INTER - STATE VARIATIONS IN LEVELS OF CALORIE INTAKE: AN EXPLORATORY STUDY

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CERTIFICATE

This is to certify that the dissertation entitled **INTER-STATE VARIATION IN LEVELS OF CALORIE INTAKE: AN EXPLORATORY STUDY** submitted by **NAGHMA SAHAR** in partial fulfilment of the requirements for the award of the degree of **MASTER OF PHILOSOPHY** of this University has not been previously submitted for any degree of this or any other university. To the best of our knowledge this is a bonafide work.

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CHAPTER - I

INTRODUCTION

Nutrition, is a positive attribute of health. Even as health does not mean just the absence of disease but a positive state of well-being, nutrition does not mean just the absence of starvation or nutritional deficiency, but again a positive physiological state of well-being.

Malnutrition is one of the most serious problems confronting the human species today. The imbalance that exits in nutrients taken in through the food one eats and the one required for the maintenance of tissues, growth of new cells, and the metabolic support for the range of activities, are many.

In the world's lesser developed nations, malnutrition occurs mostly on account of the deficiency of essential nutrients. Normal physiological function is adversely affected because there is a lack of nutrients required to support that function.

STATEMENT OF THE PROBLEM

The levels of calorie intake is one of the most important and commonly used measures of assessing the nutritional status of population. A certain level of caloric

intake has bee recommended by the Indian Council of Medical Research for Indian population, an intake level below which is considered as undernutrition. It has been fixed at 2400 K cal for the rural population and 2100 K cal for the urban population.

The pattern of calorie intake, however, differs across regions. It is not uniform for all the states. Some of the states have very high calorie intake as some others tend to lag behind. Even within the same state there may be considerable differences in the levels of calorie intake across communities, and spatial units. It may vary with income levels and occupational groups. At the all-India level the calorie intake for the lowest monthly per capite expenditure class was 1316 K cal while for the highest range it was 4594 K cal for the National Sample Survey-38th Round (1983).

Agricultural productivity too, influences the calorie intake pattern to a large extent, particularly in the rural areas. The nutrition level of the population is thus closely related to the levels of calorie intake which in turn depends on many other factors. The poor depend on the calories derived from cereals as a substitute even for other nutrients such as protein and Vitamins. However, it is the poor especially who bear the brunt of low levels of calorie

intake. Their monthly per capita expenditure on food is not sufficient to meet their energy requirements.

This study is an attempt to look into the variability in the calorie intake levels among the different states, more particularly between the various levels of monthly per capita expenditure classes (MPCE).

Some of the factors affecting the calorie intake pattern has also been dealt with.

OBJECTIVE OF THE STUDY

the main objective of the study are as follows-

i. to present the spatial pattern of calorie intake in rural India on a state level basis.

ii. to look into the variations in the intake pattern across the various monthly per capita expenditure classes.

iii. to study the pattern of protein intake across monthly per capita expenditure classes in the states.

iv. to analyse the relationship between the agricultural productivity and levels of calorie intake.

v. to study the policies implemented by the government to combat undernutrition and the effectiveness of these steps.

HYPOTHESIS

To analyse the above mentioned objectives, the following hypotheses have been formulated.

i. Pattern of calorie intake and levels of monthly per capita expenditure classes are positively related.

ii. The calorie intake pattern in the states is affected by the geographical and socio-cultural factors.

iii. Protein intake level is positively related to the rising level of expenditure.

iv. There is a positive relationship between the levels of agricultural production and calorie intake pattern.

DATA BASE

The present study is based on the secondary sources of data. The main sources are as follows:

i. National Sample Survey Organization (NSSO), Round 38th, 1983.

ii. National Nutrition Monitoring Bureau, Report of Repeat Surveys, 1983.

iii. Economic Survey of India, 1982-83.

iv. Statistical abstract of India - 1982-83.

METHODOLOGY

As aforementioned, the study attempts to examine the pattern of calorie intake. Thus the levels of calorie intake for the year 1983, based on the National Sample Survey date, have been used.

The National Sample Survey gives the levels of calorie intake for the monthly per capita expenditure classes a surrogate of income ranging from Rs.0-30 to Rs.300 and above. To make it more comprehensible, few classes have been clubbed together in this study. Besides, the calorie intake levels have been given for a period of 30 days by the National Sample Survey. In this study the calorie intake levels have been converted to per capita per day.

Apart from this, the following statistical techniques have been used -

i. The variability in the calorie intake pattern for different groups of monthly per capita expenditure classes has been calculated by using the Coefficient of Variation.

ii. The amount of deviation in the calorie intake level from the mean value has been calculated by calculating the standard deviation.

iii. The relationship between the levels of agricultural productivity and levels of calorie intake has been

calculated using the correlation between them. The formula is -

$$\frac{n\,\Sigma xy - (\Sigma x)\,(\Sigma y)}{\sqrt{n\Sigma x^2 - (\Sigma x)^2}\,\sqrt{n\Sigma y^2 - (\Sigma y)^2}}$$

where
n = number of observations
x = Agricultural productivity (independent variable)
y = Calorie intake (dependent variable)

ORGANIZATION OF THE STUDY

The introductory Chapter deals, with the statement of problem, objectives, hypotheses, database, methodology and the introduction of the topic.

The second Chapter is an overview of literature. The literature has been reviewed under the following broad categories :-

Anthropometric measures, Gender bias in nutrition, Poverty and undernutrition and the Organizational stucture in the field of nutrition.

The third Chapter analyses the pattern of energy related nutritional deprivation. Nutritional deprivation has been studied with the use of per capita per day calorie intake levels for the time period of 1983. This has been done at the state level.

In the fourth chapter nutritional deprivation is terms of protein intake has been analyzed for the same time period of 1983 based on the 38th round date of National Sample Survey.

The fifth chapter presents an analysis of the observations of the third and fourth chapters.

Subsequently, the Sixth Chapter deals with the policy implications in the field of Nutrition.

Lastly, a summary and conclusions of the study have been presented.

DEFINITIONAL PROPERTIES: ASSESSMENT OF NUTRITIONAL STATUS

The nutritional status of an individual is often the result of many interrelated factors. It is influenced by the adequacy of food intake both in terms of quantity and quality and also by the physical health of the individual.[1] The assessment of the nutritional status involves various techniques. Proper evaluation demands a multi-dimensional approach. The assessment methods include the following-

a. Clinical examination

b. Anthropometry

c. Biochemical evaluation

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[1] J. Park and Park, (1985), *A textbook of Social and Preventive Medicine.*

d. Functional assessment

e. Assessment of dietary intake

f. Vital and health statistics

g. Ecological studies

These different methods used for the appraisal of the nutritional status are not mutually exclusive, on the contrary, they are complementary.

However, in this study the dietary intake method for assessing the nutritional status of the population has been used. It involves dietary surveys. An attempt has been made to take a look into the prevailing nutritional pattern in rural India with respect to calorie and protein intake in the different sections of the population. The population groups are based on the monthly per capita expenditure classes devised by the National Sample Survey Organisation in the 38th round (1983).

However, the calorie intake criteria is not without limitations. First of all, the quantitative formulation of the minimum calorie intake requirement, below which there is undernutrition, is necessary. The views of different nutrition experts and organisations such as the FAO the Planning Commission of India and the Indian Council of Medical Research (ICMR) differ, on the minimum calorie intake requirement. There is also difference of opinion

between eminent nutritionists such as C.Gopalan and P.V. Sukhatme, on the the methodology for working out the per diem calorie intake.

There are various nutritional puzzles, such as the problem of defining undernutrition, limitations of growth retardation as a measure of undernutrition and the correlation between dietary intake and nutritional status. All these problems have been addressed separately in the following pages.

PROBLEMS OF DEFINING UNDERNUTRITION

The first question that puzzles one is the quantitative formulation of the minimum calorie intake below which there is undernutrition, irrespective of the individual items that contribute to the calories and even more important whether adequacy of nutrition can at all be defined only in terms of the daily total calorie intake per capita or per consumer unit.[2]

The calorie intake criterion itself has an ambiguous connotation in quantitative terms. The first and second FAO committees on calorie requirements used an energy expenditure of 3200 calories for the reference man and 2,300

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[2] V.K. R.V. Rao, (1982), *Food, Nutrition and Poverty in India*, Vikas Publishing House.

for the reference women. Dandekar and Rath used 2,250 calories per day, while the Planning Commission uses 2,400 calories per person per day for rural ares and 2,100 calories for urban areas which means 2,340 calories for the population as a whole including both its urban and rural segments. K.T. Achaya places the per caput requirements at 2,124 calories per day using the 1961 figures for percentage of population in each age group and applying it to the 1971 census population.

P.V. Sukhatme, has taken strong exception to the use of the average as a cut-off point for determining the undernutrition status of the Indian population and the level of poverty based on undernutrition. He points out that there are considerable variations in daily calorie intake and energy expenditure. the variations are both intra-individual and inter individual, the efficiency of utilisation of intake varies over time in the same individual as also between different individuals. According to Sukhatme, nutritional requirement in terms of calories cannot be stated in terms of a single figure, but should be formulated in terms of a range determined by a standard deviation of about 400 calories from the mean. It is only below the lower limit of this range that there is undernutration or nutritional poverty.

Another point which needs attention while considering undernutrition is the vast regional differences in climate and environment in a country of India size. It may be pointed out here that the average daily calorie intake varies from a low of 2,039 in Kerala to 3,530 in Punjab.

Another factor which puzzles ones' mind from the analysis of the National Sample Survey (NSS) data on food consumption of nutrition is the apparant failure of consumer behaviour to follow what the nutritionists expect. One would normally expect calorie intake per capita to move positively with rising expenditure on food consumption. The average calorie intake per capita rises with every ascending expenditure class, and the proportion of food expenditure to total consumption expenditure falls with every rising expenditure class after a given level of consumption expenditure has reached.

SECKLER AND PAYNE'S HYPOTHESES

Seckler had gone so for as to suggest that 'smallness' is an appropriate and welcome attribute of poor people, consistent with their good health. He advised Indian nutrition scientists not only not to use 'international' standards of growth but also not to use even the 'best indigenous standard' of Indian high socio economic groups

because even these will be 'abnormally large' for the majority of Indians who are poor.

More recently, Payne has argued that, even if children of developing countries have the same genetic potential for growth as those of the more fortunate countries of Europe and USA, they will settle for a lower level of growth in keeping with their 'economy and ecology'.[3]

Undernutrition, widely prevalent among socially and economically deprived population groups around the world, is associated with a cluster of related, often coexistent factors which together constitute what may be termed the 'poverty syndrome', the major attributes of which are:

1. income levels that are inadequate to meet basic needs of food, clothing and shelter.
2. diet that are quantitatively and qualitatively deficient
3. poor environment, poor access to safe water and poor sanitation
4. poor access to health care
5. large family size and high levels of illiteracy especially female illiteracy.

Among most undernourished population groups, these factors often tend to coexist, though their relative

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[3] C. Gopalan, (1992), "Undernutrition: Measurement and Implications", in S.R. Osmani (ed), *Nutrition and Poverty*, Clarendon Press, Oxford.

severity and extent may vary in different locations. In the evaluation of undernutrition, and in its progression and perpetuation, these factors act synergistically. The ultimate determinant however, of nutritional status is the availability in adequate amounts, proper combinations and at appropriate times - of all the essential nutrients required for normal growth, development, maintenance, repair and functioning of the organism.

One recurring theme, in any study on malnutrition, concerns the reference standard of nutritional status. Whether we are interested in the processes or magnitude of nutritional deprivation, we need to define a reference standard of nutritional status against which the actual status can be compared. Ideally, the reference standard should refer to that coveted nutritional status in which a person suffers from no disability in any of his nutrition related functions. According to Gopalan, empirical evidences show that the achievement of adequacy as judged by these criteria could still leave people deficient in at least some of the nutrition related functions. He believes in the state of nutrition in which there is no deficiency in any of the nutrition related functions.

Payne on the other hand argues that there can be no state of nutrition in which all the function can be

simultaneously maximized. He takes the view that evolutionary process through which the human body has come to acquire its potential for functional abilities is 'sufficing' rather than 'optimizing' in nature.[4]

These differences on the question of whether or not an ideal nutritional state exists lead directly to controversies regarding the practical methods for assessing the magnitude of undernutrition. The proposed methods of assessment differ because the standards of comparison differ.

A crucial concept that Payne invokes in this context is that of 'adaptation'. When faced with nutritional constraint, the human body adapts itself in a number of ways to minimize the adverse consequences of that constraint. Adaptation does help to limit the damage. Of course, at some point, when the nutritional constraint is too severe, it may no longer be possible to contain the damage. It is at this point - that the threat to life begins to emerge. According to Payne this threshold is identifiable while the threshold of an ideal nutrition status does not exist.

But for Gopalan, all this amounts to an unacceptable 'policy of brinkmanship'. He argues that functional

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[4] P. Payne, (1992), "Assessing undernutrition: The need for a recoceptualization", in S.R. Osmani (ed), op. cit., p.11.

impairment, even when not so serious as to pose a threat to life, are serious enough to merit attention, because severe malnutrition does not develop overnight - it is the culmination of a protracted process in which a person passes successively through the stages of mild, moderate and severe malnutrition.

This particular debate concerns the choice of level of functional competence that should be used as the standard of comparison for assessing the degree of nutritional deficiency.

Whatever level of functional competence is chosen as the standard, there is the subsequent problem of how to judge whether or not the chosen level have been attained. Very intense controversies surround this issue. The problem stems from the fact that it is virtually impossible to make direct measurements of functional competence in large populations. The only practical course is to make indirect assessments with the help of process.

In the context of energy-related nutritional deprivation, which is the principal focus of this study, two types of proxies are used. One is to compare Calorie intake with some standard of requirement, and the other is to compare anthropometric measurements of the body with some reference standard.

However, both caloric and anthropometric standards have been called into question.

The level of calorie intake as a yardstick for measurement of under nutrition has several limitations. Poor communities subject to socio-economic deprivation, who suffer from undernutrition, do not suffer from deficiency of calories alone although it is undoubtedly a major factor. Other major nutrient deficiencies also contribute very significantly to undernutrition.[5]

Caloric standard suffers from other limitations as well. Comparison of actual Calorie intake with a fixed standard set by the average intake of healthy people, carries the implication that anergy requirement of a given type of individual is a fixed quantity, and any shortfall from this fixed level must entail impairment of at least some nutritional functions.

It has been argued that, just because a person's calorie intake falls short of the standard specified for this type, one cannot say that his functions are impaired. The energy required by a person to maintain his functions - is believed to the variable rather than fixed. There are interpersonal and intrapersonal variations in energy

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[5] N.C., Kakwani, (1992), "Measuring undernutrition with variable calorie requirement", in S.R. Osmani, op. cit., p.11.

requirement resulting from genetic differences between individuals and temporal variations within the same body respectively.

As far as intrapersonal variations in energy requirements are concerned there is a great deal of disagreement among the scientists. Payne and Srinivasan cite evidence supporting the existence of significant intrapersonal variation in requirement.

But Gopalan differs on this point according to nutritionists, if a person subsisting on cereal based diet gets enough calories according to the conventional standards of requirement, his protein needs will also be met. Here Gopalan argues that if the theory of interpersonal variation new leads to a lowering of the standards of calorie requirement, it is not certain that a calorie adequate diet will also be protein adequate.

On the other type of variation, namely interpersonal variation in requirement, there is much greater measure of agreement among nutritionists. It is widely recognized that genetic differences in metabolic efficiency can indeed lead to different levels of energy requirement for individuals.

The presence of interpersonal variation in requirement creates a rather serious problem in the assessment of nutritional deprivation. When calorie intake requirements

vary between individuals, the standard practice of comparing calorie intake with a fixed standard of requirement will lead to two types of errors. Some individuals will be wrongly classified as under nourished, and some will be wrongly classified as well nourished.

Thus the results obtained shall contain some well nourished people classified as undernourished.

In theory, the problem of estimation arising from the presence of interpersonal variation in requirement could be nearly resolved if one knew the joint distribution of intake and requirement. In that case a precise estimation would be possible without resorting to the crude method of comparing average intake with average requirement. But the practical problem is that the requirements distribution is never fully known.

It is evident that measurement of nutritional status with the help of calorie intake presents many challenges. The alternative route, anthropometric measurement presents equally tough challenges.

The choice of anthropometric measures for measuring nutritional status also presents the problem of a reference standard. Nutritional deprivation is measured in the anthropometric approach by comparing actual physical dimensions (height, weight etc) with the standard set by the

achievements of a chosen sample of healthy people. Generally a fixed standard is taken, presuming that if free from all nutrition constraints, most populations groups in the world are capable of achieving the same physical dimensions, that is they all have the same genetic potential. The reference standard is supported to reflect this common genetic potential, so that if a particular population fails to achieve this standard, its members may be presumed to suffer from nutritional deprivation. Recent research has indeed shown that most population groups in the world do have remarkably similar genetic potential. So, for practical purposes, most nutritionists no longer regard genetic variation as a serious problem for anthropometry.

However anthropometry also suffers from the problems of intrapersonal variation When faced with a nutritional constraint, the child's body initiates a process of adaptation by reducing its growth. It is then argued that, although the child may fail to achieve its genetic potential of height as a result of this 'stunted' growth, it need not suffer from any functional impairment so long as the stunting is not too severe and weight remains normal in

relation to height. This is known as 'small but healthy' hypothesis.[6]

For the proponents of this hypothesis, the usual anthropometric measurements made against the standard of genetic potential overstate the extent of nutritional deprivation. They recommend comparison with a lower standard - a threshold of adaptation upto which functions do not suffer despite smallness o size. But according to the proponents of traditional practice, this would give an underestimate of deprivation some problems in measurement.

THE PROBLEMS IN MEASUREMENT: THE CALORIE INTAKE YARDSTICK

Poor diets are deficient not in calories alone but in several nutrients as well. Where the major dietary item is lacking in an important nutrient, the diet could be adequate with respect to calories while being highly deficient with respect to protein. Under these circumstances Calorie intake measurements generally provide a quantitative and not necessarily a qualitative measure of the adequacy of diets.

