

7.2 DIETARY INTAKES AND NUTRITIONAL STATUS

NNMB surveys provide data on time trends in dietary intake (by 24 hours dietary recall) and nutritional status of the population in eight states from 1975 to 2005. The NNMB and INP surveys provide information on dietary intake and nutritional status of all major states in India in mid nineties.

Time Trends in dietary intake

Data on time trends in dietary intake in rural areas (Annexure 7.2.1) and urban slums in nine states was available from surveys conducted by the NNMB (Table 7.2.1). Data from NNMB surveys shows that over the last decade there has been some decline in cereal intake both in urban and rural areas. Over this period there has been a substantial decline in the cost of cereals and improvement in availability of and access to cereals. The decline is therefore not due to economic constraints. Over the same period there has been a decline in the dietary intake of pulses, which are a major source of protein in Indian diets. This is partly attributable to the soaring cost of pulses and inability of the poor to purchase adequate quantity inspite of higher expenditure on pulses. In spite of massive increase in milk out put in the country, improvement in per capita intake of milk over years has been small. Intake of vegetables and fruits also continues to be very low. In rural areas there has not been any significant increase in per-capita intake of fats/oils and sugar/jaggery. Data from NNMB rural surveys suggest that dietary intake has not undergone any major shift towards increase in intake of fat/oils, sugar and processed food in rural population. However in urban slum dwellers there has been an increase in oil intake and some increase in sugar intake.

Intake of cereals and leafy vegetables are lower in urban areas; however intake of pulses, milk and milk products, fruits and fat and oils are higher in urban areas (Table 7.2.1). There are no urban rural differences in sugar and other vegetable intake. Data from NNMB and INP surveys (using 24 hour dietary recall method) show that in the mid nineties average intake of cereals were near RDA; intake of pulses, vegetables and fruits were low (Table 7.2.1, Annexure 7.2.1, 7.2.2, 7.2.4).

	NNMB								INP (1995-96)		RDA
	Rural					Urban Slums			Rural	Urban	
	75-79	88-90	96-97	00-01	04-05	75-79	93-94				
Cereals & Millets	505	490	450	457	396	416	380	488	420	460	
Dairy products	116	92	85	85	116.6	42	75	126	143	150	
Pulses & Legumes	34	32	29	34	28	33	27	33	55	40	
Vegetables	8	9	15	18	16	11	16	32	23	40	
Green leafy	54	49	47	57	109	40	47	70	75	60	
Others(includes tubers)											
Fruits	13	23	24	25	27	26	26	15	37	50	
Fats & oil	14	13	12	14	14	13	17	14	21	20	
Sugar & jaggery	23	29	21	23	14	20	22	20	22	30	

Source: Reference 7.2.1 & 7.2.2

Interstate differences in dietary intake

NNMB

Cereals and millets formed the bulk of dietaries in all states. The intake of cereals was adequate to meet the RDA in most of the states. Cereal intake was lowest in Kerala and intake of cereal and millets was highest in Orissa. Cereal and millet intake was lower in the 1996-97 surveys than that in the previous two surveys in almost all the States, with Karnataka showing the steepest fall. Intake of pulses was less than the RDA in all states, with intake in Kerala being less than 50% of the RDA. With the exception of Kerala and Gujarat, in all other states the intake of pulses has gone down between 1975-79 and 1996-97. The intake of green leafy vegetables (GLV's) is considerably lower than the RDA in all states with the exception of Orissa. Although there was an increase intake of GLV's (except in the state of Maharashtra) between 1975-79 and 1996-97, the increase was marginal. Dietary intake of GLV's is still way below the RDA in all states except Orissa where the intake met the RDA in 1996-97. The intake of other vegetables is below the RDA in almost all the states (except Kerala and Orissa), with intake in Karnataka and Andhra Pradesh being less than half the RDA. In 1996-97, a steep fall in vegetable intake was observed in Kerala and Tamil Nadu, as compared to the intake in 1975-79. Intake of roots and tubers was lowest in Andhra. Roots and tuber intake was highest in Kerala and Orissa. The intake of milk was less than the recommended level of 150 ml in all states except Gujarat. Intake of milk and milk products were highest in Gujarat and lowest in Orissa. In none of the States, the intakes of fats and oils were adequate. A marginal increase was however observed in the intake of fats and oils in 1996-97 as compared to 1975-79 (Annexure 7.2.1).

INP

The state wise data on average intake of foodstuff under INP survey is given in Annexure 7.2.2. Intake of cereals and roots and tubers, which constitute the major bulk of Indian diet, was adequate in most states and UT's. The exceptions were Chandigarh, Delhi, Arunachal Pradesh, Meghalaya, Mizoram, Goa, Maharashtra, Daman and Diu and Dadra and Nagar Haveli for cereals and Goa for roots and tubers. Average intake of pulses was inadequate in most of the states except Chandigarh, Delhi, Mizoram, Tripura, Dadra and Nagar Haveli. Average intake of green leafy vegetables was markedly below their RDAs in most of the states except in those in hill states of northeastern region (except Meghalaya) Himachal Pradesh, Sikkim and Daman and Diu. The intake of other vegetables was adequate in most of the states except in Haryana, Himachal Pradesh, Punjab, Rajasthan and Nagaland. Intake of milk and its products and fats and oils was inadequate in almost all the districts of India excepting those belonging to northern region, Haryana, Himachal Pradesh, Punjab, Rajasthan, Chandigarh and Delhi. Intake of fats and oils was adequate in Mizoram and Daman and Diu.

