UNIVERSITY OF SOUTHAMPTON

Socio-cultural factors influencing the nutrition of girls and women in rural Maharashtra, India

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ABSTRACT

FACULTY OF MEDICINE, HEALTH AND BIOLOGICAL SCIENCES
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A recent study of maternal nutrition and fetal growth in rural Maharashtra (the Pune Maternal Nutrition Study) showed that maternal size and body composition are strong determinants of fetal growth and that women had lower BMIs than their menfolk. This study aimed to examine, in the same population, the social and cultural factors at both community and household level, which lead to gender differences in the nutritional status of adults and children.

Focus group discussions were used to obtain the community's viewpoint on the causes of the low nutritional status of women. Sons and daughters are treated equally in terms of provision of food and health care, although families prefer sons as future name bearers for the family. In contrast, marriage brings several changes for young women, which add together to reduce her nutritional status. They include a significant increase in workload (both at home and on the farm), and lack of rest and leisure. Furthermore, young women nutritionally deplete themselves by starting to fast, a characteristic ritual after marriage for women. In addition, the new bride is expected to bear a child within a year of marriage. On the other hand, men although working hard on the farm, seldom do any household chores and get rest in the evenings. They eat first in the house, and have freedom and access to cash, enabling them to eat extra snacks and tea in the village. Men are aware of the fact that life for rural women is very hard. The recent change from bride price to dowry, although apparently a retrograde step, is the parents' way of getting their daughters out of this situation and into better-off households.

The focus group findings were used to design a questionnaire, administered separately to men, women, boys and girls, within households. Households were selected using anthropometric parameters, to achieve a broad range of households with different levels of nutritional status. The data confirmed that women have a heavy workload both on the farm and at home. Heavy household chores such as carrying water and firewood, and washing clothes and utensils are mainly done by women. Although many men do farming work, a significant proportion instead now work as petty employees in shops and factories. Men spend more time at leisure than women; indeed it was striking how little leisure time the women have. Children, especially girls, share household chores with the mother. There is no gender difference in the number and quality of meals, but men travel to the main village and have additional food as snacks prepared outside the home. Women start fasting as young brides, and often give up fasting after the birth of children, especially sons.

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LIST OF ACRONYMS AND ABBREVIATIONS

AC	Abdominal Circumference
ANM	Auxillary Nurse Mid-wife
BHMS	Bachelor in Homeopathic Medical Sciences
BMI	Body Mass Index
BW	Birth Weight
CED	Chronic Energy Deficiency
CHW	Community Health Worker
FAO	Food and Agriculture Organisation
FCND	Food Consumption and Nutrition Division
FPAI	Family Planning Association of India
GNP	Gross National Product
G'father	Grandfather
G'mother	Grandmother
HAZ	Height for Age Z-score
HC	Head Circumference
IMR	Infant Mortality Rate
IIPS	International Institute of Population Studies
ICMR	Indian Council of Medical Research
IUGR	Intra Uterine Growth Retardation
kg	Kilogram
km	Kilometre
L	Length
LBW	Low Birth Weight
MBBS	Bachelor of Medicine and Bachelor of Surgery
MPHW	Multi Purpose Health Worker
MRC	Medical Research Council
MUAC	Mid-Upper Arm Circumference
NCHS	National Center for Health Statistics

NFHS	National Family Health Survey
NIN	National Institute of Nutrition
NNMB	National Nutrition Monitoring Bureau
NSSO	National Sample Survey Organisation
PHC	Primary Health Center
PMNS	Pune Maternal Nutrition Study
PPP	Purchasing Power Parity
RDA	Recommended Dietary Allowance
SC	Sub Center
SD	Standard Deviation
SRS	Sample Registration System
SS	Subscapular Skinfold Thickness
Tr	Triceps Skinfold Thickness
UNICEF	United Nations Children Fund
WAZ	Weight for Age Z-score
WHO	World Health Organisation
WHZ	Weight for Height Z-score
Yrs	Years

EXECUTIVE SUMMARY

Background: The Pune Maternal Nutrition and Fetal Growth Study was conducted in the six rural villages of Pune in western Maharashtra, India. Results indicated that maternal size and body composition were strong determinants of fetal growth. 65 percent of women were chronically energy deficient (BMI ≤18.5) compared with 39 percent of men in this rural community.

Objective: To examine the social cultural factors which lead to gender differences in the nutritional status of adults and children.

Design: Assessment of factors associated with gender differences in nutritional status at both household and community level. Anthropometric measurements were used to assess nutritional status amongst members of households, and to obtain a broad range of households with different levels of nutritional status and gender difference. Focus group discussions were used to obtain the community's viewpoint of the causes of low nutritional status of women, and to design a detailed questionnaire, which was administered separately for men, women, boys and girls, within households.

Setting: Village Pabal, the largest of the six villages from the Pune Maternal Nutrition Study.

Participants: All households with boy-girl children aged 3 to 8 years, and their parents and grandparents. In total, 101 households with 202 children were selected for the study.

Main Results:

Women were thinner than men but this gender difference diminished amongst the children. Better economic resources were associated with better nutrition among children and men but women often showed no benefit.

Marriage brings several changes for young women, which add together to reduce her nutritional status. These changes were related to:

Excessive workload: Men and women agreed that the women have more work to do then anyone else in the family. Women do heavy household chores like fetching water, washing

clothes and collecting firewood, as well as farm work involving tasks like weeding, sowing and cutting of crops. More women worked on the farm than men, as men opted to work in shops and nearby factories. Women tend to spend less time resting and at leisure. Majority of women reported an increase in workload after marriage.

Unequal access to resources: Women seldom or never kept cash and men did the selling and purchasing of produce. Men had access to the village market and most of them visited it twice a day. In the households, men ate first but the number of meals eaten was similar for men and women. Men tended to consume more milk and fruits. This could be due to them having access to cash and the main market where these foods are available. Also, consumption of 'snacks eaten outside home' was considerably higher for men.

Fasting habit: Young women nutritionally deplete themselves by starting to fast, a characteristic ritual after marriage. More women than men reported starting to fast after marriage. On a typical fasting day abstinence from one or two meals, and if available eating only fasting snacks usually made of tapioca, potato and groundnuts. More women fasted once per week or more and ate only one meal compared to men. Usually it is older women in the house and neighbourhood who influence the young bride to start to fast. Fasting is followed to maintain family tradition, and for the health of the family and children. Men compared to women report fasting 'to give rest to stomach' and for dietary variety. Many women gave up fasting after the birth of children, especially sons.

Early motherhood: Parents get their daughters married young for three reasons: firstly, they fear losing family pride if she marries someone not of their choice; secondly, due to growing demands of dowry they want to get over the responsibility of marrying their daughter soon, and thirdly, a high proportion of girls drop-out from school after puberty as it is considered unsafe for a them to travel alone to school or college. Once married young, the bride is expected to bear a child within a year. During pregnancy there is little reduction in the workload and women tend to work till the last trimester.

Conclusion: No major gender differences in nutritional status were found amongst the children but women were thinner than men highlighting that changes in adulthood played a greater role towards women's thinness. Numerous roles and responsibilities taken up after marriage for young women explained the reasons for their thinness; these include a drastic increase in work, fasting and early childbearing. There was no evidence of deliberate gender bias as men were aware of the difficulties faced by the women and were interested in ways of improving this situation for them.

Chapter 1 Introduction

Famines in India are a "nightmare of the past" (Gopalan, 1992). Improvements in health and nutrition have increased life expectancy from 31.7 years in 1950 to 59.0 years in 1998(The World Bank, 1996). Despite this, the low nutritional status of the population, especially young women, is still a cause of concern.

One indicator of the poor nutritional status of young women is the large percentage of infants born with low birth weight. Every third baby born in India is in the low birth weight category (birth weight < 2500 grams) which means that there are 7-10 million low birth weight babies born annually(Ramlingaswami et al. 1997).

The percentage of low birth weight infants born in the Indian sub-continent is markedly higher than that in affluent western countries, but also higher than in most other Asian countries (Table 1.1).

Table 1.1: Percentage of newborn babies with low birth weight in various countries

Region and Country	Low Birth Weight (%)	
	1998	2001
World	**17**	**16**
Indian sub-continent		
India	**33**	**33**
Bangladesh	**50**	**30**
Pakistan	**25**	**25**
Sri Lanka	**25**	**25**
Maldives	**20**	**13**
Myanmar	**16**	**24**
Thailand	**13**	**6**
United Kingdom	**7**	**7**
Sweden	**5**	**5**

Source: (UNICEF, 1998), (UNICEF, 2001)

Low birth weight is an important problem. The immediate survival of an infant is directly correlated with its birth weight(Kramer, 1987). Birth weight not only determines infant mortality but also substantially predicts the future health of the

baby. The short term consequences of low birth weight are stunted growth(Gopalan, 1994a), delayed cognitive development, and increased susceptibility to infectious disease(Nelson, 1996). It has recently been shown that low birth weight carries long-term disadvantages including an increased risk of adult coronary heart disease and diabetes mellitus. In India, these diseases are on the rise(Reddy, 1998; Fall and Barker, 1997), (Bulatao and Stephens, 1992), (Ramachandran et al. 1997) and are a major public health concern.

Low birth weight can be the result of either a short period of gestation (prematurity) or a reduced rate of fetal growth, or a combination of both. The majority of low birth weight babies in India are small because of reduced fetal growth rather than prematurity(WHO, 1994). A multicentre World Health Organisation (WHO) study in the South Asian countries showed that of all babies born low birth weight, India had the highest proportion (82.6%) born small for gestational age (Table 1.2).

Table 1.2: Percentage of low birth weight babies born small for gestational age

	India ***(N-1940)***	**Nepal** ***(N-2271)***	**Sri Lanka** ***(N-1561)***
Low Birth Weight Infants	**28.8%**	**14.5%**	**18.8%**
'Small for Dates'	**82.6%**	**69.7%**	**75.2%**

Source:(WHO, 1994)

1.1 Low Birth Weight and Maternal Nutrition

A strong determinant of birth weight is the nutritional status of the mother. Maternal pre-pregnant weight and body mass index, and weight gain during pregnancy have all been positively correlated with infant birth weight (Kramer, 1987), (Gopalan, 1989a), (WHO, 1995). Studies in India have indicated that pre-pregnant weight less than 41 kgs and body mass index less than 18.5 kg/m^2 (Chronic Energy Deficiency: CED) are major risk factors for low birth weight (WHO, 1995), (Bhargava and Dadhich, 1994), (Nadamuni Naidu and Prahlad Rao, 1994), (Reddy et al. 1993), (Shetty and James, 1994). In a study carried out by the National Institute of Nutrition (NIN), Hyderabad, it was found that mothers with a BMI less than 16 kg/m^2 had a low birth weight percentage as high as 53% (Table 1.3) (Gopalan, 1994b).

Body mass index is a measure of the current nutritional status of the mother. There is also evidence that the nutrition of the women during childhood influences her ability to support fetal growth. Under-nutrition has two effects on the physique of a growing child. Firstly, it decreases the weight for age (wasting). If under-nutrition continues for several months the child's growth slows leading to a decrease in height for age (stunting). If nutrition improves later on, the child's weight for height may return to normal, as fat and lean mass increase, but height may not recover. Therefore girls who are chronically undernourished often become stunted women.

Table 1.3: Maternal body mass index and low birth weight

Body Mass Index *(kg/m2)*	*WHO Classification*	**Low Birth Weight (<2500 g)**
<16	*CED III (Severe)*	**53.1%**
16 - 17	*CED II (Moderate)*	**41.4%**
17 - 18.5	*CED I (Mild)*	**35.9%**
18.5 - 20	*Normal*	**27.7%**
20 - 25	*Normal*	**26.4%**
25 – 30	*Obese*	**14.7%**
>30	*Obese*	**20.0%**

Source: (Shetty and James, 1994)

Studies relating maternal anthropometry to fetal growth have shown that maternal height is an important determinant of fetal growth. A WHO collaborative study of maternal anthropometry and fetal outcome carried out in 20 countries including India, showed an odds ratio of 1.7 for low birth weight in babies born to mothers below the lowest quartile of height compared with mothers above the highest quartile. If the mother was below the lowest quartile for both pre-pregnant weight and height the odds ratio was 2.6 (WHO, 1995).

Since stunting can result from poor intrauterine growth as well as under-nutrition in childhood, Gopalan has said "we are today witness to a vicious cycle of stunted mothers giving birth to girls of low birth weight who, because of the permanent damage suffered by them because of IUGR, grow and develop in a substandard growth and development ending up as stunted mothers"(Gopalan, 1994b).

1.2 Maternal Nutrition in India

The World Health Organisation collaborative study showed that even compared with other Asian countries, Indian women have the lowest heights and weights, indicating the low nutritional status of India's potential mothers (Table: 1.4).

Table 1.4: Mean weight, height and BMI of pre-pregnant women

	Weight *(kg)*	Height *(cm)*
India (Pune)	**42**	**150**
Sri Lanka	**43**	**150**
Nepal (Rural)	**42**	**150**
Nepal (Urban)	**44**	**150**
Myanmar	**45**	**152**
Thailand	**49**	**153**
United Kingdom	**57**	**159**

Source: (WHO, 1995)

According to data collected by the National Nutrition Monitoring Bureau (NNMB) in India, 15-29% of adult Indian women in 10 states have body weights less than 38 kgs, and 12-25%, heights less than 145 cms (Gopalan, 1994b). According to WHO's proposed criteria they all fall in the 'High risk category' and are likely to give birth to low birth weight babies.

The poor nutritional status of women in India has shown disappointing rates of improvement. NNMB data, pooled from 10 states, showed that there were 47.1 percent women with CED in 1994, only a marginal improvement from 51.8 percent in 1975-79 (Sachdev, 1997), (Krishnaswamy et al. 1997). Similarly, there has been only a small improvement in adult female height from 149.9 cms in 1975-79 to 151.5 cms in 1994(Krishnaswamy et al. 1997). Interestingly, any improvement in height seems to be confined to the better-off sections of the population. There have been significant increases in mean height in well-to-do Indian communities but no positive trend in women from poor socio-economic strata (Gopalan, 1989b).

Data on heights and weights of children including Indian Council of Medical Research (ICMR) data collected in 1955 and NNMB data collected from 1975 to 1988 showed a positive but marginal trend. The mean increase in body weight of girls aged 10-19 years is estimated at 1 kilogram and the increase in height at 3-4 cms (Gopalan, 1989b),(Krishnaswamy et al. 1997).

1.3 Economic Indicators and Maternal Nutrition

In worldwide terms, poverty is clearly a major cause of under-nutrition. A country's economic strength is indicated by the Gross National Product (GNP). India is a poor country, with a GNP per capita of 340 US$ compared with 18,700 US$ in the U.K. and 26,980 US$ in USA. It does, however, have a better GNP than many other developing countries including sub-Saharan Africa and some other Asian countries. Despite economic growth in India there has been little or no improvement in birth weight and maternal nutritional status. Table 1.5 shows the GNP alongside health statistics, and indicates that India, although economically similar or stronger than other developing countries, and having similar overall energy intakes, has persistently poor maternal size and birth weight (UNICEF, 1998).

Table 1.5: Birth weight and maternal anthropometry statistics in India and countries with a similar GNP

	India	Gambia	Myanmar
Gross national product *(US$)*[a] (1995)	**320**	**320**	**220**
Daily per capita calorie supply as a % of requirements [b] (1988-90)	**101**	**NA**	**114**
Low birth weight *(%)*[c] (1995)	**28.2**	**12.1**	**17.8**
Maternal height *(cm)*[c] (1995)	**150**	**157**	**152**
Pre-pregnant weight *(kg)*[c] (1995)	**42**	**49**	**45**
Pre-pregnant BMI *(kg/m^2)*[c] (1995)	**18.3**	**19.7**	**19.8**

Source: [b](UNICEF, 1997), [a] (UNICEF, 1998), [c] (WHO, 1995)

Taking broader economic indicators, an international study carried out by the Food Consumption and Nutrition Division (FCND) of the International Food Policy Research Institute (IFPRI) showed that access to safe water, female education, dietary

energy intakes and the degree of democracy in government were important determinants of child nutrition(Smith and Haddad, 1999). Comparing South Asia (Indian sub-continent) and sub-Saharan Africa, the two most undernourished regions, this study showed that South Asia performed better according to these indicators but still had higher levels of child malnutrition (Table 1.6). The region's high rates of under-nutrition are therefore not fully explained by economic factors.

Table 1.6: Comparison of the prevalence of child malnutrition and its determinants in South Asia and sub-Saharan Africa

	South Asia	sub-Saharan Africa
Child malnutrition *(%)*	**49.3**	**31.1**
Access to safe water *(%)*	**79.7**	**48.8**
Female secondary school enrolments *(%)*	**34**	**19**
Female to Male Life expectancy ratio	**1.023**	**1.054**
Per capita dietary energy supply *(kcal)*	**2356**	**2136**
Per capita income/ year *(PPP$US)*	**1136**	**778**
Democracy index	**4.10**	**2.44**
Poverty *(%)* (1993)	**43.1**	**39.1**

Source: (Smith and Haddad, 1999) PPP-Purchasing Power Parity

1.4 Pune Maternal Nutrition and Fetal Growth Study

A recent study carried out in Pune, India, provided useful data on the relationship between maternal nutritional status and fetal growth. The Pune Maternal Nutrition Study (PMNS) was a collaboration between the MRC Environmental Epidemiology Unit in Southampton and the King Edward Memorial Hospital (KEM) in Pune, Maharashtra, India (Fall et al. 1999), to examine the relationship between the nutritional status of the mother and the size of her baby at birth. The study was conducted in six rural villages near Pune. A house-to-house survey of the total population (approximately 33,000) identified 2986 married women of childbearing age (15-40 years). Excluding couples where the husband or wife had been sterilised, there were 2,675 women "at risk" of becoming pregnant. Detailed anthropometric measurements were recorded for these women by specially trained fieldworkers using standardised techniques. These field workers also visited the women monthly to

record menstrual period dates. As the women conceived, they were followed through their pregnancy and until childbirth. During pregnancy data were collected on the women's food intakes, workload and biochemical status for some micronutrients. The babies were measured in detail at birth.

Of the 2,675 non-pregnant women measured, 1,102 became pregnant. Excluding women who had spontaneous abortions, terminations, multiple pregnancies and major fetal anomalies 770 babies were delivered within the study. Birth measurements were obtained for 702 normal live births, 633 of which were full term.

The mother's were short and thin (mean pre-pregnant weight 41.7 kgs, height 1.52 m and BMI 18.0 kg/m^2). 64.8% had a pre-pregnant BMI below the high risk threshold of 18.5 kg/m^2, 8.8% were below the high risk weight threshold of 145 cm for height and 23.5% were below the high risk threshold of 38 kgs. The babies were correspondingly small (mean birth weight 2.67 kgs). This is similar to mean birth weights reported elsewhere in India (WHO, 1995), (Gopalan, 1989b), (Mohan et al. 1990), but 800 grams lower than the mean birth weight in the U.K (Kramer, 1987), (Godfrey et al. 1996).

1.4.1 Mother to baby relationships (anthropometry)

The study showed that the lowest birth weight babies were born to the shortest and thinnest mothers (Table 1.7). The correlation between pre-pregnant maternal weight and birth weight was 0.21 ($p<0.001$).

Table 1.7: Mean birth weight (kg) according to maternal height and pre-pregnant fat mass

Maternal fat mass *(kg)*	Maternal height *(m)*			
	<1.5 *(N)*	**-1.55** *(N)*	**≥1.55** *(N)*	**All** *(N)*
<7.5	**2568** *(95)*	**2625** *(82)*	**2673** *(33)*	**2601** *(210)*
-9.5	**2611** *(66)*	**2618** *(79)*	**2749** *(69)*	**2658** *(214)*
≥9.5	**2646** *(58)*	**2771** *(63)*	**2755** *(88)*	**2729** *(209)*
All	**2601** *(219)*	**2663** *(224)*	**2739** *(190)*	**2664** *(633)*

Source: (Fall et al. 1999)

Maternal weight is a composite measure of various components of her body composition including height, head size, fat mass, muscle mass and visceral mass. In the PMNS, anthropometric measures were able to estimate the first four of these components. A simultaneous analysis of the babies' measurements in relation to these four maternal components (Table 1.8) showed that maternal height, head circumference and fat mass all predicted neonatal size.

Table 1.8: Multiple linear regression analysis of babies' measurements at birth on maternal pre-pregnant height, head-circumference, fat mass and muscle mass

(Gestational age, sex and maternal parity were included in all analysis).

Birth measurements	Maternal pre-pregnant							
	Height *(cm)*		Head circumference(*cm)*		Fat mass *(kg)*		Muscle mass *(kg)*	
	β *(95% C.I)*	*p*	β *(95% C.I)*	*p*	β *(95% C.I)*	*p*	β *(95% C.I)*	*p*
Birth weight *(g)*	**8.6** *(3.2 - 14.0)*	***0.002***	**17.3** *(-0.4 – 34.9)*	***0.06***	**20.0** *(9.8 – 30.3)*	***<0.001***	**-7.2** *(-20.5 – 6.1)*	***0.3***
Length *(cm)*	**0.08** *(0.05 – 0.1)*	***<0.001***	**0.2** *(0.09 – 0.3)*	***0.001***	**0.001** *(-0.06 – 0.06)*	***1.0***	**-0.02** *(-0.1 – 0.05)*	***0.5***
Head circumference *(cm)*	**0.01** *(-0.01 – 0.03)*	***0.4***	**0.16** *(0.1 – 0.22)*	***<0.001***	**0.03** *(-0.01 – 0.06)*	***0.2***	**-0.03** *(-0.08 – 0.01)*	***0.2***
Triceps Skinfold *(mm)*	**-0.004** *(-0.02 – 0.01)*	***0.6***	**0.05** *(0.01 – 0.1)*	***0.02***	**0.04** *(0.02 – 0.07)*	***<0.001***	**-0.02** *(-0.06 – 0.01)*	***0.2***

Source: (Fall et al. 1999)

The mother's height independently predicted neonatal length. The mother's fat mass predicted the skinfold thickness of the baby. The mother's head circumference predicted all birth measurements independently of her height, fat mass and muscle mass. These results indicated that the mother's growth during childhood, reflected in her height and head size, as well as her current nutritional status, reflected in her fat mass, influence the growth of her fetus.

1.4.2 Mother to baby relationships (food intake and micro nutrient status)

The mean maternal energy and protein intakes were low (Energy: 7.4 mJ and 7.0 mJ at 18 and 28 weeks gestation respectively; protein: 45.4 g and 43.5 g). None of the

baby's measurement were related to mother's energy and protein intakes. In contrast there were strong relationships with the mother's fat intakes and also with her intakes of high quality micronutrient rich foods including milk, green leafy vegetables and fruit. Mothers with higher intakes of these foods had babies which were larger in most measurements (Table 1.9).

Table 1.9: Maternal intakes of green leafy vegetables, fruit and milk products, and erythrocyte folate and serum vitamin C with neonatal anthropometry

Maternal Intakes	Frequency/ concentration	*N*	Neonatal measurements		
			Birth weight *(g)*	Length *(cm)*	Head circumference *(cm)*
FOOD GROUP					
Green	Never	*60*	2571	47.0	32.6
Leafy	<Once / wk	*175*	2601	47.5	32.9
Vegetables	Once / wk+	*225*	2675	48.0	33.2
@ 28 wks	≥Alternate days	*149*	2742	47.9	33.3
		p*	<0.001	0.005	<0.001
Fruits	<Once / wk	*44*	2598	47.5	32.7
@ 28 wks	Once / wk+	*563*	2633	47.5	32.9
	≥Once / wk	*202*	2721	48.1	33.4
		p*	0.007	0.008	<0.001
Milk	Never	*95*	2643	47.5	32.9
Products	<Once / wk	*134*	2618	47.6	33.0
@ 18 wks	Once / wk+	*116*	2639	47.6	33.0
	≥Alternate days	*281*	2704	48.0	33.2
		p*	0.03	0.03	0.004
BLOOD NUTRIENT					
Erythrocyte	<360	*171*	2616	47.5	33.0
Folate (ug/l)	-506	*171*	2637	47.7	32.9
	≥506	*172*	2727	48.1	33.3
		p*	<0.0001	0.02	0.03
Serum	<4	*254*	2647	47.6	33.0
Vitamin C	-19	*169*	2679	47.8	33.1
(um)	≥19	*146*	2688	47.9	33.1
		p*	0.2	0.05	0.7

Source:(Rao et al. 2001)

Three micronutrients were measured in maternal blood samples: red cell folate, serum vitamin C and ferritin. Higher red cell folate and vitamin C concentrations were associated with larger neonatal measurements (Table 1.9). These results suggest that micronutrients may be important limiting factors for fetal growth in this community, and that the quality, not just the quantity, of the mother's diet is important for fetal growth.

1.4.3 Mother to baby relationships (workload)

In the PMNS, maternal physical activity was measured using a specially developed questionnaire. Details of typical daily activities were recorded under three headings: a) resting, b) domestic work, and c) outside work (including farm-work). In the 'resting' section women were asked what time they went to bed and got up, whether and for how long they rested during the day and how much time they spent watching TV. Domestic activities were recorded in simple numeric measures, such as the number of roties they prepared each day, the number of trips to the well, and the number of animals they cared for. Activities involving walking, to the farm or well, were recorded as 'near' or 'far'. Time spent labouring on the farm or elsewhere was recorded in half or full days per week.

Using published data for the energy expenditure of various activities, a weighted score was derived. This score reflected, as a base unit, an activity level of 1 kcal/minute for a 30-minute slot of time. For example, farm labour is listed as expending 3.5 kcal energy per minute; 6 hours of farm work had a score of 3.5 X12 (6 hours X2) = 42. For sleeping and resting activities, different weighting was used to reflect the fact that if a woman spends less time sleeping she is spending more time active. Women were categorised as having a 'low', 'medium' or 'high' energy expenditure by dividing the total scores as closely as possible into thirds (<50, <85 and >85).

90% of women worked 6 full days per week on the farm. 85% women fetched water for the household, making an average of two trips to the well carrying two or more heavy containers per day. In addition, most women cooked twice a day and 18% were still breast-feeding their youngest child. Many women slept for less than 6 hours per

night. Overall, the data revealed that women had a high physical workload, which continued into late pregnancy, and little time for leisure and rest.

Mothers with higher workload scores at 18 and 28 weeks produced babies who were lighter, had smaller head circumferences and lower placental weights. The heaviest babies were born to mothers who had a high prepregnant weight and low workload during pregnancy (Table 1.10).

Table 1.10: Mean birthweight (kg) according to maternal pre-pregnant weight and activity score at 28 weeks

Maternal pre-pregnant weight *(kg)*	Activity score at 28 weeks			
	Low *(N)*	**Medium** *(N)*	**High** *(N)*	**All** *(N)*
<40	**2.614** *(89)*	**2.562** *(87)*	**2.596** *(60)*	**2.590** *(236)*
-45	**2.709** *(73)*	**2.692** *(83)*	**2.611** *(60)*	**2.675** *(216)*
≥45	**2.774** *(55)*	**2.763** *(53)*	**2.697** *(50)*	**2.746** *(158)*
All	**2.687** *(217)*	**2.658** *(223)*	**2.631** *(170)*	**2.661** *(610)*

Source: (Fall and Yajnik, 1997)

1.4.4 Nutritional status of mothers and fathers

The PMNS aimed to study the nutritional status of women and mothers, and only collected limited data on nutritional status of men. In as many households as possible, the height and weight of the woman's husband was recorded. The BMI comparison of young women and their husbands showed that 65% of young women (16-30 yrs) in the study had BMI lower than 18.5, in comparison with only 39% of their husbands (Table1.11).

Table 1.11: Comparison of young wives (16-30 yrs) with their husbands in PMNS (N=587)

Body Mass Index (kg/m^2)	Women *(%)*	Men *(%)*
<16	**66** *(11.2)*	**16** *(2.7)*
-17	**111** *(20.1)*	**64** *(10.9)*
-18.5	**200** *(34.1)*	**151** *(25.7)*
-25	**202** *(34.4)*	**335** *(57.1)*
≥25	**1** *(0.2)*	**21** *(3.6)*

Source: (Fall and Yajnik, 1997)

1.4.5 Conclusions of the PMNS were:

- The nutritional status of women in this rural community was low. Low maternal body mass index and fat mass, and low intake of good quality food, during pregnancy were associated with poor fetal growth in their babies.
- Poor growth in childhood, indicated by maternal short stature and small head circumference were also associated with poor fetal growth.
- Women had a high physical workload from farming and domestic chores. This continued throughout pregnancy. High maternal workload during pregnancy was associated with poorer fetal growth.
- Based on body mass index there was some evidence that the women in this community were less nourished than the men.

