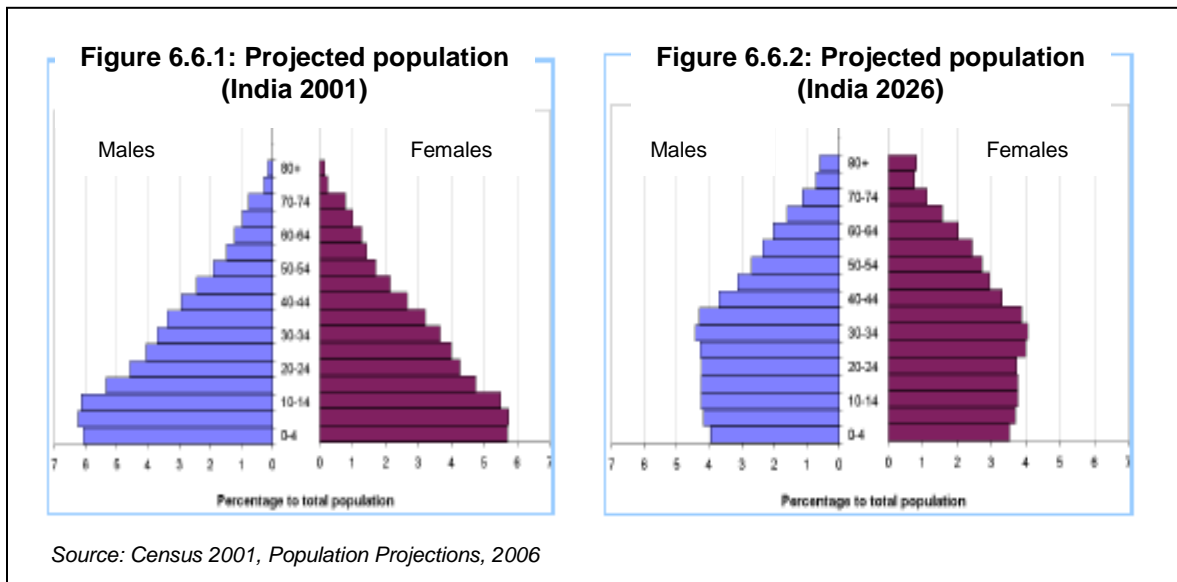
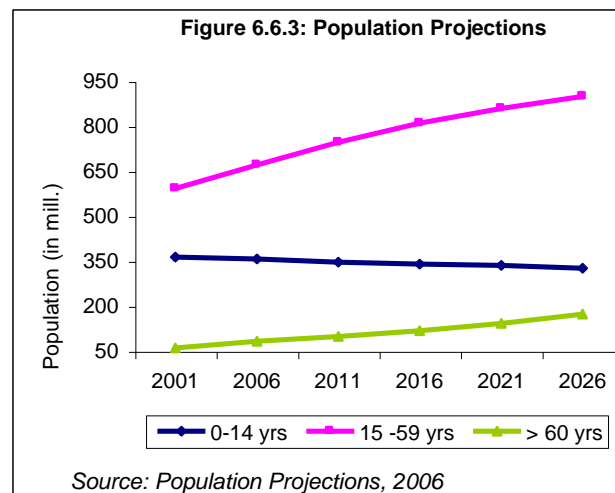


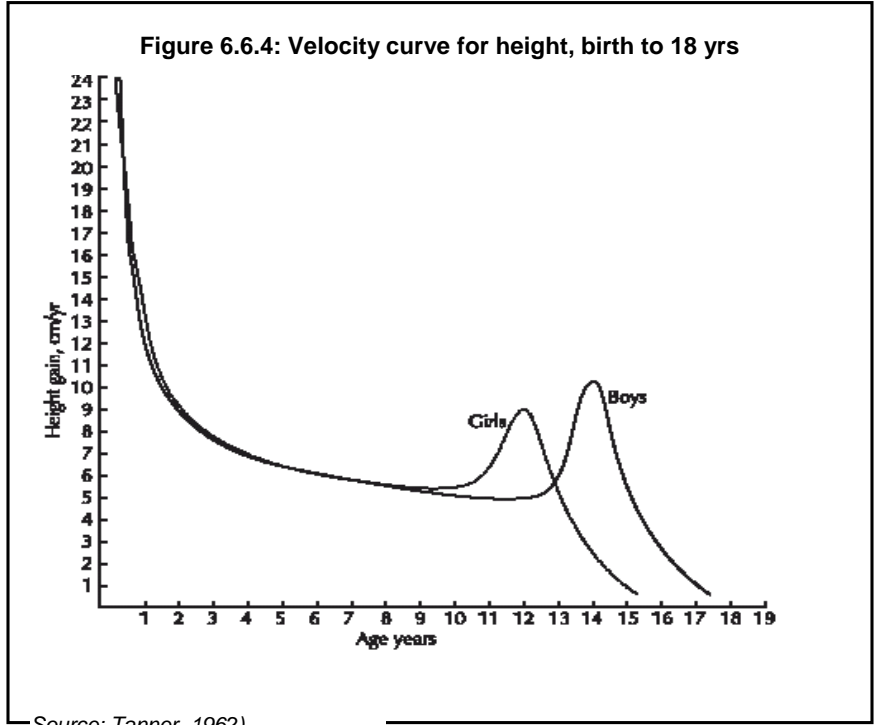
## 6.6 EARLY SCHOOL YEARS AND ADOLESCENCE

School age group (5-18 yrs) spans the period between preschool years and adult life. Census 2001 (Figure 6.6.1) has shown this age group forms a very large proportion of the population. Population projections (Figures 6.6.2 & 6.6.3) indicate that over the next decade this age group will show by far the largest increase in numbers but subsequently there will be a relatively sharp reduction in both numbers and proportion of the 5-18 year olds. It is therefore essential that over the decade efforts be focused on improving health and nutritional status of school age children, irrespective of the fact whether they are studying in school or school dropouts so that they reach adult life with optimal nutrition and health status.



School age is a period of rapid growth with a growth spurt in peri-pubertal years (Figure 6.6.4). The growth velocity is slower during the early school years (5-9 yrs), 80% of adolescent growth is completed in early adolescence (10-15 years); there is marked deceleration in weight and height velocity in the post-pubertal phase. Adolescent growth spurt in girls begins about 10 years and peak velocity is at about 12 years. This age of adolescent growth spurt varies from country to country, being lowest in developed countries and highest in poorest countries. The adolescent growth spurt in boys begins 2-3 years later than girls and peaks by 16-17 years.

