hill	0.941	0.000	2.562
	Southern Plateau and Hill	1.146	0.000	3.147
	East Coast Plain and Hill	0.810	0.000	2.247
	Western Plain and Ghat	1.030	0.000	2.800
	Gujarat Plain and Hill	1.015	0.000	2.759
	Western Dry	0.110	0.000	1.116
Poverty Line Group	Below poverty Line (Ref)		0.000	1
	Above Poverty Line	-2.745	0.000	0.064
	Constant	3.374	0.000	29.183

Note:@Significance level, ≥ 0.01= 1 percent, 0.02-0.05= 5 percent, 0.06-0.1= 10 percent
^Reference Category, * Insignificant
Dependent Variable: Calorie Intake, 1 shows below 2400 Kcal and 0 shows 2400 & above Kcal
Source: Computed from NSS 61st Consumer Expenditure Schedule

recommended intake than the West Himalayan Region. As far as poverty level is concerned, APL people have lower likelihood of being calorie deprived (0.064 odd ratios) than the BPL category people.

Thus, the above discussion shows that in rural India total calorie intake has declined because of decline in coarse cereal calories. However, calories from rice and wheat have increased from 1993/94 to 2004/05 in rural India. As far as other food items are concerned, oil and fat recorded a highest increase in total calorie intake and least by meat and meat products. The fall in cereal calories and rise in calories from other food items vary from person to person. For example, widowed/divorced/separated, currently married, small households, Hindu and other religion groups, higher MPCE classes, self employed in agriculture groups and Trans Gangetic, Upper Gangetic, Lower Gangetic and Southern Plateau and Hill Regions show higher decline in calorie intake due to decline in cereal calories but calories from other food items have increased much in these groups and regions.

On the other hand are big households, scheduled tribes, lower educated people, middle MPCE classes, agricultural and other labourers groups and Central Plateau and Hill, Western Dry and Eastern Plateau and Hill regions show substantial decline in total calorie intake. Among these groups there is decline in cereal calories and very low increase in calories from other food items. The probability of consuming lower calories than recommended is also higher among these groups and regions. In fact, poverty level is also high among them which make them vulnerable to hunger and under-nutrition.

Chapter V

SUMMARY AND CONCLUSION

CHAPTER V
Summary and Conclusion

The present chapter aims to draw findings and conclusion from the preceding chapters where we have analysed factors affecting under-nutrition among children, factors affecting consumption of different food items, level of calorie deprivation and poverty among different groups of population and factors affecting calorie intake among population.

Calorie intake, which is derived from consumption of different food items, is one of the indicators for measuring under-nutrition among population. Protein and fat intake are also important but they are helpless in the absence of calories as both the nutrients work where calorie intake is inadequate. We get energy in terms of calories by consuming several foods such as coarse cereals (Jowar, Bajra, Maize etc.), fine cereals (rice and wheat), pulses and other food items (vegetables, fruits, meat, oil etc.). Consumption of all these food items is affected by several factors such as production, prices, level of expenditure, taste and preferences, level of urbanisation, climate, activity level, awareness about the healthy food etc.

Besides these factors, there are also some socio-economic and demographic (SED) and agro-climatic factors which affect food consumption, for instance, old age people consume more vegetables and fruits than younger. Similarly, men eat meat, milk and egg more frequently whereas consumption of fruits and vegetables is high among women. Educated people consume lower intake of meat than less educated persons. Among the religious groups, Muslims consider the concept of *haram* (forbidden) and *halal* (permitted) before consuming any type of meat. Similarly Hindus generally avoid beef consumption as cow is sacred to them. Thus, these SED variables to some extent direct our dietary pattern. While most of the existing literature focuses on income or per capita consumption expenditure in explaining levels and variations in calorie consumption, we have attempted to present a more disaggregated picture by looking at the impacts of a range of socio-economic-demographic and agro-climatic factors.

Besides calorie intake, an attempt has been made to discuss the level of under-nutrition in India using the anthropometric measures of nutrition (stunted, wasted and underweight). It is found that in India there is no clear cut relation between calorie intake and deprivation as measured by different anthropometric measures. On one hand are Punjab and Uttar Pradesh where average PCPD calorie intake is high and at the same time percentage of underweight children is low. On the other hand, there are western and southern states such as Maharashtra, Tamil Nadu, Karnataka, Kerala and Andhra Pradesh where percentage of underweight children is low but intake of average PCPD calorie is also low. In states of Gujarat, Madhya Pradesh, Bihar and Orissa where average PCPD calorie intake is moderate, percentage of underweight children is high.

Thus, from an analysis at the inter-state levels, it is difficult to conclude whether lower calorie intake areas have higher underweight children or not. Since calorie intake is one of the important measure of nutrition and it is also used as a criteria to measure poverty by Planning Commission. So we have taken only calorie intake as a measure of nutrition.

Most of the literature shows that our food consumption basket is diversifying. Expenditure on cereals is declining and that on other food items is rising. From our analysis, it is found that coarse cereal consumption has declined much which has resulted fall in overall cereal consumption whereas consumption of vegetables, fruits and other food items have recorded a rise in rural Indian diets. This change in diet pattern has led to change in calorie intake. There is continuous decline in PCPD calorie intake from 1993-94 to 2004-05 both in rural and urban areas, especially in rural areas. The decline in cereal consumption and resultant calorie intake brings a controversy among researchers. One group of thought argue that decline in cereal and calorie intake is the result of increase in income, change in taste and preference, urbanisation, improved health care whereas other group of thought describes this change as deterioration in human health and increase in percentage of hungry people. The debate remains inconclusive. But fact is that our food consumption pattern is changing which in return is causing change in calorie intake level.

Socio-economic-demographic (SED) variables affecting child under-nutrition at India as well as regional level has also been studied. It is found that all selected variables such as age and sex of a child, education and anemia level of mothers, religion, caste status etc. have much impact on child under-nutrition. With increase in the age and size of a child, the probability of being underweight also increases. If we see affect of mother's education and her anemia level on children, it is found that with an increase in the level of mother's education, the likelihood of having underweight children declines whereas more anemic a mother is, more is the probability of being underweight among children. Other social factors such as religion and type of caste also affect under-nutrition among children. For instance, children of ST are more prone to become underweight and children of OBC and other category people have lesser chance than the children of SC population.

If we take economic conditions of population, we find that rich and middle class people have lower percentage of underweight children than the poor class. Besides these above discussed factors, regional factor also plays an important role for instance, central, eastern and western regions of the country which covers Madhya Pradesh, Jharkhand, Chhattisgarh, Orissa, Bihar and Gujarat states have higher probability of having underweight children than the northern region (Punjab, Haryana, Delhi, Himachal Pradesh etc.). Southern region (Tamil Nadu, Karnataka, Kerala and Andhra Pradesh) have much lower proportion of underweight children than the northern region.

If we see SED factors affecting child under-nutrition at regional level, we find that affect of these factors are more or less same in all regions. Female children are more vulnerable to become underweight than male children. Similarly, children belonging to Muslims, scheduled tribes and lower income classes have higher probability of having under-nutrition than the Hindus, scheduled caste and higher income classes respectively. Mother's education and her anemia level have much effect on child nutrition. Better educated mother can take care of the nutritional needs of her child. An anemic mother has a higher probability of having an anemic and unhealthy child than the non-anemic mother. These correlations are same in all the regions with little variations which require further investigations.

If we see trend and pattern of food consumption across SED groups and affect of these SED variables on food consumption, it is found that rural Indian diet constitutes mainly rice, wheat, coarse cereals, vegetables, milk, oil and fruits. Consumption of meat is very low in rural India. If we see trend of food consumption, it is found on one hand that cereal consumption has declined much particularly due to decline in coarse cereal consumption and generally due to a decline in rice and wheat consumption. On the other hand, consumption of all other food items (vegetables, fruit, meat and oil) has recorded an increase in rural diet.

Trend and pattern of food items across all socio-economic-demographic (SED) groups show that cereal consumption is high among married persons (both currently married and widowed/divorced/separated), elders, males, small households, self employed in agriculture and non-agricultural activities, higher MPCE class, APL group, primary and secondary class pass, Hindus. However, cereal consumption is high among them on one hand and on the other hand this group also shows highest decline in cereal consumption from 1993/94 to 2004/05 because of decline in coarse cereal consumption. The consumption of other foods such as edible oil, fruits and vegetables recorded a rise in the diet of these groups which probably show their better nutritional standard.

The other remaining SED groups such as never married persons, children, lower MPCE class, BPL, agricultural labour and other labour, ST and SC group, Muslims, illiterates and big households show decline in consumption of cereals at a lower rate which is also not good for their health as these groups constitute lower section of the society which is not economically and socially advanced, a mere decline in cereal consumption may harm their nutritional security. The consumption of other food items also has not recorded a significant rise in their diet which may pose a serious micronutrient deficiency among these groups.

It is also found that there is little variation in the male and female food consumption pattern. From the nutritional security perspective, females do not face biasness at least in terms of per capita consumption of calories. However an important finding also comes when we see food consumption pattern between widowed/divorced/separated men and women, it is found that married men and women

have almost similar food intakes but once a women gets widowed/divorced/separated, she consumes less intake of food than a widowed/divorced/separated man. Females who are secondary pass surpass their male counterparts in consumption of fruits, meat and oil. In rural India, pulse and milk consumption is declining in almost all sections of population which is a serious issue from nutritional point of view as both food items are a rich source of nutrients as well as micronutrients.

The regional dimension of food consumption pattern in India is carried out through an investigation into diversity across agro-climatic regions. The study brings out some important aspects of the regional diversity in food and calorie intake. As expected, we find that there is a strong correlation between agro-climatic conditions in terms of production and food consumption. For instance, rice belt area (Lower Gangetic, East Coast and East Himalayan Region) have higher rice consumption. Coarse belt (Western Dry Region) and wheat belt (Upper, Middle, Trans-Gangetic Plain and Central Plateau and Hill Regions) have higher coarse cereal and wheat consumption respectively. Milk consumption is high where dairy production is dominant such as northern and western regions. High meat consumption areas include southern and north eastern parts of India. Areas which are not agriculturally productive and less developed such as eastern Plateau and Hill (Chhattisgarh, Jharkhand and Orissa) and Central Plateau and Hill (Madhya Pradesh, southern Uttar Pradesh and eastern Rajasthan) regions show low intake of fruits. The worrying aspect is that these regions also show higher decline in cereal consumption and lower increase in other food items especially fruits, vegetables and oil, thus suffer from nutritional deficiency. On the other hand are Gujarat Plain and Hill (Gujarat, Dadra & Nagar Haveli and Daman & Diu), East Himalayan (North Eastern states), Western Plateau and Hill (Malwa plateau of M.P. and Maharashtra), East Coast Plain (Tamil Nadu, Andhra Pradesh, Coastal Orissa and Pondicherry) Regions where consumption of cereals has not declined much and at the same time consumption of other food items records an increase.

From our analysis, it is found that Socio-economic and demographic (SED) variables along with agro climatic regions (ACRs) together affect mainly coarse cereal and milk consumption. On vegetables, fruits and edible oil consumption, these variables

have less affect. Food consumption pattern is mainly affected by MPCE classes (proxy variable of income) and agro climatic conditions. These two factors have much dominance in determining our food consumption pattern. Apart from income and agro climatic regions, food consumption is also affected by a number of socio-economic and demographic variables but their effect is much less. However, it is also true that if these factors were not working then our food consumption pattern could have been different.

In rural India during 2004-05, cereals and cereal substitutes accounted a major share in total calorie intake. Among cereal calories, rice recorded a highest share followed by wheat and coarse cereals. Among all other food items, oil and fat contributes largely whereas lowest proportion of calories is provided by meat and meat products. In rural India, decline in calories from 1993/94 to 2004/05 was mainly brought by fall in cereal calories particularly coarse cereals decline. However rice and wheat calories increased slightly which contributed in lower decline in total calories which shows that rural India is making a shift from coarse cereals to finer cereals. All other food items also marked a rise in total calorie intake among which oil and fat recorded a highest increase.

The level of calorie deprivation in rural India shows an increase from 71.6 percent to 80 percent whereas Planning Commission's poverty estimate shows a fall in percentage of poor people. It is difficult to reconcile this divergent picture from two different dimensions of poverty. While an exclusive emphasis on calorie norm leads to inconsistent results and has been termed as 'calorie fundamentalism'. The widespread calorie deprivation in rural India and its concentration among poor regions and poor households raise serious questions about food security in India.

