

## CHAPTER 3.3

# FOOD AND NUTRITION SECURITY

### INTRODUCTION

3.3.1 The importance of optimal nutrition for health and human development is well recognised. At the time of Independence the country faced two major nutritional problems. One was the threat of famine and the resultant acute starvation due to low agricultural production and the lack of an appropriate food distribution system. The other was chronic energy deficiency due to:

- ☒ low dietary intake because of poverty and low purchasing power;
- ☒ high prevalence of infection because of poor access to safe-drinking water, sanitation and health care;
- ☒ poor utilisation of available facilities due to low literacy and lack of awareness.

3.3.2 The major public health problems were chronic energy deficiency (CED), kwashiorkor, marasmus and micronutrient deficiencies such as goitre, beriberi, blindness due to Vitamin-A deficiency and anaemia.

3.3.3 The country adopted multi-sectoral, multi-pronged strategy to combat these problems and to improve the nutritional status of the population. Article 47 of the Constitution of India states that "the State shall regard raising the level of nutrition and standard of living of its people and improvement in public health among its primary duties". Successive Five-Year Plans laid down the policies and strategies for achieving these goals.

3.3.4 The Green Revolution ensured that the increase in food production stayed ahead of the increase in population. The country has moved from chronic shortages to an era of surplus and export in most food items. The country is self sufficient in food grain production and currently there is a buffer stock of over 60 million tonnes. Along with the steps

to achieve adequate production, initiatives were taken to reach foodstuffs of the right quality and quantity to the right places and persons at the right time and at an affordable cost.

#### **Initiatives to improve nutritional status of the population during the last five decades include:**

- ☒ Increasing food production- building buffer stocks
- ☒ Improving food distribution- building up the Public Distribution System (PDS)
- ☒ Improving household food security through
  - ↳ Improving purchasing power
  - ↳ Food for work programme
  - ↳ Direct or indirect food subsidy
- ☒ Food supplementation to address special needs of the vulnerable groups-Integrated Child Development Services (ICDS), Mid-Day Meals
- ☒ Nutrition education especially through Food and Nutrition Board (FNB) and ICDS
- ☒ Efforts of the health sector to tackle
  - ↳ Adverse health consequences of undernutrition
  - ↳ Adverse effects of infection and unwanted fertility on the nutritional status
  - ↳ Micronutrient deficiencies and their health consequences

3.3.5 Over the years, there has been improvement in access to food through the PDS; the food for work programme has addressed the needs of the vulnerable out-of-work persons. The ICDS programme aimed at providing food supplementation for pre-school children, pregnant and lactating women, nearly covers all blocks in the

country. The Mid-day-meal programme aimed at improving the dietary intake of primary school children and reduction in the school drop out rates has been operationalised. There has been substantial improvement in access to health care. National programmes for tackling anaemia, iodine deficiency disorders and Vitamin-A deficiency are being implemented. As a result of all these interventions, there has been a substantial reduction in severe grades of under-nutrition in children and some improvement in the nutritional status of all the segments of population. Kwashiorkor, marasmus, pellagra, lathyrism, beriberi and blindness due to severe Vitamin-A deficiency have become rare.

3.3.6 However, several challenges remain. To meet all the nutritional needs of the growing population, the country will have to produce an extra five million tonnes of food grains annually and increase the production of livestock, fish and horticultural products. This has to be achieved in the face of shrinking arable land and farm size, low productivity, growing regional disparities in productivity and depletion of the natural resource base. Appropriate steps have to be taken to minimise the potential adverse consequences of globalisation on domestic production, employment and price stability of food commodities. In spite of huge buffer stocks, 8 per cent of Indians do not get two square meals a day and there are pockets where severe under-nutrition takes its toll even today. Every third child born is under weight. Low birth weight is associated not only with higher infant mortality but also long-term health consequences including increased risk of non-communicable diseases. In the last five decades, the mortality rate has come down by 50 percent and the fertility rate by 40 percent but the reduction in under nutrition is only 20 percent. Around half of the pre-school children suffer from under-nutrition. Micronutrient deficiencies are widespread; more than half the women and children are anaemic; reduction in Vitamin-A deficiency and iodine deficiency disorders (IDD) is sub-optimal. Under-nutrition associated with HIV/AIDS will soon emerge as a public health problem. Alterations in lifestyles and dietary intake have led to the increasing prevalence of obesity and associated non-communicable diseases. The country will have to gear itself up to prevent and

combat the dual burden of under-nutrition and over-nutrition and associated health problems.

#### **Major nutrition-related public health problems**

- ☒ Chronic energy deficiency and undernutrition
- ☒ Micro-nutrient deficiencies
  - ↳ Anaemia due to iron and folate deficiency
  - ↳ Vitamin A deficiency
  - ↳ Iodine Deficiency Disorders
- ☒ Chronic energy excess and obesity

#### **Initiatives in the Tenth Plan**

3.3.7 During the Tenth Plan there will be focused and comprehensive interventions aimed at improving the nutritional and health status of the individuals.

3.3.8 There will be a paradigm shift from:

- ☒ household food security and freedom from hunger to nutrition security for the family and the individual;
- ☒ untargeted food supplementation to screening of all the persons from vulnerable groups, identification of those with various grades of under-nutrition and appropriate management;
- ☒ lack of focused interventions on the prevention of over-nutrition to the promotion of appropriate lifestyles and dietary intakes for the prevention and management of over-nutrition and obesity.

#### **Interventions will be initiated to achieve:**

##### **Adequate availability of foodstuffs by:**

- ☒ ensuring production of cereals, pulses and seasonal vegetables to meet the nutritional needs;
- ☒ making them available throughout the year at affordable cost through reduction in post harvest losses and appropriate processing;
- ☒ more cost-effective and efficient targeting of the PDS to address macro and micronutrient deficiencies. This may include providing coarse grains, pulses and iodised/ double fortified salt

to below poverty line (BPL) families through the targeted PDS (TPDS);

- ☒ improving people's purchasing power through appropriate programmes including food for work schemes.

***Prevention of under-nutrition through nutrition education aimed at:***

- ☒ ensuring appropriate infant feeding practices (universal colostrum feeding, exclusive breast feeding up to six months, introduction of semisolids at six months);
- ☒ promoting appropriate intra-family distribution of food based on requirements;
- ☒ dietary diversification to meet the nutritional needs of the family

***Operationalising universal screening of all pregnant women, infants, preschool and school children for under-nutrition.***

***Operationalisation of nutrition interventions for the management of under-nutrition through:***

- ☒ targeted food supplementation and health care for those with under-nutrition;
- ☒ effective monitoring of these individuals and their families;
- ☒ utilisation of the panchayati raj institutions (PRIs) for effective inter-sectoral coordination and convergence of services and improving community participation in planning and monitoring of the ongoing interventions.

***Prevention, early detection and appropriate management of micronutrient deficiencies and associated health hazards through:***

- ☒ nutrition education to promote dietary diversification to achieve a balanced intake of all micronutrients;
- ☒ universal access to iodised/double fortified salt;
- ☒ early detection of micronutrient deficiencies through screening of all children with severe

under-nutrition, pregnant women and school children;

- ☒ timely treatment of micronutrient deficiencies.

***Promotion of appropriate dietary intake and lifestyles*** for the prevention and management of obesity and diet-related chronic diseases

***Nutrition monitoring and surveillance*** to enable the country to track changes in the nutritional and health status of the population to ensure that:

- ☒ the existing opportunities for improving nutritional status are fully utilized; and
- ☒ emerging problems are identified early and corrected expeditiously.

***Research efforts will be directed towards:***

- ☒ review of the recommended dietary intake of Indians;
- ☒ building up of epidemiological data on:
  - ☒ relationship between birth weight, survival, growth and development in childhood and adolescence;
  - ☒ body mass index norms of Indians and health consequences of deviation from these norms.

3.3.9 In view of the massive inter-state (and, perhaps even inter-district) variations in the access to nutrition related services and nutritional status, state specific goals to be achieved by 2007 have been worked out taking the current status into account. National goals have been drawn taking into account the state specific goals (Annexure 3.3.1).

**SUSTAINABLE FOOD PRODUCTION TO MEET NUTRITIONAL NEEDS**

3.3.10 One of the major achievements in the last 50 years has been the green revolution and self-sufficiency in food production. Food grain production has increased four-fold (Figure 3.3.1).

### Food Production

**Progress achieved:**

- ☒ the country has achieved self-sufficiency in food grains to meet the needs of the growing population;
- ☒ there are ample food grain stocks.

**Current Problems:**

- ☒ 'Green Revolution Fatigue' in some areas;
- ☒ productivity remains low;
- ☒ improved food grain availability has not resulted in eradication of hunger or reduction in under-nutrition especially in vulnerable groups.
- ☒ very little attention is being paid to achieve integrated farming systems that will ensure sustainable evergreen revolution essential for appropriate dietary diversification to achieve nutrition security.

**Paradigm shift needed:**

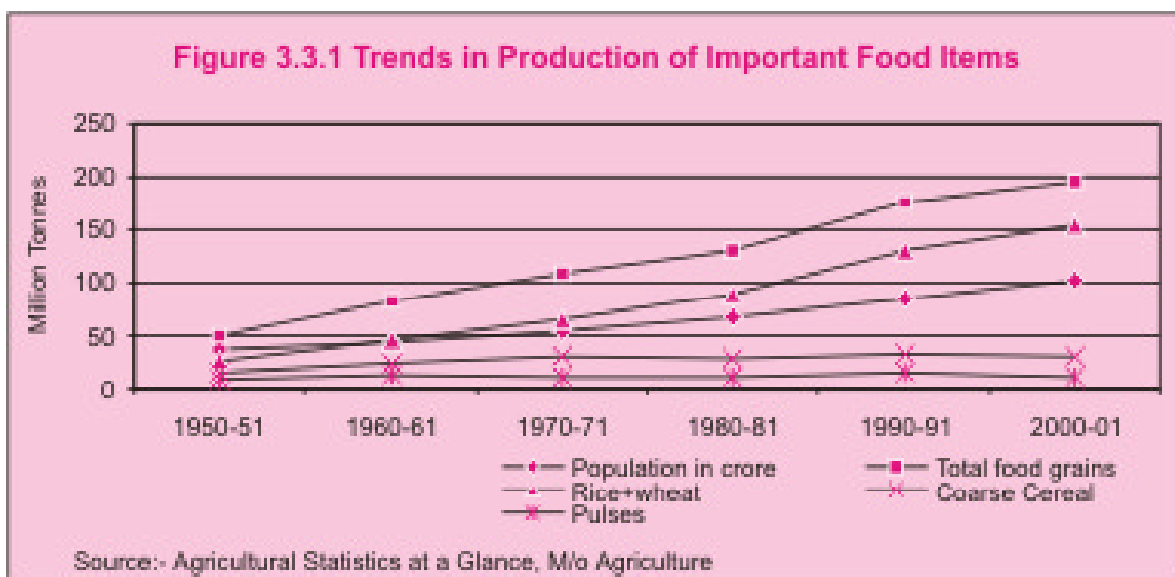
- ☒ from self sufficiency in food grains to meet energy needs to providing food items needed for meeting all the nutritional needs;
- ☒ from production alone to reduction in post harvest losses and value addition through appropriate processing;
- ☒ from food security at the state level to nutrition security at the individual level.

**Challenges:**

- ☒ continue to improve food grain production to meet the needs of the growing population;
- ☒ increase production of coarse grains to meet the energy requirements of the BPL families at a lower cost;
- ☒ increase production of pulses and make them affordable to increase consumption;
- ☒ improve the availability of vegetables at an affordable cost throughout the year in urban and rural areas.

**Opportunities:**

- ☒ achieve substantial improvement in nutrition security;
- ☒ achieve decline in macro and micronutrient under-nutrition.



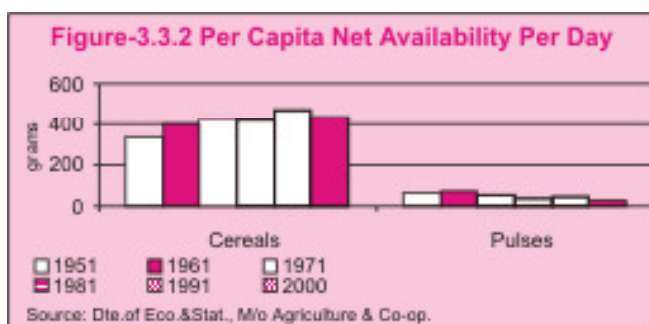
## Interventions to Improve Food Production to Meet the Nutrient Needs

### Food grain production

3.3.11 Inputs needed to achieve a sustainable increase in food grain production to meet the needs of the growing population have to be provided. Locally produced and procured coarse grains made available through the TPDS at a subsidised rate may substantially bring down the subsidy cost without any reduction in calories provided. This will also improve targeting as only the most needy are likely to buy these coarse grains. Millets are rich in minerals and micronutrients and hence increased consumption will improve the intake of these vital nutrients by the poor.

### Pulse production

3.3.12 In the last two decades, there has been a progressive decline in pulse consumption, especially among the poorer segments of the population (Fig. 3.3.2). This is due to stagnant production and the rising cost of pulses. This trend has to be reversed. Measures to improve pulse production may include reactivation of the pulse component of the Oil Seed and Pulse Mission, a major thrust on research and development and innovative community-based efforts similar to the M.S. Swaminathan Research Foundation's efforts in Tamil Nadu to improve pulse production.



### Horticultural production

3.3.13 Available data on the current production of fruits and vegetables and the projected demand for 2006 are shown in Table-3.3.1. Per capita consumption of these in the country is very low. Consumption of adequate quantities of vegetables,

especially green leafy ones, is essential for meeting the dietary requirement of vital micronutrients. Besides, vegetables also provide several phytochemicals and fibre.

**Table-3.3.1 Fruits and vegetables (in million tons)**

|            | Demand 2006 | Production 1997/98 |
|------------|-------------|--------------------|
| Fruit      | 50          | 40.05              |
| Vegetables | 130         | 72.83              |

**Source** :Dr.M.S.Bamji: Background paper for the Subgroup on Dietary Diversification

3.3.14 At present, there is insufficient focus on the cultivation and marketing of low-cost, locally-acceptable green leafy vegetables, yellow vegetables and fruits. As a result, these vegetables are not available at affordable cost throughout the year. Health and nutrition education emphasising the importance of consuming these inexpensive but rich sources of micronutrients will not result in any change in food habits unless the horticultural resources in the country are harnessed and managed effectively to meet the growing needs of the people at an affordable cost. Horticultural products provide higher yields per hectare and sell at higher prices. The processing, storage and transportation of horticultural products in a manner so that there is no glut and distress sales will make their production economically attractive to farmers and improve availability to the consumers.

### Homestead production for dietary diversification

3.3.15 Homestead production is another method of increasing consumption of vegetables, milk and animal products and reduces the gap in consumption.

3.3.16 Strategies can be worked out for using degraded lands for vegetable production. Farm wastes as well as food grains unfit for human consumption can be used to feed backyard poultry in order to increase homestead production of eggs and chicken and also increase consumption of these at home (Table 3.3.2).

**Table-3.3.2**  
**Per capita availability and deficit**

| Food Items | Per capita availability | ICMR dietary guidelines for Indians | Per capita deficit |
|------------|-------------------------|-------------------------------------|--------------------|
| Milk       | 216 g**/day             | 300 ml*/day                         | 34 g/day           |
| Egg        | 30 eggs/annum           | 180 eggs/annum                      | 150 eggs/annum     |
| Meat       | 3.24 kg/annum           | 10.95 kg/annum                      | 7.71 kg/annum      |

**Source:** Dr.M.S.Bamji: Background paper for the Sub-group on Dietary Diversification

\* milli litre \*\* grams

### Food Processing and Preservation

3.3.17 Post harvest losses especially in vegetables and fruits are presently in the range of 20 to 30 percent and contribute directly to higher costs and reduce availability of these commodities. Precision farming and food processing based on science and technology are both intellectually stimulating and economically rewarding, they can increase farmers' income and rural employment considerably. This will not only help in retaining educated youth in the farm sector but would also enable the micro-nutrient needs of the population to be met through a sustainable food-based approach.

### EQUITABLE DISTRIBUTION OF FOODSTUFFS

3.3.18 Achievement of food adequacy at the national level is a necessary, though not sufficient, precondition to ensure the achievement of household nutrition security. Buffer stocks do help to combat acute transient food scarcity, caused by natural disasters like floods and droughts. Early warning systems are in place and food can be rushed to areas of threatened distress fairly rapidly. What is proving more difficult is the task of combating chronic mild/moderate under-nutrition in a large number of poor households. Inequitable distribution of available food among different segments of the population and even within the family is one of the major factors responsible for under-nutrition/over-nutrition. Good governance and health and nutrition education hold the key to improving equitable distribution of food based on need.

3.3.19 The TPDS was introduced in June 1997 in an attempt to limit the mounting cost of subsidy, and at the same time, ensure that the BPL

population does get subsidised food grains. Under this system subsidised foodgrains are provided only to people below the poverty line. Taking the average household size as 5.51 (1991 Census), the monthly requirement of food grain for a household is 73 kg. TPDS meets only a part of the total requirement of food grains for the family.

3.3.20 Apart from TPDS, other initiatives to improve food security of families include:

- ☒ allocation of food grains to institutions where indigent people live at rates similar to that for BPL population;
- ☒ Annapoorna Scheme (1998) to provide foodgrains to indigent old persons;
- ☒ Antyodaya Anna Yojana (2000) to provide food grains to the poorest of the poor families among the BPL population at the rate of Rs.2 per kg for wheat and Rs.3 per kg for rice;
- ☒ Sampoorna Grameen Rozgar Yojana (2001) for rural poor in need of wage employment; preference is given to scheduled castes, scheduled tribes and parents of children withdrawn from hazardous jobs.

### Role of the Community

3.3.21 Innovative local efforts can go a long way in improving nutrition security especially for the poorer segments of the population living in vulnerable areas. Formation of local food grain banks under the supervision of the PRIs to help in achieving nutrition security for all and insulating the economically and socially deprived sections of the community from seasonal food insecurity

### Community Food bank

Main features of the proposed food bank are:

- ☒ one bank for every village or cluster of villages with population ranging from 2000 to 5000;
- ☒ supervised by a society or council chosen by the gram sabha;
- ☒ managed by a stakeholder council, with different operations assigned to different self-help groups;
- ☒ to be implemented with honesty, political neutrality, fairness, absence of discrimination based on religion, caste, class, gender and political belief



| Entitlement                                       | Ecology and employment<br>(Food for Work)             | Ethics   | Emergencies  |
|---|---|--|--|
| To overcome chronic hunger among under-privileged | Water Banks<br>Watershed Development<br>Afforestation | Supplementary Nutrition<br>Pregnant and nursing mothers, infants and old, infirm persons | Transient hunger (Seasonal Slide)<br>Droughts, Floods<br>Cyclones<br>Earthquakes |

has been suggested. A diagrammatic representation of the proposed Community Food Security System suggested by the M.S. Swaminathan Research Foundation, Chennai is shown in the Text Box.

**During the Tenth Plan period** every effort will be made to:

- ☒ identify vulnerable groups/families, undernourished individuals and provide them with well-targeted subsidised food items through TPDS. In addition to the supply of rice and wheat, locally procured coarse grains, pulses and iodised salt may be provided;
- ☒ test and evaluate various modalities of improving the efficiency of the systems currently in operation to improve household nutrition security;
- ☒ choose appropriate modalities for making optimal use of available subsidies to meet the needs of the vulnerable segments of the population; and

- ☒ ensure that there is no duplication of schemes for improving nutrition security to vulnerable groups.

### MANAGEMENT OF TRANSIENT FOOD SCARCITY DUE TO DROUGHT

3.3.22 Though the country has averted large-scale severe under-nutrition or famine in the past five decades, droughts do pose a major threat to food security. Over the years, the country has developed a system for the early recognition and management of transient food scarcity in times of drought. During the Ninth Plan period, Rajasthan, Andhra Pradesh and Gujarat were affected by drought. Of the various relief measures, Andhra Pradesh benefited only from additional ration through PDS. In the other two states, additional measures such as food for work, supply of drinking water, essential medicines and cattle feed were also in operation.

3.3.23 The National Institute of Nutrition (NIN), Hyderabad conducted a survey in the drought-affected districts in these three states to assess the impact of drought and the ongoing intervention

programmes on the diet and nutritional status of the population. In Rajasthan, there was no increase in prevalence of CED in adults (Body Mass Index <18.5) as compared to the non-drought period. However, there was an increase in the prevalence of under-nutrition in pre-school children (64.8 per cent) as compared to non-drought period (46.7 per cent). In Gujarat and Andhra Pradesh, prevalence of CED in children and adults was not more in the drought-affected districts. These data suggest that except in the case of children in Rajasthan, the adverse consequences of drought on the nutritional status were prevented due to intervention programmes.

3.3.24 **During the Tenth Plan period**, efforts will be made to monitor rainfall data to provide early warning of drought. Monitoring agricultural production will provide information about impending food insecurity. In drought-prone areas intensive monitoring of the nutritional status of pre-school children based on ICDS reporting system will help to assess the severity of the problem at block level. Timely relief measures can be organised based on these data. Apart from other process indicators for monitoring the relief operations, monitoring the nutritional status of pre-school children through the ICDS system will be used for assessing the out reach, adequacy and impact of relief measures.

**NUTRITIONAL STATUS OF TRIBAL POPULATION**

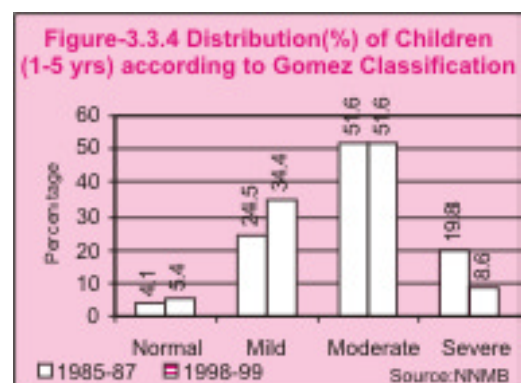
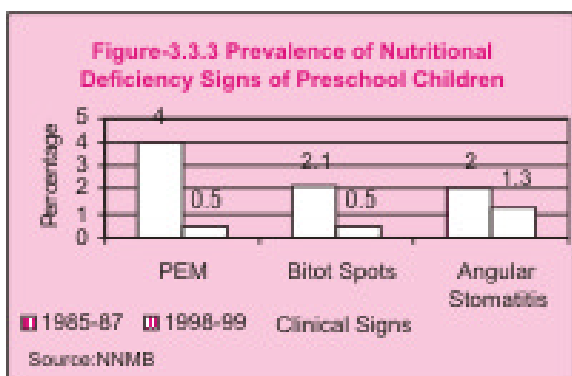
3.3.25 The tribal population is not a homogeneous group. There are wide variations among the groups in nutritional status and access to and utilisation of nutrition and health services. The tribal populations in the north-eastern states have high literacy levels; they access available facilities, and hence their

**Higher prevalence of under-nutrition in tribal population is due to**

- ☒ poverty and consequent under-nutrition
- ☒ lack of awareness about, access to and utilisation of the available nutrition supplementation programmes;
- ☒ social barriers preventing the utilisation of available nutrition supplementation programme and services.
- ☒ poor environmental sanitation and lack of safe drinking water, leading to increased morbidity from water-borne infections;
- ☒ environmental conditions that favour vector-borne diseases;
- ☒ lack of access to health care facilities resulting in increased severity and /or duration of illnesses.

nutritional and health status is better than the national level. On the other hand, primitive tribes such as the Onges in the Andamans have very little awareness or access to either nutrition or health care. Differential area-specific need assessment, strategies and programmes to improve access and utilisation of nutrition services have to be developed for each of the tribal areas.