The Current Study

1.5 Study Hypothesis

Although poverty plays an important role in the nutritional status of women there are additional social and cultural factors within the Indian rural environment which lower the nutritional status of women.

The PMNS highlighted the problem of maternal and fetal under-nutrition in this area of rural Maharashtra. The Research Centre of the Pune KEM hospital wanted to plan interventions to improve the nutritional status of women in the PMNS area, but wanted additional information on these social and cultural factors.

Study Aim

To identify and explore socio cultural factors to explain the fact that rural Indian women are less-nourished than their male counterparts.

1.5.1 Study population

The 'sampling universe' for this study was one of the villages in the Pune Maternal Nutrition Study. I planned to study all family members of selected households in the study village (discussed Chapter 5). Amongst the selected households, I intended to investigate the young parents (mothers and fathers) as I was interested in women of childbearing age. Secondly, the children in the house because I wanted insight into the nutritional situation of future mothers. Thirdly, the grandparents because the degree of gender bias (if any) in the older generation may influence the way the women of childbearing age are treated within the family.

1.5.2 Study objectives

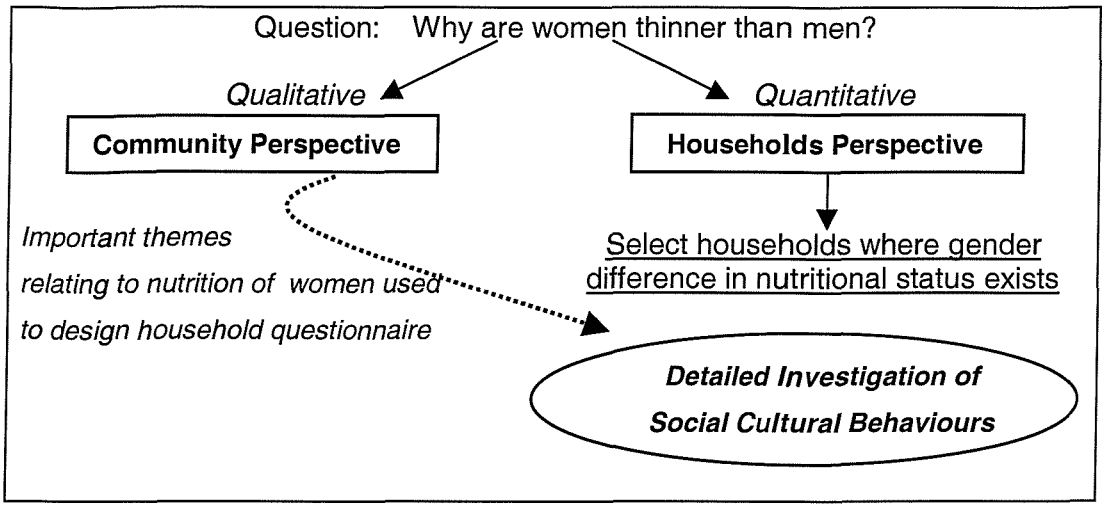
I planned to select qualitative and quantitative method styles to collect data, and to obtain the views of the whole community as well to acquire a picture of behaviour within households. My objectives were to assess factors at both **community** and **household** level as follows:

i. To identify and explore the reasons as perceived by the community itself to account for the lower nutritional status of women in the village.

ii. To locate households within the village where gender differences exist, through an examination of the nutritional status of its members.

iii. To select households, based on their members' nutritional status, and to investigate the differences in behaviour frequencies and patterns of the members of these households.

Figure 1.1: Broad outline to the study



1.6 Overview of Data Collection

1.6.1 At Community level

The situation and events that surround an individual depend upon his or her community which, in turn, determines behaviour. Qualitative methods investigate the research problem from the people's view, they are descriptive and generate community participation. Suitable qualitative methods include participant observation, in-depth interviews and focus group discussions.

I chose to hold focus group discussions. Their major advantage over other methods is that they are an efficient method of establishing the views of a community. A focus group is a discussion-based interview held with a small group of people usually in their own surroundings. The researcher decides on a topic or "focus" around which discussion is organised. Focus groups have been widely used in social and behavioural research to gather people's views and perceptions(Bernard, 1995). These have been used for example to investigate beliefs and behaviours regarding diet during pregnancy in rural Gujarat (SEWA- Rural Research Team, 1996), and to examine the multiple roles of women in communities in Kenya and Swaziland (Nagwa, 1994). They can provide more in-depth information than face-to-face interviews(Bernard, 1995). Focus group discussions permit participants to talk about

local beliefs and practices without having to admit that they, too, follow them, but at the same time provide a forum in which the information is verified by others. Holding focus groups is also a well-established method of formulating topics for questionnaires and interviews(Millward, 1995). This was important as I intended to use the themes identified in the focus groups to develop the household questionnaire.

The main investigation areas of the focus groups were local beliefs and behaviours influencing diet, workload and health of women, and views regarding the low nutritional status of women.

1.6.2 At Household level

1.6.2.1 Household assessment of nutritional status

At household level, I wanted to assess the nutritional status of its members. Possible methods of assessing nutritional status are:

- Biochemical assessment
- Dietary intake (Macro- and Micro-nutrient)
- Workload and energy balance
- Metabolic rate assessment
- Anthropometry

Laboratory metabolic and biochemical tests are costly and time-consuming. Numerous biochemical tests may need to be examined. There are problems with maintenance of a 'cold chain' for the biochemical samples. Obtaining consent for the collection of biochemical samples may be difficult from healthy people in remote areas.

Dietary information and workload assessment are good methods for developing the nutritional profile of an individual. I carried out a pilot study where dietary and workload data were collected using the already developed methods for PMNS. I was

trained with the PMNS team for food weighment, the recording of dietary intake by 24 hour recall interview, administration of the food frequency questionnaire and a work activity questionnaire. As these methods were developed for women only, I faced the following problems in relation to my own study:

a. While collecting dietary recall and food frequency questionnaire data for children I found that children were not able to give information on diet and activities. I had to rely on information provided by an elder (usually the mother). This was not appropriate as such reporting might not pick up differences between the children in the same household.

b. Assessment of workload for children was difficult, as children often have no idea of the time spent in playing or performing a particular task. The PMNS work activity questionnaire was devised for women and could not be used for men, children or the elderly as they participate in different activities. Finally, there are no standardised energy expenditure standards for children that can be used to convert activities into a scale.

Therefore, for the purpose of this study, I restricted the assessment of nutritional status to anthropometry. There are international protocols and standards that can be used to collect and interpret accurate data. These standards are available for both children and adults.

This phase of data collection was called the 'family survey'. In addition to assessment of the nutritional status of all household members (children, adults and elders) using anthropometry, I also collected information on education, occupation and household's socio-economic background.

1.6.2.2 Selection of households for detailed investigation

The anthropometric data collected for males (fathers, grandfathers and sons) and females (mothers, grandmothers and daughters) for each household was converted into indices of nutritional status. The methods used for the analysis of raw anthropometric data were: body mass index for adults, as it is an age and sex independent score, Z-scores (weight for age, height for age and weight for height) and

skinfold standards for children. International rather than Indian standards were used to assess the nutritional status of children; this was for two major reasons: firstly, it is generally thought that every community has the same growth potential and therefore it is more appropriate to use standards from the best nourished communities. Secondly, there is a risk that Indian standards are 'contaminated' by gender differences – so that Z-scores generated from them would obscure male-female differences within my study population.

Husband and wife (both adult and elderly couples) and siblings (son and daughter) within each household were compared. The selection of households for further investigation was on the basis of nutritional differences between the males and females i.e. households where females were markedly better nourished than the males and vice versa.

1.6.2.3 Detailed survey of selected households

Methods for collecting survey data are self-administered questionnaires, telephone interviews and face-to-face interviews.

I decided to develop a face-to-face questionnaire to be administered by me. Face-to-face interviews provide an opportunity for the respondent to understand the question and if the interviewer senses that the respondent is not answering it fully, he or she can be probed for more complete data. These interviews can be lengthy, perhaps lasting up to 2 hours, and it is difficult to ask a respondent to fill out a lengthy questionnaire on their own. In rural India it is difficult to use a self-administered tool due to high rates of illiteracy. In a face to face interviews, respondents cannot miss out sections of the questionnaire and the researcher knows exactly 'who' has answered the questions (Bernard, 1995). One can use different data collection techniques with the same respondent, as part of the interview can be open-ended and part close-ended. Some of the disadvantages of this method are that these interviews are time-consuming and costly; often time is taken in locating respondents and arranging interviews. To remove interviewer bias, I was blinded to the final selection of the households to be surveyed and they were given to me in a randomised order. This meant that I did not know the nutritional status of individuals in the households.

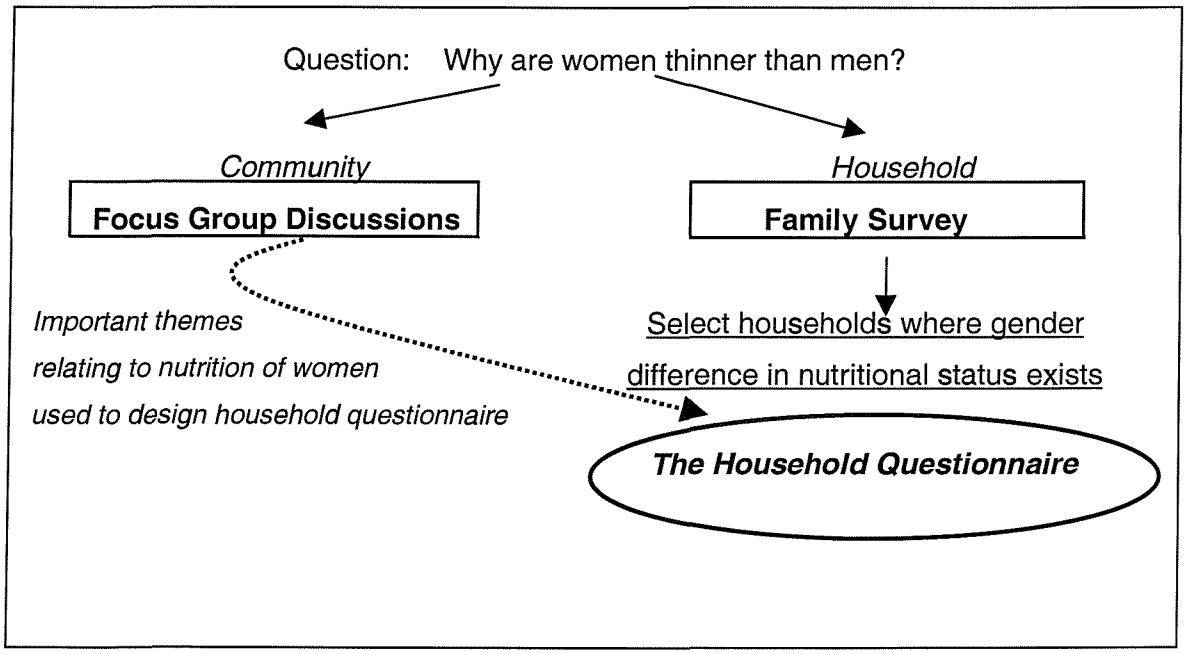
The household questionnaire I developed for my study had questions on the themes that were identified by the focus groups. The questions were both open and close-ended.

1.7 Final Study Plan

The data collection was planned to be carried out in the following three phases:

- focus group discussions to identify key themes relating to nutrition in the community;
- collection of anthropometric data for children (boy-girl pairs), parents and grandparents within households: the family survey;
- selection of a sub-sample of households for a detailed questionnaire exploring themes identified during the focus group discussions.

Figure 1.2: Final outline of the study methods



Chapter 2 Literature Review of Gender and Nutrition in the Indian Sub-continent

Studies from the Indian sub-continent suggest that the nutritional status of women and girls is worse than that of men and boys, and that there is discrimination against women and girls in terms of education and health care and their status within the family.

The government of India conducts Censuses and collects demographic, health and nutrition related information for the whole population. Health indicators are collected by the Sample Registration System (SRS) for providing reliable annual estimates of birth rates, death rates and other fertility and mortality indicators at national and sub-national levels(Office of the Registrar General, 1991). The SRS was initiated by the Office of the Registrar General, India, on a pilot basis in a few selected states in 1964-65. It became fully operational during 1969-70, and thereafter sample size updated after every Census (recently updated in the 1991 Census). The sample unit in rural areas is a village or a segment of it if the village has a population of 1500 or more. In urban areas the sample unit is a census enumeration block with a population ranging from 750 to 1000. At present SRS covers 6671 sample units (4436 rural and 2235 urban) in all the states and union territories of India covering 1.1 million households and a population of about 6 million. The field investigation consists of continuous enumeration of births and deaths by a resident part time enumerator, generally a teacher, followed by an independent survey every six months by an official.

Nutritional status in India is assessed by two governmental organisations - the National Sample Survey Organisation (NSSO) and the National Nutrition Monitoring Bureau (NNMB).

The National Sample Survey Organisation in New Delhi conducts a survey of general household expenditure in order to estimate poverty levels. From data on food expenditure they produce estimates of calories consumed per head. These are compared with calorie requirements set by the Indian Council of Medical Research, to derive the proportion of the population that is under-nourished. This survey is conducted throughout the country and has a large sample size. It is widely used by

national and international agencies to determine household caloric adequacy to estimate protein energy malnutrition. Recent data available from this survey (1993-94) indicates almost 80 percent of rural, and 70 percent of urban population had caloric intakes below the recommended caloric requirement (2400 calories per adult for rural, and 2100 calories per adult for urban areas) (Measham and Chatterjee, 1999).

A disadvantage of the NSSO approach is that this procedure can average out families who may have higher or lower demands than the pre-set calorie norm. For example, the calorie needs of a labourer will not be the same as those of a shop worker. Also, it may obscure differences in food allocation between members of the same family as data is collected at household level. Illness is not accounted for and can further distort the picture for vulnerable groups such as pregnant women and children. NSS questionnaires may even underestimate consumption as they may not capture the diverse components of diet(Swaminathan and Ramachandran, 1999), (Swaminathan and Aiyar, 2000).

The National Nutrition Monitoring Bureau in Hyderabad collects individual dietary intake and anthropometric measurements. Information is collected on the average daily consumption of different types of foods, average daily nutrient intakes and different anthropometric parameters. Approximately fifty seven thousand households are covered for diet and nutrients, and three hundred thousand individuals assessed for nutritional status in these surveys (Krishnaswamy, Vijayaraghavan, et al., 1997). NNMB data have their limitations too. Firstly, quality of data may be compromised by the high turnover of survey staff. Secondly, as data are collected in only ten states the coverage is not as complete as for the NSSO survey. Thirdly, over the years changes in the types of data collected make interpretation difficult. Nevertheless, NNMB data is the only standardised database on the nutritional status of the Indian population.

2.1 Nutritional Status

Studies conducted to measure nutritional status in India have shown a very high prevalence of chronic energy deficiency affecting over half the population in both

rural and urban areas (Ferro-Luzzi et al. 1992), (Monteiro, 1991). Adults and children belonging to affluent groups have weights and heights similar to WHO reference values indicating that racial characteristics cannot explain the lower nutritional status of Indians(WHO, 1995).

Naidu and Rao (1994) have highlighted data from NNMB which show a higher percentage of women in the most undernourished group than that of men at all ages, most marked in the childbearing years (Table 2.1).

Table 2.1: Percentage of CED based on BMI in males and females according to age (yrs)

BMI	20 – 29		30 – 39		40 – 49		50 – 59		≥ 60	
(kg/m^2)	M	F	M	F	M	F	M	F	M	F
<16	6.7	8.6	6.5	11.3	9.1	12.7	11.0	12.0	17.5	20.9
16-18.4	44.8	41.2	39.6	37.9	37.5	34.7	36.7	32.7	35.1	35.5
18.5-24.9	47.9	48.2	51.2	46.9	49.1	45.9	47.3	47.0	43.0	38.3
>25	0.6	2.0	2.7	3.9	4.3	6.7	4.3	8.3	3.4	5.3

Source: (Nadamuni Naidu and Prahlad Rao, 1994)

Further, on comparing the data from two NNMB surveys conducted in 1974-79 and 1988-90, the nutritional status of men has improved more than that of women over the last 15 years (Table 2.2). Indian men and women face the same poverty but males are better nourished, a situation similar reflected in rural Maharashtra as described in chapter one.

Table 2.2: Distribution of chronic energy deficiency in adult Indians on the basis of BMI

Body Mass Index	1975-79		1988-90	
(kg/m^2)	Men (%)	Women (%)	Men(%)	Women(%)
<16.0	11.4	12.7	8.8	11.3
16.0-16.9	14.7	13.2	12.5	12.9
17.0-18.4	29.5	25.9	27.7	25.1
18.5-19.9	22.3	21.9	23.3	20.2
20.0-24.9	19.8	22.9	25.0	26.4
25-29.9	2.1	2.9	2.5	3.6
>30	0.2	0.5	0.2	0.5

Source: (Nadamuni Naidu and Prahlad Rao, 1994)

2.2 Role of Gender in Nutrition

Lesley Doyal has defined gender as women's and men's roles and responsibilities that are determined socially. "Gender is related to how we are perceived and expected to think and act as women and men because of the way society is organised, not because of our biological differences (Doyal, 1997)". There is a large body of literature showing gender bias in Indian communities and the way it affects access not only to food but also to education and health services (Miller, 1996),(Pachauri et al. 1971), (Jaya Rao, 1978). Such bias is commonly found in Asian patriarchal societies and has religious, economic and cultural origins.

India has many religions but the majority of the population is Hindu. Hinduism teaches that a father who does not have a son will not achieve peace (shanti) after death. Sons are supposed to perform the ancestral rites (shraddha) and this role cannot be filled by a daughter as women are not allowed, by religious law, to perform any Vedic rituals. Also, according to the rules laid down by Manu, an ancient Hindu sage from 200 BC "through a son, a man conquers the world, through a son's son he obtains immortality, and through a son's grandson he gains the world of the sun" (Sharma and Khosala, 1997). Some of the Hindu rules prescribe the duties of women: "by a young girl, by a young women or even by an aged one, nothing must be done independently, even in her own house(Desai, 1995)".

In economic terms, girl children are regarded as a net cost to the family (Miller, 1996). Boy children are regarded as assets because of their potential contribution to the family's productivity for the whole of their life (Miller, 1987). In contrast, girl children are expected to get married and move away and hence do not contribute to the family income after marriage. Moreover it costs money to get girls married, as the bridegroom's family often demands dowry. As a result women are regarded as having intrinsically less value than men. Their status in society simply reflects the status of their men-folk on whom they are perceived to be totally dependent. It is said "a woman should obey her father before marriage, her husband during married life, and her son in widowhood" (Arnold, 1997). Srinivas has argued that over the years only a tiny minority of women have benefited from developmental changes in India and

overall the position of Indian women remains subordinate compared to men (Srinivas, 1977).

The following is a discussion of the literature exploring social and cultural biases against women in the Indian sub-continent at each stage of life from birth through adulthood.

2.2.1 Fetal life and birth

The female to male ratio in India according to the 1991 census was 927 females for every 1000 males at all ages (Haq, 1997). This has not improved in recent years and in fact may be worsening. It has gone down consistently from the beginning of this century having been 974 women for every 1000 men in 1901 (The World Bank, 1996). Certain communities in states like Rajasthan and Bihar have the lowest ratio in the world at 660 women for every 1000 men (BMJ, 1999). This is contrary to biological norms and in most societies women outnumber men. In the UK for example, there are 104 women for every 100 men (United Nations, 1995).

There is evidence from India that at least part of this adverse sex ratio is present at birth and is caused by female feticide. Evidence of sex-selective feticide has been documented in a Bombay hospital, which found that 96% of aborted fetuses were female (Ramanamma and Bambawale, 1980). Another study in the Punjab showed that at least 117 boy babies are born to every 100 girls (Sehgal et al. 1990). According to newspaper reports female feticide is practised all over India, and a review of 1981-91 data indicates that female fetus abortions amounted to almost one percent of actual female births in India (Kaur, 1993), (Mudur, 1999), (Chaudhuri, 1998).

To combat sex-selective abortions, the Indian government made antenatal sex-determination tests illegal and introduced the Antenatal Diagnostic Techniques (Regulation and Prevention of Misuse) Act (1994). The implementation of the act has proved difficult and has not stopped this practice spreading across urban and rural India. Non-invasive sex-determination based on ultrasound is easily accessed and openly advertised.

Before these sex-determination tests were available, infanticide, the most extreme form of gender bias, was practiced (Miller, 1996). A well-known Punjabi song sung by the killer Dai (mid-wife) to the newborn girl illustrates how female babies were killed at birth: "Gur kha, puni khat, aap jah, vir noo ghat" meaning "Eat this jaggery, and weave this cotton, you go and please the God and send your brother in your place" (Sehgal et al. 1990). Accurate data on infanticide are lacking, but it has been documented in both northern and southern India. George, Abel and Miller (1992) studied 12 villages in the south Arcot district of Tamil Nadu and found that female infanticide was practised in six. They found that infanticide was highest in the middle-cultivator caste group of Gouder, in families where there was at least one other living daughter, in remote and hilly areas and amongst those with low levels of education (George et al. 1992). Recent data from Primary Health Centres (PHCs) in the same area show that the practice of infanticide has now spread to all caste groups. These data confirm George's findings that the highest rates of female infanticide were in families who already had one or more female children (Chakath and Athreya, 1997).

2.2.2 Childhood

Preference for sons is apparent in differential treatment of sons and daughters in childhood and is blamed for higher mortality rates for girls (D'Souza and Chen, 1980). Das Gupta analysed two studies from Punjab in north India and one from Matlab in Bangladesh. The rapid increase in mortality of girls after the first month suggests differential care and treatment by parents (Table 2.3).

Table 2.3: Infant and child mortality rates by sex in Khanna villages, Punjab and in Matlab area, Bangladesh (deaths per 1000 live births)

		Age at Death *(months)*			
		<1	1-11	12-23	24-59
Khanna Study	**Total**	**47.0**	**38.6**	**13.8**	**10.3**
1965-84	**Males**	**50.7**	**27.1**	**9.4**	**8.2**
	Females	**43.0**	**51.3**	**18.5**	**12.6**
	Male/Female	**1.18**	**0.53**	**0.51**	**0.65**
Matlab Thana	**Total**	**73.0**	**58.2**		
1974-77	**Male/Female**	**1.16**	**0.82**		

Source: (Das Gupta et al. 1995)

As with feticide and infanticide poorer treatment of daughters is particularly seen in families where there is already a daughter. Das Gupta (1987) reported that among Punjabi first born children aged 0-4 years the death rate was higher for boys than for girls as would be expected. However, this ratio was reversed for younger siblings. For second children, the female death rate was higher, and with each successive birth the male/female ratio declined further (Table 2.4). When parents already had a living girl, a second girl was less likely to survive than one born to a family whose firstborn child was boy (Das Gupta, 1987).

Table 2.4: Child mortality between 0-4 years by birth order and sex in Khanna study, Punjab based on all births to women aged 15-49 (deaths per 1,000 live births)

Sex of the child	Birth order *(not disaggregated by sex)*			
	1	2	3	4+
Male	**126.8**	**96.7**	**100.9**	**99.3**
Female	**95.7**	**119.1**	**116.1**	**152.7**
Total	**112.1**	**107.5**	**108.1**	**124.5**
Male/ Female	**1.32**	**0.81**	**0.87**	**0.65**

Source: (Das Gupta, 1987)

2.2.2.1 Nutritional status

Neglect of girls' nutrition begins in infancy. Data on the nutritional status of infants show that female infants are less likely to have normal nutritional status, and more likely to have third degree under-nutrition than male infants (Table 2.5).

Table 2.5: Frequency distribution (%) of boy and girl infants by grades of malnutrition

Indian Cities	Normal		1st degree malnutrition		2nd degree malnutrition		3rd degree malnutrition		Total no. of children	
	M	F	M	F	M	F	M	F	M	F
Bombay	**34.4**	**25.6**	**42.5**	**43.2**	**18.3**	**25.4**	**2.8**	**4.5**	**939**	**851**
Calcutta	**19.6**	**20.3**	**42.7**	**36.9**	**25.0**	**27.5**	**8.2**	**10.6**	**637**	**677**
Madras	**30.1**	**20.4**	**41.7**	**43.8**	**23.0**	**28.3**	**3.1**	**5.7**	**828**	**867**

Source: (Ghosh, 1994)

Levinson (1974) found in a study of a sample of under-fives in Punjab more girls than boys both moderately and severely malnourished (Table 2.6). Over 70% of severely malnourished were girls. This disparity was greatest amongst infants and diminished progressively with age (World Bank, 1991)

Table 2.6: Distribution (%) of boys and girls under 5 years in different grades of malnutrition

Age group	Normal		Mild		Moderate		Severe	
	M	F	M	F	M	F	M	F
Infants	**56.7**	**20.8**	**25.6**	**30.5**	**15.3**	**30.4**	**2.4**	**18.4**
Toddlers	**36.6**	**14.3**	**34.4**	**35.7**	**21.0**	**35.3**	**8.0**	**14.7**
Pre-schoolers	**34.7**	**27.9**	**39.5**	**37.2**	**21.6**	**38.2**	**4.3**	**6.7**
All 0-5's	**69.2**	**30.8**	**56.4**	**43.6**	**43.1**	**56.9**	**28.6**	**71.4**

Source: Levinson,F.J. (1974) Morinda: An economic analysis of malnutrition among young children in rural India, In. (World Bank, 1991)

Studies of the nutritional condition of children below five years of age conducted in a rural district of West Bengal showed systematic sex bias. The sex bias was reflected in the greater prevalence of under-nourishment and lower growth dynamics of girls compared to boys. Interestingly, the study also showed that the village with the overall best nutrition had the sharpest sex discrimination (Sen and Sengupta, 1983).

Chen (1981), describing the Bangladesh's Matlab Food and Nutrition Study of 882 children, found 14% of girls to be severely malnourished as opposed to 5% of boys, and 60% girls to be moderately malnourished as opposed to 55% boys. In the normal and mild malnourishment categories, the proportion of boys exceeded that of girls (Chen et al. 1989).

However official statistics by the National Nutrition Monitoring Bureau do not show sex differentials in childrens' anthropometric nutritional status (Table 2.7) (Krishnaswamy et al. 1997), (Basu, 1993).

Table 2.7: Prevalence (%) of under-nutrition in children 1-5 years

SD classification	Weight for age		Height for age		Weight for height	
	Boys	Girls	Boys	Girls	Boys	Girls
> median	2.6	2.1	4.8	3.7	9.7	12.1
-1SD to median	6.5	8.6	10.9	12.5	26.3	28.9
-2SD to –1SD	26.7	26.5	21.9	20.2	45	44.5
-3SD to –2SD	41.7	36.2	28.9	25.6	16.4	11.9
< -3SD	22.5	26.7	33.5	38	2.6	2.6

Source: (Krishnaswamy et al. 1997)

2.2.2.2 Breast-feeding, weaning and food allocation

Females are breast-fed for a shorter period than their male siblings, and weaned sooner (International Institute of Population Sciences, 1995), (Khan et al. 1989). The recent National Family Health Survey (NFHS) data from all over India showed that boys and girls are on average breast-fed for 25.3 and 23.6 months respectively (International Institute of Population Sciences, 1995). Khan has reported a study conducted by Kumar (1983) in Haryana (northern state), where daughters were weaned to artificial milk sooner than sons (Table 2.8) (Khan et al. 1989).

