CHAPTER 4

RESULTS AND DISCUSSION

On the basis of the objectives the results are discussed under four major sections as below:

Section I

Socio-economic profile of the adolescent boys and girls

Section II

Nutritional health status of the adolescents and gender differences

- Height for age
- Weight for age
- Prevalence of under-nutrition
- Body mass index
- Mid upper arm circumference
- Skin fold thickness
- Iron deficiency anaemia
- Morbidity profile

Section III

Proximal and distal determinants of nutritional status of adolescent boys and girls

- Proximal Factors
    - Frequency of selected protective food consumption across the three seasons
    - Intra-household comparison of nutrient intake as % RDA
    - Intra-household food distribution and nutrient intake expressed as mean scores
    - Haemoglobin status and under-nutrition
    - Nutrient intake and under-nutrition
- Distal factors

Section IV

Perceptions of adolescent boys and girls regarding adolescent growth, nutrition, health and gender Issues

- Perceptions of adolescent boys and girls regarding their own nutritional health status
- Perceptions of the adolescents regarding their own height and weight
- Perceptions of the adolescent boys and girls regarding the period of adolescence
- Perceptions of the adolescent boys and girls regarding nutritious diet
- Perceptions of the adolescent boys and girls regarding nutrition and gender
- Perceptions of adolescent boys and girls regarding gender roles and responsibilities
- Knowledge About Pregnancy, Lactation and Childcare Among Older Adolescent Girls

inadequately ventilated. As for ventilation facility in the kitchen, only 8 % of the houses were adequately ventilated. In three fourths of the house, the kitchens were partially ventilated. The table further shows that as a domestic fuel, 60 % and 40 % used kerosene and gas respectively. In addition to or as a substitute, wood and cow dung were also used as domestic fuel.

Apart from PCI, availability of appliances such as fan, TV, radio, tape, fridge, iron, vehicle and mixer in the house hold was also assessed to obtain better understanding of their economic condition. All the adolescent boys and girls had at least one fan. More than three fourths possessed radio and tape. An equal proportion of the adolescents had iron and at least one vehicle (two wheeler) facility. Overall 52 % of the houses were equipped with television facility. Between the adolescent boys and girls, about 10 % more boys had access to TV (Table 4.01). Thus, the adolescents living in the slum area did not have access to all civic amenities and also did not have any satisfactory housing condition or clean environment. However, compared to several other the city slums, the environmental sanitation facilities were better.

Table 4.01: Socio - Economic Characteristics of Adolescent Boys and Girls (10 - 18 Years)

Sr No	Particulars	Boys (N= 330)		Girls (N= 362)		Total (N= 692)	
		n	%	n	%	N	%
1	Caste						
	a. General caste	229	69.4	304	83.9	503	72.7
	b. Other backward caste	101	30.6	58	16.1	159	27.3
2	Mother tongue						
	a. Gujarati	324	98.2	360	99.4	684	98.8
	b. Hindi	6	1.8	2	0.6	8	1.2
3	Education of father						
	a. Illiterate	4	1.2	4	1.1	8	1.2
	b. Literate	-	-	-	-	-	-
	c. Primary (up to 5)	41	12.4	16	4.4	57	8.2
	d. Secondary (6 - 10)	232	70.2	280	77.2	512	73.9
	e. Higher secondary (11 -12)	39	8.8	56	15.4	95	13.7
	f. College	2	0.7	-	-	2	0.6
	g. Not available	12	3.6	6	1.7	18	2.6
4	Education of mother						
	a. Illiterate	21	6.4	12	3.3	33	4.8
	b. Literate	12	3.4	-	-	12	1.7
	c. Primary (up to 5)	58	17.6	34	9.4	92	13.3
	d. Secondary (6 - 10)	216	65.5	284	78.4	500	72.3
	e. Higher secondary (11 -12)	11	3.3	25	6.9	36	5.2
	f. Not available	12	3.6	7	1.9	19	2.7
5	Occupation of Father						
	a. Non - agriculture labour	19	5.8	70	19.3	89	12.8
	b. Self employed/petty business	203	61.5	191	52.8	394	57.0
	c. Service	96	29.1	95	26.2	191	27.6
	d. Not available	12	3.6	6	1.7	18	2.6
6	Occupation of mother						
	a. Maid Servant	7	2.2	7	1.9	14	2.0
	b. House wife	250	75.8	281	77.6	531	76.7
	c. Labour	54	16.4	64	17.8	118	17.1
	d. Service	7	2.2	10	2.8	17	2.5
	e. Not available	12	3.6	7	1.9	19	2.7

Table 4.01 contd...

...Table 4.01 contd

Sr No	Particulars	Boys (N= 330)		Girls (N= 362)		Total (N= 692)	
		n	%	n	%	N	%
7	Family size						
	a. 5 or less	184	55.8	136	37.6	340	49.1
	b. 6 – 7 member	134	40.6	214	59.1	349	50.4
	c. 8 or more	12	3.6	12	3.3	24	3 5
8	Type of family						
	a. Joint	125	37.9	96	26.5	221	31.9
	b. Nuclear	205	62.1	266	73 5	471	68.1
9	Total monthly income per month in Rs.						
	a. 500 - 1000	11	3.3	17	4.7	28	4.1
	b. 1000 - 2000	55	16.7	62	17.1	117	16.9
	c. 2000 - 3000	46	13.9	58	16.0	104	15.0
	d. 3000 - 5000	44	13.3	41	11.3	85	12 3
	e. More than 5000	174	52.7	184	50.8	358	51.7
10	Per capita income per month in Rs.						
	a. 500 or less	87	26.4	108	29.8	195	28.2
	b. 500 - 1000	67	20.3	94	25.9	161	23.3
	c. 1000 - 1500	171	51.8	158	40.9	329	47.5
	d. Above 1500	5	1.5	12	3.3	17	2.5
11	Own house						
	a. Yes	305	92.4	337	93.1	642	92.8
	b No	25	7.6	25	6.9	·50	7.2
12	Type of house						
	a Semi pucca	187	56.7	183	50 6	370	53 5
	c. Pucca	143	43.3	179	49.4	322	46.5
13	Location of Kitchen						
	a. Separate	259	78 5	272	75.1	531	76 8
	b. In a corner of room	66	19.9	90	24 9	156	22.5
	c. In the backyard/verandah	5	5	25	6 9	30	4 3
14	Availability of toilet facility						
	a Own	312	94.6	344	95.1	658	95.1
	b Public	18	5.4	18	4.9	36	4 9

Table 4.01 contd ...

. Table 4 01 contd

Sr No	Particulars	Boys (N= 330)		Girls (N= 362)		Total (N= 692)	
		n	%	n	%	N	%
15	Source of drinking water*						
	a Own tap	146	44.2	163	45.0	309	44.6
	b. Public/common tap	189	57.3	140	38.7	329	47.6
	c. Hand pump	25	7.6	59	16 3	84	12.1
16	Type of drainage system						
	a Open	135	40.8	145	40.1	280	40.4
	b Closed	149	45 3	162	44.8	311	45.0
	c. Soak pit	46	13.9	55	15.2	101	14.6
17	Ventilation facility in the house						
	d. adequate						
	e. Partially adequate	55	16.7	69	10.1	124	17 9
	f Inadequate	214	64.9	230	63.5	444	64.2
		61	18.4	63	17.4	124	17.9
18	Ventilation facility in kitchen						
	a. Adequate	33	10.0	29	8.0	62	8.9
	b. Partially adequate	228	69.2	293	80.9	521	75.3
	c. Inadequate	69	20.8	40	11.1	109	15.7
19	Type of fuel used for cooking*						
	a. Wood	100	30.3	86	23.8	186	26.8
	b. Cow dung	95	28.8	32	8.8	127	18.3
	c. Kerosene	198	60.0	216	59.7	414	59 8
	d. Gas	132	40.0	146	40.3	278	40.2
20	Availability of other facilities						
	a. Fan	330	100.0	362	100.0	692	100.0
	b. Television	188	56.9	173	47.8	361	52.2
	c. Radio	273	82.7	282	78.9	555	80.2
	d. Fridge	81	24.5	65	17.9	146	21.1
	e. Tape recorder	244	73.9	302	84.5	546	78.9
	f. Iron	227	68.8	272	75.3	500	72.3
	g. Vehicle	263	79.7	351	97.1	614	88.7
	h. Mixer	142	43.0	111	27.9	253	36.5
	ı. Others (Phone, mixer, washing machine)	27	8.2	30	8 3	57	8.2

* Multiple responses

Section II

Nutritional Health Status of the Adolescents and Gender Differences

In this section, anthropometric profile, prevalence of anemia and vitamin A deficiency (VAD) and morbidity status of 10 - 18 years old urban poor boys and girls with a gender perspective is presented.

4.2.1 Anthropometric Profile

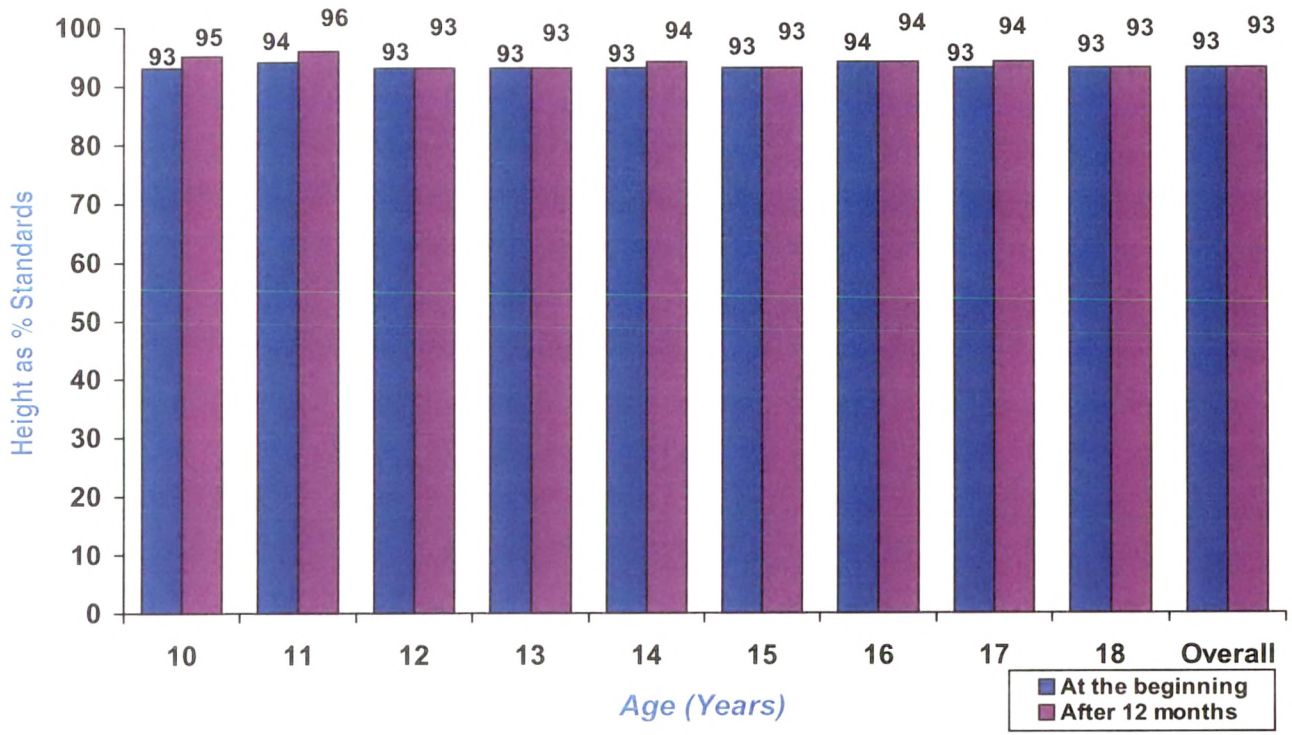
Mean values for height, weight, MUAC and SFT of the study subjects are given in Appendix – VIII to XIII.

4.2.1.1 Height for Age

Pooled data of boys and girls (as percent standards) are given in Fig 4.01. Mean height as percent standards of the adolescents was above 90 percent of the 50th percentile of NCHS values across all ages. The mean height ranged between 92 and 96 percent during the study period. Overall mean height as percent standards was 93.07 ± 0.16 at the beginning and 93.76 ± 0.17 after one year of the study. Although mean height for age (H–A) values of the adolescents were above 90 %, about one fifth of the subjects were stunted (H–A < 90 % of the standards) during the study period.

Comparison of mean H–A of adolescent boys and girls with NCHS and other Indian studies showed that mean H–A of the present study subjects were similar to ICMR subjects but shorter than their NCHS counter parts and other Indian affluent subjects (Fig 4.02).

Fig 4.01 : Mean Height as Percent Standards of the Adolescents (Boys + Girls) at the Beginning and After 12 months of the Study (N = 692)



Comparative analysis was done to study the differences between the boys and the girls with regard to mean height as percent standards. Table 4.02 presents that in early adolescent years (10 and 11 years), the boys were significantly taller than the girls, despite the fact that at this time, the girls were undergoing the pre-menarcheal spurt in height. From 12 years onwards, no significant difference in mean height was seen between the boys and the girls. Overall mean height as percent standards (10 - 18 years) did not show any significant difference at the beginning of the study between the boys and the girls. But the difference in mean value was significant after 12 months of the study indicating that as adolescence progressed, the growth retardation became more pronounced in girls.

Gain in Height

It can be seen from Fig 4.02 that the present boys' height curve lagged behind the NCHS and Indian affluent boys, and was slightly better than average Indian boys (ICMR 1972). Catch up growth as regards height increment is evident in Fig 4.03. In almost all the age groups up to 18 years, the boys gained more height than the NCHS increments. Despite this, at the end of 18 years, height deficits of 13.63 cms remained. This could possibly be due to the result of pre-existing childhood stunting and the large height deficits at the age of 10 years.

As for the girls, Fig 4.04 shows that their growth profile was unsatisfactory compared to the standards, but was similar to the other poor girls. The height of the girls lagged behind their NCHS counterparts considerably even at the age of 18 years. However, the gain in height among the girls exceeded the NCHS values in early adolescence, during 10, 11 and 12 years. In these girls, the maximum difference in height gain (vs. NCHS) occurred at the age of 12 years (Fig 4.05). This indicates that pattern of height gain among the girls was markedly different from the boys.

As regards the differences between the boys and the girls, Table 4.03 gives overall height increments of the boys and girls compared to NCHS. It is evident from the table

Table 4.02: Comparative Data of Height as Percent Standards[#] (Mean values) for{PRIVATE } Adolescent Boys and Girls (10-18 years) at the Beginning and After 12 months of the Study

{PRIVATE }Age (Years) {PRIVATE }	Initial (Percent Standards)				After 12 months (Percent Standards)			
	Boys		Girls		Boys		Girls	
	N	Mean ± SE		Mean ± SE	N	Mean ± SE	N	Mean ± SE
10	33	94.5 ± 0.81	34	91.4 ± 0.76**	33	94.9 ± 0.81	34	91.9 ± 0.71**
11	31	94.1 ± 0.80	32	93.3 ± 0.96NS	31	98.0 ± 0.78	32	93.9 ± 0.82***
12	34	93.4 ± 0.87	32	91.4 ± 0.81NS	34	93.4 ± 0.91	32	92.1 ± 0.69NS
13	60	92.4 ± 0 66	58	93.2 ± 0 53NS	60	93.2 ± 0.69	58	93.7 ± 0.41NS
14	54	93.7 ± 0.64	77	92.6 ± 0.53 NS	54	92.6 ± 0.63	77	93.9 ± 0.41NS
15	28	91.8 ± 1.00	38	94.2 ± 0.51 NS	28	92.8 ± 0.86	38	94 1 ± 0.53NS
16	37	94.4 ± 0.54	35	93.6 ± 0.67 NS	37	94.6 ± 0 49	35	93.4 ± 0.70 NS
17	30	92.2 ± 0.77	34	93.0 ± 0.55 NS	30	93.0 ± 0.67	34	93.9 ± 0.55 NS
18	23	92.7 ± 0.57	22	93.3 ± 0.62 NS	23	92.9 ± 0.57	22	93.2 ± 0.56 NS
10 - 18	330	93.2 ± 0.25	362	92.9 ± 0.21 NS	330	94.4 ± 0 27	362	93.2 ± 0.19**

50th percentile of the NCHS Standards
By 't' test NS (Not significant) p > 0 05 * P ≤ 0 05 ** P ≤ 0 01 *** P ≤ 0.001

Fig 4.02 Comparison of Mean Height for Age of 10 - 18 Years Old Study Boys with the NCHS Standards and Other Indian Studies

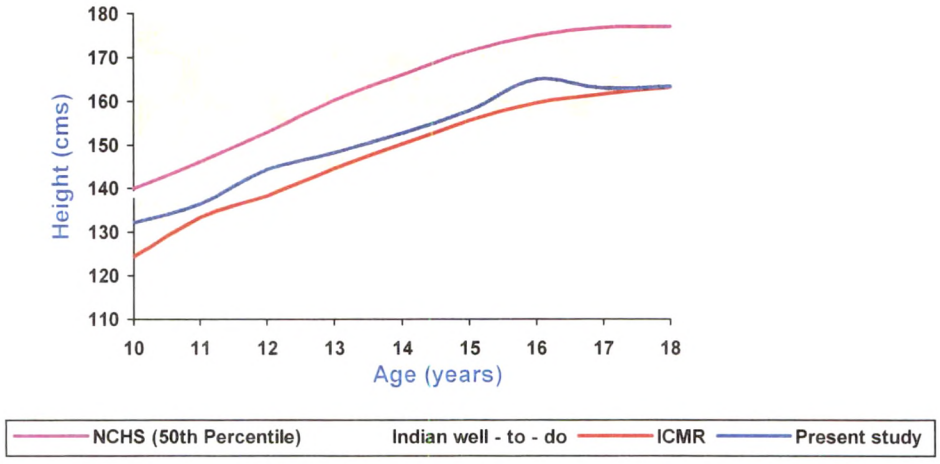


Fig 4.03: Mean Increment in Height of Adolescent Boys (10 - 18 Years) During Study Period

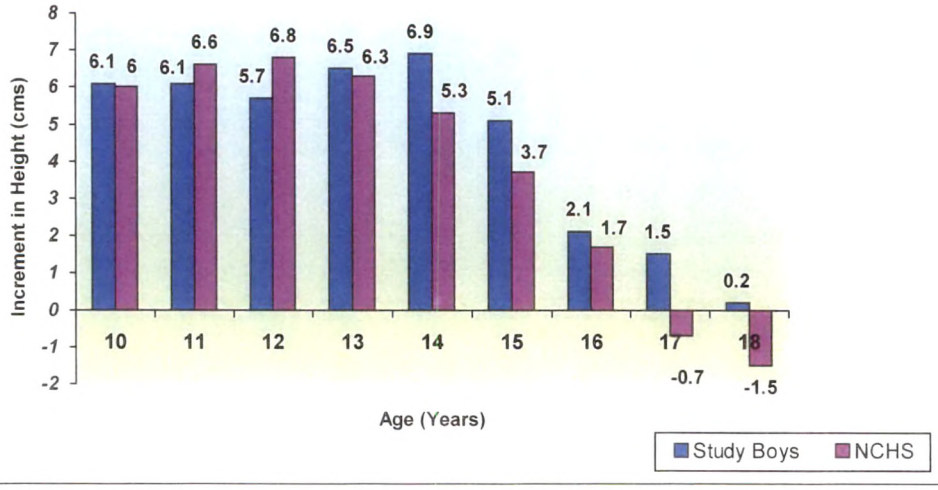


Fig 4.04:Comparison of Mean Height for Age of 10 - 18 Years Old Study Girls with the NCHS Standards and Other Indian Studies

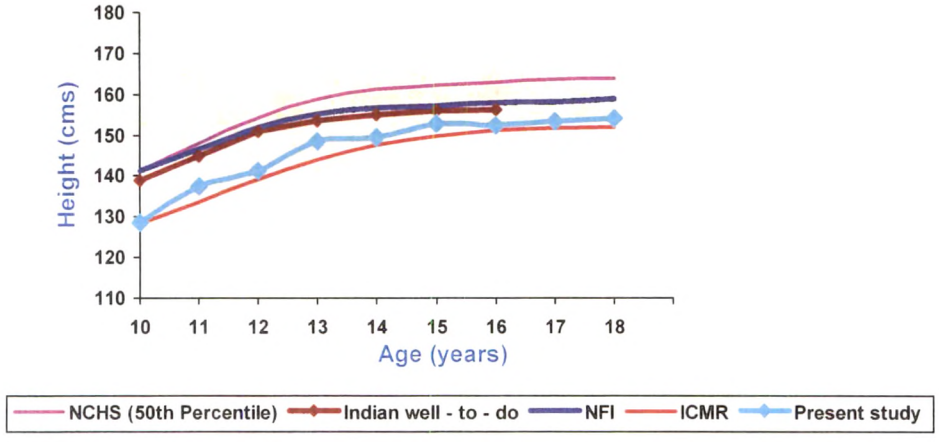
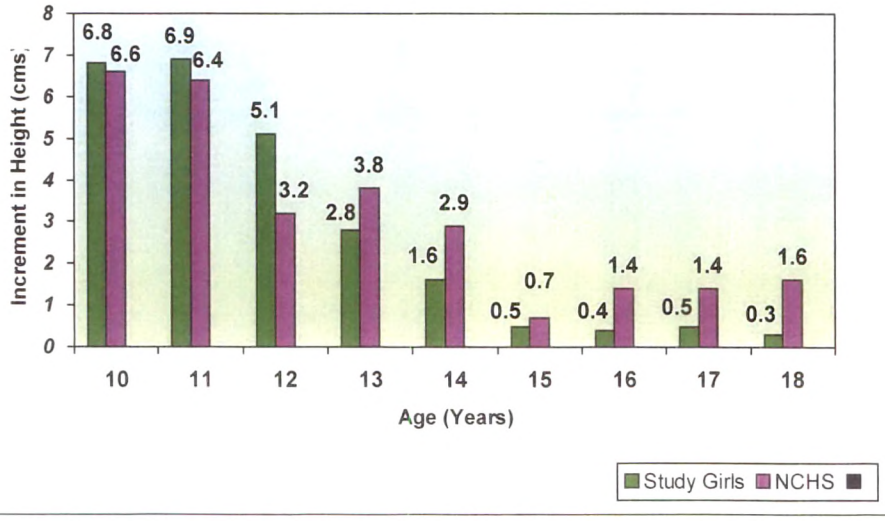


Fig 4.05:Mean Increment in Height of Adolescent Girls (10 - 18 Years) During Study Period



that like the boys, a wide difference existed in the mean height of the girls and their NCHS counterparts at the age of 10 and 18 years. However, from 10 to 18 years, the height increments in the girls were similar to NCHS subjects (24.99 vs. 25.4 cms) unlike in case of boys who gained less than the NCHS subjects. This indicates an overall catch up growth in the girls, which was not seen in the boys.

Table 4.03 : Comparison of Mean Height and Height Deficits of the Study Subjects with the NCHS Norms

	Mean Height (cms)			
	Boys		Girls	
	10 Years	18 Years	10 Years	18 Years
Present Study	132.36	163.17	128.69	153.68
NCHS	137.50	176.80	138.30	163.70
Deficits vs. NCHS	5.10	13.63	9.60	10.02
Total Increments in the Present Study		30.81		24.99
NCHS increments		39.3		25.4

To sum up, the catch up growth in terms of height gain was more evident in the girls than in the boys. During the adolescent period, the girls showed higher height increments compared to NCHS, whereas in the boys overall increment was less than the NCHS increments. Thus in the boys height deficits vs. NCHS increased from 10 years to 18 years : 5.10 cm to 13.63 cms, while the deficits were not very different at 10 years and 18 years compared to the NCHS standards : 9.60 to 10.02 cms (Table 4.03).

Peak Height Velocity (PHV)

Fig. 4.06 presents the height velocity over 12 month period of the boys at each age group with six month interval, that is, from 10 up to 18 years and is compared with NCHS velocity. In the figure, 10 years represents a six month interval between 10 year and zero month up to 5 months and 10.5 as 10 year and six months up to 11 months. From the age of 10 years up to 14.5 years, the yearly increments remained high and

was comparable to the NCHS ranging between 6.6 and 7.0 cms annually. The highest PHV occurred between the age of 13.5 and 14.5 years, when height gain was 6.9 cms

In contrast to boys, the PHV in the girls was short lived. The maximum PHV occurred between 10 and 11 years of age wherein height gain was 6.8 – 7.5 cms. Thereafter height velocity showed a sharp and progressive decline till the age of 18 years (Fig 4.07).

Thus, the PHV in the boys occurred two years later than in the girls. The magnitude of PHV was high in the study subjects in early adolescence during the spurt vs. the NCHS indicating catch up growth.

Discussion

The present study was compared with earlier studies. However, the earlier studies reported cross sectional data whereas the present study has longitudinal data available for boys and girls. Nevertheless, comparative trends are presented in Table 4.04 and 4.05. At 10 years, the study boys had height similar to that reported for the poor Vadodara and Bengali boys and were taller than rural Pune, Rajasthani boys and Indian poor boys; but height was less than that observed in Indian reference, Guajarati affluent, Indian affluent boys across the eight states, Italian and Libyan boys and (Table 4.04). However, at the end of adolescence; height of the study boys, Rajasthani and Bengali boys were more or less similar, better than the poor Vadodara boys, but lagged behind Indian reference. Indian affluent in 8 states, Libyan and Italian boys by 5 to 13.6 cms (Table 4.04).

As regards the study girls, a similar trend was evident with little difference. Unlike the boys, the study girls were taller than the Rajasthani girls by about 3 cms at the end of the adolescent period (Table 4.05).