3.3.26 The tribal population is recognised as socially and economically vulnerable. Their lifestyles and food habits are different from that of their rural neighbours. They depend on minor forest produce, are employed in manual labour and may not have adequate income. Their food consumption pattern is dependent on the vagaries of nature and varies from extreme deprivation (in the lean seasons) to high intakes (in the post-harvest period).





3.3.27 Several focused interventions for tribal development and improvement in their health and nutritional status have been initiated in the last three decades. In order to assess the impact of these, the National Nutrition Monitoring Bureau (NNMB) carried out a repeat diet and nutrition surveys of the tribal populations living in the Integrated Tribal Development Project (ITDP) areas in 1998-99. These covered the states of Kerala, Tamil Nadu, Karnataka, Andhra Pradesh, Maharashtra, Gujarat, Orissa and West Bengal, where the NNMB had carried out an earlier survey in 1985-87. Comparison of data of the two surveys showed that there has not been any improvement in the food and nutrient intake. However, there has been some reduction in the prevalence of severe forms of under-nutrition and in nutritional deficiency signs (Figures 3.3.3 and 3.3.4). The tribal population is more under-nourished than their rural counterparts.

3.3.28 There were substantial differences in the food and nutrient intake and nutritional status between tribal populations living in different states (Table-3.3.3). In some population groups, there was adequate intake of minerals and some micronutrients even though the diet was inadequate in terms of meeting energy and protein needs. The nutritional status of women and children in some of the northeastern states with a predominantly tribal population is better than the national average (Table 3.3.4).

**Table-3.3.3 Inter-State Differences in Nutrient Intake**

| Nutrient Intake           | State with |            |
|---------------------------|------------|------------|
|                           | Lowest     | Highest    |
| <u>1-3 age-group</u>      |            |            |
| Protein                   | 10g        | 24.5g      |
| Energy                    | 466 k cal  | 1000 k cal |
| Vit. A                    | 34 µ g     | 264 µ g    |
| <u>4-6 age-group</u>      |            |            |
| Protein                   | 19.8 g     | 36.3 g     |
| Energy                    | 756 k cal  | 1524 k cal |
| Vit. A                    | 51.2 µ g   | 502.7 µ g  |
| <u>&gt;18 years males</u> |            |            |
| Protein                   | 47.0g      | 59.5g      |
| Energy                    | 1932k cal  | 2503k cal  |
| Vit. A                    | 82µ g      | 575µ g     |

Source: NNMB (2000)

3.3.29 **During the Tenth Plan**, monitoring nutritional status of the tribal population, especially of those who have poor access to services, will be continued. Monitoring of the ICDS reporting will provide early warning of any deterioration in the nutritional status in pre-school children so that appropriate intervention can be initiated. Research studies on dietary habits that contribute to good nutritional status as well as those that make the tribal population vulnerable to diseases will be carried out. Based on the data, specific intervention programmes will be taken up to improve nutritional status and to eliminate dietary habits that are likely to cause ill health.

**Table- 3.3.4 Nutritional Status in North Eastern States**

| State             | % Tribal population as per 1991 Census | Weight-for-age (% below -3SD) in children < 3 years | % ever married women with |                              |                            |
|-------------------|--|---|---------------------------|------------------------------|----------------------------|
|                   |  |   | Height below 145 cm       | BMI < 18.5 kg/m <sup>2</sup> | BMI > 25 kg/m <sup>2</sup> |
| Arunachal Pradesh | 63.7                                   | 7.8   | 11.9                      | 10.7                         | 5.1                        |
| Meghalaya         | 85.5                                   | 11.3  | 10.3                      | 18.8                         | 10.8                       |
| Mizoram           | 94.8                                   | 5.0   | 21.1                      | 25.8                         | 5.8                        |
| Nagaland          | 87.7                                   | 7.4   | 10.7                      | 22.6                         | 5.3                        |
| All-India         | 8.1                                    | 18.0  | 13.2                      | 20.3                         | 10.6                       |

Source : NFHS 2 - 1998-99

## ENERGY REQUIREMENTS OF INDIANS

3.3.30 Energy requirement is defined as the amount that will balance the energy expenditure of the individual (as determined by body size and composition and level of physical activity) consistent with long-term good health. This intake will allow for the maintenance of economically necessary and socially desirable physical activity. In children and pregnant/ lactating women, the energy requirement will include energy needed for deposition of tissue and secretion of milk at the rate consistent with good health. All estimates of requirement are based on habitual intakes and though these are expressed as daily intake, it is not implied that these amounts must be consumed on a daily basis. Estimates of requirement are derived from actual data of individuals on intake and expenditure. Actual intakes and expenditure of people of the same age, sex, similar body size and performing similar physical activity are used to compute average energy requirement for the groups.

3.3.31 The recommended intake of energy of a group is equal to the average energy requirement of individuals of the group because both lower and higher energy intake are associated with health hazards. This is in contrast to other nutrients. For example, the recommended safe level of protein intake is the mean +2 SD value of the group because with this over 97 per cent of the persons in the group would get their requirements.

3.3.32 The energy needs of men and women for different activity levels computed on the basis of recommendations made by a Joint Expert Consultation of the World Health Organisation (WHO)/Food and Agricultural Organisation (FAO)/United Nations University (UNU) in 1985 and by an Expert Committee constituted in 1988

by the Indian Council of Medical Research (ICMR) are shown in Figures 3.3.5 and 3.3.6 The ICMR's RDA is higher than those recommended by the WHO/FAO/UNU.

3.3.33 Studies have shown that Indians have about 5 per cent lower Basal Metabolic Rate (BMR) than those predicted on the basis of WHO/FAO/UNU equations. The possible causes of lower BMR among Indian include:

- ☒ under-nutrition with low body weight and low BMI (weight in kg/ height in metre<sup>2</sup>);
- ☒ under-nutrition resulting in lower protein turn-over (which accounts for 20 per cent of BMR);
- ☒ difference in proportion of muscle and viscera;
- ☒ lower oxygen supply to the muscle;

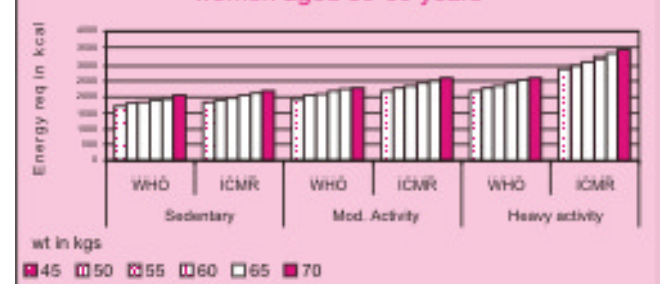
However, the energy cost of work done computed in terms of basal energy cost or physical activity ratios are similar.

3.3.34 For computing RDA, the ICMR has taken body weight of 'reference man' as 60 kg and that of 'woman' as 50 kg. Average weight of Indian men is 52 kg and women 44 Kg. For children and adolescents, weight for age from NCHS / well-to-do Indian children have been utilised by ICMR for deriving the RDA so that energy intake enables optimum growth. However, as in adults, majority of children and adolescents weigh substantially less and hence their energy requirement is lower. In view of these, it is likely that the energy requirement of Indians is likely to be substantially lower than the current ICMR recommendations (Table 3.3.5). Over the last few decades there has been a reduction in the physical activity and hence reduction in the energy needs in all the age and weight categories.

Figure-3.3.5 Daily Average Energy Requirement in men aged 30-60 years



Figure-3.3.6 Daily Average Energy Requirement in women aged 30-60 years



**Table-3.3.5 ICMR's RDA for Energy (reference body weights and actual body weights)**

| Sex   | Ref.Body weight | Actual body weight | Energy RDA        |                      |                        |                    |
|-------|-----------------|--------------------|-------------------|----------------------|------------------------|--------------------|
|       |                 |                    | Activity category | For Ref. Body Weight | For Actual body weight | Percent difference |
| Man   | 60.0            | 52.0               | Sedentary         | 2425                 | 2115                   | 13                 |
|       |                 |                    | Moderate          | 2875                 | 2492                   | 13                 |
|       |                 |                    | Heavy             | 3800                 | 3293                   | 13                 |
| Woman | 50.0            | 44.0               | Sedentary         | 1875                 | 1740                   | 12                 |
|       |                 |                    | Moderate          | 2225                 | 1958                   | 12                 |
|       |                 |                    | Heavy             | 2925                 | 2594                   | 11                 |

**Source:** Dr.B.S.Narasinga Rao-Gopalan Oration 2001

Obesity rates in all age groups are increasing mainly because of the reduction in physical activity without concomitant reduction in energy intake. In view of the known adverse health consequences of both excess and deficient energy intake, it is essential that appropriate recommendation for the RDA for Indians is evolved. This has to be done quickly as the country is entering an era of dual disease burden of CED and infections on the one hand and that of obesity and non-communicable diseases on the other.

3.3.35 **During the Tenth Plan**, review of the RDA for Indians will be taken up on a priority basis. The ICMR has reconstituted its Expert Committee on RDA which will take all the above factors into consideration and come up with an appropriate recommendation regarding the dietary intake of Indians. One of the priority areas of research during the Tenth Plan will be studies to define the BMR and energy requirement of healthy adult Indian men and women, adolescents, children and the elderly. Simultaneously studies will be taken up to define the dietary intake needed to correct the chronic energy deficiency or obesity in each of these groups.

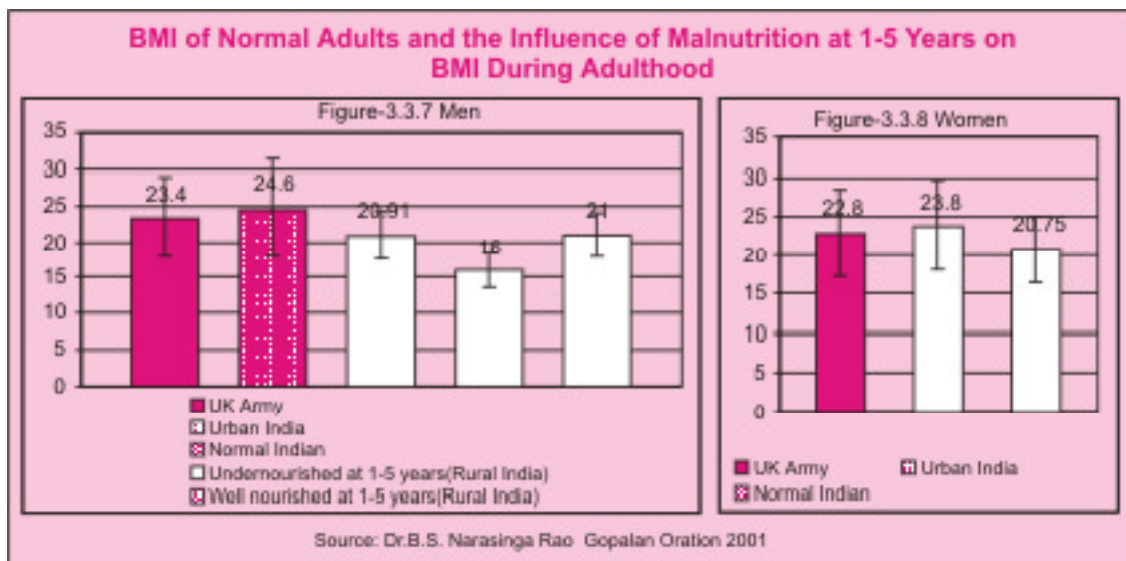
### ASSESSMENT OF NUTRITIONAL STATUS

3.3.36 Anthropometric indices (height, weight and BMI) are widely used for the assessment of the adequacy of energy intake. Body weights and heights of children reflect their nutritional and growth status; weights and heights of adults represent the cumulative effect of dietary intake over a long period. The BMI is the most widely used anthropometric index for the assessment of the nutritional status in adults as it reflects the effect of both acute and chronic energy deficiency/excess. BMI, however, does not clearly bring out the entire extent of chronic under-nutrition. For instance those who are stunted and have low body weight may have normal BMI. An increase in energy intake will result in improvement in BMI both in adults and in children, but in adults and children with severe stunting, improvement in dietary intake will not result in an improvement in height. Continued over-consumption of energy especially in stunted individuals could lead to over-nutrition, obesity and increased risk of non-communicable diseases. It has also been reported that the body fat content for a given BMI is different not only between men and women but also among countries (Table-3.3.6).

**Table-3.3.6 Variability of body fat at BMI 20 among rural population of three countries**

| Country          | % Body fat | Fat mass (kg) |        | Assuming fat = 0 then BMI |
|------------------|------------|---------------|--------|---------------------------|
|                  |            | Male          | Female |                           |
| Papua New Guinea | 1          | 1             | 6      | 19.7                      |
| Ethiopia         | 7          | 4             | 8      | 18.0                      |
| India            | 12         | 6             | 8      | 16.9                      |

**Source:** Dr.B.S. Narasinga Rao - Gopalan Oration 2001



3.3.37 BMI has been used to assess energy deficiency as well as energy excess. The currently used norms (<18.5 - undernutrition and >25 overweight) were evolved on the basis of data from the developed countries where adverse health consequences of under-nutrition have been shown to be associated with BMI values below 18.5 and the health hazards of over-nutrition have been reported with BMI of over 25. The mean and frequency distribution of BMI of Indians are substantially different from developed countries. It is, therefore, possible that the currently used classification may be satisfactory for developed countries but not for India.

3.3.38 There are wide variations in height, weight, body composition and BMI right from birth through childhood and adolescence between countries and different income groups in the same country ( Figures 3.3.7 and 3.3.8). Birth weight and growth of Indian children from well-to-do segments of the population are similar to United States National Center of Health Statistics (NCHS) standards but adult heights and weights in India are lower. The functional significance of inter-country variations in stature are not yet clearly understood. However, the existing gap between the stature of Indians from well-to-do families where there are no nutritional constraints and under-nourished persons from poorer segments of the population is clearly due to poor nutrition and health care. The short-term nutritional goal of the country is to identify individuals and families, who are under-nourished and provide them

with adequate nutrition and health care so that they do not incur health hazard associated with under-nutrition.

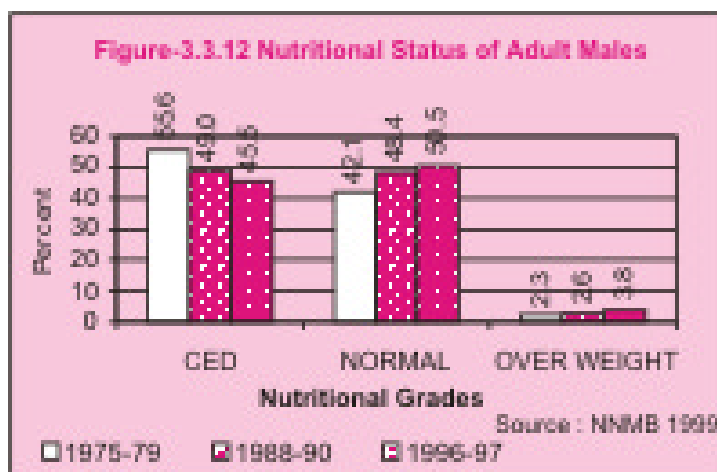
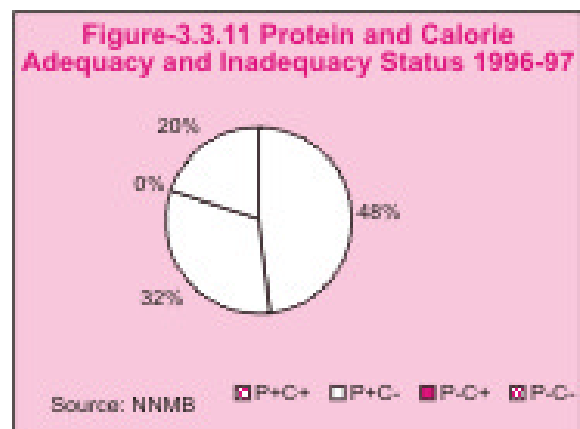
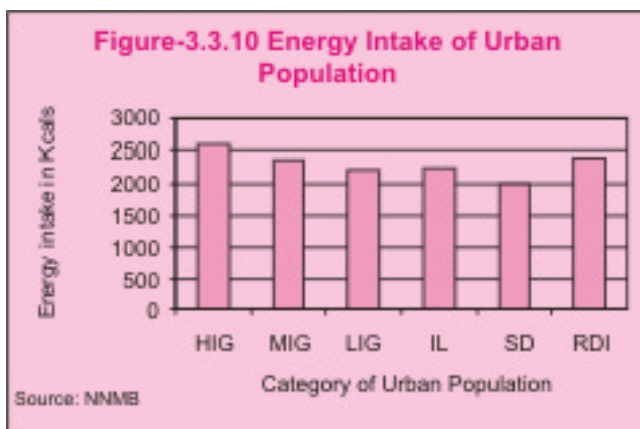
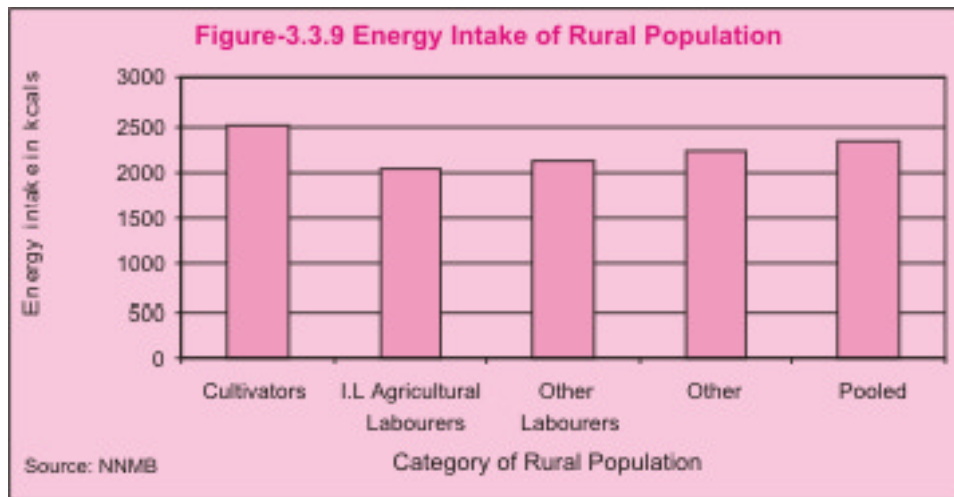
3.3.39 As both CED and obesity are associated with adverse health consequences, it has been suggested that each country should develop its own norms for BMI and cut-off points indicative of various degrees of under-nutrition and over-nutrition based on their own data on health problems in persons with varying BMI levels. In view of the profound implications of these suggestions it is essential that research studies are taken up during the Tenth Plan period to examine the usefulness of currently used cut-off points of BMI as indicators of CED, metabolic functions, work capacity and health indices. It is also important to collect data on BMI of well-nourished Indians in different regions and the health profile of adults with different BMI. Epidemiological data on the risk of non-communicable diseases among different BMI groups in India will have to be collected to evolve appropriate cut-off points for BMI in Indians so that those at risk can be identified and appropriate interventions undertaken.

### Dietary Intake and Nutritional Status of Adults

3.3.40 Over the last three decades, there have been substantial changes in the socio-economic status of people, some increase in the dietary intake of men and women especially of the affluent segments in rural and urban areas, ready availability of fast foods, ice creams and other energy rich food items at affordable costs have resulted in increased

energy consumption (Figures 3.3.9 and 3.3.10). The distribution of households according to protein-energy adequacy status is presented in Figure-3.3.11. About 48 per cent of the households consumed more than adequate amount of both proteins and calories, while 20 per cent of households consumed inadequate amounts of both the nutrients. With increasing access to cooking

gas, piped water supply, labour-saving gadgets and transport, there has been a substantial reduction in the physical activity pattern and energy expenditure, especially in the middle and upper income groups. Data from NNMB repeat surveys indicate that there has been some reduction in under-nutrition and some increase in obesity over the last two decades (Figure-3.3.12). Data from National Family Health



Survey-2 (NFHS) confirms that currently both under-nutrition and over-nutrition are problems in women (Table 3.3.6) and that there are massive

**Table-3.3.6 Nutritional Status of ever married women aged 15-49**

|           | BMI < 18.5<br>(kg/m <sup>2</sup> ) | BMI > 25<br>(kg/m <sup>2</sup> ) |
|-----------|------------------------------------|----------------------------------|
| All India | 35.8%                              | 10.6%                            |

Source: NFHS- 2, 1998-99

inter-state differences. The percentage of women with under-nutrition varies from 10.7 in Arunachal Pradesh to 48 in Orissa and those who are overweight from 3.7 in Bihar to 33.8 in Delhi. The country will, therefore, have to gear up to prevent, detect and tackle the problems of both under-nutrition and over-nutrition in the next two decades.

3.3.41 Over the last two decades there have been a growing number of reports that Indians are a very high-risk group for cardiovascular diseases and diabetes. A majority of them are not obese and do not have risk factors associated with non-communicable diseases in the developed countries. The higher prevalence of non-communicable diseases among persons whose birth weights were low has been documented. It has been hypothesised that people who have lived under nutritional constraints over millennia have 'thrifty genes' which enable them to survive and sustain themselves with lower energy intake. In such a population, any rapid increase in energy intake may result in increased risk of non-communicable diseases. This is an area where further research studies need to be done.

3.3.42 The amount by which the dietary intake should be increased or decreased to correct CED/obesity in adults will depend upon the rate at which the desirable weight is to be achieved and the extent to which the deficit or excess in weight is due to lean and fat tissue. Since adults cannot grow, the appropriate weight for actual height is to be calculated and the appropriate dietary intake to correct under-nutrition or over-nutrition computed. In adults who are seriously under-weight for their height, there will generally be a loss of both fat stores and lean body mass.