Secondly, measurements of calorie intake lack precision; daily and seasonal fluctuation in dietary intake

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[6] A. Lechtig, C. Yarbrough, et.al., (1978), "Small stature in developing countries: Its causes and consequences", in S. Margen and R.A. Ogar; (ed) *Progress in Human Nutrition*, AVI Publishing.

could add to this problem. Thus repeated diet surveys in different seasons may be necessary to obtain a reliable picture.

Third, where diets of entire household are estimated, the actual calorie intake of the most vulnerable segments of the population, namely women and children is often indirectly derived through the application of certain arbitrary coefficients based on the assumption that the intrafamilial distribution of food conforms to relative physiological needs, an assumption not often valid.

GROWTH RETARDATION AS A MEASURE OF UNDERNUTRITION

Children below 5 yrs of age represent the most vulnerable segment of the population from the nutritional standpoint. For all practical purpose, the growth performance of children of this age group is a convenient measure of the nutritional status of a community. This procedure is now being widely employed in many developing countries.

Among the different anthropometric measurements namely, weight for age, height-for-age, weight-for-height and arm circumference, the most widely accepted and used is the weight-for-age measurements as for as infants and under five are concerned. The procedure that is now being widely

adopted is to compare that wight-for-age of the child with the weight for age in the international standard.[7]

CORRELATION BETWEEN DIETARY INTAKE AND NUTRITIONAL STATUS

The correction between the levels of dietary inadequacy prevailing in households and communities on the one hand and the degree of severity of undernutrition prevailing among them on the other is not always strict. The major reason are :-

(1) The severity of effects of primary dietary inadequacy in a population can be aggravated by superadded conditioning factors, such as infection and diseases eg. In communities subject to the same order of dietary deficiency right through the year, clinical manifestation of undernutrition could be more pronounced in seasons characterized by a high prevalence of infections than at other times eg. In Coonoor in India, in poor communities, the peak incidence of 'Kwashiorkor' in children in successive years was noticed in May-June, following the peak incidence of diarrhoeal diseases in the 'fly season' of April-May.

Thus, while the level of dietary inadequacy is undoubtedly the dominant determinant of undernutrition the

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[7] C. Gopalan, (1992), "Undernutrition: measurement and Implications", in S.R. Osmani (ed), op. cit., p.11.

level of primary health care in the community can significantly modify the severity of its clinical manifestations.

(2) Where diets of entire households rather than of individuals within the family are being used as yardsticks in the assessment of community nutritional status, differences in the nature of intrafamilial distribution of food, can result in important differences with respect to nutritional status between households of communities with nearly similar overall level of dietary inadequacy.

(3) Furthermore, except in acute famine situations, the current nutritional status of a community is often a reflection of its erstwhile rather than its present dietary status. There is a viable time lag between dietary deprivations and the onset of clinical undernutrition. In the case of growth retardation consequent on calorie-protein undernutrition itself, retardation in linear growth is generally the outcome of a more longstanding dietary deprivation than retardation in body weight.

These considerations will underscore the limitations with respect to the measurement of nutritional status of communities on the basis of the level of dietary intake al one, and will highlight the need for additional yardsticks.

CHAPTER - II

AN OVERVIEW OF LITERATURE

Nutrition, and the associated problems constitute an important area for research by national and international organizations. Some eminent names in the field of nutrition, are C. Gopalan, Barbara Harris, V.K.R.V. Rao, Amartya Sen, P.V. Sukhatme, and J. Behrman, who have written extensively in the various aspects of problem of undernutrition. The previous chapter has already introduced the concept of undernutrition and various problems attached with it.

In the present chapter, we present a review of literature covering the wide range of nutrition from definitional controversies to measurement problems, disparities in allocation and the organization structure which deals with the public policies and governmental efforts towards mitigating the problem.

The literature has been reviewed under the following broad categories -

(1) **ANTHROPOMETRIC MEASURES**

Under this category, issues arising from the definition and measurement of undernutrition as compared to a reference standard, have been addressed.

(2) GENDER BIAS IN NUTRITION

It covers the issues regarding gender bias in the incidence of nutritional deprivation. The evidences suggest existence of bias against females. The views of different authors has been presented under this category.

(3) POVERTY AND UNDERNUTRITION

The developing countries of the world are afflicted by undernutrition. It is widely prevalent among the socially and economically deprived population groups around the world. It is associated with a cluster of related, often co-existent factors which together constitute the 'poverty syndrome'. different authors, such as V.K.R.V. Rao and Amartya Sen have written extensively on this aspect. Literature dealing with the correction of poverty and undernutrition have been discussed under this category.

(4) ORGANIZATIONAL STRUCTURE:

The governmental policies and interventions for combating undernutrition has been discussed under this category.

Since there are a network of correlates of malnutrition, such as biological, socio-cultural, economical and transgenerational, the study of undernutrition involves a multidimensional approach.

ANTHROPOMETRIC MEASURES:

A person's nutritional status can be assessed clinically by examining the signs of infection, anthropometrically - by measuring height, weight, arm circumference and skinfold thickness, by biochemical tests and through questionnaires. Each involves an expenditure of resources, and while they are partially substitutable as avenues of inquiry, their costs differ. Waterlow[1] showed that a child's height for age and weight for height are good indicators of his nutritional status. Height is a person's summary statistic of past nutritional experience while height for weight is a summary statistic of his current nutritional status. Low birth weight is a significant contributor to infant mortality. Waterlow[2] says that relative to those whose weight at birth equalled or exceeded 2.5 kg, the risk of death among neonates with low birth weight is about 4; among part-neonetals the corresponding figure is about 2. Chen, Chaudhury and Huffman[3] demonstrated clear threshold

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1. J.C.Waterlow et. al (1977) "The presentation and use of height and weight data for comparing the nutritional status of groups of children under the age of 10 years." *Bulletin of WHO, 55.*

2. J.C.Waterlow, Tonikins & M C Gregor (1992) *Protein Energy Malnutrition.*

3. L.C.Chen, A.K.Choudhary & S.L.Huffman (1980) "Anthropometric assessment of Energy - Protein - Malnutrition and Subsequent risk of mortality among Pre-school aged children", *American Journal of clinical*

effects in both height for age and weight for height. The risk of death was found not to differ much among those whose deficits in these anthropometric measures were mild to moderate. But there was a sharp increase for those whose deficits reached certain figures.

Epidemiological studies show instead that it is nutrition and freedom from infections that are major determinants of early growth. Within ethnic groups in poor countries, differences in children's body size across socio-economic classes are usually large. whereas differences in body size between European, African, Latin American and Indian children from the upper income groups are small. Martorell and Habicht[4] provide illustration of this by comparing the height of a sample of 7 years old children from Indian families of high socio-economic status & American standards.

Tanner[5] says that the final height of a person is determined by both genetic and environmental factors. But the low average stature of persons in poor countries is for the most part attributed to poor nutrition and consequently

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nutrition, 33.

4. R.Martorell & J.P. Habicht (1986) "Growth in Early childhood in developing countries"; in Falkner & Tanner. *Human Growth*, Plenum Press, New York.

5. J.M.Tanner, et.al (1982) "Increase in length of leg relative to Trunk in Japanese Children and Adults from 1957 to 1977: Comparisons with British and Japanese Americans", *Annals of Human Biology*.

heavy incidence of infectious diseases." Thus, the increase in the Japanese height is an illustration of the impact of better health care and nutrition, the sharp increase having taken place during 1957-77.

There is evidence that nutrition and morbidity in early childhood leave a large imprint on a person. Satyanarayan, Naidu and Rao[6] have shown in a classic study on Hyderabad the impact of nutrition on early growth and it's consequent impact on final height. Heights of a group of 17-year old boys in rural Hyderabad was measured and compared to their heights when they had been 5 years of age. It was observed that all sub-groups had gained the same amount in height during the 12 year interval and the average increase was only 5 cm less than the increase that children on average experience in the U S over the same time interval.

Anthropometric data are among the most revealing statistics concerning health. Weight for age is widely used among children, although its limitations are various. Arm circumference is a reliable index of nutritional status.

However, the multifaceted nature of under nutrition on one hand and limitation of data on the other makes the

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6. K.Satyanarayan, A.N.Naidu & Rao, B.S.N.(1980) "Adoloscent growth spurt among Rural Indian Boys in relation to their Nutritional status in Early childhood", *Annals of Human Biology*.

measurement of undernutrition quite difficult according to Gopalan[7] Calorie intake is used as a yardstick for the measurement of undernutrition. Gopalan[8] says that level of calorie intake as a yardstick of measurement of undernutrition suffers from many limitation - like the debate over the accepted standard norm against which the prevailing level of calorie intake and growth performance should be compared in order to determine adequacy. His assessment is that a combination of diet surveys, anthropometric measurements, clinical assessments, socio-economic and environmental status assessments and selective bio-chemical estimations, should be carried out for measuring undernutrition. Both Sukhatme and Seckler have argued that the traditional methods of measuring undernutrition give a highly exaggerated picture by placing the 'norm' of adequate nutrition at a much higher level than is warranted by facts & theories. Payne[9] discusses this current controversy regarding 'adaption' to cover calorie -intake level propounded by Sukhatme, Seckler and others. He concludes that even if

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7. C.Gopalan, (1992) "Undernutrition - measurement and implications" *"Nutrition and Poverty"*, in S.R. Osmani (ed.) Clarendon Press, Oxford.

8. C. Gopalan (1992) "Measurement of Undernutrition : Biological Considerations"; in S.R. Osmani (ed.). Ibid.

9. P.Payne (1992) "Assessing undernutrition - The need for a reconceptualization"; S.R. Osmani ed. (Ibid).

children of developing countries have the same genetic potential for growth as those of the more fortunate countries of Europe and USA, they will settle for a lower level of growth in keeping with their 'economy and ecology'. Thus even the 'best indigenous standards' of the Indian high socio-economic groups should not be very high for majority of Indians who are poor.

Kakwani[10] shares the same view when he says that the approach which classifies people as undernourished by comparing them to a fixed norm, is not altogether faultless because of variations in requirements both inter-personally i.e. from person to person as well as intra-individually i.e. for the same individual at different points of time. the objective of this paper is to suggest sensible ways of estimating undernutrition in the absence of the ideal solution. Goldstein and Tanner[11] say that the application of standards based on economically privileged group, to the entire population is in appropriate. Even within the same country especially in some developing countries, it may be useful to have separate standards for different regions

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10. N.C.Kakwani (1992) "Measuring undernutrition with variable calorie requirements" S.R. Osmani (Ibid).

11. W.Goldstein and J.M.Tanner (1980) "Ecological considerations in the creation and the use of child growth." *Lancet*.

where there are large growth differences. The concept of a single international growth standard is invalid.

Gender bias in food allocation

Though observing food allocation among members of a household is a difficult task, data on household expenditure provide a possible route to detecting biases in the allocation of nutrition. The practice of relative food deprivation among household menders is not uniform across regions. Deaton[12] found in a study of that there was no sign of girls being discriminated against in case of food allocation. Similarly Caldwell and Caldwell have emphasized that in Sub-Saharan Africa there is no evidence of gender differences in the child death rate. On the other hand Behrman[13] has shown in his work on rural Indian data that there is a bias against female children in the allocation of household nutrients, most especially among higher birth-order girls.

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12. A.Deaton, (1989) "Looking for Boy-Girl discrimination in Household expenditure", *World Bank Review*, 3.

13. J.Behrman (1987) "Intra-household allocation of nutrients and Gender effects", *mimeo, University of Pennsylvania*.

Behrman[14] says that this bias is pronounced in the northern states of India, and is the sharpest during the lean season when food is scarce in northern Indian. It is the less endowed, female and low caste children who are placed at greater nutritional risk. However, during surplus season parents appear to allocate food among their children more along the lines of need. Acute scarcity forces households to practice discrimination in a ruthless way. The evidence from the Indian sub-continent, at least seems to be that the sphere in which discrimination against female children manifests itself most strongly is health care and nutrition.

D'Souza and Chen[15] and 'Chen, Hug and D'Souza[16] have shown in their pioneering quantitative study in Bangladesh during (1974-77) that nearly 15 percent of female children

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14. J.Behrman (1988a) "Intra household Allocation of Nutrients in Rural India : Are boys favoured, Do Parents exhibit inequality in food allocation?", *Oxford Economic Papers*.

    - (1988b) Nutrition, Health, Birth order & seasonality : Intra-household allocation among children in Rural India; *Journal of Development Economics*.

15. S.D'Souza & L.C.Chen (1980) "Sex differentials in mortality in Rural Bangladesh", *Population and Development Review, 6*.

16. L.B. Chen, Hug & D'Souza (1981) "Sex Bias in the family allocation of food & health care in Bangladesh", *'Population and Development Review'*.

were severely malnourished as compared to 5 percent for male children. The female children were less than 60 percent of the Harvard weight for age standard. Thus there was a significantly greater incidence of mortality among girls. On the age group (1-5 years), the female mortality rate exceeded that of males by some 45 percent.

Inadequate nutrition in childhood & adolescence impairs the growth of females, placing theme at risk of obstetric difficulties and of bearing low birth weight infants. Ghosh et.al[17] found that, while the incidence of low birth weight babies may 15.0 percent among infants born to mothers over 145 cm in height with income higher than Rs. 200 per capita per month, it was 24.2 percent among mothers with height over 145 cm but income below Rs. 50 per head per month, and 35.5 percent among short, poor mothers.

Studies by Bhatia[18] have shown that mean birth weights of infants can be varied above 2.5 kg. by ensuring calorie intakes of ever 2000 real among very thin women and may exceed 3kg. in infants born to women who have adequate

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17. S.Ghosh, S.K. Bhargaw and I.M. Meriyama (1982) 'Longitudinal study of the survival and outcome of a Birth Cohert : Vol.II. Report of Phase I of a Research Project, Safdarjang Hospital, N. Delhi.

18. B.D.Bhatia, D. Banerjee, D.K. Aggarwal and K.N. Agarwal (1983), "Foetal growth, Importance of maternal body size & dietary intake during their ", *Indian Journal of Paediatrics*, (1-8).

weight for height to calorie intake above the recommended level (2300 cal.).

Micro studies have shown that the diets of female children and women are inadequate as a result of discrimination in intra-household food allocation. Gopalan says that discrimination against females begins during infancy. According to Ghosh, Khan et.al, even during breast feeding infant girls receive less milk,less frequently for a shorter period. Females are also discriminated against in terms of quality of food. Gopalan and Kaur[19] have dealt with the socio-economic and socio-cultural influences on women's nutritional status. It also deals with the pattern of growth and development of Indian girls and body size of adult Indian women.

Organisational structure in the Nutrition Sectors -Programmes and policies

While the country has adequate foodgrains in terms of calories, the national dietary is imbalanced and maldistributed. The Public Distribution System provides nutritional support by making foodgrains and a few other essential commodities available at controlled prices. In addition to poverty alleviation programmes and TDS, programmes to ad-

19. C.Gopalan and S. Kaur (ed) (1989), "Women and Nutrition in India", special publication series, Nutrition Foundation of India.

dress malnutrition in India include supplementary feeding. Sud[20] is of the opinion that the stress in future is likely to be more on nutrition security than mere provision of food. The short term measures such as nutrition intervention have thus gained significance. Children are the most vulnerable group in terms of malnutrition. Government has launched various nutrition intervention programmes such as 'Mid-day Meal' scheme, Integrated Child Development Services Scheme, nutrition fortification programmes etc. for improving the nutritional status of children.

Jeyapaul[21] says that the National Programme of Nutritional support to primary Education is a landmark in the fight against malnutrition among children. He demonstrates by citing various researches that with improved nutritional status children perform better in studies.

The Integrated Child Development Services provides food and micro-nutrient supplements to pre-school children and pregnant/lactating women along with other health care services. The supplementary feeding aims to provide a ration of 300 Kcal to each pre-school child in the ICDS area for 300 days in the year and 500 k cal to pregnant/lactating

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20. S.Sud (1997),"Ensuring Food Society", *Yojana*, pp.46-48.

21. C.Jeyapaul Jan (1996) "Nutrition Support to Primary Eduction", *Yojana*, pp. 81-85.

women during their pregnancy. A carefully done evaluation on 19 ICDS projects in two districts (Panchmahal in Gujarat and Chanderpur in Maharashtra). shows that the special attention resulted in marked increases in coverage of the target Reputation.[22] Substantial improvements occurred in nutrition and health status. Sincere malnutrition in 0-36 month-old children was reduced by 25 per cent in the first district and 53 per cent in the second. Vitamin A deficiency in children, and anaemia in both children and pregnant women also declined.

Meera Chatterjee[23] points out the problems facing the ICDS. The programme facts to focus on the most needy children, whether need is defined by degree of undernutrition or by socio-economic status. Nutrition education in the programme remains extremely poor, as does community participation.

In Tamil Nadu[24] in addition to ICDS two other programmes, provide supplementary nutrition - The Tamil Nadu In-

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22. S.Gujral and C. Gopalan (1984-1990), "Summary Report of the USAID assisted ICDS impact Evaluation project in Panchmahal and Chandapur, Department of Foods and Nutrition, Faculty of Home Science, M.S. University, Baredi, mimeo.

23. M.Chatterjee (1976) "Nutritional Challenges to health and Development", *Health, Poverty and Development in India*. Nutrition Foundation of India.

24. Ibid.

tegrated Nutrition Programme (TINP) and the Chief Minister's Nutritious Meal programme (NMP). These schemes cater to all children of whom a significant proportion may not be malnourished.

The Public Distribution System (PDS) is an important step taken by the government in pursuit of food security. It provides nutritional support by making foodgrains and a few other essential commodities available at controlled prices. It is intended to protect the purchasing power of the poor. Meera Chatterjee[25] shows in her study that Kerala has benefited a lot from PDS. It is often cited as an example of a successful PDS, which is credited with substantial nutritional improvement particularly in the 1980s. A variation of the PDS evolved in Andhra in 1983, the 'Two-Rupee Rice scheme' is also considered successful.

Tyagi[26] has found out that physical access to food, as measured by per capital availability of foodgrains, and economic access, as measured by proportion of per capita income required to buy a unit of food and relative increase in normal per capita income and foodgrain prices, has increased in India. Technology and price policies were in-

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25. Ibid.

26. Tyagi and Vyas (1990): "*Increasing Access to food - The Asian experience*", Sage Publication.

strumental in promoting physical access while a public distribution system confined to poverty alleviation programmes ensured increased access of foodgrains.