Fig 4.06 : Comparison of Mean Height Velocity of the Study Boys Over a 12 Month Period at Each Age Compared with the NCHS Standards (N = 330)

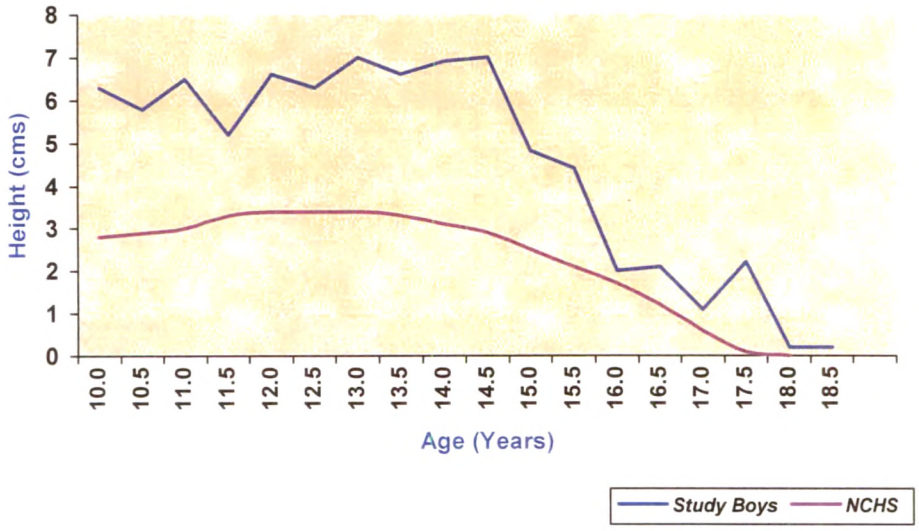


Fig 4.07: Comparison of Mean Height Velocity of the Study Girls Over a 12 Month Period at Each Age Compared with the NCHS Standards (N = 362)

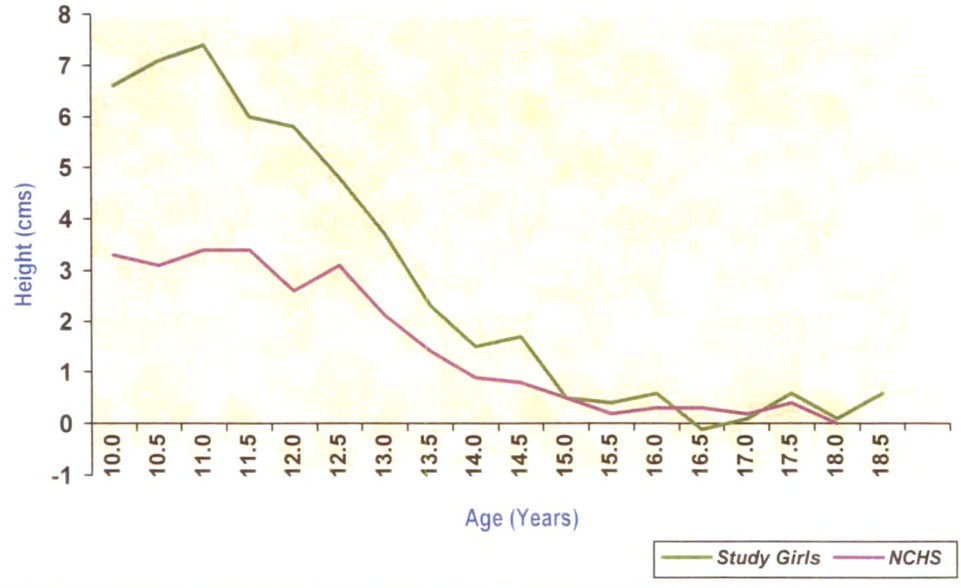


Table 4.04 : Comparison of Height for Age of the Present Boys with Boys in Various Studies

Name of the Study	Place & Area	SEG*	N	Height (cms)								
				10	11	12	13	14	15	16	17	18
Present Study	**Vadodara**	**LSEG**	**330**	**1 32.36**	**136.55**	**144.38**	**148.24**	**152.64**	**157.65**	**164.97**	**162.76**	**163.17**
Zoppi et al (1996)	Verona (Italy)	Refernce charts		139.90	144.80	150.50	157.30	164.70	170.50	173.90	175 60	176 70
Shamssain (1989)	Libya(U)	HSEG	406	136.00	141.0	145.0	149.0	152.0	160.0	165 0	170.0	170.00
Vijayaraghavan (1971)	India (U)	HSEG	4215	138.45	142.73	148.40	155.00	162.58	165.45	168.40	-	-
Agarwal et al (1992)	All India (U)	HSEG	9731	134.7 - 137.6	139.6 - 142.3	144.7 - 147.9	150.3 - 154.9	158.0 - 161.4	164.3 - 165.5	167.1 - 167.9	168.6 - 169.4	168.9
Gopaldas & Capoor (1981)	Vadodara (U)	HSEG	274	135.01	135.01	139.37	143.57	149.94	151.82	163.91	166.91	168.59**
Vijayaraghavan (1971)	India (U)	LSEG	574	126.98	129.99	135.15	139.68	144.0	153.04	156.35	-	-
Rao (1996)	Pune (R)	NA	332	128.20	131.10	136.9	139.3	148.4	147.6	157.17	-	*
Singh et al (1996)	Rajasthan (R)	LSEG	504	128.40	136.10	139.00	146.80	148.80	156.20	157.90	161.70	164.00
Goyal &Chavan (1993)	Ahmedna gar (U)	NA	630	-	-	147.60	148.10	154.80	160.80	161.50	166.50	-
Chatterjee & Mandal (1994)	West Bengal (R)	MSEG LSEG	567	131.08	135.06	140.25	145.26	152.92	160.03	162.74	165.26	165.12
Kanani & Zararia (1996)	Vadodara (U)	LSEG	250	132.88	137.41	140.25	146.2	150.25	158.59	160.57	161.35	160.10

* SEG · Scoio - economic group - LSEG Lower Scoio Economic Group

MSEG - Middle Scoio Economic Group HSEG - Higher Scoio Economic Group

U Urban R Rural

Table 4.0 5 : Comparison of Height for Age of the Present Girls with Girls in Various Studies

Name of the Study	Place & Area	SEG*	N	Height (cms)								
				10	11	12	13	14	15	16	17	18
Present Study	**Vadodara**	**LSEG**	**362**	**128.69**	**137.51**	**141.43**	**148.35**	**149.12**	**152.75**	**152.17**	**153.32**	**153.68**
Zoppi et al (1996)	Verona (Italy)	Reference charts		139.70	146.30	152.40	156.90	159.70	161.20	162.20	162.70	162.90
Shamssain (1989)	Libya (U)	HSEG	424	137.00	142.00	147.00	152.00	152.00	156.00	158.00	158.00	158.00
Vijayaraghavan (1971)	India (U)	HSEG	1329	138.90	145.00	150.98	153.44	155.01	155.98	156.00	-	-
Agarwal et al (1992)	8 states of India (U)	HSEG	5477	134.8 0 - 137.90	141.3 0 - 144.30	146.70 - 149.90	151.40 - 153.20	153.60 - 154.8 0	155.00 - 155.40	155.1 0 - 156.00	157 10	-
Vijayaraghavan (1971)	India (U)	LSEG	577	128.35	131.44	136.95	142.95	146.82	148.01	149.10	-	-
Rao (1996)	Pune (R)	NA	210	127.64	132.3	136.3	142.10	143.8	146.4	146.70	-	-
Singh et al (1996)	Rajasthan (R)	LSEG	233	131.50	135.00	139.40	146.90	148.50	149.20	151.40	150.10	150.10
Goyal &Chavan (1993)	Ahmedna gar (U)	NA	710	-	-	147.70	150.70	152.30	153.80	154.00	158.90	-
Chatterjee & Mandal (1991)	West Bengal (R)	MSEG LSEG	602	131.66	137.29	142.71	148.34	150.70	151.21	151.59	151.98	-

* SEG Scoio - economic group - LSEG Lower Scoio Economic Group
MSEG - Middle Scoio Economic Group HSEG - Higher Scoio Economic Group
U Urban R Rural

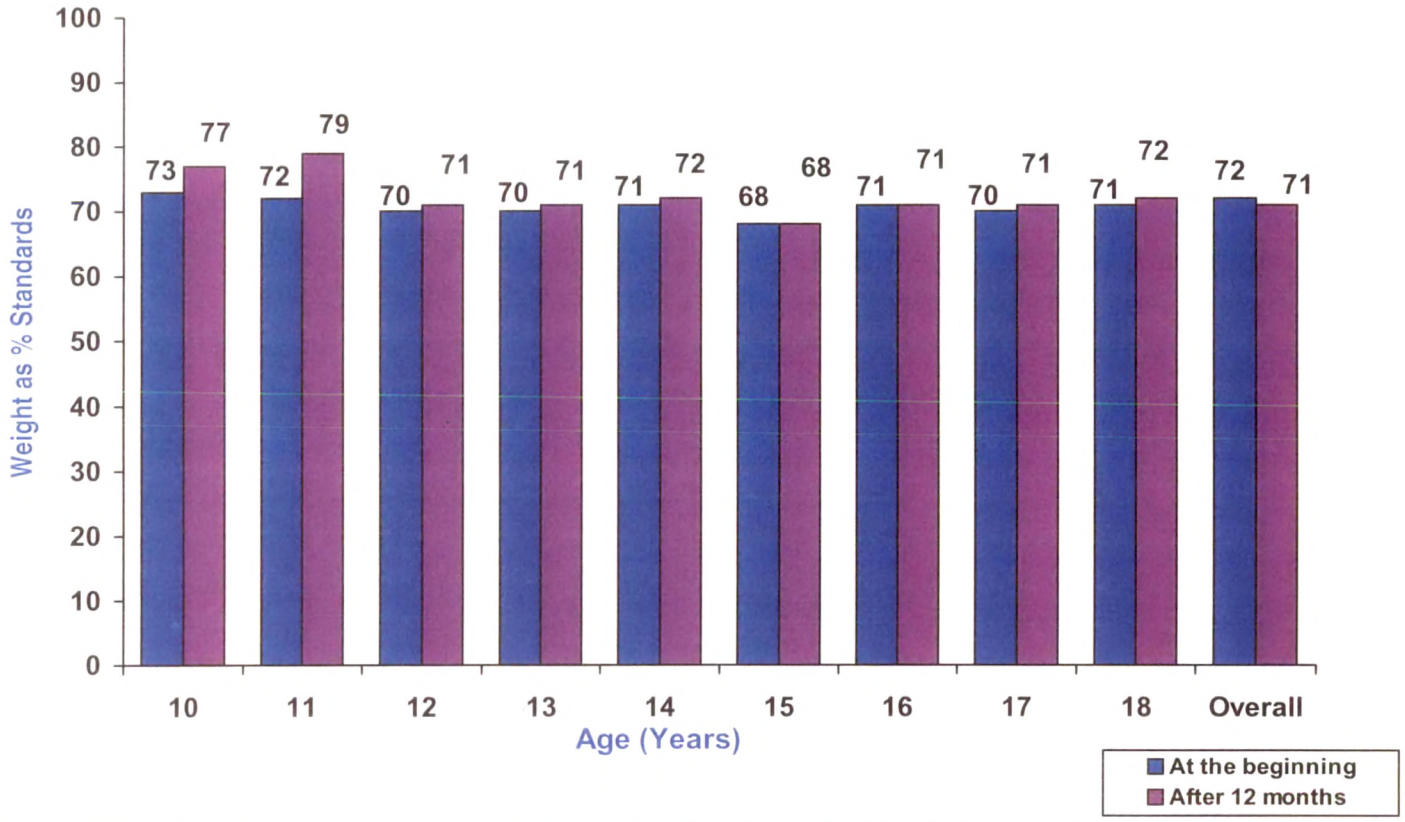
As regards height increment during adolescence, in the study boys, it was similar to Pune and poor Indian boys, better than Vadodara poor boys but 4 – 5 cms less than poor Bengali, Rajasthani boys and affluent Indian boys as well as affluent Italian and Libyan boys (Rao 1996, Vijayaraghavan et al 1971, Chatterjee and Mandal 1994, Sing et al 1996, Zoppi et al 1996, Shamssain 1989). While height increment in the study girls was higher (3 – 6 cms) than the poor Indian, rural Bengali and Rajasthani girls. Though height increment in the study girls was higher by 2 – 6 cms than the affluent girls in the other studies, they still remained shorter by age of 18 years (Vijayaraghavan et al 1971, Chatterjee and Mandal 1991, Sing et al 1994, Zoppi et al 1996, Agarwal et al 1992). Severely under nourished girls with substantial deficits in height cab make good part of these deficits by larger increments during the later life due to longer adolescent growth spurt period. Not withstanding this they continued to be shorter and lighter indicating that the after effects of erstwhile under-nutrition (Satyanarayan et al 1993).

4.2.1.2 Weight for Age

Pooled data of boys and girls of mean weight as percent standards of the 10 - 18 years old adolescents is shown in Fig 4.08. The mean weight (as % standards) was above 66 % across all the ages. The overall mean weight values as percent standard of the study subjects was 70.6 ± 0.47 and 72.3 ± 0.49 at the beginning and 12 months after the study respectively. Considering proportion of under nourished adolescents, 82 percent were under weight. The percent prevalence then reduced to 76 % after 12 months indicating an improvement in nutritional status of the adolescents. Despite this, at least three fourths of the adolescent boys and girls had their weight below 80 % of the standards.

Table 4.06 shows that in boys – in each age group, they either maintained or improved their weight (as % standards) over the 12 month period. However, an 18 year old boy on an average had less weight than a 10 year old, that is, with progression in adolescence, weight profile of the boys declined. Nevertheless, prevalence of underweight (< 80 % of the standard) reduced from 82 % to 76 % during the study period.

Fig 4.08: Mean Weight as Percent Standards of the Adolescents (Boys + Girls) at the Beginning and After 12 months of the Study (N = 692)



The table further shows that similar to boys, the girls in each group either maintained or improved their weight (as % standards) over the 12 month period. However, unlike boys on comparison of weight of a 10 year old girl with an 18 year old had better weight on an average, that is, weight profile of a girl improved with occurrence of adolescent growth (Table 4.06). The prevalence of girls having weight below 80 % of the standards (under nutrition) decreased from 81 to 76 %.

Comparative gender analysis thus revealed that overall the girls were better than the boys at the age of 18 years. A closer look at the Table 4.06 shows that at 10 years of age, the boys were significantly heavier than the girls. However, from the age of 15 years onwards, weight of the girls improved significantly over the boys. But, considering overall mean weight value of 10 – 18 years old, no significant gender based difference was evident, which could be due to a wide variation in weight among the adolescents.

Gain in Weight

The mean weight of the boys was 25.89 ± 0.84 at 10 years and 45.61 ± 1.26 at the18 years (Appendix – IX). In other words, a total of 19.7 kg weight gain, that is, only about 50 % of the gain in weight as per the norms (34 kg) occurred during adolescence. It can be observed from Fig 4.09 that throughout adolescence, weight gain in the boys remained much below the NCHS norms. The maximum weight gain during adolescent period occurred at the age of 14 years which was 4.7 kg (83 % of the standards) and minimum was 0.8 kg (42 % of the standards) at the age of 17 years.

On the contrary, in the study girls weight gain at all ages was comparable to or above the NCHS values except at the age of 15 and 16 years (Fig 4.10). Further the figure shows that the gain in weight was six times higher at the age of 18 years. Consequently, the study girls surpassed the weight norms.

A comparison of weight for age values between the boys and the girls revealed that overall the performance of the girls was better than the boys. Also during late years of

Table 4.06 : Comparative Data of Weight as Percent Standards[#] (Mean values) for Adolescent Boys and Girls (10 – 18 years) at the Beginning and After 12 months of the Study

{PRIVATE }Age (Years) {PRIVATE }	Initial (Percent Standards)				After 12 months (Percent Standards)			
	Boys		Girls		Boys		Girls	
	N	Mean ± SE	N	Mean ± SE	N	Mean ± SE	N	Mean ± SE
10	33	78.2 ± 2.53	34	68.1 ± 1.69**	33	85.4 ± 2.61	34	69.1 ± 1.60***
11	31	71.6 ± 1.73	32	72.2 ± 2.83 NS	31	82.3 ± 2.10	32	74.8 ± 2.45*
12	34	72.3 ± 2.33	32	68.1 ± 3.07 NS	34	72.3 ± 2.19	32	70 4 ± 3.19 NS
13	60	69.8 ± 1.82	58	71.1 ± 1.62 NS	60	69.4 ± 1 88	58	73.3 ± 1.58 NS
14	54	69.6 ± 1.75	77	71.4 ± 1.20 NS	54	70.8 ± 1.82	77	72.4 ± 1.28 NS
15	28	63.9 ± 1.41	38	70.5 ± 1.45**	28	64.6 ± 1.39	38	70.4 ± 1.53**
16	37	70.9 ± 1.81	35	70.0 ± 1.08 NS	37	70.4 ± 1.60	35	70.9 ± 1.92
17	30	64.9 ± 1.91	34	73.8 ± 1.82**	30	66.0 ± 1.74	34	76.2 ± 1.62***
18	23	66.6 ± 2.01	22	75.4 ± 2.54**	23	67.5 ± 2.03	22	77 9 ± 2.08***
10 - 18	330	70.1 ± 0.69	362	71.1 ± 0 63 NS	330	71.9 ± 0.75	362	72 7 ± 0.63 NS

50th percentile of the NCHS Standards
By 't' test : NS (Not significant) p > 0 05 * P ≤ 0 05 ** P ≤ 0 01 *** P ≤ 0 001

Fig 4.09. : Mean Increment in Weight of Adolescent Boys (10 - 18 Years) During Study Period

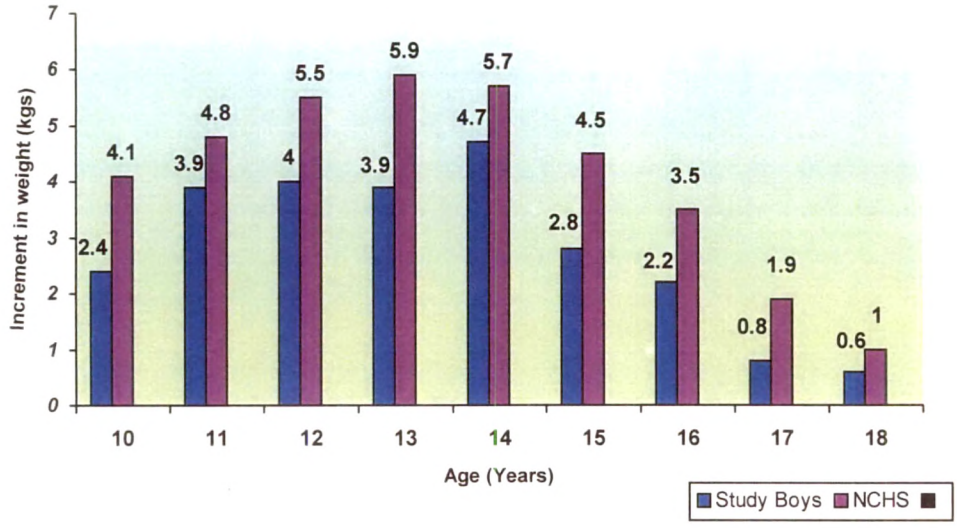
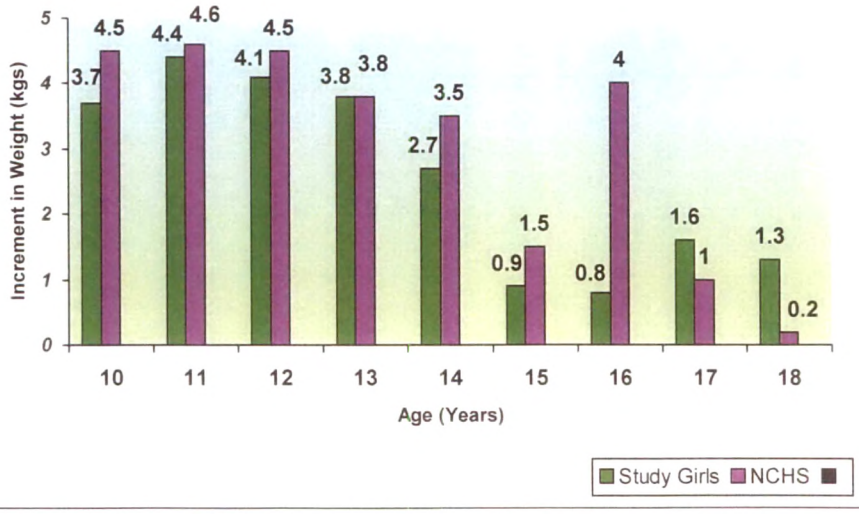


Fig 4.10 : Mean Increment in Weight of Adolescent Girls (10 - 18 years) During Study Period



adolescence, the weight gain in girls showed a remarkable improvement while in the boys it remained much below the norms (Table 4.07).

Table 4.07 : Comparison of Mean Weight and Weight Deficits of the Study Subjects with the NCHS Norms

	Mean Weight (kg)			
	Boys		Girls	
	10 Years	18 Years	10 Years	18 Years
Present Study	25.89	45.61	23.34	43.18
NCHS	33.20	68.90	34.60	56.60
Deficits vs. NCHS	7.31	23.29	11.26	13.42
Total Increments in the Present Study		19.72		19.84
NCHS increments		35.70		22.00

Peak Weight Velocity (PWV)

The weight velocity (WV) in the boys was high during the ages of 11 up to 14.5 years and was maximum (5.4 kg) at 14.5 years. Thereafter, a sharp fall in weight gain was observed till the end of adolescence (Fig 4.11).

With regard to the girls, a similar trend was observed. Like height velocity, WV in girls was short lived (lasting up to 13.5 years). The maximum WV was seen at the age of 12 years (5.7 kg), about one half year earlier than seen in the boys (Fig 4.12).

Comparison of WV data between the boys and the girls revealed that in the boys the process of weight increment continued for a longer period compared with the girls. But the magnitude of weight gain was higher in the girls than in the boys. As the velocity of weight gain was high in the girls, they exhibited catch up growth which was absent in the boys.

Fig 4.11 : Comparison of Mean Weight Velocity of the Study Boys Over a 12 Month Period at Each Age with the NCHS Standards (N = 330)

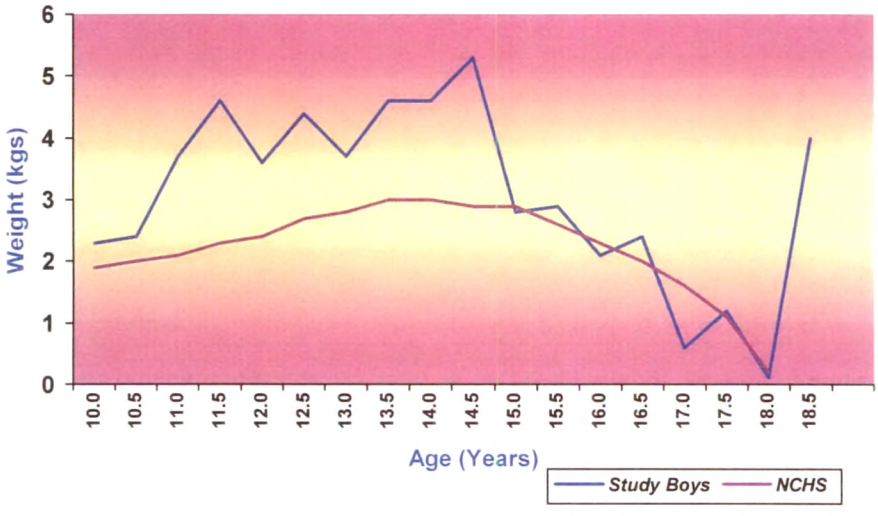
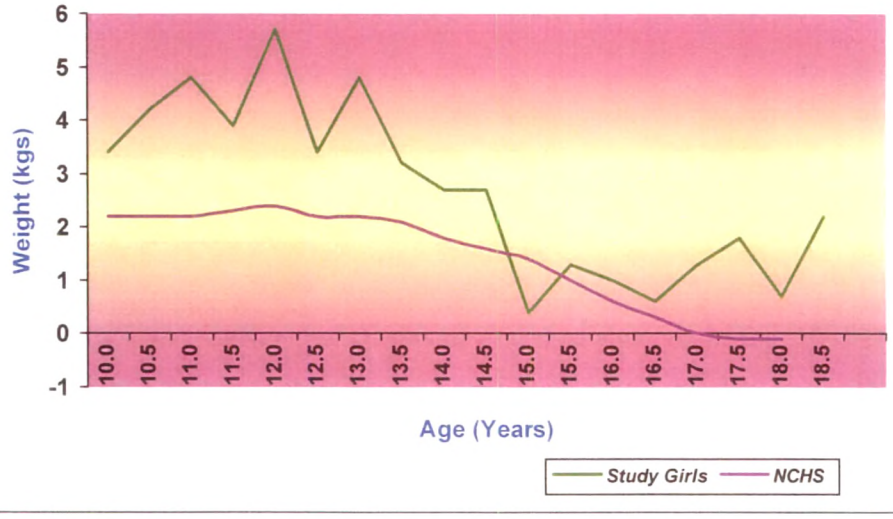


Fig 4.12 : Comparison of Mean Weight Velocity of the Study Girls Over a 12 Month Period at Each Age with the NCHS Standards (N = 362)



Discussion

As mentioned earlier, the present study was compared with earlier studies with cross sectional data (Table 4.08 – 4.09)

At the age of 10 years, the study boys were heavier than the rural Pune rural poor Rajasthani, Bengali and urban poor Indian boys but lighter than affluent Gujarati, Indian reference, Indian affluent boys of 8 states, Italian and Libyan boys (Sing et al 1996, Rao 1996, Chatterjee and Mandal 1994, Vijayaraghavan et al 1971, Gopaldas and Capoor 1981, Agarwal et al 1992, Zoppi et al 1996, Shamssain 1989). A similar trend persisted at the age of 18 years also with an exception of rural Bengali boys who became heavier than the present boys by 5 kg.

Further, the total weight gain in the study boys was similar to the rural Pune boys but better (by about 2 kg) than poor Indian and Vadodara boys but 5 to 6 kg less than the rural poor Bengali and Rajasthani boys and; much below the Indian reference, affluent Gujarati, Indian affluent boys of 8 states, Italian and Libyan boys (Table 4.08). As observed in the study boys, Kanani (1984) reported an increase in weight deficits among the boys with increase in age.

As for the study girls, at the age of 10 and 18 years, weight profile of the study girls and the poor girls from the other parts of the country was similar, but far below the Indian reference, Indian affluent girls (across 8 states), Italian and Libyan girls (Table 4.09). Further, the weight gain was better in the study girls compared with the girls in the above studies indicating catch up growth in the study girls. The PWV in the study girls occurred one year earlier (11 - 12 years) than observed in rural poor Rajasthani and Bengali girls (12 – 13 years) and two years earlier than poor Indian and Coimbatore and affluent Indian girls (Sing et al 1996, Chaturvedi et al 1996, Chatterjee and Mandal 1991, Vijayaraghavan 1971). But it was one year later (10 – 11years) than that reported in a study conducted by Agarwal et al (1992) across the eight states of India

Table 4.08: Comparison of Weight for Age of the Present Boys with Boys in Various Studies

Name of the Study	Place & Area	SEG*	N	Weight (kgs)								
				10	11	12	13	14	15	16	17	18
Present Study	**Vadodara**	**LSEG**	**330**	**25.89**	**26.40**	**30.58**	**33.44**	**36.53**	**38.16**	**45.22**	**43.65**	**45.61**
Zoppi et al (1996)	Verona (Italy)	Reference charts		34.02	37.52	41.73	47.27	53.63	59.42	63.69	66.42	68.50
Shamssain (1989)	Libya (U)	HSEG	406	30.76	33.63	37.59	42.36	43.97	50.32	55.68	59.66	61.89
Vijayaraghavan (1971)	India (U)	HSEG	4215	32.39	35.26	38.78	42.88	48.26	52.16	55.54	-	-
Agarwal et al (1992)	All India (U)	HSEG	9722	28.70 - 30.80	31.90 - 33.80	35.40 - 37.90	39.40 - 43.20	44.70 - 48.10	51.0 0- 52.40	55.0 0- 54.90	56.60 - 56.90	59 70
Gopaldas & Capoor (1981)	Vadodara (U)	HSEG	274	29.57	31.12	35.93	39.63	40 03	44.99	50.39	54.85	-
Vijayaraghavan (1971)	India (U)	LSEG	574	22.34	23.76	25.98	28.68	30.61	37.32	40.01	-	-
Rao (1996)	Pune (R)	NA	332	2309	24.42	26.76	27.83	33.8	33.5	41.26	-	-
Singh et al (1996)	Rajasthan (R)	LSEG	258	23.50	27.10	28.50	33.10	34.70	39.00	41.80	45.70	49.50
Goyal &Chavan (1993)	Ahmedna gar (U)	NA	630	-	-	32.40	33.00	37.60	41.70	42.70	46.50	-
Chatterjee & Mandal (1994)	West Bengal (R)	MSEG LSEG	567	23.84	26.14	29.47	32.72	37 37	43.94	46.38	48.54	50.16
Zararia & Kanani (1996)	Vadodara (U)	LSEG	250	25.33	26.11	28.48	31.95	35.28	39.89	42.50	43.10	43.27

* SEG : Scoio - economic group - LSEG Lower Scoio Economic Group
MSEG - Middle Scoio Economic Group HSEG - Higher Scoio Economic Group
U Urban R Rural

Table 4.09 : Comparison of Weight for Age of the Present Girls with Girls in Various Studies

Name of the Study	Place & Area	SEG*	N	Weight (kgs)								
				10	11	12	13	14	15	16	17	18
Present Study	**Vadodara**	**LSEG**	**362**	**23.34**	**28.05**	**30.02**	**34.45**	**38.86**	**38.84**	**39.40**	**41.86**	**43.18**
Zoppi et al (1996)	Verona (Italy)	Reference charts		34.06	38.58	43.49	48.45	52.33	54.37	55.33	55.92	56.67
Shamssain (1989)	Libya (U)	HSEG	424	33 75	38.31	43.07	49.28	48.02	57.27	58.70	59.70	59.58
Vijayaraghavan (1971)	India (U)	HSEG	1329	33.58	37.17	42.97	44.54	46.70	48.75	49.75	-	-
Agarwal et al (1992)	All India (U)	HSEG	5477	29.6 - 31.9	34.3 - 36.8	38.7 - 41.9	42.6 - 45.2	45.7 - 46.6	48 0 - 48.9	49.2 - 49.6	49.0	-
Vijayaraghavan (1971)	India (U)	LSEG	577	23.29	24.72	28.44	31.85	35.98	37.10	38.87	-	-
Rao (1996)	Pune (R)	NA	210	22.67	25.32	27.26	31.02	32.72	35.07	35.41	-	-
Singh et al (1996)	Rajasthan (R)	LSEG	233	24.50	26.00	28.90	34.00	37.20	39.30	40.00	41.30	39.80
Chaturvedi et al (1996)	Rajasthan (R)	LSEG	941	22.34	25.26	28.09	34.09	36.71	37.82	40.79	40.73	40 81
Goyal &Chavan (1993)	Ahmedna gar (U)	NA	710	-	-	33.20	34.90	39.60	39.50	41.70	43.20	-
Chatterjee & Mandal (1991)	West Bengal (R)	MSEG LSEG	602	24.47	27.47	31.15	37.30	39.30	40.68	42.27	43.89	-

* SEG Scoio - economic group - LSEG Lower Scoio Economic Group
MSEG - Middle Scoio Economic Group HSEG - Higher Scoio Economic Group
U Urban R Rural

Thus, overall for both weight and height, pattern of adolescent growth varies from region to region among the boys and girls.