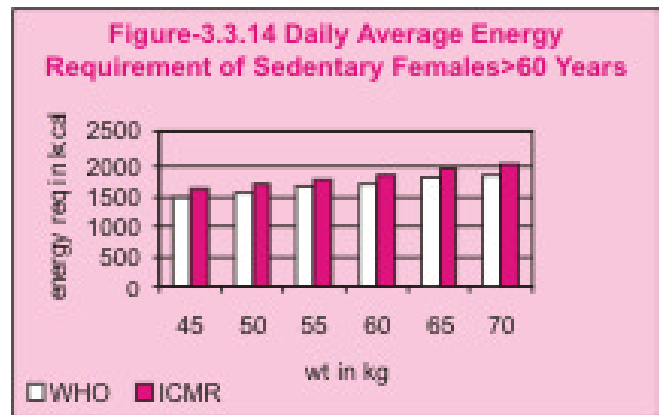
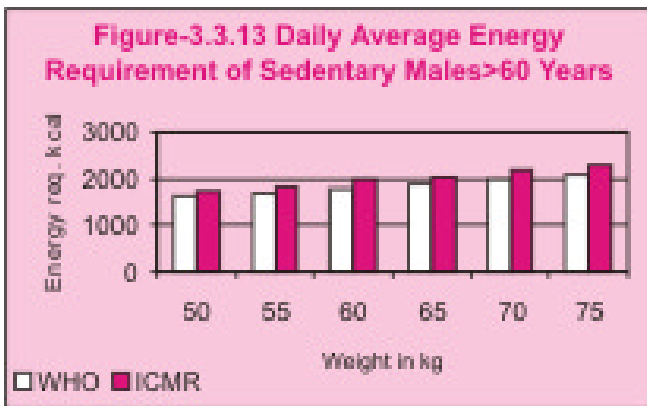
Therefore, bringing their weight into the normal range requires additional amounts of both energy and protein. Clinical experiences suggested that under-weight adults who are free from disease could be rehabilitated fairly rapidly if they eat to appetite. For correction of obesity, a low energy diet coupled with adequate exercise will be needed. If low energy diet is to be continued for a long period to achieve desired reduction in weight, it is essential to ensure adequate amounts of protein and micronutrients intake. For sedentary adults food low in energy density, rich in fibre containing lot of vegetables and adequate exercise would go a long way in terms of providing satiety and preventing obesity.

3.3.43 During the Tenth Plan, the major thrust would be to undertake massive health and nutrition education to encourage appropriate dietary intake and healthy life styles among all segments of the population. Epidemiological studies will be initiated to obtain data on dietary intake, nutritional and health status to define levels at which functional impairment in health status occur.

### Geriatric Nutrition

3.3.44 With increasing longevity, the proportion and number of persons in the age group of 60 years and beyond is rapidly increasing, with women outnumbering men. The population of elderly has been projected to double from 6.23 crore in 1996 to 11.29 crore in 2016. With increasing age, there are metabolic changes and also reduction in physical activity and, as a result, their energy requirement is substantially lower than younger adults (Figures 3.3.13 and 3.3.14).

3.3.45 Elderly individuals face problems in ensuring appropriate dietary intake because of alteration in taste with increasing age and loss of teeth. The reduction in physical activity with increasing age, not accompanied by a concurrent reduction in energy intake, makes the elderly prone to obesity. Due to low intake of vegetables, food rich in micronutrients and increased susceptibility to infection, anaemia and Vitamin B complex deficiency may be more common in the elderly. Adequate dietary calcium intake from birth to 30

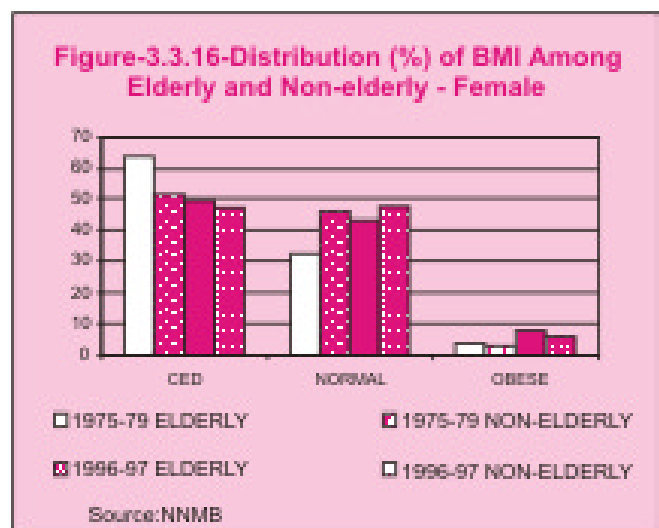
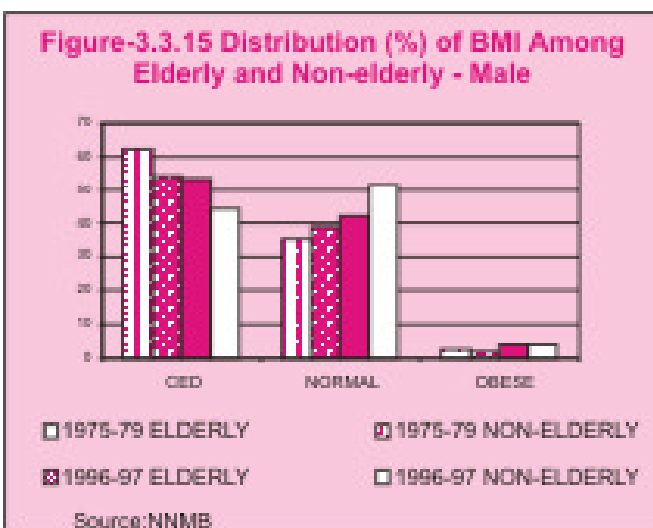


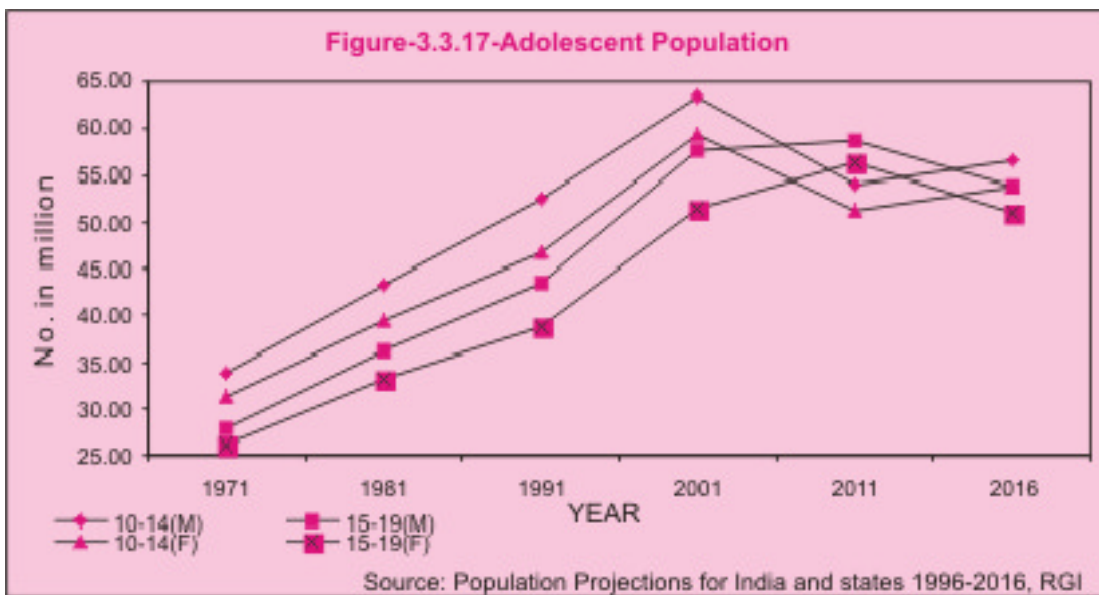
years is critical for the development of peak bone mass. Osteoporosis occurs more commonly in women than in men as bone loss occurs earlier and more rapidly in women as compared to men. With increasing longevity, there will be an increase in the number of persons with osteoporosis. There is very little data on the incidence of osteoporosis in India.

3.3.46 Lack of social support, breaking up of the joint family system, changing lifestyles all aggravate the health and nutritional problems of the elderly. Available data from nutrition surveys indicate that the dual problem of chronic energy and micronutrient deficiency on the one hand and obesity on the other are seen among the elderly (Figures 3.3.15 and 3.3.16). Innovative efforts to provide societal support, health care and nutrition services to the elderly are currently being taken up by several agencies. Simultaneously, there are efforts to improve family and societal support to elderly within the existing cultural ethos in different

regions. Successful models for improving quality of life will have to be replicated.

3.3.47 In many states elderly persons who are without any financial support get old age pension. The amount as well as coverage varies between states but, on the whole, the amount provided is too low to meet the nutritional needs of the elderly person. Following reports of severe under-nutrition among the elderly and destitute persons in several states, the central and the state governments initiated steps to improve the access of these segments to food-grains. The National Policy on Older Persons announced in January 1999 provides a framework for welfare of the elderly persons including improved financial security and increased access to health and nutrition services. It is envisaged that National Plan of Action for the implementation of the policy will be drawn up. The policy also recommends research to expand the knowledge base on nutritional needs of the elderly.



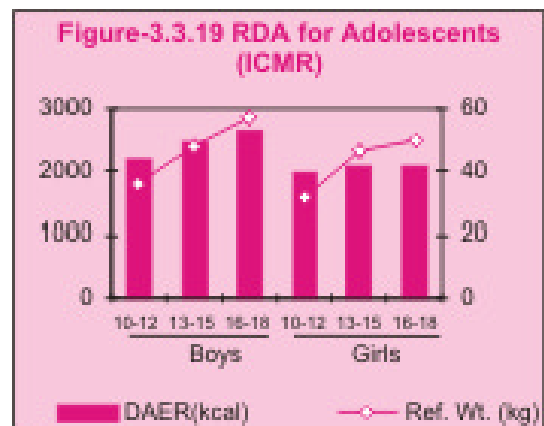
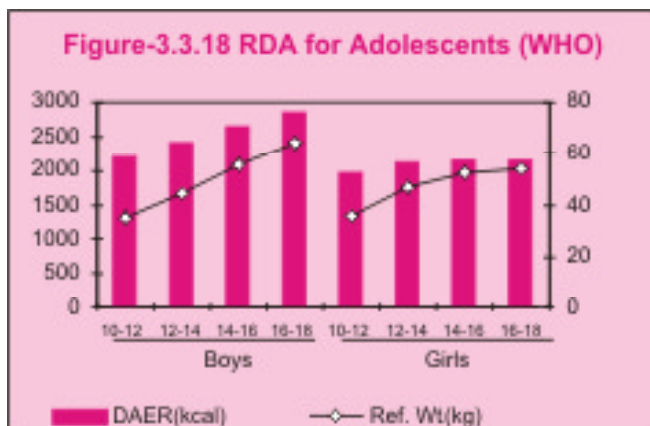


3.3.48 **During the Tenth Plan**, a database on the magnitude of the nutritional problems in the elderly (under-nutrition, micronutrient deficiency and obesity) will have to be created through the ongoing diet and nutrition surveys. Based on the data appropriate area-specific intervention programmes can be drawn up. While the technical inputs will come from the nutritionists, implementation of the programme will largely rest with the families, community and the PRIs.

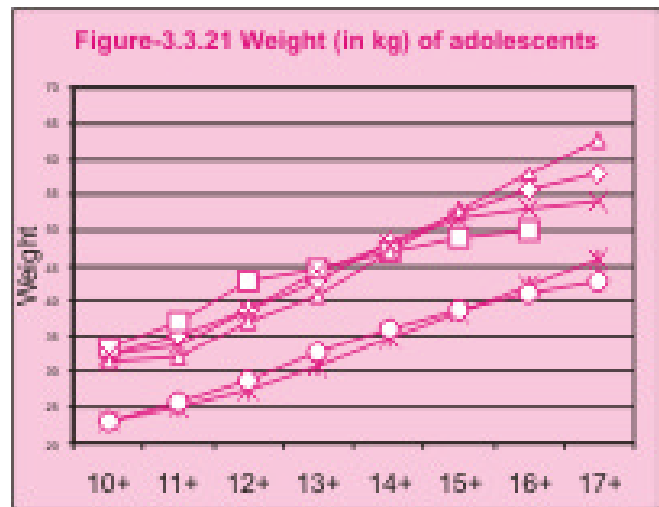
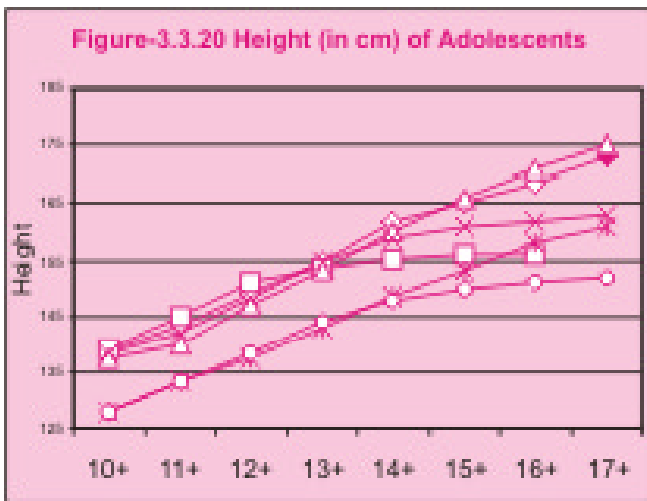
**Nutritional Status of Adolescents**

3.3.49 Projections made by the Technical Group on Population Projections (Figure 3.3.17) indicate that the number of adolescents (in the 10-19 age group) will increase from 200 million in 1996 to 215.3 million in 2016. Adolescents, who are undergoing rapid growth and development, are

one of the nutritionally vulnerable groups who have not received the attention they deserve. Adolescents gain 30 per cent of their adult weight and more than 20 per cent of their adult height between 10 and 19 years. Taking into account, the desirability of achieving full potential for growth, ICMR has used NCHS/well-to-do Indian children's body weight for computing RDA for adolescents (Figures 3.3.18 and 3.3.19). However, children from the poorer segments of the population in India are shorter and weigh less (Figures 3.3.20 and 3.3.21). It is unlikely that any extra food at this stage can accelerate or extend the duration of physical growth. Additional dietary intake at this period can only lead to adolescent obesity. The ICMR Expert Committee for RDA may have to take all these into account and evolve appropriate recommendations for dietary intake in Indian adolescents.

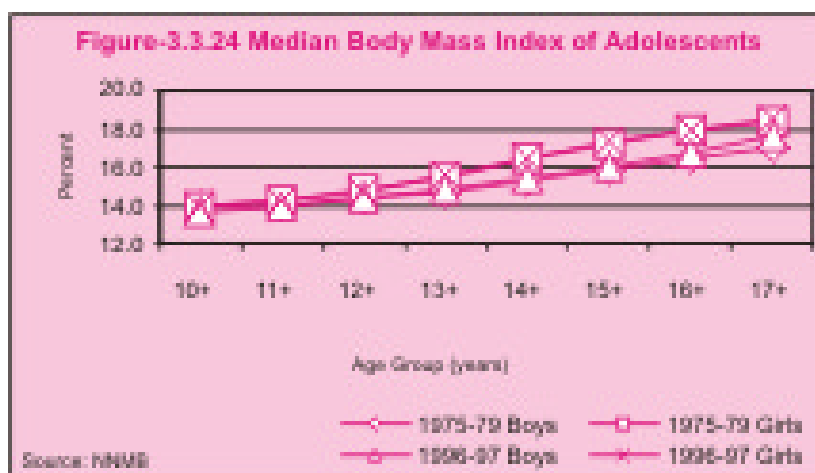
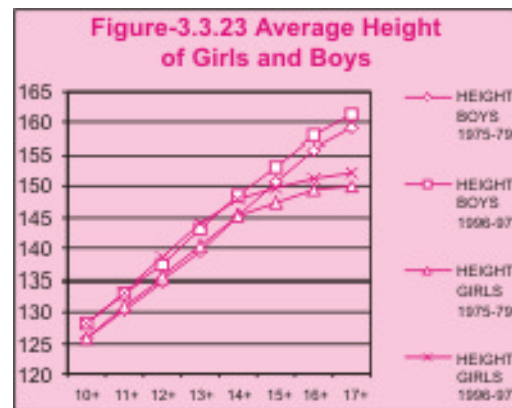
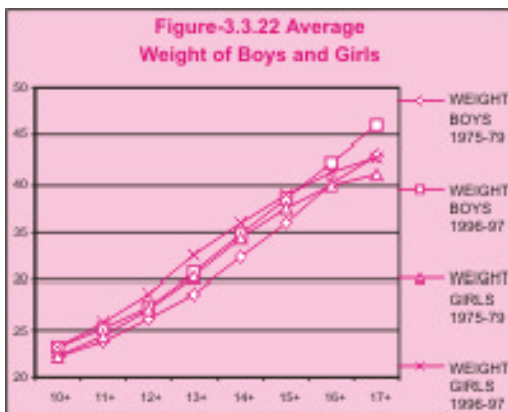






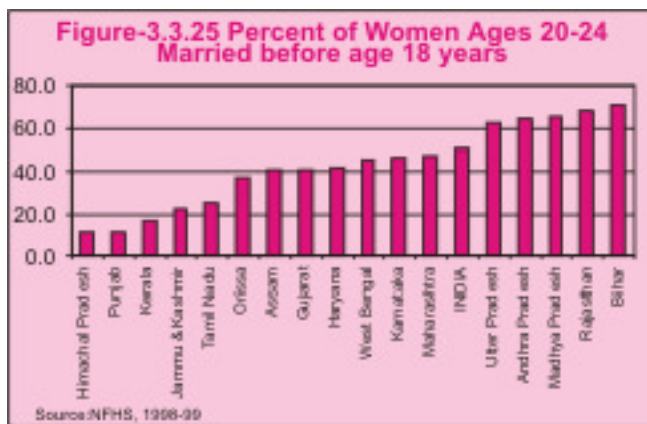
3.3.50 Data from the NNMB repeat surveys have shown that there has not been any substantial increase in the dietary intake of adolescents; but

there has been some improvement in height (2.5-3.5 cms), weight (1-1.5 kg) and BMI between 1975-79 and 1995-97 (Figure 3.3.22,23,24).



3.3.51 Data from NNMB also shows that over this period there has been some increase in obesity among adolescents especially for those from the affluent groups both in the urban and rural areas. The prevalence of micronutrient deficiencies are high. With the onset of menstruation, girls in this age group are vulnerable to anaemia and all its adverse consequences.

3.3.52 Data from NFHS-2 indicate that the median age at marriage of girls in India is 16 years and 61 per cent of all girls were married before the age of 18. There are large inter-state variations in age at marriage (Figure-3.3.25). The mean age at first birth



is 19.2. Under-nutrition, anaemia and poor ante-natal care inevitably lead not only to increased maternal morbidity but also to higher incidence of low birth weight and peri-natal mortality. Poor childrearing practices of these girls will add to infant morbidity and under-nutrition, thus perpetuating the intergenerational cycle of under nutrition. Appropriate education, nutrition and health interventions, delay in age at marriage, optimum health and nutrition interventions during pregnancy are some of the inter-sectoral initiatives to break this vicious cycle.

3.3.53 With a view to minimising these adverse effects, appropriate nutritional and health interventions for adolescents are being taken up under the ICDS and Reproductive and Child Health (RCH) Programmes. The Department of Women and Child Development has launched Kishori Shakti Yojana (2000). The details of these initiatives are given in respective sections. Prime Minister in his Independence day address in 2001 stated that food grains will be provided to combat under-nutrition in adolescent girls and pregnant and lactating women.

A pilot project is being initiated to operationalise the announcement of the Prime Minister. The project, initially for a period of two years, will be taken up in two of the backward districts in each of the major states and most populous district (excluding the capital district) in the remaining smaller states/Union Territories. The funds for 2002-03 is being given as special additional central assistance to the states so that they can provide food grains through TPDS totally free of cost to the families of identified under-nourished persons. The programme will be operationalised through the Department of Women and Child Development in the centre and in the states.

3.3.54 During the Tenth Plan, studies to improve the understanding of the relationship between energy requirements, body composition, endocrine changes and micronutrient status in children and adolescents will be taken up so that appropriate focused interventions can be initiated. Programmes to improve the nutrition and health status of adolescents will be effectively implemented.

3.3.55 Adolescent girls fall into two categories --- those who are in school and those who are not. The focus of efforts to improve the health and nutritional status of those who are in school will have to be through the school health system. Efforts will be made to screen all for anaemia and under-nutrition and provide appropriate management. Screening will also enable the identification of obese adolescents and the initiation of appropriate remedial measures. Appropriate information, education, communication and motivation (IECM) to delay marriage until at least the age of 18 and postpone child-bearing till the age of 20 will be vigorously taken up.

3.3.56 A majority of the girls in the out-of-school category marry during their early teens and conceive soon after. The focus of any strategy will be to get these girls to the anganwadi so that the anganwadi worker, in collaboration with the auxiliary nurse midwife (ANM), can undertake the following activities:

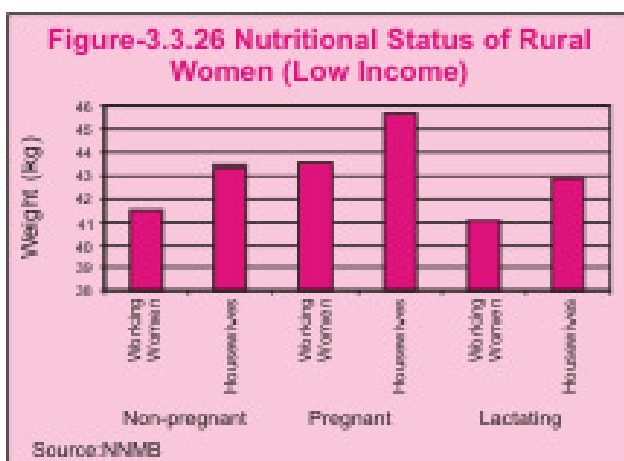
- ☒ screening for under-/over-nutrition and micronutrient deficiencies;
- ☒ targeted interventions to tackle the nutritional problems of adolescents, especially girls;

- ☒ introduction of community-supported supplementary nutrition programmes using community food and food prepared by women's groups using locally-available commodities and given on a priority basis to adolescent girls who are under-nourished or pregnant;
- ☒ IEC to improve awareness;
- ☒ health and nutrition education to prevent early pregnancies and under-nutrition; and
- ☒ appropriate antenatal and intrapartum care and contraceptive care when needed

### Nutritional Status of Pregnant and Lactating Women

3.3.57 Traditional belief was that pregnant and lactating women require additional dietary intake as they have to meet their own nutritional requirements and also supply nutrients to the foetus and the infants. Some available data indicated that a low dietary intake, especially in already chronically undernourished women, had adverse effects on the health and nutritional status of the mother, the course and outcome of pregnancy and the birth weight of the offspring.