Gillespiel and Mc Neil[27] have made an attempt to address macro level policy issues that can reduce nutritional deprivation. they have discussed the different aspects of policy including the impact of agricultural policy on the nutritional status of people. They have included the aspects of pricing, food policy, public distribution, food subsidies, rations and quotas.

While this array of food policy instruments has proved effective in averting acute undernutrition, many economists feel that the current level of food security could be achieved with less strain in public expenditure if policies were more targeted to the undernourished", Harris.[28]

Ravallion[29] feels that one means of potentially raising the cost effectiveness of food security programmes is to target programme resources to households and villages

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27. Gillespie Stuart and Mc Neil Geraldine (1986) *Food, Health and Survival in India and Developing countries.*, Oxford University Paperbacks.

28. B.Harris (1991) *Child Nutrition and Poverty in South India : Noon Meals in Tamil Nadu*, Concept publishing company, N. Delhi.

29. M.Ravallion (1990) "Reaching the poor through Rural Public employment: A summary of theory and evidence", *World Bank Discussion paper, World Bank*, Washington.

according to the policy objective being pursued. A familiar strategy is to minimise the severity of undernourished, another way of improving cost-effectiveness is to monitor food security during the course of programme operations.

The cornerstone of a viable monitoring system is the identification and use of indicators that are valid and reliable and yet inexpensive to collect." Tucker.[30]

Jain[31] feels that the calls for more targeted and flexible approaches to the promotion of food security are not easily addressed. There are several reasons for this. First targeting is politically controversial. Eligibility criteria can create incentives among these who administer programmes to 'rent-seek' by taking advantages of unforeseeable criteria. Eligibility criteria can also provide incentives for households to misrepresent their circumstances, such as reporting female hardship when this is not the case.

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30. K.D. Tucker, K. Pelletier, K. Rasnussen and Pinstrup - Andersen (1989) "Advances in Nutritional surveillence", The Cornell Nutritional Surveillence programme, *Cornell Food and Nutrition Policy Programme Monograph*, Cornell University.

31. D.Jain (1992) "Can poor women be targeted?" *Population Council, New York* (mimeo).

Undernutrition and Poverty

Though poverty has to be identified with deficiency in the total level of living, nutritional norms in terms of daily calorie intake by consumer unit, is commonly employed for the measurement of poverty.

Rao[32] believes that while the proportion of under nutritional poverty undoubtedly declines with increasing income, the poor as defined also include the not poor and that the not poor include the poor. This is because of our basing the estimates of poverty on the sole criterion of calorie intake.

Sukhatme[33] says "analysis of data confirms that as income increases, the energy intake increases, rapidly to start with and gradually thereafter indicting that an appre-
cia
ble number of people remain undernourished for want of adequate income." Economists were quite surprised to see in this analysis that poverty was the principal cause of the large and widespread incidence of malnutrition and began to use the minimum energy requirement as the criterion for

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32. V.K.R.V.Rao (1997) "Nutrition norms by calorie intake and measurement of poverty", *Bulletin of the International statistical Institute*.

33. P.V. Sukhatme (1978) "Assessment of adequacy of diets at different income levels", *Economic and Political Weekly*, pp. 1373-1384.

estimating poverty. A person who cannot afford a diet which meets his minimum energy needs for a healthy active life is certainly both poor and malnourished.

Majumdar and Datta[34] suggest that the percentage of people below calorie norm expenditure line not a proper criteria for determining poverty situation. Calorie intake from free and subsidised food should be excluded before estimating monetary equivalent poverty line based on calorie norm. Total calorie deficiency in states should one of the main criteria in assisting the states. Majumdar and Datta have made an attempt to estimate the deficiency in calorie intake in different states and to identify a few casual factors.

Das Gupta[35] examines whether meaningful estimate of the incidence of undernutrition subject to inter and intra personal variations, can be obtained or not from consumer expenditure survey data aggregated at different income classes. He concludes that if requirement and intake be specified in terms of per consumer unit, incidence of malnutrition can be estimated using a single cut-off value which

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34. K.C.Majumdar and K.L.Datta (1981) "Calorie deficiency among states - a comparative study", *Yojana*, November pp.25-29.

35. Rajaram Das Gupta (1981) "Undernutrition and Poverty -Measurement problems", *Margin*, October.

is the weighted average of requirements of different groups of people. Das Gupta[36] says that the consumption pattern is very important to determine the incidence of undernutrition. He even suggests some measures in the field of agricultural production to obtain a better balance. A shift in the emphasis on the production pattern e.g. greater emphasis of wheat and cereals will bring about a better balance.

Sawant[37] uses the state of undernutrition in different parts of India to understand the character and nature of poverty. He presents an overview of the regional pattern of food consumption in rural India based on the statewise information relating to calorie intake and protein consumption.

Poverty and malnutrition are part of the vicious circle. It can be seen as the cause and consequence of poverty. In the case of India, the problem of undernutrition has assumed alarming proportions.

Concluding, it can be said that this chapter presents an overview of the literature selected to the problem of

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36. Rajaram Das Gupta, "A cross-sectional analysis of poverty and undernutrition in Rural India".

37. S.D.Sawant, 1982, "Incidence of undernutrition in Rural India - An inter-regional Perspective", *Indian Economic Journal*, April-June.

undernutrition. In the following chapters, we shall look into some of these problems concerning nutritional deprivia-tion.

CHAPTER - III

INTER-STATE PATTERNS OF CALORIE INTAKE

This chapter discusses the inter-state patterns of calorie intake in rural India. An attempt has been made to analyse the prevalence of undernutrition from the point of calorie intake levels. It will be seen, whether there is any relationship, between the levels of cereal output in the states and the per capita calorie intake. The contribution of different sources of food items in supplying calories to the population will also be looked into. Other aspects which will be discussed are variation accross different consumption expenditure categories and occupation groups.

The study is based on the data obtained from the National Sample survey Organisation for the 38th round. The survey period of the data is 1983, which was the third quinquennial survey of the National sample survey Organisation.

Some of the terms will occur frequently in the chapter are explained here -

(i) Monthly Per Capita Expenditure Class

The households have been classified on the basis of the

levels of monthly per capita expenditure (MPCE). The MPCE is the ratio of total household consumer expenditure during a period of thirty days to the household size.

(ii) Consumer Unit

The Consumer Unit number for a person of a particular age-sex group is an index number representing his/her energy requirement in relation to that for a "reference man". A man belonging to the age group 20-39 is considered as the 'reference man', and his per diem energy requirement level is considered as the energy requirement of one Consumer Unit.

VARIATIONS IN CALORIE INTAKE DURING THE 28th AND 38th ROUND

The Overall pattern of per capita per diem intake of calories across the states has shown a slight variation between the 27th and the 38th round of National Sample survey (a time period of almost 10 years), from 1972-'73 to 1983. For all-India levels, it has declined from 2266 Kcal to 2221 Kcal between 1972-73 to 1983. The per capita per diem intake of calories for the 27th round (1972-73) and the 38th round (1983) has been presented in table III.1. The situation between the two time periods for rural India has been analysed with occasional reference to the patterns in urban India.

The average calorie intake of 2221 Kcal per capita per day among the rural population was about 1.98 per cent below that in 1972-73. The average per capita per day calorie intake level declined from 2266 Kcal in 1972-73 to 2221 Kcal in 1983. the decline was registered in most of the states, the percentage decline ranged from 0.6 in Manipur to 23.36 in Punjab. Haryana too, registered a major decline of 20.5 per cent.

The few which registered a slight increase were Andhra Pradesh (4.5), Kerala (2.5), Karnataka (17.25), Orissa (5.13) and West Bengal (5.2) per cent .

This decline in calorie intake was registered despite the fact that the expenditure on cereals still constituted half of the total expenditure on food items. It was 33.44 per cent as compared to 65.56 per cent on all food items.

The significance of the decline differs qualitatively across the states e.g. In Punjab the calorie intake declined from 3493 Kcal in 1972-73 to 2677 Kcal in 1983. This was still above the norm. It can be said that the decline may not necessarily signify nutritional deterioration. On the contrary, it could well reflect, a qualitative improvement in the diet. A fall in the calorie intake level in Punjab, may signify an increase in the nutritional intake from milk

and milk products'. This can be said because Punjab is much above the all-India average in terms of intake of milk and it's products, as has been discussed in Chapter IV.

On the other hand, a decline in calorie intake level may also result from the decline in the per capital availability of agricultural land due to the increased population pressure. It may be said that the growth in the national output of cereals over the y ears has been nullified by a greater increase in population, thus decreasing the calorie intake level.[1]

INTER-STATE VARIATIONS IN CALORIE INTAKE

Though the all-India level of calorie intake was 2221 Kcal in 1983, there was a great deal of inequality between the states in terms of calorie intake levels. The norm of 2400 Kcal which has been adopted by the Planning Commission as the standard for the rural areas, has been followed in this study. The states have been compared to be deficient, sufficient or above the norm, following the 2400 Kcal norm.

Delhi comes out to be the only state which has a per capita per day calorie intake level 2400 Kcal. However,

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1. V.K.R.V. Rao (1982) "A National Policy for Food and Nutrition", *Food, Nutrition and Poverty in India*, Vikas Publishing House.

TABLE III.1

TABLE : III.1: PER CAPITA INTAKE OF CALORIE/DIEM BY STATE AND NSS ROUND

NSS ROUND STATES	1983 38th	1972-73 27th	PERCENT VARIATION
ANDHRA PRADESH	2204	2103	4.58
ASSAM	2056	2074	0.86
BIHAR	2189	2225	1.61
GUJRAT	2113	2142	1.35
HARYANA	2554	3215	20.5
HIMACHAL PRADESH	2636	2954	10.7
JAMMU & KASHMIR	2569	3151	18.4
KERALA	2260	2202	2.5
KARNATAKA	1884	1559	17.25
MADHYA PRADESH	2323	2423	4.12
MAHARASHTRA	2144	1895	11.61
MANIPUT	2296	2310	0.6
ORISSA	2103	1995	5.13
PUNJAB	2677	3493	23.36
TAMIL NADU	1861	1995	6.7
UTTAR PRADESH	2399	2575	6.8
WEST BENGAL	2027	1921	5.2
ALL INDIA	2221	2266	1.98

SOURCE: NATIONAL SAMPLE SURVEY(NSS), 38th ROUND

there is a respectable degree of variation between the various MPCE classes even within Delhi. It has a calorie intake level of 1440 Kcal for the MPCE Class of (Rs)100-125 while the calorie intake for the higher ranges such as (Rs)200-250 and (Rs)300 and above, are 2425 Kcal and 4096 Kcal respectively. These extremes in the calorie intake levels point towards a widespread nutritional inequality in the consumption pattern.

The states which are well above the norm of 2400 Kcal for rural areas are Haryana, Himachal Pradesh and Jammu andKashmir with calorie intake levels of 2554, 2636 and 2569 Kcal respectively [table III.2]. Punjab, Rajasthan and Chandigarh too have their calorie intake levels above 2400 Kcal.

The state with one of the lowest value for per capita calorie intake appears to be Kerala - with a value of 1884 Kcal per capita per day, which is 22 per cent below the norm of 2400 Kcal. This is a peculiar behaviour in the case of Kerala which is otherwise a better-off state in terms of other indicators of development such as literacy, sex-ratio etcetre. This anomaly may be accounted for by considering the fact that tapioca, which is a major food item in Kerala, has been completely ignored by National sample Survey data.

TABLE : III.2: PER CAPITA PER DIEM INTAKE OF CALORIED BY MONTHLY PER CAPITA									
	EXPENDITURE CLAS			*Estimated Persons/Households)*					
MPCE CLASS (Rs)	0-50	50-70	70-100	100-12	125-20	200-25	250-30	300&abov	All Class
STATEs									
ANDHRA PRADESH	1302	1730	2040	2289	2586	2913	3035	4334	2204
No. of Persons	1840	2460	8445	5125	6730	1620	790	1045	30115
ASSAM	1132	1433	1795	2128	2503	2818	2896	3134	2056
No. of Persons	175	1210	5850	4915	4875	780	310	220	18335
BIHAR	1300	1750	2137	2539	2991	3510	3854	5052	2189
No. of Persons	4305	8770	12655	6460	5935	955	275	480	39835
GUJARAT	7126	1481	1800	2127	2566	3128	3229	3514	2113
No. of Persons	355	1430	4015	2905	3590	680	305	390	13670
HARYANA	1183	1676	2007	2245	2718	3361	3499	4808	2554
No. of Persons	65	285	1165	1100	2015	565	300	410	5905
HIMACHAL PRADESH	1330	1740	2080	2417	2815	3230	3557	4359	2636
No. of Persons	75	420	1550	1980	3905	950	510	775	10165
JAMMU & KASHMIR	1192	1613	2212	2507	2938	3394	3341	4831	2569
No. of Persons	85	650	354	3760	4560	835	285	355	14070
KARNATAKA	1193	1606	2009	2373	2718	3286	3397	4683	2260
No. of Persons	2625	2560	3995	3075	3985	780	435	635	16645
KERALA	857	1197	1486	1754	2117	2597	3023	3565	1884
No. of Persons	410	834	3595	2750	4465	1350	605	1170	15645
MADHYA PRADESH	1515	1874	2219	2545	2905	3329	3738	5517	2323
No. of Persons	3175	5935	8695	4165	4835	985	480	720	29030
MAHARASHTRA	1469	1751	2009	2230	2501	2860	3209	3953	2144
No. of Persons	1880	4735	8545	4645	5670	1235	700	80	27885
MANIPUR		1310	1973	2166	2520	2886	3197	3453	2296
No. of Persons	30	290	1215	1255	2555	425	150	65	5985
MIZORAM		1526	1756	2054	2298	2352	2324		2046
No. of Persons		70	1530	2045	2455	165	55	5	6325
ORISSA	1206	1638	2016	2398	2850	3470	3688	3904	2103
No. of Persons	1695	2840	4590	2585	2870	420	115	315	15435
PUNJAB	693	1453	1906	2019	2714	3239	3451	4675	2677
No. of Persons	80	460	1815	2030	4800	1690	855	1385	13115
RAJASTHAN	1590	1940	2174	2387	2720	3158	3333	4929	2433
No. of Persons	1405	2500	4200	2690	4215	1100	610	1140	17860
TAMIL NADU	902	1364	1690	1904	2310	2720	3039	5124	1861
No. of Person	2475	3705	5995	3805	4460	1065	495	830	22830
UTTAR PRADESH	1499	1887	2273	2602	2999	3628	3931	5390	2399
No. of Person	4645	10260	14985	8480	10070	1980	1005	1370	52795
WEST BENGAL	1049	1495	1911	2184	2643	3262	3888	4253	2027
No. of Person	2295	4425	7615	4180	4830	995	385	495	25220
ANDAMAN & NICOBAR	1080	1694	1827	2095	2306	2686	3173	38975	2289
No. of Person	50	135	570	545	1115	475	290	625	3805
CHANDIGARH				1399	2749			4763	2619
No. of Person			10	30	40	15	10	40	145
DADRA & NAGAR HAVELI	1192	1403	1718	1855	2261	2066	2971	3178	1689
No. of Person	75	440	530	185	255	30	35	50	1600
DELHI				1440	2306		2425	4096	2400
No. of Person	5	5	15	50	130	20	50	75	350
GOA		1300	1673	1838	2035	2786		2714	2084
No. of Person		155	225	150	290	55	20	80	975
PONDICHERRY	1092	1262	1607	1754	2402				1752
No. of Person	100	55	160	105	160	20	15	15	795
INDIA	1316	1712	2042	2322	2696	3161	3447	4594	2221
	26805	58275	107575	70710	91630	20015	9470	14030	398460
	SOURCE: BASIC DATA FROM NSS 38th ROUND								

Thus, a major source of calorie intake has not been taken into consideration at all which is why the calorie supply levels fall very short of the norm.

Table III.2a shows the percentage of estimated population below the calorie intake norm of 2400 Kcal. Punjab and Haryana are the two states having the lowest percentage of population below the norm. Kerala, Karnataka and Orissa have a high percentage of population below the norm. It stands at 77.04, 73.6 and 75.86 per cent respectively. Maharashtra and West Bengal too have their values above the all-India average, also have calorie intake level below the norm for all classes.

The union territories are in a better position in terms of intake levels, except for Pondicherry and Dadra & Nagar Haveli with a value of 1752 and 1689 Kcal respectively which is less than 30 per cent of the norm (Table III.3).

Table III.3 shows the per cent variation in calorie intake to norm for the different states. Three broad divisions have been considered under which most of the states fall in terms of percentage intake of the norm. They are ten per cent or less below the norm, twenty per cent or less below the norm, and thirty per cent or less below the norm.

TABLE III.2a

TABLE III.2a: PER CENT OF ESTIMATED PERSONS BELOW THE CALORIE INTAKE NORM BY STATES [RURAL]	
STATES	PER CENT OF ESTIMATED PERSONS BELOW NORM (2400 Kcal)
ANDHRA PRADESH	59.33
ASSAM	66.26
BIHAR	64.6
GUJRAT	63.6
HARYANA	44.2
HIMACHAL PRADESH	20.11
JAMMU & KASHMIR	7.73
KARNATAKA	73.6
KERALA	77.04
MADHYA PRADESH	61.3
MAHARASHTRA	71.02
MANIPUR	46.6
MIZORAM	100%
ORISSA	75.86
PUNJAB	33.43
RAJASTHAN	60.4
U.P.	56.6
WEST BENGAL	73.4
ANDAMAN & NICOBAR	63.46
CHANDIGARH	27.5
DADRA & NAGAR HAVELI	94.6
DELHI	58.5
GOA	84.10
PONDICHERRY	52.8
INDIA	66.09

TABLE III.3: PERCENT VARIATION OF CALORIE INTAKE TO NORM (2400Kcal)					
10 PERCENT BELOW NORM		**10-20 PERCENT BELOW NORM**		**20-30 PERCENT BELOW NORM**	
STATES/U.T	%BELOW NORM	STATES/U.T	%BELOW NORM	STATES/U.Ts	% BELOW NORM
ANDHRA PRADESH	8%	ASSAM	14%	TAMIL NADU	
BIHAR	9%	GUJRAT	12%	DADRA & NAGAR HAVELI	22
KARNATAKA	6%	KERALA	11%	PONDICHERI	30
MANIPUR	5%	MAHARASHTRA	11%		27
ANDAMAN & NICOBAR	5%	MIZORAM	15%		
UTTAR PRADESH	1%	ORISSA	12%		
MADHYA PRADESH	3%	WEST BENGAL	16%		
		GOA	13%		
	SOURCE OF BASIC DATA : NSS 38th ROUND				

VARIABILITY IN CALORIE INTAKE ALONG THE STATES AND ACROSS THE MONTHLY PER CAPITA EXPENDITURE CLASSES

Table III.4a&b presents the coefficient of variation for the various MPCE Classes along the states as well as the variation within the state across the different values of MPCE Classes. It shows the amount by which the calorie intake levels vary within the state and across the different states.