There were significant differences in dietary intake between NNMB states and states covered under INP surveys (Annexure 7.2.1, 7.2.2). The dietary intake of all foodstuffs

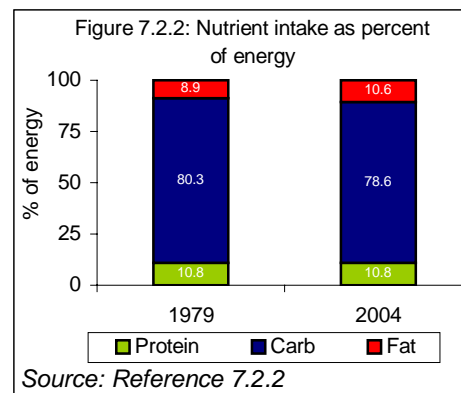
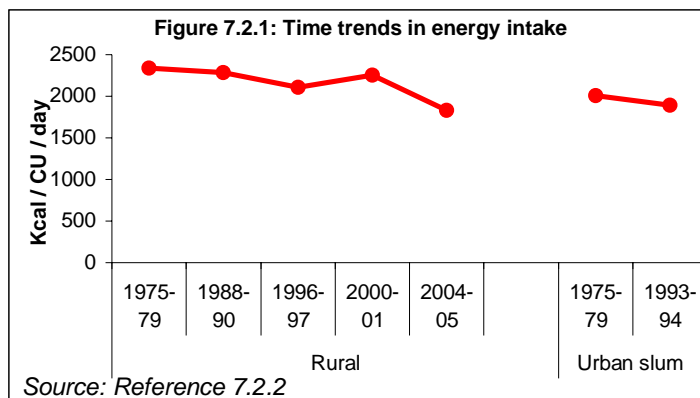
is lower in all age groups NNMB states (Annexure 7.2.3) as compared to INP states (Annexure 7.2.4); this is attributable to higher dietary intake especially cereals and pulses in the non-NNMB states, which were covered in the INP. Dietary intake was higher in some states with high per capita income (Punjab) but not in others (Maharashtra) suggesting that greater per-capita income is not always associated with higher dietary intake. Both NNMB and INP data showed that cereal intake was higher in some of the poor states (Orissa in NNMB, Uttar Pradesh in INP survey); this is perhaps because majority of the population are working as manual labourers and require high cereal intake to meet their energy requirements. NNMB surveys in 2004 indicated that as compared to 1975-80 there has been a reduction in cereal intake; pulse intake, vegetable and fruit intake remained unchanged (Annexure 7.2.3) in all age groups.

Time trends in of nutrient intake

Data on time trends in nutrient intake is available from surveys conducted by the NNMB (Table 7.2.2 & Annexure 7.2.5). Data from NNMB surveys show that over the last decade there has been a small decline in energy intake (Figure 7.2.1). There has been some decline in intake of most of the nutrients both in urban and rural areas over the last three decades. Over the past three decades there have been a reduction in percent of total energy intake from carbohydrates and some increase in percent dietary energy from fats (Figure 7.2.2). In spite of this, the proportion of dietary energy from fat remains lower than 15 %. However, these aggregate measures mask large disparities between intakes of urban and rural populations, different states and different socio-economic groups. Dietary intake of iron from Indian dietaries has always been low. The steep decline reported in iron intake in the last two NNMB surveys can be attributed to different estimation methods; newer methods showed that absorbable iron was only 50% of earlier values.

	NNMB							INP (1995-96)	
	Rural					Urban Slums		Rural	Urban
	1975-79	1988-90	1996-97	2000-01	2004-05	1975-79	1993-94		
Energy (Kcal)	2340	2283	2108	2255	1834	2008	1896	2321	2259
Protein (g)	62.9	61.8	53.7	58.7	49.4	53.4	46.75	70	70
Calcium (mg)	590	556	521	523	439	492	*	631	673.4
Iron (mg)	30.2	28.4	24.9	17.5@	14.8	24.9	18.96	23.2	22.3
Vitamin A	257	294	300	242	257	248	352.5	355	356.0
Thiamin	1.6	1.5	1.2	1.4	1.2	1.27	*	1.9	1.9
Riboflavin	0.9	0.9	0.9	0.8	0.6	0.81	0.79	1.0	1.0
Niacin	15.7	15.5	12.7	17.1	14.7	14.6	*	19.7	18.8
Vitamin C	37	37	40	51	44	40	42	55.2	62.4
Folic acid	*	*	153	62	52.3	*	*	*	*

Source: Reference 7.2.1 & 7.2.2



Energy intake is lower in urban areas in spite of higher intake of fats and oils because of lower cereal intake (Table 7.2.2). Data from NNMB suggests that the intake of all nutrients is lower in urban slums as compared to rural areas.

INP survey, which covered most of the major states not covered by NNMB surveys, did not show any significant difference in nutrient intake between urban and rural areas (Annexure 7.2.6). Interstate differences in nutrient intake and the fact that NNMB survey data was available only from urban slums are some of the factors that might account for the apparent differences between NNMB and the INP survey data.