In rural India, if we examine pattern of total calorie intake among various SED groups, we find, on one hand, that among demographic groups; widowed/divorced/separated and currently married, among social groups; small families, other caste people, Hindus, other religion groups and high educated persons, among economic groups; high income class, APL, self employed in agriculture and non-agriculture activities have recorded a highest decline in cereal calories and at the same time calories from other food items have increased substantially among these groups. However decline in cereal calories is not a matter of great concern as rise in calories from

other food items has compensated decline in cereal calories and also these groups constitute lower percentage of poor population.

On the other hand, there are certain groups who are socially and economically deprived such as illiterates & primary pass, agricultural and other labourers, SC & ST groups, big families and Muslims who experienced a decline in cereal calories and lower rise in calories from other food items which show their nutritional insufficiency and insecurity. Another important finding comes from comparing calorie deprivation and poverty level. It is found that social groups among which poverty level is high, calorie deprivation level is also high, for instance, among SC & ST, agricultural & other labourers and lower MPCE classes.

If we analyse share of calories from different food items in total calorie intake across ACRs, we find that Central Plateau and Hill (Madhya Pradesh, southern Uttar Pradesh and eastern Rajasthan), Eastern Plateau and Hill (Chhattisgarh, Jharkhand and Orissa), Middle Gangetic Plain (Bihar and Eastern Uttar Pradesh) and Western Dry (western Rajasthan) regions show decline in total calories because of decline in coarse cereal calories and lower increase in calories from other food items which is not good from nutritional point of view as these regions cover highest percentage of poor population of the country and also calorie deprivation level is one of the highest in these regions.

There are regions such as Western Pain and Ghat, East Coast Plain and Hill and Southern Plateau and Hill regions covering all southern states where calorie deprivation level is however higher but level of poverty is quite low which shows that people in these regions are not unable to meet their calorie requirements but it the preference of them to select their food items in their diet.

Thus, we can conclude that SED factors to some extent shape the dietary pattern of rural population whose food consumption pattern is changing towards finer cereals and other food items particularly edible oil, vegetables and fruits. Coarse cereal decline is one of the most important factors for decline in calories in rural India. However, pulse and milk consumption is also declining which is a serious issue from nutrition point of view

as these two food items are rich with several nutrients and micronutrients. Decline in cereal consumption especially coarse cereal consumption and rise in consumption of other food items is more pronounced among higher status people such as higher MPCE classes, APL, widow/divorce/separated, self employed in agriculture and non-agriculture activities, Christians and Hindus, small families, other social class people and highly educated persons. All other remaining SED classes have also shown a fall in cereal consumption at a lower rate thanks to slight rise in rice & wheat intake and lower increase in consumption of other food items. Even lower decline in cereal consumption also highlights their worst conditions as these groups constitute poor section of the society.

A similar case can be seen if we analyse all sections of society from nutritional point of view. Calories from cereals have declined and that of from other food items have increased among higher status people. There are other lower status people such as illiterates & primary pass, ST, Muslims, lower MPCE class, BPL and big households where cereal calories declined but calories from other food items have not increased. However cereal calorie decline is minimal but it may affect their nutritional level as they are poor section of the society.

Similarly, across ACRs, Central Plateau and Hill (Madhya Pradesh, southern Uttar Pradesh and eastern Rajasthan), Eastern Plateau and Hill (Chhattisgarh, Jharkhand and Orissa), Middle Gangetic Plain (Bihar and Eastern Uttar Pradesh) and Western Dry (western Rajasthan) regions are worst affected as both calorie deprivation and poverty level is high in these regions. Thus policy makers and planners while formulating any nutrition policy should keep in view the interest of these deprived section and areas of our society.

BIBLIOGRAPHY

Bibliography

Achaya, K. T. (1983), 'RDAs: Their Limitations and Application', *Economic and Political Weekly*, Vol. 18, No. 15, April 9, pp. 587-590.

Alagh, Yoginder K. (1995), 'Poverty and Food Security: Toward a Policy System for Food Security', *Economic and Political Weekly*, Vol. 30, No. 52, December 30, pp. A142-A150.

Ali, Jabir (2007), 'Structural Changes in Food Consumption and Nutritional Intake from Livestock Products in India', *South Asia Research*, Vol. 27, No. 2, pp. 137-151.

Amarasinghe, A. U., Shah, T. and Singh, O.P. (2007), 'Changing consumption patterns: Implications on food and water demand in India', Research Report, International Water Management Institute, Sri Lanka.

Maleta, K. (2007), 'Under-nutrition in Malawi', *Malawi Medical Journal*, Vol. 18, Issue 4, December, pp. 191-207.

Atibudhi, H.N. (2006), 'A Comparative Analysis of Food Consumption and Monthly Per Capita Expenditure of Orissa vis-a-vis All India Level', *Indian Journal Of Agricultural Economics*, Vol. 61, No. 3, July-September.

Balchand, K. and Sunderarajan, P. (2011), 'You will be on BPL List if your annual income is Rs. 27,000', The Hindu, Saturday, May 21.

Bansil, P.C. (2003), 'Demand for Food grains by 2020 AD'. In: Dev, S. Mahendra et al., ed. *Towards a Food secure India: Issues and Policies*, Institute for Human Development, New Delhi.

Bardhan, D. et al. (2006), 'Trends in Consumption of Food Commodities: A Global Perspective', *Indian Journal of Agricultural Economics*, Vol. 61, No. 3, July-September.

Basiotis, P. et al. (1983), 'Nutrient Availability, Food Costs, and Food Stamps', *American Journal of Agricultural Economics*, Vol. 65, pp. 685-93.

Bhalotra, S. C. V. and Soest, A. V. (2010), 'The puzzle of Muslim advantage in child survival', *Journal of Health Economics*, Vol. 29, pp. 191-204.

Bhandari, Rajika and Smith, Frank J. (2000), 'Education and Food Consumption Pattern in China: Household analysis and Policy implication', *Journal of Nutrition Education,* Vol. 32, pp. 214-224.

Bharati, S. et al. (2010), 'Socio-economic determinants of underweight children in West Bengal, India', *Asian Pacific Journal of Tropical Medicine*, Vol. 3, Issue 4, April 10, pp. 322-327.

Biswas, S., Bose, K. and Koziel, S. (2011), 'Effect of social factors on nutritional status among rural Bengalee preschool children from Eastern India', *International Journal of Human Sciences*, Vol. 8, Issue 1.

Bouis, Howarth E. and Hadded, L. J. (1992), 'Are estimates of Calorie Income elasticities too high? A recalibration of the Plausible range', *Journal of Development Economics*, Vol. 39, pp. 333-364.

Brown, Kenneth H. (1984), 'Measurement of Dietary Intake', *Population and Development Review*, Vol. 10, pp. 69-91.

Carla, E. (2008), 'Socioeconomic Differences in Fruit and Vegetable Consumption among Middle-Aged French Adults: Adherence to the 5 A Day Recommendation', *Journal of American Diet Association*, Vol. 108, pp. 2021-2030.

Chand, Ramesh (2007), 'Trends in food consumption and nutrition-food security concerns', *Indian Journal of Agricultural Economics*, Vol. 62, No. 1, January-March.

Chatterjee, M. (1995), 'Distributing the Loaves', *Seminar-New Delhi-,* Issue 433, September, pp. 46-49.

Chatterjee, S., Rae, Allan and Ray, Ranjan (2007), 'Food Consumption and calorie intake in contemporary India', Working Paper, September.

Chen, Y. and Li, Hongbin (2009), 'Mother's education and child health: Is there a nurturing effect?', *Journal of Health Economics*, Vol. 28, pp. 413-426.

Dandekar, V. M. and Rath, N. (1971), 'Poverty in India—I, Dimensions and Trends', *Economic and Political Weekly*, Vol. 6, No. 1, January 2.

Dandekar, V. M. and Rath, N. (1971), 'Poverty in India-II Policies and Programmes', *Economic and Political Weekly*, Vol. 6, No. 2, January 9.

Das, Sibabrata (2008), 'Childhood Under-nutrition: A comparative analysis of Scheduled Tribes and others in the mid-Indian Tribal Region', *Social Change,* Vol. 38, No. 1, March, pp 64-83.

Deaton, A. and Dreze, Jean (2009), 'Food and Nutrition in India: Facts and Interpretations', *Economic & Political Weekly*, Vol. xliv, No 7, February 14.

Deaton, A. and Dreze, Jean (2010), 'Nutrition, Poverty and Calorie Fundamentalism: Response to Utsa', *Economic & Political Weekly*, Vol. xlv, No. 14, April 3.

Defo, B. Kuate (1996), 'Areal and Socioeconomic Differentials in Infant and Child Mortality in Cameroon', *Social Science Medicine,* Vol. 42, No. 3, pp. 399-420.

Deolalikar, Anil B. (2005), *Attaining Millennium Development Goals in India*, Oxford University Press, New Delhi.

Dev, S. M. (2005), 'Calorie Norms and Poverty', *Economic & Political Weekly*, Vol. 40, No. 8, February 19-25.

Dittus, K.L. et al. (1995), 'Benefits and barriers to fruit and vegetable intake: relationship between attitudes and consumption', *Journal of Nutritional Education*, Vol. 27, pp. 120-126.

Dynesen, A.W. et al. (2003), 'Socio-demographic differences in dietary habits described by food frequency questions-results from Denmark', *European Journal of Clinical Nutrition*, Vol. 57, pp. 1586-1597.

Edison, D. (1993), 'Regional Changes in Food Poverty in India', *Geo Journal*, Vol. 30, No. 2, June, pp. 167-177.

Eng, Patricia Mona (2005), 'Effects of marital transitions on changes in dietary and other health behaviors in US male health professionals', *Journal of Epidemiology and Community Health*, Vol. 59, pp. 56–62.

Estaquio, C. et al. (2008), 'Socio-economic differences in fruit and vegetable consumption among middle aged French adults: Adherence to the 5 A day recommendation', *Journal of American Dietary Association*, Vol. 108, pp. 2021-2030.

Estevez, J De Irala et al. (2000), 'A Systematic review of socio-economic differences in food habits in Europe: consumption of fruit and vegetables', *European Journal of Clinical Nutrition*, Vol. 54, pp. 706-714.

Food and Agricultural Organisation (1996), *The Sixth World Food Survey* (Rome: FAO).

Food and Agricultural Organisation (2000), *Food Insecurity, When People live with hunger and fear starvation, The state of food insecurity in the world 2000* (Rome: FAO).

Fraser, G.E. et al. (2000), 'The Effect of Age, Sex, and Education on Food Consumption of a Middle-Aged English Cohort—EPIC in East Anglia', *Preventive Medicine,* Vol. 30, pp. 26–34.

Gaiha, R. (1997), 'Hunger, under nutrition and poverty in India', *Contemporary South Asia*, Vol. 6, Issue 2, pp. 161-175.

Gaiha, R. and Kulkarni, V. (2005), 'Anthropometric failure and persistence of poverty in rural India', *International Review of Applied Economics*, Vol. 19, Issue 2, pp. 179-197.

Giri, A.K. (2006), 'Cereal Consumption over Time in the Country and across the States', *Indian Journal of Agricultural Economics*, Vol. 61, No. 3, July-September.

Giskes, Katrina et al. (2002), 'Socio-economic differences in fruit and vegetable consumption among Australian adolescents and adults', *Public Health Nutrition*, Vol. 5, Issue 5, pp. 663–669.

Gittelsohn, J. et al. (1997), 'Cultural factors, calorie intake and micronutrient sufficiency in rural Nepali households', *Social Science Medicine,* Vol. 44, No. 11, pp. 1739-1749.

Golait, Ramesh and Pradhan, N.C. (2006), 'Changing Food Consumption Pattern in Rural India: Implication on food and Nutrition security', *Indian Journal Of Agricultural Economics*, Vol. 61, No. 3, July-September.

Gopalan, C. (1995), 'Towards Food and Nutrition Security', *Economic and Political Weekly*, Vol. 30, No. 52, December 30, pp. A134-A141.

Gopalan, C., Shastri, B.V. R. & Balasubramanian, S.C. (2009), *Nutritive value of Indian foods*, National Institute of Nutrition, ICMR, Hyderabad.

Gragnolati, M. et al. (2005), 'India's Undernourished Children, A Call for Reform and Action', The World Bank Report, August, Health, Nutrition and Population Series.

Groth, M.V. et al. (2001), 'Social determinants of dietary habits in Denmark', *European Journal of Clinical Nutrition*, Vol. 55, pp. 959–966.