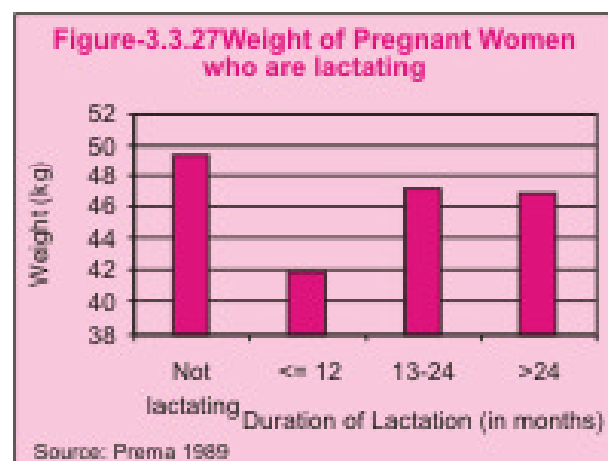
3.3.58 Both the ICMR and the WHO Expert Groups recommended additional intake for pregnant and lactating women. The WHO had recommended an additional 300 kilo calories (Kcal) throughout pregnancy and 500 additional Kcal during the first year of lactation. The ICMR has recommended an additional intake of 300 Kcal during the second and third trimester of pregnancy, 550 Kcal during the first six months of lactation and 400 Kcal during 7- 12 months of lactation.



3.3.59 Epidemiological data from the developed and developing countries, however, indicate that there is no increase in dietary intake during pregnancy and lactation among habitually well-nourished women who eat to appetite. This did not have any adverse effect either on their own nutritional status or on the course and outcome of pregnancy. Studies undertaken during the 1980s have shown that there are adaptive changes during pregnancy. There is a reduction in BMR and physical activity and there might be some improvement in the as yet unmeasured efficiency of energy utilisation. The energy and nutrients saved due to these adaptive processes are sufficient to meet the increased requirements for nutrients during pregnancy. So long as there is no reduction in the habitual dietary intake, there is no deterioration in the maternal nutritional status either during pregnancy or during lactation. In well-nourished individuals, additional intake during pregnancy and lactation results in excessive weight gain and this may lead to obesity.

3.3.60 However, there are limits to adaptations. Studies from developing countries have shown that reduction in dietary intake below habitual levels and increased workload above the habitual levels are associated with deterioration in maternal nutritional status and reduction in birth weight. Some such readily identifiable situations are:

- ☒ reduction in habitual dietary intake during drought and the pre-harvest season;
- ☒ increase in work (Figure 3.3.26) e.g., newly inducted manual laborers;
- ☒ combination of both the above (food for work programmes);



- ☒ adolescent pregnancy;
- ☒ pregnancy in a lactating woman (Figure 3.3.27); and
- ☒ pregnancy occurring within two years after last delivery.

3.3.61 Research studies in India and elsewhere have shown if pregnant women in whom there has been a reduction in habitual dietary intake or excess energy expenditure or whose body weight is less than 40 kg are identified and given adequate continuous food supplementation and antenatal care there is substantial improvement in outcome of pregnancy, birth weight and neonatal mortality. Encouraged by such data, almost all developing countries embarked on food supplementation programmes for pregnant and lactating women. None of these programmes screen pregnant women or provide supplements only to those with energy gap or those with moderate/severe undernutrition. When food supplements are provided without screening, targeting supplementation and monitoring the programme, the improvement in maternal nutrition, and birth weight, if any, is very limited.

3.3.62 One of the major problems is to reach food supplements to the under-nourished women. Even when the logistics of reaching the food to women is meticulously worked out and efficiently carried out, food sharing patterns within the family results in the 'target' women not getting the supplements in significant quantities. Obviously this is one of the factors responsible for the demonstrated lack of beneficial effect. The lack of adequate antenatal care and continued physical work during pregnancy are two other factors responsible for the lack of impact.

3.3.63 Under the ICDS programme, food supplements are being provided to pregnant and lactating women who come to anganwadis. The reported coverage is between 15 and 20 per cent in most blocks. The women who receive supplements are not being chosen on the basis of their nutritional status and may not be the most needy ones. There has not been any evaluation studies on this component of the ICDS. However, data from nutrition surveys indicate that there has

not been any significant decline in maternal under-nutrition over the last decade.

3.3.64 **During the Tenth Plan** efforts will be made to weigh all women as early in pregnancy as possible and to monitor their weight gain. Well-nourished women will be advised not to increase their dietary intake to prevent over nutrition and obesity. Women who weigh less than 40 kg will be identified and

- ☒ given food supplements consistently throughout pregnancy;
- ☒ given adequate antenatal care;
- ☒ monitored for weight gain during pregnancy and, if weight gain is sub-optimal, identify the causes and attempt remedial measures; and
- ☒ given appropriate antenatal, intrapartum and postpartum care.

3.3.65 Effective intersectoral coordination between ANMs and anganwadi workers will enable the identification of and provision of appropriate care to undernourished pregnant women. The PRIs can play an important role by ensuring that these women receive food supplement throughout pregnancy.

3.3.66 The methods by which food supplements can be provided to identified undernourished pregnant and lactating women may vary. In some cases the food may be provided at the work site. In yet other cases, it might be possible to link antenatal care and the provision of free food-grains for pregnant and lactating women on lines similar to the Mid-day-meals scheme to increase enrolment. With the empowerment of the PRIs and nagar palikas, it might be possible to monitor these programmes at the local level and consequently achieve better coverage. If well-targeted intervention to identify undernourished women and provide them health and nutrition education and ante-natal care are implemented effectively, there can be substantial reduction in severe under-nutrition in pregnant women and low birth weight. The feasibility, utilisation, cost and impact of such well-directed, innovative strategies involving close local monitoring need to be assessed.

## Maternal Nutrition and Birth Weight

**Table-3.3.7 Birth Weight and Socio-economic Status**

|                  | Poor Income | Middle Income | High Income |
|------------------|-------------|---------------|-------------|
| Age (years)      | 24.1        | 24.3          | 27.8        |
| Parity           | 2.41        | 1.96          | 1.61        |
| Height (cm)      | 151.5       | 154.2         | 156.3       |
| Weight (kg)      | 45.7        | 49.9          | 56.2        |
| Hb (g/dl)        | 10.9        | 11.1          | 12.4        |
| Birh weight (kg) | 2.70        | 2.90          | 3.13        |

Source : Prema 1987

3.3.67 It is estimated that one-third of Indian neonates weigh less than 2.5 kg at birth. There are substantial differences in the maternal body weight and birth weight between income groups, which are partly due to differences in the nutritional status and partly due to differences in health care (Table-3.3.7). Efforts to improve these through appropriate health and nutrition interventions are dealt with in the section under Family Welfare. A majority of deliveries occur at home. Identification of infants weighing less than 2.2 kg and referring them to hospitals where a paediatrician is available will substantially reduce neonatal mortality.

3.3.68 During the Tenth Plan, efforts will be made to ensure that the anganwadi workers report all births in the village, weigh all neonates delivered at home soon after birth and refer those weighing less than 2.2 kg to a hospital with a pediatrician. This will enable development of referral services, reduce neonatal mortality and generate nation-wide data on birth weight and prevalence of low birth weight.

### Growth During Infancy

3.3.69 Energy requirements during infancy are very high because this is one of the periods of very rapid growth. The energy cost of growth in infants and children include two components: the energy value for the tissue and the energy cost of synthesising the tissue. This has to be taken into account along with the basal energy

needs and energy needs for activity in infants and children. Available data suggest that energy needs are highest during the first three months and then fall over the next six months when the growth rates are lower. It rises again after nine months as the child becomes physically more active. The RDA for infants drawn up both by WHO and by ICMR takes this phenomenon into account (Tables 3.3.8 and 3.3.9).

3.3.70 Growth during infancy and childhood depend upon birth weight, adequacy of infant

**Table-3.3.8 RDA of infants and children**

|             | Energy (kcal) | weight(kg) |
|-------------|---------------|------------|
| 3-6 months  | 700           | 7          |
| 6-9 months  | 810           | 8.5        |
| 9-12 months | 950           | 9.5        |

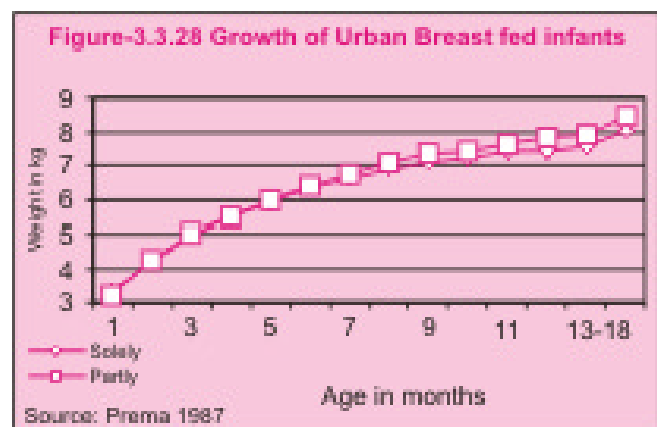
Source : WHO/FAO/UNO - 1985

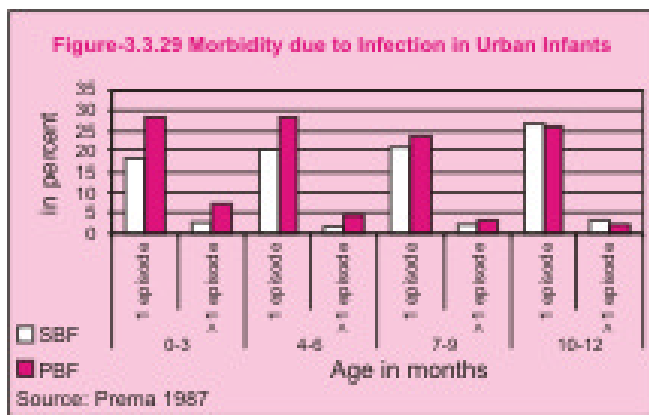
**Table-3.3.9 RDA of infants and children**

|             | Energy(kcal) | weight(kg) |
|-------------|--------------|------------|
| <6 months   | 583          | 5.4        |
| 6-12 months | 844          | 8.6        |

Source : ICMR - 1988

feeding and absence of infection. Available data clearly indicate that in India exclusively breast-fed infants thrive normally during the first six months of life (Figure 3.3.28) and have lower morbidity episodes than those receiving supplements in addition to breast milk (Figure-3.3.29). In view of this, promotion of universal exclusive breast-feeding for the first six months



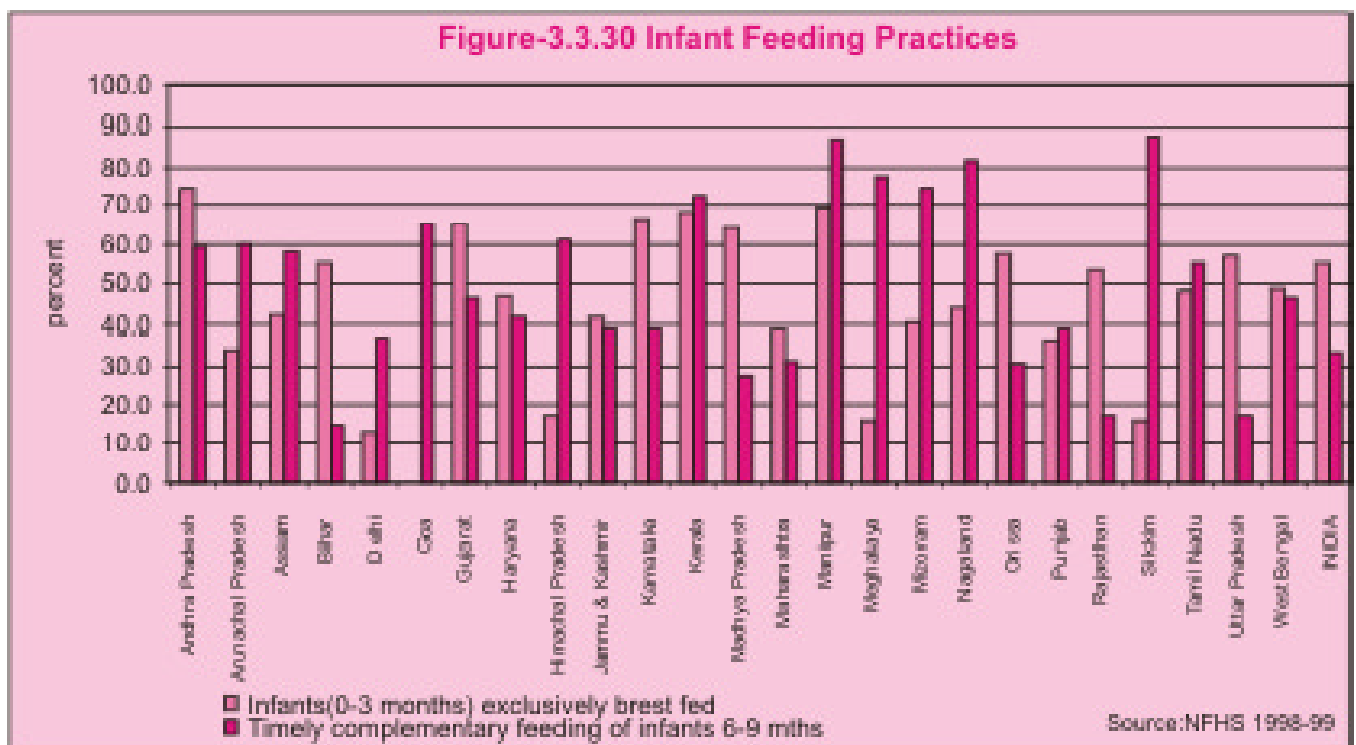


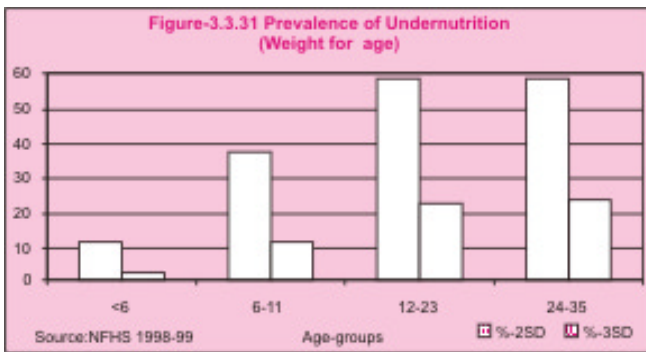
of life has been the national policy. Breast milk alone is insufficient to meet the growing baby's needs after six months and appropriate semi-solid complementary foods have to be introduced to enable them to meet their nutrient needs. Care should be taken to reduce the chances of infection by providing freshly prepared food.

3.3.71 In India, steps taken for the protection and promotion of the practice of breast-feeding have been effective and breast feeding is almost universal. However, the message that exclusive breast feeding up to six months and gradual introduction of semisolids after that are critical for the prevention of

under-nutrition in infancy has not been as effectively communicated. Data from NFHS-2 indicated that exclusive breast-feeding among infants in the age group of 0-3 months was only 55.2 percent. In spite of the emphasis on the need for timely introduction of complementary food only 33.5 per cent of the infants in the age group of 6-9 months received breast milk and semi- solid food.

3.3.72 There are substantial inter-state differences in exclusive breast feeding and timely introduction of semi-solid food (Figure 3.3.30). While Andhra Pradesh and Kerala fare well in terms of appropriate infant feeding practices, the too early introduction of supplements is a major problem in states like Delhi, Himachal Pradesh and Punjab and too late introduction of supplements is a big problem in Bihar, Uttar Pradesh, Madhya Pradesh, Rajasthan, and Orissa. Both these practices are associated with increased risk of under-nutrition and infection. As a result of these faulty infant feeding habits, there is a steep increase in the prevalence of under-nutrition from 11.9 per cent at less than 6 months to 58.5 per cent in the 12- 23 months age group (Figure 3.3.31). Correction of these faulty infant feeding practices through nutrition education will prevent the steep increase in under-nutrition in the 6-24 months age group.





### During the Tenth Plan the major focus will be on

- ☒ promotion of exclusive breast feeding in the first six months;
- ☒ nutrition education for the introduction of appropriate low-cost, energy dense complementary food at six months of age;
- ☒ three-monthly monitoring of weight in infancy and childhood; and
- ☒ detection of infants with faltering growth and initiating appropriate steps to improve their nutritional status.

3.3.73 Studies carried out at the NIN had shown that if roasted coarsely ground cereals, pulses and oil seeds mixture is provided to households free of cost, the mothers were willing and able to give this to young children three to four times a day; as a result there was improvement in timely introduction of complementary food. In an effort to find out if this could be replicated at the national level, Additional Central Assistance is being given since 2000-01 under the nutrition component of PMGY

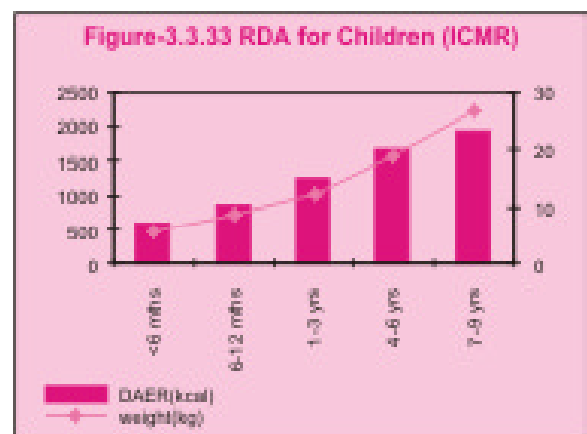
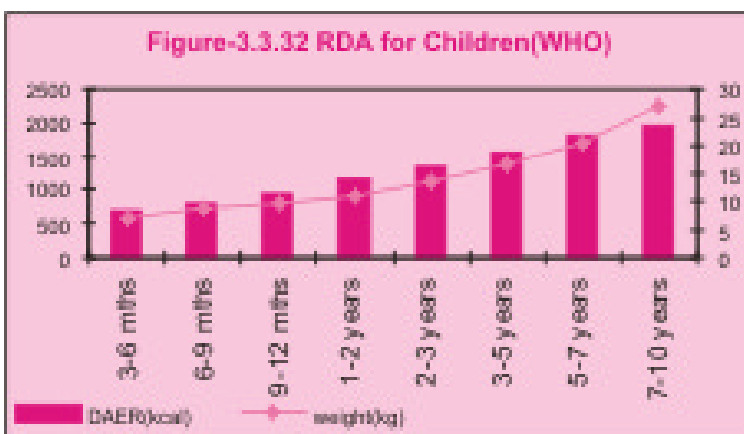
to provide such a mixture once a week to BPL families totally free of cost. The progress and impact of this will be assessed during the Tenth Plan period.

### The goals for the Tenth Plan are to

- ☒ enhance early initiation of breast-feeding (colostrum feeding) from the current level of 15.8 per cent (as per NFHS 2) to 50 per cent;
- ☒ enhance the exclusive breast-feeding rate for children up to the age of six months from the current rate of 55.2 per cent (as per NFHS 2) to 80 per cent; and
- ☒ enhance the complementary feeding rate at six months from the current level of 33.5 percent (as per NFHS 2) to 75 per cent.

### Growth During Childhood

3.3.74 The WHO/FAO/ UNU and the ICMR Expert Committee took note of the fact that Indian children are smaller at birth, infancy, childhood and adolescence but suggested that it is desirable that the growth potential of children should be fully expressed and that the estimates of energy and protein requirement should allow for this (Figures 3.3.32 and 3.3.33). However, as the normal Indian children are smaller and they weigh less, the actual energy requirements may be substantially lower. It is a matter of concern that even this small amount is not fully met. Low dietary intake is associated with short and long term metabolic, biological, genetic, social and behavioural adaptations. Reduction in physical activity could be behavioural



adaptation in children to low energy intake. While this could be considered as a protective adaptation to ensure continuing growth, it may impair the child's curiosity, exploration or play and hence have adverse consequences on intellectual and social development. Research studies are needed to define adaptation to low dietary intake and its functional consequences .

3.3.75 Even though, Indian children have lower birth weight, dietary intake, growth trajectories and body size than their counterparts from developed countries, those with mild under-nutrition do not have any major functional or intellectual impairment. However, those with severe under-nutrition incur health hazards such as increased susceptibility to infections. The vicious self-perpetuating cycle of under-nutrition rendering them susceptible to infection and infections aggravating under-nutrition can at times result in death. Efforts are, therefore, directed towards screening all under five children for under-nutrition and initiating appropriate health and nutrition intervention to combat adverse health consequences of under-nutrition.

### Catch up growth in children

3.3.76 In order to enable children with under-nutrition to 'catch up' with those who are well-nourished, it is essential to provide them with additional food and excellent health care. Quantitative estimates of the dietary requirements for catch up growth in children are very difficult because the targeted body weight in a growing child is not fixed but increases with time; the longer the

period of rehabilitation, the greater is the gap to be filled. Milder form of CED of short duration in a child leads to low weight (wasting) but does not affect the height. This can be easily corrected with adequate dietary intake. More severe or prolonged CED can result in stunting and wasting. Adequate dietary intake at this stage may reverse wasting but the child may not be able to catch up with the deficit in height. The relative contributions of these two factors and their severity will vary in different communities. It is impossible to make generalisations about the amounts of additional energy and protein needed for catch up growth in children who have become under-nourished as a result of prolonged inadequate dietary intake. Clinical monitoring is critical to achieve optimal results.

3.3.77 Diets consumed by Indians from low-income group families are predominantly cereal-based, have low fat content and are not energy dense; young children share the food from the family pot. Infants and young children require more energy per kg weight than adults but they have a relatively small stomach capacity. As a result, unlike adults who, with their larger stomach capacity, can readily meet their energy needs through the cereal pulse diet taken as three meals, the children have problems in meeting their energy needs unless fed five to six times a day (Table 3.3.10). It is, therefore, imperative that nutrition education should clearly focus on the need to ensure that children are fed more often - at least once in four hours - so that their nutritional needs are met from even this type of food. Wherever feasible, efforts may be made to

**Table-3.3.10 Energy intake in relation to stomach capacity and total volume of diet**

| Group  | Body weight (kg) | Energy requirement Kcal/d | Observed energy intake Kcal/d | Total volume of diet (ml) | Stomach capacity (ml) |
|--|------------------|---------------------------|-------------------------------|---------------------------|-----------------------|
| <b>Pre-school children</b>                   |                  |                           |                               |                           |                       |
| Urban middle income                          | 12.4             | 1,240                     | 1,346                         | 1301                      | 245 <sup>a</sup>      |
| Urban low middle income                      | 12.4             | 1,240                     | 1,115                         | 975                       | 245 <sup>a</sup>      |
| Rural poor                                   | 9.9              | 1,240                     | 714                           | 1015                      | 203 <sup>a</sup>      |
| <b>Rural adult male (moderate activity)</b>  | 52               | 2,664                     | 2,418                         | 3565                      | 1040 <sup>b</sup>     |
| a : Stomach capacity 20.4 ml/kg; b: 20 ml/kg |                  |                           |                               |                           |                       |

**Source** : Dr.B.S.Narasinga Rao - Gopalan Oration, 2001



increase the energy density of the food provided to them by adding sugar/jaggery and oil seeds/oil to their food. Because of the low stomach volume, pre-school children can consume a cereal-pulse mix providing only about 150-200 calories in one meal. This has to be kept in mind when food supplementation programmes are planned for these children. Food supplements aimed at providing adequate nutrients needed for catch up growth in undernourished children must compromise energy-dense food and these have to be fed at least once in four to five hours to the child daily. It is not possible to provide the needed amount of food for catch up growth in undernourished children through on-the-spot feeding at anganwadis.