Interstate Differences in nutrient intake

NNMB

Time trends in nutrient intake in different NNMB states are given in Annexure 7.2.5. The trends in nutrient intakes in states are similar to overall trends even though there are substantial inter state differences. There was a reduction in energy, protein, iron and calcium intakes, between 1975-79 and 1996-97. Although intake of vitamin A was higher 1988-90 and 1996-97 as compared to 1975-79, but was still way below RDA. There has been a gradual increase in the intake of riboflavin between 1975-79 and 1996-97. Thiamin intake showed a decline over the same period. Intake of protein, energy, vitamin A and riboflavin were less than the RDA in almost all States. Calcium intakes were above the RDA (400 mg) in all the States except in Orissa. Iron intake (as per the revised nutritive values for Indian foods) is low. Bioavailability of iron from Indian diets is very low. Low dietary intake coupled with poor absorption is the major reason for widespread prevalence of anaemia. For the first time, NNMB computed folate content of the diets in 1997-97, the intake of which was less than RDA of 200 µg in all the States, except Gujarat. In spite of low nutrient intake, Kerala, has lowest prevalence of undernutrition and nutritional deficiency signs. This can be attributed to a relatively more egalitarian society with equitable distribution of food based on needs and ready access to health services; high literacy rate and consequent awareness about importance of health, hygiene and sanitation and ability to access services may also have played an important role. Orissa has the highest dietary intakes of nutrients but this high intake

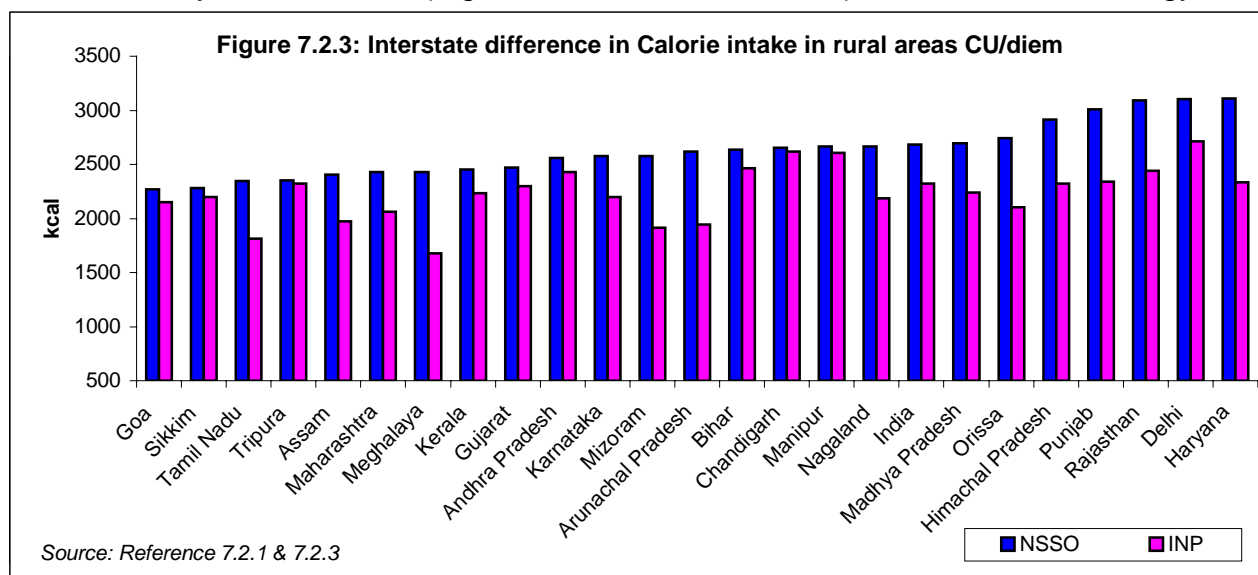
does not lead to a better nutritional status perhaps due to inequitable distribution of food within the state, districts, different income groups and within the family. Poor access to health care might be another factor that aggravates under-nutrition.

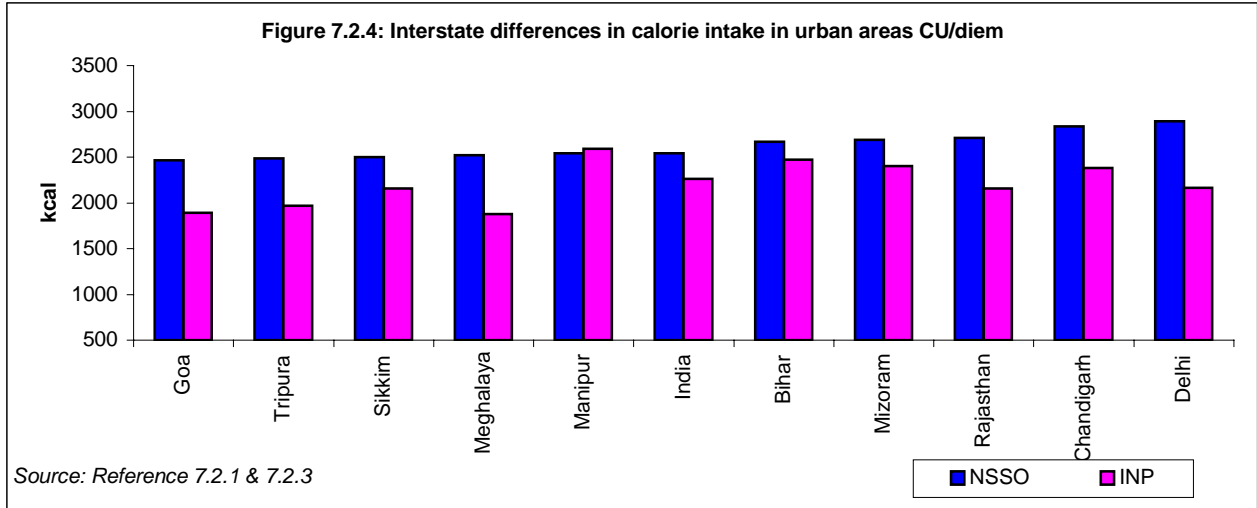
INP

India Nutrition Profile (INP) provides data on nutrient intake in all non-NNMB states of the country in urban and rural areas. The reported nutrient intake in most of the states is higher in INP as compared to National Nutrition Monitoring Bureau (NNMB). At the aggregate national level, total energy intake was less than 2,300 kcal/ cu/ day, even in the mid-nineties (Annexure 7.2.6).