4.2.1.3 Prevalence of Under-nutrition.

During various stages of the life cycle including adolescence, anthropometry is extensively used to assess nutritional status. However, there are no well defined criteria or cut off values that relate to specific risks or aspects of health in the individuals (WHO 1995). In the present study, Waterlow's qualitative classification has been applied to assess prevalence of under nutrition in the study subjects. The percent prevalence of under nutrition by Waterlow's qualitative classification among the study subjects is presented in Fig 4.13 and 4.14. At the beginning of the study, the proportion of well nourished boys (according to both height and weight) ranged between 44 % and 60 % in the three age groups; and after 12 months 46 % and 63 % across all the ages, that is not much change over the study year was observed. The percentage of weil nourished boys was higher in 10 – 12 year age group as against the older age groups (60 - 63 % vs. 44 - 52 %). There was marginal increase in stunting + wasting : from 2 % to 5 % in the younger boys (Fig 4.13).

As for the girls, in the beginning as well as after 12 months, the percentage of the well nourished girls by both height and weight was higher in the older age groups (13 – 18 years) : 56 % - 70 % vs. 40 % - 44 % (Fig 4.14). However, after 12 months, the percentage of well nourished girls in the age group of 10 – 15 years increased from 39 % to 67 % indicating growth improvement (Fig 4.14). Correspondingly, the levels of stunting and wasting declined in these age groups.

According to Watelow's qualitative classification, gender comparison was made between the boys and the girls, who had height for age (H-A) and weight for height normal and below normal (Table 4.10 and 4.11). A significantly higher percentage of the boys were well nourished in the younger age group when compared with the girls of

Fig 4.13 : Percent Prevalence of Under Nutrition in Boys (10 – 18 years) by Waterlow's Qualitative Classification at the Beginning and After 12 months of the Study

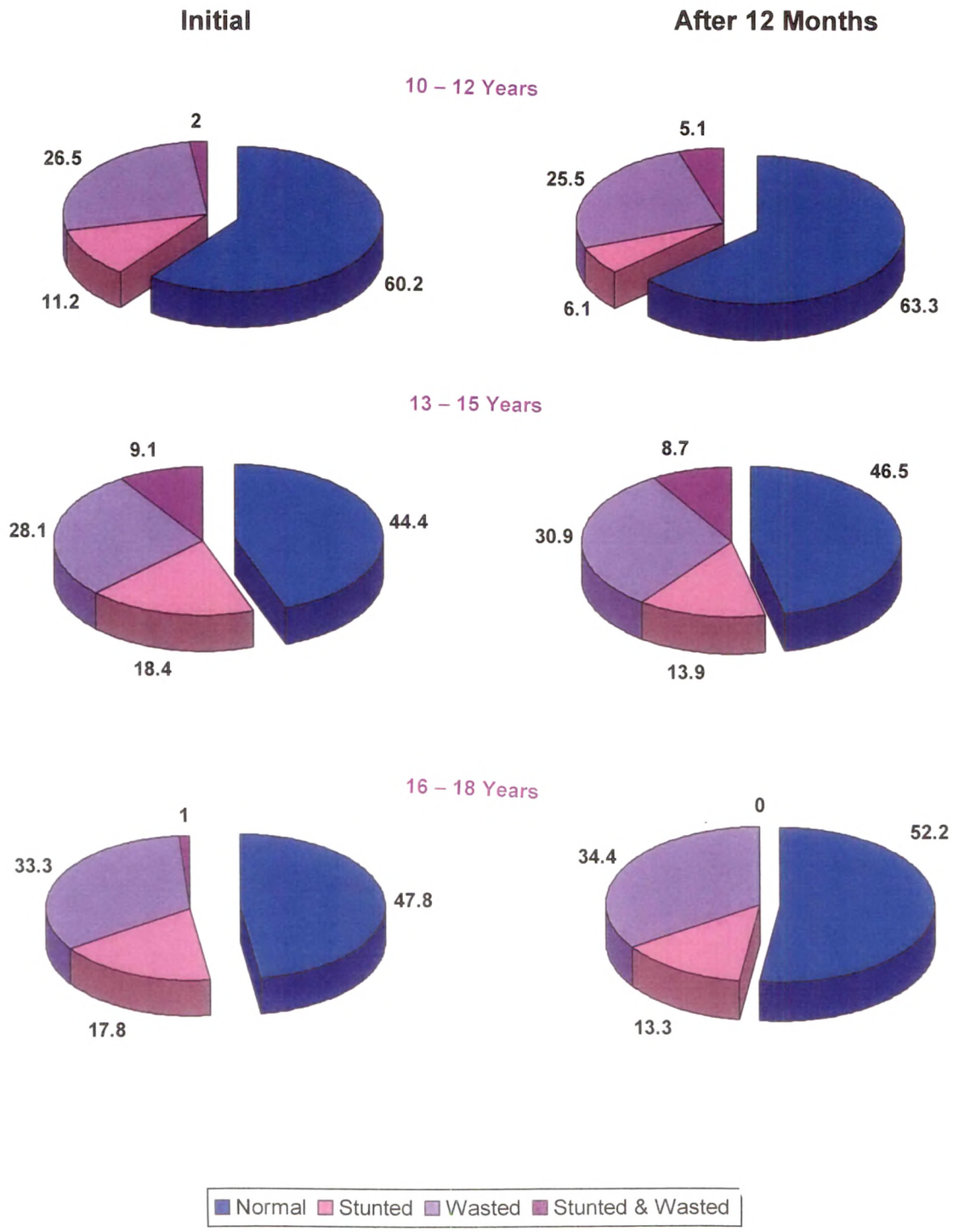


Fig 4.14 : Percent Prevalence of Under Nutrition in Girls (10 – 18 years) by Waterlow's Qualitative Classification at the Beginning and After 12 months of the Study

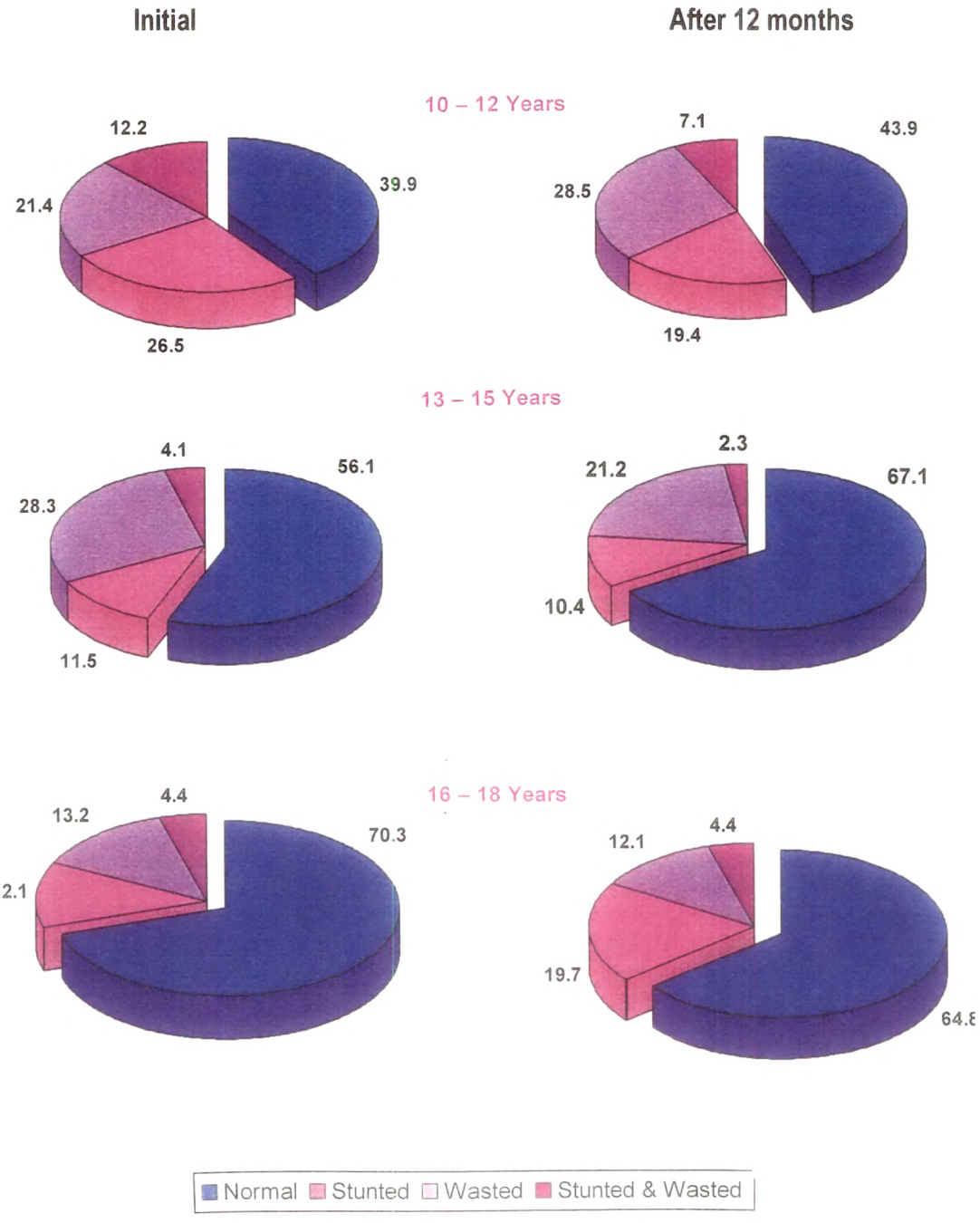


Table 4.10 : Adolescent Boys and Girls (10 –18 years) with Normal Nutrition Status# at the Beginning and after 12 months of the study : Is there a Gender Difference ?

Age (Years)	Boys			Girls			Chi square
	N	n	Percent	N	n	Percent	
	Initial						
10 - 12	98	59	60 2	98	39	39 9	8 16**
13 - 15	142	63	44.4	173	97	56.1	4.27*
16 - 18	90	43	47.8	91	64	70 3	9 52**
10 - 18	330	165	50 0	362	200	55 2	1.91^{NS}
	After 12 months						
10 - 12	98	62	63.3	98	45	43 9	7.41**
13 - 15	142	66	46.5	173	116	67 1	13.64***
16 - 18	90	47	52 2	91	58	64.8	2 07^{NS}
10 - 18	330	331	52.9	362	199	60.3	3 52^{NS}

Table 4.11: Adolescent Boys and Girls (10 –18 years) with Under Nutrition# at the Beginning and after 12 months of the study : Is there a Gender Difference ?

Age (Years)	Boys			Girls			Chi square
	N	n	Percent	N	n	Percent	
	Initial						
10 - 12	98	2	2 0	98	12	12.2	7.69**
13 - 15	142	13	9 1	173	7	4.1	3.42^{NS}
16 - 18	90	1	1.0	91	4	4 4	0.80^{NS}
10 - 18	330	16	4.8	362	23	6.8	1.31^{NS}
	After 12 months						
10 - 12	98	5	5.1	98	7	7.1	0.74^{NS}
13 - 15	142	12	8.7	173	4	2.3	9.77**
16 - 18	90	0	0.0	91	4	4.4	1.33^{NS}
10 - 18	330	17	5.1	362	15	3.6	1.00^{NS}

Normal nutritional status : Weight for Height ≥ 80 % of the NCHS standards and Height for age ≥ 90 % of the NCHS standards

Under nutrition : Weight for Height < 80 % of the NCHS standards and Height for age < 90 % of the NCHS standards

Significance of p value . NS (not significant) $p > 0\ 05$ $*p \leq 0\ 05$ $**p < 0.01$ $***p < 0.00$

the same age group category. With regard to under - nutrition, initially the percent prevalence was significantly higher in the girls than in the boys in the same age group. But after 13 years, the difference disappeared. However, after 12 months of the study, the significant difference became evident between the boys and the girls in 13 to 15 years age group when the percentage of under nourished boys higher (Table 4.07). The reason could be that occurrence of growth spurt before menarche in the girls and between 13 - 15 years in the boys.

4.2.1.4 Body Mass Index (BMI) for Age

The mean BMI of 10 - 18 years old boys ranged between 14 and 18 during the study period. No change in overall mean BMI of the boys was found which was 15.5 at the beginning and 15.8 after 12 months of the study (Appendix – XII and XIII). Further analysis of BMI as percent standards showed that in the boys, BMI (as % standards) declined as the age increased, this was observed both in the beginning and after 12 months of the study (Table 4.12).

As for the girls, it was observed that mean BMI of the younger girls was on par with the younger boys. But with increase in age mean BMI (as % standards) of the girls improved unlike the boys (Table 4.12).

Table 4.12 :Comparative Data of Body Mass Index (BMI) as the Percent Standards (Mean Values) for Adolescent Boys and girls (10 – 18 Years) at the Beginning and After 12 months of the Study

Age Group	N	At the Beginning		After 12 months	
	B + G@	Boys	Girls	Boys	Girls
10 – 12 Years	98 + 98	83.70 ± 0.97	82.19 ± 1.22 NS	83.44 ± 0.93	83.54 ± 1.32 NS
13 – 15 Years	142 + 173	80.44 ± 0.82	84.21 ± 0 78 NS	79.52 ± 0.80	86 83 ± 0 91 NS
16 – 18 Years	90 + 91	79.30 ± 0.97	86 68 ± 1 25 NS	78.87 ± 0 98	87 78 ± 1 20 NS
10 – 18 Years	330 + 362	81 09 ± 0.53	84 28 ± 0 59*	80 51 ± 0 55	86 18 ± 0 64*

@ B + G : Boys + Girls

By 't' test : NS (Not significant) $p > 0.05$ * $p \leq 0.05$

Data were analyzed to ascertain whether the difference between the boys and the girls with respect to mean percent values for BMI existed. In the overall age group (10 – 18 years), mean BMI of the girls was significantly higher than the boys in the beginning as well as after 12 months of the study (Table 4.12).

4.2.1.5 Mid Upper Arm Circumference (MUAC) for Age

In the beginning of the study, the mean MUAC of the urban poor adolescent boys increased from 17.62 cm at the age of 10 years to 22.34 cms at 18 years. After 12 months, the range was 18.12 cm at 10 years and 22.50 cms at the age of 18 years (Appendix - X). Thus, the increment in MUAC ranged between 4.48 cms and 4.72 cms which was about half of that found in the Indian well - to - do boys (8 cms).

As seen in Table 4.13, the mean MUAC as percent standards of the boys was 85 % and above across all the ages. The present 10 – 15 years old boys were better than those reported in a study (75 % – 83 %) by Kanani (1984). Affluent Indian boys showed higher mean MUAC values by 2 – 3 cms compared to the present boys (Vijayaraghavan 1974). An earlier study by Kanani and Zararia (1996) on urban poor adolescent boys showed similar values (Table 4.14).

Unlike the boys, the increment in MUAC measurements of the girls was nearly same as that of Indian well - to - do (4.9 to 5.6 cms ≈ 6.9 cms). Table 4.13 shows that, the mean MUAC as percent standards in the girls improved with adolescent growth attaining the position of Indian well - to - do girls by the age of 17 years.

As regards the gender difference in the increment in MUAC, a significant difference was evident after the boys and the girls attained 13 years, that is, the study girls had significantly higher MUAC (as % standards) at 14 years and above (except at 16 years). This could be attributed to improved weight for age status in the girls with growing years of adolescence. As against this, MUAC (as % standards) for age in the boys declined.

Table 4.13 : Comparative Data of Mid Upper Arm Circumference (MUAC) as the Percent Standards (Mean values) for Adolescent Boys and Girls (10-18 years) at the Beginning and After 12 months of the Study

{PRIVATE }Age (Years) {PRIVATE }	Initial (Percent Standards)				After 12 months (Percent Standards)			
	Boys		Girls		Boys		Girls	
	N	Mean ± SE	N	Mean + SE	N	Mean + SE	N	Mean + SE
{PRIVATE }10	33	95.2 ± 1.62	34	88.9 ± 1.24*	33	94.4 ± 1.56	34	91.9 ± 1.24 NS
11	31	88.9 ± 1.48	32	92.4 ± 2.09 NS	31	91.9 ± 1.48	32	92.2 ± 2.02 NS
12	34	93.8 ± 1.90	32	88.3 ± 2.30 NS	34	95.8 ± 1.92	32	93.6 ± 2.94 NS
13	60	89.8 ± 1.41	58	88.4 ± 1.92 NS	61	89.4 ± 1.24	58	93.2 ± 1.25*
14	54	87.3 ± 1.32	77	92.3 ± 1.04**	54	89.9 ± 1.48	77	95.5 ± 1.33**
15	28	84.8 ± 1.23	38	88.8 ± 1.19*	28	85.9 ± 1 32	38	91.1 ± 1.18**
16	37	88.4 ± 1.64	35	89.2 ± 1.68 NS	37	93.3 ± 1.44	35	92.8 ± 1.89 NS
17	30	89.1 ± 1.67	34	97.8 ± 1.84***	30	90.8 ± 1.41	34	100.7± 1.62***
{PRIVATE }10 - 17	307	89.2 ± 0.56	340	90.7 ± 0.60 NS	307	90.9 ± 0.54	340	93.9 ± 0.60***

50th percentile of the Indian Standards (Vijayaraghavan et al 1974)
By 't' test · NS (Not significant) p > 0.05 * P ≤ 0.05 ** P ≤ 0 01 *** P ≤ 0 001

However, the study girls exhibited lower values by about 2 to 3 cms compared with Indian affluent girls but similar to poor girls (Table 4.15).

4.2.1.6 Skin Fold Thickness (SFT) for Age

During adolescence, in boys muscle mass increases and proportion of subcutaneous fat decreases. Keeping with this trend, the mean SFT values was 8.06 mm the age of 10 years which decreased to 6.29 mm at the age of 18 years in the beginning of the study. After 12 months, mean SFT value was 7.47 mm at 10 years of age and 6.07 mm at 18 years of age. Thus about 1.4 – 1.8 cm decrease in subcutaneous fat at triceps was observed in the study boys (Appendix - XI). Further, mean SFT values as percent standards revealed that nutritional status of the study boys deteriorated during the adolescent growth - 95 % at 10 years to 77 % at 18 years at the beginning and after 12 months 85 % at 10 years of age to 65 % at 18 years age (Table 4.16). Thus, the calorie reserve of the study boys as indicated by the SFT diminished during the course of adolescent growth. This is not surprising as earlier, it was seen that on an average weight for age (% standards) declined in a boy during this period.

Contrary to the boys, proportion of subcutaneous fat increased in girls. Like wise on average an increment of 6.2 cms was seen in the study girls during adolescent period. Table 4.16 reveals that at each age, mean SFT value as percent standards improved in the study girls. However, on an average a 10 year old girl had higher proportion of subcutaneous fat compared with a 17 years old girl.

Comparative gender analysis revealed that at the beginning of the study, at each age except at 15 years, the study boys had higher mean SFT values than the girls but only at the age of 13 years, the difference was statistically significant. After 12 months of the study, from the age of 13 years the study girls exhibited higher mean SFT values (% standards) over boys and the difference was significant only at the age of 15 years. Further comparative gender analysis on pooled data of 10 – 18 years old boys and girls

Table 4.14 : Studies Reporting Mid Upper Arm Circumference (MUAC) Data in Adolescent Boys

Author and Year	Place	Area	SEG*	MUAC (cms)								
				10	11	12	13	14	15	16	17	18
Present Study	**Vadodara**	**Urban**	**LSEG**	**17.6**	**17.1**	**18.0**	**18.7**	**19.3**	**19.5**	**21.2**	**21.5**	**22.3**
Vijayaraghavan et al (1974)	India	Urban	HSEG	18.5	19.2	20.1	20.8	22.0	23.0	24.0	-	-
Agarwal et al (1992)	India	Urban	HSEG	17.95	18.70	19.5	20.35	21.20	22.10	22.95	23.80	24.30
Gopaldas and Capoor (1981)	Vadodara	Urban	HSEG	17.92	18.82	19.98	19.94	20 36	20.86	22.09	23.07	
Chandrasekhar and Jacob (1992)	Chennai	Urban	YMCA sports children	-	-	-	-	20.6 – 22.9			-	-
Kanani and Zararia (1996)	Vadodara	Urban	LSEG	16.28	16.95	17.37	17.93	19 02	20.10	21.22	20.87	22.30

Table 4.15 : Studies Reporting Mid Upper Arm Circumference (MUAC) Data in Adolescent Girls

Author and Year	Place	Area	SEG*	MUAC (cms)								
				10	11	12	13	14	15	16	17	18
Present Study	**Vadodara**	**Urban**	**LSEG**	**16.9**	**18.0**	**18.4**	**18.9**	**20.1**	**20.1**	**20.5**	**21.6**	**22.5**
Vijayaraghavan et al (1974)	India	Urban	HSEG	19.1	19.5	20.8	21.1	21.8	22.6	23.0	-	-
Agarwal et al (1992)	India	Urban	HSEG	19.05	20.0	20.9	21.7	22.35	22.8	23.0	23.0	-
			LSEG	16.9	17.5	17.6	-	-	-	-	-	-
Easwaran and Devdas (1984)	Coimbatore	Urban	MSEG	17.7	17.8	18.2	-	-	-	-	-	-
			HSEG	18.8	19.0	19.7	-	-	-	-	-	-

*HSEG – High Socio Economic Group MSEG – Middle Socio Economic Group LSEG – Lower Socio Economic Group

revealed that in the beginning mean SFT value at triceps (% standards) in the study boys were significantly higher than in the girls.

Discussion

Comparison of mean SFT values of the present boys with other studies conducted in India is presented in Table 4.17 – 4.18. Affluent boys exhibited a higher adiposity at triceps compared to the present boys, while urban poor boys of Vadodara city exhibited lower amount of fat at triceps (Vijayaraghavan et al 1974, Agarwal et al 1992, Gopaldas and Capoor 1981, Chandrasekhar and Jacob 1992, Kanani and Zararia 1996). A similar trend emerged in the present girls too.

4.2.2 Haemoglobin Status

As seen in Table 4.19 and 4.20 by and large, in all the age groups the mean haemoglobin (Hb) levels of the boys and the girls were below the normal levels (12g/dl – WHO criteria), indicating that anaemia was rampant in the study subjects. Further, in the younger age group, mean Hb levels were far below the normal : 8.74 g/dl and 9.94 g/dl in 10 – 12 years old boys and girls respectively. The younger adolescent boys (10 – 12 years) had lower Hb values than the younger adolescent girls (10 – 12 years). After 12 months of the study, no significant change in mean Hb values of the boys and girls was evident in all the age groups.

Table 4.21 reveals that the mean increment in haemoglobin level was low in the boys during the study period across all the age groups. In the girls, it was much lower during the study period : less than 0.1 g/dl). Though the mean increment in the boys was higher than in the girls, no significant difference was observed in mean increments between the boys and the girls across the age groups. However, on pooling the values of the 10 – 18 year old children, the mean increment in Hb values was significantly higher in the boys (0.157 vs. 0.016).

Table 4.16 : Comparative Data of Skin Fold Thickness (SFT) as the Percent Standards[#] (Mean values) for Adolescent Boys and Girls (10 - 18 years) at the Beginning and After 12 months of the Study

{PRIVATE }Age {PRIVATE }(Years)	Initial (Percent Standards)				After 12 months (Percent Standards)			
	Boys		Girls		Boys		Girls	
	N	Mean ± SE	N	Mean ± SE	N	Mean ± SE	N	Mean ± SE
{PRIVATE } {PRIVATE }10	33	94.8 ± 5.60	34	78.0 ± 3.13*	33	84.8 ± 5.10	34	83.3 ± 3.26NS
11	31	85.3 ± 4.57	32	86.2 ± 5.12NS	31	84.4 ± 4.93	32	77.0 ± 4.56NS
12	34	85.7 ± 5.53	32	76.5 ± 5.34NS	34	85.5 ± 5.59	32	82.8 ± 5.95NS
13	60	88.2 ± 3.82	58	78.8 ± 3.51*	60	92.1 ± 4.41	58	93.2 ± 3.56NS
14	54	90.7 ± 5.52	77	84.9 ± 2.9NS	54	90.3 ± 6.09	77	95.9 ± 3.32NS
15	28	79.6 ± 5.16	38	82.1 ± 3.8NS	28	77.8 ± 4.24	38	86.1 ± 3.80*
16	37	82.4 ± 4.46	35	82.3 ± 4.1NS	37	80 7 ± 4.79	35	90.9 ± 5.09NS
17	30	77.2 ± 3.96	34	69.2 ± 3.8NS	30	65.4 ± 3.04	34	77.7 ± 3.77*
{PRIVATE }10 - 17	307	86.4 ± 1.76	362	80.4 ± 1.39**	307	84.8 ± 1.89	362	87.7 ± 1.49NS

50th percentile of the Indian Standards (Vijayaraghavan et al 1974)
By 't' test : NS (Not significant) p > 0 05 * P ≤ 0.05 ** P ≤ 0 01 *** P ≤ 0.001

Table 4.17 : Studies Reporting Skin Fold Thickness (SFT) Data in Adolescent Boys

Author and Year	Place	Area	SEG	SFT (mm)								
				10	11	12	13	14	15	16	17	18
Present Study	**Vadodara**	**Urban**	**LSEG**	**8.1**	**7.5**	**7.5**	**7.6**	**7.5**	**6.5**	**6.6**	**6.2**	**6.3**
Vijayaraghavan et al (1974)	India	Urban	HSEG	8.5	8.8	8.9	8 5	8.3	8.1	8 0	-	-
Agarwal et al (1992)	India	Urban	HSEG	10.15	10.55	10.75	10.85	10.85	10.75	10.55	10.35	10.20
Gopaldas and Capoor (1981)	Vadodara	Urban	HSEG	10.15	10.24	10.33	11.33	12.24	12.53	11.93	12.0	-
Shamssaın (1989)	Libya	Urban	HSEG	8.7	9.3	9.3	8.1	8.8	-	-	-	-
Kapoor et al (1991)	Delhı	Urban	HSEG	-	13.8	13.4	10.3	10.8	10.6	12.0	11.0	10.0
			LSEG	-	7.1	7.0	7.0	7.4	7.5	8.6	7.8	6.7
Chiplonkar (1990)	Pune	Army Recruits		-	-	-	-	-	-	-	7.2	
Chandrasekhar and Jacob (1992)	Chennai	Urban	YMCA sports children	-	-	-	-	6.6 – 8.3			-	-
Kanani and Zararıa (1996)	Vadodara	Urban	LSEG	5.03	5.45	5.66	5 52	5.28	4.90	4.98	4.31	4.78

HSEG – High Socio Economic Group
MSEG – Middle Socio Economic Group
LSEG – Lower Socio Economic Group

Table 4.18 : Studies Reporting Skin Fold Thickness (SFT) Data in Adolescent Girls

Author and Year	Place	Area	SEG	SFT (mm)								
				10	11	12	13	14	15	16	17	18
Present Study	**Vadodara**	**Urban**	**LSEG**	**8.5**	**8.8**	**9.3**	**10.0**	**10.9**	**10.8**	**11.6**	**13.2**	**14.7**
Vijayaraghavan et al (1974)	India	Urban	HSEG	10.6	10.2	12.1	12.7	12.8	13.2	14.1	-	-
Agarwal et al (1992)	India	Urban	HSEG	12.15	13.25	14.15	14.95	15.55	15.95	16.0	16.0	-
Shamssain (1989)	Libya	Urban	HSEG	11.4	-	10.8	11.0	11.0	14.0	-	-	-
Kapoor et al (1991)	Delhi	Urban	HSEG	-	8.0	8.6	11.0	13.0	13.8	14.2	13.8	13.6
			LSEG	-	16.4	15.6	15.5	17.1	16.6	17.4	16.4	21.0
Easwaran and Devdas (1984)	Coimbatore	Urban	LSEG	7.6	7.8	11.5	-	-	-	-	-	-
			MSEG	7.8	8.2	-	-	-	-	-	-	-
			HSEG	7.9	8.7	11.9	-	-	-	-	-	-

HSEG – High Socio Economic Group
MSEG – Middle Socio Economic Group
LSEG – Lower Socio Economic Group

Table 4.19: Longitudinal Data of Haemoglobin Values of the Adolescent Boys (10 - 18 Years) at the beginning and after 12 months of the Study

Age (Years)	N	Mean ± SE (g/dl)	Median (g/dl)
	Initial		
10 - 12	25	8.74 ± 0.32	9.00
13 - 15	37	11.59 ± 0.22	11.80
16 - 18	28	11..39 ± 0.25	10.45
10 - 18	90	10.22 ± 0.13	10.35
	After 12 months		
10 -12	25	8.92 ± 0.30	9.00
13 - 15	37	11.43 ± 0.19	11.80
16 - 18	28	11.43 ± 0.19	11.55
10 -18	90	10.73 ± 0.17	11.20

Table 4.20 : Longitudinal Data of Haemoglobin Values of the Adolescent Girls (10 - 18 Years) at the beginning and after 12 months of the Study

Age (Years)	N	Mean ± SE (g/dl)	Median (g/dl)
	Initial		
10 - 12	26	9.94 ± 0.27	10.10
13 - 15	43	10.45 ± 0.20	10.40
16 - 18	27	10 12 ± 0.35	10.40
10 - 18	96	10.22 ± 0.15	10.40
	After 12 months		
10 -12	26	9.91 ± 0.24	10.10
13 - 15	43	10.28 ± 0.16	10.40
16 - 18	27	9.96 ± 0.29	10.10
10 -18	96	10.09 ± 0.13	10 35

Table 4.21: Comparative Data of Mean Increment in Haemoglobin Levels among the Adolescent Boys and Girls (10 - 18 Years) during the Study Period

Age (Years)	Increment (g/dl)				t' Value
	Boys		Girls		
	N	Mean ± SE (g/dl)	N	Mean ± SE (g/dl)	
10 - 12	25	0.312 ± 0.115	26	0.073 ± 0.046	1 98 ^{NS}
13 - 15	37	0.059 ± 0.067	43	-0.009 ± 0.081	0 41 ^{NS}
16 - 18	28	0.146 ± 0.096	27	0.000 ± 0 102	1 09 ^{NS}
10 - 18	90	0.157 ± 0.052	96	0.016 ± 0.048	4.00 *

By 't' test NS (Not significant) p > 0 05 * p < 0 05

4.2.2.1 *Prevalence of Anaemia*

A look at Fig 4.15 reveals that the percentage of the boys with normal Hb level varied from zero to 41 % across all the age groups at the beginning. The trend remains more or less same after 12 months of the study (Fig 4.16). In other words, no change occurred in the boys with normal Hb levels over the study period in different age groups. In the overall age group (10 – 18 years), only 25 % - 27 % of the boys had normal Hb levels during the study period. Further, these figures show that majority of the boys had mild anaemia (Hb 10.0 – 11.99 g/dl) both in the beginning and after 12 months. Moderate to severe anaemia (Hb < 10.0 g/dl) prevalence was high in the younger adolescents both in the beginning and after 12 months of the study. The prevalence of severe anaemia decreased in the younger boys simultaneously, the prevalence of moderate and mild anaemia increased indicating improvement in Hb levels among the younger adolescent boys (Fig 4.15 – 4.16).