A look at the tables III.4a&b shows that the variation is much stronger across the different values of MPCE Classes than within the same class for different states. The point which comes across is that inter-state variations are lower than intra-state variations. It is to be noted, that the disparity among the different MPCE Classes is much higher than the disparity within the same class for different states.

As for example, the coefficient of variation for the Rs.0-50 MPCE Class is only 18.45 percent (one of the highest values for the various classes) whereas the coefficient of variation among Bihar and Punjab are as high as 40 percent and 47 percent, across the various MPCE Classes.

When one takes a look along the different states, we see that the variation is the highest for the MPCE Class of

Rs.0-50. It stands at 18.45 percent. This is because the per capita per day calorie intake values are very low for some of the states like Kerala, Tamil Nadu and even Punjab for this particular class. The calorie intake values are 857 Kcal, 902 Kcal and 693 Kcal respectively. The lowest value for the coefficient of variation is for the Rs.125-200 class.

The variations in calorie intake within the states, across the MPCE classes is presented in table III.4a. The states with very high levels of variation are Bihar, Kerala, Madhya Pradesh, Punjab, Tamil Nadu and West Bengal. Their percent of variation are 40, 42, 47, 51 and 41 respectively. Among the union territories Chandigarh has a high level of variation at 47.

(i) Variability In Calorie Intake Across The States By Monthly Per Capita Expenditure Class

The levels of calorie intake for the different states, for different groups of MPCE classes has been presented in table III.2, as already mentioned. It can be seen from the table III.2, that the variation in calorie intake levels among the different states is not very pronounced for the lower classes. They generally show a slight variation from the all-India value for that particular class. However, the

coefficient of variation presented in table III.4 a, shows the highest value for the Rs.0-50 class. It's variation value stands at 0.18 which is the highest level of variation among the different ranges of MPCE classes. this is because in the class of Rs.0-50, there are some states like Kerala, Punjab and Tamil Nadu which have very low calorie intake levels as compared to the all-India average for this class. The all-India average the Rs.0-50 class is 1316 Kcal whereas the values for Kerala, Punjab and Tamil Nadu are 857 Kcal, 693 KCal and 902 KCal respectively. It is due to this that the coefficient of variation has the highest value for this class. However, the general trend as seen from table III.2 is that the plight of the poor is more or less the same in most of the states.

The MPCE Class of Rs.100-125 is assumed to be the model class for this study, because the all-India value for this particular class is closest to the norm. With an average value of 2322 Kcal per person per day, for all classes, it is just 3 per cent below the norm. Within this category, Delhi and Chandigarh have a much lower intake value as compared to the other states in the same class. They are 43 per cent and 40 per cent less than the norm. The middle values of MPCE Class in Delhi have very low calorie intake

TABLE III.4(a)

TABLEIII.4a COEFFECIENT OF VARIATION ALONG THE STATES FOR MONTHLY PER CAPITA EXPENDITURE CLASSES. [RURAL]	
PER CENT OF COEFFICIENT OF VARIATION	
STATES	
ANDHRA PRADESH	35
ASSAM	31
BIHAR	40
GUJRAT	35
HARYANA	41
HIMACHAL	35
JAMMU & KASHMIR	39
KARNATAKA	39
KERALA	42
MADHYA PRADESH	40
MAHARASHTRA	31
MANIPUR	28
MIZORAM	15
ORISSA	35
PUNJAB	47
RAJASTHAN	35
TAMILNADU	51
UTTAR PRADESH	39
WEST BENGAL	41
ANDAMAN	36
CHANDIGARH	47
DADRA & NAGAR HAVELI	32
DELHI	37
GOA	26
PONDICHERY	28
SOURCE : BASIC DATA - NSSO 38th ROUND (1983)	

value as compared to the higher ranges. The calorie intake value for the lower ranges of MPCE Class, such as Rs.0-50, Rs.50-70 and Rs.70-100, for Delhi are not available in the National sample Survey data for the 38th round (1983). For the higher MPCE Class of Rs.300 and above, its calorie intake value is 4096 Kcal.

The inter-class values show a lot of variation in Delhi, probably due to the high cost of living here. The condition of the poorest is comparable with the same class of other states. However, the values for the middle ranges of MPCE (MPCE) class shows a lot of variation across the states. It is very low in places like Delhi and Chandigarh - 1440 Kcal and 1399 Kcal respectively for the model class of Rs.100-125. Whereas, the value for the same class is quite high for states like West Bengal and Uttar Pradesh - 2184 Kcal and 2602 Kcal respectively (Table III.2).

The state with the highest level of calorie intake in Rs.0-50 class is Madhya Pradesh. For most of the other classes, ranging from Rs.70-100 till Rs.250-300, U. P. has the highest value of calorie intake. unjab leads in the level of calorie intake. (Table III.9).

On the other hand, Kerala has the lowest value of calorie intake level for three classes of the bottom level

- Rs.0-50, Rs.50-70, Rs.70-100. For the model class of Rs.100-125, Delhi has the lowest value. For all the classes combined, the union territory of Dadra and Nagar Haveli has the lowest level of calorie intake.

Thus, in the middle ranges of MPCE class, Uttar Pradesh is in the most comfortable position. This shows that the general population in Uttar Pradesh is much better-off than the other states, in terms of calorie intake levels, as shown in table III.5.

In the states like Gujarat, whose all-class average is only 12 per cent less than the norm, the value for the middle ranges is 25 per cent less than the norm.

For almost all the classes in Kerala, the value of calorie intake is much less than the value for the corresponding classes in other states.

Apart from this, most of the states do not show a marked variation between the value of calorie intake, within a particular Per MPCE monthly per capita expenditure class is, reffered to as MPCE subsequently class.

(ii) Intra-State Variations In Calorie Intake Levels Across Monthly Per Capita Expenditure Classes: [Rural]

Intra-state variations, (table III.2), within the classes are more pronounced with respect to the Inter-state

TABLE III.4(b)

TABLE : III 4b: COEFFICIENT OF VARIATION AND STANDARD DEVIATION ACROSS THE STATES BY MONTHLY PER CAPITA EXPENDITURE CLASS [RURAL]			
MPCE CLASS(Rs)	STANDARD DEVIATION	MEAN	PER CENT OF CO-EFFEICIENT OF VARIATION
0-50	220.5	1195	18
50-70	206.06	1570.5	13
70-100	207.69	1926.8	11
100-125	320.58	2129.6	15
125-200	266.68	258.8	10
200-250	387.17	3030.6	13
250-300	414.03	32817	13
300 & ABOVE	746.26	42662.2	17
ALL CLASS	268.02	2224.5	12

TABLE III.5

TABLE III.5 : ALL INDIA CAPITA CALORIE INTAKE BY MONTHLY PER CAPITA EXPENDITURE CLASS [RURAL]			
	AVERAGE	STATE WITH	
MPCE (Rs)	CLAORIE(Kcal)	HIGHEST (Kcal)	LOWEST (Kcal)
0-50	1316	M.P. - 1515	KERALA -857
50-70	1712	RAJASTHAN - 1940	KERALA - 1197
70-100	2042	U.P. - 2273	KERALA - 1486
100-125	2322	U.P. - 2602	DELHI - 1440
125-200	2696	U.P. - 2999	GOA - 2035
200-250	3161	U.P. - 3628	DADRA & NAGAR HAVELI-2066
250-300	3447	U.P. - 3931	MIZORAM - 2324
300 & ABOVE	4594	M.P. - 5517	GOA - 2714
ALL CLASS	2221	PUNJAB - 2677	DADRA & NAGAR HAVELI-1689
	SOURCE : NSS 38th ROUND		

variations in calorie intake, in most of the cases. Even in states like Rajasthan which are well-off in terms of the calorie intake values, & the lower MPCE classes, there is high intra-state variations. The difference in the calorie intake level between the 0-50 and the 300 and above class is 3339 Kcal per capita per day. These two classes represent the two extremes with calorie intake level of 1590 Kcal and 4929 Kcal respectively.

The Rs.0-50 class is 34 per cent less than the norm, whereas 300 and above MPCE class is 105 per cent more than the norm. The difference between the two shows the prevailing level of disparity in terms of availability of food.

At the all-India level the difference between the Rs.0-50 and the Rs.300 & above MPCE class is 3278 Kcal. The value for the 0-50 class is 1316 Kcal and for the 300 & above class is 4594 Kcal.

On the other hand, states like Kerala with one of the lowest value of calorie intake for almost all the classes, also show a glaring disparity level. It has a value of 857 Kcal for Rs.0-50 MPCE class and 3565 Kcal for 300 and above class.

These values also show a glaring disparity level within the state among different MPCE classes. Other states also

follow more or less the same trend, as far as intra-state variations are concerned (table III.2).

It can be said that the various states follow the same trend roughly as for as intra-state variations are concerned. The intra-state variations are more pronounced in terms of percentage of calorie intake of the norm, than the inter-state differences, within the MPCE classes. The jist is that variations in calorie intake levels are higher across the different MPCE classes than within them.

Some states do have a significantly low value within the same class for different states. However, this is an exception in the case of states like Kerala and Tamil Nadu, and not the general trend. The middle ranges of MPCE classes show more striking inter-state differences.

The major states like Uttar Pradesh, Bihar, Madhya Pradesh, Karnataka are in a comfortable position as far as calorie intake levels are concerned. They are just ten per cent or less below the norm. Uttar Pradesh is closest to the norm, being deficient by only one per cent.

Tamil Nadu lags behind the norm of 2400 Kcal by 22 per cent, followed by West Bengal and Assam with 16 per cent and 14 per cent respectively.

Kerala is deficient by 21 per cent, almost the same as

Tamil Nadu. The reason for the low value of calorie intake in Kerala is the exclusion of Tapioca (a major source of calorie) from the survey data.

ASSOCIATION BETWEEN CALORIE INTAKE AND THE LEVELS OF FOODGRAIN OUTPUT

It is generally believed that the intake of calories is generally high in those states where the levels of agricultural productivity is also high. The association seems to be stronger between the per capita output of cereals and per capita intake of calories, in the rural areas.[2] In this section of the Chapter, it will be seen whether there is any association between the levels of calorie intake in the rural areas specially and the overall levels of production of food crops for the major states. The values of calorie intake are taken for the rural areas based on the date of National sample Survey of 38th round (1983).

The state level values for agricultural productivity for the year 1981 has been presented in table III.6. The levels of per capita calorie intake for all classes for the major states have also been shown in the next column. Thirteen major states have been taken to look at the

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2. P.G.K. Panikar (1980) "Inter-regional Variation in Calorie intake", *Economic and Political Weekly*, volume 15, October pp. 1803-1814.

TABLE III.6 : CORRELATION BETWEEN AGRICULTURAL PRODUCTIVITY AND PER CPITA CALORIE INTAKE		
STATES	AGRICULTURAL PRODUCTICITY (TONS) 1981	PER CAPITA CALORIE INTAKE (1983)(Kcal)
ANDHRA PRADESH	1.11	2204
BIHAR	0.62	2189
GUJRAT	0.90	2113
HARYANA	3.08	2554
KARNATAKA	1.02	2260
MADHYA PRADESH	1.22	2323
MAHARASHTRA	1.11	2144
ORISSA	0.99	2103
PUNJAB	4.68	2677
RAJASTHAN	1.23	2433
TAMIL NADU	0.78	1861
UTTAR PRADESH	1.16	2399
WEST BENGAL	0.90	2027
CORRELATION COEFFICIENT= 0.78		

relationship between the levels of agricultural productivity and the per capita per day calorie intake levels. The union territories and some of the insignificant states in terms of agricultural production have been deliberately left out since their contribution is minimal as far as agricultural production is concerned.

The correlation between the two variables i.e. productivity levels and calorie intake values, has been worked out. The correlation value comes out to be 0.78, which shows that there exists a positive and strong relationship between the levels of agricultural productivity and the per capita per day calorie intake values.

Those states which have high values of agricultural productivity are also rich in calorie intake levels. If we take the case of Punjab and Haryana, it can be seen from table III.6 that they have one of the highest values for agricultural productivity among the 13 major states. Consequently, their per capita per day calorie intake values are also one of the highest. Punjab's agricultural productivity is 4.68 tons according to the 1981 data shown in table III.6. In tune with this it has a high calorie intake value of 2677 Kcal per capita per day which is much above the norm of 2400 Kcal taken for the rural areas.

On the other hand, the states with low agricultural productivity, have low calorie intake values, as for example Tamil Nadu has a low agricultural productivity value of 0.78 and the corresponding calorie intake value is also low at 1861 Kcal.

Thus it can be said that there is a strong correlation between the levels of production and the per day per capita calorie intake. There is an invariable increase in the calorie in take levels along with an increase in agricultural productivity (Table III.6).

Table III.7 presents the output of major food crops as per the quinquennium ending in 1983-84 over 1978-79. The percentage growth rate is also shown. Here too, it is seen that the states with high levels of calorie in take are also the ones which have contributed in a major way in the output and growth rate of food crops.

Thus the analysis shows a positive and strong correlation of 0.78 between the two variables i.e. agricultural productivity and levels of calorie intake for the major states. However, there are some states like Andhra Pradesh and Orissa whose per capita output of cereals is higher than the all-India average but calorie intake is still significantly below the national average. Another

TABLE III.7

TABLE III.7 : STATEWISE OUTPUT OF MAJOR FOOD CROPS FOR 1983-84 OVER 1978-79	
STATES	GROWTH RATE (%)
ANDHRA PRADESH	12.6
TAMIL NADU	– 3.3
KARNATAKA	1.6
KERALA	– 0.1
ASSAM	1.8
BIHAR	- 6.4
WEST BENGAL	– 6.4
ORISSA	2.9
GUJRAT	2.10
MAHARASHTRA	6.0
RAJASTHAN	3.3
MADHYA PRADESH	7.9
HARYANA	18.5
PUNJAB	28.5
UTTAR PRADESH	33.6
REST OF INDIA	2.1

exceptional pattern which is noticed is that in states like Gujarat and Maharashtra, the intake of calories is higher than in Assam and West Bengal, which have a higher per capita output of cereals.

A significant feature of states like Rajasthan, Gujarat, Maharashtra and Karnataka is the high proportion of coarse cereals like Jowar, Bajra and the like, in the total consumption of cereals. This has been shown in table III.8. These states also have high levels of calorie intake as shown in table III.2. Their calorie intake levels are higher than the total output of cereals would suggest. The reason for this is the higher quantity of consumption of coarse cereals. Coarse cereals being cheaper than rice and wheat yield more calories per rupee of expenditure than rice or wheat.

Thus in states where the proportion of coarse cereals consumed is relatively high, like for example, Gujarat and Maharashtra, the average price of cereals is lower than the states where the per capita output of cereals are higher. The coarse cereals are cheaper and provide more calories for every rupee of expenditure. Therefore, the states where coarse cereals constitute a higher proportion of total cereal consumption, the level of calorie intake turns out to

TABLE III.8

TABLE III.8 :	ENERGY/DAY/PERSON FROM DIFFERENCE FOOD GROUPS					
	FOR ALL CLASSES					
		FOOD ITEMS				
	STATES	RICE	WHEAT	JAWAR	BAJRA	MAIZE
		ENERGY(Kcal)				
	ALL INDIA	771	529	166	105	87
	ANDHRA PRADE	1372	14.2	277	47	24
	ASSAM	1577	80			
	BIHAR	775	660	12.7	18	314
	GUJRAT	225	334	166	608	140
	HARYANA	112	1346	3.5	233	28.5
	HIMACHAL	458	793		1.20	595
	JAMMU & KASHM	1192	555		2.4	300
	KARNATAKA	618	63	633	24	6.8
	KERALA	1093	72			
	MADHYA PRADE	746	641		246	23
	MAHARASHTRA	313	188.6	913	150	5.7
	MANIPUR	1992	6.4			5.7
	MIZORAM	162	53			30.7
	ORISSA	1605	128		4.8	4.5
	PUNJAB	115	1380		6.0	95.8
	RAJASTHAN	337	902	58	654	254
	TAMIL NADU	1000	48.6	121	137	3.4
	UTTAR PRADESH	444	1210	26	70	43
	WEST BENGAL	1364	291		1.2	8.0
	DELHI	97.7	2178		31.3	9.12
	GOA	1016	222	56	19	1.1

be higher than in states with more or less the same level of output of cereals but lower level of consumption of coarse grains.

In states like Orissa, Assam, West Bengal and Kerala where rice constituted the staple diet of the rural population, the average intake of calories is among the lowest. This is also because the price of rice is highest among all cereals.

The average intake of calories is much higher in states like Punjab, Haryana, Madhya Pradesh and Uttar Pradesh because apart from the per capita output of cereals being high in these states, the cereal basket mainly consisted of wheat, coarse cereals and rice. Wheat and coarse cereals being cheaper than rice, their consumption is more thus increasing the calorie level. This shows that there is an association between the level of calorie intake and the average price of cereals.

However, greater dependence on the consumption of coarse grains has its disadvantages too. These states suffer from some basic constraints, which render the food budgets of these regions extremely vulnerable. Being primarily rainfed crops and mostly grown in drought prone areas, they are characterised by high instability of output. In case of

failure of rain, the economy of the state becomes very vulnerable. Being inferior cereals, the staple food of the lower income groups, in case of low output, the most vulnerable section of the society is worst hit.