Average intake of nutrients (cu/day) for all the states covered in INP is shown in Annexure 7.2.6. The total energy intake did not meet requirements in the states except in Chandigarh, Bihar, Manipur and Daman and Diu. Intake of protein was marginally higher than NNMB states in almost all INP states. Iron intake met around or more than 70% of the recommended level, though, it was inadequate in Assam, Mizoram and Goa. However, the NIN has revised iron content of foodstuffs in the Nutritive Value of Indian; if this correction is applied to INP states iron intake is low in all the states. The poor dietary intake and low bioavailability of iron mostly from vegetable based diet are the major factors responsible for high prevalence of anaemia. Average calcium, thiamin, niacin and vitamin C intake were adequate in almost all the states surveyed; vitamin A intake was inadequate in most of the states except Arunachal Pradesh, Mizoram and Nagaland.

Data on energy consumption per consumption unit in different states computed from NSSO consumer expenditure survey in 1993-94 were compared with energy intake per consumption unit per day computed from NNMB survey 1996-97 and INP 1995-96 using 24 hour dietary recall method (Figure 7.2.3, 7.2.4, and 7.2.5). In all the states energy

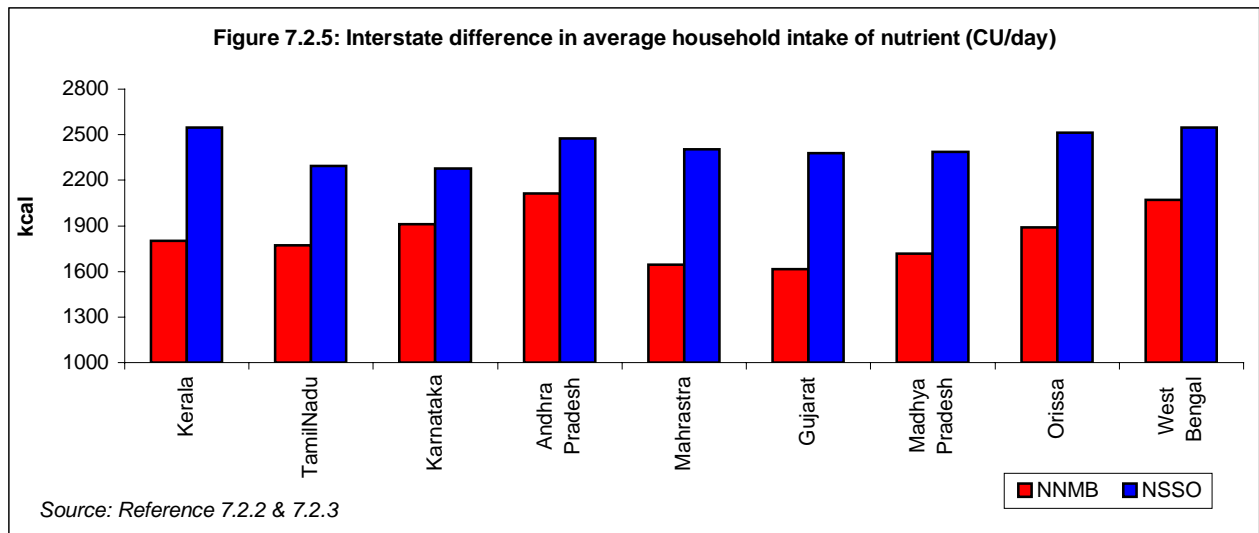




intake computed from NSSO was higher than energy intake computed from NNMB/INP survey. The magnitude of difference is relatively low in Goa, Sikkim, Kerala, Andhra, Bihar, Chandigarh, and Manipur. The difference in energy intake between NSSO urban and INP urban survey were relatively small. The higher energy consumption in NSSO rural surveys might be attributable to the fact that NSSO surveys take into account the total household expenditure on food for computing consumption; food sharing between family, guests or servants will therefore not be taken into account in NSSO surveys, but will be taken into account while computing household dietary intake in NNMB/INP surveys.

Source of dietary energy

Data on time trends in total energy intake, % of energy intake from fat, carbohydrate and protein from NNMB (9 states) and data on in total energy intake, % of energy intake from fat, carbohydrate and protein from all the major states from INP in different age groups is given in Annexure 7.2.7. Carbohydrates remain the major source of energy in Indian dietaries. There has been no major change in % of total energy intake from



carbohydrates and protein and some increase in % dietary energy from fats over the past three decades at the aggregate level. Even now the proportion of dietary energy from fat is far lower than 15% (Figure 7.2.2).

Data from diet surveys suggest that dietary intake has not undergone any major shift towards increase in intake of fat/oils, sugar and processed food. There has not been any increase in energy intake in any age group (Annexure 7.2.8 and 7.2.9). The undernutrition appears to be mainly due to improved access to health care. The reported improvement in child problem of overnutrition in adults and health hazards associated with it appears to be attributable mainly to reduction in physical activity.