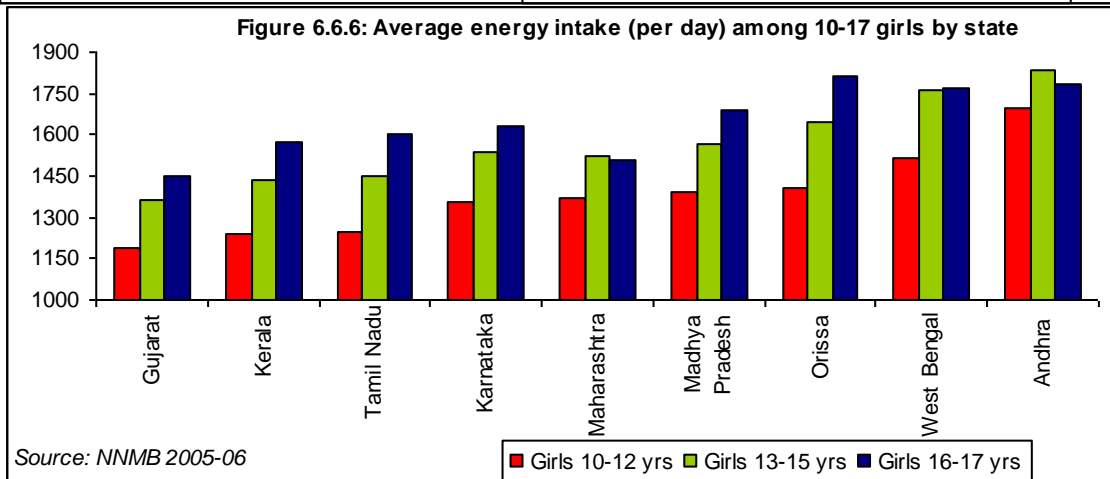
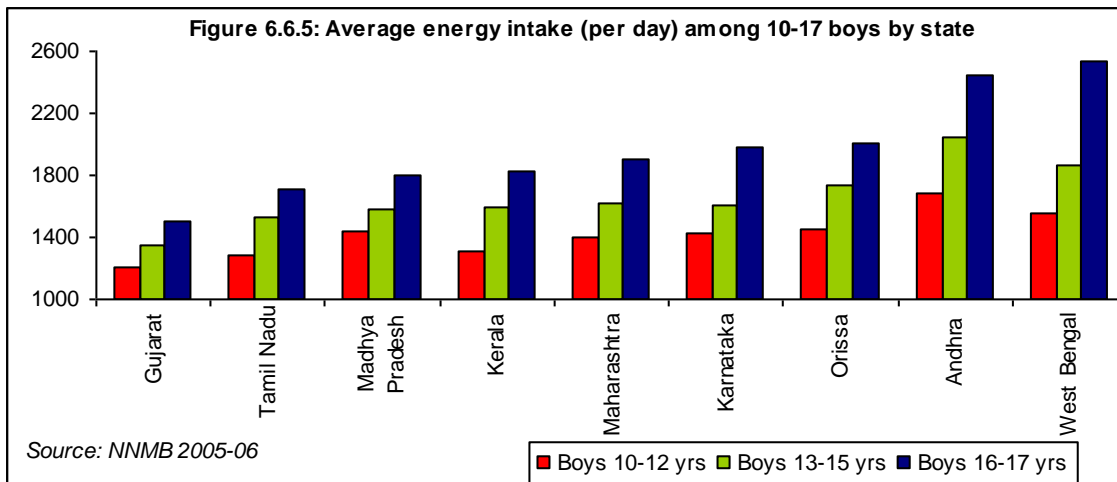




### Dietary Intake

Data from the NNMB repeat surveys have shown that energy intake in children and adolescents improved till nineties and then showed a decline. Energy gap in school age children is lower than the gap in preschool children but larger than the gap in adults from the same households. Their protein and micronutrient intakes continue to be low (Table 6.6.1) (Annexure 6.6.1 & 6.6.2). There are large interstate variations in energy intake both in boys and girls (Figure 6.6.5 & 6.6.6). Energy intakes are lowest in Gujarat and higher in West Bengal and Andhra Pradesh.

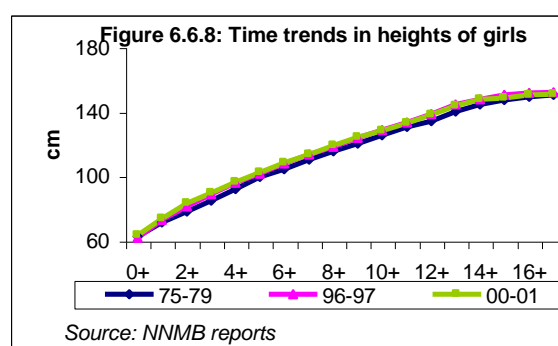
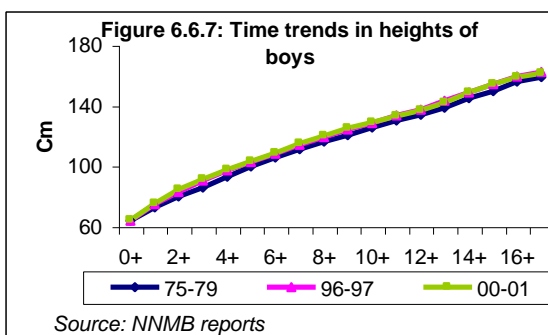
Ages	Total Dietary Energy Intake (Kcals)				
	NNMB				INP
	'79	'96	'01	'05	'96
<b>Males</b>					
4-6	1015*	1154*	1066	1020	1300
7-9	1240*	1417*	1294	1230	1550
10-12	1439	1738	1524	1423	1847
13-15	1618	2004	1856	1645	2185
16-17	1926	2369	2114	1913	2514
<18 <sup>#</sup>	2065	2488	2225	2000	2592
<b>Females</b>					
10-12	1394	1635	1500	1389	1482
13-15	1566	1848	1689	1566	2097
16-17	1704	2030	1856	1630	2327
<18 <sup>#</sup>	1698	2106	1878	1738	2293
*Median values					
Source: NNMB 1979, 2002, 2005-06; INP 1996					

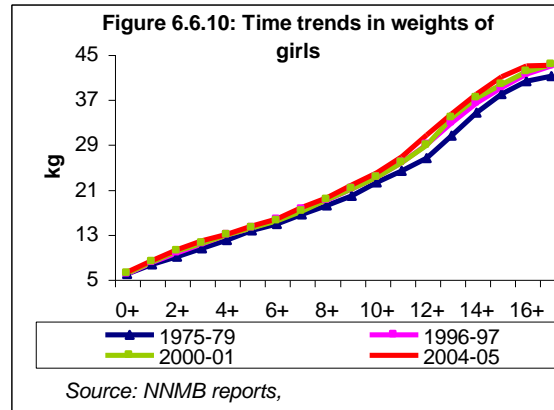
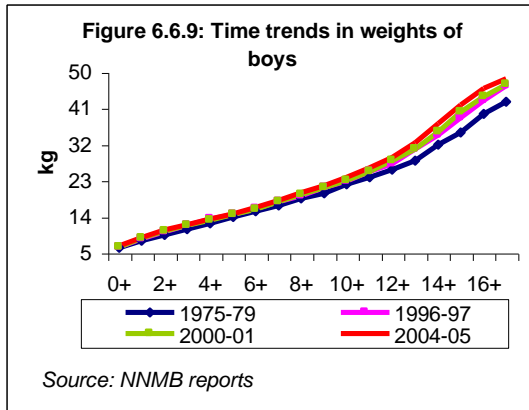


## Nutritional Status

### Time trends

Data from the NNMB survey showed that though there has not been any substantial increase in the dietary intake of children and adolescents, there has been some improvement in height (2.5-6 cms), weight (2-6 kg) and BMI between 1975-79 and 2005-06 (Figures 6.6.7-6.6.10). Data from NNMB also shows that over this period there has been some increase in over nutrition among children and adolescents. Though there has been improvement in the height and weight over the past 25 yrs, stunting and under weight are common in rural children even in year 2005.