EXPENDITURE ON FOOD ITEMS FOR ALL CLASSES BY STATES (RURAL)

It is found that a major portion of the income, specially in the rural areas is spent on food. The percentage of food expenditure to total expenditure at the all-India level was 65.56 per cent according to the 38th round (1983) date of the National sample Survey. Table III.9 shows the percentage expenditure on food to total expenditure for all the states and union territories. Assam, Bihar, Manipur, Tripura and West Bengal spend 73.3 per cent, 73.6 per cent, 71.3 per cent, 70.7 per cent and 74 per cent respectively on food. They spend more than 70 per cent of their income on food and still many of them like Assam, Bihar, Manipur and West Bengal are below the norm of 2400 Kcal. On the other hand, Punjab which spends only 58.7 per cent of its expenditure on food, has a high calorie intake level of 2677 Kcal.

This shows that the people who are spending a greater percentage of their total expenditure on food, are not getting the due calories. This means that since these states

TABLE III.9

TABLE III.9 : PERCENT EXPENDITURE ON FOOD FOR ALL CLASS BY STATES (RURAL)	
STATE	% EXPENDITURE
ANDHRA PRADESH	60.3
ASSAM	73.3
BIHAR	73.6
GUJARAT	66.14
HARYANA	63.58
HIMACHAL PRADESH	63.02
JAMMU & KASHMIR	69.6
KARNATAKA	63.47
KERALA	61.6
MADHYA PRADESH	66.5
MAHARASHTRA	61.5
MANIPUR	71.3
MEGHALAYA	68.08
ORISSA	73.6
PUNJAB	58.7
RAJASTHAN	60.74
SIKKIM	67.0
TAMIL NADU	65.05
TRIPURA	70.7
UTTAR PRADESH	63.3
WEST BENGAL	66.2
ANDAMAN & NICOBAR	66.9
DELHI	54.8
GOA	63.8
MIZORAM	66
PONDICHERRY	67.5
ALL INDIA	65.56
SOURCE - NSS 38th ROUND	

are already deficient in calories, they are spending more on food to increase the quantity of calorie intake. The same holds true for the lower values of monthly per capita expenditure classes. Their percentage expenditure on food to the total expenditure is more than the percentage spent by the higher ranges of monthly per capita expenditure classes.

VARIATION IN THE TOTAL INTAKE OF CALORIES FROM DIFFERENT FOOD GROUPS (RURAL)

Now, the percentage of calorie derived from cereal and cereal substitutes across the states and union territories, will be discussed.

The percentage intake of calorie from different items of food is shown in table III.10. It is apparent from the table, that the major part of the nutrient was derived from the two food groups which were mainly composed of cereals and cereal substitutes.

Of the total calorie intake, more than 75 per cent was derived from cereal and cereal substitutes in the rural areas.

The calorie derived from the different cereals has been presented in table III.8

At the all-India level, the calorie derived from rice is the maximum out of the commonly consumed cereals like

TABLE III.10

TABLE No. III.10: PERCENTAGE OF TOTAL INTAKE OF CALORIE FROM DIFFERENT FOOD ITEM BY STATE/ UNION TERRITORY		
% OF CALORIE INTAKE		
STATE/UNION TERRITORY	CEREALS	CEREAL SUBSTITTUTES
ANDHRA PRADESH	79.74	0.05
ARUNACHAL		
ASSAM	79.73	0.01
BIHAR	81.97	0.45
GUJARAT	64.60	
HARYANA	63.82	
HIMACHAL PRADESH	69.43	
JAMMU & KASHMIR	78.08	
KARNATAKA	75.65	0.02
KERALA	60.96	6.34
MADHYA PRADESH	77.30	0.20
MAHARASHTRA	73.41	0.45
MANIPUR	85.86	0.01
MEGHALAYA		
MIZORAM	82.48	0.12
NAGALAND		
ORISSA	85.07	0.14
PUNJAB	57.46	
RAJASTHAN	73.27	0.02
SIKKIM		
TAMIL NADU	75.69	0.27
TRIPURA		
UTTAR PRADESH	73.18	0.05
W. BENGAL	80.47	0.09
ANDAMAN & NICOBAR	60.33	2.36
CHANDIGARH	36.91	
DADRA & NAGAR HAVELI	74.19	0.05
DELHI	52.52	
GOA, DAMAN & DIU	62.14	
LAKSHADWEEP		
PONDICHERRY	77.62	0.07
ALL INDIA	75.16	0.36
SOURCE: BASIC DATA OBTAINED FROM NSS(38th) ROUND		

TABLE III.11

TABLE III.11LEVELS OF GROWTH AND OUTPUT OF MAJOR CROPS(1980-83)		
CROP	**AVERAGE OUTPUT(TONNES**	**PERCENT COMPOUND GROWTH RATE**
RICE	49335	1.79
WHEAT	38553	7.26
JAWAR	10964	0.78
MAIZE	6565	2.08
BAJRA	5424	1.54
RAGI	2593	1.38
PULSES	6658	0.12
TOTAL CEREALS	115488	2.87
SOURCE : G.S.BHALLA &D.S. TYAGI, PATTERNS IN INDIAN AGRICULTURAL DEVELOPMENT- A DISTRICT LEVEL STUDY		

rice, wheat, jowar, bajra and maize. It is followed by wheat, Jowar, Bajra and Maize in that order, at the all-India level. In Karnataka, Jowar is the main source of energy instead of rice and wheat. In the northern states of Punjab, Haryana and Himachal, wheat is the leading source of energy.

Since rice and wheat are the principal source of calorie for majority of the states the per cent compound growth rate for them is also the highest. The per cent compound growth rate during the period of 1980-83 for rice and wheat was 1.79 and 7.26 per cent respectively. However, the compound growth rate of Pulses was negative (-0.12). This has been presented in table III.11.

The average intake of protein, a vital nutrient, from cereals, in the country as a whole are found to be 74 per cent in rural areas. Other food items like pulses, milk and milk products and meat, fish and eggs, which are otherwise the major sources of protein, contributed 20 per cent only as a whole.[3]

The quantity of foodgrains actually consumed by the population of the country could almost meet the minimum

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3. "Sarvekshana" (1980) *Journal of the National Sample Survey Organisation*, Round 38, Jan-Dec., Vol. XIII, p.32.

requirement of nutrition, as this particular food group alone contributes more than 75 per cent of the calorie intake in the rural areas and 74 per cent of the protein intake.

However, these proportions decline progressively with a rise of per capita expenditure level both in rural and urban areas. In the higher monthly per capita expenditure classes, higher proportion of nutrients was derived from food items rich in high quality protein, such as, meat, milk, eggs, fish etcetra. While in rural areas the share of pulses was the highest in providing protein.

Cereals were the major source of calorie intake in some of the major states like Bihar (82 per cent), Manipur (86 per cent), West Bengal (80 per cent), Mizoram (83 per cent) and Orissa (85 per cent). Bihar, West Bengal and Orissa are part of the rice belt, therefore, the high percentage of calorie intake from cereals.

On the other hand Punjab derives only 57.5 per cent of calorie intake from cereals and no per cent from cereal substitutes. This implies that the calorie intake in Punjab is derived from other, better sources, of calorie and protein such as milk and milk products, meat and eggs. The behaviour pattern of consumption of food items is also

determined by socio-cultural reasons. Punjab is culturally used to deriving a major portion of its nutrition from milk and milk products.

Cereal substitutes play a marginal role in most of the states, generally contributing less than 1 per cent to the total percentage of calorie intake. However, Kerala is a deviation from the trend. In Kerala cereal substitutes contribute 6.34 per cent to the percentage of calorie intake. The union territory of Andaman and Nicobar islands also has a higher percentage of cereal substitutes (2.36 per cent) as compared to the average value of the states and the all India average value which stands at 0.36 per cent.

The quantity of consumption of total cereals per capita per day was the highest in the state of Jammu and Kashmir - 670 gm/day/capita. On the other hand Kerala presented the lowest value of cereal consumption per capita per day - 334 gm. The reason being the exclusion of Tapioce, a major food item of Kerala, from the survey. Bihar, U.P., Orissa, Rajasthan, Manipur, M.P., Karnataka and Andhra Pradesh have the consumption Value of cereals higher than the all-India average of 493 gm per capita per day.

Tamil Nadu (435 gm), Kerala (334 gm), Assam (474 gm), Punjab (451 gm), Maharashtra (460 gm) and West Bengal (476

gm) are much below the all-India average value of 493 gm. (Table 4.2)

ENERGY DERIVED FROM DIFFERENT CEREALS FOR ALL CLASSES BY STATES (RURAL)

The energy derived per day per person from different cereals for all-India has already been shown in Table III.8. It shows the variation in the source of calories in different states. At All-India level rice is the source of the highest level of calorie intake per day per capita. Wheat occupies the second place as the most important source of calorie, followed by Jowar, Bajra and Maize in that order.

The states where the principle source of calorie intake is rice are Andhra Pradesh (1372 Kcal), Assam (1572 Kcal), West Bengal (1364 Kcal), Orissa (1605 Kcal), Manipur (1992 Kcal), Tamil Nadu (1000 Kcal) and Kerala (1093 Kcal).

On the other hand the states with wheat as the principal source of calorie are U.P. (1210 Kcal), Delhi (2178 Kcal), Haryana (1346 Kcal) and Punjab (1380 Kcal).

Jowar is a main source of calorie in Karnataka (633 Kcal) and Maharashtra (913 Kcal). Even in Andhra Pradesh Jowar occupies the second place after rice. A glance at the table 4.3 shows that Jowar is an important cereal by way of per capita / day calorie intake, in peninsular India.

Bajra is the second most important crop calorie-wise in Rajasthan. It derives 27 percent of the calorie norm from Bajra. Another state where Bajra is most important is Gujrat (608 Kcal). It derives 29 per cent of its calories from Bajra. The All-India value of calorie intake per person / day is 2113 Kcal for Gujarat, out of which Bajra alone provides 608 Kcal.

It can be said that Bajra occupies a place of prominence in Western India.

Maize is more significant in the hilly states of Himachal Pradesh, Jammu and Kashmir and even in Punjab and Bihar.

Kerala, Andhra Pradesh and Assam are the states where the calorie derived from wheat is significantly low. Andhra Pradesh has the lowest figure of 14.2 Kcal only from wheat.

There is a wide variation in the rate of consumption of total cereals amongst the households belonging to both the rural and urban sectors of the country. In an average the monthly per capita consumption of cereals is 14.8 kg in the rural and 11.3 kg. in the urban areas. For scheduled class and scheduled tribe population the monthly per capita consumption of cereals is slightly less than the all-India rural average. However, in the urban areas the MPC for total

cereals for both scheduled caste and scheduled tribe households is appreciably higher than the all-India average.

For agricultural labour it is one kg. less than the all-India average while for rural labour households it is 2 kg. less than the all-India average.

QUANTITY OF CONSUMPTION OF CEREALS OVER YEAR

The per capita per day consumption of major cereals is shown in table III.12 for the four rounds of NSS surveys, on consumer expenditure - 27th (1972-73), 28th (1973-74), 32nd (1977-78) and 38th (1983). It is observed that since the 27th round, the overall pattern of consumption of total quantity of cereals remained stable in urban India whereas it appears to have fallen by about 3 per cent in 1983 in the rural sector.

FACTORS UNDERLYING INTER-STATE VARIATIONS

The main factors underlying inter-state differences in calorie intake in rural areas are the levels of production of foodgrains and the degree of inequality in the distribution of land. calorie intake varies strictly with per capita output and inversely with the degree of inequality in land distribution. It is also a function of their income, as

TABLE III.12 : QUANTITY (gm) OF CONSUMPTION OF RICE, WHEAT AND TOTAL CEREALS PER PERSON/DAY BY NSS ROUND [RURAL]			
CEREALS (gm) NSS ROUND	RICE	WHEAT	TOTAL CEREALS
27th (72-73)	219.6	129	509
28th (73-74)	230	117	503
32nd (77-78)	237	135	508
38th (1983)	221	119	493

TABLE III.13 : ENERGY INTAKE BY OCCUPATION

OCCUPATION CLASS	YEAR	
	1975-79	1988-90
1.LANDLESS AGRICULTURAL LABOURER	2043	2179
2.OTHER LABOURER	2123	2118
3. CULTIVATORS	2514	2356
4. OTHERS	2244	2168
RECOMENDED DIETARY INTAKE (RDI)		

SOURCE: NNMB REPORT 1991

governed by the level of employment. The income level determines the MPCE levels which in turn governs the expenditure on food thus determining the nutritional levels. The calorie intake levels also increase with the increasing MPCE classes, as already shown in table III.2

It follows that an increase in cereal production by itself will not ensure an improvement in the calorie intake in the low-calorie group of states. It is no doubt a necessary condition but increase in employment opportunities and income is a precondition for raising the level of their nutritional status.

ENERGY INTAKE BY OCCUPATION FOR RURAL INDIA

The requirement is well as actual intake of energy varies across different sections of the population. The average calorie intake of cultivator families is higher than that of landless agricultural labourers, other labourers and other sections of the population in the rural areas. The cultivator families are close to the RDI of 2400 Kcal for the rural sectors. The intake of calorie, even for the cultivators has come down from 2514 Kcal per day per capita in 1975-79 to 2350 Kcal in 1988-90. The calorie intake level has slightly gone up from 2043 Kcal in 1975-79 to 2179 Kcal 1988-90 for the landless agricultural labourers.

Apart from the Cultivators, the calorie intake level, for landless agricultural labourers and labourers and the remainder of the community, is around 2150 Kcal/ consumer unit - which is the cut-off level used to determine the magnitude of poverty in any Indian population. This has been shown in Table III.13.

NUTRITIONAL STATUS OF ADULTS

For adults, Body Mars Index (BMI): which is a ratio of the weight in kg. to the height in meters, is considered to reflect the nutritional status of the adults. Persons with a BMI value of less than 18.5 are considered to suffer from chronic Energy Deficiency (CED). "The CED group is further classified into different degrees, such as first, second and third, using values of 18.5-17, 17-16 and below 16 as the cut-off levels per BMI,"[4] (Table III.14).

A positive shift in the distribution of BMI values noted during the 1970s and '80s are suggestive of an improvement in nutritional status of rural adults during the period.

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4. "Nutritional Status of Indian Adults Assessed by BMI" (1991) *Report of National Nutritional Monitoring Bureau*, National Institute of Nutrition, ICMR, Hyderabad, p.35.

TABLE III.14

TABLE III.14 : DISTRIBUTION OF ADULTS BY NUTRITIONAL STATUS			
BMI VALUES	MALE	FEMALE	
CHROMIC ENERGY DEFICIENCY			
1. NORMAL	50.7	50.8	
2. FIRST DEGREE	27.9	25.4	
3. SECOND DEGREE	12.5	12.9	
4. THIRD DEGREE	8.8	11.3	
SOURCE : NNMB REPORT 1988-89			

A positive relationship is observed between adult BMI and proxies for economic status in rural areas, like possession of agricultural lands, major occupation and income. Cultivators are nutritionally better off than landless agricultural labourers. A larger percentage of adults belonging to better income levels had higher BMI levels.

CHAPTER IV

PROTEIN ENERGY MALNUTRITION AND NUTRITIONAL DISORDERS IN RURAL INDIA.

The significance of protein in the dietary intake can not be undermined. It is a very important component for meeting the requirement of a 'balanced diet' - "a diet which contains a variety of foods in such quantities and proportions that the need for energy, carbohydrate, Vitamins, minerals and fats and other micro-nutrients is adequately met for maintaining health, vitality and general well-being".[1]

The following requirements are essential to he met in a 'balanced diet'

i. First and foremost, the daily requirement of protein should be met. This amounts to 15-20 percent of daily energy intake.

ii. Next comes the fat requirement, which should be limited to 10-30 percent of daily energy intake.

iii. Carbohydrates rich in natural fibre should constitute the remaining food energy

The focus of discussion here will be the importance and distribution of protein intake across the states and across

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1 J. Park and Park (1985) "Nutrition and Health", *A Text Book of Preventive and Social Medicine*, pp.353.

monthly per capita expenditure (MPCE) classes, and comparing them with the all-India average value intake level by nutritionists facts and oils will also be seem in the perspective of their distribution by means of intake level across the states and over various MPCE classes will also be discussed briefly, and the deficiency diseases, related to there important components of a 'Balanced diet' will be looked into. The nutritional status of an individual is the result of there interrelated factors. It is influenced by the quantity and quality of food intake, in terms of adequacy, and also by the physical health of the individual.

Protein is taken as the of foundation of human diet. It is an important constituent of the diet as it is necessary for the growth and integrity of living issues. During the process of digestion protein breaks down into amino acids. They are not stored in the body unlike fet.Shortage of protein requirement is greater during periods of growth in Children and under stress conditions such as pregnancy and lactation. Thus pre-school children and lactating mother, pregnant women form the most vulnerable section of the society in terms of protein deficiency.

Protein is derived mainly from pulses, milk, egg, fish and meat. Animal proteins, i.e., those derived from

biological value than vegetable proteins.It is usually expressed in grams per 100 gm of edible food.

INTAKE OF PROTEIN; DISTRIBUTION PATTERN

The all India average per capite consumption of protein has been estimated to be 62 gm per day for the urban sector and 56.7 gm per day for the urban sector.

The recommended dietary intake level of protein is 55 gm per day. It is seem from table 5.1 that the average per capite per diem intake of protein is in general adequate at the state level for the rural sector. Haryana, Himachal Pradesh and Punjab are some of the states with the highest per capite per diem intake level of protein. Their protein in take levels stand at 78g, 80g and 79g/capita/diem, respectively. The dietary intake pattern of any region is dependent on the kind of food produced or imported. In the case of rural areas it is largely dependent on the kind of food produced because of little inter-state movements of food. Thus the food intake level is largely dependent on the kind and quantity of food produced which again centres around the climatic conditions of the region, economic capacity, religion, customs, tastes and taboos of the people. Largely because of these factors, the protein intake

level is quite high in the states of Punjab, Haryana and Himachal Pradesh.

They have a high consumption level of milk and milk products due to which the intake of animal protein is adequately met.

On the other hand there are stake like Kerala and Tamil Nadu with protein intake levels of 47 gm each respectively. It is much below the recommended dietary intake level of 55gm as well as the all- India average of 62 gm/capita/diem for rural areas. The reasons for the low intake level of protein is again accounted for, by the cultural factors and habits of the people. Climatically too, Kerala is more suitable for the production of rice and Tapioca which form the major food item in Kerala. These food items are rich in calories but deficient in protein level. Thus the deficiency in protein intake level in Kerala can be explained by social and cultured factors, rather than any deficiency in the actual production of protein rich food. Tamil Nadu is another state where protein intake level is low, despite the fact that it emerges as one of the better off states with respect to other indicators of development.