Gulati, K. Jatinder (2010), 'Child Malnutrition: Trends and Issues', *Anthropologist*, Vol. 12, Issue 2, pp. 131-140.

Gupta, S. (2011), 'Poverty, Caste and Religion to be simultaneously mapped for Census', The Hindu, Friday, May 20.

Guruswamy, Mohan and Abraham, R. J. (2006), 'Redefining Poverty, a new poverty line for new India', *Economic and Political Weekly*, Vol. 41, No. 25, June 24-30.

Himanshu (2010), 'Towards New Poverty Lines for India', *Economic and Political Weekly,* Vol. xlv, No. 1, January 2.

Holcomb, Carol Ann (1995), 'Positive influence of age and education on food and nutrient intakes of older women living alone', *Journal of American Diet Association*, Vol. 9, Issue 12, December, pp. 1381-1386.

Hopper, Gordon R. (1999), 'Changing Food Production and Quality of Diet in India, 1947-98', *Population and Development Review*, Vol. 25, No. 3, September, pp. 443-477.

Hupkens, L.H. Christianne et al. (2000), 'Social class differences in food consumption: The explanatory value of permissiveness and health and cost considerations', *European Journal of Public Health*, Vol. 10, Issue 2, pp. 108-113.

ICMR (1988), *Nutrient Requirements and Recommended Dietary Allowances for Indians*, Indian Council of Medical Research.

International Institute for Population Sciences (2000), 'Women's Education Can Improve Child Nutrition in India', *NFHS Bulletin*, No. 15.

Jensen, Robert T. and Miller, Nolan H. (2010), 'A revealed preference approach to measuring hunger and under-nutrition', Working Paper 16555, National Bureau of Economic Research.

Jha, R., Gaiha, R. and Sharma, A. (2009), 'Modelling variety in consumption expenditure on food in India', *International Review of Applied Economics*, Vol. 23, Issue 4, pp. 503-519.

Johansson, Lars et al. (1999), 'Healthy dietary habits in relation to social determinants and life style factors', *British Journal of Nutrition*, Vol. 81, pp. 211–220.

Jones, R. P. and Sen, K. (2001), 'On India's Poverty Puzzles and Statistics of Poverty', *Economic and Political Weekly*, Vol. 36, No. 3, January 20-26, pp. 211-217.

Kakwani, Nanak (1986), 'On Measuring Under nutrition', Working Paper 8, World Institute for development Economics Research of the United Nations University.

Kanjilal, B. et al. (2010), 'Nutritional status of children in India: household socio-economic condition as the contextual determinant', *International Journal for Equity in Health*, Vol. 9, Issue 19.

Kiefer, Ingrid et al. (2005), 'Eating and dieting differences in men and women', *Journal of Men's Health and Gender*, Vol. 2, No. 2, June, pp. 194–201.

Kinley, J.D. (1994), 'Food and families socio-economic status', *Journal of Nutrition*, Vol. 124, Issue 9, pp. 1878S-85S.

Kossioni, A. and Bellou, O. (2011), 'Eating habits in older people in Greece: The role of age, dental status and chewing difficulties', *Archives of Gerontology and Geriatrics,* Vol. 52, pp. 197–201.

Krishnaji, N. (1981), 'On Measuring Incidence of Under-nutrition: What Is a Consumer Unit?', *Economic and Political Weekly*, Vol. 16, No. 37, September 12, pp. 1509-1511.

Kroshus, Emily (2008), 'Gender, Marital Status, and Commercially Prepared Food Expenditure', *Journal of Nutrition Education Behavior*, Vol. 40, pp. 355-360.

Kumar, A. K. S. (n.d.), 'Why are levels of child malnutrition high?' The Hindu, [Online] Available at http://www.thehindu.com/2007/06/22/stories/2007062250151000.htm, (Accessed on 21 June 2011).

Kumar, P., Mruthyunjaya and Dev, Madan M (2007), 'Long Term Changes in Indian Food Basket and Nutrition', *Economic and Political Weekly*, Vol. 42, No. 35, September 1-7.

Kumar, T. K., Mallick, S. and Holla, J. (2009), 'Estimating Consumption Deprivation in India Using Survey Data: A State-Level Rural-Urban Analysis Before and During Reform Period', *Journal of Development Studies*, Vol. 45, Issue 4, pp. 441-470.

Legal Correspondent (2011), 'Planning Commission asked to revise Poverty norm', The Hindu. Sunday, May 15.

Louk, Kelly Reams et al. (1999), 'Comparison of Dietary Intakes of Husbands and Wives', *Journal of Nutrition Education,* Vol. 31, Issue 3, May, pp. 145-152.

Mandelson, S. (n.d.), 'Child Malnutrition in India, why does it persists?' CINI Report.

Manna, G.C. (2007), 'On Calibrating the poverty line for poverty estimation in India' *Economic and Political Weekly*, Vol. 42, No. 30, July 28-August 3.

Martorell, R. and Ho, J.J. (1984), 'Malnutrition Morbidity and Mortality', *Population and Development Review*, Vol.10, pp. 49-68.

Mehta, Jaya (1982), 'Nutritional Norms and Measurement of Malnourishment and Poverty', *Economic and Political Weekly*, Vol. 17, No. 33, August 14, pp. 1332-1340.

Mehta, Jaya and Venkatraman, S. (2000), 'Poverty Statistics, Bermicide's Feast', *Economic and Political Weekly*, Vol. 35, No. 27, July 1-7.

Meenakshi, J. V. and Vishwanathan, B. (2003), 'Calorie Deprivation in Rural India, 1983-1999/2000', *Economic and Political Weekly*, Vol. 38, No. 4, January 25-31, pp. 369-375.

Meshram, I.I. et al. (2011), 'Prevalence and Determinants of Under-nutrition and its Trends among Pre-School Tribal Children of Maharashtra State, India', *Journal of Tropical Pediatrics,* Vol. 10, Issue 1093, May 4.

Morgan, Karen J. (1986), 'Socioeconomic Factors Affecting Dietary Status: An Appraisal', *American Journal of Agricultural Economics*, Vol. 68, No. 5, December, pp. 1240-1246.

Musaiger, O. A. (1993), 'Socio-cultural and Economic factors affecting food consumption patterns in the Arab countries', The *Journal of the Royal Society for the Promotion of Health*, Vol. 113, Issue 68.

Nasurudeen, P. et al. (2006), 'The Dynamics and Inequality of Nutrient Consumption in India', *Indian Journal of Agriculture Economics*, Vol. 61, No. 3, July-September.

National Family Health Survey (2005-06), *Fact Sheets.*

National Family Health Survey Report (2005-06), International Institute for Population Sciences and Macro International.

Omann, Ines et al. (2008), 'The environmental effects of food consumption for different household categories', Working Paper.

Osmani, S.R. (1987), 'Controversies in Nutrition and their implication for the Economics of Food', Working Paper, July 16.

Panikar, P. G. K. (1980), 'Inter-Regional Variation in Calorie Intake', *Economic and Political Weekly*, Vol. 15, No. 41/43, October.

Patnaik, Utsa (2004), 'Republic of Hunger', *Social Scientist*, Vol. 32, No. 9/10, September-October.

Patnaik, Utsa (2007), 'Neoliberalism and Rural Poverty in India', *Economic and Political Weekly,* Vol. 42, No. 30, July 28-August 3.

Patnaik, Utsa (2010), 'A Critical Look at Some Propositions on Consumption and Poverty', *Economic & Political Weekly*, Vol. xlv no 6, February 6.

Planning Commission (2007) '*Poverty Estimates for 2004-05*', Press Information Bureau, March.

Planning Commission (2009), *Report of the Expert Group to review the methodology for estimation of poverty.*

Prattala, R. et al. (2003), 'Use of butter and cheese in 10 European Countries, a case of contrasting educational differences', *European Journal of Public Health*, Vol. 13, pp. 124-132.

Prattala, R. et al. (2006), 'Gender differences in the consumption of meat, fruit and vegetables are similar in Finland and the Baltic countries', *European Journal of Public Health*, Vol. 17, No. 5, pp. 520–525.

Radhakrishna, R. and Ravi, C. (1992), 'Effects of Growth, Relative price and preferences on food and nutrition', *Indian Economic Review*, Vol. 27, pp. 303-23.

Radhakrishna, R. et al. (2004), 'Chronic Poverty and Malnutrition in 1990s', *Economic and Political Weekly*, Vol. 39, No. 28, July 10-16, pp. 3121-3130.

Radhakrishna, R. (2005), 'Food and Nutrition Security of the Poor, Emerging Perspectives and Policy Issues', *Economic and Political Weekly*, Vol. 40, No. 18, April 30-May 6.

Radhakrishna, R. (2006), 'Food Consumption and Nutritional Status in India: Emerging Trends and Perspectives', Working Paper, November, Indira Gandhi Institute of Development Research, Mumbai.

Radhakrishna, R. and Reddy V. (n.d.), 'Food Security and Nutrition: Vision 2020'.

Rao, V. B. (1981), 'Measurement of Deprivation and Poverty Based on the Proportion Spent on Food, an Exploratory Exercise', *World Development*, Vol. 9, No. 4, pp. 337-353.

Rao, H. C. H (2000), 'Declining Demand for Food-grains in Rural India: Causes and Implications', *Economic and Political Weekly*, Vol. 35, No. 4, January 22-28, pp. 201-206.

Rao, G. Rama, Ladusingh, L. and Pritamjit, R. (2004), 'Nutritional Status of Children in North-East India', *Asia-Pacific Population Journal*, Vol. 19, Issue 3, September.

Ray, Ranjan (2005-10), 'Analysis of Changes in Food Consumption and Their Implications for Food Security and Undernourishment: The Indian Experience in the 1990s', Discussion Paper, University of Tasmania.

Ray, S. Kumar et al. (2001), 'Epidemiology of Under-nutrition', *Indian Journal Of Pediatrics*, Vol. 68, November.

Ray, Ranjan and Lancaster, G. (2005), 'On Setting the Poverty Line Based on Estimated Nutrient Prices: Condition of Socially Disadvantaged Groups during the Reform Period', *Economic and Political Weekly*, Vol. 40, No. 1, January 1-7.

Reddy, A. Amarender (2004), 'Consumption Pattern, Trade and Production Potential of Pulses', *Economic and Political Weekly*, Vol. 39, No. 44, October 30-November 5.

Riediger, Natalie Diane et al. (2007), 'The Influence of Socio-demographic Factors on Patterns of Fruit and Vegetable Consumption in Canadian Adolescents', *Journal of American Diet Association*, Vol. 107, Issue 9, September, pp. 1511-1518.

Roos, Eva et al. (1998), 'Gender Socio economic status and family status as determinants of food behavior', *Social Science Medicine*, Vol. 46, No. 12, pp. 1519-1529.

Roos, Gun et al. (2001), 'Disparities in vegetable and fruit consumption: European cases from the north to the south', *Public Health Nutrition*, Vol. 4, Issue 1, pp. 35-43.

Ruel, Marie T. et al. (2004), 'Patterns and determinants of fruits and vegetable consumption in Sub Saharan Africa: a multi-country comparison', Background paper for the joint FAO/WHO workshop on fruit and vegetables for health, 1-3 September, Kobe, Japan.

Saraswat, S.P. et al. (2006), 'Assessment of Food Security at Household Level in Different Zones of Hindukush Himalayas with particular reference to Himachal Pradesh in India', *Indian Journal Of Agricultural Economics*, Vol. 61, No. 3, July-September.

Sastry, N. (1997), 'What Explains Rural-Urban Differentials In Child Mortality In Brazil?', *Social Science Medical*, Vol. 44, No. 7, pp. 989-1002.

Sastry, N. S. (2003), 'District Level Poverty Estimates: Feasibility of using NSS Household Consumer Expenditure Survey Data', *Economic and Political Weekly*, Vol. 38, Number 4. January 25-31.

Saxena N.C. (2009), 'Hunger, Under-nutrition and Food Security in India', CPRC-11PA Working Paper 44.

Sen, Pronab (2005), 'Of Calories and Things Reflections on Nutritional Norms, Poverty Lines and Consumption behaviour in India', *Economic and Political Weekly*, Vol. 40, No. 43, October 22-28.

Shariff, Abusaleh and Mallick, A. C. (1999), 'Dynamics of Food Intake and Nutrition by Expenditure Class in India', *Economic and Political Weekly*, Vol. 34, No. 27, July 3-9, pp. 1790-1800.