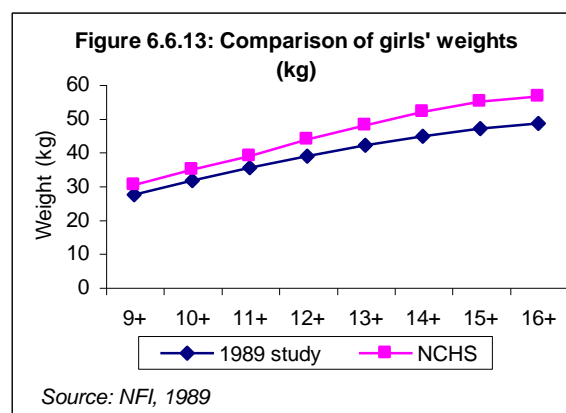
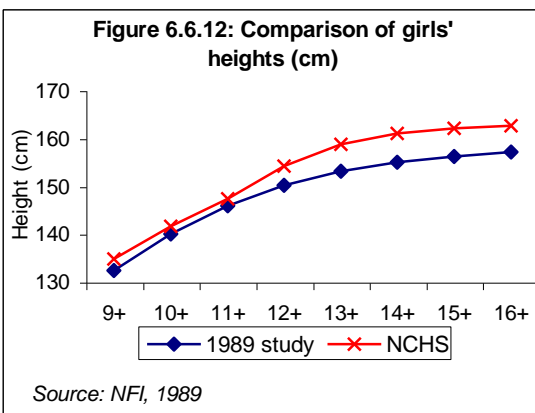
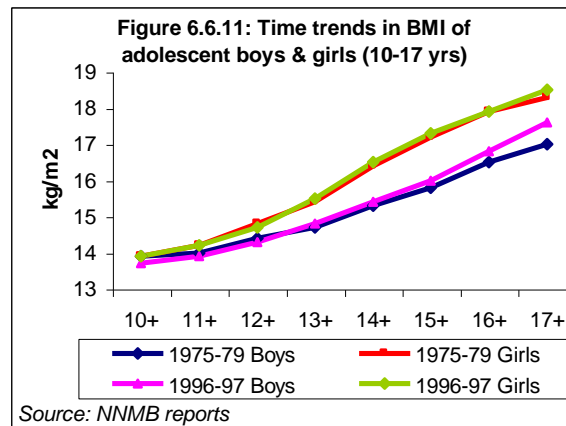




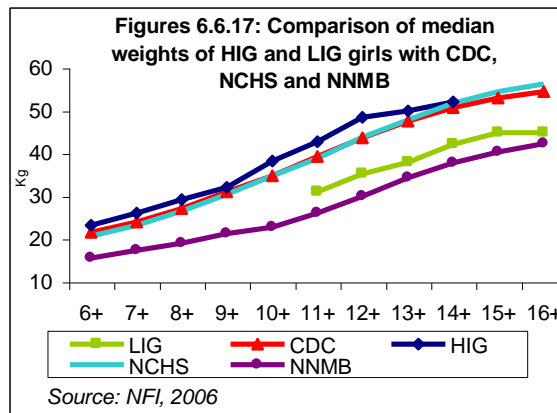
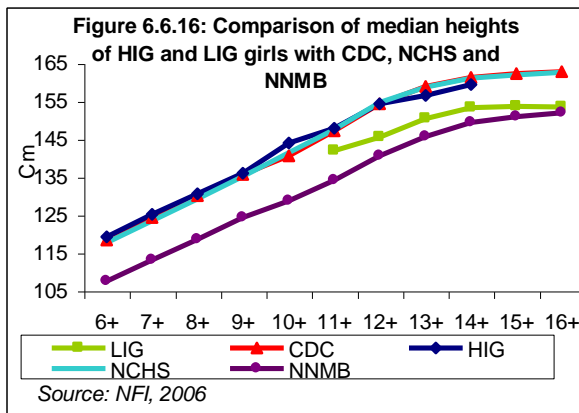
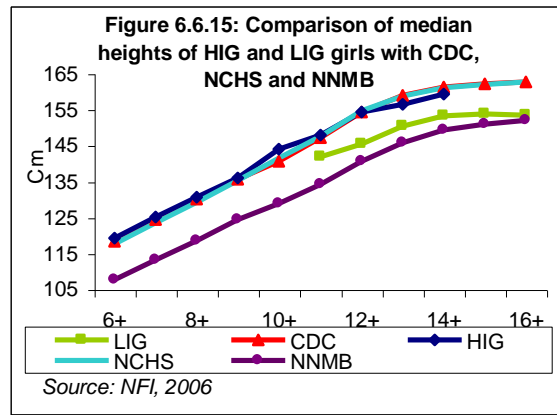
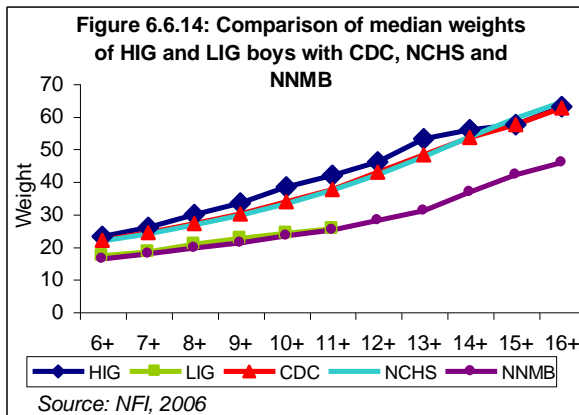
### Interstate differences

Data from NNMB showed that there are substantial interstate differences in underweight and stunting among rural girls and boys even in 2005 (Annexure 6.6.3 & 6.6.4).