Table IV.1 shows the position of all the states of India for all classes with respect to protein intake levels. None of the states show any serious deficiency except Kerala

TABLE :IV.1 : PER CAPITA PER DIEM INTAKE OF PROTEIN FOR ALL CLASSES BY STATES [RURAL]

STATES	PROTEIN (gm)
ANDHRA PRADESH	56
ASSAM	52
BIHAR	65
GUJARAT	59
HARYANA	78
HIMACHAL	80
JAMMU & KASHMIR	71
KARNATAKA	60
KERALA	47
MADHYA PRADESH	68
MAHARASHTRA	62
MANIPUR	61
MIZORAM	52
ORISSA	51
PUNJAB	79
RAJASTHAN	75
TAMIL NADU	47
UTTAR PRADESH	73
W. BENGAL	52
DELHI	71
GOA	54
ALL INDIA	62

Source : NSS 38th Round (1983)

and Tamil Nadu. The value of protein intake for other states varies around the Recommended Dietary Intake (RDI) level of 55 gm per day per capita.

Variation over the years

The protein intake levels over two time periods have been presented in table IV.2 The all-India average for the two National Sample Survey (NSS) round (1973) and (1983) was constant at 62 gm/day/capita for the rural areas.

Thus, a decade has seen no change in the average all-India protein intake level. This is because, there has been no significant change in the intake level in any of the states. These states which were above the RDI in the 27th sound (1972-73) were still above it in the 38th sound (1983).[2] The position of the states lagging behind deteriorated slightly during 1983 as compared to 1973- e.g. Tamil Nadu declined from 49gm to 47gm / day/ capite) kerala, though still below the RDI, increased its protein intake level from 38gm to 47gm /day/ capite during 1973 to 1983. Haryana, which was much above the all- India average of 62gm/ day/ capite, with 90gm of protein intake per day/ capite came down to 78gm in 1983. Another state which

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2 "Sarvekshana" (1989) *Journal of the National Sample Survey Organisation*, Vol.XIII, No.2, November-December, Ministry of Planning, Government of India.

registered a decline of almost to gm during 1973-1983 was Punjab. However, it was still much above the all-India average.

Almost all the states recorded almost the same value of protein intake level in 1983 as they did in 1973. There was no significant change in any of the states.

VARIATIONS ACROSS THE MPCE CLASSES IN THE LEVEL OF PROTEIN INTAKE BY STATES FOR RURAL AREAS:

Protein intake levels vary significantly at all-India level, per the lowest and highest MPCE classes, in the rural areas. The all-India levels of protein intake for the lowest MPCE class value of different states and the 300 & above MPCE class, for rural areas, show a wide gap of around 100 gm/day/capita.

The all India average for the lowest MPCE class is 23 while the figure for the highest class is 122 gm/day/capita. The gap is narrowest in the state of Goa for the highest and lowest class - 30 gm/day/capita.

Most of the other states have a difference ranging between 80-100 gm/day/capita, between the lowest and the highest classes (Refer table IV.3).

The variations along the states for the lower most and highest MPCE classes is not very significant except for the few states, as for example, Kerala, Orissa and Tamil Nadu.

TABLE IV.2

TABLE IV.2 : PER CAPITA INTAKE OF PROTEIN/DIEM BY STATE & NSS ROUND		
NSS ROUND	(1983) 38th	(1972-73) 27th
STATES		
ANDHRA PRADESH	56	53
ASSAM	52	53
BIHAR	65	65
GUJARAT	57	58
HARYANA	78	70
HIMACHAL	80	86
JAMMU & KASHMIR	71	80
KARNATAKA	60	57
KERALA	47	38
MADHYA PRADESH	68	68
MAHARASHTRA	62	54
MANIPUR	61	60
ORISSA	51	49
PUNJAB	79	85
TAMIL NADU	75	84
UTTAR PRADESH	47	49
W. BENGAL	73	76
ALL INDIA	62	62

Source : NSS Round 38 (1983)

TABLE IV.3

TABLE : IV.3 : PER CAPITA, PER DIEM INTAKE OF PROTEIN (gm) FOR THE LOWEST & HIGHEST MPCE CLASS BY STATES [RURAL]

MPCE (Rs)	LOWEST	HIGHEST
STATES		
ANDHRA PRADESH	15	113
ASSAM	25	84
BIHAR	26	134
GUJARAT	26	90
HARYANA	33	137
HIMACHAL	42	123
JAMMU & KASHMIR	36	107
KARNATAKA	24	117
KERALA	12	97
MADHYA PRADESH	31	160
MAHARASHTRA	27	112
MANIPUR	25	105
MIZORAM	38	63
ORISSA	17	97
PUNJAB	21	132
RAJASTHAN	36	129
TAMIL NADU	16	110
UTTAR PRADESH	33	147
W. BENGAL	18	111
DELHI	42	114
GOA	30	66
ALL INDIA	23	122

Source : NSS Round 38 (1983)

These states are much below the all India average of 22 gm/Capita/day intake of protein for the lowest MPCE class for rural areas. Kerala stands at 12 gm each. Andhra Pradesh too, has a low value of 15 gm. All these values are much below the average of 22gm/day/capita. If seen from the perspective of the RDI, the lower MPCE clauses for almost all the states, really trail behind the RDI, except for Himanchal Pradesh which is the closest to the RDI at 42 gm/day/capita.

The variations are much less along the states for the highest MPCE class of 300 and above. States like Madhya Pradesh, Haryana and Bihar are exceptions with very high values of protein intake in the rural areas. Madhya Pradesh has a value as high as 160 gm per day per capita for the 300 and above MPCE class for the rural areas. U.P., Harayana and Bihar too have high values of Protein intake 147 gm, 137 gm and 134 gm respectively, which are all above the all-India average of 122 gm for this MPCE class in the rural areas.

The values for the protein intake level in rural areas for the middle ranges of MPCE class, also do not how any significant variation. States like Haryana, Himanchal Pradesh, Rajasthan 69 gm, 74 gm, 74 gm and 79 gm respectively for the average MPCE class of 100-125. These values are above the all India average of 65 gm/day/ Capite

for 100-125 MPCE range in the rural areas. Kerala and Tamil Nadu stand values much below the average value even for the mean MPCE class of 100-125. The values for Kerala and Tamil Nadu strand at 44 gm and 49 gm per day/capita for the rural areas.[3] Most of the other states have values close to the all-India average of 65 gm for this particular MPCE class.

At all-India level, the MPCE classes ranging from 70-85 to 300 and above are above the RDI of 55 gm/day/capita. The MPCE classes below the RDI range from 0-30 to 50-70. The MPCE classes which are above or below the recommended daily intake of protein per the different states are presented in table IV.4.

It can be seen from the table that Maharastra follows the all-India average value of 70-300 and above are above the RDI in Maharastra. In Delhi and Tamil Nadu all classes below 125-200 MPCE range are below the RDI. In the rural sector of Kerala, all MPCE classes ranging from 0-30 till 125-150 are below the RDI level of protein.

The scenario of protein intake in the rural areas is bleak for the lower ranges of MPCE classes, making them vulnerable to protein energy malnutrition and related diseases.

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3 Ibid., p.92.

TABLE IV.4

TABLE IV.4 : MPCE CLASSES ABOVE & BELOW THE RECOMMENDED DAILY INTAKE OF PROTEIN BY STATE [RURAL]

	RDI- 55 gm	
	MPCE(Rs)	
STATES	ABOVE RDI	BELOW RDI
ANDHRA PRADESH	100-300	0-100
ASSAM	125-300& >	0-125
BIHAR	60-300 & >	0-60
GUJARAT	100-300 & >	0-100
HARYANA	70-300 & >	0-70
HIMACHAL	60-300 & >	0-60
JAMMU & KASHMIR	70-300 & >	0-70
KARNATAKA	85- 300 & >	0-85
KERALA	150-300 & >	0-150
MADHYA PRADESH	60-300 & >	0-60
MAHARASHTRA	70-300 & >	0-70
MANIPUR	100-300 & >	0-100
MIZORAM	125-300 & >	0-125
ORISSA	100-300 & >	0-100
PUNJAB	85-300 & >	0-85
RAJASTHAN	40-300 & >	0-40
TAMIL NADU	125-300 & >	0-125
UTTAR PRADESH	50-300 & >	0-50
W. BENGAL	100-300 & >	0-100
DELHI	125-300 & >	0-125
GOA	150-300 & >	0-150
ALL INDIA	70-300 & >	0-70

Source : NSS Round 38 (1983)

TABLE IV.5

TABLE IV.5 : PERCENTAGE OF TOTAL INTAKE OF PROTEIN FROM DIFFERENT FOOD FOR ALL CLASSES BY STATE [RURAL]			
% OF PROTIEN	PULSES	MILK & MILK PRODUCTS	MEAT,FISH &EGG
STATES			
ANDHRA PRADESH	9.63	4.28	5.97
ASSAM	10.09	4.82	8.55
BIHAR	9.73	2.89	1.92
GUJARAT	12.58	9.47	1.10
HARYANA	8.69	14.61	0.61
HIMACHAL	12.83	10.17	0.96
JAMMU & KASHMIR	7.16	9.05	3.01
KARNATAKA	11.90	4.64	1.11
KERALA	6.09	5.36	21.60
MADHYA PRADESH	13.27	3.91	1.20
MAHARASHTRA	12.84	3.84	3.52
MANIPUR	11.26	0.96	10.63
MIZORAM	7.42	2.83	8.46
ORISSA	6.50	1.44	4.95
PUNJAB	10.28	15.90	0.94
RAJASTHAN	7.29	8.52	0.6
TAMIL NADU	10.91	3.60	6.2
UTTAR PRADESH	10.7	5.38	1.5
W. BENGAL	6.9	3.47	10.0
DELHI	8.9	20.50	2.32
GOA	6.2	4.34	16.9
ALL INDIA	10.17	5.35	3.44
Source : Basic data obtained from NSS Round 38 (1983)			

DIFFERENT SOURCES OF PROTEIN: Their percentage intake in rural areas

The main sources of protein are milk and milk products, meet, fish and eggs are well as pulses, of all these sources pulses are the most affordable for the poor men specially in rural areas. The percentage of consumption of pulses is generally the highest among all the three sources per most of the states in the rural sector. The exceptions being, Haryana, where the consumption of milk and it's products is the highest of all the three sources, Punjab, which follows the same trend, Delhi and Rajasthan.

The difference between the percentage of consumption of protein from different sources is very significant in Delhi, with milk and it's products providing 20.5 per cent of protein intake while the other two contribute only 8.9 per cent and 2.32 per cent respectively. The consumption of meat, fish and eggs is high in Kerela and Mizoram. This food group provides 21.6 per cent and 8.46 per cent, the highest all the three food groups, for both of these states respectively.

The percentage intake of protein from pulses is 10.17 per cent for all-India in the rural sector. Most of the states are close to this average level of protein intake of rom pulses. Kerala, Orissa and west Bengal are few of those

states whose percentage intake of protein from pulses is much lower them the national average.

Maharastra, Gujarat and Madhya Pradesh have their percentage intake value much higher then the national average - 12.84, 12.58 and 13.27 respectively as shown in table IV.4.

The reason for the high level of protein intake from pulses in these states is the high production level. These states are major pulse growers due to geographical factors of climate, thus it forms a major part of their diet.

PROTEIN ENERGY MALNUTRITION

The growth rate of preschool children is considered to reflect the nutritional situation in the community to which they belong. They form the most vulnerable section of the society is terms of malnutrition of any form. It is manifested in their growth rate.

> "The growth situation is generally assessed in terms of the percentage distribution of children in different grades of growth retardation".[4]

According to the Gomez classification, which is based on weight deficit, hardly 10 percent of rural children have

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[4] V. Reddy, P. Rao, et al (1993) *Nutrition trends in India - A Graphic Presentation*, National Institute of Nutrition, Hyderabad.

a 'normal' nutritional status, according to the survey conducted in 1988-90 by NNMB.

A majority of them exhibit moderate (43.8per cent), mild (37.6per cent) forms of malnutrition, while 8.7 per cent are 'severely' malnourished. the extent of malnutrition is of the same magnitude among boys and girls.

Protein Energy Malnutrition (PEM) has been identified as a major health and nutrition problem in India, particularly in the weanlings and children in the first years of life. The incidence of protein energy malnutrition is 1-2 per cent among the preschool children in India. The clinical forms of protein energy malnutrition are kwashiorkor and marasmus. The mild and moderate cases of protein energy malnutrition are more common than the severe ones. Protein deficiency is although the major cause of PEM, other infections also perpetuate the deficiency by increasing the requirement of protein, calorie and other nutrients.

According to the NNMB report of Repeat Surveys (1988-90), 1991, the prevalence of Marasmus in preschool children was 0.6 per cent in 1988-90. this was appreciable lower than the corresponding figure of 1.3per cent in 1975-80.

The great majority of cases of PEM, nearly 80 per cent, are the intermediate ones, that is the mild and moderate cases which go frequently unrecognized. The problem exists in all the states. Nutritional marasmus is more frequent than Kwashiorkor.

Protein Energy Malnutrition (PEM) is widely due to protein deficiency. Another popular belief these days is that PEM[5] is primarily due to an inadequate intake of food both in quantity and quality, and infections, notably diarrhoea, respiratory infections, measles and intestinal worms which increase the requirements for calories, protein and other nutrients, while decreasing their absorption and utilization. it is a viscous circle - infection contributing to malnutrition and malnutrition contributing to infection, both acting synergistically. It is possible to prevent (even to cure) PEM in children through adequate and judicious use of inexpensive, locally available, cereal-pulse based diets.

According to an ICMR (1986) study only 5 per cent of the pre-school children have normal weight for age, 7 per cent show severe degree of malnutrition, 41 per cent suffer from mild malnutrition and 47 per cent from moderate degree of malnutrition. Malnutrition among children is closely related to the child mortality rate.

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5 See n.1, pp.353.

"Baseline date from the ICDS programme (Integrated child Development scheme) an the magnitude of Malnutrition among young children and child mortality in different areas show a direct relationship between the two"[6]

Areas with higher levels of malnutrition among the under three year old were also those with higher level of child (0-5 years) mortality. Reduction in the levels of severe degree of malnutrition would thus reduce child mortality levels.

ALL-INDIA FAT INTAKE LEVEL FOR THE RURAL POPULATION

Fat is a concentrated source of energy and is a necessary nutrient in the diet. It is mainly derived from ghee, butter and edible oil.

Dietary fat, however, should be restricted to approximately 20-30 per cent of total daily intake. Saturated fats should contribute no more then 10 per cent of the total energy intake, unsaturated vegetable oils should be substituted for the remaining saturated fats.

The all-India average fat consumption per-capita has been estimated to be 27 gm per day for the rural sector. For the urban sector it is 37 gm per day. According to the nutritionists a 'balanced' diet should not contain more than

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6 N. Kachani and K.Subba Rao (1990) "Rural Poverty and its alleviation in India", *Economic and Political Weekly*, Vol.XXV, No.13, 31st March pp.1-6.

20-30 per cent of dietary fat. It appears that in view of consumption of vegetable oils, the fat requirement, at least in respect of providing necessary amounts of essential fatty acids, is met on an average.

The values for per capita per diem intake of fat for all classes by states, according to the NSS, has been presented in Table IV.6. The all-India average stands at 27 gm for all classes for the rural area. States like Assam, Bihar, Manipur, Mizoram, West Bengal and Orissa fall below the all-India average. Manipur has the lowest value of 14 gm per dry intake of fat followed by Mizoram with 15 gm. The low level of fat of fat intake in there states, obviously find an explanation in the dietary habits of the people.

The social taboos, religious and cultural factors etc. influence the food intake to a great extent. Manipur is principally a rice consuming state - deriving 1990 Kcal energy per day per capita from rice intake. Other sources of food which are significant here are those rich in protein especially animal protein, such as eggs, meat etc. The consumption of food items rich in fat and edible oils is very low because of the taste of the people and cultural factors. Consequently, the low level of fat intake.

TABLE IV.6

TABLE IV.6 : PER CAPITA PER DIEM INTAKE OF FAT(gm) FOR ALL CLASSES BY STATES

STATES	FAT (gm)
ANDHRA PRADESH	24
ASSAM	18
BIHAR	20
GUJARAT	44
HARYANA	47
HIMACHAL	46
JAMMU & KASHMIR	36
KARNATAKA	26
KERALA	32
MADHYA PRADESH	25
MAHARASHTRA	30
MANIPUR	14
MIZORAM	15
ORISSA	18
PUNJAB	52
RAJASTHAN	42
TAMIL NADU	22
UTTAR PRADESH	29
W. BENGAL	17
DELHI	65
GOA	40
ALL INDIA	27

Source : NSS Round 38 (1983)

On the other hand fat intake level is very high in Delhi, Punjab and Haryana, with 65 gm, 52 gm and 47 gm respectively.

The high intake level in Delhi can, again be accounted for by the food habits of the people. There is a high level of consumption of fatty foods, edible oil etc partly because of the culture of the migrant Punjabi population and to some extent due to affluence.

Himanchal Pradesh has a high fat intake level of 46 gm. The reason for the high intake level can be purely geographical. People living in the hilly areas have to consume high level of fat to provide them the extra energy which is required in the difficult terrain. Fat deposit in the body convert into energy whenever required.

The remaining states are more or less close to the national average of 27 gm per day per capita.

Detrimental effects of the excess consumption of fat

Excessive intake of fat leads to a high level of plasma cholesterol in the population. High level of cholesterol is the causative factor of coronary heart diseases and hypertension.

The main source of cholesterol is the unsaturated fat found in the food groups of animal origin. High intake of

these, leads to cardiovascular diseases, which is more prevalent in the affluent sections of the society.

DEFICIENCY DISEASES RELATED TO OTHER NUTRIENTS

Vitamin A is an essential component of our diet, the deficiency of which leads to serious nutritional disorders, the most prevalent of which is Xerophthalmic or night blindness.

According to the NNMB and FNB data the mean intake of Vitamin A is 350 micro gm per consumer unit for India as a whole, which is much below the RDA of 600 micro gm.