Table 2.8: Breast feeding pattern differential between boys and girls at the end of the fourth month of life in Haryana (1983)

	Son *(%) n=385*		Daughter *(%) n=282*	
Breast-feeding only	**155**	*(40.2)*	**90**	*(31.9)*
Artificial bottle-feeding only	**55**	*(14.3)*	**65**	*(23.0)*
Both breast and bottle fed	**175**	*(45.5)*	**127**	*(45.0)*

Source:(Khan et al. 1989)

One major reason for weaning girls earlier than boys is that mothers who have girls want to become pregnant again, hoping for a male child. Conversely, women breast-feed their sons longer to prevent further conception (Khan et al. 1989). NFHS (1997) suggested that family size is directly dependent on the number of daughters relative to sons in a household. A couple who have two daughters are twice as likely to have a third child than couples having two sons. In Maharashtra, NFHS showed that the

desire for sons is increasing, and this is reflected in the fertility rate, which has gone up by nearly 15% (Mutharayappa and Choe, 1997). Similarly a Demography and Health Study analysis found that in South Asian countries if a son is born first then family planning measures tend to be adopted, whereas if a daughter is born, parents tend to try for another baby as soon as possible(Arnold, 1997).

Official statistics do not show sex differentials in childrens' food intake. Both the NFHS and the ten state NNMB data show that boys and girls fare equally badly in terms of energy and protein intakes (Table 2.9) (UNICEF, 1990) (International Institute of Population Sciences (IIPS), 1995).

Table 2.9: Comparison of energy and protein intakes of children aged 1-9 years, 1975-80

Age Group	Energy *(kcal/d)*				Protein *(g/d)*			
	Boys		Girls		Boys		Girls	
	Intake	*(RDA)*	Intake	*(RDA)*	Intake	*(RDA)*	Intake	*(RDA)*
1-3 years	**780**	*(1200)*	**773**	*(1050)*	**22.0**	*(23.5)*	**21.9**	*(22.5)*
4-6 years	**1112**	*(1700)*	**1097**	*(1500)*	**31.5**	*(20.0)*	**30.9**	*(28.5)*
7-9 years	**1325**	*(2050)*	**1320**	*(1800)*	**39.0**	*(43.0)*	**36.0**	*(43.0)*

Source:(UNICEF, 1990) (RDA-Recommended Dietary Allowance)

There is a large body of ethnographic literature, however, based on in-depth studies of particular communities which suggests that girls are not fed as well as boys at least in northern India (Chen et al. 1981), (Harriss, 1995), (Miller, 1996).

In Uttar Pradesh, Khan showed that, although there were no differences between sexes in intakes of cereals and vegetables, boys had more high quality foods such as eggs, milk, butter and fruits(Khan et al. 1989). A study in Punjab showed that although caloric intakes for girls and boys were identical, high-quality food such as items containing fat were given to boys while girls were given cereals (Das Gupta, 1987). Again, Behrman (1985) found that there was a nutrient bias in favour of boys in the intra-household allocation of food in Andhra Pradesh and Maharashtra. This unequal distribution had a seasonal dimension. In the lean seasons boys were favoured over girls in the distribution of food in the family, while in the surplus season they were treated equally(Behrman et al. 1995).

2.2.2.3 Work in childhood

Officially, child labour in India is illegal. However this is difficult to enforce and non-compliance is widespread. It is therefore difficult to estimate the number of children in employment. Rural Indian children help their parents in household chores and often take up farming activities too, although there is little recorded information on sex differences in the workload of children. Batliwala quotes from Miller describing how girls of the household rather than their brothers are often kept back from school to help with household chores, take care of younger siblings and sometimes bring in extra income by working as labourers(Batliwala, 1982).

2.2.2.4 Medical treatment and access to care

Disparities in the care of boys and girls are reflected in differences in access to health care. In India, daughters receive less and later medical treatment for common childhood illnesses than sons(Arnold, 1997). It has been argued that the reason for higher female mortality rates in children from Uttar Pradesh is better health care for boys rather than the fact that girls are denied food(Basu, 1989), (International Institute of Population Sciences (IIPS), 1995). Health care discrimination takes two forms. Firstly, boys receive medical attention earlier than girls. Secondly, even after girls have been taken to see a health professional, less money is spent on their treatment and they are less well followed-up.

Kielmann and workers (1983) in the Narangwal study in Punjab established that 64% of boys received medical attention earlier during their terminal illness in comparison to 48% of girls (Kielmann et al. 1983). A hospital study in Ludhiana concluded that gender bias prevented three out of four girls who were ill enough to require hospitalisation from receiving the care they needed(Booth and Verma, 1992). Das Gupta (1987) in Ludhiana district of Punjab found that low-caste girls under the age of three years received less medical care than boys, and that the medical care provided tended to be of poorer quality. These families spent less on medication as well as clothing for girls than on boys (Das Gupta, 1987).

Caldwell, Reddy and Caldwell (1983) found a similar trend in rural Karnataka, where twice as many boys as girls were brought to the primary health center suggesting

preferential treatment for boys. Similarly, Khan (1989) reported that in Krishnapur rural block of Uttar Pradesh, over a one-week period roughly three times as many boys as girls were brought to the primary health centre.

The International Institute of Population Studies (IIPS), Bombay documented that in India in the year 1992-93, 37% of boys compared to 34% of girls were fully vaccinated, and 71% of boys were taken to a health provider or health facility in the event of acute respiratory infection compared to 61% of girls (International Institute of Population Sciences (IIPS), 1995).

In Bangladesh, it was reported that amongst children under five years, rates of illness recorded during field visits did not relate to the rates of hospitalisation even when the treatment and transportation to the hospital was free. The same boy: girl rates of illness were recorded in the field, but there were 66% more boys brought to the hospital than girls (Chen et al. 1989).

2.2.3 Adolescence

As the growing girl child steps into adolescence there are further challenges to her nutritional status. The nutritional demands of menarche and rapid pubertal growth may exacerbate existing under-nourishment.

Sexual maturity brings cultural expectations that may also influence the adolescent girl's nutritional status. Her freedom outside the home is reduced because of fears for her safety and chastity. Early marriage is encouraged to reduce the risk of extra-marital relationships, which might bring dishonour to the family. Since the girl's education is not seen as important it is often stopped early. Thus these actions result in loss of freedom, poor education, early marriage and a further blow to self-confidence and esteem.

A study in rural and urban areas of Delhi in1993 showed that even in educated and well-placed households, adolescent girls are given a secondary position and have lower priority than boys. There is less emphasis put on their education, skill training, employment, health care, and less food is given to them, particularly expensive foodstuffs and delicacies (Kaushik, 1993).

2.2.3.1 Education

The poorer education of girls is reflected in the national literacy rate. In 1991, 64.1% of men were literate compared with only 39.3 % of women (Family Planning Association of India, 1998). The national figures for secondary school enrolment show that 59% of boys were enrolled compared to 38% of girls. Although female education is free in most of the states of India, often the cost of uniform, books and travel makes parents decide to stop a girl's education. Since the girl is not seen as a long term economic asset to the family little may be gained from educating her further. Under-investment in girls' education is reflected in the sudden rise in the 'drop out' rate of girls from school after menarche. After menarche, parents worry about exposure of their girls to older and un-related males (Caldwell et al. 1989).

2.2.3.2 Early marriage and motherhood

Indian women are often married during their teens. Girls below the age of 20 make up a quarter of India's population, and it is estimated that there are 92.7 million girl teenagers between the ages of 15-19 years. 38% of these girls will get married, and 49% of these will have given birth to a child by the age of 20 (Population Reference Bureau, 1996). This may be a worsening problem. A recent study of adolescent girls in rural Hyderabad shows a downward trend in age at menarche from 14.6 years in 1970 to 12.7 years in 1990. Earlier menarche results in earlier marriage, and earlier pregnancy (NNMB- Research Notes, 1990). The pressure for early marriage of girls comes from the need to avoid inappropriate sexual activity by the adolescent girl (Mukhopadhya, 1994).

Adolescent girls are more likely than adult women to deliver low birth weight babies. This is due to the combined effects of shorter maternal height, competition for nutrients between the mother's growth needs and the growth needs of her fetus, and poorer placental function (Scholl et al. 1990). It is also known that adolescents gain less weight during pregnancy, and lose more during lactation (Geervani and Jayashree, 1988).

2.2.3.3 Diet during adolescence

Cultural constraints such as the imposition of chaperoning throughout daily activities restrict the freedom of post-menarcheal girls. These may limit their consumption of seasonal fruits, commercially prepared foods or other important sources of dietary diversity that they may previously have had access to out and about or on the way to school(Leslie and Jamison, 1990).

In an in-depth analysis of three villages of Uttar Pradesh, Khan and workers (1987) found that girls were intentionally fed less by parents to keep them from growing up and achieving maturity. Parents feared that once girls were mature they would have to be married, and parents would have to find the money for the wedding (Khan et al. 1989).

2.2.4 Adult women

It is difficult to segregate adolescence from womanhood in India but womanhood is probably best defined as the post-marriage phase. Nutritional status in adulthood is dependent on a woman's diet and workload as well as her development up to this point.

2.2.4.1 Diet in adulthood

Food is a limited commodity in the average Indian household and the diet in rural Indian homes is based largely on cereals and pulses. Meat and vegetables are accompaniments, and the variety of side dishes is limited. As the table below (Table 2.10) suggests, both adult men and women in rural areas eat less than the Indian Council for Medical Research (ICMR) recommended daily allowance (RDA) of many food items.

Even in households that theoretically have enough food, the way it is distributed may leave women inadequately nourished. The literature records several factors that determine this distribution including the household's land-holding status and specific beliefs and practices.

Table 2.10: Comparison of recommended daily allowance with the actual daily intake (in grams) among the rural Indian population

Foods	RDA	1975	1980	1995
Cereals and millets	**460**	**523**	**533**	**464**
Pulses and legumes	**40**	**32**	**33**	**33**
Green leafy vegetables	**40**	**11**	**14**	**13**
Other vegetables	**60**	**51**	**75**	**40**
Fruits	**10**	**25**	**22**	**NA**
Milk & milk products	**150**	**80**	**88**	**95**
Fats and oils	**20**	**9**	**10**	**13**
Sugar and jaggery	**30**	**19**	**18**	**23**

Source: (NNMB, 1998) (RDA-Recommended Dietary Allowance)

Intra-household food distribution

Marion Kerr (1986) suggests that sexual divisions and power relations within families have an impact on the choice of food for family consumption and on women's theories concerning the food needs of family members(Kerr and Charles, 1986). In traditional Hindu society, the male head of the household is entitled to the largest and the best share of the available food and his wife to the smallest and worst (Indra, 1955 in (Basu et al. 1986)). The established pattern of food allocation is as follows: the men-folk eat first, children (boys first and then girls) next followed by older women and then younger women. Women eat only after the men have finished, and a young wife must allow her mother-in-law to eat first (Gittlesohn, 1991), (Caldwell et al. 1989). Young women may be therefore eating less and lower quality food than others in the same household. This type of discrimination is partially self-inflicted as women themselves accept a subordinate position. A mother will feed her sons at the expense of her own and her daughters' nutritional well being(Ramlingaswami et al. 1997).

Several studies have described how women get a smaller share of the available food. This has been documented in the whole of South Asia(Chen et al. 1981), (Kynch and Sen, 1983), (Pinstrup Andersen, 1995), (Basu et al. 1986), and particularly noted in northern India (Harriss, 1995), (Miller, 1996) and (Jeffery et al. 1989).

Gulati (1978) showed that an average Indian woman's caloric intake on a working day fell short of the ICMR recommended allowances by 20% while a man's fell short by 11%(Gulati, 1978). As she has shown for girls, Das-Gupta (1987) has shown that though women may receive the same amount of calories as men from staple foods, they are often denied micronutrient-rich foods like milk, fruits, treats and snacks(Das Gupta, 1987). Thus the quality as well as the quantity of womens' food may be poorer than that of men.

Differences in food distribution within households have been shown to vary according to the family's land-holding status. Discriminatory practices in nutrition and health-care for women are more common in land-owning families than in the landless. The reason is believed to be that the latter already have a low standard of living with little high quality food to distribute, whereas the former want to favour the son who will inherit the family property and benefit the whole family. It has also been noted that certain castes and regions in India show this bias (Krishnaji, 1987).

Beliefs and practices related to food intake

The nutrition and health 'beliefs' followed by the woman preparing and serving food in a house are likely to affect the foods eaten by herself and other members of the household(Messer, 1997). Hutter (1996) found that in South India, women reduce their food intake during pregnancy as they believe that eating more leaves less growing space in the stomach for the child(Hutter, 1996).

Certain beliefs regarding the appropriateness of 'hot' and 'cold' food items can lead to their decreased consumption at certain times. 'Hot' and 'cold' values are attached to certain food items and as a result the items are avoided or preferred. 'Hot' foods, which include meat are thought to generate heat in the body and are to be avoided in summer months. They are also not recommended for women because they are believed to cause hot temper! 'Cold' foods include curds and cucumber. They are to be avoided in the winter and rainy seasons and during febrile illnesses. There are no restrictions for women on the eating of 'cold' foods. These beliefs are very widely held by Indians in all social classes and all levels of education (Nag, 1994), (Price, 1984), (Uma and Chandrasekhar, 1990), (Mishra et al. 1985).

2.2.4.2 Work

Nutritional status is dependent not only on food intake but also on energy expenditure. In rural India, shortage of energy resources leads to greater dependence on human energy for survival. An average rural woman's daily routine revolves around labour-intensive household chores, for example cooking, gathering firewood, fetching water, washing, and farm work which involves weeding and cultivating the land.

Domestic labour in India, as elsewhere, is given no economic value. Men are respected for the income they generate and women are forgotten for the work they put in at home and on the farm(Merchant and Kurz, 1993), (Batliwala, 1985).

Gulati (1978) found in an agricultural labourer households in Kerala that daily nutritional adequacy was more related to women's than to men's employment. As on days when both the man and his wife were employed, their nutritional shortfalls in terms of calories were 11% and 20%, respectively, while on days on which the woman was unemployed the shortfalls increased to 26% and 50% (Gulati, 1978).

In India, recent 'agrarian transformation' has led to a shift from agriculture to non-agricultural occupations. There has been a decline in the percentage of rural workers' from 84% of the total population in 1972-78 to 78% in 1993-94. This decline is largely due to male workers moving to non-agricultural occupations, while women have remained in agricultural work. Today 58% of all male workers compared to 78% of female workers do agricultural work (Agarwal, 1998). In a study on 291 districts from different states in India showed more women in agriculture where agricultural growth was slower, more coarse grains are grown and land ownership is more unequal(Sen, 1985).

Despite having similar calorie intakes, it has been estimated that when women's physical activity, including field and domestic labour are taken into account, women have a higher daily expenditure of calories than men in the same households(Batliwala, 1982). This heavy work demand in agricultural societies continues when young women bear children. Lal quotes a UNICEF assignment stating that studies have revealed pregnant women working 14-16 hours in a day, and women and girls working longer hours than men and boys (Lal and Sood, 1992). Continued

physical activity until late pregnancy and lack of rest can negatively affect women's health and reduce the growth of her baby (Khan et al. 1989).

Physical constraints and limited access to resources

Restrictions on women's movements, combined with limited access to financial resources within the household may limit her access to medical treatment. Joanne Leslie explains that 'this self-neglect in South Asia appears as women have accepted a self-sacrificing role that dictates meeting their own needs last' (Leslie, 1995). Internalisation of low self-esteem in the Indian culture stems from women having no sphere of their own and no independent livelihood. Women might consider themselves of no intrinsic use, the only reason for their being is to be of service to others. It is ingrained in the mind of every Indian girl that thinking of her own welfare is a grave sin; she should always think of her family.

2.3.5 Variation within India

Differences in gender have been noted in both rural and urban areas, and in the northern and southern regions of India. National statistics reveal that girls have higher mortality rates in infancy and throughout childhood (Table 2.11).

Table 2.11: Infancy and childhood mortality rates of boys and girls in rural and urban India 1989-91 (deaths per 1000 live births)

Age	Rural			Urban			All India		
(years)	Male	Female	M/F ratio	Male	Female	M/F ratio	Male	Female	M/F ratio
0-4	28.9	32.1	0.90	15.6	16.4	0.95	26.3	28.9	0.91
5-9	2.7	3.4	0.81	1.4	1.5	0.94	2.4	3.0	0.82

Source: (The World Bank, 1996)

The male/female ratios are marginally better for urban children and this may be due to more coverage and availability of health care and treatment. A nation-wide survey, the National Family Health Survey (1994) compared nutritional status of children (1-4 years) in different Indian states showed a diverse picture (Table 2.12).

Table 2.12: Percent prevalence of malnutrition among children (1-4 years) in India and selected states, 1992-93

State	Underweight (Weight-for-age below 2SD of the median)			Stunted (Height-for-age below 2SD of the median)			Wasted (Weight-for-height below 2SD of the median)		
	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total
INDIA	**59.9**	**45.2**	**53.1**	**54.1**	**44.8**	**52.0**	**18.0**	**15.8**	**17.5**
South									
Andhra Pradesh	**52.1**	**40.0**	**49.1**	-	-	-	-	-	-
Karnataka			**54.3**	-	-	**47.6**	-	-	**17.4**
Kerala	**30.6**	**22.9**	**28.5**	**29.6**	**21.5**	**27.5**	**11.5**	**12.0**	**11.6**
Tamil Nadu	**52.1**	**37.3**	**46.6**	-	-	-	-	-	-
West									
Gujarat	**45.8**	**40.5**	**44.1**	**44.6**	**41.6**	**43.6**	**20.3**	**16.1**	**18.9**
Maharashtra	**57.5**	**45.5**	**52.6**	**50.8**	**39.1**	**46.0**	**21.5**	**18.3**	**20.2**
North									
Jammu & Kashmir	-	-	**44.5**	-	-	**40.8**	-	-	**14.8**
Himachal Pradesh	**48.3**	**30.2**	**47.0**	-	-	-	-	-	-
North West									
Haryana	**39.4**	**33.0**	**37.9**	**48.0**	**42.4**	**46.7**	**5.7**	**6.4**	**5.9**
Punjab	**47.4**	**40.0**	**45.9**	**40.4**	**38.4**	**40.0**	**21.4**	**14.3**	**19.9**
Bihar	**64.1**	**53.8**	**62.6**	**61.8**	**55.2**	**60.9**	**22.7**	**16.3**	**21.8**
Madhya Pradesh	**59.4**	**50.1**	**57.4**	-	-	-	-	-	-
Rajasthan	**41.1**	**43.9**	**41.6**	**43.0**	**43.5**	**43.1**	**17.7**	**29.1**	**19.5**
Uttar Pradesh	-	-	**49.8**	-	-	**49.2**	-	-	**16.2**
East									
Orissa	-	-	**53.3**	-	-	**48.2**	-	-	**21.3**
West Bengal	-	-	**56.8**	-	-	**43.2**	-	-	**11.9**
Assam	**51.8**	**37.3**	**50.4**	**53.5**	**39.6**	**52.5**	**11.4**	**5.6**	**10.8**

Source: International Institute of Population Sciences: National family health Survey: India, 1992-93, Bombay, 1995, In.(Measham and Chatterjee, 1999)

The children in the north-central states are more malnourished than southern states, especially Kerala, but overall a very high percentage of children are found to be malnourished in India. The different level of nutritional status further highlights the need to investigate the reasons at community level rather than at state level.

Studies in India have documented a north-south divide on the issue of gender differences. Studies show greater gender disparity in north India and traditionally gender bias against girls is considered worst here. Das Gupta and Bhat compared the existing regional differences in India, and showed that the northern states have a higher female child mortality than the southern states (Table 2.13).

Table 2.13: Comparison of male-female death rates, childhood sex ratio and total fertility rate in Indian states

State	Male/Female Age specific death rates (0-4 yrs)		Childhood Sex Ratio (0-6 yrs) Females /1000 Males			Total Fertility Rates		
	1979-81	1990-91	1981	1991	% change '81-91	1981	1991	% change '81-91
INDIA	**0.92**	**0.91**	**962**	**945**	**-1.77**	**4.5**	**3.6**	**20.00**
South								
Andhra Pradesh	**1.14**	**1.06**	**992**	**974**	**-1.81**	**4.0**	**3.0**	**25.00**
Karnataka	**0.92**	**1.10**	**975**	**960**	**-1.54**	**3.6**	**3.1**	**13.89**
Kerala	**1.13**	**1.17**	**970**	**958**	**-1.24**	**2.8**	**1.8**	**35.71**
Tamil Nadu	**1.03**	**1.02**	**967**	**948**	**-1.96**	**3.4**	**2.2**	**35.29**
West								
Gujarat	**0.94**	**0.99**	**947**	**928**	**-2.01**	**4.3**	**3.1**	**27.91**
Maharashtra	**0.88**	**0.92**	**956**	**946**	**-1.05**	**3.6**	**3.0**	**16.67**
East								
Orissa	**0.96**	**0.97**	**995**	**967**	**-2.81**	**4.3**	**3.3**	**23.26**
West Bengal	**1.11**	**0.99**	**981**	**967**	**-1.43**	**4.2**	**3.2**	**23.81**
North								
Haryana	**0.76**	**0.82**	**902**	**879**	**-2.55**	**5.0**	**4.0**	**20.00**
Punjab	**0.81**	**0.76**	**908**	**879**	**-3.63**	**4.0**	**3.1**	**22.50**
Bihar	**0.90**	**0.89**	**981**	**959**	**-2.24**	**5.7**	**4.4**	**22.81**
Madhya Pradesh	**0.88**	**0.90**	**978**	**952**	**-2.66**	**5.2**	**4.6**	**11.54**
Rajasthan	**0.90**	**0.81**	**954**	**916**	**-3.98**	**5.2**	**4.6**	**11.54**
Uttar Pradesh	**0.84**	**0.82**	**935**	**928**	**-0.75**	**5.8**	**5.1**	**12.07**

Source: (Das Gupta and Mari Bhat, 1998)

This regional gender bias against girls has also been documented by Miller (1981), where she explains that female survival is linked to payment of dowry, a practice more prevalent in north than south India. High dowry and marriage expenses were associated with adverse sex ratios(Miller, 1996). However, Dasgupta and Bhat

showed that the childhood sex ratio (female/male) is higher even in southern states in the latest data, a change from tradition (Table 2.13).

They highlighted that this pattern had changed little in the 1991's census despite a marked fall in overall child mortality rates. The states with the highest 0-4 years age specific death rate, West Bengal, Rajasthan, Bihar and Uttar Pradesh were worse than ten years ago, while Karnataka, Andhra Pradesh, Tamil Nadu and Maharashtra show a marginal improvement. During this time period even though the total fertility rates went down, there was an increase in percent change (1981-91) for female/male (0-6 years) sex ratio indicating an increase in gender differential against girls.

2.3 Conclusion

The discussion above describes some of the ways in which Indian culture and society determine behaviours that may influence womens' nutritional status. These behaviours result from the inter-relationships between roles and expectations that have an influence on every aspect of their lives. This review showed:

- Studies conducted to measure nutritional status in India have shown a high prevalence of chronic energy deficiency, with urban/ rural and regional differences, suggesting a need to look at each community individually.

- These studies suggest gender bias against girls and women, but few have been at the community-level in rural Maharashtra. Therefore an assumption that gender bias will be prevalent would only be a premise and not a conclusion.

- With the scarcity of community level findings, research investigating socio-economic factors and their linkages to health and nutritional status will provide an insight into the dynamics that play a role in the study area.

Therefore, I attempted in conducting my study to explore behaviours associated with nutritional status of women with an open mind.

Chapter 3 Study Area

India is a vast and diverse country comprising twenty-eight states, which have markedly contrasting historical, demographic, economic, health, social and cultural aspects.

3.1 Selection of Research Area

The study village of Pabal is situated in Pune district in the state of Maharashtra. It is one of the six villages of the Pune Maternal Nutrition Study, all of which are homogenous in terms of agriculture, and rainfall pattern, and have similar agrarian-based economies. Pabal was selected as it has the largest population (approx. 9,000) providing a large sample for the study.

3.2 Familiarisation with the Research Area

Field research involving exploration of social and cultural factors always brings an element of intrusion. It is essential to involve the people and answer their questions before starting to question them. Rapport building helps obtain people's participation for data-collection and instrument construction. As this study was being conducted in the maternal nutrition study villages, people were already acquainted with the team of researchers visiting their homes and taking food and anthropometric measurements. Still it was necessary for me to introduce myself to the villagers and form a close rapport with the people. This was all the more essential in my study, as I had to visit subjects' homes and needed to be able to interact with them. I started by learning the local dialect *'Gawnthi Marathi'*. I also changed my style of dress and wore an Indian dress *'salwar-kameez'* that was more acceptable than skirts or trousers. I started to wear a black-bead necklace *'mangal sutra'* to indicate that I was married. I wore my hair short prior to starting this study, which was often a cause of concern to the people. I therefore grew my hair and tie it up in a bun. These changes in dress and appearance helped to overcome the initial distance between the people in the village and myself.

For data collection I shifted my residence from the city of Bombay to an outreach hospital near the study area. This gave me the advantage of being able to visit homes in the morning and evenings, before people left for the farm, and after they got back at the end of the day. Most importantly it made me aware of local events, helped in my orientation to village life and helped me to feel comfortable in the study area. I started by making handy maps of the main village and its hamlets to get acquainted with their location and distances from each other. This helped me to recognise the area and its people when I met them in the main village.

3.3 Profile of Maharashtra and Pabal village

The state of Maharashtra is located in the west-central region of India, and is neighboured by Gujarat, Madhya Pradesh, Chhattisgarh, Andhra Pradesh, Karnataka and Goa.

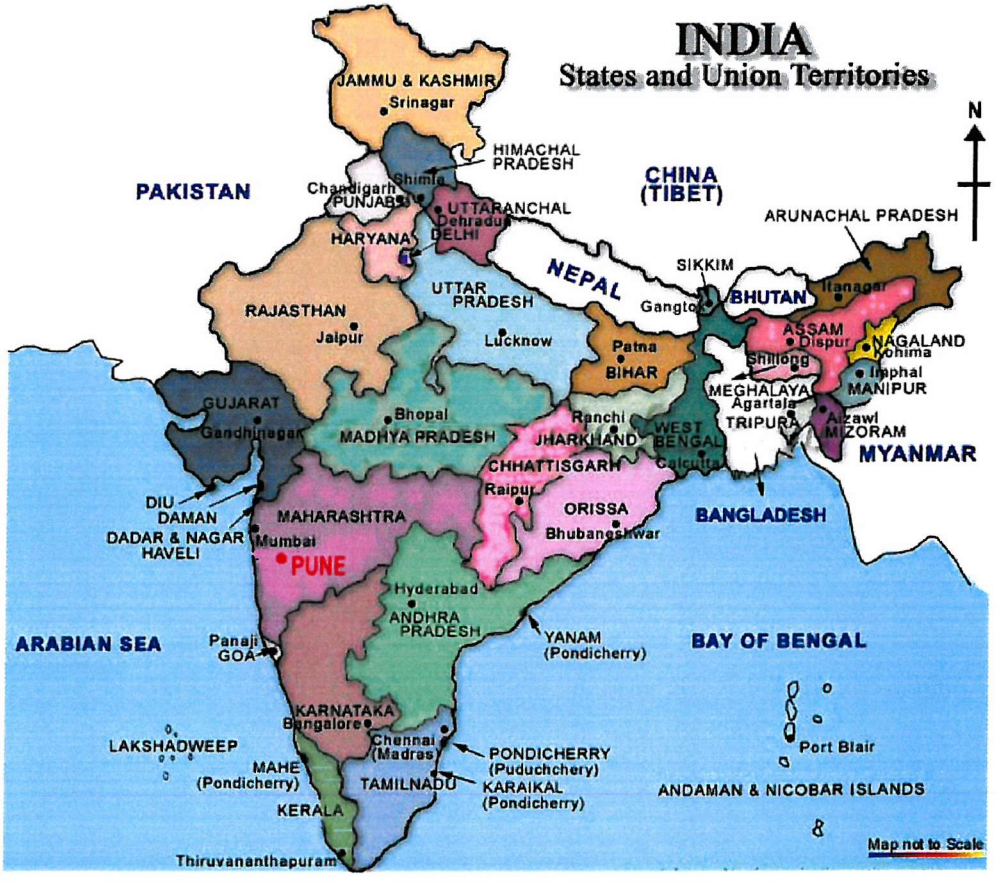


Figure 3.1 Map of India and location of Pune in the state of Maharashtra

Source:(Mapience India Limited, 2001a)

3.3.1 Demographic indicators

In 1991, Maharashtra had a population of 79 million and with 9.4% of the country's land area, it is one of the largest states in India. Its population density of 256 persons per sq.km in 1991, is comparable to that of India (267 per sq.km) as a whole.