As regards the girls, Fig 4.17 and 4.18 reveals that the percentage of the girls with normal Hb levels were much lower (4 % - 9 %) as compared with their male counterparts both at the beginning and after 12 months of the study across the age groups(Fig 4.17 – 4.18). About 22 % - 46 % had moderate anaemia. The picture did not show much change during the period. Overall the most striking difference between the boys and girls was in the youngest age group (10 – 12 years) wherein a higher proportion of boys than the girls had Hb levels below 10.0 – 11.99 g/dl : 50 % - 60 % boys and 40 % - 42 % girls. Severe anaemia was less both in the boys and girls.

Discussion

Other studies in the literature have included mostly the girls' Hb status, data on boys are few. In a study by Kanani and Zararia (1996) urban poor adolescent boys had a higher mean values for haemoglobin (13.12 g/dl) and a low prevalence of anaemia (28 %) compared with the present boys. Similarly, Kashmiri school children and Chennai YMCA sports children had higher mean haemoglobin values (12.17 and 11.29 g/dl

Fig 4.15 : Percent Prevalence of Anaemia among Adolescent Boys (10 - 18 Years) at the Beginning of the Study

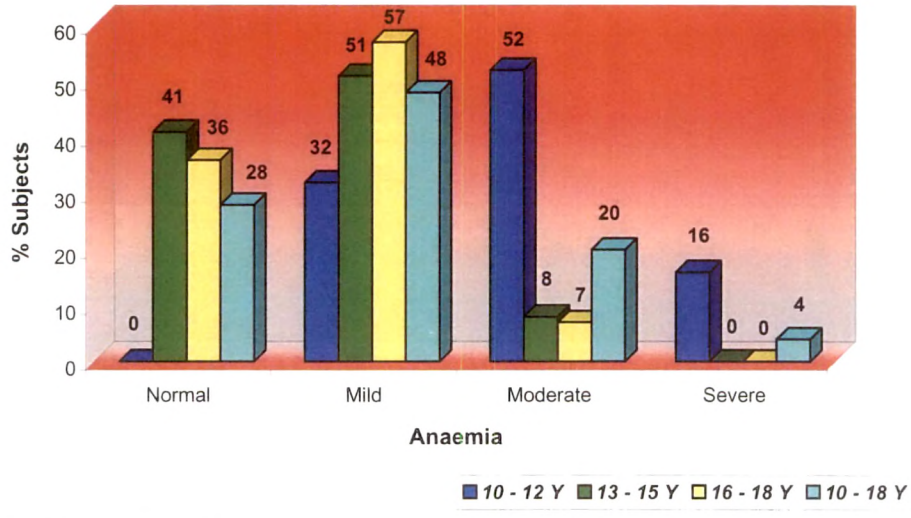


Fig 4.16 : Percent Prevalence of Anaemia among Adolescent Boys (10 - 18 Years) after 12 Months of the Study

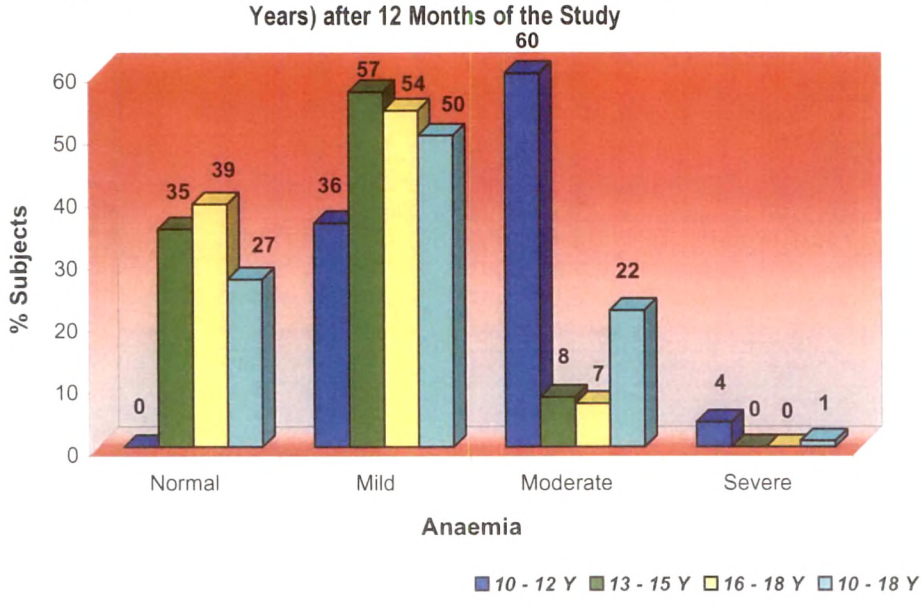


Fig 4.17 : Percent Prevalence of Anaemia among Adolescent Girls (10 - 18 Years) at the Beginning of the Study

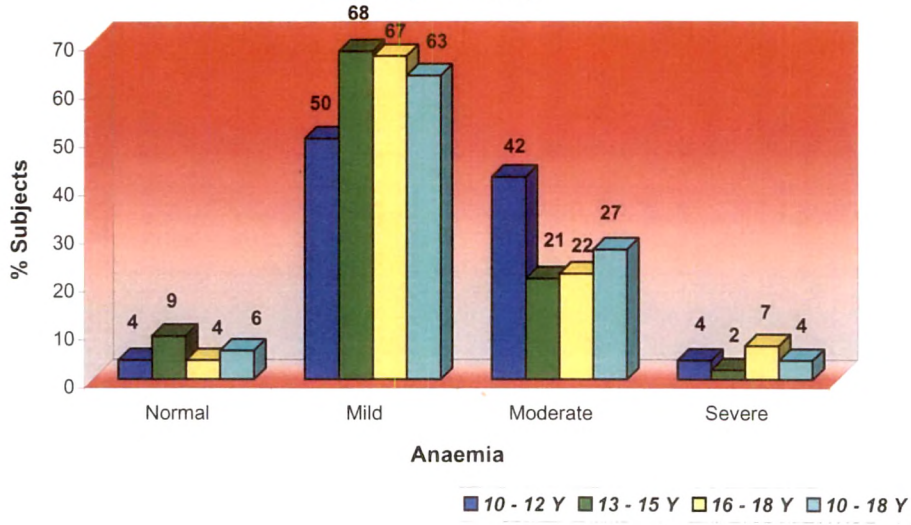
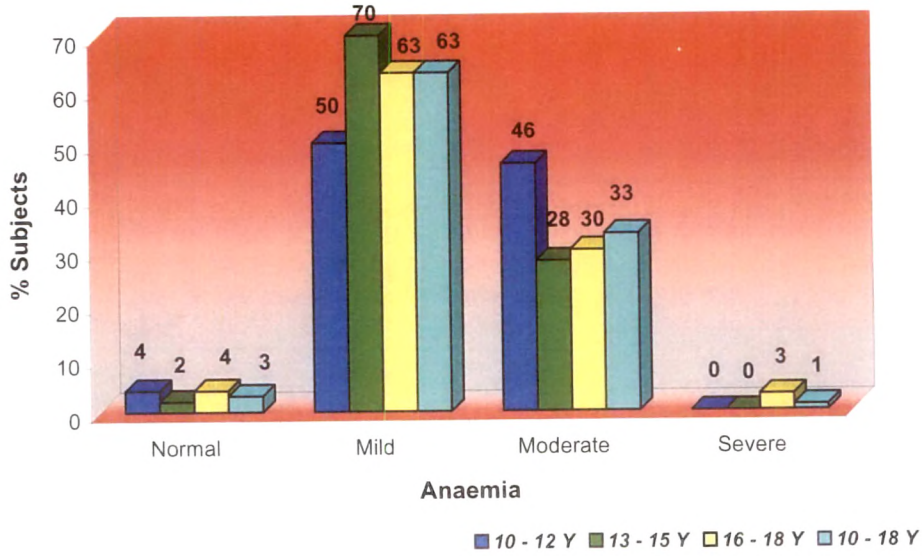


Fig 4.18 : Percent Prevalence of Anaemia among Adolescent Girls (10 - 18 Years) after 12 Months of the Study



respectively) than the present study boys (Dhar et al 1977, Chandrashekar and Jacob 1992). Siacheri et al (1996) in their study observed low levels of anaemia prevalence in 10 - 12 years old Brazilian children (boys + girls) : 18.7%. A high prevalence of anaemia ranging between 39 and 95 was seen among the boys in Hyderabd, Delhi and Calcutta (Viswesar rao 1987).

Comparison of mean Hb values of the present girls with the other studies is presented in Table 4.22. The affluent girls in various studies had a higher mean Hb value than the present girls. But the mean Hb value of the poor girls of Vadodara exhibited either a similar or lower value compared with the present girls.

4.2.3 Morbidity Status

An assessment of morbidity status of the adolescent boys and girls was carried out during three seasons of the study period (monsoon, winter and summer). In all the three seasons, at least half of the boys had fallen sick 15 days prior to the survey. The major illnesses reported were fever, cold, cough, headache and stomach pain. A look at Table 4.23 to 4.25 reveals that the incidence of fever among the boys in all the three different seasons remained the same which was about one third. Comparatively, a higher proportion of older adolescent boys complained of headache during summer and monsoon seasons. The prevalence of cold and cough was the highest in the winter season. In most of the boys, the illnesses lasted up to 4 days. The reasons for the illnesses were probed into, which revealed that the boys associated some of the illnesses like fever, cold, cough, headache with seasonal changes. Fever and headache occurred in the summer and was attributed to "roaming/playing in the hot sun". In monsoon season, these illnesses occurred due to "mosquito bite and getting wet in rain" and in winter, due to "cold weather" according to the boys. The boys also believed that food caused stomach pain in monsoon season. The percentage of the boys unable to specify the reasons varied from 21 % to 45 %.

Table 4.22 : Prevalence of Anaemia among Adolescent Boys and Girls in Various Studies

Author & Year	Place	U/ R[b]	SEG	Age group (Years)	N	Mean Hb(g/dl)	% Prevalence	
							<11 g/dl	<12 g/dl
	Boys + Girls							
Iyer et al (2000)	Vadodara	U	HSEG	6 - 15	920 (B + G)	12 7	-	21 0
	Boys							
Present Study	**Vadodara**	**U**	**LSEG**	**10 - 18**	**90**	**10.22**	**-**	**72**
Chandrasekhar & Jacob (1992)	Chennai	U	NR	14 - 16	120	11.28	-	65 0 – 85 0
Zararia (1996)	Vadodara	U	LSEG	10 - 19	124	13.12	-	28 0
	Girls							
Present Study	**Vadodara**	**U**	**LSEG**	**10 - 18**	**96**	**10.73**	**-**	**96**
Rajaratnam et al (2000)	Coimbatore	U	HSEG	13 - 19	290	11 63*	-	40 7
						11.52**	-	45.2
Kanani & Bhargava (1992)	Vadodara	U	HSEG	10 – 12	166	11.30	41 0	71 0
Kanani & Sanghani (1992)	Vadodara	U	HSEG	13 – 15	184	11.70	46 0	54 0
Kanani & Shah (2001)	Vadodara	U	HSEG	11 - 14	91	11.8	12	30
Dubey et al (2000)	Jabalpur	R	NR	9 17	NR	9 55	-	91 0
		U				10.50	-	51 0
Kanani & Sen (2001)	Vadodara	U	LSEG	11 - 16	160	11.3	33	62
Kanani & Mutreja (1998)	Vadodara	U	MSEG	10 - 15	259	10 70	46	77
Kanani & Agarwal (1998)	Vadodara	U	LSEG	8 - 13	473	9.93	75.0	90
Kanani & Poojara (1997)	Vadodara	U	LSEG	10 - 18	180	10.90	57	81
Kanani & Ghanekar (1995)	Vadodara	U	LSEG	10 - 19	60	9.30	90 0	NR
Kanani & Baxi (1991)	Vadodara	U	LSEG	10 - 18	105	9.0	97 0	NR

* Pre menarche ** Post menarche @ cutoffs level not available
U Urban R Rural NR . Not Reported
LSEG Lower Socio Economic Group MSEG · Middle Socio Economic Group
HSEG · Higher Socio Economic Group

With regard to treatment seeking behaviour, the pattern seemed to have seasonal variation. The maximum number of the boys visiting the doctor was observed only in monsoon (58.3 %), followed by home remedies and self medication in winter (41.2 % and 39.7 % respectively). The proportion of the boys not seeking any kind of the medical help was highest in summer (35.9 %) and the lowest in monsoon (11.7 %).

The prevalence of morbidity in the girls ranged between 43 % and 56 %. The illnesses reported by the girls were similar to the boys. However, some of the girls also complained of body ache and pain in legs, which were absent in the boys. Among all the illnesses in three different seasons, the prevalence of headache was highest in the summer (44 %). The percent prevalence of the other illnesses did not differ much among them. Fever and respiratory infections were more common in 10 - 12 years old girls than in the 13 - 18 years old girls especially during monsoon and winter seasons (Table 4.26 - 4.28). In majority of the girls, the illnesses lasted up to 4 days across all the seasons. The girls were also asked as to what caused the illnesses. It was observed that the girls reported more number of reasons than the boys. Similar to the boys, they attributed illnesses like headache, cold, cough and fever to the seasonal changes. The girls particularly came up with more reasons for headache such as "no oil in hair", "due to hunger", "too much reading", "tension", "late nights" and "spectacles". The reasons mentioned for stomach pain were over-eating and swelling in intestine. For pain in legs, it was over-exertion. In other words, the proportion of the girls reporting causes behind various illnesses was more compared to the boys (Table 4.23 – 4.28). Further, the treatment seeking behaviour of the girls revealed that comparatively less number of the girls sought treatment from doctor (21 % - 35%). The girls preferred sources of treatment like home remedies and self-medication. About one fifth of the girls did not take any treatment across the three seasons.

Data were analyzed to ascertain the difference in percent prevalence and duration of morbidity between the boys and the girls. The findings are presented in Table 4.29 and 4.30. With regard to percent prevalence, no significant difference between the boys and the girls was seen. As for duration of morbidity, a significant difference was observed

Table 4.23: Morbidity Pattern by Age among Adolescent Boys in Summer Season - 15 Day Recall

	10 -12 Years (n = 34)		13 -15 Years (n = 45)		16 -18 Years (n = 39)		All (N = 118)	
	n	Percent	n	Percent	n	Percent	n	Percent
A Fell sick	20	58 8	21	46 7	23	58.9	64	54 2
B Type of sickness*								
a Fever	7	35.0	9	42.9	9	39.1	25	39.1
b Cold & cough	3	15.0	5	23.8	2	8.7	10	15 6
c Headache	6	30.0	8	38 1	10	43.5	24	37 5
d Pain in stomach	4	20.0	2	9.5	5	21.7	11	17 2
e Others	2	10 0	2	9.5	2	8 7	6	9 4
C Duration of sickness*								
1 - 2 Days	8	40 0	13	61.9	12	52.2	33	51.6
3 - 4 Days	10	50.0	8	38 1	14	60.9	32	50.0
4 - 8 Days	4	20 0	5	23 8	2	8.7	11	17 2
D Reasons for the sickness as perceived by the boys*								
a. Roamed/played in the sun	3	15.0	10	47.6	13	56 5	26	40 6
b Just happened	-	-	3	14.3	5	21.7	8	12 5
c. Do not know	17	85.0	8	38.1	4	17.4	29	45 3
d. Others	2	10.0	5	23.8	6	26.1	13	20.3
E Actions Taken*								
a Went to Doctor	5	25.0	6	28.6	8	34 8	19	29 7
b. Went to Vaid	3	15.0	-	-	-	-	3	4.7
c. Home remedies	8	40 0	7	33.3	4	17.4	19	29.7
d. Got medicines from the shop	4	20.0	5	23.8	3	13 0	12	18.8
e Did nothing	2	10.0	8	38.1	13	56.5	23	35.9
f Others	-	-	2	9.5	-	-	2	3 1

* Multiple responses

Table 4.24: Morbidity Pattern by Age among Adolescent Boys in Monsoon Season : 15 Day Recall

	10 -12 Years (n = 34)		13 -15 Years (n = 45)		16 -18 Years (n = 39)		All (N = 118)	
	n	Percent	n	Percent	n	Percent	n	Percent
A Fell sick	17	50 0	24	53 3	19	48 7	60	50.8
B Type of sickness*								
a Fever/ Malaria	7	41 2	9	37 5	7	36 8	23	38 3
c Cold & cough	5	29.4	7	29 2	9	47 4	21	35 0
d Headache	4	23 5	6	25 0	4	21 1	14	23 3
e Pain in stomach	5	29.4	4	16 7	-	-	9	15 0
f Others			1	4.2	3	15 8		
C Duration of sickness*								
1 - 2 Days	8	47 1	10	41 7	8	42 1	26	43 3
3 - 4 Days	8	47 1	8	33 3	11	57 9	27	45 0
4 - 8 Days	5	29.4	9	37 5	4	21 1	18	30 0
D. Reasons for the sickness as perceived by the boys*								
a. Due to cold / mosquito	5	29 4	4	16 7	4	21.1	13	21 6
b. Got wet in rain	7	41.2	10	41 7	8	42 1	25	41.6
c Food origin	4	23.5	3	12.5	-	-	7	11 7
d. Others	-		3	12.5	3	15 8	6	10 0
e Do not know	5	29 4	4	16 7	8	42 1	17	28 3
E Actions Taken*								
a Went to doctor	10	58 8	16	66 7	9	47 4	35	58.3
b Got medicines from the shop	6	35 3	5	20 8	4	21 1	15	25 0
c. Home remedies	4	23.5	5	20 8	6	31 6	15	25 0
d. Did nothing	2	11 8	3	12 5	2	10 5	7	11 7
e Others	-	-	2	8 3	-	-	2	3 3

* Multiple responses

Table 4.25: Morbidity Pattern by Age among Adolescent Boys in Winter Season :15 Day Recall

	10 -12 Years (n = 34)		13 -15 Years (n = 45)		16 -18 Years (n = 39)		All (N = 118)	
	n	Percent	n	Percent	n	Percent	n	Percent
A. Fell sick	21	61.8	25	55 6	22	56.4	68	57 6
B. Type of sickness*								
a. Fever	8	38.1	10	40.0	7	31.8	25	36.8
b Cold & cough	16	76.2	13	52.0	14	63.6	43	63 2
c. Headache	6	28.6	7	28 0	6	27.3	19	27.9
d. Pain in stomach	4	19.0	-	-	-		2	2 9
e. Others	-	-	2	8.0	5	22 7	7	10.3
C. Duration of sickness*								
1 - 2 Days	11	52.3	7	28 0	8	36.4	26	38 2
3 - 4 Days	13	61.9	17	68 0	19	86.4	49	72 1
4 - 8 Days	8	38.1	8	32.0	5	22.7	21	30 9
D. Reasons for the sickness as perceived by the boys*								
a. Due to cold weather	13	61.9	17	68 0	12	54.5	42	61.8
b. Just happened	6	28.6	6	24 0	8	36.4	20	29.4
c. Do not know	9	42.9	5	20.0	6	27.3	20	29 4
d Others	4	19.0	4	16.0	6	27.3	14	20.6
E. Actions taken*								
a Went to doctor	6	28.6	6	24 0	10	45.5	22	32 4
b. Went to vaid	4	19.0	2	8.0	8	36 4	6	8 8
c. Home remedies	10	47.6	10	40.0	9	40.9	28	41 2
d Got medicines from the shop	8	38.1	8	32 0	7	31.8	27	39 7
e. Did nothing	2	10.0	10	40.0	13	59.5	15	22 1
f. Others	-	-	2	8.0	-	-	2	2 9

* Multiple responses

Table 4.26: Morbidity Pattern by Age among Adolescent Girls in Summer Season : 15 Days Recall

	10 -12 Years (n = 32)		13 -15 Years (n = 42)		16 -18 Years (n = 38)		All (N = 112)	
	n	Percent	n	Percent	n	Percent	n	Percent
A. Fell sick	16	50.0	21	50.0	11	28.9	48	42.9
B Type of sickness*								
a Fever	5	31.3	4	19 0	-	-	9	18.8
b. Cold & cough	2	12.5	3	14.3	-	-	5	10.4
c. Pain in stomach			5	23.8	3	27 3	8	16 7
d. Headache	8	50.0	8	38.1	5	45.5	21	43.8
e. Pain in legs	-	-	3	14.3	3	27.3	6	12 5
f. Body ache	3	18.8	4	19.0	4	36.4	11	22 9
g. Others	-	-	-	-				
C Duration of sickness*								
1 - 2 Days	9	56.3	13	61 9	3	27.3	25	52 1
3 - 4 Days	4	25.0	6	28.6	4	36.4	14	29 2
4 - 8 Days	3	18.8	2	9.5	3	27.3	8	16 7
E. Reasons for the sickness as perceived by the girls*								
a. Due to heat	5	31.3	13	61.9	9	81.8	27	56.3
b. Due to mosquito	-	-	3	14.3	2	18.2	5	10.4
c. No oil in hair	-	-	4	19.0	2	18.2	6	12.5
d. Due to food	5	31.3	3	14.3	-	-	8	16.7
e. Due to cold	3	18.8	-	-	-	-	3	6 3
f. Do not know	4	25.0	3	14.3	2	18.2	9	18.8
F Actions taken*								
a. Went to doctor	5	31 3	3	14.3	2	18.2	10	20.8
b. Home remedies	6	37.5	12	57.1	6	54.5	24	50.0
c. Got medicines from the shop	4	25.0	6	28.6	3	27.3	13	27 1
d. Did nothing	3	18.8	4	19.0	3	27.3	10	20.8

* Multiple responses

Table 4.27: Morbidity Pattern by Age among Adolescent Girls in Monsoon Season: 15 Days Recall

	10 -12 Years (n = 32)		13 -15 Years (n = 42)		16 -18 Years (n = 38)		All (N = 112)	
	n	Percent	n	Percent	n	Percent	n	Percent
A. Fell sick	19	59 3	23	54 8	13	34.2	55	49 1
B. Type of sickness*								
a. Fever	8	42.1	9	39 1	2	15.4	19	34.5
b. Cold & cough	9	47.4	5	21.7	3	23.1	17	30 9
c. Diarrhoea	2	10 5	1	4.3	-	-	3	5.5
d. Pain in stomach	-	-	3	13.0	2	15.4	5	9 1
e. Headache	6	31.6	8	34.8	5	38 5	19	34 5
f. Others (ulcers in mouth/pain in legs)			1	4 3	5	38 5	6	10 9
C. Duration of sickness*								
1 - 2 Days	12	63 2	7	30 4	6	46.2	25	45.5
3 - 4 Days	11	57.9	6	26 1	2	15.4	19	34 5
4 - 8 Days	2	10.5	8	34.8	2	15.4	12	21.8
Everyday			4	17.4	4	30 8	8	14 5
D. Reasons for the sickness as perceived by the girls*								
a. Got wet in rain	5	26.3	3	13.0	-	-	8	14.5
b. Due to hunger	-	-	3	13.0	-	-	3	5.5
c. Too much reading	-		3	13.0	2	15.4	5	9.1
d. Noise pollution	-		2	8.7	-	-	2	3.6
e. Mosquito	2	10.5	1	4.3	-	-	3	5.5
f. Spectacles	2	10.5	1	4.3	-	-	1	1.8
g. Food origin	-	-	1	4 3	2	15.4	5	9.1
h. Roamed in sun	-	-	1	4.3	-	-	1	1 8
I. no oil in hair	-	-	1	4.3	-	-	1	1 8
j. Late nights	-	-	1	4.3	2	15 4	3	5.5
k. *kaf thayo*	-	-	1	4.3	-	-	1	1 8
l. lack of blood	-	-	1	4 3	-	-	1	1.8
m tension	-	-	1	4.3	-	-	1	1.8
n. Over eating	-	-	1	4.3	-	-	1	1.8
o. Swelling in intestine	-	-	1	4 3	-	-	1	1 8
p Do not know	13	68.4	1	4.3	-	-	14	25 4
F Actions taken*								
a. Went to doctor	10	51.8	6	26.1	3	23 1	19	34 5
b. Got medicines from the shop	8	42.1	6	26.1	-	-	14	25.5
c Home remedies	3	15 8	2	8 7	2	15 4	7	12 7
d Did nothing	-	-	1	4.3	10	76 9	11	20 0
e. Others								

* Multiple responses

Table 4.28: Morbidity Pattern by Age among Adolescent Girls in Winter Season : 15 Days Recall

	10 -12 Years (n = 32)		13 -15 Years (n = 42)		16 -18 Years (n = 38)		All (N = 112)	
	n	Percent	n	Percent	n	Percent	n	Percent
A. Fell sick	21	65.6	26	61 9	16	42 1	63	56 3
B. Type of sickness*								
a. Fever	8	38.1	5	19.2	3	18.8	16	25.4
b. Cold & cough	7	33.3	6	23.1	2	12.5	15	23 8
c Headache	1	4.8	1	3.8	3	18.8	5	7.9
d. Pain in stomach	5	23.8	9	34.6	4	25.0	18	28.6
e. Pain in legs	3	14 3	8	30.8	6	37.5	17	26 9
C. Duration of sickness*								
1 - 2 Days	6	28.6	8	30.8	7	43.8	21	33.3
3 - 4 Days	10	47.6	10	38.5	5	31 3	25	39.7
4 - 8 Days	5	23.8	6	23.1	3	18.8	14	22.2
Everyday			2	7.7	2	12.5	4	6.4
D. Reasons for the sickness as perceived by the girls*								
a. Due to cold weather	12	57.1	12.	46.2	12	75.0	36	57.1
b. Cold weather	8	38.1	3	11.5	2	12.5	13	20.6
c. Over exertion	-	-	3	11.5	5	31 3	8	12.7
d. Mosquito	2	9.5	5	19.2	1	6.3	8	12.7
e Tension	1	4.8	3	11.5	-	-	4	6.4
f. Do not know	4	19.0	2	7.7	3	18.8	9	14.3
F. Actions taken*								
a Went to doctor	5	23 8	7	26 9	4	25.0	16	25 4
b. Got medicines from the shop	12	57.1	9	34.6	8	50.0	29	46.0
c. Home remedies	-	-	6	23.1	2	12 5	8	12.7
e. Did nothing	4	19.0	6	23.1	5	31.3	15	23.8

* Multiple responses

only in the winter season. The proportion of boys with illnesses lasting for three to eight days was significantly higher than the girls.