Shetty, Prakash S. (2002), 'Nutrition transition in India', *Public Health Nutrition*, Vol. 5, Issue 1A, pp. 175-182.

Singh, R. K., Vishwakarma, A. and Singh, P.K. (2006), 'Food Security and Policy Perspective in India', *Indian Journal of Agricultural Economics*, Vol. 61, No. 3, July-September.

Smith, L. C., Ruel, M. T. and Ndiaye, A. (2004), 'Why Is Child Malnutrition Lower In Urban Than Rural Areas? Evidence From 36 Developing Countries', Fcnd Discussion Paper No. 176. International Food Policy Research Institute.

Smith, A.M. and Baghurst, K.I. (1992), 'Public health implications of dietary differences between social status and occupation category groups', *Journal of Epidemiology and community health*, Vol. 46, pp. 409-416.

Sobal, J. (2005), 'Men, Meat and Marriage: Models of masculinity', *Food and Food-ways*, Vol. 13, Issue 1, pp. 135-158.

Subramanian, S. and Deaton, A. (1991), 'Gender effects in Indian consumption patterns', *Sarvekshana*, April-June.

Subramanian, S. and Deaton, A. (1996), 'The Demand for Food and Calories', *Journal of Political Economy*, Vol. 104, No. 1.

Subramanyam, A. Malavika et al. (2010), 'Socioeconomic Inequalities in Childhood Under-nutrition in India: Analyzing Trends between 1992 and 2005', *PLoS ONE*, Vol. 5, Issue 6.

Sukhatme, P.V. (1961), 'The World's Hunger and Future Needs in Food Supplies', *Journal of Royal Statistical Society*, Vol. 124, pp. 463-525.

..... (1978), 'Assessment of Adequacy of Diets at Different Income Levels', *Economic and Political Weekly*, Vol. 13, No. 31/33, August.

..... (1980), 'Nutrition Policy: Need for Reorientation', *Economic and Political Weekly*, Vol. 15, No. 26, June 28, pp. 1101-1105.

..... (1981a), 'Measuring the Incidence of Under-nutrition: A Comment,' *Economic and Political Weekly*, Vol. XVI, No. 23, June 6.

..... (1981b), 'On Measurement of Poverty', *Economic and Political Weekly*, Vol. XVI, No. 32, August 8.

Sukhatme, P. V. and Margen, S. (1982), 'Auto-regulatory homeostatic nature of energy balance', *The American Journal of Clinical Nutrition*, Vol. 35, February, pp. 355-365.

Suryanarayana, M. H. (2009), 'Nutritional Norms for Poverty: Issues and Implications', Concept Paper, Indira Gandhi Institute of Development Research.

Sztainer, D. Neumark et al. (1996), 'Correlates of Inadequate Fruit and Vegetable Consumption among Adolescents', *Preventive Medicine,* Vol. 25, pp. 497–505.

Taskar, Priya Deshmukh (2007), 'Does Food Group Consumption Vary by Differences in Socioeconomic, Demographic, and Lifestyle Factors in Young Adults? The Bogalusa Heart Study', *Journal of American Diet Association*, Vol. 107, pp. 223-234.

Thomson, C. (1985), 'The power to pollute and the power to preserve: perceptions of females in a Hindu village', *Social Science and Medicine*, Vol. 21, Issue 6, pp. 701-711.

Thorat, Sukhdeo and Lee, J. (2005), 'Caste Discrimination and Food Security Programmes', *Economic and Political Weekly*, Vol. 40, No. 39, September 24-30, pp. 4198-4201.

Tucker, K. et al. (1995), 'Variation in Food and Nutrient Intakes among Older men: Age, and other socio-demographic factors', *Nutrition Research*, Vol. 15, No. 2, pp. 161-176.

Verma, Med Ram et al. (2008), 'Diversification of Food Production and Consumption Patterns in India', *Journal of Agricultural & Food Information*, Vol. 8, Issue 3, pp. 87-100.

Villegas, Sanchez et al. (2003), 'A systematic review of socioeconomic differences in food habits in Europe: consumption of cheese and milk', *European Journal of Clinical Nutrition,* Vol. 57, pp. 917–929.

Viswanathan, Brinda (2001), 'Structural breaks in consumption patterns: India 1952-1991', *Applied Economics*, Vol. 33, Issue 9, pp. 1187-1200.

Waibel, Ruth A. (n.d.), 'Religion and Dietary Practices' [Online]. Available at: http://www.faqs.org/nutrition/Pre-Sma/Religion-and-Dietary-Practices.html (Accessed 4 June 2011).

Widdowson, E.M. (1962), 'Individual Variation', *Proceedings of the Nutrition Society of London*, Vol. 21, Issue 121.

World Health Organisation (WHO) (2003), 'Diet, *Nutrition and the Prevention of Chronic Diseases*', Technical Report Series no. 916, Geneva.

Yang, X. et al. (1998), 'The role of income and education in food consumption and nutrient intake in a Chinese population', *Asia Pacific Journal of Clinical Nutrition,* Vol. 7, Issue 3/4, pp. 217-223.

APPENDICES

Appendix A

Appendix 1.1

Agro Climatic Regions and their Constituents

Agro Climatic Regions covering States and their codes		NSS Regions with codes
1	**West Himalayan Region**	
	1. Jammu & Kashmir (10)	Mountainous (101),Outer Hills (102), Jhelum Valley (103)
	2. Himachal Pradesh (9)	Himachal Pradesh (91)
	3. Uttaranchal (25)	Himalayan (251)
2	**East Himalayan Region**	
	1. Arunachal Pradesh (3)	Arunachal Pradesh (31)
	2. Assam (4)	Plain Eastern (41),Plain Western (42),Hills (43)
	3. Meghalaya (16)	Meghalaya (161)
	4. Manipur (15)	Plains (151),Hills (152)
	5. Mizoram (17)	Mizoram (171)
	6. Nagaland (18)	Nagaland (181)
	7. Sikkim (22)	Sikkim (221)
	8. Tripura (24)	Tripura (241)
	9. West Bengal (hilly region) (26)	Himalayan (261)
3	**Lower Gangetic Plain Region**	
	1. West Bengal (26)	Eastern Plain (262),Central Plain (263),Western Plain (264)
4	**Middle Gangetic Plain Region**	
	1. Bihar (5)	Northern (52),Central (53)
	2. Eastern U.P. (25)	Eastern (254)
5	**Upper Gangetic Plain Region**	
	Western & Central U.P. (25)	Western (252), Central (253)
6	**Trans Gangetic Plain**	
	1. Chandigarh (28)	Chandigarh (281)
	2. Delhi (31)	Delhi (311)
	3. Haryana (8)	Eastern (81),Western (82)
	4. Punjab (20)	Northern (201),Southern (202)
7	**Eastern Plateau and Hill Region**	
	1. Chhattisgarh (13)	Chhattisgarh (131)
	2. Jharkhand (5)	Southern (51)
	3. Maharashtra (14)	Eastern (146)
	4. Orissa (19)	Southern (192),Northern (193)
8	**Central Plateau and Hill Region**	
	1. Madhya Pradesh (13)	Vindhyan (132), Central (133), South (135), South Western (136),Northern (137)
	2. Rajasthan (21)	North east (212),Southern (213),South eastern (214)
	3. Southern U.P. (25)	Southern (255)
9	**Western Plateau and Hill Region**	
	1. Madhya Pradesh (13)	Malwa (134)
	2. Maharashtra (14)	Inland Western (142),Inland Northern (143),Inland Central (144),Inland Eastern (145)
10	**Southern Plateau and Hill Region**	
	1. Andhra Pradesh (2)	Inland Northern (22),South Western (23),Inland Southern (24)
	2. Karnataka (11)	Island Southern (113),Island Northern (114)
	3.Tamil Nadu (23)	Coastal (232),Inland (234)
11	**East Coast Plain and Hill Region**	
	1. Tamil Nadu (23)	Coastal Northern (231),
	2. Andhra Pradesh (2)	Coastal (21)
	3. Orissa (19)	Coastal (191)
	4. Pondicherry (33)	Pondicherry (331)
12	**Western Plain and Ghat Region**	
	1. Goa (6)	Goa (61)
	2. Karnataka (11)	Coastal & Ghats (111),Island Eastern (112)
	3. Maharashtra (14)	Coastal (141)
	4. Tamil Nadu (23)	Southern (233)
	5. Kerala (12)	Northern (121),Southern (122)
13	**Gujarat Plain and Hill Region**	
	1. Gujarat (7)	Eastern (71),Plain Northern (72),Plain Southern (73),Dry Areas (74),Saurashtra (75)
	2. Dadra and Nagar Haveli (29)	Dadra and Nagar Haveli (291)
	3. Daman and Diu (30)	Daman and Diu (301)
14	**Western Dry Region**	
	1. Rajasthan (21)	Western (211)

Note: Agro climatic regions and their constituents have been taken from the papers written by Dr. Anwar Alam (n.d.) 'long term mechanization strategy papers for different agro climatic regions'. For regional analysis, NSS regions (given in 50th and 61st rounds) have been grouped into different agro climatic regions.

Districts falling in agro climatic regions and NSS regions are almost same.

Appendix B

Appendix 3.1

Age Wise Average Monthly Per Capita Consumption Of Commodities (Kg)* Over NSS 50th And 61st Rounds

Age Group	Sex of individuals	Cereal		Wheat		Rice		Coarse cereal		Pulses		Milk liquid (liter)		Vegetables		Fruits		Fruits (no)		Meat		Egg (no)		Fish		Edible Oil	
		1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
Children (0-12)	Male	12.81	11.67	4.47	4.38	6.16	5.78	1.91	1.27	0.70	0.65	3.69	3.56	4.46	4.94	0.20	0.28	2.33	2.37	0.12	0.14	0.53	0.85	0.15	0.16	0.34	0.44
	Female	12.70	11.56	4.21	4.27	6.24	5.82	1.96	1.23	0.68	0.64	3.49	3.31	4.36	4.85	0.20	0.27	2.28	2.35	0.12	0.12	0.54	0.85	0.15	0.16	0.33	0.43
	Total	12.76	11.62	4.34	4.33	6.20	5.80	1.93	1.25	0.69	0.65	3.59	3.44	4.41	4.90	0.20	0.28	2.30	2.36	0.12	0.13	0.53	0.85	0.15	0.16	0.33	0.44
Teenagers (13-19)	Male	14.09	12.66	4.79	4.62	6.93	6.44	2.04	1.31	0.79	0.72	4.33	4.04	4.83	5.29	0.23	0.31	2.83	2.72	0.13	0.13	0.66	1.00	0.18	0.20	0.39	0.49
	Female	13.82	12.48	4.28	4.28	7.25	6.60	1.96	1.31	0.78	0.71	4.09	3.87	4.74	5.25	0.23	0.30	2.89	2.77	0.13	0.14	0.70	1.02	0.21	0.20	0.38	0.49
	Total	13.97	12.58	4.56	4.47	7.07	6.51	2.00	1.31	0.78	0.71	4.22	3.96	4.79	5.27	0.23	0.30	2.86	2.74	0.13	0.14	0.68	1.01	0.19	0.20	0.38	0.49
Adults (20-59)	Male	13.69	12.30	4.23	4.07	7.14	6.66	1.98	1.28	0.79	0.73	4.06	4.04	4.97	5.45	0.23	0.32	2.95	3.11	0.13	0.15	0.71	1.12	0.20	0.22	0.39	0.51
	Female	13.55	12.21	4.13	3.95	7.11	6.71	1.98	1.26	0.78	0.73	3.98	3.98	4.91	5.41	0.22	0.30	2.89	3.11	0.13	0.14	0.69	1.11	0.20	0.23	0.39	0.50
	Total	13.62	12.25	4.18	4.01	7.13	6.68	1.98	1.27	0.79	0.73	4.02	4.01	4.94	5.43	0.22	0.31	2.92	3.11	0.13	0.15	0.70	1.12	0.20	0.22	0.39	0.51
Elders (Above 59)	Male	14.08	12.58	4.81	4.41	6.88	6.61	2.07	1.28	0.85	0.79	4.68	4.75	5.12	5.61	0.22	0.32	3.06	3.27	0.12	0.13	0.65	1.00	0.19	0.22	0.40	0.53
	Female	13.71	12.34	4.49	4.16	6.83	6.59	2.05	1.30	0.82	0.78	4.32	4.37	4.99	5.45	0.21	0.31	2.95	3.26	0.11	0.12	0.61	1.01	0.19	0.22	0.39	0.53
	Total	13.89	12.46	4.65	4.28	6.85	6.60	2.06	1.29	0.83	0.78	4.51	4.56	5.05	5.53	0.22	0.31	3.00	3.27	0.11	0.12	0.64	1.01	0.19	0.22	0.40	0.53