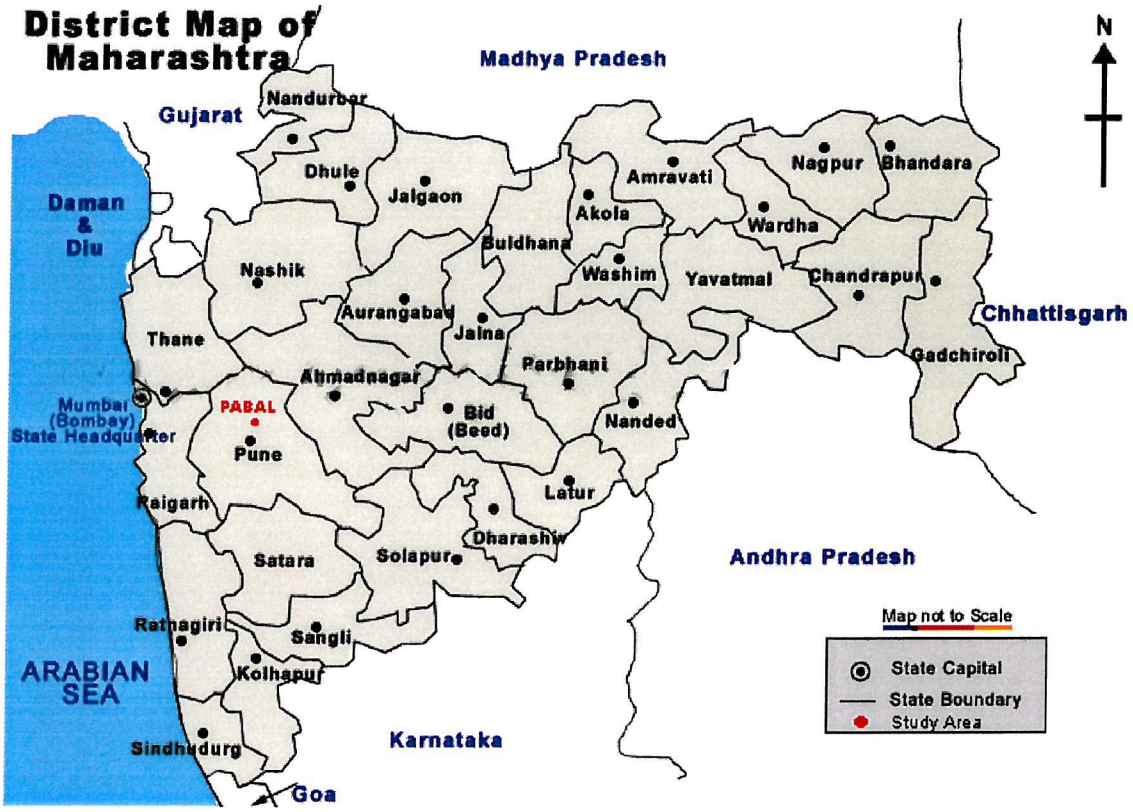


Figure 3.2: Map of Maharashtra and the study area in Pune

Source: (Mapience India Limited, 2001b)

It is considered to be amongst the most progressive states as its economy is divided between agriculture and industry, with the latter developing faster.

The state is divided into thirty districts, of which Pune is one. Pune lies inland from the Western Ghats, a range of mountains, which lie along the western coast stretching from Maharashtra to Kerala. The Western Ghats rain-shadow this region making it drought prone.

Pabal village is located in the Sirur sub-division of Pune district, and lies about 51 kms from Pune the nearest city. Ecologically, Pabal has a rugged landscape with a number of hills surrounding it. Farming is the main occupation; the terrain for farming

is mostly dry non-irrigated land and is rain-fed only during the monsoons from June to August.

Pabal comprises a main village area or ***gaothan*** and 27 neighbouring hamlets or ***wadi's*** and ***wasti's.*** The entire village population was surveyed in 1991 as a part of the national census. It had a population of 8,300 adults with 3,975 males and 4,023 females. There were then 1,271 children aged 0-6 years (638 boys and 633 girls).

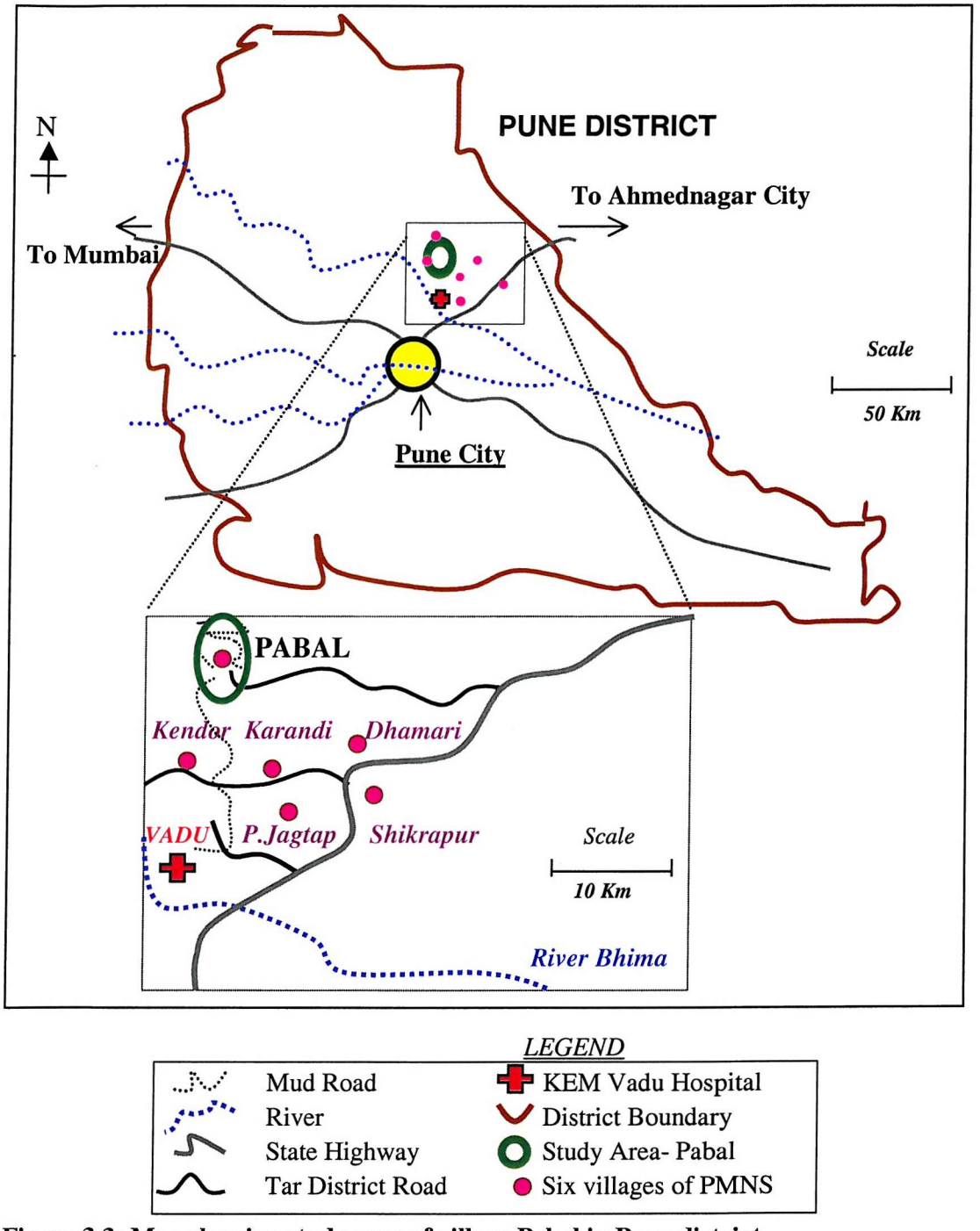


Figure 3.3: Map showing study area of village Pabal in Pune district

The main village is accessible by state transport bus, but the hamlets can only be reached by bicycle or on foot. It is possible to hire a jeep to go from the main village to city, but this expensive service is used only in times of emergency.

3.3.2 Historical origins

The name Maharashtra first appeared in a 7th century AD inscription and in a Chinese Traveller's account. Its name may have originated from *rathi*, meaning "chariot driver", referring to builders and drivers of chariots who formed a *maharathi*, a "fighting force."

The State is well known because of its great Hindu warrior community (Marathas) who fought the Moghuls and later the British. The Moghuls in alliance with southern Muslim powers like Nizamshahi, Adilshahi, and Qutubshahi established their rule in this region. One of them, Nizamshahi was located in Ahmednagar, a town 95 miles east of Pune. Maloji Bhosle, Grandfather of Shivaji (see below) served for the Nizam (king of the Deccan Muslim Empire) as a Sardar (head of solders). In 1595, Bahadur Nizam II honoured him as 'Raja' for his courage in a battle with Moghuls and gave him the estates of Pune and the fort of Chakan, near Pune. This is considered the starting point of Maratha history.

Shivaji Bhosle (1627-1680), founder of the Maratha Empire, was born in 1627, in the fort of Shivneri, 40 miles north of Pune. Under Shivaji the Marathas fought to stop the Moghuls entering the region and eventually established an empire that extended almost as far north as Delhi. The Maratha Peshwe dynasty (1712-1818) continued his rule. In 1802, the dying Peshwa signed the treaty of Bassein with the British. This essentially ended Peshwai, establishing British supremacy in the region. The capturing of the Ahmednagar fort in 1803, led to British rule in the Deccan. In 1804, General Wellesly proclaimed in the Deccan a state of emergency and established military rule and the Peshwas remained rulers only in name. The British developed Pune City and ruled Maharashtra from 1818 till 1947.

Pabal village is one of the oldest villages in Pune district and played its own part in establishing the importance of the Maratha Empire. Pabal was the sub-divisional government head-quarters until 1867, and the nearby town of Sirur later became the

head-quarters for the sub-division of Pune district. History documents that the second Peshwa Bajirao Balaji (1721-1740) granted this area to his favourite mistress "Mastani". She was a Muslim and is said to have been captured by Chimanaji Appa in northern India and presented to Bajirao (Government of India, 1992). The history of Pune documents Mastani as an extremely beautiful dancing girl who seduced their king. Mastani was given the area of Pabal as her estate and was later buried at a mosque situated north of Pabal. Today, the tomb called 'Mastani-ka-wada' is in ruins and her grave is the only sign of her existence. Only a handful of Muslim families remain in the main Pabal village.

3.3.3 Economic indicators

Modern Maharashtra, in comparison to other Indian states, has a high index of economic development and the highest per capita bank deposits (Table 3.1). This could be due to the high percentage of urban population (38.73% in 1991).

Table 3.1: Comparison of five states with index of economic development, infrastructure, per capita bank deposit and percentage of urban population

1991	India	Maharashtra	Bihar	Kerala	Madhya Pradesh	Punjab
Index of economic development	**100**	**119**	**48**	**105**	**68**	**213**
Index of infrastructure	**100**	**112**	**96**	**140**	**72**	**214**
Per capita bank deposits (Rs)	**2362**	**4977**	**1081**	**2654**	**1170**	**4565**
Urban Population (%)	**25.7**	**38.7**	**13.2**	**26.4**	**23.2**	**29.7**

Source: (George and Nandraj, 1992)

Development in rural Maharashtra has been far less than in the urban areas. The infra-structural development of rural areas is reflected in the percentage of villages connected by all weather roads. Maharashtra is a distant third with 53% while Kerala with 100% and Punjab with 99% are the front runners. Food crop cultivation and the percentage of irrigated land area are smaller than in other states. On the other hand, like Kerala and Punjab, 100% of Maharashtra's villages are electrified (Table 3.2).

Table 3.2: Comparison of electrification, accessibility to villages and crop cultivation in five Indian states

	India	Maharashtra	Bihar	Kerala	Madhya Pradesh	Punjab
Electrified villages (%) ('91)	**82.7**	**100**	**69**	**100**	**87**	**100**
Villages connected with all weather roads (%) ('87-88)	**41**	**53**	**35**	**100**	**23**	**99**
Food crop cultivation in total area (%) ('86-87)	**71.9**	**68.9**	**90.3**	**24.4**	**79.7**	**76.9**
Irrigated area to total cultivated land (%) ('86-87)	**31.4**	**12.4**	**36.7**	**14.8**	**15.6**	**91.3**

Source: (George and Nandraj, 1992)

In Pabal village the major source of income is agriculture. There are two main cropping seasons- the *Kharif* (rainy season) and the *Rabi* (winter season). Mainly millet including *Jowar* (sorghum) and *Bajra* (pigeon millet) is grown in a biennial-cropping pattern. In addition, groundnut, potato, wheat and pulses are grown as alternatives or as a crop-share variety (grown between two main crops). The land holdings are divided into two types, non-irrigated or dry land and irrigated or wet land. 'Wet' land has round-the-year access to water from an underground water source, usually with an electric or diesel pump. The advantage is that wet land owners can grow more than two crops per year, and especially cash crops like onions, sugarcane and green leafy vegetables. The total farmland available to the village is 3,978 hectares, 1,575 hectares of which are irrigated and 1,377 hectares non-irrigated. The rest is either non-cultivable or left for animal grazing.

Table 3.3: Land share for cultivation of different crops in Pabal (1991)

Crop variety	Irrigated wet land *(hectares)*	Non-irrigated dry land *(hectares)*
Bajra (Pearl Millet)	**125**	**1235**
Jowar (Sorghum)	**65**	**1420**
Bhiumoong (Groundnut)	**12**	**365**
Batata (Potato)	**54**	**NA**
Green leafy vegetables	**12**	**NA**

Source: (Patwari (Village Record Keeper), 1998)

In villages animals are a major economic asset. Bullocks have a significant role for every farmer who owns land, because a pair of bullocks is used for ploughing, for transporting goods in bullock carts, and for entertainment in the prestigious yearly bullock racing competition in the main village. To win this race is a matter of great pride. Some households keep cows and buffaloes to supply milk to the main village 'teashops'. People also rear cows, goats and poultry for domestic use.

In the village, waged labour is largely agricultural, which is especially needed during harvest season. Traditionally, specific caste groups were associated with specific occupations. For example a 'Maratha' would traditionally be a warrior who has now taken up farming as there are no wars. Similarly a 'Sutar' would be a carpenter but who now works on a farm as a labourer. At the time of my data collection the daily wage for a labourer was Rs.30-Rs.50 (£0.43 – 0.71) per day for a woman, and Rs.35-65 (£0.50 – 0.93) per day for a man.

3.3.4 Health indicators

The sex ratio in Maharashtra in 1991 was 936 females per 1,000 males which was similar to the national average of 929 females per 1,000 males. It was better than Punjab (888), Bihar (912), and Madhya Pradesh (932) but lower than Kerala (1040), the only state having more females than males. The crude birth rate in Maharashtra is 27.5 per 1,000 live births and crude death rate of 7.3 per 1000 population (Table 3.4).

On both these indicators Maharashtra fares better than the national average of 29.9 and 9.6 respectively. Life expectancy is 60.6 years compared to the national figure of 55.4 years. The same pattern is repeated in the Infant Mortality Rate (IMR) of 58 per 1,000 live births, the national figure being 80 per 1000 live births, though the rate in rural Maharashtra (64/1000) was much higher than that in urban areas (44/1000).

Table 3.4: Health indicators of five Indian states compared with national figures

		India	Maharashtra	Bihar	Kerala	Madhya Pradesh	Punjab
Annual Birth Rate per 1000 Live births (1987-90)	R	31.5	29.5	33.8	19.0	38.7	28.4
	U	24.4	23.6	24.6	19.3	29.1	25.6
	C	29.9	27.5	32.9	19.0	36.9	27.9
Annual Death Rate per 1000 Population (1987-90)	R	10.4	8.4	11.0	5.9	13.6	8.5
	U	6.7	5.2	6.2	5.8	7.5	5.8
	C	9.6	7.3	10.6	5.9	12.5	7.8
Infant Mortality rate per 1000 Live births (1990)	R	86	64	77	18	119	58
	U	51	44	46	16	61	45
	C	80	58	75	17	111	55
Life Expectancy (in years) 1981-85	C	55.4	60.6	52.8	68.4	51.6	63.1

Source: (George and Nandraj, 1992)R-Rural, U-Urban and C-Combined

The Indian health care system is managed by the central government. It is structured as follows: tertiary care hospitals for specialised treatment in the major cities; then 100 bedded hospitals at the district level; and finally primary health care blocks. The blocks have Primary Health Centres (PHC), each catering to a population of 30,000 with Sub-Centres (SC) catering to 3,000 people. Every PHC has a doctor and a nurse, while the sub-centre only has a male and female 'multi-purpose health worker' (MPHW). Maharashtra has the third highest PHC's to population ratio, with one PHC per 29,243 people (Table 3.5).

Table 3.5: Rural health infrastructure comparison of five Indian states

1992	India	Maharashtra	Bihar	Kerala	Madhya Pradesh	Punjab
Average rural population served by Sub-centre (SC)	4816	5145	5065	4192	4264	4973
Average rural population served by Primary Health Centre (PHC)	27,946	29,243	30,060	23,442	42,967	6923
Maximum Radial distance covered by SC *(km)*	3.04	3.21	1.91	1.52	3.42	2.34
Maximum Radial distance covered by PHC *(km)*	6.67	7.62	4.66	3.59	10.87	2.77

Source: (George and Nandraj, 1992)

It can boast of having achieved the national target of 1 PHC per 30,000 population. The state of Punjab, which has 1 PHC per 6,928 persons and Kerala with 1 PHC per 23,442 come first and second, respectively. The Sub-Centre to population ratio for Maharashtra is 1 per 5,145 persons against the nationally set norm of 1 SC per 3,000 population. People may have further to travel to receive healthcare than in other states. The maximum radial distance covered by PHC's in Maharashtra is as high as 7.62 kms, compared to 3.59 kms in Kerala and 2.77 kms in Punjab. The same distance for SC's is Maharashtra is 3.21 kms as against 1.52 kms in Kerala and 2.34 kms in Punjab.

Pabal has a Sub-Centre and the nearest Primary Health Centre is located 7 kms away in the neighbouring village of Kendur while the nearest district hospital is 55 kms away in Pune. In addition to the public health facilities, there are three doctors running private practice in Pabal, two allopathic (western) medicine (MBBS) and one homeopathic (BHMS).

3.3.5 Literacy

In overall literacy rates, Maharashtra has improved between 1981 and 1991, from 54% to 63%. Although the female literacy rate has remained the same at 51%, whilst the male rate has improved to 74% in 1991, still it is higher than the national average of 39%.

Table 3.6 Literacy rate comparison of five Indian states, 1991

1991	India	Maharashtra	Bihar	Kerala	Madhya Pradesh	Punjab
Literacy (%)	**52**	**63**	**39**	**91**	**43**	**57**
Female Literacy (%)	**39**	**51**	**23**	**87**	**28**	**50**

Source: (George and Nandraj, 1992)

In Pabal village there is a high school, located in the main village, and three primary schools, two of which are located in hamlets. There are nine playgroups, called 'balwadis' (for pre-school children) located in the hamlets. The nearest college for graduate studies is 30 kms away.

3.3.6 Social and cultural context

The Local Self-Government or *Gram Panchayat* is the governing body for every village in India. '*Gram*' means a village and '*Panchayat*' means a group of five. Five people would be the elected representatives of the five caste groups prevalent in India. The head of this Panchayat is called 'Sarpanch'.

In Pabal, the first Panchayat was constituted on 12th January 1939. Today, there are 17 members including one woman. The majority of villagers are Hindus, and the major castes present in the village are Marathas and Malis (approx. 85%) with a small percentage of lower caste Chamars and Kumbhars (approx. 10%). There are few upper caste Brahmins and Muslim families.

The village celebrates most of the Hindu festivals and people organise functions after consulting the Hindu astrological charts for that year. The village has six Hindu temples spread in different hamlets.

3.3.6.1 Types of household and family

The basic social unit of the Maharashtrian village is the family or 'kutumbha', led by the head of the household or 'Kutumbha Pramukh'. The family is distinguished from a household, the former constituting a social unit on the basis of blood ties. Most of the families are patriarchal.

Families are either 'nuclear', 'extended' or 'joint'. A nuclear family constitutes a husband and wife living with their unmarried children. An extended family has two married or unmarried siblings living together with their unmarried children. A joint family consists of one or two parents living with their sons and their wives and children. Occasionally, the family may comprise a married daughter's child staying with her parents.

Traditionally most families in Pabal were joint families. The family classification in the village is very dynamic as a joint family may break up into a nuclear one and a nuclear family may become joint, when sons marry.

3.3.6.2 Type of houses and settlement structure

Pabal has mostly old and some new style houses. The old style houses consist of mud brick construction with a tile roof for the main house and a thatched verandha. The walls and flooring are of mud plaster and cow dung. The neo-style houses have asbestos sheets or concrete-flat roofs with brick walls. The open compounds outside the house are used to sit and meet friends. None of the houses have a toilet attached. Except for houses in the main village which have a water supply direct to the house or close by outside in the lane, most households have to rely on fetching water from the nearby well. There is a weekly open market in Pabal every Friday. This is the focus of public activity as villagers from the hamlets come to sell their produce.

3.3.6.3 Rural Maharashtrian diet

The rural Maharashtrian diet, traditionally, as well as in present day Pabal, is based on the consumption of two millet staples, Bajra and Jowar. The mid-morning and evening meals consist of a millet roti *'Bhakari'* served with an accompaniment, usually a seasonal vegetable, a pulse curry or chilli-groundnut-garlic chutney. A little variety is provided with wheat roti and rice. Animal protein in the diet comes from milk, which is often eaten with a *Bhakari.* Mutton, chicken, eggs and fish are rarely eaten and are seen as special dishes for occasions like weddings and birthday celebrations. Meat products are not to be cooked on a religious festival days or in the month of Shravana (in August). On festival days, the food is richer in fat and sugar with a special dish of Puranpoli, Amti (a wheat-pulse preparation) and a sweetmeat. As snacks the villagers eat potato crisps *'batata-keiss'*, sago-potato cake *'sabodanavada'* or *'pohe'* a preparation made with rice flakes, potato and groundnut.

Chapter 4 Focus Group Discussions on Community Beliefs about the Thinness of Young Women

The first stage of this study was to run focus group discussions to identify the social and cultural behaviours that the community believed might affect the nutritional status of young women in this area.

4.1 Aims of Focus Group Discussions

- To identify and explore local beliefs and behaviours which might influence the diet, workload, and health of women.
- To discover the reasons the community believed gave rise to women being thinner than men.

4.2 Method

A focus group consists of a small group of participants, guided by a moderator. The participants are encouraged to talk spontaneously on themes considered relevant to the investigation(Bernard, 1995). The discussion should provide a relaxed, supportive and interactive situation that stimulates memories and feelings, and encourages free expression of opinions. It is usually tape-recorded and later systematically analysed. Planning is essential, as discussions differ in the content, procedure, participants and environment in which they take place. Methodological considerations include the selection of questions for discussion, selection and training of people to organise the discussions, the selection of participants, the choice of location, time and duration and method of analysis.

The first step is to lay out the '***question route***'. This describes the questions around which the discussion will focus, and the order in which they will be asked. The specific questions for my study were derived from the literature review, followed by discussion with nutritionists, epidemiologists, and social scientists in this field, and from the results of my own pilot data.

The ***question route*** had five broad areas of enquiry. These were as follows:

a. family structure, hierarchy and decision making within the household, including issues such as who makes the decisions about purchasing food and selling crops, who does the cooking and allocation of food, who eats first and the order in which different family members eat or are served; the advantages and disadvantages of joint and nuclear family types;

b. health care sought and provided for the children; differences in access to treatment for boys and girls; how access to treatment has changed from past to present in this community;

c. changes in diet and workload after marriage for young women; how the community selects a daughter-in-law and the qualities taken into consideration; preference and avoidance of certain foods during pregnancy;

d. fasting, exploring what type and frequency of fasting is followed; reasons for fasting, when fasting begins, and differences in fasting between men and women;

e. perceptions regarding the thinness of young women; how the community identifies this as a problem; factors responsible for the lower nutritional status of women and how they can be resolved.

Appendix A 1 shows the detailed question route used in the discussions.

4.3 Training and Selection of Organisers

I received training on how to conduct a focus group discussion during a course on methodology at the Department of Social Statistics, University of Southampton, UK. Training is essential to standardise techniques and ensure consistency in the way data is collected.

I learnt how to handle difficult situations which could arise, such as how to remain focused on the question route when the discussion starts to wander, how not to put answers into people's mouths, and techniques to limit the role of dominant

participants and increase the contribution of others. It is vital to have a team, which in my case included a moderator, observer and community health worker.

4.3.1 The role of the moderator

I acted as moderator for all my focus group discussions. I started each discussion by welcoming the group, introducing myself and the observer, thanking them for giving me their time, and giving an estimate of how long the session would last. I explained that this discussion was a part of my research study and was intended to gather information about the views, norms and behaviour of the people in this village in respect of their diet and workload.

I also emphasised that as everyone's views were important, one person should talk at a time and everyone would be given the opportunity to talk. This was essential as I was relying on audiocassette recording and if two people spoke together it would be difficult to interpret. Permission to record the discussion was gained by explaining that it was difficult for the observer to note down every spoken word. The participants were reassured that their identities would remain anonymous in any subsequent written reports.

4.3.2 The role of the observer

An experienced observer is essential, to record non-verbal observations. I consulted other people who did research in this region and found a suitable person who could act as observer. Her role in the discussions was explained to each group. The themes were communicated to her prior to the discussion to enable her to identify and note relevant points arising in the discussion. She also helped me to interpret the audio recording in spoken Marathi and transcribe it into written Marathi and then into English.

4.3.3 The role of the community health worker

My community health worker had worked on the Pune Maternal Nutrition Study. She was a young woman educated to secondary standard and lived in Pabal village. She

was familiar with all the local hamlets, and it was her responsibility to let the participants know about the focus group discussion by visiting them at home the preceding day. In the absence of telephones, she was an essential means of communication.

On the day of the discussion, she would accompany the observer and myself and help in gathering the participants. Since she was local, people easily agreed to attend. On the other hand she was excluded from the discussions themselves, since being local, she might have inhibited the group from speaking freely. She also performed the valuable duty of looking after the participants' children and preventing interruptions during discussions.

4.4 Selection of Participants and the Location

Focus groups are more productive if the participants are selected so that there is relative homogeneity in terms of gender, age, social and economic status. For this study setting, homogeneous groups of grandfathers, grandmothers, young fathers and young mothers were created to encourage free discussion. Heterogeneous groups containing for example a mixture of the mothers-in-law and daughters-in-law, might inhibit free expression. Ideally, participants should not be known to each other but in my study situation this was impossible.

People with grandchildren aged 10 years or less were chosen to represent grandfathers and grandmothers. Similarly young fathers and mothers were defined as parents of children under ten. The size of a focus group is important. A large group can be difficult to manage, whereas a very small group might not generate enough discussion. Six to ten participants in each group seemed to be a manageable size and gave an opportunity for everyone to speak and for discussion to be generated.

I initially planned to limit the focus group discussions to people who were in my selected study families (see chapter five) and asked them to attend the discussions in the health sub-centre in Pabal village. This proved to be impractical because my families were spread out and could not travel long distances to attend a 'common' focus group discussion.