### Health - Nutrition Interactions

3.3.78 Dietary intake is a critical, but not the sole, determinant of the nutritional status of the population. Low birth weight, poor infant feeding practices, infections due to poor sanitation, lack of safe drinking water and poor access to health care are other major factors responsible for under-nutrition. In spite of low dietary intake, the prevalence of severe under-nutrition and under-five mortality is lower in Kerala because of more equitable distribution of food between income groups and within families and better access to and utilisation of health care facilities. However, in Uttar Pradesh, Madhya Pradesh and Orissa, under-nutrition and under-five mortality rates are higher, in spite of higher average dietary intake, because of the lack of equitable distribution of food and access to health care. Identification and appropriate nutrition and health interventions among 'at risk' groups and under-nourished children are essential for optimal results. Equally important are interventions from related sectors to provide safe drinking water and improve environmental sanitation so that morbidity due to infections is reduced. In spite of high per capita income, dietary intake and access to health care, both under-nutrition and infant mortality rates (IMR) are relatively high in Punjab. It is imperative that health and nutrition programmes are co-ordinated to achieve optimal synergy between the two interventions so that there is improvement in the nutritional and health status in all states.

### Nutrition-Fertility Interactions

3.3.79 The association between low birth weight, under-nutrition during infancy and childhood and high infant mortality on the one hand and high parity and low inter birth intervals on the other have been well documented by research studies. Currently, birth order of three or more form over 50 per cent of all births in Uttar Pradesh, Madhya Pradesh and Bihar. In Kerala and Tamil Nadu, birth order of three or more constitute less than 30 percent of all births. Efforts to meet all unmet needs for contraception in the poorly performing states in order to reduce the high order of births would indirectly have a beneficial effect on child nutritional status, especially in terms of reduction in severe grades of undernutrition. Coordination between ICDS and health functionaries to achieve optimal synergy between the interventions is critical for improving the nutritional and health status of women.

3.3.80 In the last two decades, there have been reports on the health status and growth performance of Indian children from the low-income group who have been adopted and grew up without nutritional constraints during childhood. Data from these studies suggest that these children have a substantially higher prevalence of obesity during childhood, adolescence and in adult life. Girls have higher body weight and body fat and, compared to their counterparts, attain menarche one or two years earlier. This, in turn, may result in their being shorter than their counterparts as skeletal growth ceases after menarche. In view of the changing dietary habits and life styles and the increase in obesity, research studies may have to be taken up to document the growth pattern of Indian children living not only under nutritional constraints but also among affluent groups and their impact on adult stature and reproductive function.

### Time Trends in the Dietary Intake and Nutritional Status of Pre-School Children

3.3.81 Pre-school children constitute one of the most nutritionally vulnerable segment of the population and their nutritional status is considered to be a sensitive indicator of community health and nutrition. There has not

**Table-3.3.11 Average Nutrient Intakes Among Pre-school Children**

|                 | 1-3 years |         |         | 4-6 years |         |         |
|-----------------|-----------|---------|---------|-----------|---------|---------|
|                 | 1975-79   | 1988-90 | 1996-97 | 1975-79   | 1988-90 | 1996-97 |
| Protein (g)     | 22.8      | 23.7    | 20.9    | 30.2      | 33.9    | 31.2    |
| Energy (Kcal)   | 834       | 908     | 807     | 1118      | 1260    | 1213    |
| Vitamin A (mg)  | 136       | 117     | 133     | 159       | 153     | 205     |
| Thiamin(mg)     | 0.50      | 0.52    | 0.40    | 0.76      | 0.83    | 0.70    |
| Riboflavin (mg) | 0.38      | 0.37    | 0.40    | 0.48      | 0.52    | 0.60    |
| Niacin (mg)     | 5.08      | 5.56    | 4.60    | 7.09      | 8.40    | 7.40    |
| Vitamin C (mg)  | 15        | 14      | 15      | 20        | 23      | 25      |

Source: NNMB (1999)

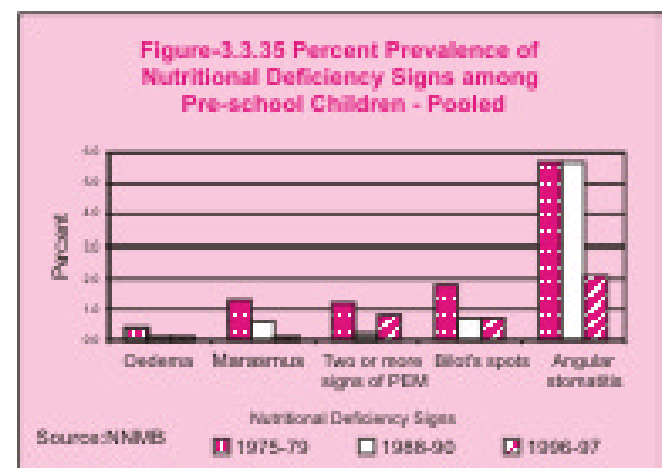
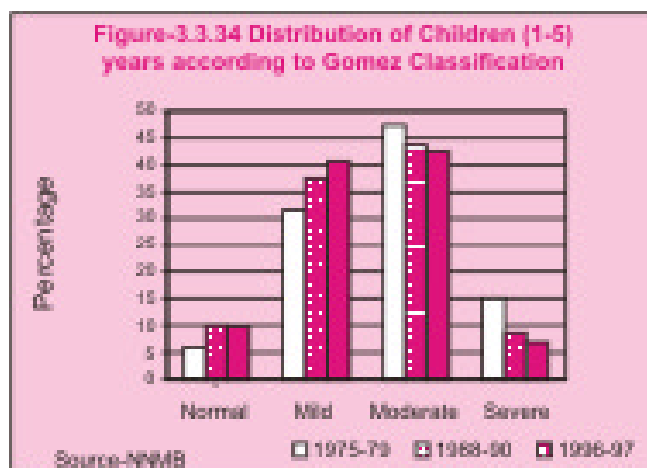
been a substantial improvement in their energy intake over the last two decades (Table 3.3.11). However, there has been a reduction in moderate and severe under-nutrition (Figure-3.3.34). Though there has not been any improvement in micronutrient intake over the years, there has been a substantial decline in the prevalence of nutritional deficiency signs (Figure-3.3.35). This is, perhaps, because of the better access to health care and effective treatment of infections. The decline in fertility and reduction in the higher order births may also have contributed to this because prevalence of severe forms of under-nutrition is higher among higher order births.

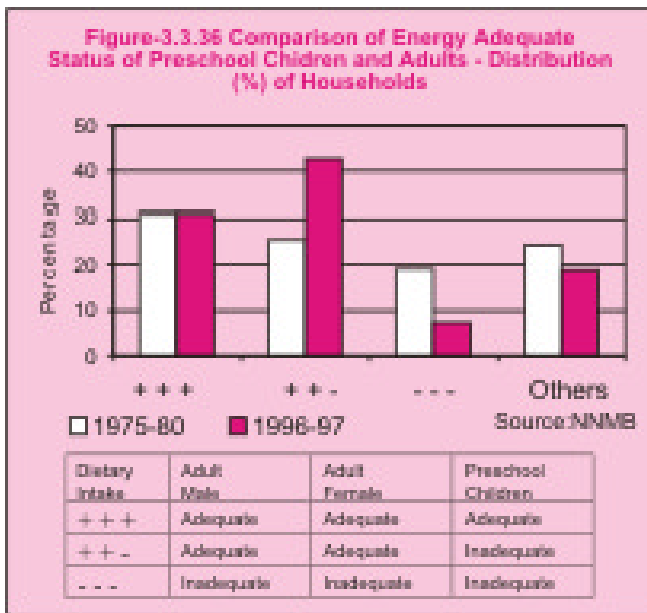
### Intra-familial Distribution of Food

3.3.82 It is widely believed that in India, especially among the rural poor, food distribution is not based on 'need'. The breadwinner gets sufficient food, the children get the next share and the women take the remains. In times of

scarcity, the dietary intake of women and children are likely to be most adversely affected. Several small studies in different states have reported that intra-familial distribution of food follows this traditional pattern even today.

3.3.83 However, this may not be applicable to all states and all strata of society. Analysis of data from diet surveys carried out by the NNMB in 1975-79 and in 1996-97 using the 24 hours dietary recall method is shown in Figure 3.3.36. Data from the repeat survey showed that there has been reduction in the proportion of families where both adults and pre-school children were having inadequate food intake. However, it is a matter of concern that the proportion of families where the dietary intake of adults is adequate but that of pre-school children is inadequate has nearly doubled. Nutrition and health education on child-feeding and child-rearing practices are of paramount importance in improving the dietary intake and nutritional status of children through appropriate intra-familial distribution of food.





### Programme for Improving Nutritional Status of Pre-school Children

3.3.84 The ICDS scheme was initiated in 1975 with the following objectives:-

- ☒ to improve the health and nutrition status of children in the 0-6 age group by providing supplementary food and coordinating with state health departments to ensure the delivery of the required health inputs;
- ☒ to provide conditions necessary for pre-school children's psychological and social development through early stimulation and education;
- ☒ to provide pregnant and lactating women with food supplements;
- ☒ to enhance the mother's ability to provide proper child care through health and nutrition education;
- ☒ to achieve effective coordination of policy and implementation among the various departments to promote child development.

3.3.85 The initial geographic focus of ICDS was on drought-prone areas and blocks with a significant

proportion of scheduled caste and scheduled tribe population. In 1975, 33 blocks were covered under ICDS. Over the last two decades the ICDS coverage has progressively increased. The nutrition component of the ICDS aims at providing food supplements to pre-school children between the age of six months to six years, pregnant and lactating mothers and adolescent girls (in some selected blocks). The type of food supplements in the ICDS programme varies widely, from ready-to-eat food to the supply of supplements cooked in the anganwadi.

3.3.86 The emphasis was initially on providing cooked food through on-the-spot feeding in the anganwadi because it was believed that

- ☒ this would ensure that the targeted child would get food supplements, which would not be shared between other members of the family; and
- ☒ the anganwadi centres would provide practical nutrition education to women on cooking and feeding young children.

3.3.87 However, the on-the-spot cooked food feeding programme has several disadvantages as well. They are:

- ☒ children especially those in the age group of 6-36 months cannot consume the entire amount of food provided because of a smaller stomach capacity;
- ☒ even if older children do eat the food provided in the anganwadis, this acts mainly as a substitute, and not an addition, to home food;
- ☒ the most needy segments viz., children in the critical 6-36 month age group and women, may not be able to come to the anganwadis duty and receive the food;
- ☒ providing food supplements only to the children from BPL families or those with under-nutrition is not possible as it may be difficult to feed one child and withhold food from another in the same anganwadi;

- ☒ cooking food, feeding the children and cleaning the vessels and the anganwadi take up most of the time of the anganwadi workers and helpers, leaving them little time for other important activities such as growth monitoring, nutrition education, or pre-school education;
- ☒ in any mass cooking and feeding programme, the monotony of the food provided and relatively poor quality of the preparations is a problem;
- ☒ cooking in poor hygienic conditions and keeping left-over food may result in bacterial contamination of food;
- ☒ under-nourished children, even those in the 3-6 year age group, if given double rations, cannot consume all the food at one sitting in the anganwadi.

### Evaluation of the Nutrition Component of ICDS

3.3.88 The nutrition component of the programme was evaluated by the Nutrition Foundation of India (NFI), Delhi, National Institute of Public Cooperation and Child Development (NIPCCD), Delhi, and the National Council of Applied Economic Research (NCAER), Delhi. In addition, there have been several small-scale evaluations.

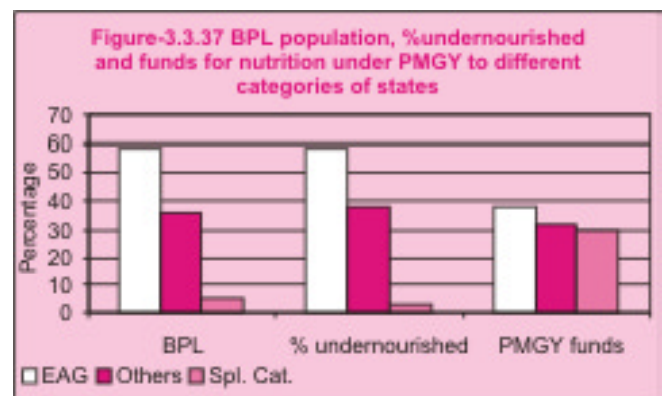
3.3.89 There were major reviews of the nutrition sector and ICDS programme by the World Bank and the Government of India in 1997 and 2001. The findings showed:

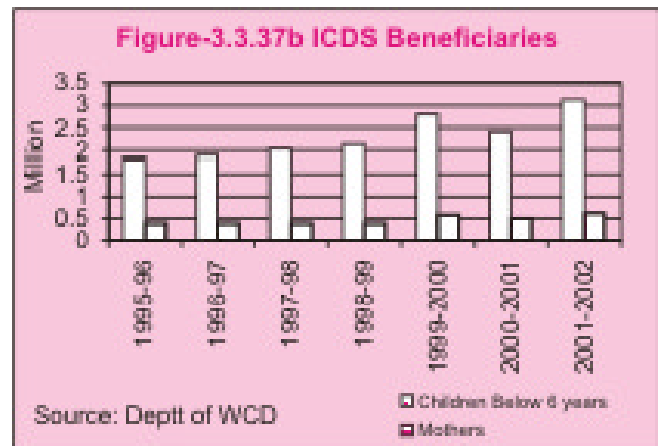
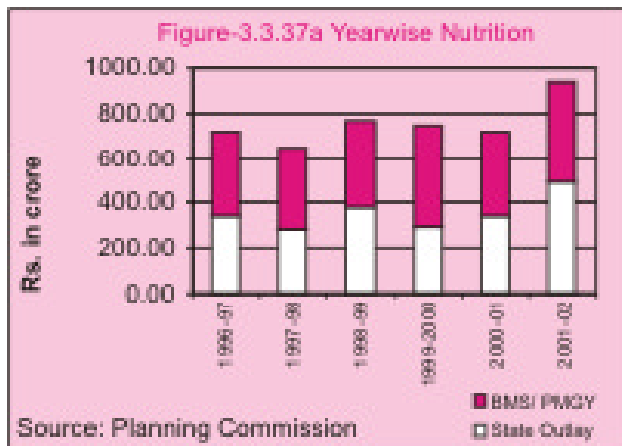
- ☒ ICDS services were much in demand but there are problems in delivery, quality and coordination;
- ☒ the programme might be improving food security at the household level, but does not effectively address the issue of prevention, detection and management of the under-nourished child/mother;
- ☒ children in the 6-36 months age group and pregnant and lactating women do not come to the anganwadi and do not get food supplements;

- ☒ available food is shared between mostly children in the 3-5 years age group irrespective of their nutritional status;
- ☒ as there was no attempt in ensuring that all children are weighed, the children with severe CED could not be identified and offered double the rations as envisaged in the ICDS guidelines. As a result, there is very little focussed attention on the correction of under-nutrition, prevention and management of health problems associated with moderate and severe under-nutrition.
- ☒ child care and nutrition education of the mother is poor or non-existent.
- ☒ there were gaps in the training and knowledge of anganwadi workers. Also, supervision of the programme, community support and inter-sectoral coordination was poor.

### Nutrition Component of PMGY

3.3.90 Under Pradhan Mantri Gramodhaya Yojna 15% funds are earmarked for Nutrition Component. As the funding for PMGY is through the Gadgil-Mukherjee formula, the populous poor states with high under-nutrition rates do not get sufficient funds (Figure 3.3.37). The Department of Women and Child Development implemented the nutrition component of the programme providing take-home food supplements to children in the 6-36 months age group in the first two years viz., 2000-01 and 2001-02. From 1st April 2002, the Planning Commission has taken over its implementation. Some of the available data indicate that in many states:





- ☒ there was difficulty in procuring locally available take-home food supplements;
- ☒ relatively expensive ready-to-eat food, and not cereal-pulse-oilseed mix was provided;
- ☒ the funds provided under the nutrition component of PMGY were not treated as an additionality but were substituted for state's own Plan funds for nutrition (Figure 3.3.37a);
- ☒ there has not been any substantial improvement in the enrolment of children (Figure 3.3.37b).

3.3.91 The guidelines laid down for the nutrition component of PMGY emphasise that all infants and children should be weighed at least once in three months to detect those who are under-nourished so that health and nutrition interventions could be undertaken. Even though growth monitoring is an essential component of ICDS, this actually has not been operationalised. During the Tenth Plan, the physical and financial evaluation and the impact of the programme on infant feeding practices or infant nutritional status will be taken up.

### ICDS During the Tenth Plan

3.3.92 During the Tenth Plan, every effort will be made to strengthen India's commitment and institutional capacity to combat under-nutrition in pre-school children and pregnant and lactating women. The nutrition component of ICDS will be specifically directed to achieve reduction in both micro and macro-nutrient under-nutrition. The focus will be on:

- ☒ strengthening the nutrition and health education component so that there is appropriate intra-familial distribution of food based on needs;
- ☒ reaching children in the 6-36 months age group, pregnant and lactating women;
- ☒ weighing all vulnerable population, identify those with CED and provide integrated health and nutritional support so that they recover within the next three months;
- ☒ ensuring universal screening of all children at least once a quarter to identify those children with growth faltering;
- ☒ focusing health and nutrition intervention (by providing take-home supplements) to ensure that children in Grades III and IV under-nutrition are in Grade II by the next quarter;
- ☒ looking for and treating health problems associated with severe under-nutrition;
- ☒ enhancing the quality and impact of ICDS substantially through training, supervision of the ICDS personnel and improved community ownership of the programme;
- ☒ concentrating on the improvement of the quality of care and inter-sectoral coordination and strengthening nutrition action by the health sector;
- ☒ creating nutrition awareness through IEC at all levels (community, women's group, village-

level workers, PRIs, programme managers and policy makers at the state and central levels);

- ☒ establishing a reliable monitoring and evaluation mechanism

3.3.93 There is a shift in focus from providing cooked food at anganwadis to take-home food supplementation (under the PMGY and the pilot project providing food-grains to under-nourished pregnant and lactating women and adolescent girls). Undoubtedly, the take-home food supplements provided will be shared with the family, but that would add to household food security. When coupled with nutrition education, the under-nourished persons may get their due share. Nutritional education and careful monitoring of weight of the under-nourished individual will go a long way in ensuring that the person does get her due share. This shift may free the anganwadi workers and helpers from the time-consuming task of cooking and cleaning, giving them time for their other designated tasks for child development.

3.3.94 During the Tenth Plan, inter-sectoral linkages between the health and the ICDS programmes will be strengthened. The Health sector will :

- ☒ invest in upgrading the nutritional knowledge and skills of all health care workers;
- ☒ focus on the management of health problems in moderately and severely under-nourished children; and
- ☒ train health and anganwadi workers so that they provide nutrition and health education on

feeding of infants and young children and nutrition counseling to parents with sick children.

3.3.95 Simultaneously, efforts will be made to build up institution capacity for strengthening

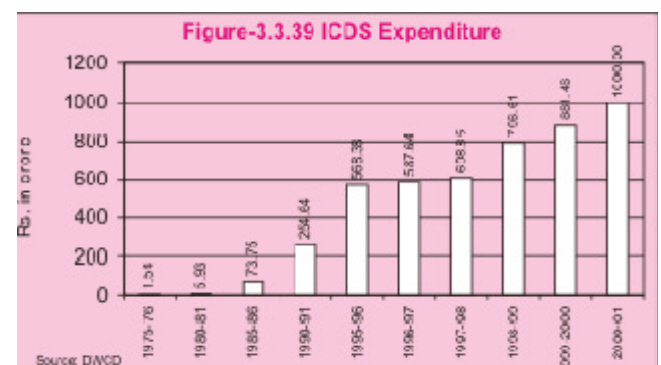
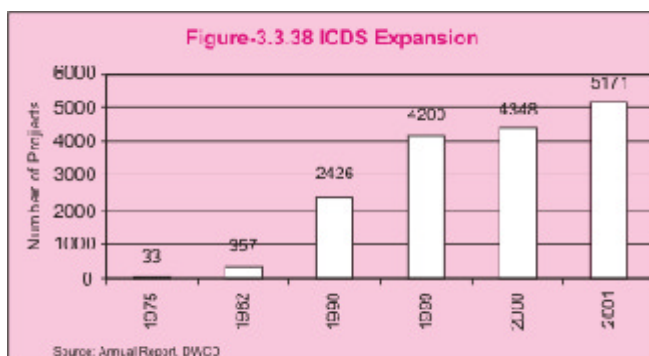
- ☒ advocacy for nutrition among policy makers, programme implementers, women's groups, PRIs etc;
- ☒ country's capacity for nutrition action, training and research; and
- ☒ the network of medical colleges, home science colleges, centres undertaking nutrition monitoring and nutrition education.

3.3.96 Priority areas for research in nutrition during the Tenth Plan will include:

- ☒ operational research to identify and eliminate constraints in the ongoing programme; and
- ☒ analysis of nutrition needs at the local level and tailoring ongoing nutritional interventions to meet these needs.

### Funding of the Nutrition Component of the ICDS Programme

3.3.97 The ICDS programme is a centrally sponsored one in which the Centre bears the cost of maintaining the infrastructure, while the states bear the expenditure on the food component. The programme has expanded (Figure 3.3.38) and central expenditure on the scheme has increased from Rs.1.54 crore in 1975-76 to Rs. 1,000 crore in



2000-2001 (Figure-3.3.39). With the increase in coverage, there is an increasing need for funds for the food supplements as well. Though the central expenditure has increased over the years, there has been no corresponding increase in the states' own plan expenditure on food supplements (Figure-3.3.37a).

### Expenditure on Nutrition - World Bank's Computation

3.3.99 The World Bank computed the information on expenditure relating to nutrition in 12 major states (Table 3.3.12). In addition to ICDS, some states have supplementary feeding programmes, like the Mid-day meals programme in Tamil Nadu. States' expenditure on supplementary nutrition does not have any correlation with level of under-nutrition or state domestic product. States with a higher prevalence of under-nutrition are not investing higher amounts in food supplementation programmes. However, expenditure on supplementary nutrition is not the only critical determinant of the level of under-nutrition. Kerala, which is spending very little on supplementary

nutrition programmes, has the lowest under-nutrition rates, perhaps due to more equitable distribution of food and effective health care.