Note: Unit in kg unless specified after food name
Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule

Appendix 3.2

Sex Wise Change In Average Monthly Per Capita Consumption Of Commodities (Kg)* Over NSS 50th And 61st Rounds

Sex of Individuals	Cereal		Wheat		Rice		Coarse cereal		Pulses		Milk liquid (liter)		Vegetables		Fruits		Fruits (no)		Meat		Egg (no)		Fish		Edible Oil	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
Male	13.47	12.17	4.43	4.27	6.75	6.34	1.97	1.28	0.76	0.71	4.01	3.94	4.79	5.27	0.22	0.31	2.72	2.82	0.12	0.14	0.64	1.01	0.18	0.20	0.37	0.49
Female	13.32	12.06	4.20	4.11	6.83	6.42	1.98	1.26	0.75	0.70	3.86	3.79	4.71	5.22	0.21	0.29	2.69	2.85	0.12	0.13	0.64	1.01	0.19	0.20	0.37	0.48

Note: Unit in kg unless specified after food name
Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule

Appendix 3.3

Marital Status Wise Change In Average Monthly Per Capita Consumption Of Commodities (Kg)* Over NSS 50th And 61st Rounds

Marital Status	Sex of Individuals	Cereal		Wheat		Rice		Coarse cereal		Pulses		Milk liquid (liter)		Vegetables		Fruits		Fruits (no)		Meat		Egg (no)		Fish		Edible Oil	
		1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
Never Married	Male	13.31	12.09	4.43	4.38	6.65	6.19	1.91	1.25	0.74	0.69	3.93	3.81	4.67	5.18	0.22	0.30	2.67	2.67	0.12	0.15	0.63	0.97	0.18	0.19	0.36	0.47
	Female	12.90	11.81	4.08	4.17	6.62	6.17	1.90	1.20	0.70	0.66	3.63	3.47	4.46	4.99	0.21	0.28	2.56	2.56	0.12	0.13	0.61	0.93	0.18	0.19	0.34	0.45
	Total	13.13	11.97	4.28	4.29	6.64	6.18	1.91	1.23	0.72	0.68	3.80	3.66	4.58	5.10	0.21	0.29	2.62	2.62	0.12	0.14	0.62	0.95	0.18	0.19	0.35	0.46
Currently Married	Male	13.62	12.23	4.38	4.12	6.89	6.52	2.03	1.31	0.79	0.73	4.11	4.09	4.89	5.35	0.22	0.32	2.81	3.03	0.13	0.14	0.66	1.07	0.18	0.21	0.39	0.51
	Female	13.61	12.23	4.42	4.16	6.85	6.50	2.02	1.30	0.79	0.73	4.15	4.12	4.87	5.36	0.22	0.30	2.78	3.03	0.13	0.14	0.65	1.06	0.18	0.21	0.38	0.50
	Total	13.61	12.23	4.40	4.14	6.87	6.51	2.02	1.30	0.79	0.73	4.13	4.10	4.88	5.35	0.22	0.31	2.80	3.03	0.13	0.14	0.66	1.06	0.18	0.21	0.38	0.50
Widow/ /Divorce/ Separated	Male	14.33	12.82	5.23	4.85	6.79	6.46	2.03	1.27	0.91	0.80	4.07	4.22	5.51	6.00	0.24	0.30	2.46	2.71	0.12	0.11	0.52	0.86	0.15	0.15	0.41	0.53
	Female	13.77	12.33	3.51	3.42	7.74	7.24	2.15	1.36	0.79	0.76	3.38	3.55	5.13	5.63	0.19	0.27	2.84	3.34	0.11	0.13	0.69	1.19	0.21	0.25	0.40	0.54
	Total	13.92	12.45	3.97	3.77	7.49	7.05	2.12	1.33	0.82	0.77	3.56	3.72	5.23	5.72	0.20	0.28	2.74	3.19	0.11	0.12	0.65	1.11	0.20	0.23	0.40	0.53

Note: Unit in kg unless specified after food name
Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule

Appendix 3.4

Household Size Wise Change In Average Monthly Per Capita Consumption Of Commodities (Kg)* Over NSS 50th And 61st Rounds

Household Size	Cereal		Wheat		Rice		Coarse cereal		Pulses		Milk liquid (liter)		Vegetables		Fruits		Fruits (no)		Meat		Egg (no)		Fish		Edible Oil	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
1-4	13.96	12.39	3.83	3.46	7.90	7.43	1.87	1.18	0.87	0.80	3.98	4.06	5.77	6.13	0.24	0.33	3.46	3.81	0.14	0.16	0.87	1.45	0.25	0.28	0.44	0.58
5-6	13.11	12.05	4.08	3.99	6.71	6.48	2.01	1.30	0.72	0.68	3.82	3.69	4.47	5.09	0.21	0.30	2.59	2.74	0.12	0.14	0.63	0.97	0.18	0.20	0.36	0.48
7-8	13.24	12.07	4.71	4.83	6.24	5.66	2.02	1.35	0.69	0.65	3.88	3.73	4.22	4.72	0.20	0.26	2.25	2.14	0.11	0.11	0.47	0.72	0.14	0.14	0.33	0.42
Above 8	13.22	11.80	5.31	5.27	5.60	5.00	2.00	1.28	0.73	0.67	4.23	4.09	4.23	4.60	0.20	0.29	2.20	2.08	0.11	0.11	0.45	0.62	0.11	0.12	0.32	0.41

Note: Unit in kg unless specified after food name
Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule

Appendix 3.5

Education Wise Change In Average Monthly Per Capita Consumption Of Commodities (Kg) Over NSS 50th And 61st Rounds

Education Group	Sex of individuals	Cereal		Wheat		Rice		Coarse cereal		Pulses		Milk liquid (liter)		Vegetables		Fruits		Fruits (no)		Meat		Egg (no)		Fish		Edible Oil	
		1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
Not Literate	Male	13.38	12.02	4.50	4.28	6.44	6.10	2.18	1.43	0.72	0.66	3.35	3.28	4.59	5.04	0.18	0.26	1.90	2.14	0.12	0.12	0.47	0.83	0.13	0.14	0.33	0.44
	Female	13.46	12.15	4.48	4.36	6.52	6.13	2.20	1.44	0.74	0.68	3.56	3.45	4.62	5.08	0.19	0.27	2.03	2.25	0.11	0.12	0.47	0.81	0.13	0.14	0.35	0.45
	Total	13.43	12.10	4.49	4.32	6.49	6.12	2.19	1.43	0.73	0.67	3.48	3.38	4.61	5.06	0.18	0.26	1.97	2.21	0.12	0.12	0.47	0.82	0.13	0.14	0.34	0.45
Primary or below	Male	13.47	12.21	4.21	4.21	7.02	6.51	1.90	1.22	0.75	0.69	4.01	3.65	4.77	5.23	0.22	0.27	2.87	2.61	0.12	0.16	0.69	1.02	0.20	0.21	0.38	0.48
	Female	13.07	12.01	3.63	3.91	7.44	6.74	1.59	1.06	0.75	0.69	4.09	3.73	4.83	5.30	0.23	0.28	3.46	2.91	0.13	0.14	0.86	1.14	0.26	0.24	0.39	0.48
	Total	13.31	12.12	3.98	4.08	7.18	6.61	1.78	1.15	0.75	0.69	4.04	3.69	4.79	5.26	0.23	0.27	3.10	2.74	0.13	0.15	0.75	1.07	0.23	0.22	0.38	0.48
Secondary	Male	13.69	12.29	4.62	4.29	7.03	6.46	1.64	1.21	0.88	0.79	5.30	4.90	5.20	5.55	0.29	0.36	4.16	3.79	0.14	0.15	0.91	1.17	0.25	0.26	0.45	0.55
	Female	12.92	11.84	3.54	3.57	7.60	6.82	1.33	1.06	0.85	0.79	5.40	4.85	5.05	5.50	0.33	0.39	5.61	4.52	0.16	0.19	1.26	1.40	0.39	0.36	0.48	0.56
	Total	13.46	12.13	4.29	4.03	7.20	6.59	1.54	1.16	0.87	0.79	5.33	4.88	5.16	5.53	0.30	0.37	4.60	4.05	0.14	0.16	1.02	1.26	0.29	0.29	0.46	0.55
Higher	Male	13.38	12.30	4.85	4.89	6.98	6.24	0.99	0.73	1.00	0.92	7.56	7.05	6.07	6.26	0.41	0.82	6.45	5.18	0.16	0.17	1.47	1.66	0.25	0.26	0.54	0.63
	Female	12.35	11.45	3.74	4.08	7.42	6.50	0.57	0.37	0.95	0.96	8.05	7.37	6.09	6.25	0.56	0.68	8.38	8.00	0.21	0.22	2.16	2.45	0.48	0.50	0.58	0.64
	Total	13.20	12.08	4.66	4.69	7.06	6.31	0.91	0.64	0.99	0.93	7.65	7.13	6.08	6.26	0.43	0.79	6.78	5.89	0.16	0.18	1.58	1.86	0.29	0.32	0.55	0.64

Note: Unit in kg unless specified after food name
Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule

Appendix 3.6

Religion Wise Change In Average Monthly Per Capita Consumption Of Commodities (Kg) Over NSS 50th And 61st Rounds

Religion	Sex of individuals	Cereal		Wheat		Rice		Coarse cereal		Pulses		Milk liquid (liter)		Vegetables		Fruits		Fruits (no)		Meat		Egg (no)		Fish		Edible Oil	
		1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
Hindu	Male	13.62	12.26	4.45	4.36	6.72	6.23	2.13	1.41	0.78	0.72	3.97	3.98	4.77	5.19	0.22	0.30	2.62	2.76	0.09	0.11	0.56	0.88	0.16	0.17	0.38	0.49
	Female	13.45	12.15	4.20	4.18	6.79	6.31	2.14	1.40	0.77	0.71	3.83	3.84	4.68	5.14	0.21	0.28	2.57	2.77	0.09	0.10	0.55	0.88	0.16	0.17	0.37	0.48
	Total	13.54	12.21	4.33	4.28	6.75	6.27	2.14	1.41	0.77	0.72	3.90	3.91	4.73	5.17	0.21	0.29	2.60	2.77	0.09	0.11	0.56	0.88	0.16	0.17	0.37	0.48
Muslim	Male	13.06	11.95	4.14	3.46	7.59	7.56	0.92	0.52	0.65	0.61	2.63	2.52	5.09	5.81	0.24	0.35	2.86	2.74	0.36	0.32	1.11	1.85	0.29	0.38	0.34	0.46
	Female	12.96	11.87	4.05	3.43	7.59	7.53	0.90	0.50	0.64	0.60	2.50	2.42	5.10	5.70	0.24	0.35	2.89	2.81	0.35	0.31	1.11	1.82	0.30	0.40	0.34	0.46
	Total	13.01	11.91	4.10	3.44	7.59	7.55	0.91	0.51	0.65	0.61	2.56	2.47	5.10	5.76	0.24	0.35	2.87	2.77	0.35	0.32	1.11	1.83	0.30	0.39	0.34	0.46
Christian	Male	12.03	11.36	0.80	0.74	10.48	10.08	0.50	0.21	0.52	0.56	2.23	2.37	4.03	5.13	0.24	0.33	5.68	6.72	0.36	0.51	1.79	2.28	0.61	0.79	0.31	0.45
	Female	11.96	11.13	0.80	0.73	10.44	9.88	0.48	0.20	0.51	0.56	2.29	2.39	3.94	5.15	0.21	0.33	5.78	6.69	0.35	0.50	1.85	2.30	0.63	0.83	0.31	0.45
	Total	12.00	11.24	0.80	0.74	10.46	9.98	0.49	0.20	0.51	0.56	2.26	2.38	3.99	5.14	0.23	0.33	5.73	6.70	0.36	0.51	1.82	2.29	0.62	0.81	0.31	0.45
Others	Male	11.64	10.86	7.24	7.17	2.45	2.50	1.82	1.07	0.84	0.82	10.91	9.22	4.85	5.60	0.22	0.36	3.21	2.39	0.11	0.10	0.56	0.64	0.07	0.04	0.43	0.60