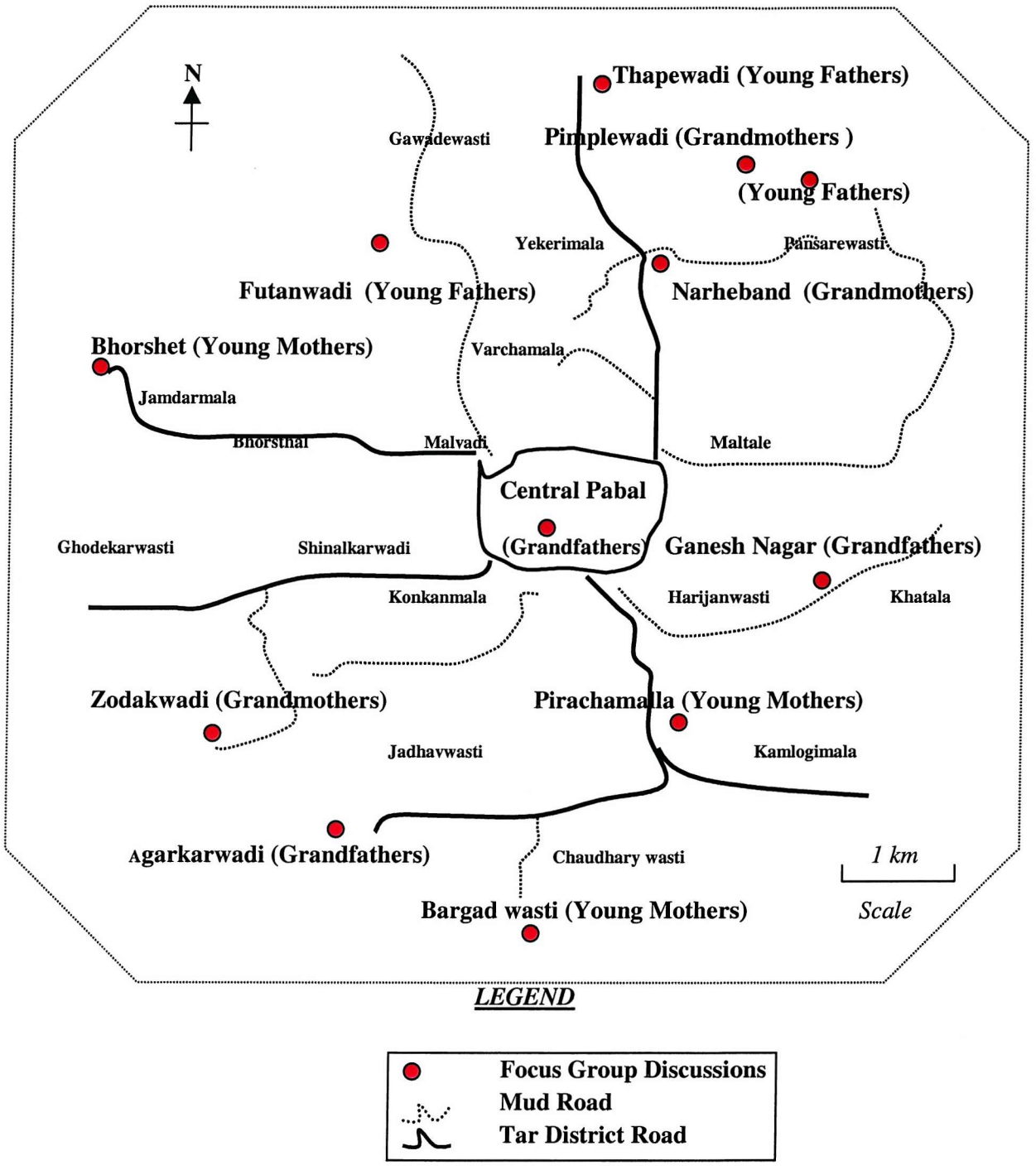


Figure 4.1 Location of the focus group discussions held in Pabal village

I therefore held 12 discussions in 11 different hamlets from March to June 1998. The number of discussion groups was limited by the convention that no more discussions need to be undertaken when responses begin to re-occur. The focus groups were held in local balwadi's or pre-schools and in people's homes (front verandhas) (Table 4.1).

Table 4.1: Focus group participant details

YOUNG MOTHERS	GRAND MOTHERS
1 Hamlet name: Bhorshet Date: 15th March 1998, Evening Location: Front room of one of the houses. Participants: 8	1 Hamlet name: Narhebend Date: 23rd March 1998, Mid-morning Location: Primary school verandha. Participants: 9
2 Hamlet name: Bargad Wasti Date: 20th June 1998, Evening Location: Open courtyard outside the house. Participants: 6	2 Hamlet name: Pimplewadi Date: 21st June 1998, Mid-morning Location: Primary school verandha. Participants: 5
3 Hamlet name: Pirachamalla Date: 23rd June 1998, Late Evening Location: Front room of one of the houses. Participants: 8	3 Hamlet name: Zodakwadi Date: 8th July 1998, Morning Location: Large room used as a Balwadi. Participants: 9

YOUNG FATHERS	GRAND FATHERS
1 Hamlet name: Futanwadi Date: 21st March 1998, Late evening Location: Primary school verandha. Participants: 10	1 Hamlet name: Central Pabal Date: 16th March 1998, Afternoon Location: Village Health Sub-centre. Participants: 10
2 Hamlet name: Pimplewadi Date: 21st June 1998, Evening Location: Primary school verandha. Participants: 6	2 Hamlet name: Agarkarwadi Date: 22nd June 1998, Evening Location: Open courtyard outside the house. Participants: 7
3 Hamlet name: Thapewadi Date: 24th June 1998, Late evening Location: Primary school classroom. Participants: 6	3 Hamlet name: Ganesh Nagar Date: 11th July 1998, Evening Location: Open courtyard outside the house. Participants: 5

Focus group discussion with young fathers

Focus group discussion with grandmothers (Photo courtesy: Dr. Mary Barker)

Focus group discussion with grandfathers

Focus group discussion with young mothers

4.4.1 Pilot focus group discussion

The focus group discussions were piloted in two villages, Amti and Pimple Jagtap, near my study area but not in the study village itself. This was done to test the appropriateness of the questions, to establish whether the participants understood them, and how long the discussion would take. The format and wording of some questions were altered as a result.

I had planned to hold the discussions either in the early morning or late evening as the participants leave for the farm early and return late. Eventually, most of the discussions were held in the evening as the participants were more relaxed and had nowhere that they needed to rush to.

The participants were told how long the discussion would take and were advised to finish urgent chores before attending the discussion. Each discussion was planned to take one hour but invariably took half an hour longer. It was not fair to keep the participants away from their daily chores for more time, especially as the women had to prepare evening meals, a task that was difficult after daylight had faded.

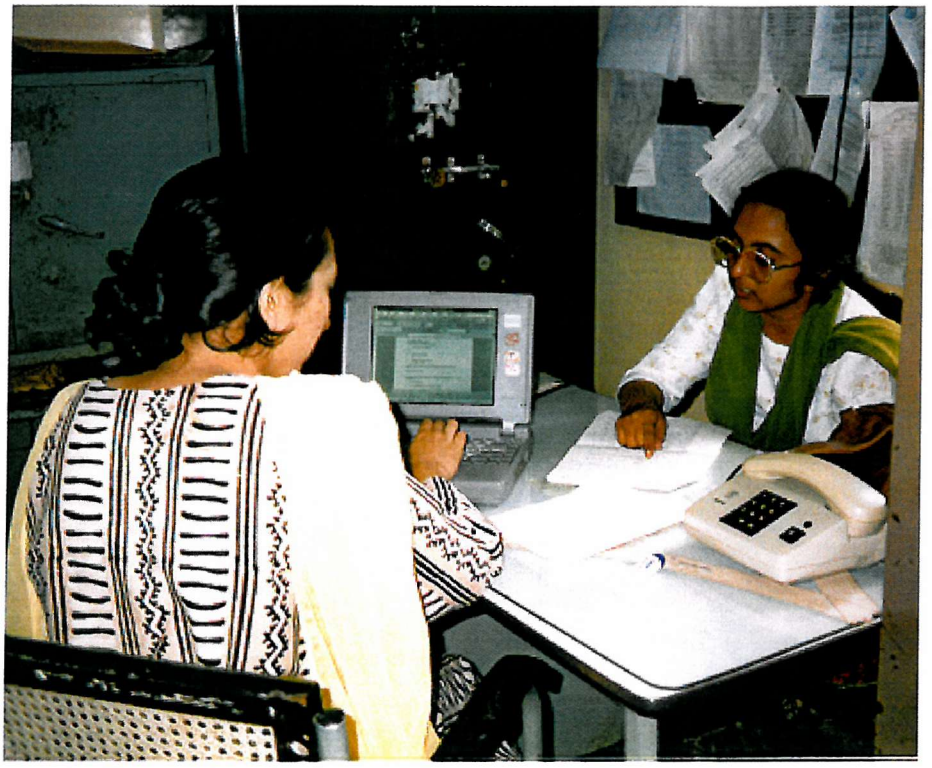
Extended discussion on topics occurred spontaneously and often pre-empted other questions from the question route. At such points it was better to let the group talk than to interrupt and risk losing important points.

4.5 Data Analysis

Data analysis took place in a series of steps as follows:

4.5.1 Translation and transcription

The discussions were conducted in the local language 'Marathi' and recorded on audiotape. Tapes were transcribed on the day after the discussion. The notes taken by the observer during the discussion were used to supplement the tape recordings, especially when more than one person had spoken at the same time. It took approximately two hours to transcribe each tape. The Marathi script was then translated into English by myself and the observer.



Typing the translated script of focus group discussion with the observer (Photo courtesy: Dr. Mary Barker)

4.5.2 Thematic analysis of transcripts

The English transcripts were then sorted and labelled. Each transcript was broken down into sections that related to each of the issues on the question route. A document was produced containing the comments and views of the young mothers in response to each question raised in the discussions. Similar documents were produced for the young fathers, the grandmothers, and the grandfathers. This was done for convenience, as in the past it has proved easier to collate the viewpoints of the four different groups separately(Miles and Huberman, 1994). The second stage involved summarising and comparing the views of all four groups of people on each question asked in the discussion. Finally, five broad themes in the participants' responses were identified. Each of these themes related to a role taken by women that participants believed caused them to be thin. Results are presented as they bear on each of the five themes.

4.6 Results

4.6.1. Theme I: Young women as a burden

Parents of young women perceived them to be a burden. All the participants were in agreement saying that the main problem was the increasing cost of getting daughters married. Marriage of a daughter often forced parents to take out loans to fund the wedding ceremony and dowry. One of the grandmothers said:

> ***"Because of dowry system everyone wants only sons. Daughters are a burden."***
>
> *(Grandmother, Narhebend)*

Grandparents said that previously there had been 'bride price' rather than dowry. The difference between 'dowry' and 'bride price' was that, in 'dowry', the bride's family gave cash or gold ornaments to the in-laws and incurred the wedding costs, whereas in the 'bride price' system the groom had to pay in cash or kind to the bride's parents for taking the girl to his home. The newer trend towards dowry is expressed clearly in the following:

> ***"I did not give any dowry at the time of my marriage. But I had to give for my daughter's marriage."***
>
> *(Grandmother, Narhebend)*

> ***"When I got married my in-laws gave grains and clothes to my family. Now, the groom needs hoonda (i.e. dowry)."***
>
> *(Grandmother, Zodakwadi)*

> ***"All of us have given hoonda."***
>
> *(Young mother, Bhorshet)*

The participants explained that the burden of having an educated daughter to marry–off was even greater. The more educated the girl was, the bigger her dowry would

have to be as her marriage would have to be arranged with a boy of equal or greater education:

> ***"If there is more education, the boy wants an educated girl and some money. The girl wants a more educated groom. There are few such boys and everyone wants them for their daughters."***
>
> *(Grandmother, Pimplewadi)*

> ***"If the girl is educated then she looks forward to marrying an educated boy, and an educated boy takes more dowry."***
>
> *(Young father, Futanwadi)*

Other types of boys for whom the family could ask a larger dowry were those who owned irrigated land or those who were employees in factories or other businesses. Families of landless labourers or families having little land with no irrigation facilities asked for less dowry.

The young fathers' group commented that village people did recognise that later age of marriage was better for the health of their daughters but needed to get them married earlier because of the risk to family's reputation. Fathers believed that increased access to television was teaching their children about sex earlier than in the past, and might therefore lead them to have sex before marriage. Parents feared that their girls might get pregnant and thus jeopardise the family's name and young fathers felt that this had led to the recent trend for marrying off daughters at a younger age:

> ***"When boys and girls are growing up in village areas it is better to get your daughter married soon as it does not spoil the family name (in case if she gets pregnant)"***
>
> *(Young fathers', Thapewadi)*

There were other reasons for wanting sons. The young fathers gave the clearest explanation for their desire for sons and also said that wanting a son did not necessarily mean they hated their daughters:

PARTICIPANT: ***"There is no difference in treatment of a son and a daughter. Though everyone does want a son."***

MODERATOR: ***Why does everyone want a son?***

PARTICIPANT: ***"For the sake of inheritance."***

PARTICIPANT: ***"He will take care of father's farm and family, and perform the funeral rites as they have to be done by a son. Girls go to the husband's home and the name of the father vanishes, whereas with a son the father's name continues."***

PARTICIPANT: ***"Also, the son-in-law will have no affinity for our land and most likely he will sell it. No one will even remember a man if he has no son."***

PARTICIPANT: ***"The son takes care of his parents in old age. The daughters will remain in the in-laws' home."***

MODERATOR: ***Then do people favour sons over daughters?***

PARTICIPANT: ***"It is not like that. If one has three girls and then a boy, one tends to treat him to whatever he wants but one does not start hating the girls."***

(Young fathers', Pimplewadi)

When participants were asked about differences in the health care they provided for their sons and daughters, they were quite emphatic that they treated sons and daughters equally. A question about medical care received the following response:

"Same as sons, we do not believe in differences between sons and daughters."

(Grandmother, Narhebend)

"We do the same, take her to the doctor. We don't show any difference in care seeking for sons and daughters."

(Young mother, Bhorshet)

"No it is not like that, both are the same. One spends the same amount. Who says we do not spend on daughters?"

(Grandfathers, Ganesh Nagar)

> ***"The son and daughter come from where? Isn't it the same place (meaning the same womb)? So they are the same. Then why should we differentiate?"***
>
> *(Grandmother, Zodakwadi)*

Participants resented the implication that they loved their daughters less than their sons. There was, however, a suggestion that when time and money were short, daughters might not receive their full share of attention:

> ***"Both are equal. Sometimes one might not get time out of the daily routine and one might get a little delayed in taking her to the doctor."***
>
> *(Young father, Futanwadi)*

> **PARTICIPANT:** ***"In homes, where there are four daughters and one son, parents might fulfil all his (the son's) requirements. For example, he is 'extra cared for', but when it comes to illness treatment there is no difference."***
>
> **MODERATOR:** ***What are the 'extra cared for' things?***
>
> **PARTICIPANT:** ***"What ever he wants is given to him."***
>
> **PARTICIPANT:** ***"If you have one son, then whatever he asks for is given to him."***
>
> **PARTICIPANT:** ***"Even if he ends up spoiling the thing, then parents will buy him more."***
>
> **MODERATOR:** ***What are the things the son wants?***
>
> **PARTICIPANT:** ***"Toys, sweets!"***
>
> *(Grandmothers, Zodakwadi)*

The participants knew that it was possible to have the sex of a baby determined during pregnancy and thought it to be appropriate when a family wanted to have son.

4.6.2 Theme II: Young women as workers

Work occupied the great majority of women's time. All the participants agreed that the women of the house worked the hardest. The young women worked both at home and on the farm:

"Women work hard, they do a lot of house work. Then wake up early, fill up water, and go to the farm. When at home, they are always doing something or the other."

(Grandfathers, Central Pabal)

One of the young fathers in the discussions said:

"They cook, do farm activities, work all day."

(Young father, Thapewadi)

The responsibility for the household chores rested solely with the women. Amongst the women in the house, the mother-in-law and daughter-in-law shared the cooking:

"Our mothers and wives do the cooking, we never help in cooking."

(Young father, Futanwadi)

Some husbands did mention that they occasionally helped by bringing water from the well when their wives had too many chores in hand. The effects of all this work seemed to be that young women had less time to eat and were also sometimes too tired to eat. Both men and women acknowledged this:

"When my husband leaves for the farm and I am still finishing the household work. In a hurry, I tend to eat half a 'bhakri' instead of one so that I can catch him(husband) up in the farm for work."

(Young mother, Bargadwasti)

"They (women) do not eat food on time."

"They often sleep without eating food."

(Grandfathers, Central Pabal)

"When she works too much, her body aches. Then how can she eat well? Food does not go in the stomach."

(Grandmother, Narhebend)

"They work a lot and do not eat on time and then fall sick."

(Young fathers, Pimplewadi)

Alternatively, some men thought that cooking the food and drinking too much tea were the cause of diminished appetite for women. They felt that tea kills one's appetite and today's young women were drinking too many cups of tea, although this tea would often be without any milk and only comprise water, tea leaves and sugar:

"Women drink a lot of tea (often with no milk) and then eat less of 'bhakri'."

"When a women is cooking food, she makes herself a cup of tea. This tea suppresses her appetite and then she does not feel like eating food."

(Young fathers, Futanwadi)

Participants tended to agree that marriage initiated important changes in the working life of a woman. Though the amount of food available in her new home might be no different, there was a drastic increase in work for the young bride. This rise in workload was attributed to the increase in responsibilities borne by the bride. She had to carry out household chores and work on the farm. Participants gave the following accounts:

PARTICIPANT: ***"At her mother's home, if her mother tells her to do work she runs away to play. When her father tells her she just sits and does not listen. If her uncle tells her she answers back that she will not do this work. All this changes when she gets married. She gets anxious and does all the chores of filling water, cleaning the animal shed, cooking, taking care of animals. They feel scared of work."***

MODERATOR: ***Scared of work? Please explain?***

PARTICIPANT: ***"Scared of their father-in-law, that he will say that she does not do any work and just sits at home."***

PARTICIPANT: ***"No one really taunts the daughter-in-law, but she needs to do the work."***

(Grandfathers, Ganesh Nagar)

PARTICIPANT: ***"The workload increases at the in-laws home. One has to clean the clothes, utensils, collect water, clean the shed, and also cook. So the workload increases. Whereas at mother's home, one can do one sort of work and omit the other."***

PARTICIPANT: ***"At mother's home there is less work, as she comes here (at in-laws) she has to immediately take responsibility and do a lot of work."***

(Young mother, Bargadwasti)

If women's food intake were to decrease, participants felt it would be for following reasons:

PARTICIPANT: ***"When you are new the amount you eat decreases as you are shy. If earlier you would eat 'one' then in your new home you would eat 'half'."***

PARTICIPANT: ***When you are at your own parent's home you tend to be more relaxed and eat well."***

(Young mother, Bargadwasti)

A woman's ability to work hard was considered so important that it was a major criterion for the selection of brides. Parents of sons looked for an able-bodied girl who was willing to do work on the farm and do the household chores:

"She should not be disabled and able to work on the farm."

(Grandfather, Central Pabal)

MODERATOR: ***If your son is working in a factory then why do you want a farming girl?***

PARTICIPANT: ***"What happens when the company shuts down or when they visit us. They need to work on the farm."***

(Grandfather, Agarkarwadi)

The participants acknowledged the hardships of the excessive workload on young women and believed that the growth of the dowry system reflected parents' desire to avoid placing their daughters in households where they would be expected to work so hard. Parents wished for a groom who could provide a relaxed and comfortable life for their daughter. For their daughters to have a comfortable life they were ready to pay a price in the form of a 'dowry':

"If the daughter marries in a 'service' household (i.e. the groom has a 'job' in a town or a city) then she has to only do the household chores like cooking, washing but no farming. This means an easy lifestyle with enough sleep. In a farming household she has to work both on the farm and the house."

"We take care that she leads a good life by giving dowry."

(Young fathers, Pimplewadi)

"We feel that even if we have to spend Rs.20,000 then it is worth it, because our daughter will get happiness for life. And if we give her a farming boy then she has to take troubles all her life."

(Grandfather, Ganesh Nagar)

This bargaining for a groom sometimes led the parents of girls to take loans or sell land to procure dowry:

"The father who has more money gets his daughter married with more expense. And then the other fathers, who cannot afford it have to spend in a similar way, which leads to taking loans. This is how the custom begins!"

(Young mother, Bargadwasti)

"One is even prepared to sell one's land to provide a 'hoonda' to improve the life of a daughter."

(Grandfather, Agarkarwadi)

4.6.3 Theme III: Young women as decision makers and consumers

The discussions highlighted the structure of household decision-making dominant in this area. Household decisions regarding purchase of goods and marriage proposals were made by the men, usually the eldest male members of the household. Young women never made decisions for the household. Some respondents felt that young women were incapable of taking any important decision:

"When we go out, women can only give water to the animals. What is to be done outside they do not understand."

(Grandfather, Agarkarwadi)

Men controlled the money and conducted most of the financial dealings, which included paying debts and selling the crops. Women seldom or never had any money themselves, and whenever they needed anything they were expected to ask their men folk:

PARTICIPANT: ***"Why do we need money? We do not go to the market or to the main village. If a vendor comes to the hamlet to sell sari then we might buy one."***

MODERATOR: ***Do women get money regularly to spend?***

PARTICIPANT: ***"No, only children get money to buy sweets. We do service (work) on the farm and we do not need money to get there as we walk down to our work place"***

MODERATOR: ***What do you do with the daily wage earned by you?***

PARTICIPANT: ***"The money is given to the head of the household."***

(Young mother, Pirachamalla)

Another reason women felt they did not need cash was that they did not visit the market. Most of the time, the men did all the household shopping. This practice had

implications for women's diets, as it meant that men had more access to the extra food and snacks available in the village market. It was common practice for men to have a snack in the main village:

"If we go to the main village the expense is on tea and breakfast."

(Grandfather, Agarkarwadi)

"One visit to the village costs Rs.20, I have some snacks and buy tobacco."

(Young father, Thapewadi)

The reason given by men for this expenditure was that when meeting friends one had to offer them tea or snacks, otherwise they would feel insulted:

"If one does not spend on food and tea for a relative or brother-in-law then they feel that you are a miser. He will say that this fellow did not even offer tea. In the village, drinking tea is a valued thing."

(Grandfather, Ganesh Nagar)

One of the grandfathers acknowledged that this opportunity might mean that men had a more varied diet than women did:

"Men folk go to the main village, so end up eating more biscuits, and bhel [1]"

(Grandfather, Central Pabal)

The family structure affected the degree to which women felt they would control their lives. Young women expressed a desire to have a nuclear rather than a joint family despite the fact that women had to work harder to sustain a nuclear household. The reason given was that in a nuclear family the women had a chance to be involved in decision-making:

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[1] Bhel is a local snack made with fried gramflour (noodle like) served with peas, onion, tomato, coriander and greenchilli.

"Today's women feel that even if they work hard in a joint family, no one appreciates it and the returns are not given to them."

(Grandmother Zodakwadi)

In addition and contrary to the young fathers, the young mothers felt that nuclear families were "progressive":

"Also a person progresses when in a nuclear family. He (her husband) gets more involved seriously when one becomes a nuclear family, as he plans what to grow, and thinks about irrigation problems."

(Young mother, Bargadwasti)

"In a nuclear family one can actively take decisions about day to day functioning which cannot be done in a joint family."

(Young mother, Bhorshet)

All except the young mothers favoured a joint family structure. Young fathers favoured joint families as they felt that nuclear families put more responsibility on them:

"Nuclear family life is difficult, as there is more responsibility, and more burden on the man. One cannot roam about as carefree as in joint family"

(Young father, Futanwadi)

Participants felt that the joint family system was slowly giving way to a nuclear family system. In particular, the older generation feared the break-up of a joint family system and tended to blame their daughters-in-law for this change:

"When a new daughter-in-law arrives, soon the house splits."

(Grandmother, Zodakwadi)

4.6.4 Theme IV: Young women's responsibility for the family's health and success

Young women carried the burden of their household's health and improvement. This burden meant that they were often worrying about household chores, the children's health and future, crop failure and unpaid debts. Some felt that this burden and these worries were part of the reason for women's thinness and ill health:

PARTICIPANT: ***"Women do a lot of work. They are always competing that others (women) should not do better on the farm. They compete by working harder and harder for a better crop, to have a better return."***

MODERATOR: ***Do the men not have worries?***

PARTICIPANT: ***"Men do have tension but they don't take it so seriously and try to live with it."***

PARTICIPANT: ***"The wife sometimes ends up taking care of her husband's work also."***

PARTICIPANT: ***"She worries about the loans and debts of the family."***

(Young fathers, Pimplewadi)

Young mothers said:

PARTICIPANT: ***"Worries are all carried by the women. One has to do house and farm work."***

MODERATOR: ***"Don't men have worries?***

PARTICIPANT: ***"Men can discuss it with their friends."***

PARTICIPANT: ***"It is like, right now, I am sitting here in this discussion. But at the back of my mind I am worrying about when to start cooking, which vegetables to make for dinner, when will the children and husband eat? Whereas my husband is still with his friends gossiping away."***

PARTICIPANT: ***"One has to always be doing something, like cleaning utensils, thinking what is to be cooked tomorrow morning."***

(Young mothers, Bargadwasti)

The responses suggested that men might get a chance to resolve their worries through talking to friends whereas the women did not.

Fasting was one way for women to show their concern for the health and improvement of the family. Fasting by young women was a norm, which all women had to follow and which was enforced by the neighbouring women:

"Women keep more fasts in praise of the God and Goddess, for betterment of the family, so that the children grow-up well, for the health of their son. Usually married women keep fasts and unmarried do not."

(Young mother, Bhorshet)

Fasts were days when regular meals were reduced to one meal a day. Men and women both kept fasts although the primary responsibility for fasting rested with the women. Some men clearly fasted in name only:

"Fasting is for name sake, as men keep eating different things on a fasting day."

(Young father, Pimplewadi)

Grandfathers commented on the difference in men's and women's fasting, by pointing out that women drink plain tea without milk at home, whereas men drank tea in the snack bar at the village where it was served with milk. Men also had the opportunity to eat fasting snacks at the village snack bar in a way women did not.

"The difference is that on a fasting day, men go to the village where they can eat 'chirva' [2] and tea. But the women stays at home therefore she does not eat anything extra."

(Young father, Futanwadi)

The grandmothers and the young mothers both felt that today's young women fasted more often than in the past. When asked why, they suggested the following:

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[2] ***Chirva is a fasting snack made out of flaked rice, gram dal, and peanuts.***

"Nowadays, young women can eat 'khichdi'[3] and tea, so they like it and do more fasting."

(Grandmothers, Pimplewadi)

"Some new fasting days have come in the past eight to ten years." "Fasts for 'Goddess Santoshi' on Thursday's, are all new fasts."

(Young mothers, Bargadwasti)

When asked how they thought the worries of young women could be reduced, one of the young mothers suggested that if they could get regular work then they would worry less.

"If we get work everyday. Then what is to worry?"

(Young mother, Bhorshet)

4.6.5 Theme V: Young women as mothers

Discussions suggested that young women were expected to conceive and bear a child in the first year of marriage. The practice of bearing a child so early in married life was known to undermine women's health:

"Nowadays, within a years time one tends to have a child. It is common to see the elder child of eleven months when the second one arrives. It they (young women) will not become thin in this way then what will they be?"

(Grandmother, Pimplewadi)

Once the young bride had proved herself to her new family by having a child, some of the burden on her was lifted:

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[3] ***Khichdi as mentioned here is a fasting food made of sago and potato.***

"She gets pressured by the family and when she has had a child she no longer feels scared."

(Young fathers, Thapewadi)

It was also felt that women should not reduce their workload during pregnancy. Some mothers-in-law advised that work should be continued throughout pregnancy as it eases the labour pains:

MODERATOR: ***What advice do you give to your daughter-in-law during her pregnancy?***

PARTICIPANT: ***"One should work more so that one can have an easy delivery."***

PARTICIPANT: ***"More work helps an easy delivery as there are fewer complications and pains."***

PARTICIPANT: ***"Work helps the veins to get loose and the body is able to relax better during labour"***

(Grandmothers, Narhebend)

With regard to any changes in food consumption, some young mothers said that they ate no differently during pregnancy, vomiting made some women avoid eating and others found it is difficult to eat a full meal:

"No change in food intake or in work. One tends to eat less because of the vomiting."

(Young mother, Pirachamala)

"I cannot eat food during pregnancy. I just tolerate the hunger and lie down."

(Young mother, Bargadwasti)

"During pregnancy, one cannot eat more as 'bhakri' is difficult to eat."

(Grandmother, Pimplewadi)

When asked about diet and the growth of the baby, participants believed that if the mother ate more, the baby would be small in size. The women had mixed views as to whether a big or a small baby was more desirable, but they perceived big babies to cause problems during delivery:

"Eating less helps in giving birth to a larger baby, women who eat more have smaller babies."

(Grandmother, Narhebend)

"One should eat less to have a bigger baby."

(Young mother, Bhorshet)

"Eat well, because if you do not eat well then the child will be big and give trouble during the delivery."

(Grandmother, Pimplewadi)

The groups reported no 'hot' and 'cold' food practices. Also, the women during pregnancy avoided no particular foods.