### Planning Commission's Review of Funding of Nutritional Component of ICDS:

3.3.100 The Planning Commission reviewed the current funding of the ICDS food supplementation programme. The funding requirements were calculated for different scenerios: on the basis of the ICDS norms (1999), for providing food supplements only to persons from BPL families, for providing food supplements to undernourished children and pregnant women or providing double the rations to children with severe under-nutrition. The total funds available for procuring food supplements i.e., state nutrition allocation under Plan and the PMGY nutrition outlays( Annexure 3.3.2) were taken into account while computing the gaps. Currently, in most states there are substantial gaps (Annexure 3.3.3) between the requirement and the actual funds provided. However there are other states where the funds provided are more than what is required. It is a matter of concern that

**Table-3.3.12 Nutrition spending in selected states, 1992-95**

| State          | Population below poverty line (%) | Severe and moderately malnourished children (%) | Net Annual state domestic product per capita (Rs.) | Nutrition spending as a % of state domestic product |         |         |
|----------------|-----------------------------------|---|--|---|---------|---------|
|                | 1993-94                           | 1992-93   | 1994-95  | 1992-93   | 1993-94 | 1994-95 |
| Andhra Pradesh | 23                                | 49  | 5,718  | 0.11  | 0.10    | 0.10    |
| Assam          | 41                                | 50  | 4,973  | 0.11  | 0.12    | 0.17    |
| Gujarat        | 24                                | 50  | 8,164  | 0.31  | 0.31    | 0.29    |
| Haryana        | 25                                | 38  | 9,037  | 0.17  | 0.17    | 0.16    |
| Karnataka      | 33                                | 54  | 6,315  | 0.08  | 0.08    | 0.10    |
| Kerala         | 25                                | 29  | 5,768  | 0.10  | 0.09    | 0.12    |
| Madhya Pr.     | 43                                | 57  | 4,544  | 0.20  | 0.16    | 0.18    |
| Maharashtra    | 37                                | 54  | 9,806  | 0.08  | 0.08    | 0.08    |
| Orissa         | 49                                | 53  | 4,114  | 0.32  | 0.33    | 0.36    |
| Rajasthan      | 27                                | 42  | 5,257  | 0.09  | 0.12    | 0.13    |
| Tamil Nadu     | 35                                | 48  | 6,670  | 0.62  | 0.53    | 0.58    |
| West Bengal    | 36                                | 57  | 5,541  | 0.07  | 0.08    | 0.08    |

**Note :** Nutrition spending figures include GOI and state government expenditures on ICDS, Mid-day meal Programme and other nutrition programmes

**Source :** India Wasting Away, World Bank (1999)

states like Bihar with high rates of poverty, under-nutrition and birth rates have substantial gaps. However states like Gujarat, Tamil Nadu and Delhi are spending more than the required minimum amount. In spite of this, the nutritional status of children in these states is not better than the national average. It would, therefore, appear that while funding constraints is a problem in some states, effective implementation may be the bottleneck in other states. The critical role of the family in ensuring intra-familial food distribution based on needs to prevent under-nutrition cannot be overestimated.

3.3.101 During the Tenth Plan efforts will be made to:

- ☒ persuade states to provide more funds;
- ☒ optimally utilize funds provided under PMGY;
- ☒ improve targeting by providing available food on a priority basis to those with under-nutrition;
- ☒ improve health care for under-nourished children; and
- ☒ monitor children / women with severe grades of undernutrition who are receiving food supplementation and assess improvement in their nutritional status.

3.3.102 Given the current financial constraints, States may find it difficult to increase the amount of funds currently being allocated to the programme. However experience in Orissa has shown that even with the existing outlay it is possible to achieve significant reduction in severe grades of undernutrition by identifying the children with severe grades of undernutrition and ensuring that they get the required health and nutrition inputs. It is essential that appropriate guidelines for screening all children and identification of those with undernutrition and utilizing the available food supplements to fully meet the requirement of these children on priority basis are drawn up and agreed to by the centre, state, PRI and the community; the PRI and the community should play a major role in ensuring the effective implementation of the programme.

### Mid-day Meal Programme

3.3.103 The National Programme of Nutritional Support to Primary Education commonly known as Mid Day Meals Scheme was launched in August, 1995 as a 100% centrally funded Centrally Sponsored Scheme. The objective of the programme is to give a boost to universalisation of Primary Education by increasing enrolment, retention and attendance and simultaneously improving nutritional status of students in primary classes. This is discussed under the section on Education.

### MICRONUTRIENT DEFICIENCIES

3.3.104 Goitre due to iodine deficiency, blindness due to Vitamin A deficiency, dry and wet beriberi and pellagra were the major public health problems in pre-independent India. Sustained dietary changes resulted in the elimination of beriberi and pellagra. Kerato malacia due to severe Vitamin A deficiency is no longer a public health problem. However, there has not been any decline in the prevalence of anaemia due to iron and folic acid deficiency; the decline in Vitamin A deficiency and iodine deficiency disorders has been very slow.

3.3.105 The Tenth Plan envisages a paradigm shift from food security to nutrition security to meet the needs of the macro, micro and phyto nutrients through dietary diversification. There will be sustained efforts to reduce/eliminate micronutrient deficiencies including universal salt iodisation to eliminate Iodine Deficiency Disorders (IDD) and a multi-pronged strategy to reduce the prevalence of anaemia and associated health hazards.

### Anaemia

3.3.106 In India, the prevalence of anaemia is high because of

- ☒ low dietary intake, poor iron and folic acid intake;
- ☒ poor bio-availability of iron in phytate fibre-rich Indian diet; and
- ☒ infection such as malaria, hook worm infestations.



Anaemia due to deficiency of other micronutrients like copper, zinc, pyridoxine and Vitamin-B12 are rare in India. Studies conducted by the ICMR and NNMB show that the prevalence of anaemia is high among pregnant women (50-90 per cent) and children (50-70 per cent).

3.3.107 India was the first developing country to take up a National Nutritional Anaemia Prophylaxis Programme to prevent anaemia among pregnant women and children. Screening for anaemia and iron-folate therapy in appropriate doses and route of administration for the prevention and management of anaemia in these vulnerable groups have been incorporated as an essential component of antenatal care and paediatric practice. In spite of all these efforts anaemia continues to be a major problem affecting all segments of the population and there has not been any substantial decline in the adverse consequences of anaemia. A nationwide survey on anaemia using the cyanmethaemoglobin (Hb) method is currently under way and will provide data on the prevalence of anaemia in pre-school children, pregnant women and adolescent girls.

3.3.108 Pregnant women with Hb less than 8 g/dl show functional decompensation and constitute a high-risk group (Table 3.3.13). A single Hb estimation done around the twentieth week of

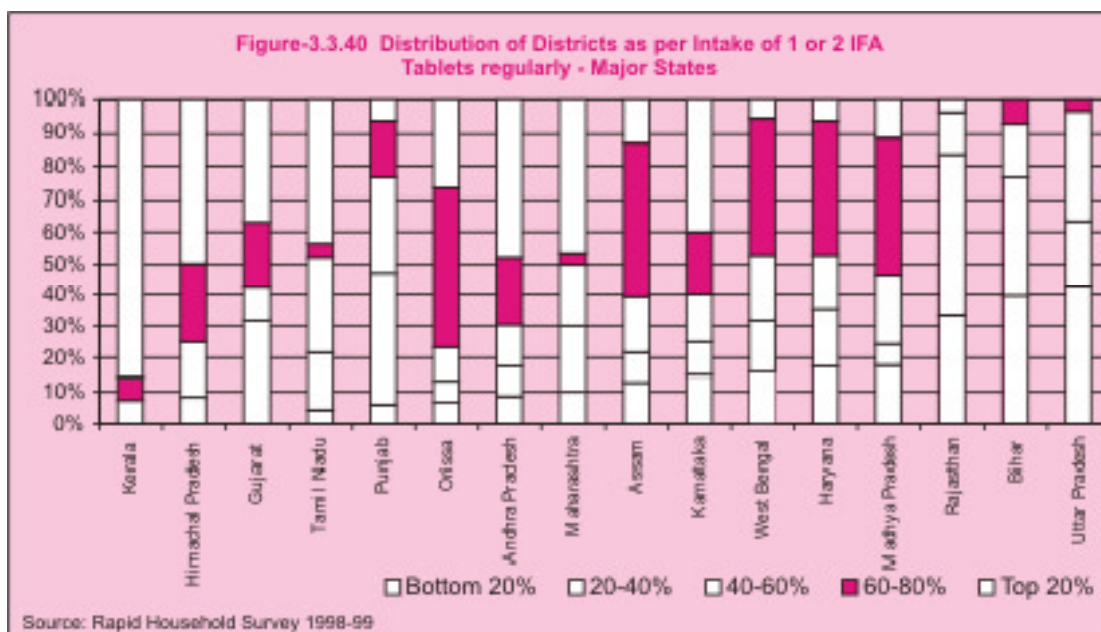
**Table-3.3.13 Effect of maternal haemoglobin level on birth weight and perinatal mortality**

|                                | Haemoglobin gm/decilitre (g/dl) |         |          |       |
|--------------------------------|---------------------------------|---------|----------|-------|
|                                | <5                              | 5 - 7.9 | 8 - 10.9 | >11.0 |
| Mean birth weight (g)          | 2,400                           | 2,530   | 2,660    | 2,710 |
| Perinatal mortality rate /1000 | 500                             | 174     | 76       | 55    |
| Number of observations         | 312                             | 362     | 1015     | 1456  |

Source: Prema et al, 1981

pregnancy is sufficient to detect the high-risk anaemic pregnant women. The RCH programme envisages screening all pregnant women for anaemia by Hb estimation utilising the ANM and laboratory technicians in the primary health centres so that anaemia in pregnancy could be detected and effectively treated. Unlike the situation elsewhere in the world, oral iron therapy is not effective in correction of moderate or severe anaemia in Indian pregnant women, within the short time available because of the poor bio-availability of iron in the Indian diet.

3.3.109 The Ninth Plan envisaged the prevention, detection and management of anaemia in pregnant women as a priority intervention but this has not yet been operationalised. Evaluation of the ongoing RCH programme by the Rapid Household Survey, Department of Family Welfare and NFHS-2 showed



that a majority of pregnant women are not screened for anaemia and their iron and folic acid tablet (IFA) intake is erratic. Poor quality and inadequate supply of IFA tablets, erratic distribution due to poor worker motivation and erratic intake by woman are some of the major problems which are responsible for anaemia among them. The recent efforts to improve packaging and availability of these IFA tablets has not yet had an impact on the regularity of intake (Figure-3.3.40). As a result very high rates of anaemia in pregnant women persist and the impact of severe anaemia on birth weight and maternal mortality remain unaltered.

### Anaemia in Childhood

3.3.110 The prevalence of anaemia in childhood is very high and contributes to poor scholastic performance and increased susceptibility to infection. In India, anaemia is caused by (a) inadequate intake of food (cereals and pulses) and vegetables rich in iron and folate; (b) poor bio-availability of iron; and (c) high incidence of hookworm infestation and incidence of malaria. Several investigators have taken up small-scale intervention studies to address each of these problems. These small research studies have proved the beneficial effect of these interventions. However, the larger programmes had very little impact. Pre-school children have been one of the target groups to receive IFA tablets under the National Nutritional Anaemia Prophylaxis Programme. But both access to and intake of IFA tablets by children have been very poor and there has been very little impact in terms of reduction in anaemia in childhood. Neither the RCH nor the school-based programmes have operationalised the programmes for detection and treatment of anaemia in children in the country. There are inter-state and perhaps inter-district variations in the prevalence of anaemia in children and the data from the RHS Survey is expected to provide information on this.

### Strategies for the Prevention, Detection and Management of Anaemia in the Tenth Plan

3.3.111 The major intervention strategies required for the prevention and management of anaemia are:

- ☒ improve dietary intake to meet RDA for all macro and micronutrients;
- ☒ dietary diversification-inclusion of iron folate rich foods as well as food items that promote iron absorption;
- ☒ food fortification, including introduction of iron and iodine-fortified salt and other iron-fortified items (e.g., atta in specific areas);
- ☒ health and nutrition education to improve over all dietary intakes and promote consumption of iron and folate-rich foodstuffs; and
- ☒ screening for early detection of anaemia among vulnerable groups (such as pregnant women).

3.3.112 Management of anaemia depends upon its severity and chronicity and the physiological status of the individual and the time available for correction of anaemia.

#### Infants:

- ☒ exclusive breast feeding for six months, and introduction of green leafy vegetables along with cereal/pulse/oilseed mix in the sixth month for the prevention of anaemia;
- ☒ screening for anaemia in pre-term, low birth weight infants and those with growth faltering and repeated episodes of infection; and
- ☒ appropriate treatment for anaemic infants.

#### Preschool children:

- ☒ advocacy with regard to dietary diversification for the prevention of anaemia;
- ☒ all growth retarded children and those with repeated infections should have Hb estimation carried out; and
- ☒ those found to be anaemic must be provided with appropriate treatment.

**School children:**

- ☒ Operational research needs to be done to
  - ☞ assess the feasibility of at least once-a-year screening for detection and correction of anaemia as a part of the school health check up; and
  - ☞ set up mechanism to cover out-of-school children among whom anaemia is likely to be more prevalent; efforts may have to be made to explore the mechanism for the prevention, detection and management of anaemia in this group.
- ☒ In hookworm endemic areas, it will be necessary to improve;
  - ☞ sanitation and educate people not to walk barefoot;
  - ☞ treat children with a history of passing worms with broad spectrum anti-helminthics; and
  - ☞ screen all anaemic children for hookworm infestation and treat them.

**Adolescents**

3.3.113 Wherever possible, (such as during school health check up) attempts should be made to screen adolescent girls, especially those who are undernourished or have menstrual problems, for anaemia and provide appropriate treatment. Adolescents who are pregnant should receive very high priority for screening and management of anaemia.

**Pregnant women**

3.3.114 The multi-pronged strategy for the control of anaemia in pregnancy include:

- ☒ fortification of common food items such as salt with iron to increase the dietary intake of iron and improve the haemoglobin status of the entire population, including girls and women prior to pregnancy;

- ☒ screening of all pregnant women for anaemia using a reliable method of haemoglobin estimation;
- ☒ oral iron folate prophylactic therapy for all non-anaemic pregnant women (with haemoglobin more than 11 g/dl);
- ☒ iron folate oral medication at the maximum tolerable dose throughout pregnancy for women with haemoglobin level between 8 and 11 g/dl;
- ☒ parenteral iron therapy for women with haemoglobin level between 5 and 8 g/dl if they do not have any obstetric or systemic complication;
- ☒ hospital admission and intensive personalised care for women with haemoglobin less than 5 g/dl;
- ☒ screening and effective management of obstetric and systemic problems in all anaemic pregnant women; and
- ☒ improvement in health care delivery systems and health education to the community to promote utilisation of available care.

**Elderly people**

- ☒ research studies to assess the magnitude of the problem; and
- ☒ mount an appropriate intervention programme based on the findings.

**Research and Development**

- ☒ evaluate the safety, efficacy, acceptability and cost effectiveness of double (iodine and iron) fortified salt so that decisions regarding universal double fortification of salt and its supply through TPDS system could be taken; and
- ☒ evaluate the safety, feasibility, efficacy and cost effectiveness of fortifying food items like atta with iron.

### Monitoring and Surveillance

3.3.115 Initiatives for monitoring the programme for preventing and controlling anaemia will include:

- ☒ strengthening routine reporting under the RCH programme to include percentage of pregnant women in whom haemoglobin estimation has been done, percentage anaemic, percentage given IFA tablets, compliance in IFA intake and the percentage given parenteral iron therapy; and
- ☒ requesting PRIs, Women's Self Help Groups and Anganwadi Worker's to monitor intake of IFA tablets.

3.3.116 Evaluation of the ongoing programmes through process and impact can be done as a part of the Rapid Household Surveys by including questions regarding haemoglobin estimation, IFA coverage and intake. In addition as and when large-scale surveys are done, information can be collected on the prevalence of anaemia in pregnancy, childhood, adolescents and the elderly so that it is possible to assess the impact of ongoing interventions.

#### Tenth Plan goals include:-

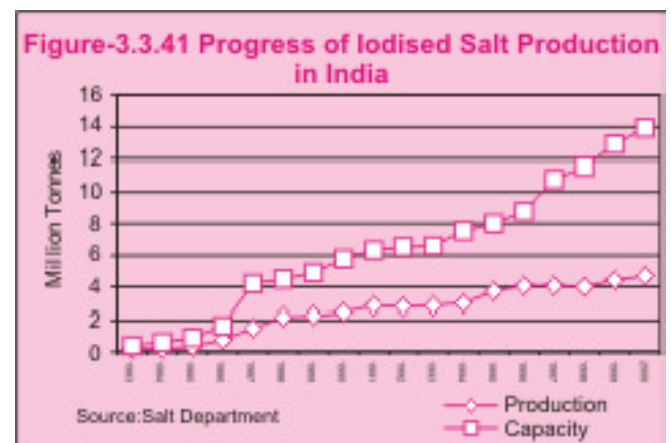
- ☒ screening of children for anaemia wherever required and appropriate treatment of those found anaemic;
- ☒ universal screening of pregnant women for anaemia and appropriate treatment; and
- ☒ reducing the prevalence of anaemia by 25 per cent and moderate and severe anaemia by 50% in children, pregnant and lactating women and adolescents;

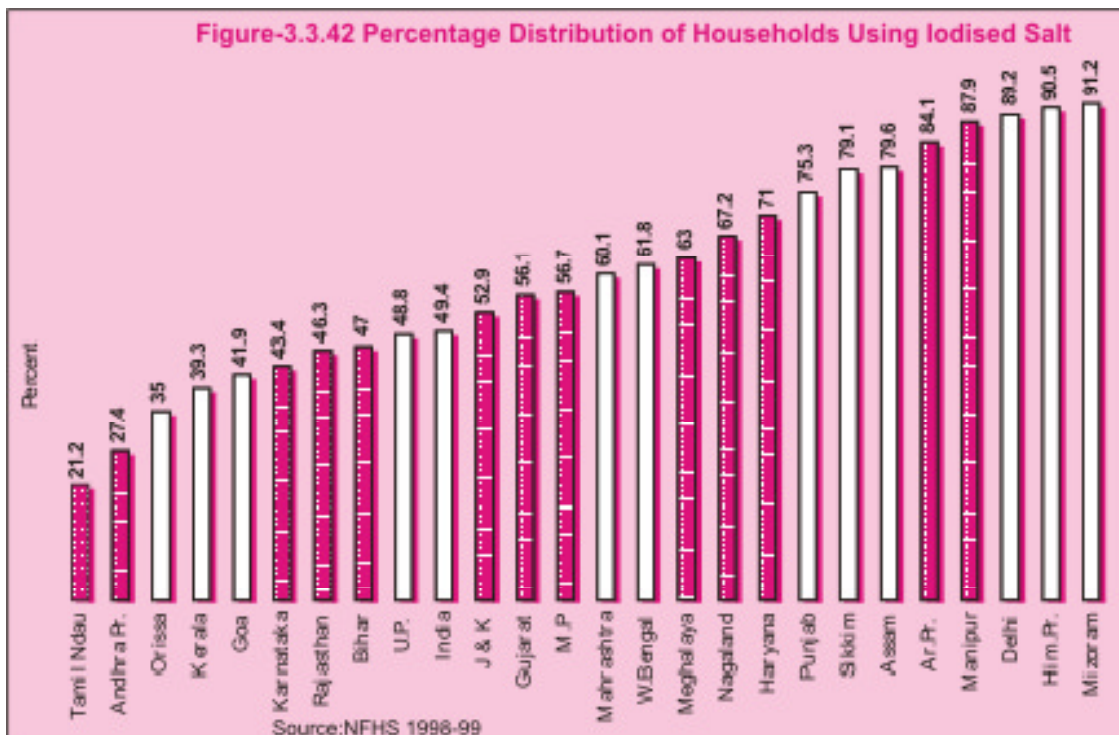
### Iodine Deficiency Disorders (IDD)

3.3.117 Iodine deficiency disorders have been recognised as a public health problem in India since the 1920s. Unlike other micronutrient deficiencies, iodine deficiency disorders are due to deficiency of iodine in water, soil and foodstuffs and affect all

socio-economic groups living in defined geographic areas. Initially, Iodine deficiency disorders was thought to be a problem in sub-Himalayan region. However, surveys carried out subsequently showed that iodine deficiency disorders exist even in riverine and coastal areas. No state in India is completely free from iodine deficiency disorders. It is estimated that 61 million people are suffering from endemic goitre and about 8.8 million people have mental/motor handicap due to iodine deficiency. Universal use of iodised salt is a simple, inexpensive method of preventing iodine deficiency disorders.

3.3.118 Following the successful trial of iodized salt in the Kangra Valley, Himachal Pradesh, a National Goitre Control Programme (NGCP) was launched in 1962. Initially the programme aimed at providing iodised salt to the well-recognised sub-Himalayan 'goitre' belt. However, there was no substantial reduction in iodine deficiency disorders due to the erratic availability of salt, availability of cheaper non-iodised salt and the lack of awareness regarding the need to use iodised salt. In view of the fact that no state was free of iodine deficiency disorders, a decision was taken for the universal iodisation of salt for human consumption, which was implemented in a phased manner from 1986. The progress in implementation of this programme was tardy as the production and availability of iodised salt was a fraction of what was required. In August 1992, the NGCP was renamed as the National Iodine Deficiency Disorders Control Programme (NIDDCP), taking into its ambit the control of a wide spectrum of iodine deficiency disorders with the goal of reducing the prevalence of IDD below 10 per cent in endemic districts of the country. Based on the recommendations of the Central Council of





Health, the Government took a policy decision to iodise the entire edible salt in the country by 1992. There has been a steady progress in the production of iodised salt over the past few years in India (Figure-3.3.41).

3.3.119 Available data suggest that there has been substantial increase in the availability and consumption of iodised salt during the 1990s. However, the NFHS-2 showed that even in the late 1990s only 49 per cent of households use cooking salt that is iodised at the recommended level of 15 the parts per million or more, about 28 per cent of the households use salt that is not iodised at all and 22 per cent use salt containing less than 15 ppm of iodine. State-wise use of iodised salt is indicated in Figure 3.3.42. The data shows that in coastal states like Tamil Nadu, Andhra Pradesh, Kerala, and Gujarat, the percentage of households consuming adequate iodised salt is much lower than in many of the northern states where the availability of iodised salt is more than 90 per cent. One of the reasons could be that the salt transported by road are not subject to any kind of check regarding iodisation and this loophole in the law permits transport of non-iodised salt by road to areas upto 250 km. Therefore, these areas have ready access to non-iodised salt.

3.3.120 A national consultation was held in April 1999, to discuss the scientific and epidemiological evidence on benefits and safety of iodised salt in the prevention and control of iodine deficiency disorders; the consensus statement from the consultation confirmed that under the existing conditions in India universal iodisation of salt for human consumption was safe and will enable the country to combat IDD. In October 2000, the central government lifted the ban on sale of non-iodised salt for human consumption. However all the states and Union territories, except Kerala and Gujarat, have issued ban notifications on the sale of non iodised salt for human consumption in their entire territories under the Prevention of Food Adulteration Act. There is a partial ban in Andhra Pradesh and Maharashtra.

### Strategies for the Prevention of Iodine Deficiency Disorders During Tenth Plan

3.3.121 It is essential to ensure that only iodised salt is made available for human consumption in order to enable the children of the 21st century to attain their full intellectual potential and take their rightful place in a knowledge based-society. Efforts to improve the quality of iodised salt will include:

- ☒ mandatory certification of the adequacy of iodisation as a pre-requisite for getting priority for the transportation of salt;
- ☒ ensuring that the salt is packed in half or one kg consumer poly pack at production site itself to prevent deterioration in quality during transportation and storage;
- ☒ periodic checking of the iodine content of salts available at wholesale/retail outlets; and
- ☒ quality check at the household level through anganwadi/school-based testing using salt iodine test kit.