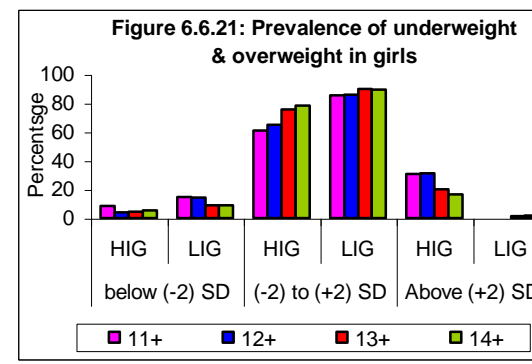
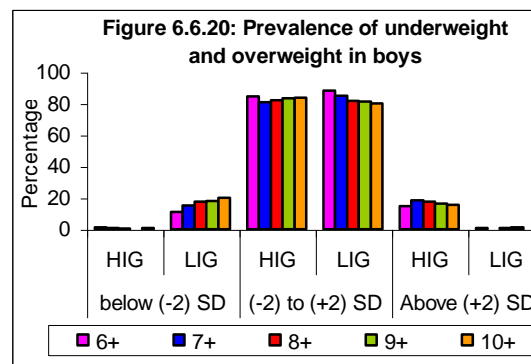
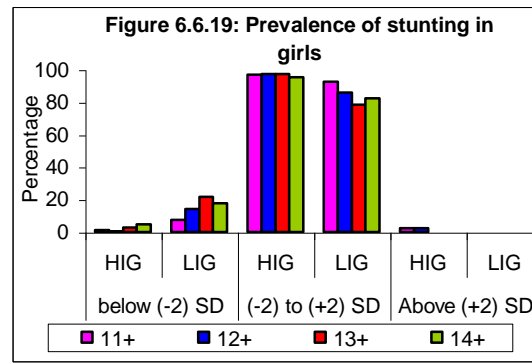
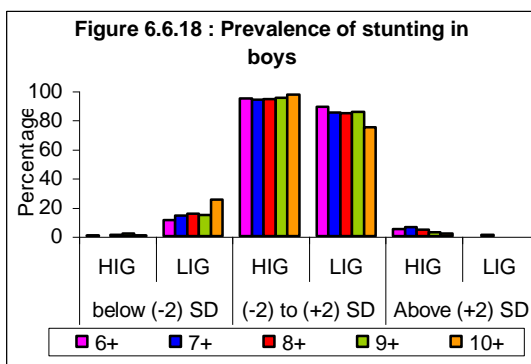
In 1989 NFI carried out a study to assess growth patterns of girls in urban areas from affluent families in Delhi, Bombay, Calcutta, and Coimbatore. Mean weight and height of these affluent girls were lower than the mean weight and height of the NCHS standards (Figure 6.6.12 & 6.6.13). Delhi girls were taller and heavier than girls from Coimbatore and Calcutta.

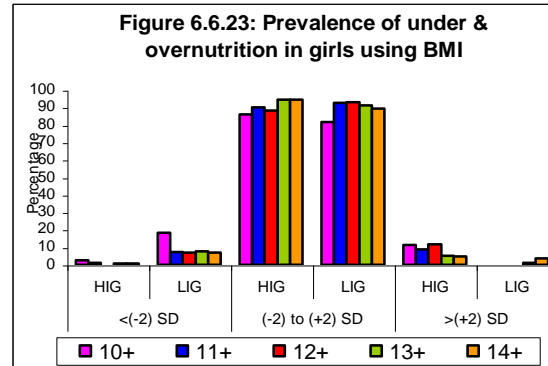
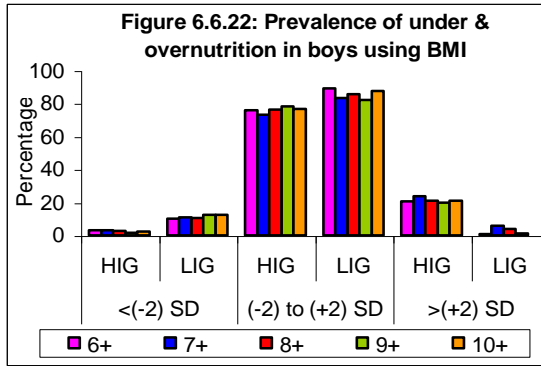


During the last decade, there had been numerous reports on the emerging problem of overnutrition among affluent urban children and adolescents. NFI carried out a cross sectional study in Delhi school children studying in government schools (predominantly low income group LIG) and public schools (predominantly high income group HIG) to assess prevalence of undernutrition and overnutrition. LIG children were shorter and weighed less as compared to HIG children and also the CDC standards (Figures 6.6.14 -17).

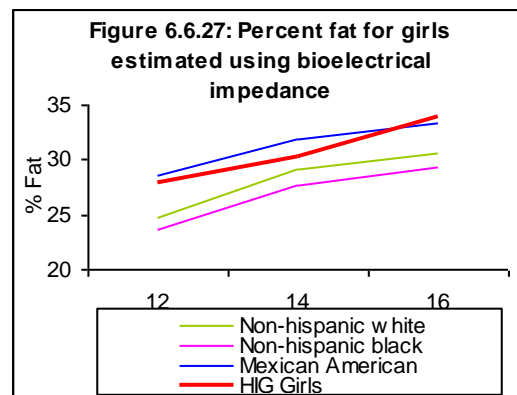
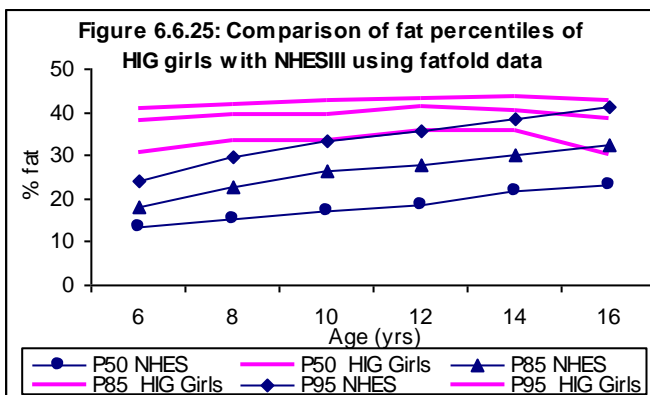
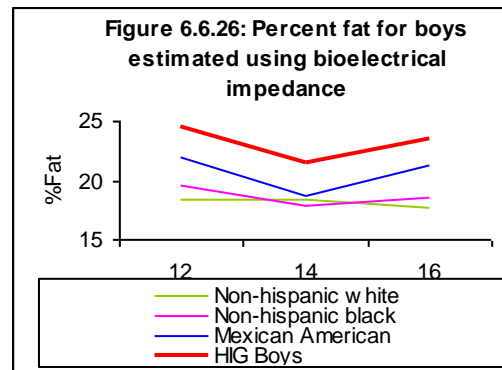
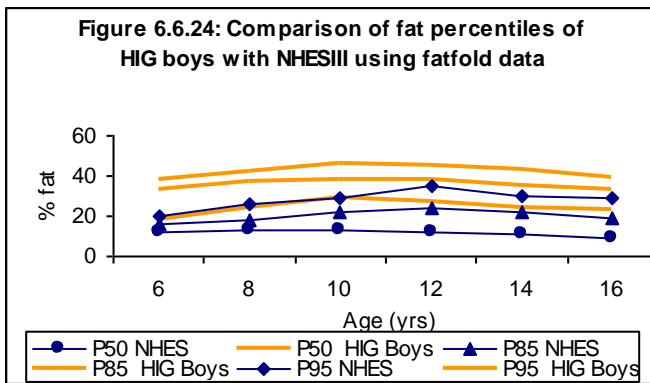


Prevalence of undernutrition ( $< \text{mean}-2\text{SD}$  of weight, height and BMI CDC standards) was higher in LIG children as compared to HIG children. Prevalence of overnutrition ( $> \text{mean}+2 \text{SD}$  of weight and BMI CDC standards) was higher in HIG children (Figure 6.6.18-6.6.23).