4.2.3.1 Morbidity and Haemoglobin Status

As observed from Table 4.31, in the younger age group among the boys, a trend observed was that as morbidity prevalence increased in the boys with mild and moderate anaemia. The girls too presented a similar picture (Table 4.32).

As seen in Table 4.33, gender difference with regard to association of percent prevalence with degree of anaemia was highly significant between non-anaemic boys and girls. Strangely, all the boys with normal Hb values suffered from at least one illness. In contrast, only one fourth or less number of girls with normal Hb values reported at least one illness 15 days prior to the survey. In other words, due to methodological reasons and small sample size, no trend was seen between morbidity and anaemia

Discussion

Kanani and Zararia (1996) reported low prevalence of morbidity (28 %) in 10 - 18 years old boys compared with that among the present boys. Similarly, less number of 10 - 18 year old girls suffered from various ailments 15 days prior to the survey (Kanani et al 1998). In another study, the prevalence of morbidity in the 8 - 13 years old poor girls of Vadodara city was high in the monsoon than in summer and winter seasons, whereas in the present girls the prevalence was the highest in winter followed by monsoon and summer seasons (Agarwal and Kanani 1998). But Kanani et al (1998) reported low prevalence of morbidity among urban poor adolescent girls. Thus, overall morbidity reported in various studies shows different trends according to seasons and gender. This is not surprising given the methodological differences in collecting data and the influence of several other environmental factors influencing morbidity.

Table 4.29 : Gender Difference in Percent Prevalence of Morbidity among Adolescent Boys and Girls (10 - 18 Years) during Three Seasons of the Study Period

Age (Years)	Adolescents with Any Morbidity						Chi Square
	Boys			Girls			
	N	n	Percent	N	n	Percent	
	Summer						
10 - 12	34	20	58 8	32	16	50 0	0 52^{NS}
13 - 15	45	21	46 7	42	21	50.0	0.10^{NS}
16 - 18	39	23	58 9	38	11	28.9	7.04^{NS}
10 - 18	118	64	54.2	112	48	42.9	2.98^{NS}
	Monsoon						
10 - 12	34	17	50.0	32	19	59 3	0 58^{NS}
13 - 15	45	24	53.3	42	23	54.8	0 02^{NS}
16 - 18	39	19	48 7	38	13	34 2	1.67^{NS}
10 - 18	118	60	50 8	112	55	49.1	0.07^{NS}
	Winter						
10 - 12	34	21	61 8	32	21	65 6	0 11^{NS}
13 - 15	45	25	55 6	42	26	61.9	0 36^{NS}
16 - 18	39	22	56 4	38	16	42 1	1 58^{NS}
10 – 18	118	68	57 6	112	63	56 3	0 04^{NS}

All Chi square values are not significant at p > 0 05

Table 4.30 : Gender Difference in Duration (3 - 8 days) of Morbidity among Adolescent Boys and Girls (10 – 18 Years) During Three Seasons of the Study Period

Age (Years)	Adolescents with Any Morbidity						Chi Square
	Boys			Girls			
	N	n	Percent	N	n	Percent	
	Summer						
10 - 12	34	14	70 0	32	7	43.0	2 52 ^{NS}
13 - 15	45	13	61 9	42	8	38.1	2.38 ^{NS}
16 - 18	39	16	69.6	38	8	63 7	0 ^{NS}
10 - 18	118	43	67.2	112	23	48.0	4 21 *
	Monsoon						
10 - 12 (	34	13	76 5	32	13	68.4	0 03 ^{NS}
13 - 15	45	17	70 8	42	18	78 3	0 34 ^{NS}
16 - 18	39	15	79 0	38	8	61 6	0.46 ^{NS}
10 - 18	118	45	75 0	112	39	70 8	0 13 ^{NS}
	Winter						
10 - 12	34	21	100 0	32	15	71 4	4 86 *
13 - 15	45	25	100.0	42	18	69 3	6 95 **
16 - 18	39	21	95.5	38	10	62.6	4.68 *
10 - 18	118	67	98 5	112	43	68 3	22 27 ***

Chi square value significance . NS $p > 0\ 05$ * $p \leq 0\ 05$ ** $p \leq 0\ 01$ *** $p \leq 0\ 001$

Table 4.31: Percent Prevalence of Morbidity by Haemoglobin Values among Adolescent Boys (10 - 18 Years) in the Three Seasons During the Study Period

Age (Years)	N	Morbidity Prevalence by Haemoglobin Values							
		Normal@		Mild@		Moderate@		Severe@	
		N	Percent	N		Percent			
		Summer							
10 - 12	34	1	2.9	9	26.5	9	26.5	1	2.9
13 - 15	45	10	22.2	8	17.8	3	6.7	-	-
16 - 18	39	11	28.1	8	20.5	4	10.2	1	2.6
10 - 18	118	22	18 7	25	21.2	16	13.6	2	16.9
		Monsoon							
10 - 12	34	1	2.9	6	17.6	7	20.6	3	8 8
13 – 15	45	20	44.5	3	6.7	1	2.2	-	-
16 - 18	39	5	12.8	8	20.5	4	10.2	2	5.1
10 - 18	118	36	30.5	17	14.4	12	10.2	5	4 2
		Winter							
10 - 12	34	1	2.9	8	23.5	10	29.4	2	5 9
13 - 15	45	17	37 8	6	13.3	2	4 4	-	-
16 - 18	39	8	20.4	10	25.6	3	7 8	1	2 6
10 - 18	118	26	22.1	24	20.3	15	12 7	3	2 5

@ Normal ≥ 12 g/dl Mild . 10 0 g/dl to 11 99g/dl Moderate · 7 0 g/dl to 9 99 g/dl Severe < 7 g/dl

Table 4.32 : Percent Prevalence of Morbidity by Haemoglobin Values among Adolescent Girls (10 - 18 Years) During Three Seasons of the Study Period

Age (Years)	N	Morbidity Prevalence by Haemoglobin Values							
		Normal@		Mild@		Moderate@		Severe@	
		n	Percent	n		Percent		n	Percent
		Summer							
10 - 12	32	-	-	5	15 6	10	31.3	1	3.1
13 - 15	42	2	4.8	10	23.8	8	19 0	1	2 4
16 - 18	38	-	-	4	10.5	6	15.8	1	2 6
10 - 18	112	2	1.8	19	16 9	24	21.4	3	2 8
		Monsoon							
10 - 12	32	-	-	5	15 6	13	40.6	1	3.1
13 - 15	42	7	16.5	13	30.9	2	4 8	1	2.4
16 - 18	38	2	5 2	5	13.2	5	13.2	1	2.6
10 - 18	112	9	8 1	23	20.5	20	17.9	3	2.8
		Winter							
10 - 12	32	-	-	5	15.6	15	46.9	1	3.1
13 - 15	42	2	4.8	18	42.9	5	11.9	1	2.4
16 - 18	38	1	2.6	8	21.1	6	15.8	1	2 6
10 - 18	112	3	2.7	31	27 7	26	23 2	3	2 8

@ Normal · ≥ 12 g/dl Mild 10 0 g/dl to 11 99g/dl Moderate . 7 0 g/dl to 9 99 g/dl Severe < 7 g/dl

Table 4.33 : Gender Difference in Percent Prevalence of Morbidity by Degree of Anemia among Adolescent Boys and Girls (10 - 18 Years) in Three Seasons During the Study Period

Age (Years)	Adolescents with Any Morbidity				Chi Square
	Boys (N = 118)		Girls (N = 112)		
	n	Percent	n	Percent	
	Summer				
Normal	21	100 0	2	16.7	21 32***
Mild	25	35.0	19	27.1	1.07 NS
Moderate	12	100 0	24	92 3	1.07 NS
Severe	2	14.3	3	75.0	3 09 NS
	Monsoon				
Normal	21	100.0	9	75.0	3.15 NS
Mild	17	23 9	23	32.9	1.38 NS
Moderate	12	100 0	20	76.9	1.78 NS
Severe	5	35.7	3	75 0	0 68 NS
	Winter				
Normal	21	100.0	3	25.0	18.04***
Mild	24	33.8	31	44 3	1.63 NS
Moderate	15	100.0	26	100.0	1 07 NS
Severe	3	21 4	3	75.0	1.07 NS

Normal ≥ 12 g/dl Mild 10 0 g/dl to 11.99g/dl Moderate 7 0 g/dl to 9 99 g/dl
Severe < 7 g/dl

By 'Chi square' test NS p > 0 05 *** p ≤ 0 001

Section III

Proximal and Distal Determinants of Nutritional Status of Adolescent Boys and Girls

Nutritional status of adolescent boys and girls who are under going rapid growth spurt is influenced by several factors. The proximal factors affecting their nutritional status (weight for age, height for age, haemoglobin status) are food and nutrient intake and morbidity. The distal factors, which indirectly influence nutritional status, are related to the environment and family composition of the subjects. These are socio – economic variables such as type of family, family size, education and occupation of the parents, per capita income, house - hold characteristics and house hold assets.

4.3.1 Proximal Factors

Presented below is the food and - nutrient intake of the subjects from a gender perspective followed by the association of food and nutrient intake and Hb status with growth.

Meal Pattern

Table 4.34 - 4.39 present food and nutrient intake of the study subjects and intra-household food distribution in three seasons during the study period. Analysis of diet survey showed that meal pattern of the adolescent boys and girls as well as their family members in general remained the similar across the three seasons. The adolescent subjects and their family members partook 3 to 4 meals in a day. The typical meal pattern consisted of morning tea with left over roti, lunch and dinner. Although lunch and dinner were major meals, usually only two food items - one a staple cereal and the other a pulse or vegetable were consumed For example rice and *dal* or vegetable curry, or *khichdi* with *kadhi* or vegetable curry, or *roti* with vegetables were cooked. Very few families included more than two food items in a meal, that is, roti, vegetable, rice

and dal. Evening tea was generally taken by adults, however some of the subjects also took tea in a small quantity (one saucer or half cup). Most of the adolescent boys and girls did not have evening snacks regularly. The study boys and girls liked to eat food sold on *lari* like *pani puri, samosa, bhel,* seasonal fruits sprinkled with *masala* on it, such as berries, wood apple, guava, raw mango, "*jamuns*", "*athela amla*" (goose berries preserved in salt water).

The results that follow regarding various aspects of food and nutrient intake are presented season - wise.

4.3.1.1 Frequency of the Selected Protective Foods Consumption Across the Three Seasons

Frequency of Pulses and Legumes Consumption

Table 4.34 presents the summary of food frequency data in summer season. The most commonly consumed pulses and legumes were red gram dal, green gram (whole and in dal form), bengal gram dal, peas and cow peas. The older study boys (16 - 18 years) consumed legumes and sprouts comparatively more frequently than the younger study boys (10 - 15 years); whereas pulses were eaten less frequently by the older study boys (16 - 18 years) and more frequently by the younger study boys (10 - 15 years).

In the study girls, the 13 - 15 years old subjects ate pulses (dal) more frequently than the other age groups. Legumes were consumed more frequently by a higher percentage of the 10 - 15 year old girls. Sprout consumption was relatively higher among 13 – 18 years old girls (Table 4.34).

In monsoon season, the types of pluses and legumes consumed remained the same as those in summer season. However, an increase in the consumption of pulses and legumes was observed among the study boys and the study girls across the age groups (Table 4.35). It was surprising to note that sprouts consumption increased among the study boys, but decreased in the study girls unlike in summer.

Table 4.34: Frequency of the Selected Protective Foods Consumed in Summer Season as Reported by the Highest Percentage of Adolescent Boy and Girls (10 – 18 Years)

Food Item	Boys		Girls	
	Percent Reporting	Frequency of Consumption	Percent Reporting	Frequency of Consumption
	10 - 12 Years			
Pulses	61	more than 3 times in a week	65	2 - 3 times in a week
Legumes	-	Nil	58	2 - 3 times in a week
Sprouts	-	Nil	47	once in a month
GLVs	-	Nil	10	once in a month
Roots & Tubers	77	2 - 3 times in a week	58	2 - 3 times in a week
Other Vegetables	91	2 - 3 times in a week	47	once in a week
Fruits	61	at least once in a fortnight	72	once in a fortnight
Non Vegetarian Foods	58	Once in a month	-	Nil
	13 - 15 years			
Pulses	56	more than 3 times in a week	43	more than 3 times in week
Legumes	8	2 - 3 times in a week	27	2 - 3 times in a week
Sprouts	50	once in a week	41	once in a fortnight
GLVs	14	once in a month	-	Nil
Roots & Tubers	84	at least 2 - 3 times in a week	54	2 - 3 times in a week
Other Vegetables	84	more than 3 times in a week	100	more than 3 times in a week
Fruits	70	once in a week	41	once in a week
Non Vegetarian Foods	50	once in a week	-	Nil
	16 - 18 Years			
Pulses	68	2 - 3 times in a week	61	2 - 3 times in a week
Legumes	72	once in a week	38	once in a week
Sprouts	40	once in a fortnight	46	once in a fortnight
GLVs	64	once in a fortnight	38	once in a fortnight
Roots & Tubers	90	at least 2 - 3 times in a week	49	2 - 3 times in a week
Other Vegetables	68	at least 2 - 3 times in a week	61	2 - 3 times in a week
Fruits	68	once in a week		once in a week
Non Vegetarian Foods	100	once in a week	11	once in a month

Table 4.35: Frequency of the Selected Protective Foods Consumed in Monsoon Season as Reported by the Highest Percentage of Adolescent Boy and Girls (10 – 18 Years)

Food Item	Boys		Girls	
	Percent Reporting	Frequency of Consumption	Percent Reporting	Frequency of Consumption
	10 - 12 Years			
Pulses	66	more than 3 times in a week	92	at least 2 - 3 times in a week
Legumes	33	once in a fortnight	62	once in a fortnight
Sprouts	43	once in a fortnight	17	once in a month
GLVs	50	Once in a week	45	once in a month
Roots & Tubers	50	2 - 3 times in a week	86	2 - 3 times in a week
Other Vegetables	83	more than 3 times	100	2 - 3 times in a week
Fruits	69	at least once in a fortnight	35	once in a month
Non Vegetarian Foods	69	once in a fortnight	-	Nil
	13 - 15 years			
Pulses	65	more than 3 times	78	at least 2 - 3 times in a week
Legumes	45	once in a week	47	once in a fortnight
Sprouts	63	once in a fortnight	-	Nil
GLVs	40	once in a fortnight	33	once in month
Roots & Tubers	88	at least 2 - 3 times in a week	91	2 - 3 times in a week
Other Vegetables	63	2 - 3 times in a week	100	2 - 3 times in a week
Fruits	48	once in a week	34	once in a month
Non Vegetarian Foods	70	once in a fortnight	-	Nil
	16 - 18 Years			
Pulses	59	2 - 3 times in a week	89	at least 2 - 3 times in a week
Legumes	83	once in a week	33	once in a fortnight
Sprouts	50	once in a fortnight	7	once in a month
GLVs	46	once in a fortnight	3	once in a month
Roots & Tubers	89	more than 3 times in a week	59	2 - 3 times in a week
Other Vegetables	83	more than 3 times in a week	53	2 - 3 times in a week
Fruits	59	once in a week	33	once in a fortnight
Non Vegetarian Foods	83	once in a week	-	Nil

Over all the frequency of pulses, legumes and sprouts consumption decreased in winter season among the study boys and girls except for the 16 - 18 year old study girls. This could be because of increased availability and intake of other vegetables especially among the younger adolescents (Table 4.36).

Frequency of GLVs Consumption

In summer, the commonly consumed GLVs were amaranth, spinach, suva ni bhaji. GLVs were more frequently consumed by a higher proportion of the 16 - 18 years old study subjects, while none of the 10 - 12 years old study boys and 13 - 15 years old study girls ate GLVs in this season (Table 4.34).

It can be seen from Table 4.35 that GLVs consumption increased in monsoon among 10 - 15 year old study boys and girls but decreased in 16 - 18 years old study boys and girls.

Table 4.36 presents that in winter, the study boys consumed GLVs less frequently than they did in monsoon. However, frequency of eating other vegetables increased indicating that perhaps economic constraints led to consumption of either GLVs or other vegetables being consumed in a meal. In the study girls, GLVs consumption increased among younger and older girls but decreased in 13 - 15 year old girls. The most commonly GLVs eaten were cabbage, fenugreek leaves, spinach, suva.

Frequency of Roots and Tuber Consumption

Potatoes and onions were generally cooked together or with other vegetables. It was observed that these two vegetables were eaten 2 to 3 times in a week. Subsequently, it was seen that these were common vegetables in other seasons as well (Table 4.34 - 4.36). Food frequency data revealed that the percentage consuming the same was much higher among the study boys than the study girls across the ages (77% - 90 % vs. 49 % - 54 %).

Table 4.36 : Frequency of the Selected Protective Foods Consumed in Winter Season as Reported by the Highest Percentage of Adolescent Boy and Girls (10 – 18 Years)

Food Item	Boys		Girls	
	Percent Reporting	Frequency of Consumption	Percent Reporting	Frequency of Consumption
	10 - 12 Years			
Pulses	90	at least 2 - 3 times in a week	80	at least 2 -3 times in a week
Legumes	10	once in a week	52	once in month
Sprouts	-	Nil	40	once in a fortnight
GLVs	20	once in a month	68	once in a month
Roots & Tubers	90	2 - 3 times in a week	96	at least 2 -3 times in a week
Other Vegetables	90	at least 2 - 3 times in a week	76	more than 3 times in a week
Fruits	42	once in a week	80	at least 2 -3 times in a week
Non Vegetarian Foods	50	once in a fortnight	-	Nil
	13 - 15 years			
Pulses	100	at least 2 - 3 times in a week	70	at least 2 -3 times in a week
Legumes	55	once in a week	41	once in a fortnight
Sprouts	61	once in a fortnight	27	once in a month
GLVs	9	once in a week	40	once in a fortnight
Roots & Tubers	100	at least 2 -3 times in a week	81	at least 2 -3 times in a week
Other Vegetables	98	at least 2 -3 times in a week	100	more than 3 times in a week
Fruits	55	once in a week	41	once in a week
Non Vegetarian Foods	77	once in a fortnight	8	once in a month
	16 - 18 Years			
Pulses	100	at least 2 -3 times in a week	100	at least 2 -3 times in a week
Legumes	72	once in a week	47	once in a fortnight
Sprouts	54	once in a fortnight	36	once in a fortnight
GLVs	36	once in a fortnight	22	once in a fortnight
Roots & Tubers	100	at least 2 -3 times in a week	100	at least 2 -3 times in a week
Other Vegetables	100	at least 2 -3 times in a week	58	more than 3 times in a week
Fruits	47	once in a week	58	once in a week
Non Vegetarian Foods	58	once in a fortnight	25	once in a fortnight

In monsoon too, frequency was similar to that in summer viz., 2 to 3 times in a week. But compared to summer, the number of 10 - 12 year old boys eating roots and tubers declined. But among the study girls across the age groups, a rise in the percentage was observed (Table 4.35). The possible reason could be that there are more number of festivals in monsoon and fasting among women and girls during this season is a common phenomenon in Gujarat.

In winter, the percentage of the boys and girls eating roots and tubers increased as many of them reported consumption of carrots (Table 4.36)

Frequency of Other Vegetables Consumption

The consumption of "other category vegetables" revealed a seasonal influence and the cost factor to a large extent. During summer bottle gourd, cucumber, bitter gourd, brinjal, ladies finger and cow pea pods were eaten. However, ladies finger and cow pea pods were reported to be relatively expensive and hence cooked with potatoes and/or onions which very often constituted the larger amount than ladies finger or cow pea pods. As evident from Table 4.34 a higher percentage of the study boys reported its consumption compared with their female counter parts. Also the frequency and the number consuming other vegetables was the lowest among 10 - 12 year old study girls.

Similar to summer, in monsoon frequency of other vegetables consumption was reported to be 2 - 3 times in a week by most of the study boys and girls. However, its consumption showed a decline among 13 - 15 years old study boys but the percentage among older study boys and the study girls across the age groups rose (Table 4.35). In this season, the commonly consumed other vegetables were cluster beans, bottle gourd, tindola and drum stick.

Except for the older adolescent girls, at least three fourths of the study boys and girls ate other vegetables in winter as the season offered a variety of vegetables perhaps at relatively low cost. The most commonly consumed vegetables reported were cauliflower, tender beans, tender peas, tender red gram and cluster beans (Table 4.36).

Frequency of Fruits Consumption

In summer mango water melon, musk melon, banana and chikoo were reported to be commonly eaten once in a week or fortnight across the age groups. Cost was the factor which determined its frequency of consumption among the study subjects (Table 4.34). The gender differences emerged especially between 13 - 18 years old study boys and girls. Comparatively much lower percentage of these girls had fruits once a week. Although, in the 10 - 12 year age group, a higher proportion of the girls reported fruits consumption, it was seen that many of these girls were fond of eating berries and amla preserved in salt. Overall the consumption of fruits was better among the study boys than the study girls

Compared to summer, the consumption of fruits in monsoon decreased among the study boys and girls across the age group except for 10 - 12 year old boys. Surprisingly, the study boys in the younger age group increased their consumption. The most commonly fruits eaten were banana and sapota (Table 4.35).

Winter season yielded encouraging results. A larger number of the study boys and girls increased frequency of eating fruits (Table 4.36). A slight gender difference was evident in their preference of fruits. The study boys preferred to eat more of tomatoes, chikoo, guava, oranges, whereas the study girls liked to eat varied variety of berries, wood apple, guava, tomatoes, oranges, chikoo.

Frequency of Milk and Milk Products Consumption

As observed in the earlier studies carried out in the department on this segment, the regular consumption of milk occurred in the form of tea only. The other milk products which were generally consumed once in a week or fortnight were buttermilk and curd. These products were reported and observed to be used to prepare "*kadhi*" or to prepare "*khatu shak*" (vegetable prepared with use of curd or buttermilk). Round the year, no change in consumption of milk and milk products was observed except that in monsoon, some of the study subjects mentioned eating sweet dish prepared from milk

occasionally on festival day. Therefore, although all the study boys and girls reported consumption of milk daily and occasional consumption of sweet dishes in monsoon, the quantity was grossly inadequate in terms of fulfilling their nutrient requirements or improving dietary quality.

Frequency of Non - Vegetarian Food Consumption

The consumption of foods in this category was more common among the boys, which were reported to be consumed more frequently by 13 - 15 year old study boys than 10 - 12 year study boys (Table 4.34). It was further seen that about one tenth of the 16 - 18 years old girls too consumed non vegetarian items once in a month. The common recipes eaten were egg curry, omlette, chicken and mutton.

Monsoon brought a decline in the frequency of non vegetarian food consumption from once in a week in summer to once in a fortnight (Table 4.35). Compared to summer season, fewer study boys across the age groups reported its consumption. None of the girls was found to eat non - vegetarian food. Two major reasons were reported – one is, monsoon season consisted of religious festivals and as per Hindu rituals, in pious months consumption of non – vegetarian foods is prohibited. The other common reason was :
"chomasa ma mutton saru na male. Varsad ne lidhe a kharab tahi gayu hoy ke pachi bagdi gayu hoy" (In monsoon, good quality mutton is not available. Because of rains, it gets spoiled)

In winter, among 10 - 12 years and 16 - 18 years old study subjects, percentage eating non-vegetarian food declined further except among 13 - 18 years old study girls (Table 4.36).

4.3.1.2 Intra-Household Comparison of Nutrient Intake as Percent RDA

Fig 4.19 and 4.20 illustrate comparative data of the adolescent boys and girls across the three seasons as regards the intake of nutrients expressed as % RDA. Calorie intake

Fig 4.19: Nutrient Intake (as % RDA) of Adolescent Boy in an average Household in Three Different Seasons During Study Period

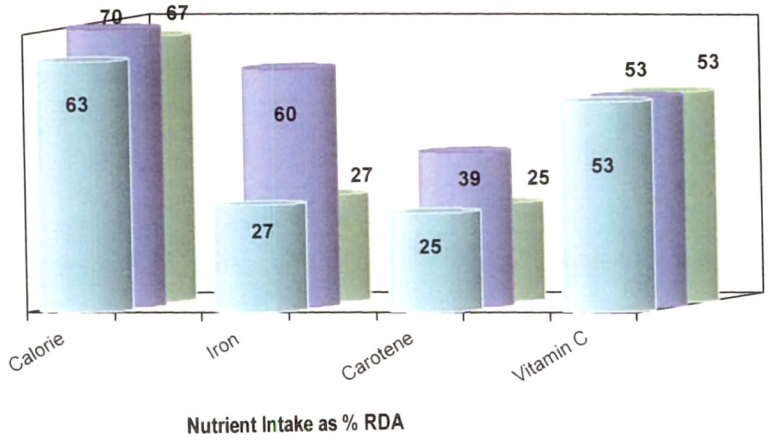
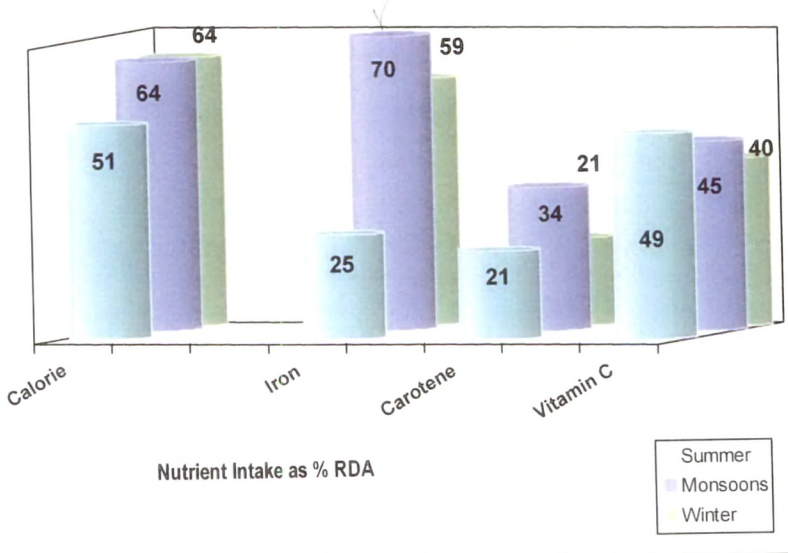


Fig 4.20 : Nutrient Intake (as % RDA) of Adolescent Girl in an average Household in Three Different Seasons During Study Period



improved in monsoons and winter as compared to summer in both the boys and girls. Relatively the boys consumed more calorie than the girl across the seasons. The iron intake was the highest in the monsoon season and the lowest in the summer season. Iron intake was somewhat better in the girls than in the boys. However, prevalence of anaemia was equally high in the study boys and girls. Low bio-availability of iron coupled with menstrual losses in the girls may have acted as contributing factors.