Thinking about the future, the young women saw themselves in the role of mothers-in-law. They described the daughter-in-law that they would like to have:

PARTICIPANT: ***"Our daughters-in-law must get 'jobs'.***

PARTICIPANT: ***"She could be a teacher, a sewing tailor, she would be like you."***

MODERATOR: ***Do you think if women got 'jobs' they would have better health?***

PARTICIPANT: ***"She will remain happy and that will help her health."***

PARTICIPANT: ***"The farming women is always under fear of someone telling her or scolding her."***

(Young mothers, Bargadwasti)

The young mothers also felt that their daughters having jobs would make them better informed, more confident about their place in society.

4.7 Summary

- Young women were seen as a burden to their parents. This was due to the cost of the wedding that had to be provided for the daughter and the dowry that had to be given to the boy's family. The role daughters play in the parents' life after their marriage was seen to be negligible as they went to the in laws' home after marriage. The parents felt that sons were the ones who took care of ageing parents. Discussions did not reveal any intentional neglect by parents of daughters, though there was a suggestion that they preferred sons.

Woman plastering her house

- Everyone agreed that the women in the household worked the hardest. Participants felt that the rural lifestyle demanded a lot of work from the young women as they end up doing both house and farm work. This overwork sometimes led the women to skip meals due to exhaustion. The parents of young girls of marriageable age acknowledged this fact and tried their best to

find a non-farming groom for their daughter. This was their way of reducing the workload for their daughters.

Women cleaning the grain

Women washing clothes at a common well

- Men in the study area made most of the household decisions. The women seldom kept any cash and almost never participated in the crop selling and

buying. Men were the ones who visited the market and had access to food available in the market. There was a rise in the number of nuclear families reported by the participants. Young women preferred the nuclear family system to the older system of joint families, even though the nuclear family meant increased work for women. The women felt that nuclear families gave them more power to control their lives.

Village tea and snack shop

- Participants felt that women were thin due their constant worrying about their children's futures, unfinished household chores, farming activities and unpaid loans. Women bore the burden of responsibility for their families' health and success. They kept fasts for the improvement of the family. Men were able to deal with their worries by talking things over with friends but the social structure did not exist to enable women to do this.

- The expectation that young women bear a child within the first year of marriage was acknowledged to be a problem for women's health and nutritional status. As mothers, the young women showed concern for their daughter's health and future, and wished for them to get work outside farming.

Chapter 5 Family Survey

5.1 Aims of the Family Survey:

- To measure the nutritional status of children and adults in the study village;
- To determine differences in nutritional status between males and females living in the same households;
- To determine social, economic and family factors which influence nutritional status and the difference in nutritional status between the sexes;
- To select households in which strong gender differences in nutritional status are present, for further in-depth study by a questionnaire (described in chapter six).

5.2 Methods

I first conducted a pilot study in a neighbouring village, collecting information on 10 newly married couples and boy-girl pairs. Initially, I had intended to focus on newly married couples, those at the peak of reproductive activity. However, any comparison of newly married young women with their husbands may be misleading, as the woman's nutritional status would reflect her recent past, i.e. food availability in her parents' home prior to the marriage. I therefore later decided to focus on families with married couples and son and daughter pairs in the age range 3 to 8. Thus I was studying men and women within the reproductive age group, but well past marriage, and also children, as the mothers and fathers of the future. I decided to include any grandparents living within these families, as gender disparities among the elders of the family may have a bearing on the nutritional status of the younger members.

I decided to assess nutritional status by measuring the children's height, weight and triceps and subscapular skinfold thickness. I also measured the height and weight of their parents and grandparents. In addition, I collected social and economic

information relating to the household, parental background data and the children's birth order. Past research findings have shown a relationship between a child's nutritional status and socio-economic factors within the household.

In designing the questionnaire for the family survey, I used a socio-economic data collection form (appendix B 1) previously devised for the Pune Maternal Nutrition Study (PMNS). I did this for two reasons: firstly, this data collection tool was prepared with reference to a standard Indian rural socio-economic assessment method(Trivedi and Pareek, 1964). Secondly, I was interested in individual components of this score as well as these components together and it was possible to do that with this tool. I added some new variables including irrigated and non-irrigated land ownership, cooking oil consumption, fasting days and eating habits such as vegetarianism and non-vegetarianism. Information on the children's birth order and gender order was also recorded.

5.2.1 Team formation

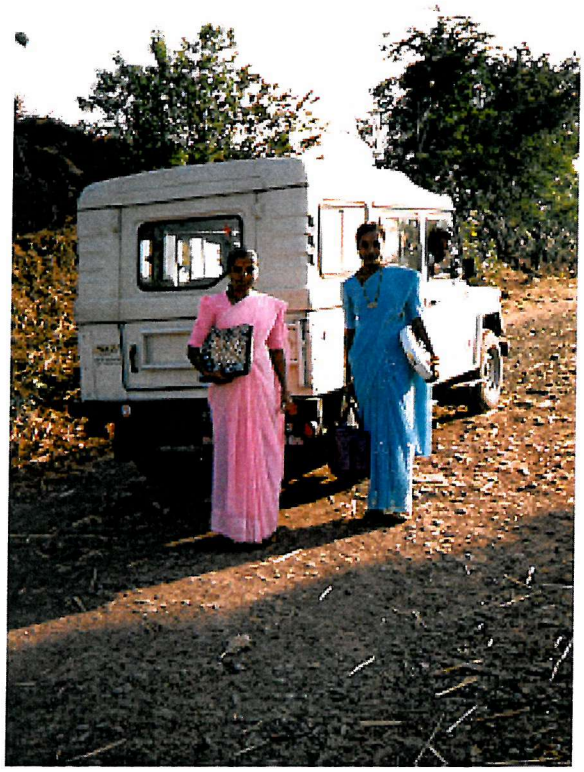
My survey team for data collection included an auxiliary nurse midwife (ANM) and a community health worker (CHW). ANMs are educated up to higher secondary level and have received nursing training for 1 year. A CHW is usually a village girl who has studied up to the eighth standard.

I selected the ANM from the recently concluded PMNS to carry out all the anthropometric measurements. She was already trained for adult anthropometry and I trained her to a strict protocol for measuring children. I had myself attained training in measuring adults and children at the MRC Environmental Epidemiology Unit, Southampton (appendix B 2). After training my ANM, I conducted an inter- and intra-observer variation study with her and myself as observers to check her accuracy and repeatability (appendix B 3).

Essential criteria for selection of the CHW were that she should be familiar with the village and know where everyone lived. Again, a trained CHW from the PMNS, and a native of the study village, was selected; she had helped me in organising and conducting the focus group discussions. She found it easier than me to obtain consent,

and to assure the families that the study would not harm the children, especially as the anthropometric measurements had to be collected from young children. She was retrained briefly during this survey.

A jeep with a driver was also hired who would help the team to visit the study village and its neighbouring hamlets.



My study team: CHW in pink saree, ANM in blue saree and the driver

5.2.2 Identification of subjects and consent from households

The sample subjects were drawn from all houses with a brother and sister pair in the age range (3-8 years) in the village. This age selection was made in order to obtain children in the steady phase of growth between infancy and adolescence, enabling me to compare a brother and sister pair. I used the PMNS household survey database to select these households.

I started by conducting a 'pre-survey' to find the present status of the siblings and household, listed in the PMNS database, to check the age and date of birth of siblings,

and the present residential status of the families. This database consisted of all the houses in the village and had the names and approximate ages of all the household members. In addition, I went manually through the 'extra intake' data sheets, of houses that were not entered into the PMNS database, usually because the women in these households had undergone family-planning operations and were not eligible for the PMNS.

This pre-survey proved to be helpful as the PMNS database was collected almost 4 years ago. Originally there were 170 households traced from the original PMNS database with a possible brother-sister sibling pair in the required age range. The pre-survey revealed that 30 families had migrated out of the village.

The next step was to verify the ages of siblings. The PMNS database did not have date of birth information about the children as the PMNS main purpose was to select women. Usually the date of birth is available from the antenatal cards issued by the village nurse when tetanus injection is given to the expectant mother at 6 months gestation or a date of birth certificate issued by a private doctor if the child is born in a private clinic. The parents maintain this card as it is needed for school admission and to claim other benefits. Some date of birth data were collected from school records.

This age verification revealed that in 27 households one of the siblings was above the required age range, and in 5 households one sibling was too young. One sibling had died and one parent refused to participate in the study. Therefore 106 households (including 101 true and 5 cousin sibling pairs) were studied. In total 275 children were measured, the total numbers of boys were more (140) than girls (135) as some households had two sons and one daughter in the required age range. I excluded the five households where the 'sibling' pair were cousins and not true siblings. In the remaining 101 households, the brother and sister that were closest in age were selected. The final detailed analysis relates to 202 children within 101 households.

Also, during this 'pre-survey' the families were informed about the study, verbal consent was obtained to conduct the study and the approximate date and time preferred by the family for a home visit was ascertained.

5.3 Data Collection

The ANM, the CHW and I visited the homes in the early morning. I started by filling in the family description form, which included information on caste, family types, land holding and other socio-economic information (appendix B 4). Also, a family tree was drawn with the help of an adult in the household (usually the father or mother) to record who was living in the house and how they were related to each other. The sibling details were recorded with the child's present school and standard of study, along with the birth order and gender of all the children (appendix B 5 and B 6). Information on the parents' and grand parents' education, present occupation, fasting days and vegetarian and non-vegetarian status was collected. The parents', grandparents' and children's anthropometry was performed simultaneously by the ANM.

ANM measuring children

Anthropometric measurements included: height and weight and, for the children, mid-upper arm circumference, triceps and subscapular skinfold thickness.

For data entry a family reference file was developed where the house number, the hamlet name, the surname, family member name and the code assigned to the member was recorded (appendix B 7). The data were entered in the computer section at the

Diabetes Unit of the KEM hospital in Pune, where the PMNS data were entered. They were double entered by different data entry operators and manually re-checked by me.

5.4 Analysis of Anthropometric Indices

For analysis, two different aspects of a child's nutritional status were considered:

a. height and weight (height related to age, weight related to age and weight related to height);

b. skinfold thickness (triceps and subscapular).

Each of these measurements conveys different information on nutritional status.

For adults, height and weight were collected to calculate body mass index.

5.4.1 Height and weight

Childrens' weight and height increase as they get older so these measurements need to be expressed in relation to the growth patterns of a reference population. This allows comparison of measurements of children of different age. This was important in my study in which siblings were, obviously, of different ages.

Boys are on average taller and heavier than girls of exactly the same age and the reference values differ for boys and girls. Consequently a child's sex needs to be taken into consideration when making the comparisons between siblings. WHO recommends(FAO/WHO/UNU, 1985) that a child's weight and height be expressed in terms of the number of standard deviation units (SD) that a child's measurement (weight or height) deviates from the mean value of the reference population for children of the same age and sex. Such standard deviation units are called "Z-scores" or SD scores. The distributions for the International Reference Population recommended for use by WHO have been developed by the United States Center's for Disease Control based on data from the United States National Center for Health Statistics (NCHS). In the case of weight-for-height (WHZ), the weight is related to

the mean weight for a given height. In the International Reference Population, only a very small percentage of children (2.3%) have Z-scores lower than -2SD.

The World Health Organisation (WHO) recommends that a child's nutritional status is expressed as his or her Z-score for each of the three anthropometric indices used: height-for-age (HAZ), weight for height (WHZ) and weight-for-age (WAZ). The terms "stunting", "wasting" and "underweight" are used to describe children whose Z-scores fall below -2SD from the mean of the International Reference Population for each of these indices(WHO, 1995b). Stunting reflects long-term growth failure or chronic under-nutrition. Wasting reflects acute or chronic energy deficiency. The WAZ index is a composite index, it reflects stunting or wasting or both. A child who is short is also often underweight, and a child who is thin may similarly have low WAZ even if he or she is not short. In order to compare these indices in my sibling pairs of different sex and age, my data were converted to SD scores for WHZ, HAZ and WHZ based on NCHS reference data.

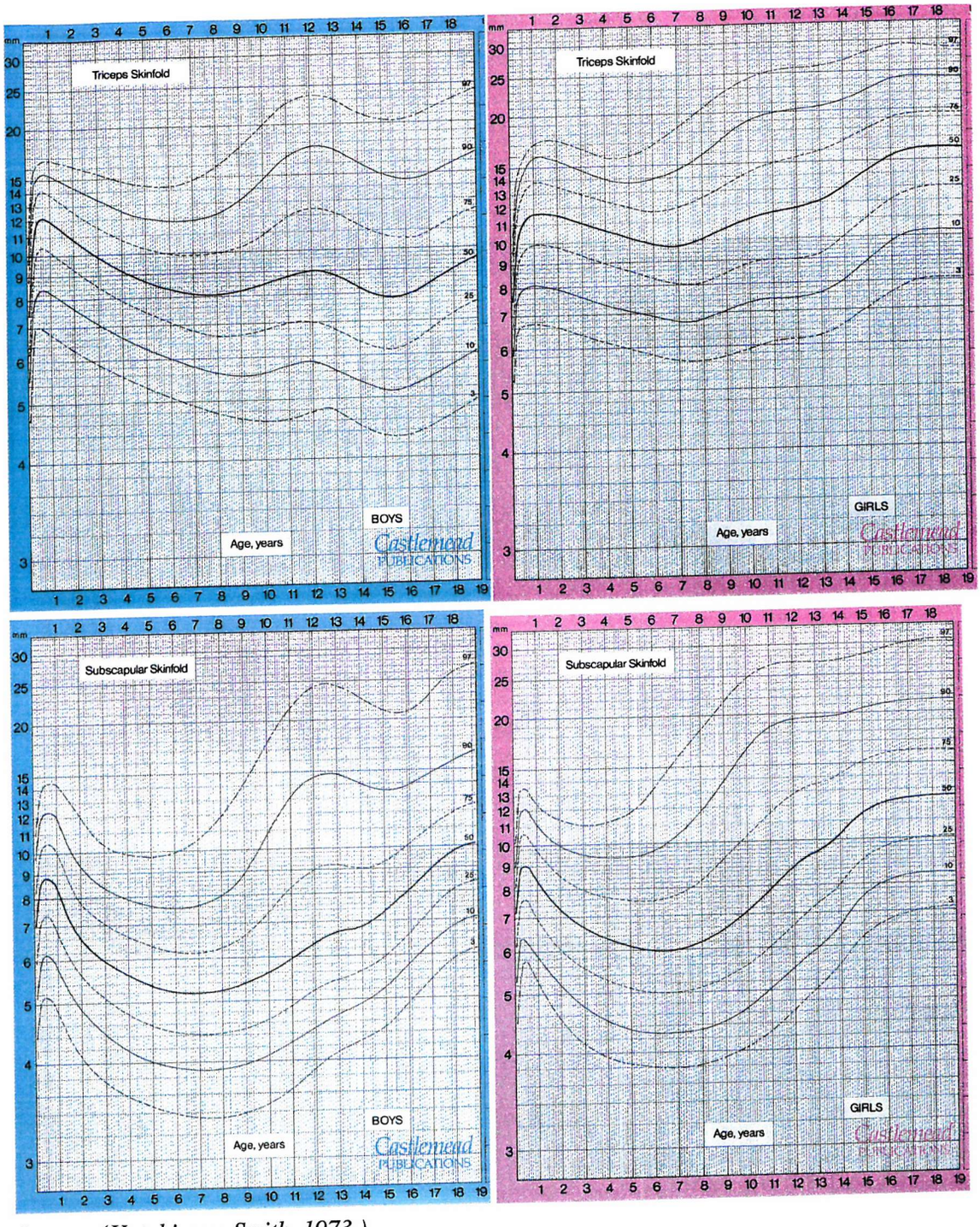
To assess the different levels of nutrition for boys and girls within each household, the difference between Z-scores was calculated for each sibling pair (boy's Z-score minus girl's Z-score). I called this value the 'Sam Index' after Sam Kellingray, the statistician who helped with my data analysis. A negative Sam index indicates that the girl is better nourished than the boy in the household, and the reverse is true when the difference is positive.

5.4.2 Skinfold thickness

Skinfolds measure a double thickness of skin and subcutaneous fat, and are used a direct measure of body fat, as an indicator of nutritional status. There are no global, for example NCHS, standards available for comparison of skinfold thickness within two populations. Therefore, in my study I compared boys and girls with skinfold standards for British children(Tanner, 1966). There are well known differences in boys' and girls' skinfolds (girls are fatter than boys) and these growth curves are available separately for both sexes. The skinfold readings from my study were plotted on the British curves (Figure 5.1) and the comparison made by obtaining the percentile range.

Readings were either less than 3rd percentile, 3rd-10th percentile, 10th-50th percentile, 50th-75th percentile, 75th-90th percentile and greater than 90th percentile.

Figure 5.1: Triceps and subscapular skinfold standards for British boys and girls



Source: (Hutchinson-Smith, 1973)

5.4.3 Adult body mass index

Body mass index (BMI) is a measure which takes into account an adult's weight and height to gauge total body fat (BMI = weight (kg) / height ^{2} (m)). Any person with a BMI of 18.5 or less is considered chronically energy deficient and above 25 is considered obese (Table 5.1).

Table 5.1: WHO's classification for Body Mass Index

Body Mass Index *(kg/m^2)*	WHO Classification
<16.00	**Severe underweight**
16.99 - 17.00	**Moderate underweight**
17.00 - 18.49	**Mild underweight**
18.50 - 24.99	**Normal**
25.00 – 29.99	**Obese (Grade I)**
30.00 - 39.99	**Obese (Grade II)**
>40.00	**Obese (Grade III)**

Source: (WHO, 1995)

BMI is a convenient and accepted way to determine total body fat and enables comparison between adult males and females, since BMI is the same in both sexes and is not age dependent(Ferro-Luzzi et al. 1992). Therefore, I used this to analyse the differences in nutritional status within father-mother and grandfather-grandmother pairs.

5.5 Results

5.5.1 Anthropometric comparison of children's data

Sibling pairs Z-scores for height and weight

The age range of the children was 3 to 8 years, with girls having a slightly higher mean age. Table 5.2 shows their mean age, weight and height.

Table 5.2: Mean (SD and range) age, weight and height amongst children (n=202)

	Boys (n=101)				Girls (n=101)			
	Mean	SD	Min	Max	Mean	SD	Min	Max
Age (in years)	6.1	1.4	3.50	8.93	6.5	1.5	3.1	9.0
Weight (kg)	15.8	2.8	10.0	22.8	16.0	3.2	9.0	24.5
Height (cm)	107.0	8.9	87.8	128.2	108.8	9.6	83.8	133.6

The Z-scores for all the children were negative, indicating the shortness and thinness of Indian children in comparison to the NCHS reference standards (Table 5.3).

Table 5.3: Sibling pairs' mean Z-scores and SAM Index of 101 sibling pairs

All Households		Mean	SD	p*	Min	Max
Weight for age Z-score (WAZ)	Boys' WAZ	-2.1	0.8	0.2	-4.0	0.1
	Girls' WAZ	-2.0	0.8		-4.0	-0.1
	SAM Index for WAZ	-0.11	0.8		-2.1	1.9
Height for age Z-score (HAZ)	Boys' HAZ	-1.8	1.0	0.2	-3.7	1.7
	Girls' HAZ	-1.7	1.0		-4.1	1.9
	SAM Index for HAZ	-0.2	1.2		-3.5	2.7
Weight for height Z-score (WHZ)	Boys' WHZ	-1.4	0.7	0.8	-3.1	0.1
	Girls' WHZ	-1.4	0.8		-3.1	0.8
	SAM Index for WHZ	0.0	0.8		-1.9	1.7

p* for difference between sexes

Percentages of boys less than or equal to -2SD for WAZ, HAZ and WHZ were 61%, 48% and 22% respectively. Corresponding figures for girls were 53%, 43% and 24%. On average girls were better off than the boys, though the differences were not large. Girls had a better (less negative) SD score in 59 households, while boys did better in 42 households. There were similar findings for HAZ; girls did better in 60 households and boys did better in 41 households. The WHZ SD scores were almost identical in boys and girls. Girls did better in 51 households, boys did better in 49 households and both siblings were identical in one household. The p-values (derived from t-tests) showed that none of the differences between boys and girls were statistically significant.

The Sam Index showed that in the community as a whole, the levels of underweight, stunting, wasting were similar in boys and girls. However it enabled me to detect

households in which there were major disparities with boys faring better than girls and girls faring better than boys.

Sibling pairs triceps and subscapular skinfolds

The skinfold results showed that girls had higher mean values than boys for both triceps and subscapular skinfolds (Table 5.4). This is expected, as girls have more body fat than boys (Figure of the skinfold graphs 5.1).

Table 5.4:Mean (SD and range) of triceps and subscapular skinfold thickness in children

N=202	Boys (n=101)				Girls (n=101)			
	Mean	SD	Min	Max	Mean	SD	Min	Max
Triceps (mm)	6.9	1.3	4.6	11.6	7.4	1.5	4.7	13.1
Subscapular (mm)	6.1	1.2	4.2	10.4	6.7	1.4	4.1	13.2

Comparison with the British skinfolds standards showed that the majority of children were below the 25th percentile (Table 5.5).

Table 5.5: Percentile values for triceps and subscapular skinfold in boys and girls

Value Percentile	Triceps –Frequency					Subscapular- Frequency				
n-202	Boys (%)		Girls (%)			Boys (%)		Girls (%)		
-3	5	(5.0)	16	(15.8)		0	(-)	1	(1.0)	
3-10	23	(22.8)	27	(26.7)		8	(7.9)	14	(13.9)	
10-25	39	(38.6)	37	(36.6)		30	(29.7)	31	(30.7)	
25-50	26	(25.7)	17	(16.8)		33	(32.7)	40	(39.6)	
50-75	6	(5.9)	3	(2.0)		20	(19.8)	14	(13.9)	
75-90	2	(2.0)	1	(1.0)		9	(8.9)	1	(1.0)	
90-97	-	-	-	-		1	(1.0)	0	(-)	
97+	-	-	-	-		-	-	-	-	
≤10 % lle	28	(27.7)	43	(42.6)	p=0.03	8	(7.9)	15	(14.9)	p=0.2
≥50 % lle	8	(7.9)	4	(4.0)	p=0.4	30	(29.9)	15	(14.9)	p=0.02

Although girls were fatter than boys in absolute terms, when compared with the sex specific reference more girls had low percentile values than boys. Fewer boys than girls were below the 10th percentile for triceps (p=0.03) and subscapular (p=0.2) skinfold thickness, and fewer girls than boys were above the 50th percentile for triceps (p=0.4) and subscapular (p=0.02).

5.5.2 Parents' and grandparents' heights and weights

From the total 101 households surveyed, 93 fathers and 98 mothers were available for data collection. The others were working away from the village. There were 32 surviving grandfathers and 52 grandmothers.

There were 90 parent couples and 27 grandparent couples available for comparison of BMI. The mothers had the lowest mean BMI in comparison to fathers, grandfathers and grandmothers (Table 5.6). 54% mothers and 48% grandmothers were below the 18.5 cut off for chronic energy deficiency in comparison to 31% fathers and 26% grandfathers.

The father's BMI was higher in 61 households and the mother's in 29 households. Amongst grandparents, the grandfather's BMI was higher in 16 households and the grandmother's in 11 households.

Table 5.6: Mean (SD and range), percent below 18.5 of parents' and grandparents' BMI

All Households	N	Mean	SD	p	Min	Max	% below 18.5
Fathers BMI	**90**	**20.4**	**2.8**	**<0.001**	**15.0**	**30.2**	**31.1**
Mothers BMI		**18.8**	**2.5**		**13.1**	**29.3**	**54.4**
Parents % BMI Diff.		15.1	6.0		-36.3	34.8	
Grandfathers BMI	**27**	**20.2**	**3.0**	**0.2**	**16.0**	**31.9**	**25.9**
Grandmothers BMI		**19.2**	**3.0**		**12.7**	**29.2**	**48.1**
Grandparents % BMI diff.		18.7	2.7		-38.7	31.6	

(Parents % difference=father-mothers/fathers*100, Grandparent % difference = grandfather-grandmother /grandfather*100))

Mothers were 15% thinner than fathers ($p<0.001$). Grandmothers were also considerably thinner than grandfathers (18%) a difference which was not statistically significant, probably because of the smaller numbers.

5.6 Male-Female differences in relation to socio-economic indicators

There now follows an analysis of nutritional status in children, parents and grandparents and the male-female differences, in relation to socio-economic indicators. For each indicator I have constructed 3 tables:

a. The children's WAZ, HAZ and WHZ

Mean WAZ, HAZ and WHZ are shown at each level of the socio-economic indicator (e.g. Socio-economic score) in ***black***. The boy and girl sibling pair WAZ, HAZ and WHZ was examined using paired t-tests, and the significance of the difference between boys and girls is shown in ***blue***. Paired t-tests compare the means of two paired observations either on the same individual or on matched individuals (in this case sibling brother and sister pair). The mean SAM index (boy's Z-score minus girl's Z-score) at each level of socio-economic score is shown in ***green***. The p value for the *trend* in Sam index with socio-economic score is also shown in ***red*** at the bottom of the SAM index column. This *trend* was examined using a linear regression analysis for each indicator. Linear regression was used as independent variables (e.g. socio-economic score) were being used to predict a continuous dependent variable (difference in Z-scores between boys and girls).

b. The children's skinfolds

Numbers and percentages of children with triceps skinfold thickness below the 10^{th} percentile and above the 50^{th} percentile are shown in ***blue*** and ***green*** respectively. The p values for the *trends* in percentages below the 10^{th} and above the 50^{th} percentiles are shown in ***red***. Logistic regression was here used instead of linear regression as triceps skinfold thicknesses were grouped into two categories.

c. Parents' and grandparents' body mass index

Mean BMI values for each father and mother, and grandfather and grandmother pairs are shown in ***black***. The p values for the significance of the difference between fathers and mothers and between grandfathers and grandmothers, examined using a paired t-test, are shown in ***blue***. The percent difference in BMI between parents and grandparents (father's BMI minus mother's BMI and grandfather's BMI minus grandmother's) are shown in ***green***. The p value for the *trend* in percent BMI difference with an indicator e.g. socio-economic score is shown in ***red*** at the bottom of the BMI percentage column. Analysis was carried out using statistical packages

SPSS/PC, version 7.5. The text description accompanying each table is intended to pick out the major points.

5.6.1 Socio-economic score

There was increase in WAZ and HAZ with improving socio-economic status. Mean WAZ became more negative in girls and HAZ became more negative in both sexes as the socio-economic status worsened. There were no significant differences between the sexes at any level of socio-economic score (Table 5.7a), and no trends across socio-economic score in male-female differences.

Table 5.7a: Socio-economic score with the children's Z-scores

Z-score		Weight for Age				Height for Age				Weight for Height			
	N	Boy's Mean	Girl's Mean	*p*	Sam Index	Boy's Mean	Girl's Mean	*p*	Sam Index	Boy's Mean	Girl's Mean	*p*	Sam Index
B (Best)	10	-2.1	-1.7	*0.1*	-0.4	-1.8	-1.1	*0.1*	-0.7	-1.5	-1.5	*0.9*	0.02
C	45	-2.1	-1.9	*0.2*	-0.2	-1.6	-1.5	*0.3*	-0.2	-1.5	-1.5	*0.6*	-0.06
D	38	-2.1	-2.2	*0.6*	0.06	-2.0	-2.0	*0.8*	0.04	-1.2	-1.3	*0.6*	0.06
E (Worst)	8	-2.3	-2.2	*0.8*	-0.08	-2.3	-1.9	*0.4*	-0.4	-1.3	-1.6	*0.3*	0.3
p for trend	101	0.8	0.06	-	0.1	0.08	0.003	-	0.3	0.1	0.7	-	0.4

There were no significant trends in skinfold thickness according to socio-economic status (Table 5.7b).

Table 5.7b: Socio-economic score with the children's triceps skinfold thickness

Triceps skinfold (mm)		Boys				Girls			
	N	≤10 % ile		≥50 % ile		≤10 % ile		≥50 % ile	
		N	(%)	N	(%)	N	(%)	N	(%)
B (Best)	10	2	(20.0)	0	(0)	4	(40.0)	1	(10.0)
C	45	17	(37.8)	4	(8.9)	19	(42.2)	2	(4.4)
D	38	9	(23.7)	3	(7.9)	16	(42.1)	1	(2.6)
E (Worst)	8	0	(0)	1	(12.5)	4	(50.0)	0	(0)
p for trend	101	0.1		0.5		0.7		0.3	

There were no significant trends in BMI with socio-economic score in either parents or grandparents. The thinness of mothers compared to fathers was most marked in families of high socio-economic status (Table 5.7c).