Data from the study also showed that HIG children had higher body fat as compared to the US standards (Figures 6.6.24-27). Numerous studies across the country have shown that the emerging problems of overnutrition among children are mainly due to changing lifestyle and substantial reduction in physical activity.



### Problems faced by adolescents

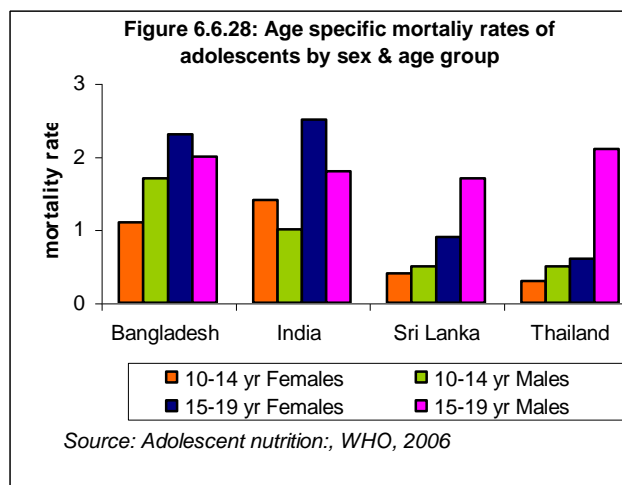
In the current phase of demographic transition in South East Asia, adolescents constitute about 18-25% of the total population. In all countries boys outnumber girls, though the magnitude of difference is low in Myanmar, Thailand and Sri Lanka (Table 6.6.2).

Data on mortality rates of adolescents by sex and age group for four SEAR countries (Bangladesh, India, Sri Lanka and Thailand) is given in Figure 6.6.28. Over decades adolescents have not received the attention that they deserve because of the relatively low mortality rate during this period-especially among boys. In Bangladesh and India, mortality rates for females were higher than males in the older age group perhaps due to early marriage and pregnancy related deaths in adolescent girls (Figures 6.6.29 & 6.6.30).

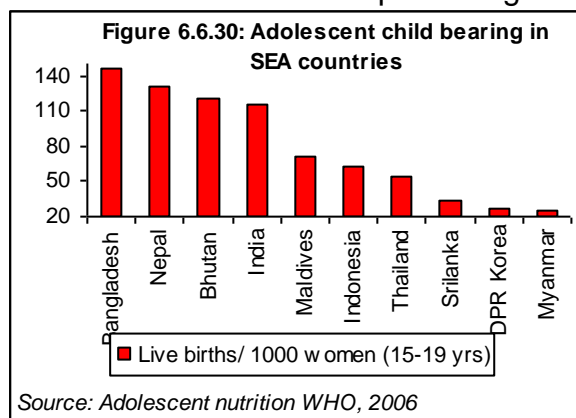
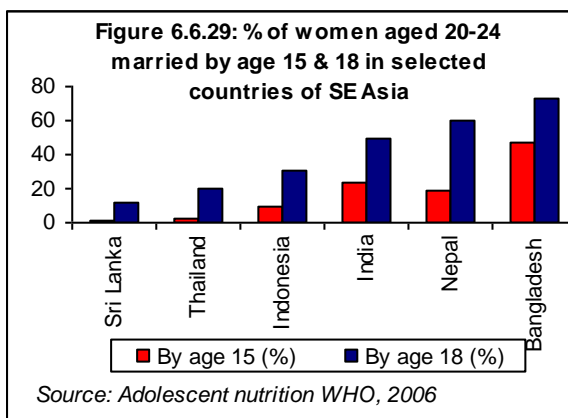
**Table 6.6.2: Adolescent population (%) in South-East Asia Region**

SEAR	10-14 yrs		15-19 yrs	
	M	F	M	F
Bangladesh	6.0	5.8	5.5	5.2
Bhutan	6.2	6.0	5.7	5.5
India	5.4	5.1	5.2	4.8
Indonesia	4.9	4.7	4.9	4.7
Maldives	6.2	5.9	5.9	5.6
Myanmar	5.3	5.2	4.9	4.9
Nepal	6.2	5.8	5.5	5.1
Srilanka	4.2	4.1	4.4	4.2
Thailand	4.2	4.1	4.3	4.2

Source: Adolescent Nutrition, WHO 2006



In India, about one sixth of adolescent girls have conceived / delivered during adolescence. There are substantial interstate differences in the age at marriage and first pregnancy. About one fourth of adolescent girls have already conceived / delivered in West Bengal and Bihar. At the other end of the spectrum are states like Kerala, Tamil Nadu, Punjab, Himachal and Delhi where adolescent marriage and conception are relatively uncommon (Annexure 6.6.5). Data from NFHS also indicates that there has been some decline at the all India level in percentage of



adolescents getting married before the legal age of marriage (Annexure 6.6.5). Data from District Level Household Survey indicates that even within states there are large inter-district variations in adolescent marriage below the legal age of marriages (Annexure 6.6.6). Adolescent pregnancies have adverse effects both

on maternal nutrition and on birth weight of the offspring. It is therefore essential to effectively implement interventions aimed at postponing age at marriage and age at first conception in order to reduce adverse consequences of adolescent pregnancy.

The importance of nutrition and health education to adolescents is well recognized. After extensive work in rural areas of Rajasthan, Madhya Pradesh and Uttar Pradesh, Nutrition Foundation of India developed two modules for education for adolescent girls, which has been widely distributed.

At the other end of the spectrum are the urban affluent adolescents among whom overnutrition has steeply increased because of sedentary life style and increasing intake of energy dense junk food. In view of the fact that overnutrition in childhood and adolescence is associated with increased risk of CVD in adult life, it is essential to improve physical activity and promote balanced food intake in school children.