3.3.122 IEC to increase the demand for good quality iodised salt will have to continue. Efforts to reduce price differentials between iodised and non-iodised salt and provide ready access to iodised salt through TPDS will have to be considered. Monitoring of the production, distribution, quality of salt at various levels, along with the studies on goitre prevalence among school children, urinary iodine excretion status, thyroid status of school children, neonatal thyroid status by appropriate screening techniques, may be used to assess the progress of reduction in iodine deficiency disorders. In areas where iodine deficiency disorders continue to be high, despite the adequate availability and extensive use of iodised salt, the possible role of goitrogens may have to be investigated.

### 3.3.123 The Tenth Plan goals are to:

- ☒ achieve universal access to iodised salt;
- ☒ generate district-wise data on iodised salt consumption; and
- ☒ reduction in the prevalence of iodine deficiency disorders in the country to less than 10 per cent by 2010.

### Vitamin A Deficiency

3.3.124 Vitamin A is an important micronutrient for maintaining normal growth, regulating cellular proliferation and differentiation, controlling development, and maintaining visual and reproductive functions. Diet surveys have shown

that the intake of Vitamin A is significantly lower than the recommended dietary allowance in young children, dietary adolescent girls and pregnant women. In these vulnerable sub-groups multiple nutritional problems coexist including inadequate intake of energy as well as of micronutrients other than Vitamin A. In spite of the fact that there has not been any significant improvement in the dietary intake of Vitamin A and coverage under Massive Dose Vitamin A programme has been low, there is a decline in clinical Vitamin A deficiency in under-five children in the country (Figure-3.3.35). This could perhaps be due to increase in access in health care, consequent reduction in severity and duration of common childhood morbidity due to infections.

### Vitamin A deficiency in Pregnancy and Lactation

3.3.125 It is estimated that the prevalence of Vitamin A deficiency signs during pregnancy and lactation ranges between 1 and 5 per cent. Small-scale studies have reported large inter state and inter district variation. However, nation-wide comparable data is not available. There are reports of night blindness occurring during pregnancy and disappearing after delivery without any treatment. Sub-clinical Vitamin A deficiency might perhaps be more widespread. It may not be feasible to undertake large-scale studies to estimate prevalence as biochemical estimation of Vitamin A deficiency during pregnancy present several problems. There is very little data on the prevalence of Vitamin A deficiency during lactation. In spite of continued secretion in breast milk, available limited data does not suggest increased prevalence of Vitamin A deficiency during lactation. Unlike anaemia, Vitamin A deficiency in pregnant and lactating women is not associated with any increase in morbidity and mortality. There is no ongoing programme for the prevention, detection and treatment of Vitamin A deficiency in pregnant and lactating women.

3.3.126 During the Tenth Plan period, the detection and management of clinical Vitamin A deficiency will be included as a component of antenatal care. Night blindness and Bitot's spot are readily identifiable clinical entities. Women with these symptoms / signs will be identified by the ANM and 10,000 IU of Vitamin A administered daily for

four weeks. Efforts to promote cultivation and consumption of micro-nutrient rich vegetables will be taken up for prevention of clinical deficiency.

### Vitamin A deficiency in Childhood

3.3.127 Vitamin A deficiency in childhood is mainly due to inadequate dietary intake of Vitamin A. Some of the earlier studies from developing countries have shown that Vitamin A administration could have beneficial effect on growth, morbidity and mortality in children but more recent studies do not confirm this. The association between measles, severe protein energy malnutrition and keratomalacia and high fatality in such cases was reported by many paediatricians. In the 1950s, prevalence of night blindness and Bitot's spot in pre-school children ranged between 5 per cent and 10 per cent in most states. Paediatricians in major hospitals in most of the states reported that blindness due to Vitamin A deficiency is one of the major causes of blindness in children below five years. A five-year long field trial conducted by NIN showed that if massive dose Vitamin A (200,000 units) is administered once in six months to children between one and three years of age, the incidence of corneal xerophthalmia is reduced by about 80 per cent. In view of the serious nature of the problem of blindness due to Vitamin A deficiency, it was felt that urgent remedial measures in the form of specific nutrient supplementation covering the entire population of susceptible children should be undertaken. In 1970, the National Prophylaxis Programme Against Nutritional Blindness was initiated as a centrally sponsored scheme. Under this scheme, all children between ages of one and three years were to be administered 200,000 IU of Vitamin A orally once in six months.

3.3.128 This programme had been implemented in all the states and union territories during the last thirty two years. The major bottleneck during the 1970s was lack of infrastructure at the peripheral level to ensure timely administration of the dose. In the 1980s there was considerable improvement in the infrastructure. The lack of adequate supply of Vitamin A which came in the way of improved coverage was also corrected. However coverage levels continued to be very low.

Ninth Plan strategy to improve the coverage of all doses of massive dose Vitamin A administration:

- ☒ increased inter-sectoral coordination between ICDS and family welfare workers - anganwadi workers may be requested to administer second and subsequent doses;
- ☒ ensure adequate availability of Vitamin A;
- ☒ health education to improve consumption of foods rich in B-carotene to be continued and backed up by efforts to improve their availability at affordable cost.

The goal for the Ninth Plan was to control Vitamin A deficiency so that the incidence of blindness due to this becomes less than one in 10,000 not only at the national level but also in every state.

3.3.129 In an attempt to improve the coverage, especially of the first two dose, it was decided to link Vitamin A administration to the ongoing immunisation programme during the Eighth Plan period. Under the revised regimen a dose of 100,000 IU of Vitamin A was administered to all infants at nine months along with measles vaccine and a second dose of 200,000 IU was administered at 18 months of age along with booster dose of DPT and OPV. Subsequently, the children were to receive three doses of 200,000 IU of Vitamin A every six months until 36 months of age. The reported coverage figures under the modified regimen indicate that there has been some improvement in coverage with the first dose (50 -75 per cent). However, the coverage for subsequent doses is low.

3.3.130 Available data suggests that during the Ninth Plan there has not been any substantial improvement in the coverage level of the second and subsequent doses of Massive Dose Vitamin A. In an attempt to improve the coverage, Orissa linked administration of Vitamin A with the pulse polio immunisation campaign. It is reported that the state took precautions to prevent overdosing by stopping Vitamin A administration in the preceding six months. The state reported improved coverage.

Following this report several states embarked on a similar exercise. Planning Commission, the Department of Family Welfare and the Indian Academy of Paediatrics stated that this strategy is inappropriate because:

- ☒ while all children in the 0-5 age group get polio vaccine only those in the 1-3 age group receive Vitamin A. It may not be easy to give the latter only to 1-3 year children as the PPI is a massive campaign covering over 120 million children and the booths are manned by persons who are not health professionals;
- ☒ there would be difficulties in keeping adequate record of Vitamin A dosing; as a result, there will always be a possibility of toxicity or side effects due to multiple dosing within six months. Stopping Vitamin A dose six months prior to PPI will have a negative impact on Vitamin A administration through the routine services;
- ☒ the second dose of Vitamin A for the year has to be administered through an alternative strategy; and
- ☒ when the pulse polio programme ends, the re-initiation of routine Vitamin A administration would pose problems.

3.3.131 During the campaign mode administration of Vitamin A, along with pulse polio, in Assam in November 2001 deaths among children who were administered massive dose Vitamin A were reported. Some of these deaths could be coincidental where Vitamin A had been administered to ill children, but the possibility that some of the deaths could have been due to Vitamin A toxicity (either due to administration of higher dose or a massive dose Vitamin A administration earlier) cannot be ruled out. Since then, the Department of Family Welfare reiterated the earlier recommendation that the campaign mode - administration of Vitamin A along with pulse polio immunisation should not be taken up.

### Strategies for Prevention and Management of Vitamin A Deficiency during the Tenth Plan

3.3.132 Clinical Vitamin A deficiency often coexists with other micro-nutrient deficiencies and, hence,

there is a need for broad-based dietary diversification programmes aimed at improving the overall micro-nutrient nutritional status of the population. In addition, the ongoing Massive Dose Vitamin A supplementation programme in children in the 9-36 month age group will be continued and its implementation strengthened.

3.3.133 Strategies in specific groups are indicated below.

#### Infancy

- ☒ health and nutrition education will be taken up to encourage colostrum feeding, exclusive breast feeding for the first six months and the introduction of complimentary feeding including mashed greens and yellow/orange fruits/vegetables at sixth month;
- ☒ 100,000 IU dose of Vitamin A will be given at nine months along with the measles vaccine; and
- ☒ every effort will be made to ensure the early detection and prompt treatment of infections.

#### Childhood

- ☒ ensure adequate intake of Vitamin A rich food throughout childhood;
- ☒ early detection and prompt treatment of infections; and
- ☒ massive dose Vitamin A administration at 18,24,30 and 36 months of age; in order to improve coverage without too many logistic problems, these four doses are to be administered by anganwadi worker during April and October each year (pre-summer/pre-winter period) under the supervision of the ANM.

#### Sick Children

- ☒ all children with xerophthalmia should be given two doses of synthetic Vitamin A as per the present schedule of the Government under the RCH programme;
- ☒ all children suffering from measles should also be given one dose of Vitamin A, if they have not received it during the previous one month;



- ☒ all cases of severe CED (based on weight for age criteria or clinical signs) should be given one additional dose of Vitamin A.

3.3.134 Research studies may have to be taken up to identify

- ☒ food items, conventional as well as non-conventional, which are rich in vitamin A;
- ☒ functional decompensation associated with Vitamin A deficiency in various stages in different age and, physiological status groups;
- ☒ time trends in the prevalence of sub-clinical and clinical Vitamin A deficiency in different regions.

### 3.3.135 Goals for the Tenth Plan

- ☒ achieve universal coverage for each of the five doses of Vitamin A;
- ☒ reduce prevalence of night blindness to below 1 per cent and that of Bitot Spots to below 0.5 per cent in children between six months to six years of age;
- ☒ eliminate Vitamin A deficiency as a public health problem.

### Dietary Improvement and Diversification

3.3.136 There are three approaches for combating micro-nutrient deficiencies: medicinal supplementation, food fortification and dietary diversification with increased intake of micro-nutrient-dense foods. The first two approaches can take care of only one or two nutrients. Dietary diversification is the most appropriate and sustainable option ensuring adequate intakes of all micronutrients and phytochemicals. Availability, affordability, access and awareness are some of the major determinants of sustained dietary diversification in families and communities. Dietary diversification can be made possible through community effort through increased production of micro-nutrient-dense foods and reduced wastage through appropriate processing. It can be linked to income generation, particularly for the rural women. Micronutrient intake in children and women can be

improved if the community contributes locally produced millets, fruits and vegetables for supplementary feeding programmes such as ICDS, and Mid-day Meal. It is important to update and expand available data on the micro and phyto nutrient content of conventional and unconventional food items so that optimal use is made of the country rich diverse plant resources to eliminate micro nutrient deficiencies.

### Research

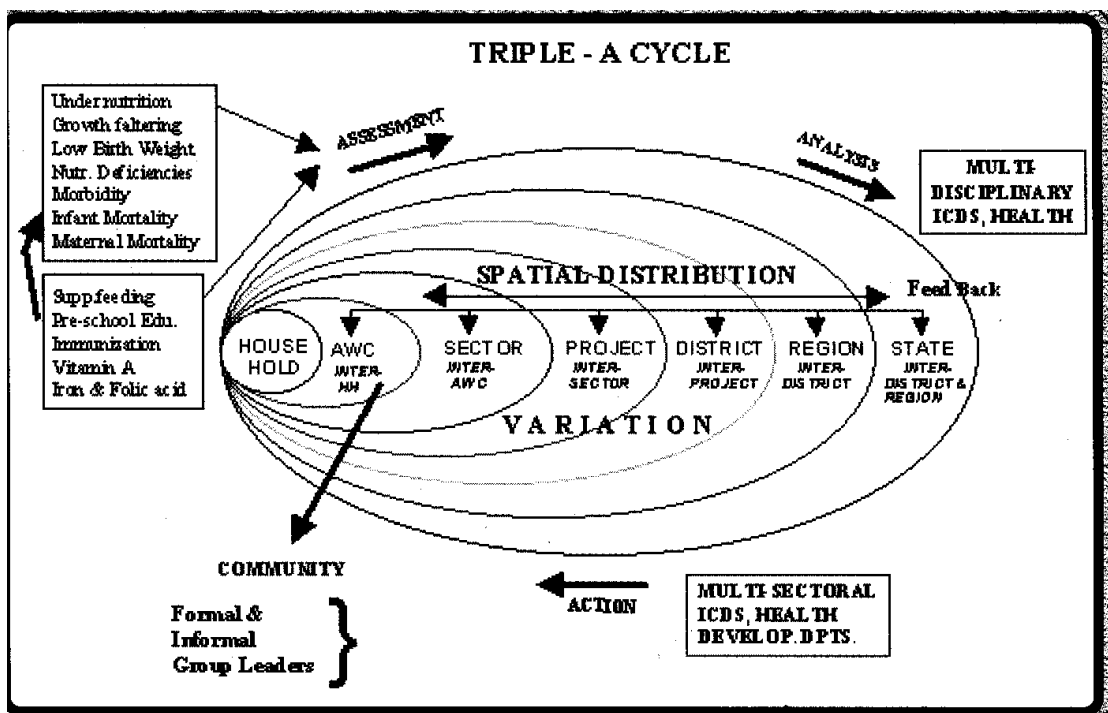
3.3.137 India is one of the pioneers in nutrition research not only in the Asian region but also in the world. Several research institutions and universities are carrying out the research studies with assistance from ministries and research funding agencies such as Indian Council of Agricultural Research, Indian Council of Medical Research, Council for Scientific and Industrial Research, Department of Bio-Technology and Department of Science and Technology. Basic, clinical, applied and operational research studies have identified major nutritional problems in the country, their aetiology, appropriate remedial and preventive measures, and the modalities of effectively operationalising the intervention programme at the regional and national level. Initially the focus of research was on deficiency diseases and chronic energy deficiency, the health hazards associated with them, methods for detection, treatment and prevention. It is noteworthy that the major interventions such as food supplementation programmes, the National Anaemia Prophylaxis Programme, massive dose Vitamin A supplementation programme have all been initiated on the basis of research work carried out in the country. Over the last two decades, responding to the changing spectrum of nutrition-related disorders, research studies have been initiated on food and drug toxins and nutritional risk factors associated with non-communicable diseases.

3.3.138 During the Tenth Plan period basic, clinical, applied, operational and socio-behavioral research in nutrition will continue to receive priority attention so that the country can effectively and rapidly tackle the dual disease burden due to under- and over-nutrition. Networking of the research institutions and universities carrying out research studies on

nutrition will be attempted, so that there is no unnecessary duplication of efforts and the available resources are fully utilised. Research priorities have already been indicated in each section dealing with specific nutritional problems.

3.3.139 Priority areas for research in nutrition include:

- ☒ nutritive value of food items - for macro , micro and phyto nutrients using newer techniques; analysis of uncommon food stuffs for their nutritive value;
- ☒ food safety including food contaminants, adulterants and genetically modified food items;
- ☒ dietary intake and nutritional requirement of Indians;
- ☒ evolving and testing better tools for assessment of nutritional status;
- ☒ evolving appropriate norms for assessing the nutritional status of Indians;
- ☒ assessing the determinants of nutritional status;
- ☒ nutritional status and health, especially epidemiological data on the health consequences of deviation from the norms;
- ☒ nutrition-fertility and nutrition-infection interactions;
- ☒ micro-nutrient deficiencies and their health consequences;
- ☒ changing dietary habits and lifestyles focusing on obesity and noncommunicable diseases;
- ☒ increasing longevity-nutritional implications;
- ☒ nutritional problems of the elderly;
- ☒ clinical nutrition, including nutritional management during illness and nutritional rehabilitation;
- ☒ emerging changes in nutritional status due to changing ecology, agriculture, life style and social policy;
- ☒ effectiveness of nutrition intervention as assessed by health and nutritional benefit and cost of different interventions;



- ☒ socio-behavioural research on lifestyle modifications, IEC&M to the population to alter lifestyles;
- ☒ operational research to improve the efficiency of the implementation of on-going programmes;

### Nutrition Monitoring

3.3.140 Nutrition monitoring refers to repeated measurements of changes in the nutritional status of individuals and groups at regular intervals. In India, there are huge differences in per capita income, purchasing power, availability of food items, dietary habits, lifestyle and nutritional status between and within states, among urban, rural and tribal population. The country is currently going through demographic, economic, social, educational, agricultural and health transition, all of which can modify nutritional status. Sound, reliable data is needed for appropriate, decentralised planning and monitoring of interventions to meet the local needs. It is important, therefore, to strengthen, streamline and effectively utilise the existing mechanisms for monitoring the nutritional status of the population. The National Nutrition Policy, drawn up by the Department of Women and Child Development and adopted in 1993, envisaged the building up of a "regular monitoring and surveillance system and developing a reliable database in the country not only to assess the impact of ongoing nutrition and development programmes but also to serve as an early warning system for initiating prompt action."

3.3.141 The ICDS functionaries regularly file monthly progress report on nutritional status. However, there are lacunae and delays in the collection, reporting, collation and analysis of data. Monthly progress reports are not utilised for district level monitoring and midcourse correction of ongoing programmes. During the Ninth Plan, the NIN, at the request of the Department of Women and Child Development, conducted a study in Andhra Pradesh for improving the monthly progress reports of the ICDS workers and improving monitoring of the ICDS programme at the district level. The data

from the study indicated that it was possible to train and orient the ICDS functionaries to improve the quality and timeliness of the reporting. Analysis of the data and discussions on the implications of the reports with the functionaries facilitated the implementation of mid-course corrections and led to improved performance.

3.3.142 When data from the Andhra Pradesh study was used for Geographical Information System (GIS) mapping, it showed that the data generated by anganwadi workers are useful for monitoring the situation at the block/district levels and for building up, over time, a database for nutritional surveillance. Orissa had utilised 'routine' reporting of the ICDS workers for block-wise GIS mapping of the severe and moderate under-nutrition in the 0-6 years age groups. The GIS maps clearly brought out trends in under-nutrition in different areas, different seasons and in different age groups. Meghalaya, Rajasthan, Maharashtra, Madhya Pradesh and Karnataka have initiated projects to improve nutrition monitoring, mapping and surveillance.

3.3.143 As part of efforts to monitor the nutritional component of the PMGY initiative, the Planning Commission has drawn up in collaboration with the Department of Women and Child Development, a proforma for assessment and reporting of the nutritional status of under-six children. This has been incorporated as a part of the monthly the ICDS reporting format. The Department of Women and Child Development and the Planning Commission have requested the secretaries of the state Departments of Women and Child Development to ensure that the data is compiled district-wise (in two age groups, gender-specific) and reported every month and monitored at the district, state and central levels. The state/central Departments of Women and Child Developments are to monitor the improvement in terms of

- ☒ enrolment of children in the 6-36 months age group;
- ☒ percentage of children who received complimentary food by six months;
- ☒ nutritional status of children in the 6-36 months age group; and

- ☒ fund allocation for nutrition and utilisation of funds provided.

### Independent Surveys to Monitor Nutritional Status

3.3.144 The ICMR established the NNMB in 1972 for undertaking

- ☒ data collection on the dietary intakes of families, and individuals belonging to different physiological and age groups, in different states;
- ☒ assessing intra-family distribution of food and nutrients;
- ☒ generating data on the diet and nutritional status of socially vulnerable groups like the tribals living in the ITDP areas, and the physiologically at-risk population like the elderly and adolescents;
- ☒ organising repeat surveys to assess time trends in the diet and nutritional situation.

During the nineties the NNMB has been using the NSSO sampling for their survey in the ten states.

3.3.145 The Food and Nutrition Board of the Department of Women and Child Development conducted a nutrition survey in 1993-94 in 187 districts, the report of which was published in 1998. This was a one-time effort and the sample covered was not derived from a representative sample of the district. The NFHS has undertaken height and weight measurement in a representative sample of children and women at the state-level. NFHS provides state-level estimates of under-nutrition and over-nutrition at two time points, 1992-93 and 1998-99. Every five years, the National Sample Survey Organisation (NSSO) collects and reports information on expenditure on food at the family level in representative sample population all over the country. The NSSO does not provide information on dietary consumption at the family and individual level and does not assess nutritional status. However, if coupled with the NNMB survey, the NSSO data may provide

excellent insights into changing dietary patterns and nutritional status .

3.3.146 Currently it is estimated that only about 20 per cent of the under-six children are weighed in the ICDS blocks. During the Tenth Plan period, all pregnant and lactating women and all under-five children will be weighed at least four times a year to identify under-nourished persons and initiate targeted interventions. Once, a good quality data becomes available at the block and district level on a regular basis, it will be used for:

- ☒ building block/district/state level data on prevalence of under-nutrition;
- ☒ monitoring ICDS activities for reduction in under-nutrition;
- ☒ assessment of the impact of ongoing nutrition interventions;
- ☒ planning appropriate mid-course corrections in the ongoing ICDS programme;
- ☒ building up a database for nutritional surveillance in vulnerable groups.

During the Tenth Plan, efforts will be made to conduct nutrition surveys in a representative sample of the population in all the states.

### Nutrition Surveillance

3.3.147 The nutrition surveillance system (NSS) provides information on under/over nutrition, its spatial distribution, causes, and changes in prevalence/incidence over time, the actions initiated and their impact. Though the National Nutrition Policy recommended the development and establishment of "nutritional surveillance of the country's population especially children and mothers" in the country by the year 2000, the NSS is yet to be developed. Currently, there are three systems, which provide the essential core information that could be developed into a full-fledged nutrition surveillance during the Tenth Plan period: nutrition monitoring through ICDS system; the NNMB-NSSO databases; and the pilot project on Food Insecurity and Vulnerability Information and Mapping System (FIVIMS) under the Department

of Food and Public Distribution. It is envisaged that the Department of Women and Child Development will ensure an improvement in quality of data being collected by the ICDS functionaries. The NNMB will be expanded to cover all states and carry out regular surveys on dietary consumption, assessment of macro and micro-nutrient nutritional status and morbidity profile; special efforts will be made to cover at-risk groups. FIVIMS will also provide nation-wide data. Once district-wise data becomes available and problem areas are identified, health and nutrition intervention could be initiated at appropriate levels. Over time, it may be desirable to integrate data on rainfall, food production, food distribution, civil registration and disease surveillance with the nutrition surveillance.

### National Nutrition Policy

3.3.148 The National Nutrition Policy had set various goals to be achieved by 2000. All the concerned departments have reviewed the progress achieved and have revised their goals for the Tenth Plan /2010. The goals set in the policy have to be revised in the light of these revised goals.

### Path Ahead and Goals Set

3.3.149 The Prime Minister, in his Independence Day speech on 15th August, 2001 announced the setting up of a National Nutrition Mission with the following objectives:

- reduction in under-nutrition (CED);
- reduction / elimination of micronutrient deficiencies viz., iron, iodine and Vitamin A;
- reduction in chronic energy deficiency.