Effect of family income on dietary and nutrient intake

Data on dietary and nutrient intake from the pooled data of NNMB survey 1996-97 was analysed with respect to per capita monthly income to assess the effect of income on these parameters (Table 7.2.3 and 7.3.4). The intake of cereals and millets was highest in the lowest socioeconomic group; however, their diet lacked diversity. With increasing incomes, the intake of cereals decreased but dietary diversification increased

It is noteworthy that the intake of protein, energy, total fat and riboflavin increased with increase in income but iron and vitamin A intakes remained lower than the RDA in all income groups. It is therefore not surprising that over 85 % of Indians are anaemic and anaemia remains the most common micronutrient deficiency in the country.

Dietary diversity

National Family Health Survey-2 (NFHS-2, IIPS, 1998-99) collected data on frequency of intake of various types of foods (other than cereals which are consumed everyday by everyone) from women (daily, weekly or occasionally) to assess dietary diversity among 90,000 ever-married women in the age group 15–49 living in 26 states; however details regarding quantity of intake were not obtained from these women. Data from the survey are presented in Annexure 7.2.10 and 7.2.11. All adult women in India consume cereals every day; their diets tend to be monotonous and there is very little dietary diversity. Fruits are eaten daily by only 8 % of women and only one-third of women eat fruits at least once a week. Almost one-third of women in India never eat chicken, meat, or fish

Table 7.2.3: Intake of foodstuffs according to per capita monthly income (g/Cu/Day) NNMB 1996-97						
Intake of foods (CU/day) based on Per Capita Monthly Income (Rs.)						
	<30	30-60	60-150	155-300	>300	RDA
Cereals and Millets	505	484	443	407	381	460
Pulses and Legumes	33	30	36	32	39	40
Green leafy veg.	19	13	11	10	6	40
Milk and milk products	51	69	103	184	284	150
Fats and oils	9	12	14	18	24	20
Sugar and Jaggery	13	21	29	30	36	40

Source: Reference 7.2.2

Table 7.2.4: Intake of nutrients according to per capita monthly income (g/Cu/Day) NNMB 1996-97						
Intake of nutrients (CU/day) as per Per Capita Monthly Income (Rs.)						
Nutrients	<30	30-60	60-150	155-300	>300	RDA
Proteins	53	54	57	59	65	60
Energy	2134	2145	2210	2283	2428	2425
Total fat	20	25	35	51	66	40
Iron	26.6	25.8	25.6	24.9	25.2	28
Vitamin A	330	257	290	306	327	600
Riboflavin	0.7	0.8	0.8	0.9	1.1	1.4