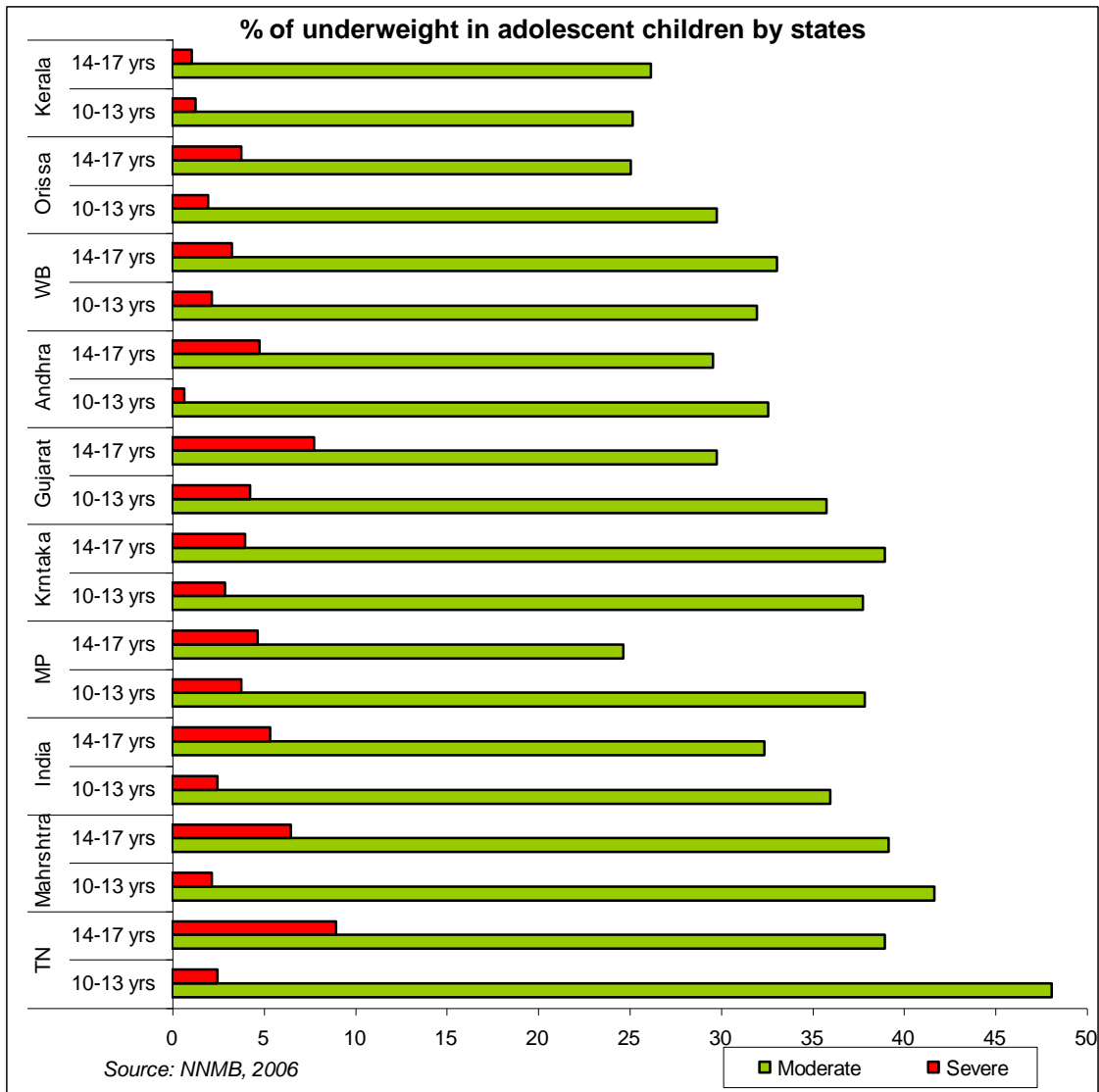
## References

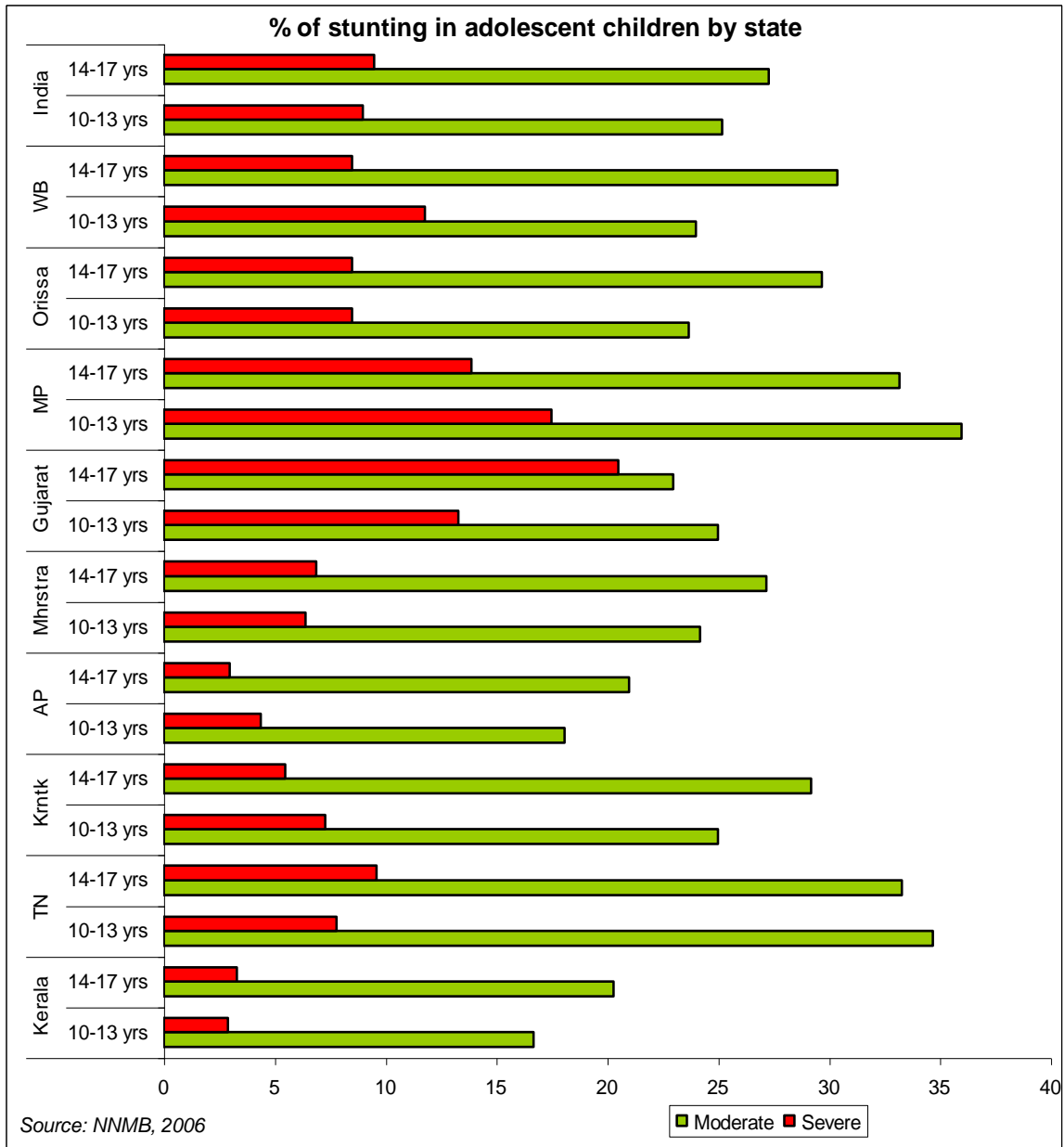
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- 6.6.3: NNMB National Nutrition Monitoring Bureau.** 1979-2005. *NNMB Reports*. National Institute Of Nutrition, Hyderabad.
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- 6.6.5:** [http://searo.who.int/LinkFiles/Nutrition\\_for\\_Health\\_and\\_Development\\_Possible\\_Actions\\_at\\_the\\_Country\\_Level.pdf](http://searo.who.int/LinkFiles/Nutrition_for_Health_and_Development_Possible_Actions_at_the_Country_Level.pdf), last accessed on 20/09/07
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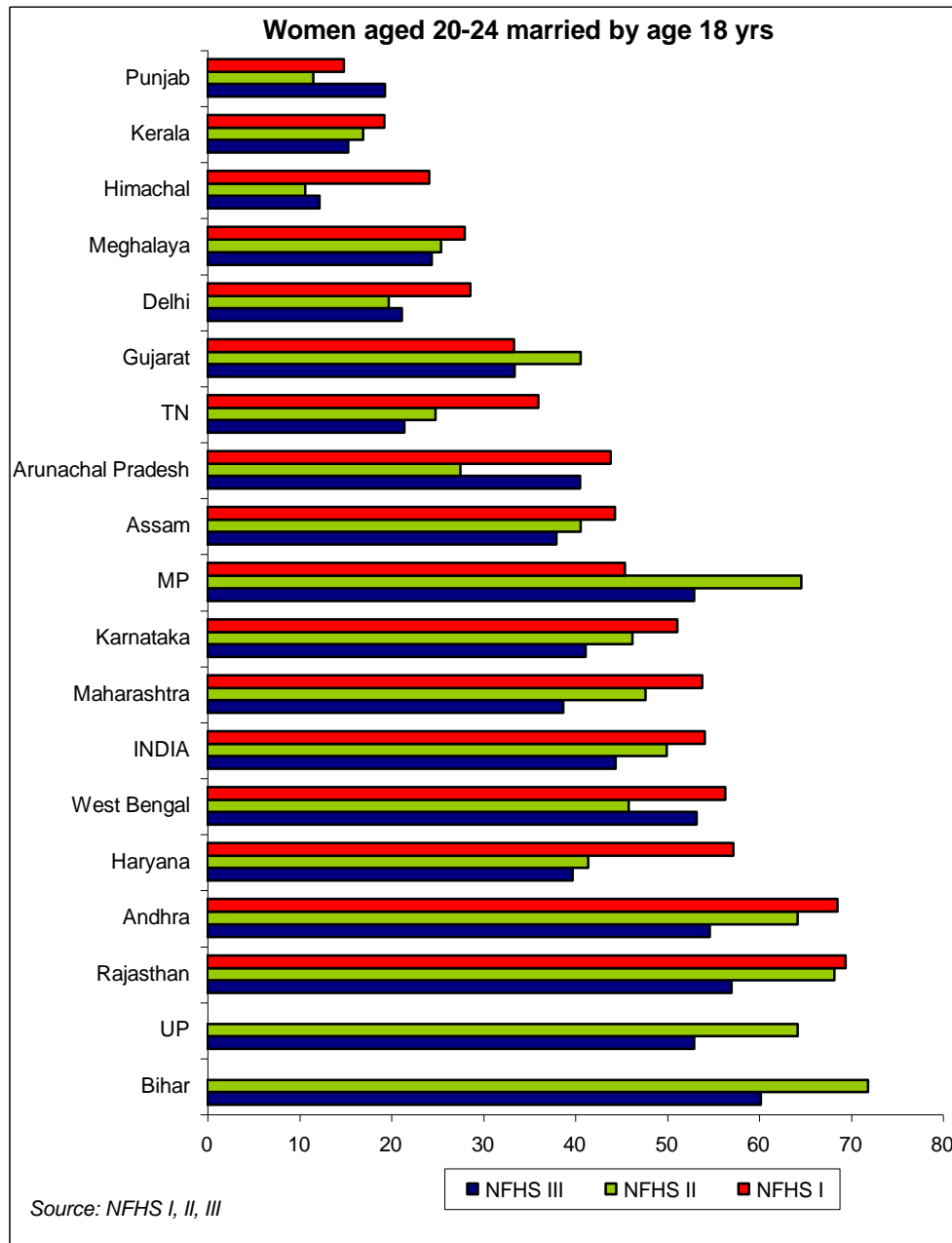


Age wise distribution of average intake of nutrients-NNMB												
			Protein (g)	Tot Fat (g)	Energy (Kcal)	Calcium (mg)	Iron (mg)	Vit A (ug)	Thiamin (mg)	Ribo (mg)	Niacin (mg)	Vit. C (mg)
4-6	Children	1975-79	28.4	10.7	1015	223	13	82	0.6	0.4	6.5	14.4
		1996-97	29.4	13.9	1154	224	12.9	96.5	0.6	0.5	6.6	17.5
		2000-01	28.2	15	1066	239	8.1	127	0.7	0.4	8.1	24
		2004-05	28.7	12.7	1020	272	8.6	166	0.7	0.4	7.9	25
7-9	Children	1975-79	33.6	12.2	1240	240.7	15.5	90	0.5	7.9	17.5	20.4
		1996-97	36.2	15.1	1417	261.5	16.4	107.5	0.7	0.6	8.4	20.4
		2000-01	34	16.9	1294	278	10.3	148	0.9	0.4	10.0	28
		2004-05	33.8	14.4	1230	291	10.2	199	0.8	0.4	9.7	29