β - carotene was extremely inadequate across the three seasons among both the study boys and girls meeting only one fourth of RDA. The intake of vitamin C was similar in the boys and girls and did not markedly change with the seasons.

Tables 4.37 - 4.39 compare data on nutrient intake of all family members of the adolescent subjects. Overall nutrient intake of an adult male was better than the rest of the family members across the seasons; however even the adult male did not satisfactorily meet his requirements for most nutrients. The group having maximum deficit in nutrient intake was the adolescent group.

In summer, the adult male met about 80 % or higher of his RDA for protein and calcium only (Table 4.37). For the remaining nutrients (iron, β - carotene, vitamin C and calories), the intake was inadequate especially β - carotene intake (32 % RDA). The table further reveals that although the nutrient intake of an adult female was better than the adolescents or children, her intake was below the RDA for most nutrients, especially iron and β - carotene intake (57 % and 35 % RDA respectively). As for the adolescent boy and girl, intake as percent RDA was the least compared to all other family members including children, except for β - carotene and vitamin C where children ate less.

Compared to summer, in monsoon overall intake (as % RDA) of nutrients improved for all the family members owing to perhaps increased availability of certain foods and decreased cost of certain foods or occurrence of more festivals in this season (Table 4.38). The adult male continued to have higher intake than the rest of the family members. The adult female exhibited higher intake of calorie and calcium compared with the adolescents and the children, but her calorie intake remained short of RDA by

Table 4.37 : Nutrient Intake as Mean and as Mean Percent RDA# of Family Members in the Summer Season

Nutrients	Adult Male (n = 104) Mean ± SE	Adult Female (n = 101) Mean ± SE	Adolescent Boy[a] (n = 90) Mean ± SE	Adolescent Girl[a] (n = 104) Mean ± SE	Male Child[b] (n = 10) Mean ± SE	Female Child[b] (n = 13) Mean ± SE
Calorie (Kcal)	1841.58 ± 73.96	1227.04 ± 59 47	1406.46 ± 84.65	986.99 ± 42.51	993.10 ± 150 90	894.12 ± 120 93
% RDA	68.21 ± 2.74	58 43 ± 2.47	62.480 ± 4 33	51.30 ± 14.03	65.20 ± 8.93	60 37 ± 15 98
Protein (gm)	54.15 ± 2.78	45 29 ± 2.30	54.13 ± 4.20	38.44 ± 2.03	29.94 ± 4.34	25.03 ± 3 82
% RDA	79.15 ± 5.30	90.59 ± 4.60	77.54 ± 5.81	48.06 ± 5.48	99.89 ± 31 20	85.03 ± 6.82
Calcium (mg)	360 64 ± 22.61	391.85 ± 5.59	369.22 ± 22.29	278.64 ± 20.19	196 32 ± 96 32	163 32 ± 80.23
% RDA	89.73 ± 5.94	84.53 ± 5.38	63.01 ± 4.43	34.71 ± 4.30	49.32 ± 9.32	40.75 ± 10 93
Iron (mg)	15.53 ± 0.93	15.94 ± 1.23	11.25 ± 1.22	8.39 ± 0.76	8.90 ± 1 03	7 20 ± 0 32
%RDA	44.45 ± 3.83	36.42 ± 4.16	26.84 ± 2.96	24.92 ± 3.41	43 20 ± 12 3	49.90 ± 6 30
β - Carotene (mcg)	790.91 ± 180.11	713.85 ± 183.13	617.69 ± 187.39	553 92 ± 169.05	243.60 ± 43.33	196 30 ± 28 90
% RDA	32.39 ± 7.89	29.74 ± 7.63	25.10 ± 7.63	20.96 ± 7.16	10.11 ± 3 91	9.39 ± 3.23
Vitamin C (mg)	29.95 ± 5.90	27 58 ± 5.37	23.66 ± 5.37	21.89 ± 3.93	10.20 ± 1 30	9 30 ± 2 32
% RDA	75.73 ± 15.63	68.95 ± 11.06	52 98 ± 12.56	48.89 ± 10.93	25.39 ± 3.10	22 93 ± 4 32

Recommended Daily Allowance (RDA) – ICMR 1989 a 10 – 18 Years b: 1 – 10 years

23 %. The intake of the remaining nutrients was similar to the adolescent boy but it was much below RDA. Between the adolescents and the children, protein intake of the male child and iron intake of the adolescent girl were the highest (Table 4.38). As regards meeting RDA for the remaining nutrients, the adolescent boy was in a better position followed by the adolescent girl, male child and female child.

In winter, the trend of fulfilling RDA across the various groups in the family was similar to that observed in summer and monsoon (Table 4.39). Over all, the adult male was more closer in meeting his RDA compared with the other family members. The nutrient intake of the children also demonstrated improvement in this season. But in the adult female and the adolescents, nutrient intake as % RDA diminished for most nutrients, contrary to the belief that food intake is enhanced in winter. A further look at the table shows that the nutrient intake of the female adult was more than the adolescent group and the children except iron which was highest in the adolescent boy. Other wise, the adolescent group gained the lower position in the family ladder in fulfilling their RDA. Between the adolescent boy and girl, the nutrient deficits were comparatively larger in the adolescent girl (Table 4.39).

In summary, the adult male was better able to meet his RDA followed by the adult female and the male child, the adolescent boy, the adolescent girl and the female child in that order.

4.3.1.3 Intra - House Hold Food Distribution and Nutrient Intake Expressed as Mean Scores

Intra - house hold food distribution was also expressed as a score (in terms of proportion of nutrients consumed by individual family member from the family pot (explained in chapter 3 – materials and methods) and is given in Tables 4.40 - 4.42.

In the summer season, adult male and female received a larger share of food compared to other family members for meeting RDA with adult male being relatively better off than adult female. The least amount of food was received by an adolescent girl and a female child (Table 4.40). Further, the adolescent girl got even less than female child as regard

Table 4.38 : Nutrient Intake as Mean and as Mean Percent RDA[#] of Family members during the Monsoon Season

Nutrients	Adult Male (n = 104) Mean ± SE	Adult Female (n = 101) Mean ± SE	Adolescent Boy[a] (n = 91) Mean ± SE	Adolescent Girl[a] (n = 101) Mean ± SE	Male Child[b] (n = 11) Mean ± SE	Female Child[b] (n = 14) Mean ± SE
Calorie (Kcal)	2182.45 ± 94.51	1625.42± 35.15	1676.28 ± 89.87	1292 18 ± 68 45	901.58 ± 54.78	851.89 ± 78.39
% RDA	80.83 ± 5.46	77 40 ± 8.2.7	70.33 ± 12.71	64.41 ± 18 17	58.17 ± 5.48	54 96 ± 8 45
Protein (gm)	59.14 ± 4.56	44.11 ± 2.46	50.83 ± 3.41	40.10 ± 5.91	25.47 ± 3 57	21 81 ± 3 34
% RDA	98.57 ± 7.35	73.52 ± 5.46	75.11 ± 8.21	64.33 ± 12 93	80.42 ± 21 20	68.87 ± 8 82
Calcium (mg)	532.16 ± 45.23	452.21 ± 43.21	468.21 ± 41.20	358.15 ± 54.91	210.58 ± 19.32	199.87 ± 21.10
% RDA	130.43 ± 21.41	113 05± 8.45	78.34 ± 10.34	56.87 ± 14 18	51.02 ± 8.42	49 96 ± 8 54
Iron (mg)	19.23± 2.45	16.78 ± 2.78	23.82 ± 2 46	18.1 ± 4.42	6.20 ± 1.45	5.96 ± 4.32
%RDA	68.68 ± 5.79	55.93 ± 5.39	59 55 ± 6.64	69 47 ± 8.15	33.54 ± 2.18	33 12 ± 5 34
β - Carotene (mcg)	915.22 ± 178 77	816 72± 85.19	924.74 ± 45.52	805.48±15.98	448.6 ± 86.33	394 54±28 90
% RDA	38.98 ± 20 36	34.03 ± 15 89	39.03 ± 12.13	33 98± 7.84	24.04 ± 8.16	21 14±5 63
Vitamin C (mg)	22.16± 2.34	20.5 ± 4.13	21.18 ± 2.34	18.14 ± 2.83	12.30 ± 2.50	8.30 ± 1.32
% RDA	53 15± 8 60	52. 22 ± 4 62	52.89 ± 15.12	45.34 ± 11.03	30.75 ± 4.10	21 00 ± 4 32

Recommended Daily Allowance (RDA) – ICMR 1989 a . 10 – 18 Years b 1 – 10 years

Table 4.39 : Nutrient Intake as Mean and as Mean Percent RDA[#] of Family Members in the Winter Season

Nutrients	Adult Male (n = 106) Mean ± SE	Adult Female (n = 106) Mean ± SE	Adolescent Boy[a] (n = 89) Mean ± SE	Adolescent Girl[a] (n = 102) Mean ± SE	Male Child[b] (n = 11) Mean ± SE	Female Child[b] (n = 12) Mean ± SE
Calorie (Kcal)	2217.93 ± 123.68	1601.65 ± 83 99	1696.94 ± 98.29	128 46 ± 85.23	1018.49 ± 230.47	999.39 ± 269.23
% RDA	80.03 ± 4.17	72.01 ± 3 94	67.20 ± 9.29	63.58 ± 15.23	67.45 ± 8.93	51.92 ± 19.18
Protein (gm)	69 06 ± 5.58	41 36 ± 1.84	40.15 ± 2.37	34.38 ± 3.10	40.88 ± 11.13	39.21 ± 20.84
% RDA	115.11 ± 9.30	82.72 ± 3.68	64.95 ± 3.79	58.35 ± 7.32	105.38 ± 27.64	95.64 ± 30.82
Calcium (mg)	519 14 ± 33.21	362 27 ± 20.05	312.37 ± 16.70	312.83 ± 24.75	334.06 ± 44 61	381 16 ± 110.79
% RDA	126 46 ± 8.42	90.57 ± 5 01	59.31 ± 3.47	58 19 ± 5.94	83.52 ± 11.23	95 29 ± 27.70
Iron (mg)	21.39 ± 1.15	11.82 ± 1.92	25.15 ± 13.86	15.28 ± 2.89	9 970 ± 2.31	8 45 ± 2.82
%RDA	67.32 ± 4.09	39.39 ± 6.39	65 .52 ± 7.45	58 77 ± 3.09	54 39 ± 6.53	46 94 ± 5.32
β - Carotene (mcg)	691.98 ± 53.39	493 25 ± 37.06	337.78 ± 24.90	476.58 ± 8.92	426.76± 64.61	350 33± 56.56
% RDA	28 09 ± 2.23	20.55 ±1.54	14.77 ± 1.07	21 14± 4 72	23 29 ± 6.78	18 15 ± 5.23
Vitamin C (mg)	38.68 ± 4.43	27.27 ± 2.29	21.42 ± 2.69	15.56 ± 3.26	10.56 ± 2 15	00 ± 3 32
% RDA	94 16 ± 10.92	68.18 ± 11 31	57.18 ± 7.04	39.89 ± 8 45	± 4.56	± 5 32

Recommended Daily Allowance (RDA) – ICMR 1989 a 10 – 18 Years b. 1 – 10 years

Table 4.40 : Intra - House Hold Food Distribution : Proportion of Total Household Level Nutrient Intake as Consumed by Adolescent Boys and Girls and Other Family Members in Summer season

	Calories Mean ± SE	Protein Mean ± SE	Calcium Mean ± SE	Iron Mean ± SE	β- Carotene Mean ± SE	Vitamin C Mean ± SE
Adult Male n = 104	1.18 ± 0 008	1.20 ± 0.062	0.98 ± 0.105	1.20 ± 0.113	1.01 ± 0 093	1 25 ± 0.132
Adult Female n = 101	0.96 ± 0.080	0.89 ± 0.045	0.75 ± 0.120	0 87 ± 0.089	0 76 ± 0.059	0.89 ± 0.210
Adolescent Boys (10 - 18)* n = 90	0.72 ± 0.058	0.90 ± 0.041	0.79 ± 0.042	0.79 ± 0.044	0.96 ± 0.049	0.84 ± 0.590
Adolescent Girls (10 - 18)* n = 104	0.69 ± 0.215	0.85 ± 0.036	0.75 ± 0.033	0.59 ± 0.011	0.88 ± 0.037	0.68 ± 0 210
Male Child (1- 10)* n = 10	0.71 ± 0.163	0.88 ± 0.167	0.65 ± 0.231	0.75 ± 0.310	0.83 ± 0.216	0.62 ± 0 020
Female Child (1 -10)* n = 13	0.68 ± 0.102	0.70 ± 0.271	0.59 ± 0.225	0.72 ± 0.210	0 79 ± 0.112	0.61 ± 0.121

★ Figures in parenthesis indicate age in years

meeting her iron requirement. The adolescent boy received more from the family pot than the adolescent female to meet his nutrient requirements and was similar to the male child's intake.

Table 4.41 presents analysis of data pertaining to intra - house hold food distribution in monsoon. The status of an adult male with regard to food distribution within family remained similar to that seen in summer. On an average adult male had the highest share of all the nutrients to meet his RDA. The adult female received less than the adult male but received a higher share of all nutrients compared with the adolescents or the children

Similarly the adolescents received a higher share from family pot to meet their RDA compared with the children but the adolescent girl received lower than the adolescent boy for most nutrients except for protein. Similarly the male child showed a higher mean scores than the female child as regards most nutrients (Table 4.41).

As expected in winter season, overall scores of all the family members were higher for most nutrients compared to other seasons indicating that they were able to meet requirements from family pot. This was the only season, where the adult male showed a score of one or higher indicating he was more closer to meeting his RDA than the rest of the family (Table 4.42). Similarly for the adolescent boy, the score was closer to one but the adolescent girl continued to show lower mean score than the adolescent boy for all the nutrients. In other words, though she was receiving more from the family pot she continued to get less than the male member of the family. The most disadvantaged group with the family was the female child who received the least from the family pot even in the winter as regards all the nutrients.

Further analysis was carried out wherein the scores pooled for the whole family were compared with that of the adolescent boy and girl. As seen from Table 4.43 - 4.45, across the seasons mean scores of the family versus the adolescent boy and girl were highly significant for all the nutrients except for β – carotene in summer season for the adolescent boy. In other words, both the adolescent boy and girl received a significantly

Table 4.41: Intra - House Hold Food Distribution : Proportion of Total Household Level Nutrient Intake as Consumed by Adolescent Boys and Girls and Other Family Members in Monsoon Season

	Calories Mean ± SE	Protein Mean ± SE	Calcium Mean ± SE	Iron Mean ± SE	β- Carotene Mean ± SE	Vitamin C Mean ± SE
Adult Male n = 104	1.10 ± 0.100	1 18 ± 0 052	1 01 ± 0.125	1 00 ± 0 106	1 02 ± 0.043	1 16 ± 0.098
Adult Female n = 101	0.89 ± 0 101	0 95 ± 0 065	0.85 ± 0 250	0.78 ± 0 053	0 83 ± 0.056	0 83 ± 0 106
Adolescent Boys (10 - 18)* n = 91	0.73 ± 0.032	0 80 ± 0 189	0 76 ± 0.133	0.71 ± 0 064	0 75 ± 0 531	0 72 ± 0 129
Adolescent Girls (10 - 18)* n = 101	0 62 ± 0.135	0.71 ± 0 018	0 65 ± 0.146	0.63 ± 0 086	0 60 ± 0 180	0 64 ± 0 198
Male Child (1- 10)* n = 11	0 68 ± 0.183	0 68 ± 0.207	0 65 ± 0.161	0.60 ± 0 200	0 63 ± 0 240	0 60 ± 0 053
Female Child (1 -10)* n = 14	0.65 ± 0.092	0.60 ± 0.211	0.57 ± 0.163	0 52 ± 0.180	0 52 ± 0.102	0 53 ± 0 081

★ Figures in parenthesis indicate age in years

Table 4.42 : Intra - House Hold Food Distribution : Proportion of Total Household Level Nutrient Intake as Consumed by Adolescent Boys and Girls and Other Family Members in Winter season

	Calorie Mean ± SE	Protein Mean ± SE	Calcium Mean ± SE	Iron Mean ± SE	β- Carotene Mean ± SE	Vitamin C Mean ± SE
Adult male n = 106	1.18 ± 0.009	1.71 ± 0.148	1.42 ± 0 145	1.42 ± 0 136	1.63 ± 0.128	1.56 ± 0 174
Adult female n = 100	1.14 ± 0.051	1.30 ± 0.925	1.17 ± 0.085	1.16 ± 0.181	1.07 ± 0.078	1.05 ± 0.108
Adolescent boy (10 - 18)* n = 89	0.99 ± 0.068	1.10 ± 0.257	0.74 ± 0.077	0.97 ± 0 058	0 99 ± 0.090	0.92 ± 0.233
Adolescent Girl (10 - 18)* n = 102	0.87 ± 0.115	0.84 ± 0.067	0.79 ± 0.008	0.89 ± 0.279	0.87 ± 0.222	0.76 ± 0.117
Male child (1- 10)* n = 11	0.84 ± 0.298	0.71 ± 0.190	0.65 ± 0.335	0.69 ± 0.360	0.58 ± 0.315	0.53 ± 0 019
Female child (1 -10)* n = 12	0.56 ± 0.153	0.34 ± 0.280	0.68 ± 0.123	0.61 ± 0.110	0.57 ± 0.208	0.51 ± 0 114

★ Figures in parenthesis indicate age in years

Table 4.43: Intra - House Hold Food Distribution : Proportion of Total Household Level Nutrient Intake as Consumed by Adolescent Boy and Girl vs Whole Family in Summer Season

	Family n = 194	Adolescent boy (10 – 18 years) n = 90	Adolescent Girl (10 – 18 years) n = 104
Calories Mean ± SE	0.97 ± 0.012	0.72 ± 0.058***	0.69 ± 0.215***
Protein Mean ± SE	1.00 ± 0.012	0.90 ± 0.041**	0.85 ± 0 036***
Calcium Mean ± SE	1.03 ± 0.012	0.79 ± 0.042***	0 75 ± 0.033***
Iron Mean ± SE	1.00 ± 0.113	0.79 ± 0.044***	0.59 ± 0.011***
β- Carotene Mean ± SE	0.99 ± 0.012	0.96 ± 0.049NS	0.88 ± 0.037***
Vitamin C Mean ± SE	0 99 ± 0.014	0.84 ± 0.59***	0.68 ± 0.210***

Table 4. 44: Intra - House Hold Food Distribution : Proportion of Total Household Level Nutrient Intake as Consumed by Adolescent Boy and Girl vs Whole Family in Monsoon Season

Nutrients	Family n = 192	Adolescent boy (10 – 18 years) n = 91	Adolescent Girl (10 – 18 years) n = 104
Calories Mean ± SE	1.10 ± 0.032	0.73 ± 0.032***	0.62 ± 0 135***
Protein Mean ± SE	1.19 ± 0.038	0.80 ± 0 189***	0 71 ± 0 018***
Calcium Mean ± SE	1 02 ± 0.079	0.76 ± 0.133***	0.65 ± 0.146***
Iron Mean ± SE	0 99 ± 0.115	0.71 ± 0.064***	0.63 ± 0.086***
β- Carotene Mean ± SE	0.87 ± 0 214	0.75 ± 0.531***	0.60 ± 0 180***
Vitamin C Mean ± SE	0.89 ± 0 223	0.72 ± 0 129***	0.64 ± 0.198***

By 't' test NS (Not Significant) - $p > 0.05$ ** $p \leq 0.05$ *** $p \leq 0.001$

Table 4.45: Intra - House Hold Food Distribution : Proportion of Total Household Level Nutrient Intake as Consumed by Adolescent Boy and Girl vs Whole Family in Winter season

Nutrients	Family n = 191	Adolescent boy (10 – 18 years) n = 89	Adolescent Girl (10 – 18 years) n = 102
Calories Mean ± SE	1 24 ± 0 051	0.99 ± 0.068***	0 87 ± 0.115***
Protein Mean ± SE	1 21 ± 0.056	1.10 ± 0 257***	0.84 ± 0 067***
Calcium Mean ± SE	1.01 ± 0.054	0.74 ± 0.077***	0.76 ± 0 008***
Iron Mean ± SE	1.22 ± 0 056	0.97 ± 0.058***	0 89 ± 0 279***
β- Carotene Mean ± SE	1.13 ± 0.046	0 99 ± 0.090***	0 87 ± 0.222***
Vitamin C Mean ± SE	1 07 ± 0 055	0.92 ± 0.233***	0 76 ± 0.117***

By 't' test NS (Not Significant) - $p > 0\ 05$ ** $p \leq 0\ 05$ *** $p \leq 0\ 001$

lower proportion of food within a family, with adolescent girls being even more disadvantaged than the adolescent boy.

Discussion

As mentioned earlier, the rapid rate of adolescent growth imposes higher nutrition demands on the body, correspondingly nutrient intakes have to be increased. However, various studies have demonstrated deficits in nutrient intake of poor adolescents and relatively higher intake in the affluent group. A study carried out on 10 – 18 years old Gujarati affluent boys (n = 64) revealed a higher intake of all the nutrients than the present boys as expected. However, the present boys had lower intake than other urban poor adolescent boys of Vadodara city (Kanani and Zararia 1996, Gopaldas and Capoor 1981).

As for the girls, it has been reported that energy intake per body weight among poor girls is substantially lower while that of affluent girls is comparable to the norms especially beyond 11 years. Further, the growth of the affluent girls is on par with their NCHS counterparts (Seshadri and Kanani 1993). Other studies conducted on affluent girls of urban Vadodara demonstrated that nutrient intake among these girls was expectedly higher when compared with the present girls. Intake of most nutrients among urban poor girls in Vadodara city as shown by other investigators was either similar to or less than that in the present girls (Kanani and Shah 2001, Kanani and Bhargava 1992, Kanani and Sanghani 1992, Kanani et al 1998, Kanani and Sen 2001).

Data on nutrient intake of adolescents in relation to the intake of their family members are scarce. Few studies presenting such data overall indicate higher intake (as proportion of requirements) among adult males compared to the other family members. Subramanyam and Nageshwar Rao (1995) observed that male food intake *exceeded* that of females in all the age groups by 16 % RDA among children under five years, 11 % RDA among and adolescents (5 - 14 years), 29 % RDA among women in the child bearing age and 61 % RDA among the adults of more than 45 years. This higher intake

Why so ?

by males continues even after adjustments are made for differences in physical activity, body weight, pregnancy and lactation.

In another study, IHFD pattern among urban street families residing in Vadodara city was studied and the comparative nutrient intakes of the family members were reported (Pg 238). The adult male consumed proportionately higher intake of all the nutrients as compared to that of other family members (as % RDA). However, this difference was not statistically significant. The adolescent met relatively less of their requirements as compared to the other family members, the adolescent female exhibiting the highest deficits (Samrani et al 1996).

Gopaldas et al (1983) studied IHFD pattern among tribals of Gujarat. It was found that except for retinol and vitamin C, adult male met his RDA for all the nutrients. A comparison of the nutrient intake of children and adolescents revealed deficits. However, this study presented that 13 – 18 years old adolescents fared much better than the rest of the family members when compared with the family head. at least produce to their full?

A study by Nelson (1986) attempted to ascertain nutrient intake and food distribution in 79 Cambridge families. This study also stated that intake was the highest among men for all the nutrients except for thiamin, whereas the children below five had the lowest intakes. Among females, girls aged 11 – 17 years were better than adult women and the girls under five had the lowest intake. Between males and females across the age groups males tended to have a higher intake.

Valenzuela et al (1979) conducted a study on 97 households to ascertain distribution of nutrient within a family in rice growing communities of Philippines. The nutrient intake of all the respondents was below RDA. Between parents and children, parents received relatively adequate food to meet their needs compared with the children. This study too observed that fathers had slightly better diets than the mothers and male children had better than their female counterparts. Further it was observed that of all the sex – age

groupings, male preschoolers were most adequately fed and female adolescents the least.

Thus, as observed in the present study, intake of the adult male preceded the rest of the family and women tended to have lower to lowest intakes. As for the adolescents, overall the boys were better than the girl.

4.3.1.4 Haemoglobin Status and Under Nutrition

Comparison of mean Hb levels of under-nourished and well-nourished boys and girls by BMI revealed no consistent trend except that in the younger girls (10 – 15 years) the mean haemoglobin levels were lower in under nourished group than the well nourished group (Table 4.46).

Table 4.47 demonstrates the gender differences in mean Hb values between the well nourished and under nourished boys and girls. Among the undernourished group, as compared with the boys the girls had significantly lower mean Hb values across the age groups but the differences were statistically significant among 10 – 15 years and overall 10 – 18 years groups. In the well-nourished group, the 16 – 18 years old girls had significantly lower mean Hb values compared with the boys.

Anaemia and BMI

Comparative analysis of boys and girls showing association between anaemia and NMI is presented in Table 4.48. In well-nourished group (upper most tertile by BMI), the prevalence of anaemia was similar in younger boys and girls, but was higher in the older girls than their male counterparts, that is, even at higher levels of BMI, older girls are at risk of anaemia, perhaps because of onset of menarche. In the under nourished group, the prevalence of anaemia was much higher in girls compared with the boys and the difference was statistically significant. This indicates again that under nourished girls are at higher risk of anaemia compared with the boys.

Table 4.46 : Is Haemoglobin Status of Adolescent Boys and Girls (10 – 18 Years) Affected by Body Mass Index (BMI)?

Age Group (Years)	Mean Haemoglobin ± SE					
	N	n	Well Nourished BMI ≥ 80 % #	n	Under Nourished BMI < 80 % #	By "t" test
	Boys					
10 – 15	63	26	10.10 ± 0.36	37	10.91 ± 0 33	1.56 NS
16 – 18	27	17	11.6 ± 0.43	10	11 27 ± 0.32	0.59 NS
10 – 18	90	44	10.43 ± 0.31	46	11.06 ± 0.24	1.61 NS
	Girls					
10 – 15	69	28	10.47 ± 0.21	41	9.95 ± 0.26	1.57 NS
16 – 18	27	11	9.77 ± 0.55	16	10.64 ± 0 29	1.18 NS
10 – 18	96	39	10.27 ± 0.21	57	10 14 ± 0.21	0.40 NS

Table 4.47 : Mean Haemoglobin Levels of Adolescent Boys and Girls (10 – 18 Years) by Body Mass Index (BMI) : Is there A Gender Difference ?

Age Group (Years)	Boys			Girls			By "t" test
	N	n	Mean Hb	N	n	Mean Hb	
	Well Nourished (BMI ≥ 80 %) #						
10 – 15	63	37	10.10 ± 0.36	69	41	10.47 ± 0.21	0 89 NS
16 – 18	27	10	11.6 ± 0.43	27	16	9.77 ± 0 55	2.34 *
10 – 18	90	46	10.43 ± 0.31	96	57	10.27 ± 0.21	0.42 NS
	Under Nourished (BMI < 80 %) #						
10 – 15	63	26	10.91 ± 0.33	69	28	9 95 ± 0.26	2 28 *
16 – 18	27	17	11.27 ± 0.32	27	11	10.64 ± 0.29	1 36 NS
10 – 18	90	44	11.06 ± 0.24	96	39	10.14 ± 0.21	2 89 **

\# BMI Standards by Must et al (1991)

By 't' test : NS (Not significant) $p > 0.05$ * $p \leq 0.05$ ** $p \leq 0.01$

Table 4.48: Anaemia and Under Nutrition Between Adolescent Boys and Girls : Is there a Gender difference ?