Table 5.7c: Socio-economic score with the parents' and grandparents' BMI

BMI (kg/m^2)	Parents					Grandparents				
	N	Father	Mother	p	% BMI diff.	N	G'father	G'mother	p	% BMI diff.
B (Best)	9	21.1	17.5	*0.000*	17.2	4	20.8	21.7	*0.7*	-4.9
C	42	20.3	18.7	*0.001*	6.5	20	20.6	18.9	*0.08*	5.7
D	32	20.8	19.7	*0.06*	4.7	3	18.1	19.2	*0.7*	-7.2
E (Worst)	7	17.8	18.6	*0.6*	-5.5	0	-	-	-	-
p for trend	90	0.2	0.08	-	0.006	27	0.3	0.2	-	1.0

5.6.2 Social factors a) factors which are social more than economic

5.6.2.1 Father's education

Fifteen percent of fathers were illiterate and only five percent were graduates. Overall, the childrens' nutritional status did not show significant trends with paternal education. However, daughters were lighter and shorter relative to sons with increasing paternal education (Table 5.8a).

Table 5.8a: Father's education with the children's Z-scores

Z-score		Weight for Age				Height for Age				Weight for Height			
	N	Boy's Mean	Girl's Mean	*p*	Sam Index	Boy's Mean	Girl's Mean	*p*	Sam Index	Boy's Mean	Girl's Mean	*p*	Sam Index
Illiterate	15	-2.2	-1.7	*0.02*	-0.5	-1.9	-1.4	*0.05*	-0.5	-1.4	-1.3	*0.5*	-0.1
Neo-literate	4	-1.8	-2.2	*0.5*	0.4	-1.4	-1.9	*0.6*	0.5	-1.4	-1.5	*0.7*	0.09
< 8 Class	40	-2.2	-1.9	*0.06*	-0.2	-2.0	-1.7	*0.05*	-0.3	-1.3	-1.3	*0.7*	-0.06
8–12Class	29	-2.1	-2.2	*0.3*	0.2	-1.8	-1.8	*0.7*	0.09	-1.4	-1.6	*0.1*	0.2
Graduate	5	-1.9	-2.1	*0.6*	0.3	-1.0	-2.0	*0.2*	1.0	-1.8	-1.3	*0.3*	-0.5
p for trend	101	0.6	0.07	-	0.02	0.3	0.2	-	0.03	0.7	0.3	-	0.6

Neo-literate are adults who have learnt to read and write in adulthood and have not attended formal schooling

The triceps analysis showed the daughters of more educated fathers were slightly fatter than those of less educated fathers. The percentage of girls below the 10th percentile decreased as the father's education improved (Table 5.8b).

Table 5.8b: Father's education with the children's triceps skinfold thickness

Triceps skinfold (mm)		Boys				Girls			
	N	≤10 % ile		≥50 % ile		≤10 % ile		≥50 % ile	
		N	(%)	N	(%)	N	(%)	N	(%)
Illiterate	15	7	(46.7)	0	(0)	8	(53.3)	0	(0)
Neo-literate	4	1	(25.0)	0	(0)	4	(100)	0	(0)
< 8 Class	40	7	(17.5)	4	(10.0)	15	(37.5)	2	(5.0)
8–12 Class	29	8	(27.6)	4	(13.8)	9	(31.0)	1	(3.4)
Graduate	5	1	(20.0)	0	(0)	0	(0)	1	(20.0)
p for trend	101	0.2		0.2		0.02		0.2	

There were no trends in the BMI of parents or grandparents according to the father's education, but graduate fathers were noticeably fatter. The difference between mothers and fathers was also greatest in the graduate group (Table 5.8c).

Table 5.8c: Father's education with the parents' and grandparents' BMI

BMI (kg/m^2)		Parents				Grandparents				
	N	Father	Mother	*p*	% BMI diff.	N	G'father	G'mother	*p*	% BMI diff.
Illiterate	13	20.0	19.4	*0.5*	2.1	6	21.2	19.1	*0.2*	8.9
Neo-literate	4	20.0	19.3	*0.7*	3.3	1	20.2	16.1	-	20.1
< 8 Class	39	20.7	18.5	*0.000*	9.3	11	19.7	19.9	*0.8*	-3.2
8–12 Class	29	19.8	19.0	*0.2*	2.9	8	20.4	19.1	*0.5*	3.8
Graduate	5	22.8	19.9	*0.1*	11.0	0	-	-	-	-
p for trend	90	0.5	1.0	-	0.7	26	0.6	0.8	-	0.5

5.6.2.2 Mother's education

More than half the mothers were illiterate, there were no neo-literate mothers and only two mothers were graduates (these were the village teachers). The children's nutritional status did not show significant trends as maternal education improved and only children whose mothers were graduates showed higher scores. There were no

marked differences between boys and girls at any level of maternal education and no trends in gender difference with maternal education (Table 5.9a).

Table 5.9a: Mother's education with the children's Z-scores

Z-score		Weight for Age				Height for Age				Weight for Height			
	N	Boy's Mean	Girl's Mean	*p*	Sam Index	Boy's Mean	Girl's Mean	*p*	Sam Index	Boy's Mean	Girl's Mean	*p*	Sam Index
Illiterate	54	-2.1	-2.0	*0.5*	-0.08	-1.9	-1.7	*0.2*	-0.2	-1.3	-1.4	*0.4*	0.09
Neo-literate	0	-	-	-	-	-	-	-	-	-	-	-	-
< 8 Class	31	-2.2	-1.9	*0.07*	-0.3	-1.8	-1.5	*0.3*	-0.3	-1.6	-1.5	*0.2*	-0.2
8–12 Class	11	-2.1	-2.4	*0.3*	0.3	-1.8	-1.9	*0.8*	0.09	-1.4	-1.9	*0.04*	0.5
Graduate	2	-1.3	-1.5	*0.8*	0.3	-0.6	-1.8	*0.5*	1.2	-1.2	-0.4	*0.3*	-0.7
p for trend	101	1.0	0.8	-	0.8	0.3	0.9	-	0.4	0.2	0.5	-	0.6

There were no trends in the children's' skinfolds with maternal education (Table 5.9b).

Table 5.9b: Mother's education with the children's triceps skinfold thickness

Triceps skinfold (mm)		Boys				Girls			
	N	≤10 % ile		≥50 % ile		≤10 % ile		≥50 % ile	
		N	(%)	N	(%)	N	(%)	N	(%)
Illiterate	54	14	(25.9)	4	(7.4)	26	(48.1)	3	(5.6)
Neo-literate	0	-	-	-	-	-	-	-	-
<8 Class	31	9	(29.0)	2	(6.5)	10	(32.3)	0	(0.0)
8- 12 Class	11	4	(36.4)	2	(18.2)	6	(54.5)	0	(0.0)
Graduate	2	0	(0.0)	0	(0.0)	0	(0.0)	1	(50.0)
p for trend	101	0.8		0.6		0.3		0.9	

BMI's of fathers and grandfathers but not mothers and grandmothers increased with increasing maternal education. The male-female differences were similar at all levels of maternal education but highest in the families with the best educated mothers (Table 5.9c).

Table 5.9c: Mother's education with the parents' and grandparents' BMI

BMI (kg/m^2)	Parents					Grandparents				
	N	Father	Mother	*p*	%BMI diff.	N	G'father	G'mother	*p*	%BMI diff.
Illiterate	48	19.8	18.5	*0.004*	5.5	15	19.2	18.5	*0.4*	2.9
Neo-literate	0	-	-	-	-	-	-	-	-	-
< 8 Class	29	20.6	19.1	*0.03*	6.1	10	20.4	20.8	*0.8*	-3.3
8– 12 Class	11	21.6	20.0	*0.1*	5.4	2	27.8	19.2	*0.08*	31.2
Graduate	2	24.0	19.1	*0.3*	20.3	0	-	-	-	-
p for trend	90	0.02	0.1	-	0.6	27	0.009	0.07	-	0.6

5.6.2.3 Caste

The majority of households belonged to agricultural castes, mainly Marathas (66%) and Mali (20%) (Table 5.10a). There were only small numbers of low caste (scheduled caste and tribes) and upper caste (Brahmin) households. There were no significant trends in WAZ, HAZ or WHZ across castes. Except for a significantly higher WHZ in boys than girls in Brahmin households, there were no significant differences between boys and girls in any caste group.

Table 5.10a: Caste with the children's Z-scores

Z-score		Weight for Age				Height for Age				Weight for Height			
	N	Boy's Mean	Girl's Mean	*p*	Sam Index	Boy's Mean	Girl's Mean	*p*	Sam Index	Boy's Mean	Girl's Mean	*p*	Sam Index
Scheduled Caste/Tribes	13	-2.2	-2.1	*0.9*	-0.04	-2.0	-1.8	*0.7*	-0.1	-1.4	-1.5	*0.7*	0.07
Oth.Agri. Caste (Mali)	19	-2.2	-2.1	*0.5*	-0.1	-2.0	-1.9	*0.7*	-0.1	-1.4	-1.3	*0.7*	-0.1
Dominant Agri. Caste(Maratha)	67	-2.1	-2.0	*0.2*	-0.1	-1.8	-1.6	*0.2*	-0.2	-1.4	-1.4	*0.9*	0.01
Upper Caste	2	-2.0	-2.3	*0.3*	0.3	-1.8	-1.4	*0.3*	-0.4	-1.1	-2.2	*0.03*	1.1
p for trend	101	0.6	0.5	-	0.9	0.5	0.3	-	0.8	0.8	0.8	-	0.6

Percentages of girls below the 10th percentile for triceps skinfold thickness exceeded boys, and percentage of boys above the 50th percentile exceeded girls in all caste groups except the Malis. The greatest boy-girl differences were seen in the upper caste households. This may be misleading, however, in view of the very small

numbers of Brahmins. There was no trend in boy-girl differences, from low to upper caste groups (Table 5.10b).

Table 5.10b: Caste with the children's triceps skinfold thickness

Triceps skinfold (mm)		Boys				Girls			
	N	≤10 % ile		≥50 % ile		≤10 % ile		≥50 % ile	
		N	(%)	N	(%)	N	(%)	N	(%)
Scheduled Tribes & Castes	13	1	(7.7)	2	(15.4)	4	(30.8)	1	(7.7)
Other Agri. Castes (Mali)	19	4	(21.1)	1	(5.3)	4	(21.1)	1	(5.3)
Dominant Agri. Caste (Maratha)	67	23	(34.3)	4	(6.0)	33	(49.3)	2	(3.0)
Upper Caste (Brahmins)	2	0	(0.0)	1	(50.0)	2	(100)	0	(0.0)
p for trend	101	0.08		0.8		0.03		0.4	

Mothers tended to be thinner in upper caste households than in lower caste households (Table 5.10c). There were no other significant trends across the castes, but grandmothers and grandfathers tended to be fatter in the upper caste. Mothers were thinner than fathers in all caste groups. Partly because of their larger numbers, the difference was statistically significant in the Maratha caste. As with the children, the smallest male-female difference was in the Mali caste, and the largest in the Brahmins.

Table 5.10c: Caste with the parents' and grandparents' BMI

BMI (kg/m^2)		Parents				Grandparents			
	N	Father	Mother	*p*	%BMI diff.	N	G'father	G'mother	*p*	%BMI diff.
Scheduled Tribes & Castes	12	21.6	20.6	*0.5*	3.0	0	-	-	-	-
Other Agri. Castes (Mali)	19	19.5	18.9	*0.4*	2.1	5	20.9	17.6	*0.1*	15.0
Dominant Agri. Caste (Maratha)	57	20.3	18.5	*<0.001*	7.6	21	19.6	19.7	*1.0*	-1.5
Upper Caste (Brahmin)	2	23.2	19.1	*0.3*	16.7	1	31.9	22.0	-	30.8
p for trend	90	0.7	0.02	-	0.1	27	0.3	0.06	-	0.5

5.6.2.4 Family type

There is a tendency for the traditional joint family system to break down and to be replaced by nuclear families. My focus group discussions indicated that although women have more work to do in a nuclear family they have more freedom to decide

allocation of household resources. Also, the woman is able to keep any money she earns as it is not handed to the head of the household as in a joint family. The majority of households in Pabal were joint families. There were no differences between nuclear and joint families in the children's WAZ, HAZ or WHZ, or in the girl-boy differences (Table 5.11a).

Table 5.11a: Family type with the children's Z-scores

		Weight for Age				Height for Age				Weight for Height			
	N	Boy's Mean	Girl's Mean	*p*	Sam Index	Boy's mean	Girl's mean	*p*	Sam Index	Boy's Mean	Girl's Mean	*p*	Sam Index
Nuclear	37	-2.1	-2.1	*0.5*	-0.1	-1.9	-1.8	*0.5*	-0.1	-1.4	-1.4	*0.8*	-0.03
Joint	64	-2.1	-2.0	*0.2*	-0.1	-1.8	-1.6	*0.2*	-0.2	-1.4	-1.5	*0.6*	0.05
p for trend	101	0.8	0.7	-	0.9	0.6	0.5	-	0.9	1.0	0.6	-	0.6

Children in nuclear families were less likely to have a triceps below the 10th percentile. Boy-girl differences were similar in both types of families (Table 5.11b).

Table 5.11b: Family type with the children's triceps skinfold thickness

Triceps skinfold (mm)		Boys				Girls			
	N	≤10 % ile		≥50 % ile		≤10 % ile		≥50 % ile	
		N	(%)	N	(%)	N	(%)	N	(%)
Nuclear	37	7	(18.9)	3	(8.1)	12	(32.4)	1	(2.7)
Joint	64	21	(32.8)	5	(7.8)	31	(48.4)	3	(4.7)
p for trend	101	0.1		1.0		0.1		0.6	

Fathers and mothers in nuclear families had a higher mean BMI than those in joint families. The grandparents were present only in the joint families. Mothers were thinner than fathers to a similar extent in both types of households (Table 5.11c).

Table 5.11c: Family type with the parents' and grandparents' BMI

BMI (kg/m^2)		Parents					Grandparents				
	N	Father	Mother	*p*	%BMI diff.	N	G'father	G'mother	*p*	%BMI diff.
Nuclear	36	21.2	19.9	*0.04*	4.8	0	-	-	-	-
Joint	54	19.9	18.3	*0.000*	6.8	27	20.3	19.4	*0.2*	2.7
p for trend	90	0.03	0.004	-	0.5	27	-	-	-	-

5.6.2.5 Radio or Television ownership

As well as being indicators of economic wealth, a radio or television gives access to the outside world, for news and information. The childrens' WAZ and HAZ were higher in families which owned a radio or television. This difference was more obvious in girls (Table 5.12a).

Table 5.12a: Ownership of radio or television with the children's Z-scores

Z-score		Weight for Age				Height for Age				Weight for Height			
	N	Boy's Mean	Girl's Mean	p	Sam Index	Boy's Mean	Girl's Mean	p	Sam Index	Boy's Mean	Girl's Mean	p	Sam Index
No	55	-2.2	-2.2	*1.0*	-0.005	-2.0	-1.9	*0.3*	-0.1	-1.3	-1.5	*0.1*	0.1
Yes	46	-2.1	-1.9	*0.1*	-0.2	-1.7	-1.5	*0.3*	-0.2	-1.5	-1.4	*0.3*	-0.1
p for trend	101	0.7	0.06	-	0.2	0.2	0.07	-	0.7	0.2	0.6	-	0.09

Triceps increased for both boys and girls with the ownership of a radio or TV. The girl-boy difference in triceps was less marked in these families (Table5.12b).

Table 5.12b: Ownership of radio or TV with children's triceps skinfolds

Triceps skinfold (mm)		Boys				Girls			
	N	≤10 % ile N	(%)	≥50 % ile N	(%)	≤10 % ile N	(%)	≥50 % ile N	(%)
No	55	17	(30.9)	5	(9.1)	28	(50.9)	0	(0)
Yes	46	11	(23.9)	3	(6.5)	15	(32.6)	4	(8.7)
p for trend	101	0.4		0.6		0.07		0.8	

Fathers had a higher BMI in families which owned a radio or TV. Male-female differences also increased in these families (Table 5.12c).

Table 5.12c: Ownership of radio or TV with parents and grandparents BMI

BMI (kg/m^2)		Parents				Grandparents			
	N	Father	Mother	*p*	%BMI diff.	N	G' father	G'mother	*p*	%BMI diff.
No	49	19.8	18.8	*0.03*	4.2	12	19.9	20.1	*0.8*	-3.1
Yes	41	21.2	19.1	*0.000*	8.2	15	20.7	18.8	*0.07*	7.4
p for trend	90	0.02	0.5	-	0.2	27	0.6	0.2	-	0.1

5.6.2.6 Iron

I have included this variable because I think iron ownership may indicate a family which is in touch with the outside world and conscious of appearance. Households with an iron showed higher WAZ and HAZ for both boys and girls. There was no relationship between iron ownership and boy-girl differences (Table 5.13a).

Table 5.13a: Possession of an iron with the children's Z-scores

Z-score		Weight for Age				Height for Age				Weight for Height			
	N	Boy's Mean	Girl's Mean	p	Sam Index	Boy's Mean	Girl's Mean	p	Sam Index	Boy's Mean	Girl's Mean	p	Sam Index
No	65	-2.2	-2.1	*0.3*	-0.09	-2.0	-1.9	*0.4*	-0.1	-1.4	-1.4	*1.0*	0.004
Yes	36	-2.0	-1.9	*0.4*	-0.2	-1.6	-1.4	*0.3*	-0.3	-1.5	-1.5	*0.7*	0.05
p for trend	101	0.3	0.2	-	0.7	0.08	0.01	-	0.6	0.4	0.3	-	0.8

Girls had better triceps, and the disparity between the sexes was reduced, in families possessing an iron (Table 5.13b).

Table 5.13b: Possession of an iron with the children's triceps skinfold thickness

Triceps skinfold (mm)		Boys				Girls			
	N	≤10 % ile		≥50 % ile		≤10 % ile		≥50 % ile	
		N	(%)	N	(%)	N	(%)	N	(%)
No	65	19	(29.2)	5	(7.7)	33	(50.8)	3	(4.6)
Yes	36	9	(25.0)	3	(8.3)	10	(27.8)	1	(2.8)
p for trend	101	0.6		0.9		0.03		0.7	

The BMI of fathers and grandfathers, but not mothers and grandmothers, was higher in families which owned an iron. Thus the male-female difference was increased in these families (Table 5.13c).

Table 5.13c: Possession of an iron with the parents' and grandparents' BMI

BMI (kg/m^2)		Parents					Grandparents				
	N	Father	Mother	*p*	%BMI diff.	N	G'father	G'mother	*p*	%BMI diff.
No	59	20.0	19.0	*0.02*	3.9	16	19.3	19.4	*0.9*	-1.8
Yes	31	21.1	18.7	*0.000*	10.0	11	21.9	19.3	*0.08*	9.3
p for trend	90	0.09	0.6	-	0.07	27	0.04	0.9	-	0.1

5.6.3 Economic Indicators b) factors which are economic more than social

5.6.3.1 Father's occupation

The occupation categories are described in full in appendix B5. As father's occupation shifted from labourer to service, HAZ for boys tended to improve. The Z scores were markedly better for both boys and girls in service households. WAZ and HAZ for girls in the 'own and others' farm category was significantly better than boys. The least gender difference was seen amongst owner cultivator fathers, the majority category, and service households. In the labourer category it was noticeable that the boys were doing well for WAZ and HAZ, but the gender disparity was very marked (Table 5.14a).

Table 5.14a: Father's occupation with the children's Z-scores

Z-score		Weight for Age				Height for Age				Weight for Height			
	N	Boy's Mean	Girl's Mean	p	Sam Index	Boy's mean	Girl's mean	p	Sam Index	Boy's Mean	Girl's Mean	p	Sam Index
Labourer (other's)	6	-1.6	-2.1	*0.2*	0.5	-1.6	-2.3	*0.2*	0.7	-0.9	-0.9	*0.9*	0.03
Own &other's	21	-2.3	-2.0	*0.03*	-0.3	-2.3	-1.8	*0.002*	-0.5	-1.2	-1.3	*0.8*	0.06
Petty employee/ artisan	9	-2.5	-2.0	*0.2*	-0.5	-2.2	-1.6	*0.1*	-0.6	-1.7	-1.6	*0.8*	-0.1
Business/ Trader	13	-2.0	-2.3	*0.3*	0.3	-1.7	-1.9	*0.5*	0.3	-1.4	-1.7	*0.2*	0.3
Owner Cultivator	36	-2.1	-2.0	*0.3*	-0.1	-1.7	-1.7	*0.7*	-0.08	-1.5	-1.4	*0.7*	-0.06
Service	8	-1.8	-1.7	*0.7*	-0.1	-1.3	-1.4	*0.8*	0.1	-1.4	-1.1	*0.4*	-0.3
p for trend	101	0.6	0.6	-	1.0	0.06	0.2	-	0.5	0.09	0.4	-	0.5

The triceps analysis showed that again, the children in service families were better nourished, with no girls or boys below the 10th percentile. The disparity between the sexes was also least in this category. As with the Z scores, the sons of labourers were doing well, but there was a marked disparity between the sexes with 50 percent of girls below the 10th percentile (Table 5.14b).

Table 5.14b: Father's occupation with the children's triceps skinfold thickness

Triceps skinfold (mm)		Boys				Girls			
	N	≤10 % ile		≥50 % ile		≤10 % ile		≥50 % ile	
		N	(%)	N	(%)	N	(%)	N	(%)
Labourer (on other's)	6	0	(0.0)	0	(0.0)	3	(50.0)	0	(0)
Own and other's farm	21	8	(38.1)	3	(14.3)	9	(42.9)	1	(4.8)
Petty employee/ artisan	9	2	(22.2)	1	(11.1)	3	(33.3)	0	(0)
Business/ Trader	13	3	(23.1)	2	(15.4)	5	(38.5)	0	(0)
Owner Cultivator	36	11	(30.6)	2	(5.6)	16	(44.4)	2	(5.6)
Service	8	0	(0.0)	0	(0.0)	0	(0)	1	(12.5)
p for trend	93	0.7		0.4		0.3		0.4	

There were no trends in parents and grandparents BMI with father's occupation, and no trend in the difference between men and women. Fathers in the service households had the highest BMI leading to greater disparity between fathers and mothers. There was also a large disparity between mothers and fathers in the 'own and others farm' category, although in this case both parents tended to be extremely thin (Table 5.14c).

Table 5.14c: Father's occupation with the parents' and grandparents' BMI

BMI (kg/m^2)		Parents				Grandparents			
	N	Father	Mother	*p*	%BMI diff.	N	G'father	G'mother	*p*	%BMIdiff
Labourer (other's)	5	20.0	20.8	*0.6*	-4.2	0	-	-	-	-
Own &other's farm	19	19.7	17.9	*0.01*	8.4	5	19.2	18.8	*0.8*	1.1
Pet.emp/ artisan	9	19.7	18.5	*0.5*	4.4	0	-	-	-	-
Business/ Trader	13	22.1	20.9	*0.2*	3.9	3	25.8	21.6	*0.4*	12.5
Owner cultivator	36	19.8	18.2	*0.002*	6.7	17	19.7	19.3	*0.7*	0.7
Service	8	23.1	20.7	*0.08*	8.9	1	19.0	16.4	-	13.7
p for trend	90	0.2	0.7	-	0.5	26	0.9	1.0	-	1.0

5.6.3.2 Mother's occupation

The majority of mothers were involved in farm work. They were greater in number than fathers (mothers=79, fathers=40), because some fathers were employed in service jobs or had their own businesses (Table 5.15a). Very few mothers had a business or service occupation. The children of mothers who were housewives,

owner cultivators or petty employer/artisans were taller than the children of labourers or mothers working on 'own or others' farm. Disparity between the sexes did not vary according to maternal occupation (Table 5.15a).

Table 5.15a: Mother's occupation with the children's Z-scores

		Weight for Age				Height for Age				Weight for Height			
	N	Boy's Mean	Girl's Mean	p	Sam Index	Boy's mean	Girl's mean	p	Sam Index	Boy's Mean	Girl's Mean	p	Sam Index
Labourer (other's)	10	-2.2	-2.1	*0.8*	-0.07	-2.0	-1.8	*0.7*	-0.2	-1.4	-1.5	*0.6*	0.2
Own & other's	25	-2.2	-2.1	*0.4*	-0.1	-2.1	-2.0	*0.4*	-0.1	-1.3	-1.2	*0.6*	-0.08
Pet.Emp /artisan	2	-1.9	-0.7	*0.3*	-1.1	-1.7	-0.7	*0.03*	-1.0	-1.1	-0.4	*0.6*	-0.7
Business/ Trader	1	-2.2	-4.0	-	1.7	-2.1	-4.0	-	2.0	-1.3	-2.4	-	1.2
Owner Cultivator	44	-2.1	-1.9	*0.2*	-0.2	-1.7	-1.4	*0.2*	-0.3	-1.5	-1.5	*0.7*	0.05
Service	2	-2.0	-2.3	*0.7*	0.4	-1.0	-2.1	*0.6*	1.1	-1.9	-1.6	*0.09*	-0.3
Housewife	14	-2.1	-2.1	*0.8*	0.04	-1.6	-1.6	*0.9*	-0.02	-1.5	-1.7	*0.5*	0.1
p for trend	101	0.6	1.0	-	0.6	0.07	0.1	-	0.7	0.2	0.09	-	0.7

The triceps analysis showed that the children of housewives were better off and that the disparity between the sexes was least in this category (Table 5.15b).

Table 5.15b: Mother's occupation with the children's triceps skinfold thickness

Triceps skinfold (mm)		Boys				Girls			
	N	≤10 % ile		≥50 % ile		≤10 % ile		≥50 % ile	
		N	(%)	N	(%)	N	(%)	N	(%)
Labourer (on other's)	10	1	(10.0)	1	(10.0)	5	(50.0)	0	(0.0)
Own & other's worker	25	10	(40.0)	2	(8.0)	12	(48.0)	1	(4)
Petty employee/ artisan	2	0	(0.0)	0	(0.0)	1	(50.0)	0	(0.0)
Business/ Trader	1	0	(0.0)	0	(0.0)	1	(100)	0	(0.0)
Owner Cultivator	44	13	(29.5)	3	(6.8)	21	(47.7)	2	(4.5)
Service	2	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)
Housewife	14	3	(21.4)	2	(14.3)	2	(14.3)	1	(7.1)
p for trend	101	0.7		0.8		0.09		0.5	

The highest BMI for both fathers and mothers was in the one household in which the mother was engaged in business (cloth trader). Fathers and both grandparents also tended to have a higher BMI if the mothers were either working in service (both

teachers) or housewives. Amongst families where the mother was engaged in farming everyone was thin (Table 5.15c).

Table 5.15c: Mother's occupation with the parents' and grandparents' BMI

BMI (kg/m^2)	Parents					Grandparents				
	N	Father	Mother	*p*	%BMI diff.	N	G'father	G'mother	*p*	%BMI diff.
Labourer (on other's)	9	19.2	18.8	*0.7*	1.2	1	19.0	16.4	-	13.7
Own & other's worker	21	20.4	18.7	*0.02*	7.4	6	19.8	18.3	*0.3*	6.9
Petty employee/ artisan	2	18.9	18.4	*0.9*	1.5	0	-	-	-	-
Business/ Trader	1	27.1	25.6	-	5.6	0	-	-	-	-
Owner Cultivator	41	19.6	18.3	*0.005*	5.6	18	20.0	19.5	*0.6*	0.6
Service	2	24.8	20.0	*0.2*	19.4	0	-	-	-	-
Housewife	14	22.4	20.6	*0.1*	6.9	2	25.5	22.8	*0.8*	3.8
p for trend	90	0.04	0.2	-	0.6	27	0.2	0.03	-	0.5

5.6.3.3 Type of house

The categories of houses are defined in appendix B2. The type of housing has traditionally been considered one of the strongest markers of economic status. In my study the majority of houses were either kutcha or mixed pucca. There were no trends in WAZ, HAZ or WHZ across the range of housing, and no trends in male-female differences (Table 5.16a).