> "The intakes in the states of West Bengal, Punjab, Jammu and Kashmir and Sikkim appeared to be adequate while in Kerala, Uttar pradesh, Tripura, Meghalaya, Goa, Gujarat, Andhra Pradesh, Karnataka and Tamil Nadu the intakes were very low at less than 300 micro g"[7]

The most serious nutritional disorder resulting from the deficiency of Vitamin A is Xerophthalmia (dry eye) which gradually leads to blindness.

It is most common is children aged 1-3 years, and is often related to weaning. The younger the child, more severe the disease. It is often associated with Protein Energy

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[7] a. NNMB Report, 1980-91, National Institute of Nutrition, ICMR, Hyderabad.

b. Food and Nutrition Board Reports, 1975-80, Government of India.

Malnutrition. Mortality is often high in this age group. The Victims belong to the poorest families.

The states badly affected are the southern and eastern states of India, notably Andhra Pradesh, Tamil nadu, Karnataka, Bihar and West Bengal.

Iodine Deficiency disorders (IDD) :

Iodine deficiency is yet another major nutrition problem in India. It leads to a wide spectrum of disorders commencing with intrauterine disorders extending through childhood to adult life with serious health implication. The most widespread iodine disorder in India is goitre. The 'Himalayan goitre belt' is the world's biggest goitre belt. It stretches from Kashmir to the Naga hills in the east, extending for about 2400 km and affecting the northern states of Jammu and Kashmir, Himachal Pradesh, Punjab, haryana, Delhi, U.P., Bihar, West Bengal, Assam, Sikkim, Nagaland, Mizoram, Meghalaya, Tripura, Manipur and Arunachal pradesh. Currently, no less than 140 million people are estimated to be living in goitre-endemic regions of the country.

Nutritional anaemia:

Nutritional anaemia has been defined by World Health Organisation (WHO) as "a condition in which the haemoglobin

content of the blood is lower than normal as a result of a deficiency of one or more essential nutrients, regardless of the cause of such deficiency. By far the most frequent cause of nutritional anaemic is iron deficiency.

Iron deficiency anaemia is a major nutrition problem in India. The incidence is highest among women and young children.

Detrimental effects of anaemic can he seen in the increased risk of maternal and foetal mortality and morbidity. In India, 20-40 per cent of maternal deaths were found to be due to anaemia.

CHAPTER - V

A DISCUSSION ON PATTERNS OF CALORIE AND PROTEIN INTAKE

The previous two chapters have discussed the patterns of calorie and protein intake. In this chapter the observations of the earlier two chapters will be looked into. The questions raised here are as follows -

(i) Whether there is adequacy of nutrition in terms of calorie intake.

(ii) Is the calorie intake pattern uniform across the states as well as for the different ranges of MPCE classes.

(iii) Does it vary at all with the MPCE classes.

(iv) Does the expenditure percentage on food as to the total expenditure, vary with the MPCE classes

(v) Is there any relationship between the levels of agricultural production and the per capita per day calorie intake.

(vi) What is the nutrition scene in terms of protein and fat intake.

We shall discuss the observation of the previous two chapters, here on the basis of these questions raised.

As far as the adequacy of calorie intake is concerned,

it is seen that the all India average of per capita per day calorie intake stands at 2221 Kcal. This, when compared to the norm of 2400 Kcal intake accepted by the Planning commission, is not very low. However, the pattern of calorie intake is not inform for the different states. The states like Kerala and Tamil Nadu have a very low calorie intake level, as shown in the table III.2 in Chapter III. In general, the other states do not show much variation from the mean value of 2224.52 Kcal for all classes. The coefficient of variation among the status for all class is 12 per cent which shows that the variation level is not very high as compared to the other values of MPCE class.

The calorie intake levels for the different MPCE classes at the all-India level also vary. It is the lowest for the Rs. 0-50 class and increases with each MPCE class.

Table III.2 shows that every increase in the level of MPCE class leads to a subsequent increase in the level of per capita per day calorie intake. This is true at the all-India level as well as for the different states. The value of calorie intake across the MPCE classes shows an increasing trend with rising levels of expenditure classes for all the states.

The reason for the increase in the level of calorie intake is the need of the poor to compensate for their

nutritional deficiencies by raising the level of calorie consumed. Thus with an increased sense of well-being, the poor like to satisfy the basic need of food and hunger. Their diet does not necessarily have a variety of nutrients rich in protein, vitamins etc, unlike that of the better-off population. Empirical evidences from the National Institute of Nutrition show, that bridging the calorie gap brings about an improvement in the nutritional status of the population. Gopalan is also of the view that if the intake of calorie is adequate, it might bring about a reduction in terms of protein calorie malnutrition.

Thus, the population in the lower ranges of MPCE classes have to compensate for high quality protein, fat and vitamins, with high levels of calorie intake.

For all values of MPCE classes, Kerala comes out as the state with the lowest levels of per day per capita calorie intake. This does not necessarily imply that Kerala is the most undernourished state. The National Sample Survey (NSS) data on calorie intake have not taken Tapioca into account, which is one of the richest sources of calorie intake for the local population. Thus the calorie intake levels for Kerala come out to be really low without Tapioca being considered as one of the sources of calorie.

The NSS has taken into account only the major sources

of calorie all over India - such as Rice, Wheat, Bajra, Jowar, Maize etc. among the cereals. The local substitutes have been ignored by this survey.

Table III.2 also presents the actual number of persons under each MPCE class for all the states as well as for all-India. The per capita per day calorie intake is also shown. It gives us an idea of the actual number of persons who are consuming that particular value of calories.

It can be seen that generally the number of persons in the lowest range of MPCE class is more than that in the highest range. However the number of persons is the maximum in the middle range of Rs. 70-100 class, which has a calorie intake level of 2042 Kcal. The all-India average number of persons for the lowest calorie intake value of 1316 Kcal, is 26805. While the number of persons closest to the norm of 2400 Kcal, in the class range of Rs.70-100, is 70710.

Thus it can be said on the basis of these observations, that the maximum number of people are not severely under-nourished. The highest number of persons come under the moderate values of calorie intake.

Another question which was raised is whether levels of calorie intake have any correlation with the agricultural productivity. The observations in chapter III have already shown that there exists a positive correlation between the

productivity levels and the calorie intake. The correlation between the two variables comes out to be 0.78. This implies that the states with higher level of agricultural productivity have high calorie intake values as shown in table III.5. the correlation between the two variables is stronger in rural areas because of the comparatively less movement of foodgrains between the states in rural areas. The inter-state movement of foodgrains is less in rural areas thus making it more dependent on agricultural productivity.

As far as the percentage expenditure on food is concerned, it can be said that the lower ranges of MPCE classes spend more than the better-off classes. The poor spend a greater percentage of their total expenditure on food. The all-India average for the Rs.0-50 range is Rs.75.94 according to the 38th round (1983) while the average expenditure by the richer section o the population i.e. 300 and above expenditure class was Rs.44.15. It has been presented in table III.9. Another trend which is noticed here is that the percentage of expenditure on food increases upto a certain level of MPCE class and then starts falling. This is perhaps due to a greater proportion of expenditure on luxury items and non food items than on basic necessities, with an increasing level of MPCE. When they feel that their food

requirements are being adequately met, people like to spend on other items, thus cursing the expenditure on food to fall as compared to expenditure on other items.

As far as the protein intake levels are concerned, it can be seen from table VI.1 in chapter VI that the average per capital per diem intake of protein is above the Recommended Dietary Intake level of 55 gm per day. The all-India average per capita consumption of protein is 62 gm per day for the rural areas. The all-India average of protein intake levels for two periods of National Sample Surveys - 1973 and 1983, was constant at 62 gm per day per capita for the rural areas. The states of Punjab, Haryana and Himachal have the highest values of protein intake while the states of Tamil Nadu and Kerala have one of lowest values of protein intake.

The variability in the protein intake level is high for the different values of MPCE classes. The all-India average stands at 23 gm per day per capita for the Rs.0-50 MPCE class while the value for the highest class is 122 gm per day per capita.

In fact, the lower ranges of MPCE classes for almost all the states trail behind the Recommended Daily Intake (RDI) level of 55 gm per day per capita. Most of the states derive the maximum percentage of protein intake from pulses which is the most affordable for the poor people.

States like Punjab, Haryana, Delhi and Rajasthan are exceptions with very high level of consumption of milk land milk products. Kerala and Mizoram derive maximum protein from meat, fish and eggs. Kerala gets 21.6 per cent of its protein intake from this food group which is the highest for this state.

However, by and large pulses remain the largest source of protein for the majority of states in the rural sector. The all-India average of protein intake stands at 10.17 per cent from pulses.

The other nutrients in which India is deficient is vitamin A (Chapter V). Due to this, deficiency diseases such as Xerophthalmia is prevalent in India. The worst affected are children.

Thus, on the basis of these observations it can be said, that, as far as calorie intake is concerned, most of the states of India have adequate levels of calorie intake. The exceptions among the major states are Kerala and Tamil Nadu. Inter-state variations in calorie intake is not very high. However, intra-State variation in terms of both calorie and protein intake is quite high, among the different MPCE classes.

CHAPTER - VI

COMBATING MALNUTRITION: POLICY IMPLICATIONS

It has new been realised that malnutrition is a multifaceted problem, that needs a multisectoral strategy for its control. It is a part of the viscious circle of poverty and underdevelopment, thus any improvement in the nutritional status of the population can only take place as part of the all-round socio-economic development of the country.

The recognition of the multifaceted nature of malnutrition has led to the felt need for a sound national nutrition policy to promote a coordinated nutrition strategy. The objectives of such a policy should be to overcome the dietary, socio-economic and environmental constraints, which lie at the root of the problem of malnutrition. The considerable gap, which lie between demand and supply of foodstuff in our country, can be dealt with by developing a sustainable nutritional security system which should aim to remove this disbalance through both long term and short-term measures.

Nutrition security, is defined as the appropriate quantity and combination of inputs such as food, nutrition and health services, to ensure a healthy life at all times

for all people. Food security is a necessary, but not sufficient, condition for nutrition security.

Food security is defined as a state in which there is an availability of sufficient food at all times for all people to ensure an active and healthy life. The term 'food security' has been used at the national, regional community household, and individual levels.[1]

The concept of food security thus implies the implementation of policies for supplementing the food and nutritional requirements of the target groups. Thus, if nutrition security is achieved, it can be assumed that the component of food security has also been achieved.

A national nutrition policy should target self-sufficiency in a range of essential foods, sound public distribution system for essential foods, control of growing population, eradication of major deficiency diseases particulary protein energy malnutrition, anti-poverty programmes etc.

While planners and policy-makers have for long been aware of these basic elements of a meaningful nutrition policy, they have not tackled the problem adequately. This is because of an in appropriate mechanism for its monitoring

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[1] Maxwell (1990) "Food security in Developing countries: Issues and options for the 1990's", *IDS Bulletin*, 21 (3), pp.2-13.

and evaluation, lack of time-bound targets and improper targeting of the population groups. Any nutrition policy does not realise its full potential without a targeted approach to the undernourished. Thus proper targeting is the most essential factor for the successful implementation of both short-term and long-term strategies.

TARGETING THE FOOD & NUTRITION INSECURE

Although, the array of food policy instruments has proved effective in helping to avert acute undernutrition, many economists feel that the current level of food security could be achieved with less strain on public expenditure, if policies were more targeted to the undernourished[2].

One means of potentially raising the cost effectiveness of food security programmes is to target programmes resources to households and villages according to the policy objective being pursued. For example, a similar strategy is to minimise the severity or depth of undernutrition by targeting the most severely undernourished. If the objective is to minimise the incidence of undernutrition, then the optimal strategy is to target all individuals just below is

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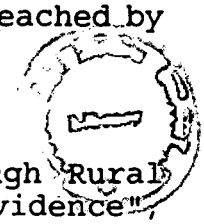
2 B. Harris (1991) "Child Nutrition and poverty in South India: Noon meals in TamilNadu", Concept Publishing Company, New Delhi.

to target all individuals just below the food poverty line.[3]

Another way of improving cost-effectiveness is to monitor food security during the course of programme operations. This enables programmes design to be more responsive to the changing causes and patterns of undernutrition.

The calls for more targeted and flexible approaches to the promotion of food security are not easily addressed. There are several reasons for this. First, targeting is politically controversial. Eligibility criteria can create incentives among those who administer programmes to 'rent-seek' by taking advantage of unforceable criteria. Eligibility criteria can also provide incentives for households to misrepresent thus circumstances, such as reporting female-headship when this is not the case.[4]

Finally, the very term 'targeting' has become politically charged, in large part due to the family planning drives of the 1970's in which targeting was interpreted in terms of the number of individuals reached by



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3 M.Ravallion (1990) "Reaching the poor through Rural public employment: A summary of theory and evidence", World Bank.

4 D. Jain (1992) "Can poor women be targeted?" Population council, New York (mimeo).

a programme rather than whether or not those individuals would have benefitted most from the programme.[5]

Second, even if an accurate and inexpensive indicator of undernutrition were found, targeting and monitoring can still be costly. Specifically, both require the regular collection of accurate and timely data on household food security, an activity that may cost more than the savings promised by targeting. Moreover, for an indicator to be integral to undernutrition reduction schemes, the information generated must be acted upon.

Therefore, given political will, the cornerstone of a viable nutrition monitoring system is the identification and use of indicators that are valid, and reliable and yet straight forward and simple to collect and analyse.

Keeping these objectives in mind, two type of strategies should be considered to combat the problem of malnutrition in India. First short-term strategies to strengthen the on-going nutrition and health programmes, and second, long-term strategies (multisectoral) aimed at the overall improvement of the nutrition status of the Indian population.

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[5] Gupta, Pal, M. Bhargava and M.Daga (1992) "Health of women and children in Rajasthan", *Economic and Political Weekly*, October 17, pp.2323-30.

SHORT TERM STRATEGIES

Short term strategies are required to control severe and moderate grade of malnutrition, reduction and prevention of specific deficiency disorders connected with low intake of Vitamin A, Iron, Iodine and protein. It has already been discussed in the previous Chapter that a large section of the Indian population suffers from deficiency of vital nutrients like protein, vitamins, iron, iodine etc. There is prevalence of severe malnutrition among slum dwellers and rural children. According to an Indian Council of Medical Research (ICMR) (1986) study only 5 per cent of the pre-school children have normal body weights for age, whereas 7 per cent show severe degree of malnutrition. Moderate degree of malnutrition is more prevalent. Surveys on the nutrition status of rural children of age group 6-11 years by the National nutrition Monitoring Bureau (NNMB) in eight states, namely. Andhra Pradesh, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Tamil Nadu and Orissa in 1990-92 indicate that only a paltry 5.57 per cent of the children surveyed, have normal nutritional status while the rest have varying degrees of malnutrition. This has been resented in table VI.1. This classification was made, based on the normative weight for age.

TABLE - VI.1

NUTRITIONAL STATUS OF 6-11 YEAR RURAL CHILDREN

NUTRITION GADES (% OF AGE) / SEX	SEVERE	MODERATE	MILD	NOMAL
BOYS	12.22	58.83	28.53	5.42
GIRLS	15.59	50.45	28.23	5.78
POOLED	13.89	52.16	28.38	5.57

SOURCE : NNMB REPORT (1990-92).

The existing energy gap among these children constitute nearly a third of the recommended Dietary intake (RDI) - (Table VI.2). If this energy gap is bridged, the protein gap will get automatically filled. According to the eminent nutrition scientist, C.Gopalan, at least 20 per cent of children in rural schools at any given point of time suffer from chronic or acute infections, such as sore throat, rheumatic heart diseases etc. According to a study by Marliene E. Lockhead and associates in 1991, India has 48.4 per cent children with chronic malnutrition, 69.4 per cent with iron deficiency, 55 per cent with iodine deficiency and 48 per cent parasite infected.

TABLE - VI.2

MEAN PROTEIN AND CALORIE INTAKES FOR RURAL CHILDREN (6-11 YRS)

Age (Yrs)	Protein (gm)		Calories (K cal)	
	Boys	Girls	Boys	Girls
5-6	28.45	27.86	1102	1070
6-7	31.0	29.20	1163	1107
7-8	32.56	31.45	1252	1211
8-9	36.5	36.08	1379	1380
9-10	37.8	37.55	1458	1443
MEAN INTAKE	33.1	32.8	1272	1257
RDI	39.5	40.0	1903	1866
Mean deficit	6.4	7.2	631	609
Pool deficit	6.8		620	

Source : Yojana (1996), p.82.

Another vulnerable section of the society is women, specially pregnant women and lactating mothers. They suffer specially fro nutritional anaemia, resulting form iron deficiency. Its clinical manifestations are not very spectacular and for this reason the disease is often ignored. It is one of the important causes of maternal

mortality. A study by the ICMR shored the distribution of haemoglobin levels of women aged 13-49 years in rural areas as 7.3 per cent with less than 8g/dl, 27.3 per cent with 8-10 g/dl and 65.4 per cent with more than 10g/dl.[6]

A collaborative study done in the rural ares of Hyderabad, Calcutta and New Delhi, showed that the percentage of women with anaemia were 73.9 per cent, 98.3 per cent and 65.9 per cent respectively in the age groups 15-24 years.[7] Severe anaemia also increases the chances of delivering low birth weight babies. It even decreases maximal and near maximal work capacity. Anaemia, therefore, is a major health problem in India women, particularly in the rural sector.

Even peak prevalence of tuberculosis is seen among women below 35 years of age, while in men this is above 45 years.[8] Repeated pregnancies probably contribute to this high prevalence. The surveys of the NNMB provide an indication that a large proportion of women are

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6 S.T. Mathai (1989) "Woman and the Health system", C. Gopalan and S. Kaur (ed.) *Women and Nutrition in India*, Nutrition Foundation of India, pp.250.

7 Government of India, Food and Nutrition Board and UNICEF Regional Office for South Central Asia', "The use of common salt fortified with Iron: A Report on collaborative studies", 1981.

8 J.E. Park and K. Park (1987) *The textbook of Social and Preventive Medicine*, 11th edition 1987.

undernourished. Women of child-bearing age are at greater nutritional risk than other population groups owing to the added demands of reproduction.

According to NNMB data, girls of poor rural communities gain over 5 cm in height and nearly 6.8 Kg in body weight as against 2.3 cm in height and 3.5 Kg in body weight by girls of the affluent section of the population.