Age group (Years)	% Anaemic						
	Boys			Girls			Chi Square
	N	n	Percent	N	n	Percent	
	Upper Most Tertile						
10 - 15	21[a]	14	66.67	23[d]	15	65.22	0.01[NS]
16 - 18	9[b]	2	22.20	9[e]	4	44.44	0.25[NS]
10 - 18	30[c]	9	53.30	32[f]	19	59.38	0.23[NS]
	Lower Most Tertile						
10 - 15	21	8	38.10	23	16	69.57	4.38[*]
16 - 18	9	5	55.56	9	6	66.67	0.00[NS]
10 - 18	30	12	40.00	32	22	68.75	5.17[*]
		12					

By Chi square test NS (Not significant) $p > 0.05$ * $p \leq 0.05$

a Upper Most Tertile : BMI for age ≥ 86.17 % of Must et al Standards
Lower Most Tertile . BMI for age ≤ 77.82 % of Must et al Standards

b Upper Most Tertile : BMI for age ≥ 81.00 % of Must et al Standards
Lower Most Tertile : BMI for age ≤ 73.58 % of Must et al Standards

c Upper Most Tertile : BMI for age ≥ 85.94 % of Must et al Standards
Lower Most Tertile : BMI for age ≤ 76.64 % of Must et al Standards

d. Upper Most Tertile : BMI for age ≥ 85 59 % of Must et al Standards
Lower Most Tertile : BMI for age ≤ 78 52 % of Must et al Standards

e Upper Most Tertile : BMI for age ≥ 91.16 % of Must et al Standards
Lower Most Tertile BMI for age ≤ 76 38 % of Must et al Standards

f Upper Most Tertile BMI for age ≥ 87 33 % of Must et al Standards
Lower Most Tertile BMI for age ≤ 78 32 % of Must et al Standards

4.3.1.5 Nutrient Intake and Under Nutrition

Data was analyzed to ascertain whether any association between nutrient intake and under nutrition according to BMI (upper most tertile and lower most tertile) existed among the adolescent boys and girls. The findings are illustrated in Fig 4.21 – 4.22 and Table 4.49 – 4.50.

As can be observed from Fig 4.21 – 4.22, the frequency distribution curve did not exhibit any marked difference between well nourished and under nourished group of both boys and girls.

Further analysis was carried out to observe the differences in mean nutrient intake between well nourished and undernourished group of the boys and girls. Table 4.49 shows that in the boys, except for β – carotene, the nutrient intake of the well nourished group was either similar or higher than the under nourished group but the difference was not significant statistically. β – carotene intake of undernourished was higher than the well nourished group but the again no significant difference was existed.

In the girls, the nutrient intake of the well nourished group was better than the under nourished group but the difference was not statistically significant. Perhaps on larger sample the differences may become significant.

With regard to the gender differences in mean nutrient intake of the boys and girls between well nourished and under nourished group, except iron and β – carotene intake, the mean nutrient intake of the well nourished boys was higher compared with well nourished girls. But the statistical difference was observed only for calcium intake (Table 4.50). In the under nourished group, the boys had markedly higher intake of all the nutrients than the girls. However, the difference was significant for protein and calcium intake. This could be due to preferential distribution to the boys with regard to good quality foods.

Fig 4.21: Frequency Distribution of Calorie Intake(as % RDA) of Adolescent Boys (10 - 18 Years) by BMI Status

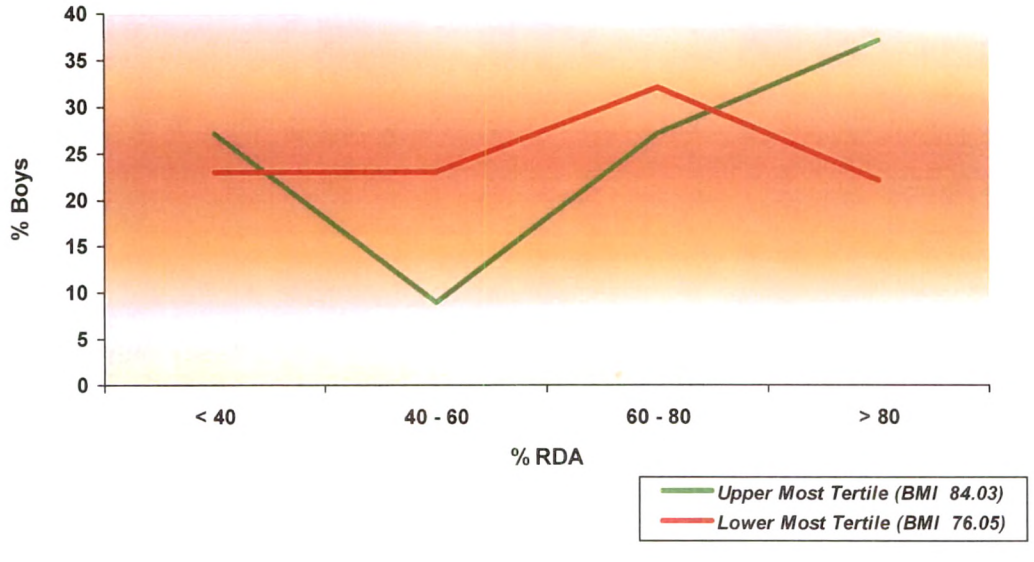


Fig 4.22:Frequency Distribution of Calorie Intake (as % RDA) of Adolescent Girls (10 - 18 Years) by BMI Status

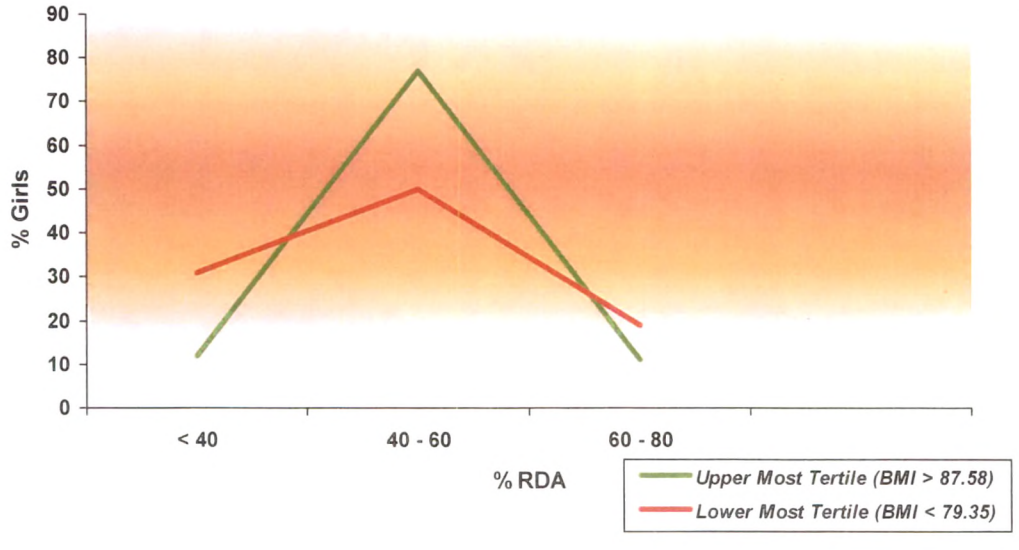


Table 4.49 : Is Body Mass Index (BMI) of Adolescent Boys and Girls (10 – 18 Years) Affected by Nutrient Intake ?

	Mean Nutrient Intake (as % RDA) ± SE					
	Calories	**Protein**	**Calcium**	**Iron**	**β - Carotene**	**Vitamin C**
	Boys					
Well Nourished#	62.76 ± 8.38	76.37 ± 9.60	66.97 ± 7.08	28.75 ± 5.03	14.99 ± 1.87	80.85 ± 29.61
Under Nourished#	62.32 ± 4.96	75.13 ± 7.41	60.81 ± 5.70	25.78 ± 3.72	30.72 ± 12.08	37.49 ± 9.94
By "t" test	0.00 ^{NS}	0.32 ^{NS}	0.68 ^{NS}	0.49 ^{NS}	1.44 ^{NS}	1.19 ^{NS}
	Girls					
Well Nourished#	46.86 ± 3.05	56.28 ± 8.59	39.10 ± 6.69	30.88 ± 6.07	29.01 ± 13.71	48.58 ± 12.93
Under Nourished#	43.56 ± 3.12	41.89 ± 6.98	31.41 ± 5.63	20.44 ± 3.72	14.94 ± 7.22	30.13 ± 10.14
By "t" test	0.73 ^{NS}	1.33 ^{NS}	0.84 ^{NS}	1.56 ^{NS}	0.95 ^{NS}	1.15 ^{NS}

By 't' test · NS (Not significant) $p > 0.05$

\# Well Nourished BMI ≥ 80 % of the Must et al Standards (1991)
Under Nourished . BMI < 80 % of the Must et al Standards (1991)

Table 4.50 : Anaemia and Under Nutrition Between Adolescent Boys and Girls : Is There a Gender difference ?

	Mean Nutrient Intake (as % RDA) ± SE					
	Calories	**Protein**	**Calcium**	**Iron**	**β - Carotene**	**Vitamin C**
	Well Nourished*					
Boys	62.76 ± 8.38	76.37 ± 9.60	66.97 ± 7.08	28.75 ± 5.03	14.99 ± 1.87	80.85 ± 29.61
Girls	46.86 ± 3.05	56.28 ± 8.59	39.10 ± 6.69	30.88 ± 6.07	29.01 ± 13.71	48.58 ± 12.93
By "t" test	1.33^{NS}	1.16^{NS}	2.90*	0.27^{NS}	1.01^{NS}	1.02^{NS}
	Under Nourished*					
Boys	62.32 ± 4.96	75.13 ± 7.41	60.81 ± 5.70	25.78 ± 3.72	30.72 ± 12.08	37.49 ± 9.94
Girls	43.56 ± 3.12	41.89 ± 6.98	31.41 ± 5.63	20.44 ± 3.72	14.94 ± 7.22	30.13 ± 10.14
By "t" test	1.79^{NS}	3.31*	3.72*	1.03^{NS}	1.07^{NS}	0.53^{NS}

By 't' test . NS (Not significant) $p > 0.05$ * $p \leq 0.05$

* Well Nourished BMI ≥ 80 % of the Must et al Standards (1991)
Under Nourished BMI < 80 % of the Must et al Standards (1991)

4.3.2 Distal Factors

Table 4.51 – 4.52 compares the socio – economic variables between the upper most tertile and the lower most tertile groups (according to BMI) of the adolescent boys and girls.

It can be observed from Table 4.51 that in the boys, the proportion of well nourished with small family size (5 or less) was much higher compared with undernourished boys, and the difference was highly significant. This indicates that the nutritional status of the adolescent boys is likely to be influenced by family size. Similarly per capita income per month also had impact on nutritional status of the boys. A significantly higher percentage of the well nourished boys had their PCI above Rs 1000/- per month. Perhaps due to constraints of limited income, a significantly higher proportion of working mother were seen in the group of the under nourished boys. As is evident from the table, the percentage of working mother was high in undernourished group than in well-nourished group.

With regard to education of the father and mother, a positive correlation was observed with nutritional status and level of education. In a significantly higher percentage of the well nourished boys, both the parents had attained secondary or above level of education (Table 4.51). Type of house, availability of sanitary facilities, radio, fan, TV and vehicle are indirect indicators of economic status. Comparing availability of these variables between well nourished and undernourished group, it was observed that a significantly higher number of the well nourished boys resided in *"pucca"* house and possessed at least one two wheeler. TV was reported to be available in a much larger number of the well nourished boys, compared with under nourished boys and the difference was highly significant.

Thus, income, family size, education of parents, household assets, type of housing were associated with nutritional status of boys. These factors are inter-related and indicate and in impoverished families, adolescent boys are at higher risk of under-nutrition.

Table 4.51: Is Nutritional Status of Older Adolescent Boys (10 – 18 Years) Affected by Socio – Economic Status ?

Sr No	Indicators	Percent Subjects		
		Well Nourished* (n = 110)	Under Nourished* (n = 110)	Chi Square
1.	Religion Hindu	100.0	100 0	-
2	Caste			
	a. Other backward caste	50.0	58.5	0.07^{NS}
	b. Higher Caste	50.0	41.5	-
				-
3.	Family size			
	a. 5 or less members	48.2	21.4	16 80***
	b > 5 members	51.8	73.6	
4.	Type of family			
	a. Nuclear	61.8	30.9	1 29^{NS}
	b. Joint	38.2	69.1	
5.	Per capita income per month (Rs)			
	a. < 1000	35.5	49.1	4.19*
	b. ≥ 1000	64.5	50.9	
6.	Education of mother			
	a. Illiterate	3.6	5 5	
	b. Primary	18 2	34.5	7.59**
	c. Secondary and above	78.2	60.0	
7.	Education of Father			
	a. Illiterate	-	0 9	
	b. Primary	7.2	17.2	5.11*
	c. Secondary and above	92.8	81.9	
8	Working mother	11.9	24.9	5 99**
9	Occupation of father			
	a. Labour	7.3	0 9	
	b Service	72.7	73.6	0.02^{NS}
	c. Self employed	20 0	25 5	

* Well Nourished : BMI for Age ≥ 84 03 % of NCHS Standards (Upper most tertile)
Under Nourished BMI for Age ≤ 76 50 % of NCHS Standards (Lower most tertile)

By Chi square test NS (Not significant) p > 0 05 * p ≤ 0 05
** p ≤ 0 01 *** p ≤ 0 001

Table 4 51 contd

.. Table 4.51 contd

Sr No	Indicators	Percent Subjects		
		Well Nourished* (n = 110)	Under Nourished* (n = 110)	Chi Square
10.	Own House	92.7	90.9	0 24 NS
11	Pucca house	93.6	85.5	3 93*
12.	≤ 3 rooms in house	52.3	52 7	0.00 NS
13	Satisfactory ventilation in house	29.1	33 3	0 53 NS
14.	Closed drainage facility	76.9	62.3	1.27 NS
15.	Own toilet	95.7	90.6	1.79 NS
16.	Own tap	88 5	75.5	1 92 NS
17.	Type of fuel used			
	a. LPG	18 2	20.9	0.26 NS
	b. Kerosene	81.8	79.1	
18.	Availability of household appliances			
	a. Fan	100 0	95.5	3.27 NS
	b. TV	78.2	56.4	11 89***
	c Radio	77.3	78 2	0.03 NS
	d Vehicle(at least one vehicle)	98 2	93.1	3 77*

* Well Nourished BMI for Age ≥ 84 03 % of NCHS Standards (Upper most tertile)
Under Nourished BMI for Age ≤ 76 50 % of NCHS Standards (Lower most tertile)

By Chi square test NS (Not significant) p > 0 05 * p ≤ 0 05
** p ≤ 0 01 *** p ≤ 0 001

Table 4.52 shows that in the girls, caste played a significant role. A significantly higher number of the well nourished girls belonged to the higher caste. The well nourished group having their PCI per month above Rs 1000/- was comparatively lower than the under nourished group, but the difference was not significant. Strangely the proportion of the mother having secondary and above level of education was high in the undernourished group but the difference was not significant.

With regard to occupation of the parents, contrary to that seen on boys, a higher number of the well nourished girls had working mothers but the difference was not statistically significant. In other words, it is possible that women working outside home value the girl child more than not working outside home and could be providing better care and food to their daughters. As regards fathers, the percentage of self employed fathers was higher among well nourished group compared with under nourished and the difference was highly significant (Table 4.52). Further the table shows that as many as 21 % of the fathers in the under nourished group subsisted on daily wages (labour class), whereas none of the fathers in the well nourished group belonged to this category. In the present study, no apparent relation between nutritional status and PCI per month was seen. Nevertheless, clearly fathers of well-nourished girls had better paying occupations. Unlike the boys no significant association was observed between nutritional status and indirect economic indicators (type of house, availability of TV, radio, vehicle).

Thus, it appears that overall selected socio – economic variables have an impact on nutritional status of the boys and the girls, in boys the impact of a higher standards of living was more evident. Perhaps the subtle factors like their nutritional status, this needs to be further studied.

Table 4.52: Is Nutritional Status of Older Adolescent Girls (10– 18 Years) Affected by Socio – Economic Status ?

Sr No	Indicators	Percent Subjects		
		Well Nourished* (n = 121)	Under Nourished* (n = 121)	Chi Square
1.	Religion Hindu	100.0	100.0	-
2	Caste a. Other backward caste b. Higher caste	 30 8 69 2	 60.3 39.7	 5.45*
3.	Family size a. 5 or less members b. > 5 members	 36.3 63 7	 33.9 66.1	 0.16 NS
4.	Type of family a. Nuclear b. Joint	 74.6 26 4	 77 1 22.3	 0 36 NS
5.	Per capita income per month (Rs) a. < 1000 b. ≥ 1000	 55.4 44.6	 52.9 47.1	 0.15NS
6.	Education of mother a. Illiterate b Primary c. Secondary and above	 1.7 33.1 65 2	 2.5 23.9 73 6	 1.95NS
7.	Education of Father a Illiterate b. Primary c. Secondary and above	 - 25.6 74.4	 1.6 23.1 75.3	 0 20 NS
8.	Working mother	34.7	24.0	3.37 NS
9	Occupation of father a. Labour b. Service c. Self employed	 - 23.1 76.9	 20.7 25.6 53.7	 27 88*** 0.20 NS 14.30***

* Well Nourished BMI for Age ≥ 85 76 % of NCHS Standards (Upper most tertile)
Under Nourished BMI for Age ≤ 78 41 % of NCHS Standards (Lower most tertile)

By Chi square test NS (Not significant) p > 0 05 * p ≤ 0 05
** p ≤ 0 01 *** p ≤ 0 001

Table 4.52 contd...

.. Table 4.52 contd

Sr No	Indicators	Percent Subjects		
		Well Nourished* (n = 121)	Under Nourished* (n = 121)	Chi Square
10.	Own House	93 4	94 2	0.07 NS
11.	Pucca house	51.2	47.1	0.41 NS
12	≤ 3 rooms in house	42 1	44 6	0.15 NS
13.	Satisfactory ventilation in house	38 8	30 6	1 82 NS
14	Closed drainage facility	87.6	90 1	0 38 NS
15.	Own toilet	95.6	96.7	0.00 NS
16	Own tap	76.9	93.3	2.09 NS
17.	Type of fuel used			
	a LPG	52.1	44.6	1 34 NS
	b. Kerosene	48 9	54 4	
18	Availability of household appliances			
	a Fan	100.0	100.0	0.00 NS
	b. TV	50.0	48 8	0.02 NS
	c. Radio	84.7	80.2	0 71 NS
	d Vehicle(at least one vehicle)	97.5	97.5	0.00 NS

* Well Nourished BMI for Age ≥ 85 76 % of NCHS Standards (Upper most tertile)
Under Nourished BMI for Age ≤ 78 41 % of NCHS Standards (Lower most tertile)

By Chi square test NS (Not significant) p > 0 05 * p ≤ 0 05
** p ≤ 0 01 *** p ≤ 0 001

Discussion

According to Satyanarayan (1988) and Vijayaraghavan et al (1971), impact of socio economic variables on nutritional health status should not be ignored as children belonging to low income group lag very much behind the well - to - do group in growth, implicitly indicating that these poor children are constantly exposed to severe nutritional, social and environmental strain, as revealed in several studies conducted in the country. Thus growth retardation observed among average Indian children may be more of nutritional than of racial or genetic origin.

Few studies have attempted to identify the determinants of nutritional status in adolescents. One such study conducted on 8 - 13 year old school going girls in this department demonstrated a correlation between socio - economic variables and nutritional status of girls. In this study, girls whose fathers' had a regular job and were better paid, exhibited better nutritional status. Further, with better education of mothers, height and weight of the girls improved (Agarwal and Kanani 1998). Similar findings emerged in the present study also with regard to boys where the BMI of the boys improved with increasing levels of parents education, but in the girls, no such difference was found. Aurelius et al (1996) reported a similar findings where BMI of 7 - 11 years old Vietnamese school children was positively associated with mothers' occupation. Girls whose mothers were workers or farmers, were lighter and had lower BMI than the girls whose mothers had better jobs such as working in government departments.

Thus, socio - economic variables also were seen to influence growth in adolescents and pre-adolescents in other studies as well.

Section IV

Perceptions of Adolescent Boys and Girls Regarding Adolescent Growth, Nutrition, Health and Gender Issues

Data were collected to assess awareness among the older adolescent boys and girls (15 – 18 years) about their own nutrition health status, adolescent growth, pregnancy, lactation and childcare and are presented in Tables 4.55 – 4.56.

4.4.1 Perceptions of Adolescent Boys and Girls Regarding Their Own Nutritional Health Status

It is evident from Table 4.53 that over all 82 % of the adolescents considered themselves to be healthy and the remaining one fifth of the adolescents stated themselves to be unhealthy. Further, between the study boys and girls, a higher percentage of the study boys believed themselves to be healthy (86 % vs. 79 % respectively). As regards, the reasons for the feeling healthy, a large majority (86 %) of the adolescents stated that never falling sick or suffering from any illness or pain indicates a healthy state. Less than one tenth attributed their better health status to consumption of good or nutritious or proper food. The reasons mentioned for feeling unhealthy were pain in legs (50 %) followed by getting tired easily (43 %). A similar proportion stated that they suffered from frequent episodes of fever or had no blood in body; therefore were not in good health. Contrary to the general perceptions that girls are more vulnerable, these complaints were comparatively more common among the study boys (Table 4.53)

Despite the fact that most adolescents considered themselves healthy when they were asked whether they desired to improve their health, to which about 90 % of the adolescents replied affirmatively, as these adolescents (85 %) wanted to remain free of illnesses or fatigue. Comparatively, a higher percentage of the study boys than the

study girls stated this reason. The other less common reasons reported were - to work for a longer duration, to remain active, to study further and for future life (Table 4 53)

An attempt was also made to ascertain whether the adolescents were aware of various kinds of health behavior that keeps them healthy. Overall less than one fifth (16 %) of the adolescents could respond that balanced diet or nutritious food makes one healthy. Although another 23 % mentioned that adequate or proper food is necessary to remain healthy, they were unable to specify as to what adequate or proper food is (Table 4 53). Overall 40 % - 45 % of the adolescents indicated that the consumption of cereals or energy giving foods and pulses improves health. According to one third, eating GLVs or vegetables or fruits makes one more healthy. Most of the adolescents (93 %) agreed that they can improve their health. It was interesting to note that all the study boys expressed that they can improve their health. In contrast, 11 % of the girls felt their health could not be improved indicating that poor health among the girls appears to be an accepted phenomenon, albeit the proportion is small. There is a need to educate the girls adequately about nutrition and health, which would go a long way in improving their own health, of the family and coming generations.

4.4.2 Perceptions of the Adolescents Regarding Their Own Height and Weight

According to two thirds of the adolescents, their own height for age was appropriate (Table 4.53). As already seen few (20 %) of the adolescents had below normal height. As regards reasons, why they considered themselves to have adequate height, three fourths stated that -

"Umar pramane barabar chhe" (height for age is proper).
About one fourth felt that their height for their weight was proper.
"Vajan pramane height barabar che "

The remaining one third who were not satisfied with their height for age presented various reasons. Half of them compared their height with their classmates and found that they were shorter than their classmates. Thirty percent desired to increase their

Table 4.53 : Perceptions of adolescent boys and girls regarding their own nutrition and health Status

Sr No	Information Elicited	Boys (n = 35)		Girls (n = 42)		Total (N = 77)	
		n	Percent	n	Percent	n	Percent
1.	Adolescents perceived themselves to be healthy	30	85.7	33	78 6	63	81 8
1.a	Reasons mentioned for feeling healthy*						
	a Never fell sick/not suffering from any disease	25	83 3	29	87 9	54	85 7
	b Eat good/proper/nutritious food	4	13.3	1	3.0	5	7 9
	c. Eat vegetables	3	10.3	2	6.1	5	7.9
	d Can do work	2	6 67	1	3 0	3	4 8
1.b	Reasons mentioned for not feeling healthy*						
	a. Pain in legs/ headache	3	60.0	4	44 4	7	50.0
	b Feel tired	3	60.0	3	33 3	6	42.9
	c. No blood in body	2	40.0	2	22.2	4	28 6
	d. Got fever often	1	20 0	2	22 2	4	28.6
2.	Desired to improve their health	33	94 3	36	85 7	69	89.6
2.a	Reasons mentioned to improve health* –						
	a Not to either fall sick or feel tired or feel pain	30	90 9	28	77.8	58	84 1
	b. For growth and development	6	18.2	8	22.2	14	20.3
	c. Want to remain active/work for a longer duration	3	9.1	3	8.3	6	8.7
	d To remain healthy	2	6.1	4	11.1	6	8.7
	e. To study further or for future life	2	6 1	2	5.6	4	5.8
3.	Approaches mentioned to improve health*						
	a. eating balanced diet	6	18.2	5	13 9	11	15.9
	b. eating adequate or proper food	10	30.3	6	16.7	16	23.2
	c eating energy rich food or cereals	15	45.5	16	44 4	31	44.9
	d eating pulses	12	36 4	16	44.4	28	40 6
	e. eating GLVs or vegetables or fruits	10	30 3	12	33 2	22	31.9
	f. keeping body free from any ailments	12	36.4	8	22 2	20	28 9
	g. exercise	8	18 2	1	2 8	9	11.7
	h others	9	27.3	5	13 9	14	18 2
4	Can improve their health						
	a. yes	35	100.0	37	88.1	72	93.5
	b No	-	-	4	11.1	4	5 2
	c. Do not know	-	-	1	2 8	1	1.3
5.	Satisfied with their own height						
	a. Yes	22	62 9	29	69 0	51	66 2
	b. No	13	37.1	13	30.9	26	33 8

* Multiple responses

Table 4.53 contd ...

. Table 4.53 contd

Sr No	Information Elicited	Boys (n = 35)		Girls (n = 42)		Total (N = 77)	
		n	Percent	n	Percent	n	Percent
5 a	Reasons mentioned for believing that their height is appropriate*						
	a. height is according to the age	18	81 8	20	68 9	38	74 5
	b height is according to weight	4	18 2	9	31 9	13	25 5
	c. others	3	13 6	-	-	3	5 9
5 b	Reasons mentioned for believing that their height is not appropriate*						
	a. shorter than their classmates	8	61.5	5	38 5	13	50 0
	b. desired to be more tall	4	30.8	4	30.8	8	30 8
	c less than their weight	-	-	3	22.1	3	11 5
	d others	2	15.4	2	15.4	4	15 4
6	Desired to increase height						
	a Yes	25	71 4	19	45.2	44	57 1
	b. No	10	28.6	23	54 8	33	42 9
6.a	Approaches mentioned by the adolescent boys and girls to increase their height*						
	a. Cycling	12	48 0	8	42 1	20	45 5
	b Exercise	7	28.0	5	26.3	12	27 3
	c Skipping	2	8 0	7	36 8	9	20.5
	d. Pull ups	8	32.0	-	-	8	18 2
	e. Swinging	2	8 0	3	7.1	5	11.4
	f. others	2	8.0	2	4.8	4	5.2
6.b.	Can improve their height						
	a. Yes	24	96 0	17	89.5	41	93.2
	b No	1	4.0	2	2	3	6 8
7.	Satisfied with their own weight						
	c. Yes	27	77.1	34	80 9	61	79 2
	d. No	8	22.9	8	19.1	16	20.8
7.a	Reasons mentioned for believing that their weight is appropriate*						
	a. weight is according to age/necessary to have this much weight	18	66 7	28	82 4	46	75.4
	b. is healthy or feels ok	5	18 5	2	5.9	7	11.5
	c. more weight is not good for health	4	14 8	8	23 5	12	19 7
7.b	Reasons mentioned for believing that their weight is not appropriate						
	a has less weight	5	62 5	6	75 0	11	68 5
	b. fall sick often	-	-	3	37 5	3	18 8
	c. weight is not according to age	3	37 5	2	25 0	5	31.3
	d not able to finish work in time	2	25.0	-	-	2	12 5
8	Desired to increase weight						
	a Yes	21	71 4	12	28.6	33	42 9
	b. No	13	28 6	29	71 4	42	57 1

Table 4.53 contd ..