3.3.150 The Mission would

- co-ordinate and monitor implementation of the National Nutrition Policy;
- strengthen
  - ↳ existing programmes;
  - ↳ research and development;

- ↳ nutrition education and IEC;
- ↳ relief in natural calamities.

The National Nutrition Mission will be supervised by the National Nutrition Council headed by the Prime Minister.

### Newer Strategies for Rapid Reduction in Severer Grades of Under Nutrition

3.3.151 The Tenth Plan envisage a change in strategy to achieve substantial reduction in the severer grades of under-nutrition and health hazards associated with it without massive increase in the cost.

### 3.3.152 For prevention of under-nutrition, strategy suggested include

- nutrition education through all modes of communication with special focus on inter-personal communication by anganwadi workers and ANMs to promote:
  - ↳ universal breastfeeding;
  - ↳ exclusive breastfeeding for first six months;
  - ↳ continuing breastfeeding up to two years;
  - ↳ introduction of semi solid supplements from family pot at sixth month;
  - ↳ giving the complimentary feeds to children at least 4-5 times a day;
  - ↳ improving intra-familial distribution of food based on needs and providing pre-school children, pregnant and lactating women some more food from the family pot;
  - ↳ introducing green leafy vegetables at least twice a week in the family meal.
- provide take-home food supplements to children in the 6-36 months age group from BPL families (utilising PMGY funds also) as they cannot consume 300 Kcal food at one sitting at the anganwadi;

- ☒ administration of massive dose Vitamin A in April and October to the children at 18, 24, 30 and 36 months by the anganwadi workers under the supervision of the ANMs;
- ☒ organise immunisation, maternal and child care at the anganwadi on a fixed date at least once a month so that the health care needs of these vulnerable groups are met;
- ☒ the anganwadi workers can keep iron and folic acid tablets and ORS for distribution as and when required in the village and also monitor the regularity of intake;
- ☒ promote universal use of iodised salt and organise testing salt for adequacy of iodisation at home level.

3.3.153 The anganwadi workers and the ANMs will be trained by appropriate agencies including Food and Nutrition Board and Home Science and medical colleges so that they learn and communicate the right nutrition and health education messages to the population on a sustained basis. This is a very important but neglected area which does not require any additional financial inputs and could play the most critical role in reducing the prevalence of under nutrition.

#### 3.3.154 *For detection and management of undernutrition*

- ☒ Ensure that all children in the age group of 0-6 years are weighed at least four times in a year and children suffering from grade III and grade IV under-nutrition are identified. Those with grade III and grade IV under-nutrition be provided with double rations (as envisaged in the ICDS guidelines) as take-home food supplements continuously with the instruction that they should be fed these preparations at least four times a day. In addition, appropriate health care should be provided to them by the ANMs and PHC doctors.
- ☒ Weigh all pregnant and lactating women, identify those with body weight less than 40 kg and provide them with food grains for the remaining period of pregnancy/lactation or until they cross the cut off point.

- ☒ Weigh all adolescent girls at least four times in a year, identify those with weight less than 35 kg and provide foodgrains for the next three months or until they weigh more than 35 kg.
- ☒ Organise antenatal and child health clinics in anganwadi by the ANM for screening vulnerable population, early detection and effective treatment of anaemia, Vitamin A deficiency and iodine deficiency disorders.

#### *Goals Set for the Tenth Plan*

3.3.155 The Tenth Plan has set specific nutrition goals to be achieved by 2007. The major goals are:

- ☒ Intensify nutrition and health education to improve infant and child feeding and caring practices so as to
  - ☒ bring down the prevalence of under-weight children under three years from the current level of 47 per cent to 40 per cent;
  - ☒ reduce prevalence of severe under-nutrition in children in the 0-6 years age group by 50 per cent.
- ☒ reduce prevalence of anaemia by 25% and that of moderate/severe anaemia by 50 per cent;
- ☒ eliminate Vitamin A deficiency as a public health problem; and
- ☒ reduce prevalence of IDD in the country to less than 10 percent by 2010.

3.3.156 In view of the massive inter-state/inter-district differences in the availability and access to the nutrition-related services and in nutritional status of the population, the state specific goals to be achieved by 2007 have been evolved based on the current level of these indices and the Tenth Plan goals for the country has been derived from the state specific goals (Annexure 3.3.1). The progress achieved in terms of the process and impact indicators will be reviewed annually. Midterm review of the progress achieved and the problems faced will enable midcourse corrections. If necessary goals can be reset at the time of the mid-term appraisal.

## NATIONAL AND STATE LEVEL GOALS FOR THE TENTH PLAN

| State Name             | % Under nourished children < 3 years     |                              |  |  | Infant Feeding Practices   |                                 |   |  |  |  |
|------------------------|--|------------------------------|--|--|--|---------------------------------|---|--|--|--|
|                        | Current levels of Wt-for-age below -3 SD | Tenth Plan Goal-Redn. by 50% | Current levels of Wt-for-age below -2 SD | Tenth Plan Goal-Redn. From current level of 47% to 40% | Current levels of % children breast fed within one hour of birth | Tenth Plan Goal-increase to 50% | Current levels of % of children 0-3 months exclusively breast fed | Tenth Plan Goal 80% of children upto 6 months to be exclusively breast-fed | Current levels of complementary feeding of infants aged 6-9 months | Tenth Plan Goal-introduction of semi-solids at 6 months to 75% of children |
| Andhra Pradesh         | 10.3                                     | 5.2                          | 37.7                                     | 32.1   | 10.3   | 32.6                            | 74.6  | 100.0  | 59.4   | 100.0  |
| Arunachal Pradesh      | 7.8                                      | 3.9                          | 24.3                                     | 20.7   | 49.0   | 100.0                           | 33.9  | 49.1   | 60.2   | 100.0  |
| Assam                  | 13.3                                     | 6.7                          | 36.0                                     | 30.6   | 44.7   | 100.0                           | 42.5  | 61.6   | 58.5   | 100.0  |
| Bihar                  | 25.5                                     | 12.8                         | 54.4                                     | 46.3   | 6.2  | 19.6                            | 55.2  | 80.0   | 15.0   | 33.6   |
| Goa                    | 4.7                                      | 2.4                          | 28.6                                     | 24.3   | 34.4   | 100.0                           |   |  | 65.4   | 100.0  |
| Gujarat                | 16.2                                     | 8.1                          | 45.1                                     | 38.4   | 10.1   | 32.0                            | 65.2  | 94.5   | 46.5   | 100.0  |
| Haryana                | 10.1                                     | 5.1                          | 34.6                                     | 29.4   | 11.7   | 37.0                            | 47.2  | 68.4   | 41.8   | 93.6   |
| Himachal Pradesh       | 12.1                                     | 6.1                          | 43.6                                     | 37.1   | 20.7   | 65.5                            | 17.5  | 25.4   | 61.3   | 100.0  |
| Jammu & Kashmir        | 8.3                                      | 4.2                          | 34.5                                     | 29.4   | 20.8   | 65.8                            | 41.5  | 60.1   | 38.9   | 87.1   |
| Karnataka              | 16.5                                     | 8.3                          | 43.9                                     | 37.4   | 18.5   | 58.5                            | 66.5  | 96.4   | 38.4   | 86.0   |
| Kerala                 | 4.7                                      | 2.4                          | 26.9                                     | 22.9   | 42.9   | 100.0                           | 68.5  | 99.3   | 72.9   | 100.0  |
| Madhya Pradesh         | 24.3                                     | 12.2                         | 55.1                                     | 46.9   | 9.9  | 31.3                            | 64.2  | 93.0   | 27.3   | 61.1   |
| Maharashtra            | 17.6                                     | 8.8                          | 49.6                                     | 42.2   | 22.8   | 72.2                            | 38.5  | 55.8   | 30.8   | 69.0   |
| Manipur                | 5.3                                      | 2.7                          | 27.5                                     | 23.4   | 27.0   | 85.4                            | 69.7  | 100.0  | 86.8   | 100.0  |
| Meghalaya              | 11.3                                     | 5.7                          | 37.9                                     | 32.3   | 26.7   | 84.5                            | 16.1  | 23.3   | 77.1   | 100.0  |
| Mizoram                | 5.0                                      | 2.5                          | 27.7                                     | 23.6   | 54.0   | 100.0                           | 40.7  | 59.0   | 74.2   | 100.0  |
| Nagaland               | 7.4                                      | 3.7                          | 24.1                                     | 20.5   | 24.5   | 77.5                            | 43.9  | 63.6   | 81.3   | 100.0  |
| Orissa                 | 20.7                                     | 10.4                         | 54.4                                     | 46.3   | 24.9   | 78.8                            | 58.0  | 84.1   | 30.1   | 67.4   |
| Punjab                 | 8.8                                      | 4.4                          | 28.7                                     | 24.4   | 6.1  | 19.3                            | 36.3  | 52.6   | 38.7   | 86.6   |
| Rajasthan              | 20.8                                     | 10.4                         | 50.6                                     | 43.1   | 4.8  | 15.2                            | 53.7  | 77.8   | 17.5   | 39.2   |
| Sikkim                 | 4.2                                      | 2.1                          | 20.6                                     | 17.5   | 31.4   | 99.4                            | 16.3  | 23.6   | 87.3   | 100.0  |
| Tamil Nadu             | 10.6                                     | 5.3                          | 36.7                                     | 31.2   | 50.3   | 100.0                           | 48.3  | 70.0   | 55.4   | 100.0  |
| Tripura*               | NA                                       | 3.9                          | NA                                       | 24.9   | NA   | 100.0                           | NA  | 70.0   | NA   | 100.0  |
| Uttar Pradesh          | 21.9                                     | 11.0                         | 51.7                                     | 44.0   | 6.5  | 20.6                            | 56.9  | 82.5   | 17.3   | 38.7   |
| West Bengal            | 16.3                                     | 8.2                          | 48.7                                     | 41.4   | 25.0   | 79.1                            | 48.8  | 70.7   | 46.3   | 100.0  |
| Andaman & Nicobar Is.* | NA                                       | -                            | NA                                       | -  | NA   | -                               | NA  | -  | NA   | -  |
| Chandigarh *           | NA                                       | 4.7                          | NA                                       | 27.0   | NA   | 28.5                            | NA  | 60.0   | NA   | 90.0   |
| Dadra & Nagar Haveli * | NA                                       | 8.8                          | NA                                       | 42.2   | NA   | 72.2                            | NA  | 55.8   | NA   | 69.0   |
| Daman & Diu *          | NA                                       | 8.1                          | NA                                       | 38.4   | NA   | 32.0                            | NA  | 94.5   | NA   | 100.0  |
| Delhi                  | 10.1                                     | 5.1                          | 34.7                                     | 29.5   | 23.8   | 75.3                            | 13.2  | 19.1   | 37.0   | 82.8   |
| Lakshadweep *          | NA                                       | 2.4                          | NA                                       | 22.9   | NA   | 100.0                           | NA  | 99.3   | NA   | 100.0  |
| Pondicherry *          | NA                                       | 5.3                          | NA                                       | 31.2   | NA   | 100.0                           | NA  | 70.0   | NA   | 100.0  |
| INDIA                  | 18.0                                     | 9.2                          | 47.0                                     | 40.0   | 15.8   | 50.0                            | 55.2  | 80.0   | 33.5   | 75.0   |

Source for current level: NFHS 1998-99

## Notes:

1. NFHS was not conducted in States with a \* mark. In these the values have been estimated.
2. Current status for children in 0-3 years age-group is taken as representing status for children in 0-6 years age-group
3. As NFHS data for Chattisgarh, Jharkhand and Uttaranchal are not available, goals laid down are for undivided states.
4. As NFHS data for A&N Islands was not available, no goals have been set.

## Year-wise allocation for Supplementary Nutrition by the State Governments during the IX Plan

(Rs. In crores)

| SI. |                      |                |               |               |               |               |               | PMGY          |               |
|-----|----------------------|----------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| No. | State Name           | IX Plan Outlay | 1997-98       | 1998-99       | 1999-2000     | 2000-01*      | 2001-02**     | 2000-01       | 2001-02       |
| 1   | Andhra Pradesh       | 299.85         | 40.00         | 75.00         | 45.00         | 31.50         | 95.60         | 21.31         | 28.41         |
| 2   | Arunachal Pradesh    | 19.40          | 3.31          | 2.41          | 2.28          | 9.28          | 11.46         | 10.23         | 11.46         |
| 3   | Assam                | 80.00          | 8.45          | 9.13          | 9.20          | 30.00         | 30.17         | 26.94         | 30.17         |
| 4   | Bihar                | 195.00         | 25.30         | 35.00         | 14.00         | 32.92         | 36.87         | 43.09         | 36.87         |
| 5   | Chattisgarh          |                |               |               |               |               | 28.23         |               | 7.29          |
| 6   | Goa                  | 4.00           | 0.70          | 0.45          | 0.50          | 0.50          | 0.80          | 0.12          | 0.13          |
| 7   | Gujarat              | 825.00         | 125.50        | 140.00        | 140.00        | 129.50        | 132.50        | 9.72          | 10.88         |
| 8   | Haryana              | 25.08          | 5.00          | 6.93          | 5.25          | 3.50          | 4.50          | 2.52          | 2.82          |
| 9   | Himachal Pradesh     | 36.00          | 6.00          | 8.00          | 9.40          | 9.40          | 9.80          | 10.59         | 9.80          |
| 10  | Jammu & Kashmir      | 38.00          | 8.35          | 8.25          | 8.25          | 8.25          | 10.00         | 25.74         | 13.50         |
| 11  | Jharkhand            |                |               |               |               |               | N.A.          |               | 11.39         |
| 12  | Karnataka            | 160.00         | 37.38         | 38.84         | 38.50         | 47.34         | 48.26         | 11.27         | 21.47         |
| 13  | Kerala               | 5.10           | 0.75          | 0.75          | 0.45          | 0.30          | 0.35          | 10.36         | 11.61         |
| 14  | Madhya Pradesh       | 126.17         | 41.39         | 47.00         | 49.60         | 51.25         | 42.00         | 17.07         | 19.22         |
| 15  | Maharashtra          | 178.92         | 43.39         | 75.38         | 74.58         | 57.47         | 49.33         | 14.87         | 19.79         |
| 16  | Manipur              | 16.30          | 2.00          | 2.30          | 2.30          | 8.29          | 8.16          | 7.28          | 8.16          |
| 17  | Meghalaya            | 14.00          | 2.00          | 2.50          | 2.60          | 6.15          | 6.82          | 6.09          | 6.82          |
| 18  | Mizoram              | 8.66           | 1.85          | 2.00          | 2.50          | 4.15          | 6.27          | 6.06          | 6.27          |
| 19  | Nagaland             | 18.00          | 1.83          | 1.83          | 1.83          | 6.17          | 6.67          | 6.17          | 6.79          |
| 20  | Orissa               | 472.00         | 82.00         |               | 64.74         | 54.79         | 26.96         | 14.78         | 16.56         |
| 21  | Punjab               | 34.58          | 3.00          | 3.00          | 5.00          | 9.00          | 7.79          | 6.06          | 6.79          |
| 22  | Rajasthan            | 102.25         | 18.10         | 18.10         | 11.35         | 25.69         | 30.00         | 14.46         | 35.59         |
| 23  | Sikkim               | 10.00          | 2.26          | 1.95          | 1.95          | 4.21          | 5.70          | 4.22          | 5.70          |
| 24  | Tamil Nadu           | 500.00         | 90.86         | 102.20        | 124.17        | 93.87         | 128.02        | 15.72         | 17.60         |
| 25  | Tripura              | 47.73          | 6.95          | 5.78          | 6.58          | 8.72          | 11.68         | 7.62          | 13.61         |
| 26  | Uttar Pradesh        | 232.00         | 35.58         | 45.00         | 45.00         | 63.77         | 81.54         | 52.34         | 56.51         |
| 27  | Uttaranchal          |                |               |               |               |               |               |               | 2.11          |
| 28  | West Bengal          | 72.91          | 26.22         | 26.14         | 41.00         | 97.47         | 76.00         | 25.17         | 28.20         |
| 29  | A & N Islands        | 4.00           | 0.55          | 0.61          | 0.50          | 1.54          | 2.20          | 1.54          | 1.73          |
| 30  | Chandigarh           | 0.25           | 0.05          | 0.05          | 0.05          | 0.73          | 0.95          | 0.68          | 0.77          |
| 31  | Dadra & Nagar Haveli | 2.37           | 0.47          | 0.47          | 0.47          | 0.67          | 0.62          | 0.20          | 0.22          |
| 32  | Daman & Diu          | 1.77           | 0.34          | 0.30          | 0.28          | 0.28          | 0.46          | 0.16          | 0.18          |
| 33  | Delhi                | 150.00         | 20.75         | 29.20         | 32.10         | 25.17         | 34.30         | 1.66          | 1.86          |
| 34  | Lakshadweep          | 0.87           | 0.19          | 0.19          | 0.30          | 0.28          | 0.59          | 0.27          | 0.30          |
| 35  | Pondicherry          | 21.00          | 3.10          | 5.18          | 6.23          | 6.46          | 6.74          | 0.72          | 1.92          |
|     | <b>All India</b>     | <b>3701.21</b> | <b>643.62</b> | <b>693.94</b> | <b>745.96</b> | <b>828.62</b> | <b>941.34</b> | <b>375.03</b> | <b>452.49</b> |

\* Excluding PMGY

\*\* Including PMGY



## GAPS IN REQUIREMENT OF FUNDS FOR NUTRITION

(Rs. In crores)

| Sl.No. | State Name           | Funds available for Supplementary Nutrition |               |                | Requirement of funds for Supplementary Nutrition |                |                |                |
|--------|----------------------|---|---------------|----------------|--|----------------|----------------|----------------|
|        |                      | State Plan                                  | PMGY          | Total          | I*   | II*            | III*           | IV*            |
| 1      | Andhra Pradesh       | 31.50                                       | 21.31         | 52.81          | 54.32  | 95.36          | 54.80          | 75.09          |
| 2      | Arunachal Pradesh    | 9.28  | 10.23         | 19.51          | 2.28   | 1.03           | 0.86           | 7.23           |
| 3      | Assam                | 30.00                                       | 26.94         | 56.94          | 55.67  | 44.69          | 31.82          | 27.63          |
| 4      | Bihar                | 32.92                                       | 43.09         | 76.01          | 244.18   | 295.41         | 227.69         | 92.82          |
| 5      | Goa                  | 0.50  | 0.12          | 0.62           | 0.22   | 0.71           | 0.37           | 2.88           |
| 6      | Gujarat              | 129.50                                      | 9.72          | 139.22         | 34.96  | 92.58          | 61.19          | 84.03          |
| 7      | Haryana              | 3.50  | 2.52          | 6.02           | 10.17  | 27.76          | 18.10          | 30.18          |
| 8      | Himachal Pradesh     | 9.40  | 10.59         | 19.99          | 2.13   | 7.96           | 5.12           | 19.29          |
| 9      | Jammu & Kashmir      | 8.25  | 25.74         | 33.99          | 1.72   | 10.01          | 6.53           | 26.16          |
| 10     | Karnataka            | 47.34                                       | 11.27         | 58.61          | 48.82  | 92.06          | 61.95          | 84.45          |
| 11     | Kerala               | 0.30  | 10.36         | 10.66          | 16.35  | 16.52          | 9.44           | 43.47          |
| 12     | Madhya Pradesh       | 51.25                                       | 17.07         | 68.32          | 142.43   | 189.26         | 141.91         | 90.45          |
| 13     | Maharashtra          | 57.47                                       | 14.87         | 72.34          | 115.84   | 181.14         | 127.65         | 107.07         |
| 14     | Manipur              | 8.29  | 7.28          | 15.57          | 3.10   | 1.46           | 0.91           | 8.67           |
| 15     | Meghalaya            | 6.15  | 6.09          | 12.24          | 5.39   | 3.97           | 2.84           | 5.28           |
| 16     | Mizoram              | 4.15  | 6.06          | 10.21          | 0.92   | 0.62           | 0.39           | 3.21           |
| 17     | Nagaland             | 6.17  | 6.17          | 12.34          | 3.00   | 1.43           | 1.14           | 6.63           |
| 18     | Orissa               | 54.79                                       | 14.78         | 69.57          | 87.04  | 87.01          | 58.98          | 67.74          |
| 19     | Punjab               | 9.00  | 6.06          | 15.06          | 6.71   | 20.61          | 14.79          | 25.86          |
| 20     | Rajasthan            | 25.69                                       | 14.46         | 40.15          | 56.76  | 161.41         | 119.56         | 62.64          |
| 21     | Sikkim               | 4.21  | 4.22          | 8.43           | 0.99   | 0.26           | 0.18           | 1.35           |
| 22     | Tamil Nadu           | 93.87                                       | 15.72         | 109.59         | 51.55  | 62.69          | 39.75          | 119.37         |
| 23     | Tripura              | 8.72  | 7.62          | 16.34          | 5.03   |                |                | 8.01           |
| 24     | Uttar Pradesh        | 63.77                                       | 52.34         | 116.11         | 340.75   | 495.73         | 367.04         | 164.67         |
| 25     | West Bengal          | 97.47                                       | 25.17         | 122.64         | 105.05   | 147.70         | 99.81          | 103.38         |
| 26     | A & N Islands        | 1.54  | 1.54          | 3.08           | 0.33   |                |                | 0.93           |
| 27     | Chandigarh           | 0.73  | 0.68          | 1.41           | 0.22   |                |                | 0.75           |
| 28     | Dadra & Nagar Haveli | 0.67  | 0.20          | 0.87           | 0.24   |                |                | 0.33           |
| 29     | Daman & Diu          | 0.28  | 0.16          | 0.44           | 0.03   |                |                | 0.21           |
| 30     | Delhi                | 25.17                                       | 1.66          | 26.83          | 5.51   | 12.90          | 10.69          | 8.85           |
| 31     | Lakshadweep          | 0.28  | 0.27          | 0.55           | 0.05   |                |                | 0.15           |
| 32     | Pondicherry          | 6.46  | 0.72          | 7.18           | 0.86   |                |                | 1.77           |
|        | <b>All India</b>     | <b>828.62</b>                               | <b>375.03</b> | <b>1203.65</b> | <b>1402.59</b>                                   | <b>2050.27</b> | <b>1463.51</b> | <b>1280.55</b> |

I\*: To provide nutrition @ Re.1/- per day for 300 days in an year to all pregnant women and children upto 6 years in the BPL families (by Planning Commission)

II\*: To provide double the ration to all severely under nourished children and pregnant women (by Planning Commission)

III\*: To provide double the ration to all severely under nourished children only (by Planning Commission)

IV\*: To provide nutrition @ Re.1/- per day for 300 days in an year to beneficiaries (72 in no.) as per ICDS norms of 1999 (by Department of WCD)

Source: Census 2001 for Population and 0-6 years old children;

Planning Commission for BPL estimates;

NFHS 1998-99 for nutritional status of children and women