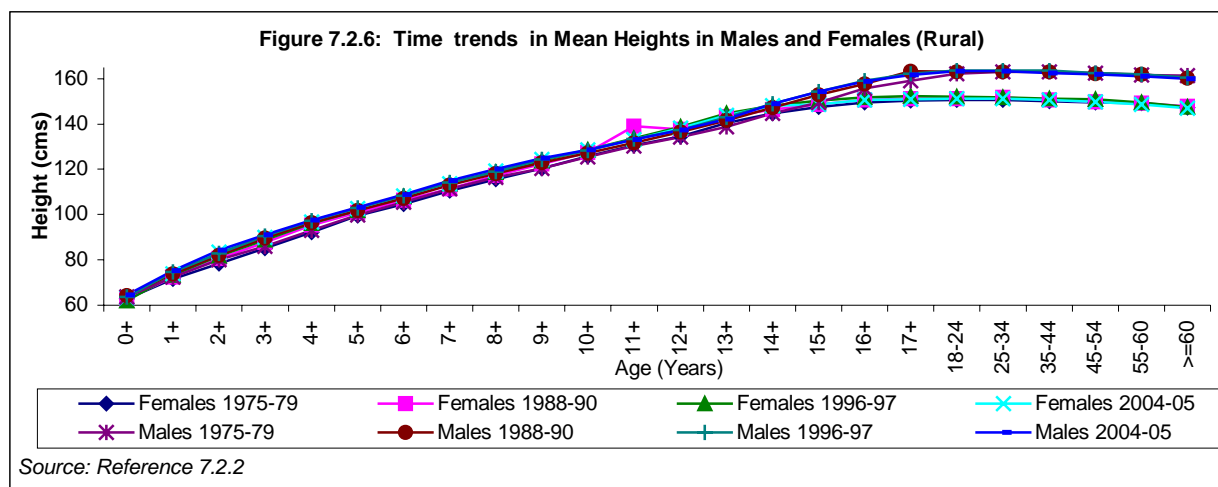
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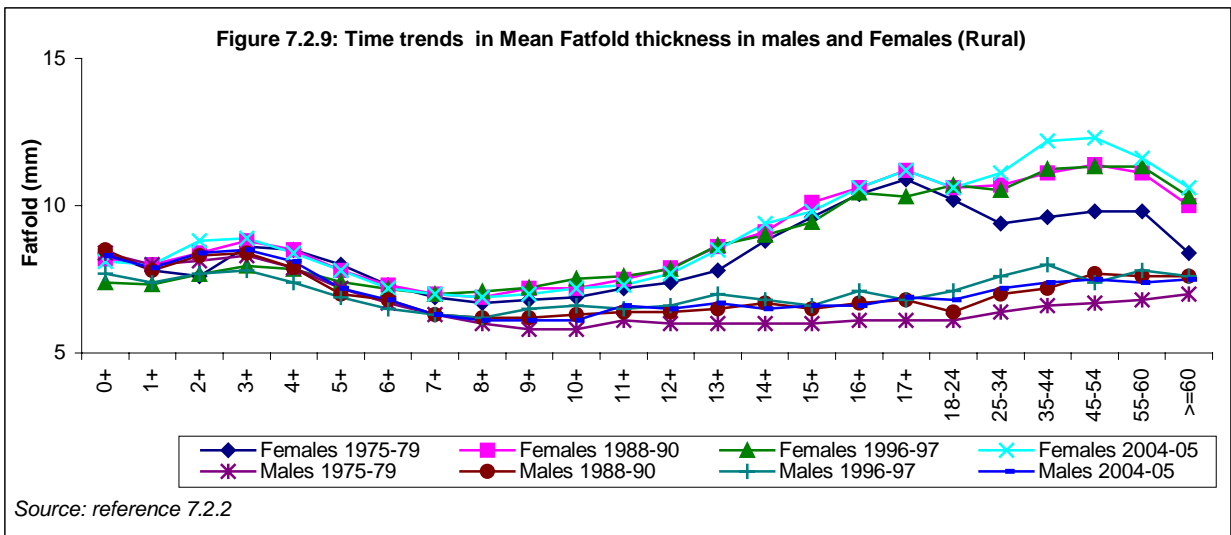
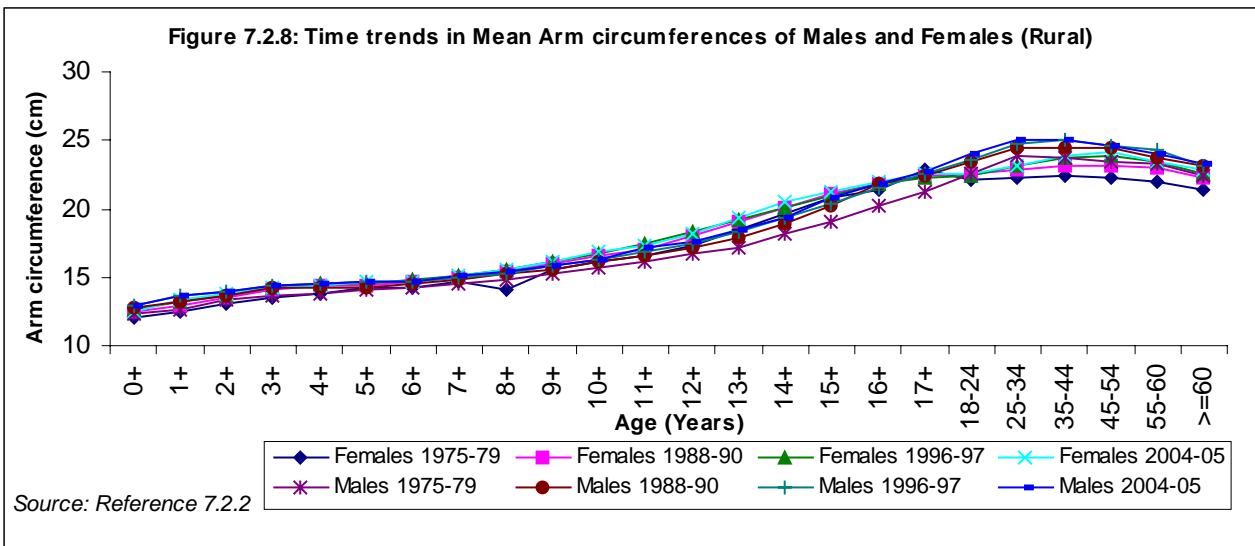
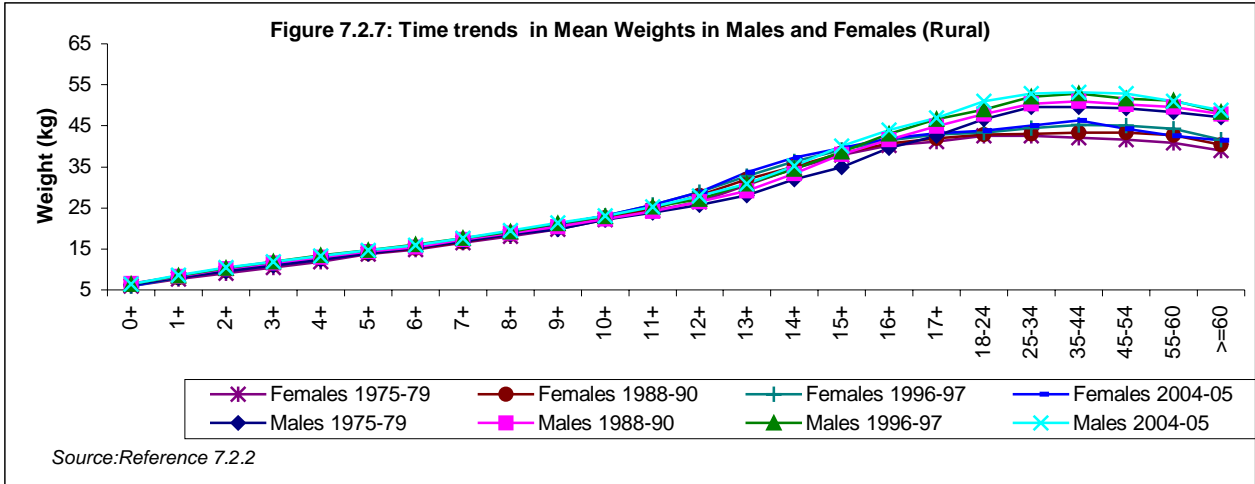
and very few women (only 6 %) eat chicken, meat, or fish every day. Eggs are consumed less often than chicken, meat, or fish.