Female	11.59	10.72	7.01	6.98	2.59	2.62	1.86	1.01	0.83	0.80	10.43	8.69	4.85	5.54	0.22	0.35	3.20	2.31	0.11	0.10	0.53	0.59	0.07	0.04	0.43	0.59
Total	11.61	10.79	7.13	7.08	2.52	2.56	1.84	1.04	0.83	0.81	10.68	8.96	4.85	5.57	0.22	0.36	3.21	2.35	0.11	0.10	0.55	0.62	0.07	0.04	0.43	0.59

Note: Unit in kg unless specified after food name
Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule

Appendix 3.7

Social Group Wise Change In Average Monthly Per Capita Consumption Of Commodities (Kg) Over NSS 50th And 61st Rounds

Social Group	Cereal		Wheat		Rice		Coarse cereal		Pulses		Milk liquid (liter)		Vegetables		Fruits		Fruits (no)		Meat		Egg (no)		Fish		Edible Oil	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
Scheduled Tribe	13.42	12.19	2.07	2.25	7.99	7.39	3.08	2.34	0.68	0.60	1.74	1.60	4.29	4.63	0.19	0.19	1.63	1.72	0.16	0.17	0.46	0.94	0.16	0.16	0.31	0.41
Scheduled Caste	13.26	12.14	4.52	4.62	6.64	6.21	1.81	1.08	0.67	0.66	2.56	2.65	4.66	5.16	0.15	0.25	1.80	2.13	0.10	0.11	0.53	0.92	0.17	0.17	0.32	0.45
Others	13.43	12.10	4.61	4.36	6.65	6.27	1.84	1.16	0.80	0.74	4.71	4.59	4.86	5.37	0.24	0.33	3.16	3.23	0.12	0.14	0.70	1.05	0.19	0.22	0.39	0.51

Note: Unit in kg unless specified after food name
Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule

Appendix 3.8

MPCE Classes Wise Change In Average Monthly Per Capita Consumption Of Commodities (Kg) Over NSS 50th And 61st Rounds

MPCE Groups (%)	Cereal		Wheat		Rice		Coarse cereal		Pulses		Milk liquid (liter)		Vegetables		Fruits		Fruits (no)		Meat		Egg (no)		Fish		Edible Oil	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
5	9.68	9.82	2.65	2.49	3.96	6.01	2.97	1.21	0.40	0.42	0.39	0.39	2.64	3.16	0.06	0.19	0.46	0.51	0.03	0.04	0.08	0.26	0.05	0.07	0.16	0.24
10	11.29	10.87	3.41	3.41	5.36	5.95	2.39	1.36	0.50	0.48	0.76	0.86	3.32	3.78	0.08	0.19	0.70	0.84	0.05	0.05	0.15	0.33	0.07	0.09	0.22	0.29
20	12.03	11.33	3.46	3.52	6.25	6.19	2.13	1.44	0.55	0.52	1.13	1.21	3.72	4.23	0.10	0.14	0.94	1.12	0.07	0.07	0.25	0.57	0.10	0.10	0.24	0.35
30	12.63	11.70	3.52	3.92	6.81	6.24	2.11	1.36	0.61	0.58	1.67	1.77	4.06	4.52	0.12	0.17	1.30	1.48	0.08	0.08	0.34	0.61	0.11	0.12	0.27	0.38
40	13.20	11.98	3.67	4.02	7.30	6.24	1.96	1.49	0.65	0.62	2.13	2.42	4.34	4.83	0.13	0.19	1.63	1.90	0.10	0.09	0.41	0.72	0.14	0.14	0.30	0.42
50	13.33	12.16	4.00	4.06	7.22	6.43	1.85	1.41	0.71	0.67	2.76	2.87	4.55	5.18	0.15	0.23	1.99	2.20	0.10	0.10	0.52	0.86	0.16	0.17	0.33	0.45
60	13.72	12.37	4.21	4.37	7.27	6.43	1.89	1.33	0.75	0.70	3.44	3.74	4.89	5.40	0.17	0.26	2.31	2.50	0.12	0.12	0.61	0.92	0.18	0.18	0.37	0.48
70	14.07	12.61	4.47	4.44	7.38	6.53	1.86	1.34	0.79	0.74	4.28	4.39	5.14	5.68	0.22	0.29	2.90	2.99	0.13	0.13	0.71	1.09	0.20	0.21	0.40	0.53
80	14.40	12.77	4.89	4.53	7.31	6.81	1.82	1.12	0.87	0.79	5.40	5.26	5.37	5.91	0.26	0.36	3.48	3.53	0.15	0.17	0.78	1.36	0.24	0.26	0.44	0.57
90	14.59	12.72	5.64	4.85	6.68	6.42	1.83	1.05	0.95	0.88	7.22	6.80	5.73	6.15	0.33	0.43	4.58	4.51	0.18	0.26	1.00	1.48	0.29	0.28	0.51	0.61

95	14.98	12.77	5.83	5.22	6.92	6.08	1.69	1.02	1.09	0.97	9.40	9.02	6.23	6.65	0.48	0.58	6.01	5.86	0.21	0.23	1.25	1.76	0.31	0.35	0.55	0.70
100	15.78	13.50	6.63	5.30	6.98	6.89	1.52	0.72	1.36	1.23	11.92	10.20	7.10	7.56	0.69	0.89	8.64	9.11	0.31	0.40	1.99	2.61	0.38	0.60	0.74	0.90

Note: Unit in kg unless specified after food name
Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule

Appendix 3.9
Poverty Group Wise Change In Average Monthly Per Capita Consumption Of Commodities (Kg) Over NSS 50th And 61st Rounds

Poverty Group	Cereal		Wheat		Rice		Coarse cereal		Pulses		Milk liquid (liter)		Vegetables		Fruits		Fruits (no)		Meat		Egg (no)		Fish		Edible Oil	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
BPL	12.01	11.05	3.69	3.66	6.07	5.94	2.05	1.28	0.55	0.51	1.41	1.22	3.87	4.12	0.10	0.17	1.09	1.02	0.07	0.06	0.26	0.47	0.11	0.12	0.25	0.33
APL	14.20	12.53	4.68	4.40	7.21	6.54	1.93	1.27	0.88	0.78	5.41	4.90	5.27	5.69	0.28	0.35	3.65	3.54	0.15	0.17	0.86	1.22	0.22	0.23	0.44	0.55

Note: Unit in kg unless specified after food name
Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule

Appendix 3.10
Occupation Type Wise Change In Average Monthly Per Capita Consumption Of Commodities (Kg) Over NSS 50th And 61st Rounds

Occupation Type	Cereal		Wheat		Rice		Coarse cereal		Pulses		Milk liquid (liter)		Vegetables		Fruits		Fruits (no)		Meat		Egg (no)		Fish		Edible Oil	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
Self employed in non agriculture	12.77	11.99	4.17	4.35	7.11	6.54	1.13	0.76	0.71	0.69	3.42	3.54	5.01	5.54	0.25	0.34	3.35	3.22	0.16	0.16	0.86	1.22	0.24	0.25	0.38	0.50
Agricultural Labor	12.89	11.87	3.10	2.99	7.27	7.03	2.26	1.60	0.63	0.62	1.76	1.74	4.32	4.67	0.13	0.18	1.66	2.05	0.10	0.11	0.48	0.95	0.17	0.17	0.30	0.43
Other Labor	12.32	11.44	3.83	3.86	6.40	6.16	1.83	1.19	0.65	0.60	2.49	2.59	4.23	4.54	0.16	0.21	2.78	2.79	0.13	0.13	0.69	1.08	0.22	0.29	0.36	0.43
Self employed in agriculture	14.39	12.67	5.46	4.94	6.49	6.03	2.09	1.45	0.86	0.78	5.65	5.48	5.05	5.53	0.26	0.34	2.76	2.84	0.12	0.14	0.54	0.84	0.15	0.16	0.39	0.51
Others	12.51	11.35	4.36	4.31	6.79	6.06	0.94	0.60	0.83	0.78	5.13	4.82	5.46	5.88	0.32	0.45	4.66	4.40	0.17	0.18	1.15	1.48	0.25	0.29	0.46	0.56

Note: Unit in kg unless specified after food name
Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule

Appendix 3.11

Agro Climatic Regions Wise Change In Average Monthly Per Capita Consumption Of Commodities (Kg) Over NSS 50th And 61st Rounds

Agro Climatic Regions	Cereal		Wheat		Rice		Coarse cereal		Pulses		Milk liquid (liter)		Vegetables		Fruits		Fruits (no)		Meat		Egg (no)		Fish		Edible Oil	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
West Himalayan	13.63	12.33	6.55	5.11	4.57	5.98	2.44	0.95	1.11	0.95	7.42	7.71	4.63	5.04	0.25	0.36	2.17	2.33	0.08	0.19	0.44	0.80	0.01	0.01	0.45	0.59
East Himalayan	13.53	12.81	0.83	0.54	12.18	11.93	0.10	0.03	0.49	0.57	1.22	1.28	5.92	7.32	0.15	0.21	4.05	3.24	0.22	0.31	1.16	2.43	0.43	0.53	0.30	0.45
Lower Gangetic Plain	14.93	13.34	0.97	0.89	12.64	11.75	0.05	0.00	0.42	0.39	1.55	1.43	7.43	7.69	0.17	0.26	2.27	2.12	0.15	0.20	1.75	2.72	0.56	0.66	0.36	0.49
Middle Gangetic Plain	14.09	13.07	7.02	6.17	6.23	6.28	0.59	0.34	0.88	0.81	3.26	3.06	6.00	6.39	0.17	0.30	1.91	1.85	0.07	0.07	0.14	0.32	0.10	0.11	0.32	0.43
Upper Gangetic Plain	13.85	12.80	9.97	9.30	2.82	2.93	0.95	0.40	0.94	0.80	6.65	5.75	5.90	6.05	0.49	0.54	2.10	2.14	0.16	0.11	0.20	0.44	0.03	0.03	0.42	0.49
Trans Gangetic Plains	11.78	10.26	10.66	9.14	0.80	0.76	0.23	0.31	0.77	0.72	13.89	12.18	5.03	5.30	0.32	0.41	3.62	2.50	0.07	0.05	0.33	0.56	0.00	0.00	0.40	0.52
Eastern Plateau and Hill	14.63	12.96	1.12	1.38	12.60	11.11	0.59	0.23	0.66	0.58	0.88	0.92	5.35	5.62	0.23	0.23	1.10	1.14	0.10	0.11	0.23	0.54	0.13	0.12	0.28	0.36
Central Plateau and Hill	14.51	12.23	9.36	8.79	1.97	1.70	3.06	1.65	0.87	0.67	5.79	5.71	3.57	3.87	0.19	0.24	1.21	1.89	0.05	0.04	0.10	0.29	0.02	0.02	0.36	0.43
Western Plateau and Hill	11.86	10.79	3.16	4.31	1.32	1.50	7.22	4.76	0.96	0.87	3.00	3.27	2.95	3.77	0.19	0.29	2.70	3.33	0.12	0.18	0.55	0.75	0.02	0.02	0.46	0.63
Southern Plateau and Hill	12.45	11.53	1.36	0.42	6.65	8.39	4.15	2.42	0.81	0.75	3.28	2.80	3.57	3.63	0.14	0.20	3.42	3.93	0.17	0.22	0.79	1.47	0.08	0.03	0.44	0.48
East Coast Plain and Hill	13.43	12.40	0.20	0.31	12.22	11.49	0.66	0.22	0.56	0.69	2.12	2.57	3.96	5.29	0.14	0.28	3.05	4.27	0.13	0.17	1.15	1.98	0.25	0.20	0.33	0.49
Western Plain and Ghat	10.67	9.85	0.64	0.67	9.35	8.44	0.33	0.37	0.53	0.65	2.22	2.74	2.98	3.65	0.31	0.28	7.45	8.12	0.18	0.26	1.63	2.00	0.94	1.14	0.32	0.44
Gujarat Plain and Hill	10.26	10.04	2.07	3.59	4.58	1.83	1.51	4.36	0.72	0.78	1.75	4.95	3.20	4.33	0.11	0.34	1.66	2.40	0.13	0.05	0.51	0.28	1.50	0.03	0.55	0.82
Western Dry	14.61	12.85	8.00	6.06	0.13	0.10	6.47	6.66	0.61	0.53	12.38	10.67	3.40	3.27	0.07	0.30	0.73	1.03	0.04	0.03	0.02	0.03	0.00	0.00	0.37	0.41

Note: Unit in kg unless specified after food name
Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule

Appendix 3.12

State Wise Change In Average Monthly Per Capita Consumption Of Commodities (Kg) Over NSS 50th And 61st Rounds