... Table 4.53 contd

Sr No	Information Elicited	Boys (n = 35)		Girls (n = 42)		Total (N = 77)	
		n	Percent	n	Percent	n	Percent
8 a	Approaches mentioned by the adolescent boys and girls to increase their weight*						
	a. Eating proper or good or nutritious food	13	61 9	7	58 3	20	60 6
	b. Eating GLVs or milk or a banana after a meal	7	33.3	3	25 0	10	30 3
	c Eating food regularly	3	14 3	5	41 7	8	24 2
	d. Exercise	5	23.8	1	8 3	6	18.2
8 b	Can improve their weight						
	c. Yes	20	95.2	11	91.7	31	93 9
	d No	1	4.7	1	1	2	6 1
9	Adolescent boys and girls believed that food						
	a. Food makes one healthy	31	88.6	34	80.9	65	84 4
	b. Can influence height	28	80 0	32	76 2	60	77 9
	c. Can influence weight	12	34.3	9	21 4	21	27 3

* Multiple responses

height and another 12 % reported that their height corresponding to their weight was less.

When the adolescent boys and girls were asked whether they wanted to increase their height, overall 57 % of the adolescents responded affirmatively. Among these, comparatively a higher percentage of the study boys (71 %) than the study girls (45 %) desired to increase their height. The adolescents believed that cycling will help increase height (45 %) followed by exercise (27 %), skipping (21 %), pull ups (8 %) and swinging (5 %).

As regards weight, as many as 79 % of the adolescents stated their weight for age was appropriate (Table 4.53). whereas, data reported earlier indicated that as many as 75 % were under weight. The most common reason mentioned by three fourths was either "it was necessary to have that much weight, or their current weight corresponded satisfactorily with their height". The remaining one fourth adolescents reported that their weight for age was inappropriate, as either they were lighter than their counterparts (69 %) or fell sick frequently (19 %) or took more time to finish work (13 %). Table 4.55 further shows that over all 43 % of the adolescents desired to increase their weight. Gender differences were seen, since twice as many study boys than the study girls desired to increase their weight. This could be attributed to preferences among the girls to have a slim body. To improve weight, a majority of the adolescents (61 %) believed that "good" or "proper" or "nutritious food" should be consumed. The other responses reported to increase weight were consumption of foodstuffs such as GLVs, milk, banana (30 %); having regular meals (24 %) and exercise (18 %).

4.4.3 Perceptions of the Adolescent Boys and Girls Regarding the Period of Adolescence

Data were collected to ascertain whether the adolescent boys and girls understood and the importance of adolescent period for future health (Table 4.54). Most of the study boys and girls (88 % – 92 %) believed that the age of 10 – 18 years in life is important for future health, as during this period physical changes occur such as : increase in height, weight and blood volume (44 %); to remain healthy for old age or later part of life

Table 4.54 : : Perceptions of Adolescent Boys and Girls Regarding Adolescence

Sr no	Information Elicited	Boys (n=35)		Girls (n=42)		Total (N=77)	
		n	Percent	n	Percent	n	Percent
1	Adolescent Period (10 – 18 years) is important for future health						
	a Yes	34	97 1	37	88 1	71	92 2
	b No	1	2 9	3	7 1	4	5 2
	c Do not know	-	-	2	4 8	2	2 6
1.a	Reasons mentioned for believing that 10 - 18 years of age in life is important*						
	a Physical development/blood increases/height and weight should properly increase	15	44.1	16	43 2	31	43.7
	b For good health/remain healthy in old age/in later part of life/for future life	7	20.6	9	24 3	16	22 5
	c. Can improve health/ right age for improvement	3	8 8	3	8 2	6	8 4
	d Adolescence stores energy for later years	5	14.7	2	5.4	7	9.9
	e Others	2	5 9	4	10 8	7	9 9
	f Do not know	2	5 9	3	8.2	5	7.0
1 b	Reasons mentioned for 10 -18 years of age is not important for future health						
	a. Do not know	1	2.9	3	7.1	4	5.2

* Multiple responses

or future (23 %), this is the right age for improvement health (10 %), to store energy for later years (8 %).

4.4.4 Perceptions of the Adolescent Boys and Girls Regarding Nutritious Diet

As seen in Table 4.55, overall, few adolescents could respond correctly as to what a nutritious diet is (17 %) also only 14 % said that nutritious diet contains three food groups. Comparatively a higher number of the adolescents (31 %) stated that a nutritious diet consists of two food groups. To a large extent, this reflected their usual meal which consisted of two food groups (usually rice and *dal*, or *roti* and vegetable/*dal*) and they thus considered this to be nutritious. The other less common responses were "nutritious diet" or "has one food group" or "it gives required vitamins to the body".

The adolescents were asked to list down "nutritious foods" that they consumed daily. The responses illustrated that the adolescent boys and girls believed that the food they eat daily nourishes their body. All the study boys and girls considered cereals and milk – milk products as nutritious foods and ate these foods daily. Milk however, was usually consumed in the form of tea (Table 4.55). In addition, more than two thirds stated pulses and vegetables as nutritious foods which were eaten daily. GLVs and fruits were mentioned by few (18 % and 7 % respectively). With regard to dietary source of information, comparatively a higher proportion of the study girls than the study boys reported that their source of information was school text books or teacher (71 % vs. 43 % respectively).

According to 92 % of the adolescents, food intake during the age of 10 – 18 years affects growth and development. However, among these adolescents, 58 % were not aware of how food intake influences adolescent growth. The remaining 42 % stated that food intake is important because food maintains health or is necessary for physical development, or for development during this period.

Data were collected to ascertain whether the adolescent boys and girls perceived a relationship between their food intake or health and the responsibilities they

undertookAlmost all the adolescent boys and girls expressed that activities and responsibilities performed by them affects their food intake (Table 4.55). When asked how roles and responsibilities affect their food intake, little less than half stated that energy is required to carry out work. An equal proportion of the adolescents reported that one can not work on an empty stomach, a healthy body enables one to take more responsibilities and, tension decreases food intake.

4.4.5 Perceptions of the Adolescent Boys and Girls Regarding Nutrition and Gender

When asked whether diet for boys and girls *should* be different, a majority (73 %) disagreed giving supporting statements that :

- both boys and girls have similar needs or do similar work (46 %),
- both boys and girls belong to the same age (20 %),
- different foods gives same nutrients (14 %) and
- there should not be any discrimination between boys and girls as they have to grow equally (14 %)

The supportive verbatim statements given by the boys and girls :

"Chokara ane chokario naa sharir ma bahu mota pherphar hota nathi. Shakti melavavaa maate banne jan ne sarkha khorak ni jaroor pade chhe"

(There are not many differences in the physical changes between boys and girls. Both boys and girls require equal amount of food to obtain energy).

"Banneno khorak sarkho hoy toj banne ni vruddhi sarkhi thay"

(If both boys and girls have similar or equal amount of food then only both can grow equally).

"Aaj na yug ma chokara chokario vachche koi bhed nathi. Banne sarkhaj hoy chhe. Bannene sarkha laad prem thi uchherava joiye"

(In today's era, there are no gender differences. Both boys and girls are equal. Both of them should be brought up with equally and be given equal affection).

"Chokara and chokario ne sarkhi shakti ni jaroor pade chhe"

(Boys and girls require equal energy).

In contrast to these perceptions by a majority, the dietary intake data presented earlier showed that girls overall, consume less food to meet their requirement compared to boys.

As regards, about 27 % believing that boys and girls *should have a different diet*, the major reasons elaborated were

- ☹ boys eat more and girls can't eat more (52 %);
- ☹ activities of boys and girls are different (38 %)

Comparatively a higher percentage of the study girls than the study boys mentioned these reasons (Table 4.56).

The statements of the boys were :

: *"Chokara ane chokario ni pravrutti alag hoy chhe. Ochhi vadhati shakti vaparay chhe.*

(The activities of boys and girls are different and therefore amount of energy spent is also different).

"Chokaro karta chokario e ochhi mehanat karvani hoy chhe"

(Compared to boys, girls do less amount of hard work).

"Chokario vadhu padti gharma kaam kare chhe. Chokarao nokari ke parishramvalu kaam kare chhe. Chokarao e vadhu paushtik khorak levo joiye"

(To a large extent, girls work in the house. Boys either do service or perform activities which require a lot of hard work).

According to few girls ·

"Darek ne potana sharir ni shakti pramane ahar judo hoy"

(Everybody eats according to his/her own body's requirement for energy).

Table 4.55: Perceptions of Adolescent Boys and Girls Regarding Food and Gender

Sr no	Information Elicited	Boys (n=35)		Girls (n=42)		Total (N=77)	
		n	Percent	n	Percent	n	Percent
1	Definition of nutritious food/balanced diet						
	a gives adequate/good nutrition/ contains complete nutrients/fresh foods	6	17 1	7	16 7	13	16 9
	b keeps one healthy/do not make one fall sick	8	22 9	3	7 1	11	14 3
	c. consists all the three food groups	6	17.1	5	11 9	11	14 3
	d consists of two food groups	10	28 6	14	33 3	24	31.2
	e. consists of one food group	7	20.0	10	23.8	17	22 1
	f gives required vitamins to the body	2	5.7	-	-	2	2 6
	g Others	2	5.7	3	7 1	5	3 9
2	Nutritious foods consumed daily by the* adolescents were*						
	a Cereals	35	100 0	42	100.0	77	100 0
	b Pulses	25	71 4	32	76 2	57	74 0
	c Vegetables	20	57 1	33	78.6	53	68.8
	d GLVs	2	5 7	12	28.6	14	18 2
	e. Fruits	2	5.7	3	7 1	5	6.5
	f Milk & Milk products	35	100.0	42	100.0	77	100 0
	g Meat, fish & eggs	-	-	-	-	-	-
3	Source of Information*						
	a Through study/teachers	15	42.9	30	71.4	45	58.4
	b parents	12	34.3	12	28 6	24	31 2
	c friends	8	22.9	10	23.8	18	23 4
	d. Doctors	2	5.7	-	-	2	2.6
	e Others	2	5.7	3	7 1	5	6 5
4.	Food intake that affects growth and development occur during 10 - 18 years of life						
	a Yes						
	b. No	34	97.1	37	88 1	71	92.2
		1	2 9	5	11.9	6	7 8
4 a	Reasons for believing that Food intake affects adolescent growth and development*						
	a. food maintains health/for physical development food is necessary/food help growth and development	6	17.6	3	8.1	9	12 7
	b development occurs during this period/development of some of the parts of the body/ changes in hormones	6	17 6	5	13 5	11	15 4
	c. Others	7	20 6	3	8 1	10	14 1
	d. Do not know	15	44.1	26	70.2	41	57 8

* Multiple responses

Table 4 55 contd

Table 4 55 contd

Sr no	Information Elicited	Boys (n=35)		Girls (n=42)		Total (N=77)	
		n	Percent	n	Percent	n	Percent
5	Activities and responsibilities carried out by adolescent affect their food intake						
	a Yes	28	80 0	37	88 1	75	97 4
	b No	7	20.0	5	11 9	12	15 6
5 a	Reasons for believing that activities and responsibilities affect food intake* –						
	a. Energy is needed for work/food gives energy to do work/ more work requires more energy/food replenishes body's demands	12	42 8	20	54 0	32	42.7
	b food keeps mind at peace/ one can not work on empty stomach	2	7.1	5	13.5	7	9 3
	c. healthy body enables one to take more responsibility	1	3 6	-	-	1	1 3
	d. Tension decreases food intake	4	14.3	4	10.8	8	10.7
	e. Good effect	3	10 7	4	10 8	7	9.3
	f. Others	2	7.1	3	8.1	5	6 7
	g. Do not know	6	21 4	1	2 7	7	9.3
6	Diet for adolescent boys and girls should be different						
	a. Yes	11	31.4	10	23.8	21	27 3
	b. No	24	68 6	32	76.2	56	72 7
6.a	Reasons for believing that diet for adolescent boys and girls :						
6.a.1	Should not be different*						
	a. Both need the same/has similar work	13	54.2	13	40 6	26	46.4
	b Different foods give same nutrients	5	20.8	3	9.4	8	14.3
	c. Both are of same age	4	16.7	7	21 9	11	19 6
	d There should not be any discrimination between boys and girls, as both have to grow equally	3	12.5	5	15 6	8	14 3
	e Others	-	-	3	9.4	3	5.4
	f Do not know	3	12.5	4	12.5	7	12 5
6.a 2	Should be different* –						
	a Boys eat more/women and girls can't eat more	5	45 5	6	60 0	11	52 4
	b Activities of girls and boys are different	4	36 4	4	40 0	8	38.1
	c. As per body's requirement / everybody does not get same energy	3	27 3	1	10 0	4	19 0
	d Depends upon likes and dislikes	4	36 4	2	20 0	6	28 6
7	Adolescents felt that adolescent boys eat more than adolescent girls eat						
	a. Yes	28	80.0	15	35.7	43	55.8
	b No	7	20.0	26	61 9	33	42.9
	c Do not know	-	-	1	2 4	1	1.3

* Multiple responses

Table 4.55 contd

Table 4 55 contd

Sr no	Information Elicited	Boys (n=35)		Girls (n=42)		Total (N=77)	
		n	Percent	n	Percent	n	Percent
8	Should there be difference in the activities carried out by the adolescent boys and girls ?						
	a Yes*	28	80 0	15	35 7	43	55 8
	b No	7	20 0	27	64 3	29	44 2

It is worth noting that many girls themselves believed that they can not or need not eat more; and that boys need more food. When the adolescent boys and girls were asked whether boys actually *eat more* than the girls, overall 56 % of the adolescents (more boys compared to girls) believed this was true.

4.4.6 Perceptions of Adolescent Boys and Girls Regarding Gender Roles and Responsibilities

The study subjects listed down their activities that they performed at the house hold level. Analysis of data revealed that overall the study boys and girls performed activities which are culturally defined. The general activities conducted by the girls were cooking, washing clothes, mopping, sweeping and stitching, whereas the boys perform tasks such as running on errands, going to work. Boys spent more time on play than girls. Further, the adolescent boys and girls were asked whether the activities performed by boys and girls *should be* different. A larger number of the adolescent girls, compared with the adolescent boys, disagreed. The study subjects who felt that activities of the boys and girls *should not be different* supported their statements by various reasons such as : both boys and girls are equal, girls can do boys' work and boys' can do girls' work , boys should also do household chores and women are also seen working in various jobs (Table 4.55).

Among the adolescent boys and girls who agreed (i.e. roles and responsibilities should be different), most expressed that girls' activities are confined to the domestic sphere and boys have freedom to do whatever they want to do. The major reasons are given in Table 4.55

The highlights of the verbatim statements given by the boys and girls in response to the above question are presented in Box I.

Further it was observed that 73 % of the adolescents believed that girls have more responsibilities than boys. This response was more common among the adolescent girls than the adolescent boys (81 % vs. 63 %).

Box I	**Responses of Boys** 	**Responses of Girls** 
The activities performed by the boys and girls *should not be* different		
	➤ *"temna (chokario) na man ma pan umang hoy chhe"* (Girls also have their own desires)	➤ *"Chokario je kaam kare te chokarao pan kari shake chhe ane chokarao kaam kare te chokario pan kari shakea chhe"* (Boys can do the tasks/ activities generally performed by girls, and girls can also carry out work that boys generally do) ➤ *"Aa ummar chokaro chokario banne e saari rite vitaavavaani hoy chhe"* (Both boys and girls should be able to spend their life happily) ➤ *"Chokario jetli jawabdari thi kaam kare chhe atli jawabdari thi chokarao e kaam karvu joiye"* (Boys should also perform various activities in a committed way similar to the girls) ➤ *"Aaj naario manas na badha kaam ma hatho-hath kaam karya kare chhe Chokario pan hamana badhij post ane department ma agal jova male chhe"* (Today's women are equally involved in all the activities done by men Now girls are also seen in leading positions in various departments)
The activities performed by the boys and girls *should be* different		
	➤ *"Chokarao purush na pramaan ma kaam kare chhe ane chokario stro na pramaan ma kaam kare chhe Aavi paramapara chalti aavi chhe "* (Boys are expected to do the activities that are generally performed by men Girls are expected to carry out activities which are usually done by women This is the way tradition is carried on ➤ "Je pravruttio chokarao kari shake te chokario kare to thaki jay" (If the girls perform the activities which boys perform they will get tired ➤ *"Chokario gharnu kaam kari shake chhe Kachra pota kare chhe Chokarao ne potu karvanu favtu nathi Chokarao dukane thi kai lavavaama madad kare chhe Gharanu kaam kari shakta nathi"* (Girls can do house hold tasks such as sweeping, mopping Boys are not able to mop the house. Boys help in getting things from shops Boys run errands They can not carry out house hold chores) ➤ *"Chokarao potani rite phave tem pravruttio kare chhe Chokario amuk kaam mata pitani marji upar karti hoy chhe"* (Boys can perform the activities that they want to do Girls have to do certain activities according to their parent's wishes	➤ *"Chokarao ne gharnu kaam karvani sharam laage Etle chokarao kamaava jay Chokario gharanu kaam kare Balako ni gharma nana bhai beno ni sambhal rakhe"* (Boys are embarrassed to do household chores, so they go to work/ earn Girls tackle house hold chores, take care of children and younger siblings) ➤ *"chokarao e mota thai ne ghar ni jawabdari sambhalvani hoy chhe"* (Boys when become adults have to look after the house)

The adolescent boys and girls were asked whether activities or responsibilities carried out by them affect their health. By and large both boys and girls gave positive response regarding influence of daily activities and responsibilities on health of boys such as boys remain energetic, have good mental health, work drives away laziness, can concentrate on studies.

"Aame je pravruttio karie ane jawabdari sambhaliye chhie tenathi tandurasti saari bane chhe. Aalas aavati nathi"

(The activities performed and responsibilities carried out by us maintain our good health. We don't feel lazy)"

"Purtu jamvanu na levathi sharir ma ashakti aave chhe"

(Inadequate food intake causes weakness).

"Chokarao potana lesson , anya pravrutti taraf dhyan aapi shake chhe."

(Boys can give adequate time to finish household work and for other activities).

"Ame loko akho divas kaam karine pachi thaki jaiye etle pachi barabar naj bhanayne"

(We get tired after completing all the house hold work. Hence we are not able to study properly).

In contrast, a majority of the boys and girls (though there were fewer boys than girls) stated that house hold responsibilities adversely affect their health, mental well being and education of girls Girls in particular said that because of domestic responsibilities all through the day they :

- feel tired and less energetic.
- Experience mental tension, worries
- Suffer from headache, body ache
- Cannot concentrate on school work
- Feel less hungry and eat less
- Do not develop properly and get wrinkles on their face

"Chokario thaki jay chhe"

(girls get tired)

"Kamjori jevu laage chhe"

(feels weak)

"Chokario par sharirik asar pade chhe"

(affect girl's health).

"Chokario ne tension rahe chhe. Gharna kaam ni chinta rahe chhe. Kharab asar pade chhe"

(Girls worry about house hold tasks, experiences tension and it has bad effect on her)

"Divas bhar kaam Karachi amuk khorak ochho thay chhe"

(The whole day's work reduces their appetite and eat less)

"Amne vanchavan lakhavno time ochho male chhe. Manoranjan nu koi karya thai shaktu nathi. Akho divas kaam karvu pade chhe.

(We get less time to read and write. We cannot do recreational activities. No work is done. Whole day we have to do house hold tasks).

"Chokario nu sharir barabar thatu nathi. Chehra par jaldi karchali aave chhe"

(Proper physical development in girls does not take place and get wrinkles on face at an early age).

"Sharir ma thi shakti ochhi thay chhe. Thak anubhavay chhe"

(Energy is lost from body. Experiences fatigue).

4.4.7 Knowledge About Pregnancy, Lactation and Childcare Among Older Adolescent Girls

Data pertaining to awareness about pregnancy, lactation and childcare were collected from the older adolescent girls to understand whether they possess this critical information for their future roles as mother and home makers. Analysis of data revealed

that only about one fourth of the adolescent girls could respond correctly to the question about what pregnancy is. Pregnancy was defined as a period when a mother conceives or has a child in her uterus for nine months. Another one fifth described the symptoms of pregnancy such as vomitting, a woman experiences uneasiness or is with heavy feet (*"pag bhare"*) and 31 % stated pregnancy as a period of motherhood. The remaining one fifth were unable to respond to the same question (Table 4.56).

About two thirds of the girls believed that weight should be increased during pregnancy. The most common reasons reported to increase weight was to have healthy child (39 %), followed by, for mother's health (30.8) and for both mother's and child's health (12 %). However, none of them could correctly state about how much weight should be increased during pregnancy. As many as one third adolescent girls (31 %) expressed that weight should not be increased during pregnancy as they felt that more weight is not good for health (50 %), it is difficult to move around or one feels tired (25 %). It was encouraging to note that most of the girls (92 %) were aware that food intake should be increased during pregnancy. Half of the girls stated that increased food intake is essential for child's growth and development or nourishment or health. Another 11 % and 17 % of the study girls considered increased food intake essential for mother's health and mother child's health respectively. Three girls (8 %) believed that a pregnant mother should not eat more as low food intake keeps the body healthy (Table 4.56).

Table 4.56 further shows that 79 % of the adolescent girls were not aware of anaemia during pregnancy. Out of the eight girls (21 %) who were aware of anaemia, 88 % stated that anaemia can be prevented by eating balanced diet or nutritious or vitamin rich foods

Data were collected on awareness about breastfeeding among the study girls. Nearly two thirds were unable to state how soon breastfeeding should be initiated after delivery. About one fifth reported that breastfeeding should be commenced within 24 hours after delivery. When the adolescent girls were asked whether colostrum should be given to the infant, only 15 % of the girls agreed to the same, whereas one third said that it should not be given. The remaining girls (about 50 %) were not sure (Table 4.56).

Table 4.56 : Awareness about Pregnancy, lactation and Child care among Adolescent Girls (N = 39)

Sr No	Particulars	N	Percent
1	Pregnancy is defined as		
	a When a mother is going to be mother	12	30 8
	b The period when a woman conceives or The period before birth, when the child is in mother's uterus/ a woman who desires to be mother has child in uterus for nine months	10	25 6
	c. The period when a woman has vomiting and/or experiences uneasiness and/or has desire to eat sour foods or a woman with heavy feet	7	17.9
	d After marriage a woman is pregnant/body swells/feel tired	2	5.1
	e. Do not know	8	20.5
2.a	Weight should be increased during pregnancy		
	a Yes	26	66 7
	b No	12	30 8
	c. Do not know	1	2.6
2 b	Reasons reported for increment in weight during pregnancy		
	a. To have healthy child or Child gets nutrition or Increment in mother's weight also increases child's weight. Therefore, the child remains healthy	10 8 3	38.5 30 8 11 5
	b. She is going to be mother or For mother's health or Mother can deliver baby easily or For healthy body	1 1	3.8 3 8
	c. For both mother and child's health	1	3.8
	d. Not to feel tired and weak		
	e. It is not good if mother's weight is less and child's weight more	1	3 8
	f. It indicates whether the child's weight is increased or not	1	3 8
	g. Good food intake increases weight	1	3.8
	h Do not know	2	7 7
2 c	Weight should not be increased during pregnancy as		
	a More weight is not good/for health	6	50.0
	b Difficult to move around if weight is increased/feel tired	3	25.0
	c Do not know	3	25.0
3	Amount of weight should be increased during pregnancy		
	a 4 to 5 kg	5	19.2
	b. 1 to 2 kg	2	7 7
	c. Pregnant mother should have 45 – 50 kg weight	3	11.3
	d. Pregnant mother should have more weight than her age	1	3 8
	e. Child's weight should be increased as per mother's weight	1	3 8
	f. Proper weight	1	3.8
	g. Do not know	13	50 0
4 a	A pregnant mother should eat more than normal mother		
	a Yes	36	92 3
	b No	3	7 7

Table 4.56 contd...

. Table 4.56 contd

Sr No	Particulars	N	Percent
4 b	A pregnant mother should have higher food intake : for -		
	a. Child's growth and development/nourishment	14	38.9
	b. Healthy mother and child	6	16 4
	c Good health of the mother	5	11.1
	d. Healthy child	3	8.3
	e. Foetus also requires food	3	8 3
	f. Mother does not have to bear more pain	1	2.8
	g. Mother feels more hungry	1	2 8
	h. Whatever pregnant mother eats, she gives the child through breast milk/Child needs breast milk	2	5.5
	i Food intake of the mother affects the child	1	2 8
	j Do not know	1	2.8
4 c	A pregnant mother should have lower food intake as:		
	a. It is better to remain healthy by eating less food	1	33 3
	b. Do not know	2	66.7
5.a	Ever heard about anemia in pregnancy		
	a. Yes	8	20.5
	b. No	31	79.5
5.b	Steps suggested by adolescent girls to prevent anemia during pregnancy		
	a. Eat adequate/proper proportion of food	2	5.1
	b. Eat nutritious/vitamin rich food	6	15.4
	c. Eat GLVs/the foods that makes blood/take tablets to increase	4	10 0
	d. blood	1	2.6
	e. Balanced diet	1	2.6
	f. Take ayurved treatment	2	5.1
	g. Eat pulses/ghee/milk	1	2.6
	h. Do not know		
5.c	Consequences of anemia in pregnancy		
	a. Harmful effect on child/child has some defects	5	62.5
	b. Harmful to both the mother and the child	3	37.5
	c. Mother's health is affected/becomes weak/mother has to be given blood when child is born	4	50 0
6	Breast feeding should be initiated		
	a. Immediately after delivery/as soon as breast milk is secreted	3	7 7
	b Within six hours of delivery	2	5.1
	c. 6 – 12 hours after delivery	2	5.1
	d. On the same day of the delivery	1	2.6
	e. After 24 hours/one day	6	15.4
	f. Do not know	25	64.1
7.a	Aware of colostrum		
	a. Yes	9	23 1
	b. No	30	76 9
7.b	Colostrum Should be given to a newborn		
	a. Yes	6	15 4
	b. No	13	33.3
	c. Do not know	20	51 3
7 c	Reasons for not giving colostrum to newborn		
	a. Colostrum is bad/harmful to the child	4	30 8
	b. Do not know	9	69 2

Table 4.56 contd.

..Table 4 56 contd

Sr No	Particulars	N	Percent
8.a	A lactating mother should eat more than normal mother		
	a Yes	29	74 3
	b. No	8	20 5
	c Do not know	2	5 1
8 b	Reasons reported for higher food intake during lactation (n = 29)		
	a Child becomes/remains healthy	8	27 6
	b. Child gets nutrition/energy as he grows	3	10.3
	c For child's growth and development	1	3.5
	d To satisfy child's hunger	5	17.2
	e For breast milk secretion/breastfeed the child	7	24 1
	f Mother has to nourish two persons (herself and child)	9	31.1
	g. Do not know	3	10 3
8.c	Reasons reported for lower food intake during lactation		
	a More food will harm either the mother or child	2	25 0
	b. Not good for child	2	25 0
	c Do not know	4	50 0
8 d	How much more food should be consumed by lactating mother		
	a. Amount should be doubled	5	17.2
	b More than normal food	6	20 7
	c As much as the lactating mother can eat	5	17.2
	d. Others	4	13 8
	e. Do not know	9	31.1
9 a	Till what age a child is exclusively breastfed		
	a 4 to 6 months	16	40.8
	b. 6 to 12 months	11	28.2
	c. More than 12 months	6	15.4
	d. Till child learns to eat	1	2 6
	e. Do not know	5	12 9
10 a	Should a child learn to eat by the age of one year		
	a. Yes	23	57.0
	b. No	15	24 5
	c Do not know	1	2.6

Information was elicited pertaining to lactation which revealed that three fourths girls correctly responded that lactating mother should eat more than normal for child's better health (Table 4.D). With regard to the amount of food consumed by the lactating mother, about one third stated that as much as the mother can eat or amount should be doubled. Another one third were not aware of the amount of food to be increased during lactation.

According to 41 % of the girls, exclusive breastfeeding should be done till the child is 4 to 6 months old, and 28 % reported that it can be continued up to the age of 6 - 12 months (Table 4.56). More than half girls reported that complementary foods should be introduced between the age of 6 and 12 moths. Few girls expressed that complementary foods should be administered before child completes six months. About 57 % of the girls believed that child should learn to eat whatever cooked in the house by the age of 12 months. Thus, awareness of exclusive breast feeding and introduction of timely complementary food need to be included in the adolescents.