There were substantial differentials in food intake patterns by selected background characteristics. Poverty has a strong negative effect on dietary diversity. Women in households belonging to low socio-economic group are less likely than other women to eat items from each type of food group listed, and their diet is particularly deficient in fruits and milk or curd. Age does not play an important role in women's intake patterns. Women in urban areas are more likely than women in rural areas to include every type of food in their diet, particularly fruits and milk or curd. Illiterate women have less varied diets than literate women, and seldom eat fruits. There are substantial inter state differences in intake of different types of food.

Time trends in nutritional status

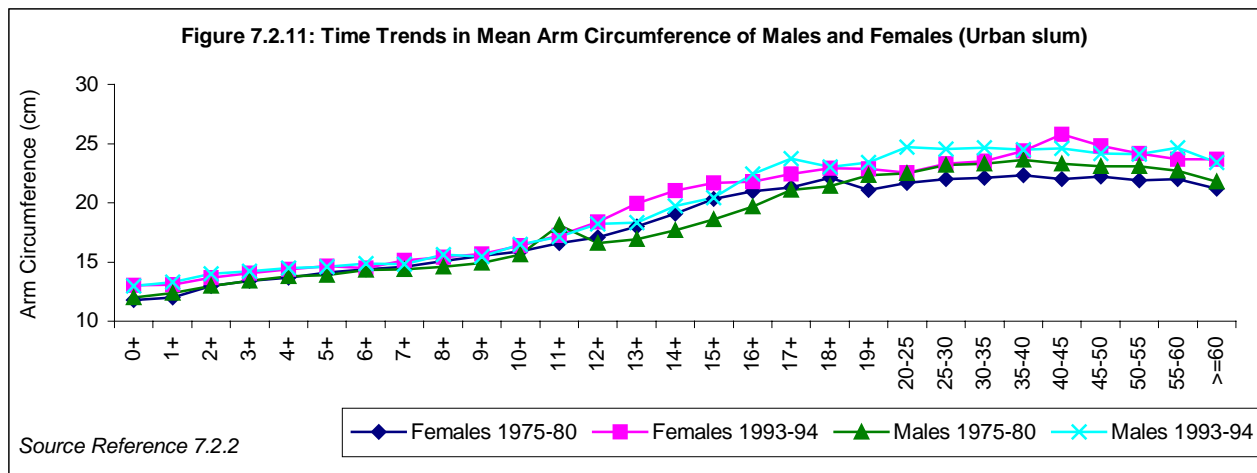
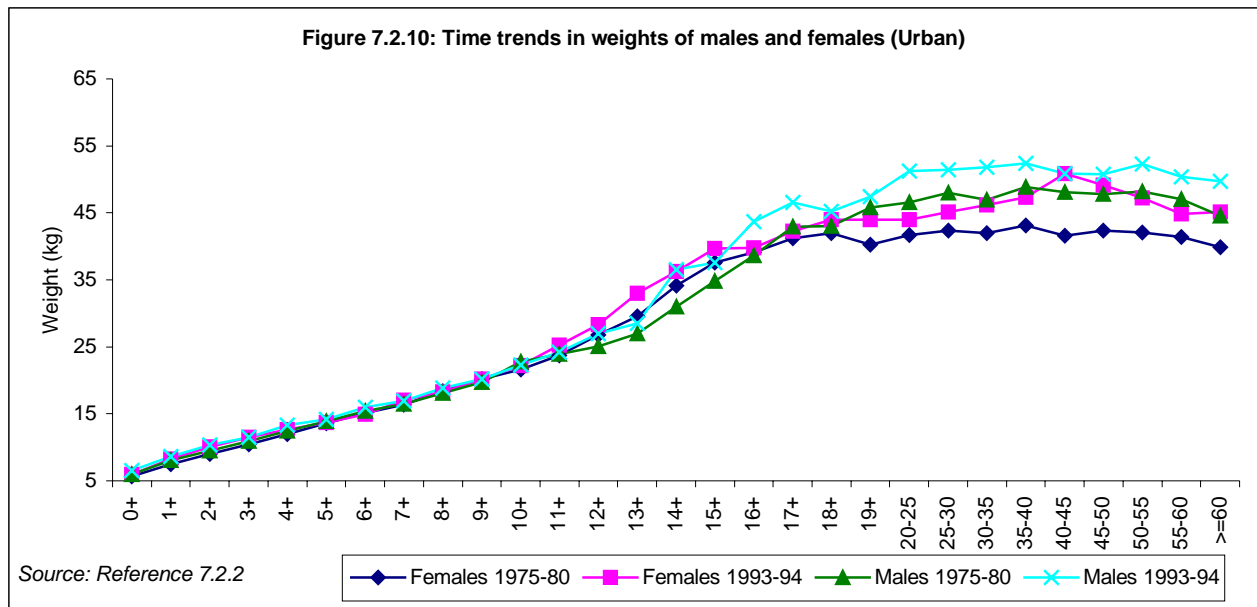
Data NNMB rural surveys on time trends in weight, mid-arm circumference and triceps fat fold thickness in all age groups is shown in Figures 7.2.6, 7.2.7, 7.2.8 and 7.2.9 respectively. Even in rural population there is an increase of about four cms in adult height; the increase in body weight over the period is greater. This is mainly due to fat deposition as shown by progressive increase in the fat fold thickness over this period.