States	Cereal		Wheat		Rice		Coarse cereal		Pulses		Milk liquid (liter)		Vegetables		Fruits		Fruits (no)		Meat		Egg (no)		Fish		Edible Oil	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
Andhra Pradesh	13.27	12.03	0.12	0.14	11.26	10.95	1.51	0.72	0.70	0.70	2.62	3.05	3.31	4.09	0.19	0.29	3.17	4.35	0.23	0.25	1.44	2.25	0.10	0.07	0.40	0.55
Arunachal Pradesh	15.16	14.63	0.44	0.32	11.47	13.30	2.74	0.64	0.58	0.56	0.43	0.63	5.32	7.13	0.06	0.20	4.60	4.98	0.74	0.67	1.02	2.43	0.32	0.42	0.17	0.51
Assam	13.16	13.04	0.61	0.53	12.12	12.21	0.00	0.00	0.51	0.62	1.21	1.31	5.59	7.21	0.12	0.14	3.79	3.30	0.18	0.23	1.12	2.32	0.43	0.58	0.31	0.46
Bihar*	14.31	13.08	5.53	4.76	7.74	7.47	0.78	0.48	0.72	0.67	2.39	2.62	6.22	6.70	0.11	0.22	1.73	1.83	0.08	0.07	0.14	0.30	0.12	0.14	0.30	0.41
Goa	9.53	9.00	2.14	1.46	6.56	6.55	0.02	0.28	0.65	0.31	2.59	3.19	2.40	2.77	0.79	0.21	11.00	8.27	0.30	0.35	3.69	1.46	1.37	1.64	0.41	0.49
Gujarat	10.66	10.07	3.95	3.61	1.92	1.81	4.66	4.38	0.87	0.78	5.07	4.98	4.31	4.34	0.17	0.34	1.94	2.39	0.06	0.05	0.17	0.27	0.03	0.02	0.69	0.82
Haryana	12.92	10.66	11.80	9.48	0.73	0.67	0.30	0.46	0.62	0.59	13.82	13.13	4.37	4.84	0.31	0.44	3.48	2.89	0.07	0.06	0.08	0.66	0.00	0.00	0.27	0.38
Himachal Pradesh	13.37	12.06	6.21	5.99	3.63	4.07	3.47	1.87	1.08	1.20	7.52	8.72	3.58	3.91	0.31	0.34	1.65	1.72	0.09	0.09	0.22	0.39	0.00	0.00	0.45	0.60
Jammu & Kashmir	14.84	13.18	7.62	2.78	4.71	9.30	2.45	0.48	1.13	0.68	7.26	8.02	3.87	6.28	0.32	0.46	2.16	2.64	0.09	0.40	0.63	1.40	0.00	0.01	0.49	0.67
Karnataka	13.15	10.73	0.63	0.76	5.25	5.13	6.86	4.36	0.79	0.76	2.88	3.30	3.19	3.43	0.10	0.20	4.24	4.63	0.15	0.18	0.89	1.28	0.14	0.11	0.29	0.44
Kerala	10.11	9.53	0.56	0.62	9.22	8.42	0.00	0.01	0.43	0.59	2.61	2.82	2.81	3.75	0.37	0.40	9.94	11.22	0.23	0.35	2.00	2.42	1.35	1.88	0.30	0.42
Madhya Pradesh*	14.20	11.68	5.75	2.57	5.93	7.05	2.37	1.73	0.97	0.66	2.76	4.02	4.03	4.86	0.25	0.27	1.25	3.53	0.07	0.18	0.15	1.42	0.06	0.28	0.37	0.51
Maharashtra	11.39	10.49	2.09	3.27	2.83	2.85	6.21	4.12	0.93	0.88	2.50	2.73	2.95	3.77	0.22	0.27	2.89	3.47	0.12	0.19	0.61	0.86	0.11	0.06	0.47	0.66
Manipur	15.93	15.69	0.00	0.01	15.72	15.56	0.16	0.02	0.49	0.45	0.12	0.17	4.11	6.07	0.13	0.28	3.32	2.56	0.32	0.32	0.84	1.33	0.41	0.41	0.20	0.59
Meghalaya	12.27	11.32	0.21	0.08	11.76	10.93	0.09	0.14	0.38	0.31	1.32	0.77	6.51	6.94	0.14	0.24	2.98	2.65	0.62	0.74	1.04	1.73	0.34	0.50	0.37	0.36
Mizoram	13.22	13.24	0.04	0.04	12.02	12.99	0.79	0.08	0.89	0.57	0.69	0.40	8.98	12.76	0.52	0.29	5.78	2.39	0.70	0.91	0.91	1.62	0.24	0.16	0.38	0.51
Nagaland	14.99	12.43	0.03	0.03	14.67	12.05	0.22	0.19	0.56	0.86	0.25	0.29	6.58	7.55	0.81	0.28	4.09	3.26	1.12	1.89	1.74	2.79	0.26	0.23	0.21	0.19
Orissa	15.93	13.98	0.33	0.45	14.69	12.80	0.31	0.15	0.45	0.50	0.77	0.78	5.44	5.98	0.18	0.30	1.62	1.78	0.07	0.08	0.29	0.74	0.30	0.27	0.22	0.28
Punjab	10.78	9.92	9.79	8.94	0.73	0.75	0.18	0.17	0.89	0.84	14.33	11.54	5.41	5.58	0.28	0.37	3.02	2.04	0.06	0.03	0.47	0.41	0.00	0.00	0.50	0.66
Rajasthan	14.84	12.68	9.39	8.45	0.22	0.17	5.18	4.01	0.64	0.51	10.41	9.50	3.19	3.40	0.13	0.26	1.24	1.91	0.05	0.04	0.07	0.09	0.00	0.00	0.35	0.42
Sikkim	11.41	11.22	0.77	0.54	9.79	10.20	0.69	0.36	0.50	0.49	4.77	5.57	4.51	6.04	0.11	0.14	2.07	1.31	0.49	0.48	1.73	1.30	0.01	0.05	0.42	0.52
Tamil Nadu	11.71	10.88	0.24	0.20	10.31	10.14	1.06	0.39	0.68	0.78	2.12	2.48	3.45	3.84	0.11	0.13	4.44	4.39	0.17	0.20	1.06	1.59	0.17	0.12	0.33	0.44
Tripura	11.94	12.24	0.16	0.14	11.28	11.70	0.00	0.00	0.49	0.38	1.43	1.07	9.81	5.44	0.29	0.72	8.23	3.99	0.11	0.20	1.48	1.64	0.90	0.69	0.37	0.40
Uttar Pradesh*	13.91	12.87	9.08	8.35	3.92	4.06	0.75	0.28	0.98	0.85	5.44	4.73	5.75	5.97	0.36	0.45	1.93	1.86	0.12	0.09	0.21	0.43	0.04	0.05	0.39	0.47
West Bengal	14.96	13.18	1.12	0.92	12.59	11.60	0.05	0.00	0.42	0.41	1.54	1.45	7.25	7.80	0.17	0.26	2.38	2.21	0.14	0.20	1.69	2.84	0.54	0.63	0.35	0.48
A&N Island	11.67	10.28	1.74	0.95	9.68	9.11	0.00	0.00	0.99	0.80	1.63	1.45	4.07	5.32	0.26	0.28	13.24	9.27	0.39	0.30	3.35	4.17	1.41	1.21	0.64	0.74
Chandigarh	9.57	9.43	7.05	7.04	2.08	2.23	0.18	0.08	0.84	1.07	8.64	8.18	5.34	6.85	0.56	0.50	5.05	2.03	0.09	0.10	0.31	0.55	0.02	0.02	0.60	0.68
Dadra & Nagar	9.88	7.72	1.60	0.82	4.39	4.99	1.11	1.25	0.74	1.01	1.08	0.87	2.82	3.26	0.08	0.25	1.68	2.80	0.08	0.15	0.35	0.53	0.40	0.16	0.46	0.64
Daman & Diu	11.17	6.99	3.16	2.78	5.02	1.66	2.45	1.39	0.68	0.83	3.35	3.55	4.08	3.68	0.17	0.64	1.62	4.46	0.23	0.18	0.90	1.16	4.12	0.88	0.76	0.79
Delhi	10.51	9.23	7.37	6.61	2.76	2.42	0.01	0.00	1.12	0.82	8.69	6.54	9.09	8.44	1.04	0.53	14.65	3.90	0.26	0.08	1.85	1.61	0.03	0.04	0.74	0.69
Lakshadweep	13.19	11.13	0.83	0.69	11.29	9.36	0.00	0.00	0.46	0.62	0.29	0.22	1.72	2.91	0.74	0.26	19.30	16.20	0.33	0.84	2.20	5.96	3.60	3.85	0.58	0.75
Pondicherry	12.15	10.61	0.13	0.20	11.66	10.05	0.21	0.23	0.77	0.87	2.99	2.92	3.06	4.20	0.03	0.18	2.70	4.00	0.20	0.23	1.09	2.64	0.69	0.25	0.36	0.59

Note: Unit in kg unless specified after food name
Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule

Appendix C

Appendix 4.1

Calorie Share (%) Of Various Food Items Between 1993/94 And 2004/05 Among Marital Status, Family Size, Social, Religion and Education Groups

SED Groups/Food Items	Rice		Wheat		Coarse cereals		Total Cereals		Root and Tubers		Sugar and honey		Pulses, nuts and oilseeds		Vegetables and fruits		Meat, eggs and fish		Milk and milk products		Oils and fats		Misc.* food, food products and beverages		Total Calories (Kcal)	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
Marital Status																										
Never Married	52.76	53.58	33.02	36.45	14.20	9.97	71.57	68.26	2.65	2.98	4.77	4.70	4.81	4.38	1.99	2.52	0.68	0.75	6.10	6.22	5.24	7.15	2.18	3.04	2095.48	2000.39
Currently Married	52.65	55.16	32.82	34.51	14.52	10.33	70.86	67.07	2.65	2.92	4.86	4.86	5.03	4.55	2.05	2.69	0.67	0.77	6.33	6.68	5.44	7.56	2.10	2.89	2193.89	2080.85
Widow/Divorced/Separated	56.09	58.60	28.99	30.99	14.90	10.41	71.12	66.75	2.68	2.95	4.71	4.91	5.15	4.82	2.12	2.85	0.67	0.76	5.36	5.98	5.54	7.72	2.65	3.26	2235.98	2128.90
Household Size																										
1-4	58.90	62.08	27.96	28.71	13.12	9.21	69.06	64.37	4.86	2.96	4.86	4.87	5.33	4.94	2.42	3.19	0.82	0.95	5.81	6.30	5.92	8.06	3.02	4.37	2312.01	2198.97
5-6	53.43	55.81	31.57	33.74	14.99	10.45	71.70	68.61	4.80	2.89	4.80	4.72	4.80	4.23	1.98	2.59	0.70	0.78	6.15	6.27	5.34	7.29	1.97	2.62	2087.88	2004.70
7-8	49.15	48.65	35.96	40.54	14.88	10.81	72.95	70.37	4.71	2.96	4.71	4.64	4.61	4.11	1.76	2.12	0.56	0.60	6.29	6.46	4.88	6.64	1.64	2.10	2070.37	1953.55
Above 8	44.57	44.16	40.61	45.34	14.81	10.49	72.11	68.72	4.89	3.06	4.89	4.97	4.89	4.59	1.66	2.06	0.49	0.54	6.79	7.05	4.82	7.03	1.60	1.99	2090.86	1954.72
Social Group																										
Scheduled Tribe	61.64	62.37	15.67	18.68	22.64	18.95	77.13	73.56	1.92	2.37	3.67	3.64	4.42	3.58	2.19	2.10	0.74	0.79	2.97	3.06	4.82	6.61	2.14	4.29	1992.7	1895.02
Scheduled Caste	52.24	52.95	34.37	38.45	13.38	8.60	74.90	71.12	2.76	3.14	4.22	4.45	4.34	4.06	1.87	2.20	0.63	0.67	4.26	4.66	4.90	6.99	2.12	2.70	2022.7	1948.09
Others	51.73	53.88	34.90	36.85	13.36	9.27	69.31	65.80	2.73	2.98	5.14	5.04	5.18	4.73	2.05	2.81	0.68	0.78	7.16	7.40	5.56	7.59	2.19	2.88	2211.5	2096.54
Religious Group																										
Hindu	52.12	53.22	32.45	35.62	15.42	11.16	71.57	68.00	2.59	2.87	4.71	4.72	4.98	4.48	1.99	2.51	0.58	0.62	6.08	6.46	5.37	7.38	2.12	2.95	2158.69	2047.58
Muslim	61.11	65.99	31.98	29.84	6.90	4.17	72.97	68.89	3.13	3.52	4.28	4.20	4.41	4.52	2.22	3.07	1.36	1.60	4.24	4.27	5.12	7.10	2.26	2.83	2041.23	1978.58
Christian	88.32	90.12	7.70	8.08	3.89	1.80	69.32	62.28	3.78	3.73	4.31	4.09	5.23	4.97	2.73	5.12	2.35	2.64	3.96	5.15	4.65	6.60	3.66	5.42	1988.59	2074.92
Others	22.36	24.29	61.93	66.10	15.63	9.61	57.33	56.53	2.19	2.59	9.37	9.25	5.06	4.06	2.09	2.13	0.39	0.33	15.47	13.84	5.85	8.53	2.24	2.75	2306.71	2176.95
Education Group																										
Not Literate	50.29	52.31	33.74	32.61	15.96	11.48	73.34	69.91	2.59	2.96	4.47	4.56	4.65	4.15	1.88	2.25	0.56	0.61	5.59	5.81	5.03	7.04	1.88	2.71	2089.18	1973.49
Primary or below	56.49	56.60	30.43	31.15	13.07	9.16	70.35	68.15	2.66	2.98	5.00	4.74	5.00	4.34	2.11	2.58	0.78	0.83	6.29	6.17	5.48	7.35	2.32	2.86	2161.92	2030.57
Secondary	56.06	56.47	32.72	30.84	11.20	9.27	65.96	63.43	2.85	2.87	5.61	5.22	5.75	5.22	2.31	3.25	0.90	0.94	7.69	7.61	6.15	7.93	2.78	3.53	2332.46	2183.49
Graduate or above	56.40	54.59	36.80	36.83	6.79	5.16	59.92	57.91	2.93	3.02	5.84	5.59	6.10	5.56	2.80	3.85	0.91	1.02	10.25	10.13	7.04	8.51	4.20	4.40	2517.35	2383.20