In our developmental programmes as they stand today there are no special efforts specially for adolescent girls. Thus, poor rural girls, having generally dropped out of school, do not even benefit from the school programmes, and antenatal services start only after the onset of pregnancy. Thus the crucial years of adolescence are wasted in terms of nutrition. This is the basic deficiency in our present developmental system which needs to be addressed if significant improvement in the health and nutritional status of our women and children are to be achieved.

It is in this background that measures to enhance the nutritional status of preschool, school-age children and women, gain priority.

STRATEGIES FOR CHILDREN

Government efforts are, on supplementary feeding for school children in the form of noon meals. The National

programme of Nutritional Support to Primary Education, launched by the Government of India on the 15th August 1995 is a landmark in this direction. The Mid-Day meal scheme was launched.

Mid-Day Meal Scheme - The objectives of the Mid-Day Meal Scheme are

(a) to enhance the nutritional status of children.

(b) To speed up the march towards the attainment of universalisation of elementary education even before the time target of 200 AD.

other objectives are:-

- fostering sound social behaviour among children by dispelling differences between castes and communities.
- to provide employment opportunities especially to women below poverty live.

The programme targeted to cover all the 2446 Revamped Public Distribution System (RPDS) block and Employment Assurance Scheme (EAS) blocks. Some 40 low female literacy blocks were also targeted to be covered by 1995-96.

Tamil Nadu, is one state where 'Noon-Meal Scheme' has been in operation since 1925. It has grown to gigantic proportions today covering all pre-school children, all school children upto 15 years of age, old age pensioners, ex-servicemen and their widows.

On the employment front too, it is claimed as the single largest employment programme for the rural area with more than 1.6 lack people employed as organisers cooks and helpers.

Integrated Child Development Services

ICDS happens to be the largest single programme in the area of child development. It is a multisectoral programme, which includes services not only to children, but also to pregnant and lactating mothers.

It's objective are -

i. Improvement in the nutritional and health status of children below 6 years.

ii. reduction in the incidence of mortality' morbidity and malnutrition.

iii. proper psychological, social and physical development of the child. the services provided through this programme include -

- supplementary nutrition
- immunisation
- referral services
- Nutrition and health education
- Non-formal preschool education

Achievements: The achievement of Integrated Child Development Scheme (ICDS) has been significant, as indicated by evaluation studies. Several studies were conducted by the students and faculty members of different medical colleges, till March 1992, which indicated the positive effects of ICDS.

There has been a significant decline in 'severe' and 'moderate' degree of malnutrition in children as a result of ICDS in these areas. The percentage of 'severe' malnutrition has gone down from 20.5 per cent in 1976 to 6.6 per cent in 1990 and the percentage of moderate malnutrition has gone down from 28.9 per cent to 18.1 per cent in 1990, in the areas covered by ICDS. Young children belonging to scheduled castes, scheduled tribes and tribals, had all shown the benefits of the ICDS scheme.[9] A decade after ICDS was installed, evaluation studies suggested that the decline in infant and early childhood mortality rates, observed in areas where ICDS was operational, was significantly greater than the decline registered in the national data of the sample Registration scheme.[10]

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9 B.N. Tandon et.al (1984) "Impact of ICDS on infant mortality rate in India", *Lancet*, pp.157.

10 Ibid.

ICDS has been largely successful because of it's cost-effective and innovative approach to the training of the functionaries at various levels, continued education about nutrition and health facilities and their advantages, monitoring of the programmes, surveillance, evaluation and research.[11]

Presently, a special nutrition programme is in operation in the country as a part of the Integrated Child Development Scheme for the malnourished children below six years of age and the expectant mother. Under this programme, supplementary feeding is given for 300 days a year to the beneficiaries.

PROGRAMMES FOR WOMEN AND OTHER SECTIONS OF THE POPULATION: National Nutrition Anaemia Prophylaxis Programme (NNAPP)

Nutritional anaemia is one of the major health problems affecting women and children in India. Thus NNAPP was devised with the specific objective of preventing overt anomie. It aims at -

i. assessing the baseline prevalence of nutritional anaemia through estimation of haemoglobin level

ii. to put those with low haemoglobin level on anti-anaemia treatment.

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11 'State of India's Health' (1986) *Voluntary Health Association of India*, p.39.

iii. to put those mother and children with haemoglobin levels more than 10g/dl and children with haemoglobin levels more than 8g/dl, on the prophylaxis programme

iv. to monitor the distribution of iron tablets and to periodically asses the haemoglobin levels of the beneficiaries.

National Goitre Control Programme

Iodine deficiency is yet another major nutrition problem in India. Apart from many other disorders, iodine deficiency leads to Goitre which has assumed enormous magnitude. It has assumed national dimensions with roughly 40 million people suffering from it. Currently, no less than 140 million people are estimated to be living in goitre - endemic regions of the country. In the sub-Himalayan goitre belt of India alone, nearly 55 million are estimated to be suffering from endemic goitre.

In view of the prevailing situation, the National Goitre Control Programmes was launched towards the end of the second five year plan. Three main objectives of the programmes are -

i. Survey of goitre in suspected areas to identify the endemic regions.

ii. Production and supply of iodised salt to the endemic areas.

iii. Resurvey after five years of supply of iodised salt in the endemic areas to assess the impact of the programme.

The Vitamin A Prophylaxis Programme : It is no less indispensable, in view of the widespread Vitamin-A deficiency among school-going children. This programme is targeted to these children. The primary health centres, sub-centres and the ICDS network are actively involved in the distribution of vitamin A Supplements.

There is need for the involvement of the primary schools, as well as an increase in the frequency of distribution.

Although the nutrition status of a population is undoubtedly a major determinant of the countries health status, nutrition status itself is largely determined by various socio-economic factors. For any long-term sustainable improvement in the nation's nutrition status, it is imperative that nutritional considerations find the proper place in developmental plans in such sectors and agriculture, food and civil supplies, health and family welfare, rural and tribal development, etc. These include various long term strategies in the sector of Agriculture and food production, distribution of the foodgrains among the population, quality of the foodgrains produced and consumed etc.

LONG TERM STRATEGIES

Agricultural sector

While the increase in cereals needed is not massive, as pointed out in the Chapter III, it is necessary to secure substantial increase in the output of edible oils, milk and milk products and vegetables to meet not only current but future requirements. Some increase in the output of pulses even on the 1980s norm is also eminent to meet the demands of protein intake, specially for rural population in the lower MPCE classes, who cannot afford milk and milk products. While some increase in cereal production will also be necessary because of the growth in our population, a much larger increase is called for in the case of non-cereal items like fruits and vegetables etc, not merely because of the increasing population but also inorder to make up the current deficit and secure a balanced diet for the people.[12]

The major constraint in dealing with this problems is the low availability per capita of agricultural land in India. All non-cereal foods, including animal foods, have land and agricultural production as their base; and this land base and productivity per hectare has to be increased

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12 V.K. R.V. Rao (1982) "A National Policy for Food and Nutrition", *Food Nutrition and Poverty in India*, Vikas Publishing House, pp.122.

in significant measures in order to secure the aggregate supplies needed for securing a balanced diet for the population.

The increase that has taken place in the national output of cereals during the last three decades, has been largely due to an increase in the per hectare yield of cereals as well as an increase in the total area under the cereal crops even at the expense of pulses, oil seeds and cereals like millets which constitute the food of the rural poor.

The question arises, if it is possible to reverse the process and set some land free for non-cereal foods, without at the some time depriving the people of the energy intake they new obtain from their cereal consumption.

There can be no doubt that we need to increase the output of pulses not only from the nutritional point of view but even from that of maintaining the soil balance that is now being disturbed by mono cereal culture.

An even more important task in the nutritional planning of our food output is to effect substantial increase in the output of milk and milk products. It is admittedly an exceptionally valuable quality food and the ICMR has given it an almost equal place in the balanced diets formulated for vegetarian and non-vegetarian consumers. In some ways it

is the most sensitive index of nutritional context in food consumption and has an elasticity of demand exceeding unity at all expenditure level. Thus it's consumption is exceptionally low in the poor rural households.

Finally, the consumption of fruits and vegetables needs to be stepped up, as they rank very low in rural consumption, their increased output being directed towards the urban markets for increased cash receipts.

It is clear that agricultural production and crop planning has to be reoriented in the light of nutritional requirement for a balanced diet in steed of being directed mainly by considerations of market demand, which is dominated by the purchasing power rather than the felt food needs of the country. What is needed is more investment, more research, and more land for cultivation, for pulses, edible oils, fruits and vegetables, in addition of course to improvement in the breed and health of much cattle.

Distribution aspect of food

The NSS data on food consumption by expenditure classed for 1983 (38th round as discussed in 3rd Chapter) gives unambiguous evidence of the skewness of the distribution of consumption of different food items, like cereals. Low purchasing power and numerical majority of the low

expenditure classes are responsible for the under-nutrition and malnutrition of the vast majority of our population.

Public Distribution System (PDS)

The most widespread and effective programme in the sphere of distribution, keeping in view the need for alleviating the nutritional poverty of the lower area,s has been the PDS. It targets at controlled and nutrition education. It has been providing the basic cereals, sugar, oil etc. to the rural and urban poor even in the remote hilly areas of the country. However, ever since the public distribution of foodgrains through subsidies was begun, the practical difficulty of identifying target groups has proved to be a major hurdle. The government usually identified the entire population, and this not only affects the efficiency of the strategy but results in many better of households drawing its benefits.

The PDS has been providing subsidy on the major cereals like wheat and Rice, as well as other eventual items, to make it within the search of the poor and rural Population. The rate of subsidy has been continuously on the rise,

standing at 106.9 per QT in 1991 for wheat and Rs.124.23/QT for Rice.[13]

The trend of the subsidy has been presented in table VI.3 for a few years, which shows a continuous increase in the amount.

TABLE - VI.3

CONSUMER SUBSIDY ON RICE AND WHEAT

YEAR	RICE (Rs/QT)	WHEAT (Rs/QT)
1986-87	80.47	84.92
1987-88	80.95	82.80
1988-89	107.29	92.98
1989-90	124.23	106.90

Source : Annual Report (1993-94), Food Corporation of India.

A few empirical studies have explored alternative rationing and financing schemes for India using an applied general equilibrium model. Their main findings are that, if the cost of the subsidy needed can be financed through substantial increase of the tax rates on incomes of the rich, a massive redistribution of 100 Kg of wheat per person per year to every Indian free of cost will result in a

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13 Annual Report (1993-94) *The Food Corporation of India*, New Delhi.

substantial reduction in poverty and undernourishment [Narayana et.al. 1988].[14]

The effectiveness and operation food subsidy and food for work scheme was reviewed in several countries including India, and it was found out that they involved substantial degree of leakage in various always. There was reshuffling of household expenditures and intra-family allocation of food in response to the price changes, and (the implicit) income of a subsidy.[15]

An overview of policy issues relating to nutrition intervention, raises a number of important problems involved in reaching the targeted populations in an effective way. the experience with direct intervention policies seems to be mixed. From a long-run perspective, it would appear that rapid economic development that succeeds in fighting the poor out of their poverty, rather than food subsidies or nutrition supplements, is the surest way of eradicating undernutrition.

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14 N.S. Narayana, K.S. Parikh, and T.N. Srinivasan (1988) "Indian Agricultural Policy: An applied General Equilibrium Model", *Journal of Policy Modelling*, 10, pp.527-558.

15 L. Taylor, S. Horton and D. Raff (1992) "Food subsidy programmes: Practice and policy lessons", *Mimeo*, Department of Economics, Marsachusetts Institute of Technology, in S.R. Osmani (ed) *Nutrition and Poverty*, Oxford Press, pp.118.

SUMMARY AND CONCLUSION

The level of dietary inadequacy is the dominant determinant of undernutrition in any population group. This study has focussed on the energy-related nutritional deprivation prevalent among the rural sector of the states, in India. The levels of calorie intake has been compared with the accepted norm of 2400 kcal recommended by the ICMR. The resultant, spatial pattern of calorie in take distribution is varied.

The per capita calorie in take in the country as a whole declined during the 27th round (1972-73) and 38th round (1983). The average calorie intake of 2221 kcal per capita per day in 1983 was about 1.98 per cent below that in 1972-73. The decline was registered in almost all the states. The percentage decline ranged from 0.6 per cent in Manipur to 23.36 per cent in Punjab. While the calorie intake level declined between 1972-73 to 1983, the percentage expenditure on cereals was still half as compared to total expenditure on food. It was 33.44 per cent out of 65.56 per cent of expenditure on all food items.

While the average calorie intake fell from 2260 kcal to 2221 Kcal between 1972-73 and 1983, the significance of the decline differs qualitatively across the states. In some states like Punjab and Haryana, the high percentage of

decline does not necessarily signify nutritional deterioration. On the contrary, it could as well reflect an improvement in the nutritional standard, the fall in calorie in take might be due to a qualitative improvement in the diet. eg. In Punjab the rural population spent 31.06 per cent of it's total expenditure on food, on milk and milk products according to the NSS date, 1983. The all India average expenditure on milk and milk products was 11.46 per cent. Thus, the proportion of expenditure on milk and milk products in Punjab was nearly three times the all-India average. However the percentage expenditure on cereals was 24.4 as compared to the all India average of 49.24 for the rural areas.

On the other hand some states like Kerala, Andhra Pradesh, West Bengal Orissa did register an increase in calorie intake level. Kerala increased by 17 per cent approximately,. But the percentage expenditure on milk and milk products was only 6.6 per cent. This shows that there was not much qualitative improvement in the case of Kerala.

However, the decline in calorie intake levels can also be attributed to the decreasing per capita land availability. The increasing population pressure has mitigated the corresponding increase in cereal production,

thus causing the calorie intake level to be either stagnant or decline.

The pattern of calorie intake shows inter-state and intra-state variations across communities and spatial units.

At the all India level, the lowest MPCE class of Rs 0-50, had a calorie in take value of 1316 Kcal, while the highest MPCE class of Rs 300 and above stood at 4594 kcal. The mean for all classes was 2224.52. Most of the states do not vary much from the average in take value of 2221 kcal for all classes. However, some states like Tamil Nadu and Kerala had very low calorie intake levels - 1861 Kcal and 1884 Kcal respectively. The coefficient of variation along the states works out to be 12 per cent for all classes. The highest level of variation is found in the Rs 0-50 MPCE class along the states - 18 per cent. The variation level is high for both the ends of MPCE classes, while the middle ranges show the least variation. It points towards a higher level of disparity in the poor and the rich sections of the population.

Every increase in the level of MPCE class leads to a subsequent increase in the per capita per day calorie intake level, both at the state and all - India level. At the all India level, the calorie intake value for the Rs 0-50 MPCE class was 1316 Kcal while for Rs 300 and above, it was 4594

Kcal. The coefficient of variation across the MPCE class in terms of calorie intake, works out to the 51 per cent for Tamil Nadu, the highest level of variation among all the states. The lowest level of variation is found in Mizoram - 15 per cent across the MPCE classes.

The variation in the level of calorie intake are more pronounced across the MPCE classes than across the states for the same MPCE class. Thus inter-state variation are higher than intra-state variation. It points toward a similarity in the plight of the poorer sections in the different states.

With an increase in the level of MPCE class, the calorie intake level also rises invariably for all the states. The reason perhaps, being the need of the poor to compensate for their nutritional deficiency by increasing the level of deficiency by increasing the level of Calorie intake with an increase in their MPCE levels. C. Gopalan, the renowned nutrition export, is also of the view that if the intake of calorie is adequate, it might bring about a reduction even in terms of protein calorie malnutrition. Empirical evidences from National Institute of Nutrition have proved that bridging the calorie gap brings about an improvement in the nutritional status of the population.

For all MPCE classes, Kerala comes out as the state with the lowest levels of per capita per day calorie in take. The reason being the exclusion of Tapioca, a major food item in Kerala, from the National Sample Survey (NSS). The percentage of estimated population below the norm of 2400 K cal is 66 for all-India. The values for Kerela, Karnataka and Orissa are higher than the all-India average. Kerala has the highest percentage of population below the norm - 77.04 per cent. It is followed by Orissa with 75.86 per cent and Karnatake with 73.6 per cent. On the other hand, Punjab has only 33.43 per cent of population below the norm.

The correlation coefficient between agricultural productivity and per capita calorie intake works out to be 0.78. This implies that states with higher levels of agricultural productivity have high Calorie intake values. eg. Punjab with an agricultural productivity value of 4.68 has high level of calorie intake- 2677 K cal. While West Bengal, with an agricultural productivity value of 0.90, has a low calorie intake level of 2027 K cal. The levels of percentage growth rate of major food crops in different states also has some bearing on the levels of calorie intake. eg. Punjab, Haryana, U.P. with high growth rate percentage of major food crops, also had high levels of

calorie intake. While Tamil Nadu, Kerala etc. Which registered negative growth rate, exhibited low levels of calorie intake 1884 and 1861 K cal respectively.

There seems to be no significant deficiency in proteins among the states. The average intake of proteins among the rural households in the country as a whole in 1983 came to 62 gm per capita per day. This was above the RDI of 55 gm per capita per day. It remained stagnant between 1972-73 and 1983.

However, the lower MPCE classes showed deficiency in protein intake. It was 23 gm per day per capita for the Rs.0-50 class while the value was 122 gm per day per capita for the highest MPC class. This disparity is due to low intake level of protein rich foods such as milk and milk products, eggs, meat, fish etcetra among the poor.

The study based on the NSS data of 38th round for food consumption, gives unambiguous evidence of the skewness of the distribution in the consumption pattern of different food items. Low purchasing power and numerical majority of the low expenditure classes are primarily responsible for the undernutrition of the majority of our population. The government has come out with nutritional and food distribution policies to combat undernutrition. The most effective and widespread, keeping in view the need for

alleviating the nutritional poverty of the poor specially in the rural areas, has been the Public Distribution System (PDS). Apart from this there have been several short term nutritional support programmes. Some of the major ones are - The Mid-day Meal Scheme, Integrated Child Development Services (ICDS), National, Nutrition Anaemia Prophylaxis programme (NNAPP) etc. The ICDS specially has been quite effective. It helped in reducing infant and early childhood mortality, in the areas of its operation. However, the experiences with direct intervention policies are mixed. From a long-rum perspective, it would appear that rapid economic development that succeeds in lifting the poor out of their poverty, rather than short term measures like food supplements, is the surest way of combating undernutrition.

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