10-12	Boys	1975-79	39.50	14.00	1438.80	270.50	19	101	1.00	0.60	10	22
		1996-97	43.10	19.30	1719.10	319.95	20	131	0.90	0.70	10	24
		2000-01	40.4	19.9	1524	326	12.2	168	1.0	0.5	11.9	33
		2004-05	39.2	16.2	1423	330	12	221	0.9	0.5	11.4	35
	Girls	1975-79	39.10	13.90	1393.50	268.20	18	105	0.90	0.6	9	20
		1996-97	40.45	17.85	1613.95	312.70	19	111	0.80	0.7	9	24
		2000-01	39.4	18.9	1500	304	12.1	174	1.0	0.5	11.7	32
		2004-05	37.8	14.8	1389	307	11.5	205	0.9	0.5	11.1	33
13-15	Boys	1975-79	43.30	16.70	1618.45	304.45	21	114	1.00	0.60	10	24
		1996-97	48.85	21.95	1899.10	367.55	21	138	1.00	0.80	12	27
		2000-01	48.8	24.7	1856	407	15.4	196	1.3	0.7	14.4	40
		2004-05	44.6	18.3	1645	363	13.3	215	1.1	0.6	13.3	37
	Girls	1975-79	41.25	15.90	1565.55	299.40	20	103	1.00	0.60	10	22
		1996-97	44.40	19.50	1811.80	324.20	21	133	0.90	0.70	11	28
		2000-01	43.7	21	1689	355	12.9	180	1.1	0.6	13	36
		2004-05	42	17.8	1566	341	13	251	1.0	0.5	12.7	37
16-17	Boys	1975-79	54.80	17.10	1926.50	327.70	25	120	1.30	0.80	14	24
		1996-97	58.10	26.40	2275.80	437.60	26	184	1.10	1.00	14	37
		2000-01	54.7	25.6	2114	437	16.7	183	1.4	0.7	16.2	37
		2004-05	53	21	1913	433	16.4	241	1.3	0.7	15.6	42
	Girls	1975-79	44.00	16.70	1704.30	317.30	22	115	1.00	0.60	11	26
		1996-97	50.10	23.70	2018.80	361.30	22	145	0.90	0.80	12	32
		2000-01	49.1	24.2	1856	415	15.3	213	1.2	0.6	14.4	40
		2004-05	43.9	19.1	1630	373	13.5	261	1.1	0.6	12.8	38