Note: *Miscellaneous

Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule

Appendix 4.2

Calorie Share (%) Of Various Food Items Between 1993/94 And 2004/05 Across Different MPCE Classes

SED Groups/Food Items	Rice		Wheat		Coarse cereals		Total Cereals		Root and Tubers		Sugar and honey		Pulses, nuts and oilseeds		Vegetables and fruits		Meat, eggs and fish		Milk and milk products		Oils and fats		Misc.* food, food products and beverages		Total Calories (Kcal)	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
MPCE Groups (%)																										
5	42.26	62.63	27.34	25.30	30.36	12.06	83.60	81.94	2.27	2.63	2.66	2.45	3.86	3.25	1.53	1.66	0.39	0.35	1.00	0.99	3.59	5.16	1.10	1.59	1323.85	1369.14
10	48.87	56.28	30.23	31.43	20.87	12.29	81.61	79.06	2.57	2.95	2.89	3.01	3.92	3.47	1.56	1.74	0.35	0.38	1.63	1.84	4.13	5.59	1.33	1.97	1580.65	1571.32
20	53.53	56.40	29.01	31.23	17.44	12.37	80.08	77.18	2.59	3.07	3.22	3.43	4.08	3.51	1.65	1.74	0.44	0.48	2.23	2.45	4.22	6.22	1.51	1.92	1717.41	1675.57
30	55.66	54.96	27.96	33.72	16.36	11.32	78.20	74.41	2.60	3.04	3.59	3.78	4.29	4.36	1.71	1.91	0.49	0.52	3.05	3.44	4.44	6.37	1.63	2.16	1846.34	1796.09
40	57.48	54.01	28.00	33.89	14.51	12.10	76.79	72.68	2.65	3.06	3.83	4.21	4.37	4.08	1.77	2.08	0.56	0.58	3.65	4.34	4.66	6.76	1.70	2.20	1964.16	1881.11
50	56.18	54.85	30.24	33.91	13.57	11.24	74.51	70.84	2.68	3.07	4.26	4.46	4.70	4.27	1.87	2.27	0.60	0.64	4.55	4.98	4.97	7.01	1.86	2.46	2043.12	1958.43
60	55.49	53.79	31.08	35.88	13.42	10.33	72.83	69.26	2.71	3.01	4.58	4.70	4.75	4.13	1.96	2.35	0.65	0.67	5.38	6.29	5.21	7.22	1.93	2.35	2150.45	2037.62
70	54.98	53.85	32.14	35.90	12.86	10.25	70.97	66.76	2.65	2.90	4.92	5.01	4.85	4.42	2.09	2.55	0.70	0.75	6.36	6.87	5.43	8.18	2.02	2.58	2263.52	2153.72
80	53.26	55.35	34.48	36.20	12.25	8.46	68.34	63.71	2.68	2.86	5.28	5.16	5.17	4.75	2.13	2.93	0.77	0.86	7.54	7.85	5.71	7.74	2.38	4.13	2405.06	2286.77
90	48.38	52.82	39.43	39.24	12.18	7.94	64.34	60.97	2.76	2.89	6.10	5.78	5.47	5.04	2.28	3.30	0.86	1.04	9.38	9.67	6.17	8.00	2.64	3.32	2586.37	2378.18
95	48.96	50.00	40.08	42.32	10.93	7.68	61.09	56.60	2.68	2.79	6.40	6.45	5.98	5.33	2.51	3.48	0.90	1.05	11.28	11.82	6.32	8.59	2.85	3.88	2798.04	2570.07
100	46.76	53.40	43.80	41.45	9.41	5.15	55.32	50.75	2.67	2.93	7.54	6.90	6.69	6.12	2.74	4.60	1.05	1.47	12.33	11.45	7.53	9.49	4.12	6.28	3253.13	3033.83
Poverty Line																										
Below Poverty Line	52.3	55.5	30.9	33.2	16.8	11.3	79	77	2.78	3.13	3.45	3.45	4.08	3.72	1.69	1.78	0.48	0.48	2.74	2.58	4.26	5.99	1.47	1.87	1736.63	1638.55
Above Poverty Line	53.2	54.3	33.6	36	13.2	9.76	67.9	64.9	2.6	2.9	5.39	5.17	5.3	4.7	2.17	2.86	0.76	0.84	7.62	7.54	5.81	7.77	2.47	3.3	2387.90	2202.02

Note: *Miscellaneous

Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule

Appendix 4.3

Calorie Share (%) Of Various Food Items Between 1993/94 And 2004/05 Across Different Occupation Groups And Agro Climatic Regions

SED Groups/Food Items	Rice		Wheat		Coarse cereals		Total Cereals		Root and Tubers		Sugar and honey		Pulses, nuts and oilseeds		Vegetables and fruits		Meat, eggs and fish		Milk and milk products		Oils and fats		Misc.* food, food products and beverages		Total Calories (Kcal)	
	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05	1993-94	2004-05
Occupation Type																										
Self employed in non agriculture	58.05	56.77	33.27	37.11	8.67	4.10	70.32	67.02	2.88	3.20	4.90	4.73	4.89	4.73	2.31	2.84	0.90	0.93	5.58	5.91	5.73	7.57	2.50	3.07	2076.1	2042.2
Agricultural Labor	58.46	61.16	24.26	25.61	17.25	9.70	76.69	73.37	2.52	2.69	3.86	4.15	4.37	4.00	1.92	2.31	0.67	0.70	3.09	3.20	4.71	7.08	2.17	2.50	1923.2	1848.8
Other Labor	53.95	55.56	31.62	34.42	14.41	6.91	71.80	68.96	2.68	2.91	4.83	4.85	4.85	4.22	2.10	2.71	0.85	0.99	4.31	4.70	5.60	7.01	2.97	3.65	1957.9	1892.1
Self employed in agriculture	47.41	49.41	38.44	39.60	14.14	7.28	69.89	66.19	2.68	2.98	5.07	5.06	5.09	4.61	1.90	2.53	0.53	0.63	8.07	8.48	5.21	7.35	1.54	2.18	2347.2	2180.5
Others	56.77	55.71	35.89	39.16	7.33	3.06	64.05	59.75	2.81	3.02	5.58	5.13	5.41	4.90	2.61	3.28	0.92	1.00	7.77	7.67	6.69	8.25	4.17	6.99	2232.9	2168.8
Agro Climatic Regions																										
West Himalayan	34.04	49.56	48.42	42.74	17.54	7.70	65.82	61.88	2.07	2.15	5.91	6.03	5.89	5.06	1.82	2.66	0.21	0.46	10.55	11.62	5.91	8.06	1.82	2.08	2357.5	2268.2
East Himalayan	92.92	95.11	6.32	4.64	0.69	0.25	77.25	72.49	2.27	3.01	2.98	2.95	3.05	2.90	3.32	3.37	1.49	1.87	2.19	2.89	4.44	6.84	3.02	3.66	2017.0	2033.2
Lower Gangetic Plain	92.86	92.95	6.80	7.04	0.34	0.01	77.21	73.73	4.28	5.01	2.55	2.68	2.41	2.10	2.63	2.47	1.44	1.90	2.41	2.39	4.92	7.07	2.16	2.65	2216.5	2077.9
Middle Gangetic Plain	45.91	50.11	49.92	47.31	4.15	2.58	74.39	71.95	3.90	4.44	3.28	3.29	5.17	4.68	1.87	2.17	0.31	0.36	5.05	4.94	4.54	6.28	1.48	1.89	2168.1	2079.4
Upper Gangetic Plain	20.93	23.60	72.49	73.39	6.58	3.01	66.27	64.64	4.23	3.83	6.05	6.25	5.05	5.41	1.68	2.24	0.29	0.30	9.36	8.57	5.62	6.70	1.46	2.07	2375.4	2253.0
Trans Gangetic Plains	6.91	7.58	91.21	89.62	1.88	2.81	54.64	52.76	2.15	2.51	10.35	10.13	4.26	3.30	2.15	2.06	0.16	0.17	18.92	18.44	5.61	7.83	1.76	2.80	2451.5	2206.8
Eastern Plateau and Hill	88.27	87.34	7.78	10.91	3.94	1.75	80.77	77.79	2.49	2.97	2.76	2.97	4.11	3.51	2.25	2.17	0.49	0.53	1.44	1.66	4.11	5.74	1.59	2.66	2082.8	1916.4
Central Plateau and Hill	14.02	14.30	65.13	72.45	20.83	13.25	72.13	68.90	1.74	1.99	4.89	5.20	5.11	3.68	1.26	1.74	0.14	0.18	8.47	9.49	5.16	6.90	1.11	1.91	2286.6	2015.0
Western Plateau and Hill	11.75	15.09	27.50	41.21	60.75	43.70	67.58	62.42	1.68	1.66	7.40	7.40	7.41	7.05	1.76	2.26	0.46	0.53	5.03	5.63	7.00	10.82	1.69	2.24	1995.5	1956.4
Southern Plateau and Hill	55.43	74.03	11.91	5.13	32.66	20.84	69.48	68.73	1.29	1.11	5.48	4.12	5.88	5.55	1.95	2.89	0.68	0.76	5.43	4.90	6.67	7.54	3.13	4.40	2040.7	1923.3
East Coast Plain and Hill	93.42	94.81	1.94	3.50	4.63	1.69	76.91	70.98	1.72	2.45	2.65	2.84	3.57	3.96	2.22	2.99	1.04	0.99	3.64	4.41	4.89	7.41	3.37	3.97	2006.5	2010.0
Western Plain and Ghat	89.18	87.30	7.73	9.06	2.95	3.64	64.41	56.23	3.71	2.81	5.45	5.31	7.31	7.12	2.69	6.40	2.71	2.81	3.94	4.82	4.90	6.54	4.88	7.96	1906.7	2012.8
Gujarat Plain and Hill	65.41	21.17	20.33	37.00	14.25	41.83	65.93	58.87	1.64	2.17	4.33	7.15	5.31	3.71	2.24	2.56	4.28	0.20	3.39	8.79	9.54	13.43	3.34	3.11	1778.9	1896.9
Western Dry	0.94	0.86	57.41	50.07	41.65	49.07	64.05	64.00	1.16	1.41	7.46	6.87	3.13	1.46	1.37	1.46	0.06	0.06	16.66	16.52	5.20	6.51	0.90	1.71	2477.3	2161.8

Note: *Miscellaneous

Source: Computed from NSS 50th and 61st Consumer Expenditure Schedule