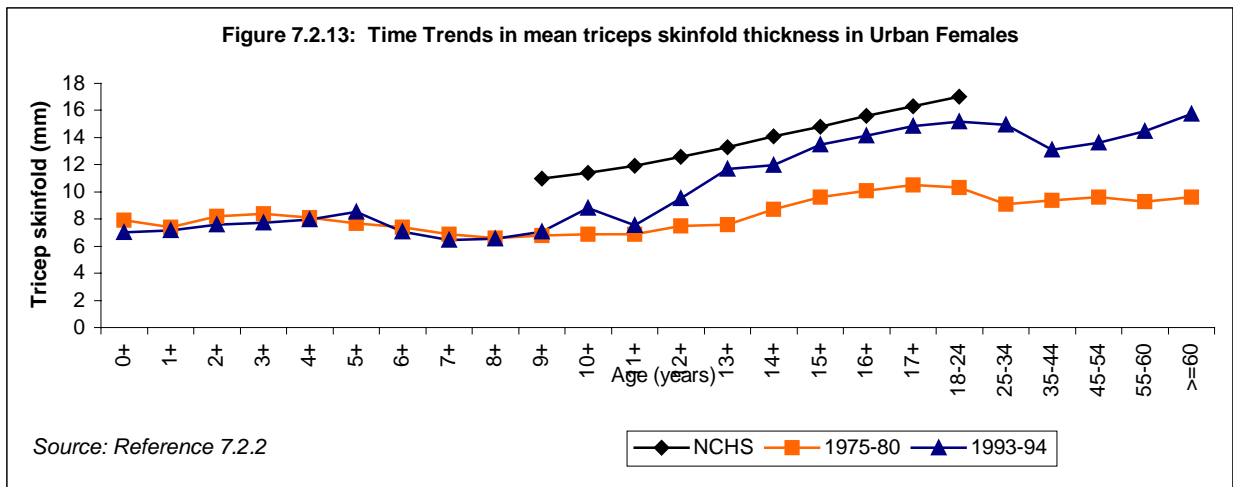
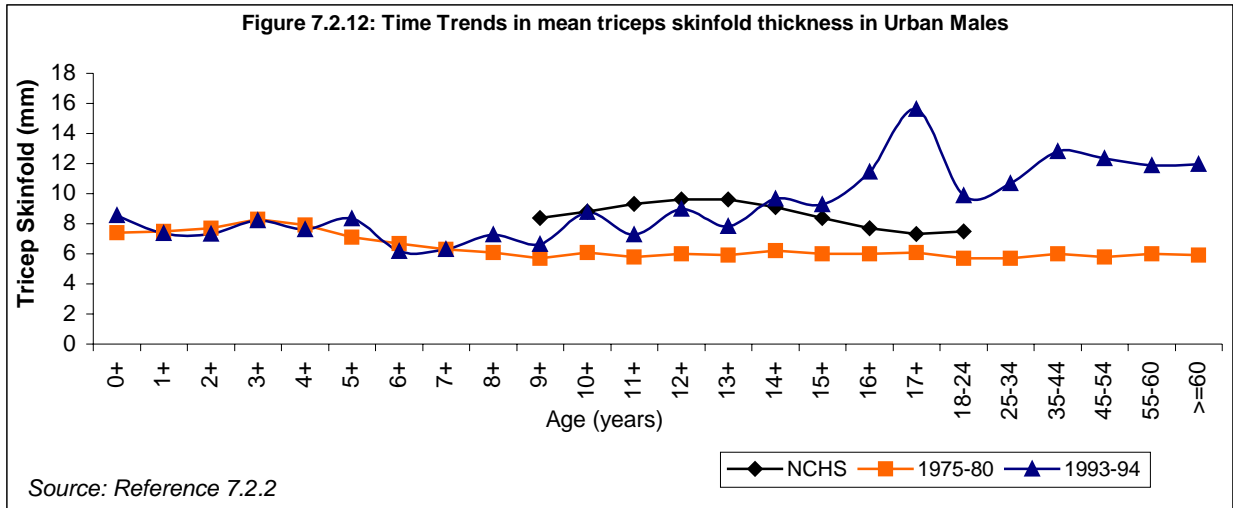




The increase in fat fold thickness over the last three decades begins in childhood and increases with age in both males and females. The increase is more in women.

Data from NNMB surveys in urban slums on time trends in weight; mid-upper arm circumference and fat fold thickness at triceps are shown in Figure 7.2.10, 7.2.11, 7.2.12 and 7.2.13. Mean body weight, mid upper arm circumference and fat fold thickness at triceps are higher in all age groups in 1993 - 94. The increase in body weight is mainly due to increase fat as shown by rising fat fold thickness. Data from NNMB reports shows that both in men and women over years, there have been an increase in body weight and fat fold thickness. The increase in body weight and fat fold thickness is greater in urban slum dwellers.





To sum up data from NNMB surveys indicate that during the past three decades diets continue to be cereal based and monotonous; among poorer segments fruit, vegetable and animal food intake continues to be low. There has been

- a progressive reduction in already low pulse intake
- small increase in fats and oil intake in urban slums
- increase in dietary diversity among rural high income group

There has been reduction in energy and protein intake except among the poor; over all there has been a small decrease in total energy and protein intake in both urban and rural areas.

- some increase in dietary energy derived from fat and a reciprocal reduction in %age of dietary energy derived from carbohydrate.

Intakes of most micronutrients continue to be low. Iron intake is low; this coupled with poor bio-availability of iron from Indian diets is responsible for high prevalence of anaemia. There has been:

- small 2-4 cm increase in height over three decades both in urban and rural areas
- there has been a greater increase in weight, more in the urban than in rural areas

The weight gain appears to be mainly due to increase in body fat-the increase in fat fold thickness is more in urban areas

References:

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