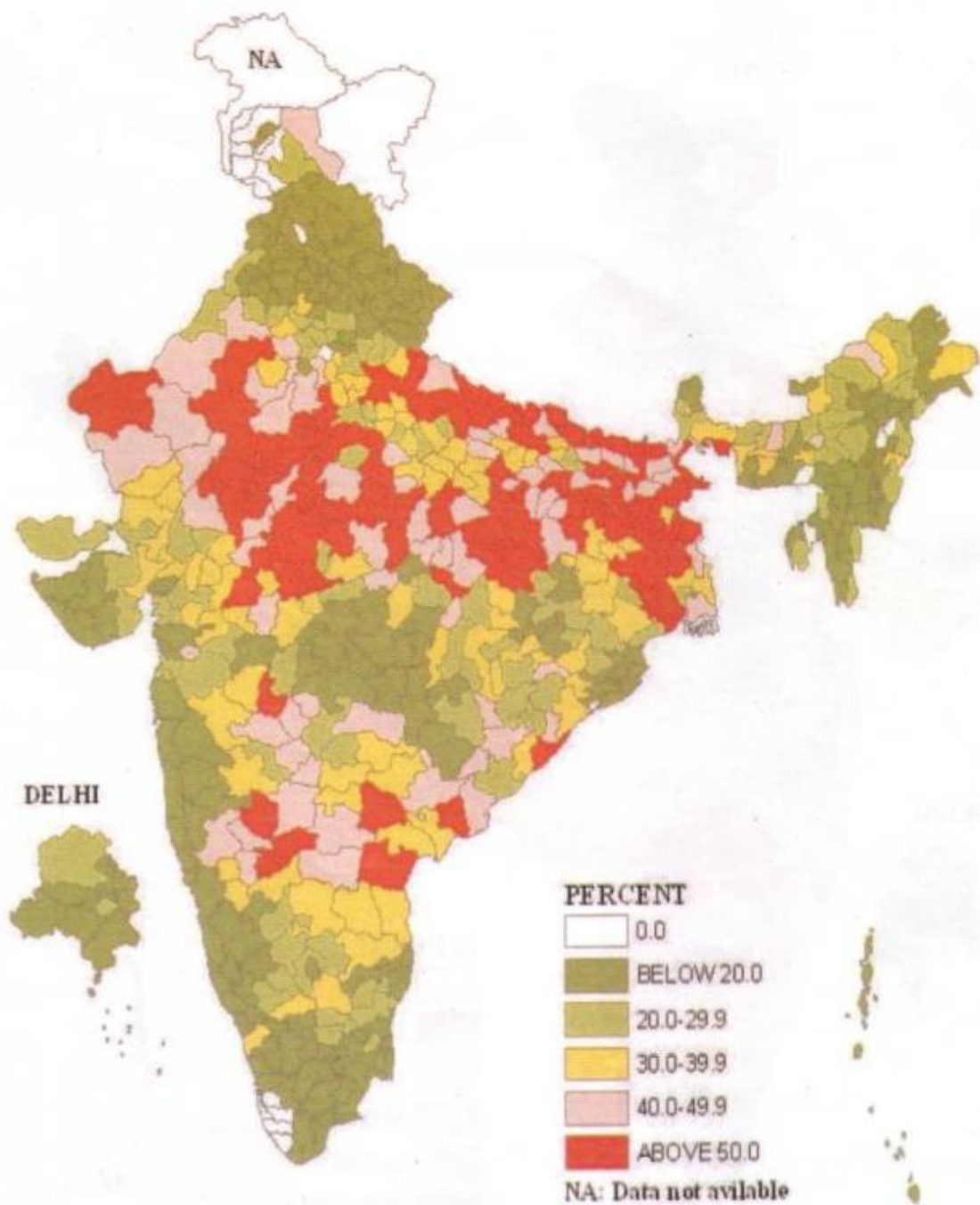
<b>Average intake of nutrients -INP survey</b>										
<b>Age group/ sex</b>	<b>Protein gm</b>	<b>Fats gm</b>	<b>Energy Kcal</b>	<b>Calcium mg</b>	<b>Iron mg</b>	<b>Thiamin mg</b>	<b>Riboflavin mg</b>	<b>Niacin mg</b>	<b>Vit. C mg</b>	<b>Vit. A µg</b>
<b>4-6 years</b>										
Boys	40.6	20.3	1300	433	13	1.03	0.62	11.1	37.4	250
Girls	41.2	19.1	1299	440	11.3	1.03	0.63	11.3	38.9	241
RDA	30	25	1690	400	18	0.8	1	11	40	400
<b>7-9 years</b>										
Boys	50	21.6	1570	468	20	1.37	0.72	13.5	41.5	258
Girls	49.7	23.5	1520	472	18.3	1.12	0.8	15.8	43.3	247
RDA	30	25	1950	400	26	1	1.2	13	40	600
<b>10-12 years</b>										
Boys	56.8	24.9	1847	522	18.7	1.52	0.83	16.2	50	307
RDA	54	22	2190	600	34	1.1	1.3	15	40	600
Girls	45.7	20.3	1482	426	15.1	1.23	0.68	13	39.6	310
RDA	57	22	1970	600	19	1	1.2	13	40	600
<b>13-15 years</b>										
Boys	67.1	28.8	2185	612	22.1	1.82	1	19.6	57.4	356
RDA	70	22	2450	600	41	1.2	1.5	16	40	600
Girls	65.6	28.4	2097	615	21.4	1.71	0.98	18.7	60.1	369
RDA	65	22	2060	600	28	1	1.2	14	40	600
<b>16-17years</b>										
Boys	79.2	31.6	2514	752	25.7	2.03	1.2	22.7	71.1	416
RDA	78	22	2640	500	50	1.3	1.6	17	40	600
Girls	74.2	31.7	2327	702	23.9	1.87	1.17	21.9	67.5	397
RDA	63	22	2060	500	30	1	1.2	14	40	600
<b>&gt;18 years</b>										
Boys	79.7	35.2	2592	716	26.1	2.12	1.18	22.6	66.8	397
RDA	60	20	2425	400	20	1.2	1.4	16	40	600
Girls	70.8	32.1	2293	659	23	1.84	1.04	20.3	62.6	376
RDA	50	20	1875	400	30	0.9	1.1	12	40	600







Percentage of girls marrying below legal age at marriage



Source: DLHS-RCH 2002-04