Table 5.16a: House type with the children's Z-scores

Z-score		Weight for Age				Height for Age				Weight for Height			
	N	Boy's Mean	Girl's Mean	p	Sam Index	Boy's mean	Girl's mean	p	Sam Index	Boy's Mean	Girl's Mean	p	Sam Index
Hut	10	-1.9	-2.0	*0.9*	0.03	-2.0	-1.6	*0.2*	-0.4	-1.0	-1.5	*0.007*	0.5
Kutcha	34	-2.2	-2.1	*0.2*	-0.1	-2.0	-1.8	*0.5*	-0.1	-1.4	-1.3	*0.3*	-0.1
Mixed Pucca	32	-2.2	-1.9	*0.08*	-0.3	-2.0	-1.6	*0.05*	-0.4	-1.4	-1.4	*0.9*	0.03
Pucca	20	-2.0	-2.1	*0.5*	0.1	-1.4	-1.6	*0.5*	0.2	-1.5	-1.7	*0.6*	0.1
Rented /Not own	5	-2.1	-2.1	*0.9*	0.03	-1.6	-2.0	*0.6*	0.3	-1.5	-1.3	*0.5*	-0.2
p for trend	101	0.8	0.7	-	0.6	0.1	1.0	-	0.1	0.1	0.4	-	0.6

As housing improved, there was a trend downwards in the number of girls with triceps below the 10th percentile. This reflects a stark contrast between families living in huts (80% girls below 10th percentile) and families living in rented accommodation (no girls below the 10th percentile) (Table 5.16b).

Table 5.16b: House type with the children's triceps skinfold thickness

Triceps skinfold (mm)		Boys				Girls			
	N	≤10 % ile		≥50 % ile		≤10 % ile		≥50 % ile	
		N	(%)	N	(%)	N	(%)	N	(%)
Hut	10	1	(10.0)	0	(0.0)	8	(80.0)	0	(0)
Kutcha	34	8	(23.5)	4	(11.8)	13	(38.2)	0	(0)
Mixed Pucca	32	11	(34.4)	2	(6.3)	14	(43.8)	3	(9.4)
Pucca	20	7	(35.0)	1	(5.0)	8	(40.0)	1	(5.0)
Rented / not own	5	1	(20.0)	1	(20.0)	0	(0)	0	(0)
p for trend	101	0.2		0.7		0.04		0.3	

Fathers, mothers and grandfathers all became significantly fatter across the range of housing. Mothers and fathers were most similar in the lowest and highest categories of house type (Table 5.16c).

Table 5.16c: House type with the parents' and grandparents' BMI

BMI (kg/m^2)	Parents					Grandparents				
	N	Father	Mother	*p*	%BMI diff.	N	G'father	G'mother	*p*	%BMI diff.
Hut	8	19.0	19.8	*0.5*	-5.2	3	19.8	22.0	*0.4*	-12.3
Kutcha	30	20.1	18.4	*0.004*	7.4	6	18.1	18.6	*0.7*	-4.6
Mixed pucca	29	20.1	18.2	*0.002*	8.1	9	20.4	19.1	*0.3*	5.2
Pucca	18	21.3	19.4	*0.01*	7.9	9	21.9	19.3	*0.1*	10.1
Rented / not own	5	22.7	23.1	*0.9*	-3.3	0	0	-	-	-
p for trend	90	0.01	0.04	-	0.6	27	0.06	0.4	-	0.03

5.6.3.4 Land score

Land is the basic source of income in the rural areas. In this region, there are two types of land, non-irrigated (dry) land and irrigated land (wet). Focus groups revealed that the villagers considered irrigated land four times better than non-irrigated land due to higher crop output. Therefore a new variable: 'land score', was calculated by

multiplying irrigated land four times and then adding non-irrigated land. As per this calculation, six acres per household was the median value among the 101 households. The data were divided into households having less or more than 6 acres of land. Children were taller in the higher land score category and this was particularly marked in the girls (Table 5.17a). However, the girls were thinner too in this category (Table 5.17b).

Table 5.17a: Land score with the children's Z-scores (*Parents in service are excluded)

Z-score		Weight for Age				Height for Age				Weight for Height			
	N	Boy's Mean	Girl's Mean	p	Sam Index	Boy's Mean	Girl's Mean	p	Sam Index	Boy's Mean	Girl's Mean	p	Sam Index
<6 Acres	43	-2.2	-2.1	*0.8*	-0.03	-2.1	-2.0	*0.6*	-0.09	-1.3	-1.3	*0.6*	0.07
≥ 6 Acres	52	-2.1	-1.9	*0.06*	-0.2	-1.7	-1.4	*0.08*	-0.3	-1.5	-1.5	*1.0*	-0.006
p for trend	95*	0.8	0.2	-	0.3	0.07	0.007	-	0.4	0.07	0.2	-	0.7

Table 5.17b: Land score with the children's triceps skinfold thickness

Triceps skinfold (mm)		Boys				Girls			
	N	≤10 % ile		≥50 % ile		≤10 % ile		≥50 % ile	
		N	(%)	N	(%)	N	(%)	N	(%)
< 6 Acres	43	13	(30.2)	5	(11.6)	16	(37.2)	0	(0)
≥ 6 Acres	52	15	(28.8)	3	(5.8)	27	(51.9)	3	(5.8)
p for trend	95*	0.9		0.3		0.1		0.8	

Mothers and fathers were thinner in households owning more land. The male-female disparity was similar in both groups (Table 5.17c).

Table 5.17c: Land score with the parents' and grandparents' BMI

BMI (kg/m^2)		Parents				Grandparents			
	N	Father	Mother	*p*	%BMI diff.	N	G'father	G'mother	*p*	%BMI diff.
< 6 Acres	37	20.3	19.2	*0.07*	4.3	6	19.2	18.3	*0.5*	3.9
≥ 6 Acres	47	19.9	18.3	*0.001*	6.6	21	20.6	19.7	*0.3*	2.4
p for trend	84*	0.6	0.09	-	0.5	27	0.4	0.3	-	0.9

5.6.3.5 Transport

Transport is extremely important in rural areas as there is no public transport. Availability of transport can improve economic output, and is a necessity for students to attend higher school or college. The commonest form of transport is the bicycle. As people become economically better off they tend to buy two-wheelers (scooters and motorcycles) or jeeps and tractors, the latter being a sign of great prosperity. Both boys and girls tended to be taller as category of transport improved (Table 5.18a).

Table 5.18a: Transport with the children's Z-scores

Z-score		Weight for Age				Height for Age				Weight for Height			
	N	Boy's Mean	Girl's Mean	p	Sam Index	Boy's Mean	Girl's Mean	p	Sam Index	Boy's Mean	Girl's Mean	p	Sam Index
None	33	-2.2	-2.2	*0.8*	0.04	-2.1	-1.9	*0.4*	-0.2	-1.3	-1.5	*0.9*	0.2
Bicycle	54	-2.1	-1.9	*0.07*	-0.2	-1.8	-1.6	*0.2*	-0.2	-1.5	-1.4	*0.4*	-0.09
2 Wheeler or <	10	-1.9	-1.9	*0.8*	-0.08	-1.5	-1.5	*1.0*	0.01	-1.4	-1.4	*0.9*	-0.03
4 Wheeler or <	4	-2.1	-2.0	*0.9*	-0.08	-1.2	-1.6	*0.7*	0.4	-1.8	-1.7	*0.8*	-0.2
p for trend	101	0.4	0.1	-	0.5	0.02	0.1	-	0.4	0.1	0.9	-	0.1

The triceps analysis showed that children were similar in the families with no transport compared to those that own bicycles. However, both boys and girls in families owning two-wheelers were significantly fatter. Interestingly, the highest percentage of boys below the 10th percentile was in the four-wheeler category (Table 5.18b).

Table 5.18b: Transport with the children's triceps skinfold thickness

Triceps skinfold (mm)		Boys				Girls			
	N	≤10 % ile		≥50 % ile		≤10 % ile		≥50 % ile	
		N	(%)	N	(%)	N	(%)	N	(%)
None	33	8	(24.2)	2	(6.1)	16	(48.5)	0	(0)
Bicycle	54	16	(29.6)	5	(9.3)	24	(44.4)	3	(5.6)
2 Wheeler or <	10	1	(10)	1	(10)	2	(20)	0	(0)
4 Wheeler or <	4	3	(75)	0	(0)	1	(25)	1	(25)
p for trend	101	0.4		0.9		0.1		0.09	

There were no differences in mean BMI or mother-father disparity across the range of transport (Table 5.18c).

Table 5.18c: Transport with the parents' and grandparents' BMI

BMI (kg/m^2)	Parents					Grandparents				
	N	Father	Mother	*p*	%BMI diff.	N	G'father	G'mother	*p*	%BMI diff.
None	28	21.0	19.3	*0.03*	5.9	5	19.4	20.6	*0.5*	-6.8
Bicycle	49	19.6	18.6	*0.02*	4.3	17	19.9	18.8	*0.2*	4.0
2 Wheeler or <	9	22.1	19.5	*0.01*	10.9	4	23.7	19.5	*0.2*	15.6
4 Wheeler or <	4	21.5	17.9	*0.002*	16.8	1	19.0	23.5	-	-23.3
p for trend	90	0.7	0.4	-	0.2	27	0.2	0.8	-	0.5

5.6.3.6 Bullock ownership

In farming communities, bullocks are an economic asset. They are used for ploughing and transport. Both girls and boys were taller in families owning bullocks. There were no marked male-female differences between the two groups (Table 5.19a).

Table 5.19a: Bullocks ownership with the children's Z-scores

Z-score		Weight for Age				Height for Age				Weight for Height			
	N	Boy's Mean	Girl's Mean	p	Sam Index	Boy's mean	Girl's mean	p	Sam Index	Boy's Mean	Girl's Mean	p	Sam Index
No	45	-2.2	-2.2	*1.0*	-0.001	-2.0	-2.0	*0.8*	-0.04	-1.3	-1.4	*0.6*	0.07
Yes	56	-2.1	-2.0	*0.08*	-0.2	-1.7	-1.5	*0.1*	-0.3	-1.5	-1.4	*0.9*	-0.02
p for trend	101	0.7	0.1	-	0.2	0.2	0.01	-	0.3	0.3	0.7	-	0.6

Despite being taller, children especially boys were thinner in houses owning bullocks (Table 5.19b). Fathers, mothers and grandfathers were thinner in houses owning bullocks (Table 5.19c).

Table 5.19b: Bullocks ownership with the children's triceps skinfold thickness

Triceps skinfold (mm)		Boys				Girls			
	N	≤10 % ile		≥50 % ile		≤10 % ile		≥50 % ile	
		N	(%)	N	(%)	N	(%)	N	(%)
No	45	7	(15.6)	5	(11.1)	16	(35.6)	1	(2.2)
Yes	56	21	(37.5)	3	(5.4)	27	(48.2)	3	(5.4)
p for trend	101	0.02		0.3		0.2		0.4	

Table 5.19c: Bullocks ownership with the parents' and grandparents' BMI

BMI (kg/m^2)	Parents					Grandparents				
	N	Father	Mother	*p*	%BMI diff.	N	G'father	G'mother	*p*	%BMI diff.
No	41	20.9	19.5	0.02	5.3	3	22.8	18.7	0.3	13.9
Yes	49	19.9	18.4	0.001	6.6	24	20.0	19.5	0.5	1.3
p for trend	90	0.09	0.03	-	0.7	27	0.2	0.7	-	0.3

I also examined the data in relation to the ownership of a bullock cart, as another economic indicator. This showed a similar pattern as with bullock ownership.

5.6.4 Amenities

5.6.4.1 Availability of electricity

Households with electricity have access to television as a window to the outside world. Children are able to do school work even after dark. These households can use work saving devices such as electric cookers and food-mixers. Fifteen percent of houses did not have an electric supply. Boys and girls were slightly taller in households having electricity (Table 5.20a).

Table 5.20a: Availability of electricity with the children's Z-scores

Z-score		Weight for Age				Height for Age				Weight for Height			
	N	Boy's Mean	Girl's Mean	p	Sam Index	Boy's mean	Girl's mean	p	Sam Index	Boy's Mean	Girl's Mean	p	Sam Index
No	16	-2.2	-2.1	*0.2*	-0.2	-2.2	-2.0	*0.2*	-0.2	-1.2	-1.3	*0.8*	0.06
Yes	85	-2.1	-2.0	*0.3*	-0.1	-1.8	-1.6	*0.3*	-0.1	-1.4	-1.5	*0.9*	0.01
p for trend	101	0.6	0.9	-	0.8	0.1	0.3	-	0.7	0.2	0.4	-	0.8

Triceps analysis showed both boys and girls were fatter, and there was less male-female disparity in houses with electricity (Table 5.20b).

Table 5.20b: Availability of electricity with children's triceps skinfold thickness

Triceps skinfold (mm)		Boys				Girls			
	N	≤10 % ile		≥50 % ile		≤10 % ile		≥50 % ile	
		N	(%)	N	(%)	N	(%)	N	(%)
No	16	5	(31.3)	2	(12.5)	10	(62.5)	0	(0)
Yes	85	28	(27.1)	6	(7.1)	33	(38.8)	4	(4.7)
p for trend	101	0.7		0.5		0.09		0.9	

There were no differences in BMI among parents or grandparents between families with or without electricity (Table 5.20c).

Table 5.20c: Availability of electricity with the parents' and grandparents' BMI

BMI (kg/m^2)		Parents				Grandparents			
	N	Father	Mother	*p*	%BMI diff.	N	G'father	G'mother	*p*	%BMI diff.
No	14	20.5	19.2	0.2	5.1	1	16.4	17.2	-	-4.6
Yes	76	20.4	18.9	0.000	6.2	26	20.5	19.5	0.2	3.0
p for trend	90	0.9	0.7	-	0.8	27	0.2	0.4	-	0.7

5.6.4.2 Water well

There tapped water supply to some parts of the main village. Water has to be collected either from a communal well, or for some families there is a 'personal' well adjacent to the house. Collecting water is one of the heaviest duties, usually for the women. A personal well is therefore a work saving asset. Thirty two percent of households owned a personal well as providing lesser exposure to water-borne infection. Their children, especially the girls, had higher WAZ and HAZ scores (Table 5.21a).

Table 5.21a: Availability of water well with children's Z-scores

Z-score		Weight for Age				Height for Age				Weight for Height			
	N	Boy's Mean	Girl's Mean	p	Sam Index	Boy's mean	Girl's mean	p	Sam Index	Boy's Mean	Girl's Mean	p	Sam Index
No	69	-2.2	-2.1	*0.6*	-0.05	-2.0	-1.8	*0.4*	-0.1	-1.4	-1.4	*0.5*	0.07
Yes	32	-2.0	-1.8	*0.1*	-0.2	-1.6	-1.3	*0.3*	-0.3	-1.5	-1.4	*0.6*	-0.08
p for trend	101	0.3	0.04	-	0.3	0.09	0.02	-	0.6	0.6	0.7	-	0.4

The households with well had higher percentages of children were below 10th percentile for triceps (Table 5.21b).

Table 5.21b: Availability of water well with the children's triceps skinfold thickness

Triceps skinfold (mm)		Boys				Girls			
	N	≤10 % ile		≥50 % ile		≤10 % ile		≥50 % ile	
		N	(%)	N	(%)	N	(%)	N	(%)
No	69	18	(26.1)	6	(8.7)	26	(37.7)	1	(1.4)
Yes	32	10	(31.3)	2	(6.3)	17	(53.1)	3	(9.4)
p for trend	101	0.6		0.7		0.1		0.09	

There was no difference in the parents' BMI according to well ownership. Specifically, there was no sign that the women were better off as a result of having a well nearby. The male-female disparity was similar in households with and without a personal well (Table 5.21c).

Table 5.21c: Availability of water well with the parents' and grandparents' BMI

BMI (kg/m^2)		Parents					Grandparents				
	N	Father	Mother	*p*	%BMI diff.	N	G' father	G'mother	*p*	%BMI diff.	
No	59	20.3	19.1	*0.008*	4.5	15	19.3	19.1	*0.9*	0.1	
Yes	31	20.7	18.6	*0.000*	8.9	12	21.6	19.7	*0.2*	6.0	
p for trend	90	0.5	0.4	-	0.2	27	0.06	0.6	-	0.4	

5.6.4.3 Distance from main village

My study sample contained a good mixture of children living in the main village and in hamlets some distance away from the village (Table 5.22a). Mean WAZ, HAZ and WHZ values were unrelated to the distance from the main village. Girls were significantly better off than boys for WAZ and HAZ in hamlets >3 kms distant from the main village, but otherwise location appeared to be irrelevant to boy-girl differences.

Table 5.22a: Distance from main village with the children's Z-scores

Z-score		Weight for Age				Height for Age				Weight for Height			
	N	Boy's Mean	Girl's Mean	p	Sam Index	Boy's mean	Girl's mean	p	Sam Index	Boy's Mean	Girl's Mean	p	Sam Index
Within 1km	40	-2.1	-2.1	*1.0*	-0.008	-1.7	-1.7	*1.0*	0.008	-1.5	-1.5	*0.8*	0.03
1-3 km	29	-2.2	-2.1	*0.5*	-0.1	-1.9	-1.8	*0.6*	-0.1	-1.5	-1.5	*1.0*	-0.001
> 3 km	32	-2.1	-1.9	*0.03*	-0.1	-1.9	-1.5	*0.04*	-0.4	-1.3	-1.3	*0.8*	0.03
p for trend	101	0.7	0.4	-	0.2	0.3	0.5	-	0.1	0.4	0.4	-	1.0

The skinfold data showed that children living > 3 kms away from the village were thinner, with very high percentages of children below the 10th percentile. Interestingly the boy-girl differences were smallest in this group (Table 5.22b).

Table 5.22b: Distance from main village with the children's triceps skinfold thickness

Triceps skinfold (mm)		Boys				Girls			
	N	≤10 % ile		≥50 % ile		≤10 % ile		≥50 % ile	
		N	(%)	N	(%)	N	(%)	N	(%)
Within 1km	40	7	(17.5)	5	(12.5)	11	(27.5)	2	(5.0)
1-3 km	29	8	(27.6)	0	(0.0)	15	(51.7)	2	(6.9)
> 3 km	32	13	(40.6)	3	(9.4)	17	(53.1)	0	(0.0)
p for trend	101	0.03		0.6		0.03		0.3	

The adults also tended to be thinner in the hamlets (not true for grandmothers). The mother-father differences were greatest outside the main village, while the opposite was true for grandmothers (Table 5.22c).

Table 5.22c: Distance from main village with the parents' and grandparents' BMI

BMI (kg/m^2)		Parents					Grandparents				
	N	Father	Mother	*p*	%BMI diff.	N	G'father	G'mother	*p*	%BMI diff.
Within 1km	38	20.8	19.7	*0.05*	3.9	6	22.8	17.7	*0.008*	21.4
1-3 km	25	19.9	18.0	*0.006*	8.5	5	21.7	19.5	*0.2*	9.3
> 3 km	27	20.3	18.7	*0.009*	6.7	16	19.0	20.0	*0.2*	-6.4
p for trend	90	0.5	0.07	-	0.04	27	0.006	0.07	-	0.000

5.6.5 Food related factors

5.6.5.1 Parents vegetarian or non-vegetarian

A person's choice to be vegetarian or non-vegetarian can be a religious decision, but more often it is an economic one. It is a complex issue, however, non-vegetarian food may provide better dietary quality but is expensive. Cheaper meats i.e. pork are eaten by lower caste families as they themselves rear pigs. Also, there can be a mixture of vegetarians and non-vegetarians within a single household; women are more likely to stay vegetarian for religious reasons and men have access to non-vegetarian food outside the house. In my study, a similar of percentages of mothers and fathers were non-vegetarian (60%). I found no differences in the nutritional status of children or adults according to whether the mother or father was vegetarian or non-vegetarian (Tables not shown).

5.6.5.2 Oil consumption

Oil is an energy dense food source. People who are economically better off like to enrich their diet with oil. The median intake of oil per household per person was 0.34 kg per month. The most commonly used oils were groundnut and mustard oil. There was no increase in the children's WAZ, HAZ or WHZ in families consuming more oil Table 5.23a).

Table 5.23a: Comparison of oil consumption with the children's Z-scores

Z-score		Weight for Age				Height for Age				Weight for Height			
Kg/ml/person	N	Boy's Mean	Girl's Mean	p	Sam Index	Boy's mean	Girl's mean	p	Sam Index	Boy's Mean	Girl's Mean	p	Sam Index
< 0.34	47	-2.1	-1.9	*0.2*	-0.1	-1.9	-1.7	*0.5*	-0.1	-1.3	-1.3	*0.6*	-0.06
≥0.34	54	-2.2	-2.1	*0.5*	-0.09	-1.8	-1.6	*0.3*	-0.2	-1.5	-1.6	*0.5*	0.09
p for trend	101	0.6	0.4	-	0.8	0.9	0.6	-	0.8	0.2	0.04	-	0.4

However, both boys and girls tended to be slightly fatter in these households. There was no difference in the gender disparity between households with high or low consumption (Table 5.23b).

Table 5.23b: Oil consumption with the children's triceps skinfold thickness

Triceps skinfold (mm)		Boys				Girls			
	N	≤10 % ile		≥50 % ile		≤10 % ile		≥50 % ile	
		N	(%)	N	(%)	N	(%)	N	(%)
< 0.34	47	15	(31.9)	3	(6.4)	23	(48.9)	3	(6.4)
≥0.34	54	13	(24.1)	5	(9.3)	20	(37.0)	1	(1.9)
p for trend	101	0.4		0.6		0.2		0.3	

Fathers and grandfathers had a higher BMI in households with higher oil consumption. There was no evidence of better nutritional status amongst women (Table 5.23c).

Table 5.23c: Oil consumption with the parent' and grandparent' BMI

BMI (kg/m^2)	Parents					Grandparents				
	N	Father	Mother	*p*	%BMI diff.	N	G'father	G'mother	*p*	%BMI diff.
< 0.34	38	19.8	18.8	*0.06*	3.7	15	19.2	19.5	*0.7*	-2.8
≥0.34	52	20.8	19.0	*0.000*	7.7	12	21.7	19.2	*0.05*	9.6
p for trend	90	0.08	0.7	-	0.2	27	0.04	0.8	-	0.09

5.6.5.3 Milking animals

Milk is a source of high quality protein. It is both expensive and deteriorates without refrigeration; so only children in the households with a milking animal tend to get milk. Adults often drink tea without milk if there is no milking animal. Ownership of a milking animal is also an economic asset because the milk can be sold. There were no significant differences in the children's WAZ, HAZ and WHZ between families with or without milking animals (Table 5.24a).

Table 5.24a: Milking animal ownership with the children's Z-scores

Z-score		Weight for Age				Height for Age				Weight for Height			
	N	Boy's Mean	Girl's Mean	p	Sam Index	Boy's mean	Girl's mean	p	Sam Index	Boy's Mean	Girl's Mean	p	Sam Index
No	28	-1.9	-2.0	*0.4*	0.1	-1.7	-1.8	*0.5*	0.2	-1.2	-1.4	*0.5*	0.1
Yes	73	-2.2	-2.0	*0.04*	-0.2	-1.9	-1.6	*0.03*	-0.3	-1.5	-1.5	*0.9*	-0.01
p for trend	101	0.08	0.9	-	0.08	0.3	0.4	-	0.08	0.2	0.6	-	0.5

Boys had significantly thinner triceps in houses owning a milking animal. Otherwise the measurements were similar for boys and girls in families with or without milking animals (Table 5.24b).

Table 5.24b: Milking animal ownership with the children's triceps skinfold thickness

Triceps skinfold (mm)		Boys		Girls	
	N	≤10 % ile N (%)	≥50 % ile N (%)	≤10 % ile N (%)	≥50 % ile N (%)
No	28	2 (7.1)	3 (10.7)	12 (42.9)	1 (3.6)
Yes	73	26 (35.6)	5 (6.8)	31 (42.5)	3 (4.1)
p for trend	101	0.01	0.5	1.0	0.9

Ownership of a milking animal was associated with a significantly lower BMI in both parents and grandparents (Table 5.24c).

Table 5.24c: Milking animal ownership with the parents' and grandparents' BMI

BMI (kg/m^2)		Parents				Grandparents				
	N	Father	Mother	*p*	%BMI diff.	N	G'father	G'mother	*p*	%BMI diff.
No	25	21.7	20.4	*0.1*	4.2	1	31.9	22.0	-	30.8
Yes	65	19.9	18.3	*0.000*	6.7	26	19.9	19.3	*0.4*	1.6
p for trend	90	0.005	0.000	-	0.5	27	0.000	0.3	-	0.1

5.6.5.4 Father's fasting

The focus group discussions highlighted fasting as a major factor influencing food intakes in this community. There are very few data on fasting practices in Indian villages. I therefore decided to include data on fasting in the family survey.

Less than half, 46% of the fathers practised fasting. Girls tended to be shorter when the father was a non-faster, but there were no major differences in the nutritional status of children according to fathers' fasting habits (Table 5.25a).

Table 5.25a: Father's fasting with the children's Z-scores

Z-score		Weight for Age				Height for Age				Weight for Height			
	N	Boy's Mean	Girl's Mean	p	Sam Index	Boy's mean	Girl's mean	p	Sam Index	Boy's Mean	Girl's Mean	p	Sam Index
Once< in wk	14	-2.0	-2.0	*0.6*	-0.5	-1.7	-1.5	*0.6*	-0.5	-1.4	-1.6	*0.5*	-0.3
Twice a month	19	-2.0	-1.6	*0.1*	-0.3	-1.7	-1.3	*0.2*	-0.3	-1.3	-1.2	*0.6*	-0.1
Once< in year	10	-2.3	-2.2	*0.7*	-0.1	-2.0	-1.8	*0.5*	-0.2	-1.5	-1.5	*1.0*	2.0
None	50	-2.2	-2.2	*0.9*	-8.4	-1.9	-2.0	*0.9*	1.7	-1.4	-1.4	*0.9*	1.9
p for trend	93	0.4	0.07	-	0.3	0.3	0.02	-	0.3	0.9	0.9	-	1.0

There were no differences among children in triceps skinfold thickness according to the fathers fasting habits. Also, there were no marked differences in adult BMI; women were thinner than men in all categories (Table not shown).

5.6.5.5 Mother's fasting

Overall more mothers fasted than fathers (64%), and the majority of them were fasting 'once or more in a week'. No trends were seen in the children's WAZ, HAZ or WHZ or in the boy-girl differences (Table 5.26a).

Table 5.26a: Mother's fasting with the children's Z-scores

Z-score		Weight for Age				Height for Age				Weight for Height			
	N	Boy's Mean	Girl's Mean	p	Sam Index	Boy's mean	Girl's mean	p	Sam Index	Boy's Mean	Girl's Mean	p	Sam Index
Once< in a wk	46	-2.1	-2.1	*1.0*	0.001	-1.7	-1.7	*0.02*	-0.02	-1.4	-1.5	*0.5*	-0.1
Twice in month	13	-1.9	-1.8	*0.6*	-0.1	-1.7	-1.6	*0.7*	-0.2	-1.2	-1.2	*0.01*	-1.0
Once< in year	8	-2.4	-1.9	*0.3*	-0.5	-1.8	-0.9	*0.2*	-0.9	-1.9	-1.7	*0.1*	-0.1
None	31	-2.2	-2.1	*0.3*	-0.1	-2.0	-1.9	*0.3*	-0.2	-1.3	-1.4	*0.05*	4.6
p for trend	98	0.3	0.9	-	0.3	0.1	0.6	-	0.4	0.8	0.8	-	0.9

The least boys and girls difference was when the mothers did not fast (Table 5.26b).

Table 5.26b: Mother's fasting habit with the children's triceps skinfold thickness

Triceps skinfold (mm)		Boys				Girls			
	N	≤10 % ile		≥50 % ile		≤10 % ile		≥50 % ile	
		N	(%)	N	(%)	N	(%)	N	(%)
Once< in a week	46	13	(28.3)	2	(4.3)	23	(50.0)	1	(2.2)
Twice in a month	13	0	(0.0)	2	(15.4)	2	(15.4)	1	(7.7)
Once< in year	8	1	(12.5)	2	(25.0)	3	(37.5)	0	(0.0)
None	31	13	(41.9)	2	(6.5)	14	(45.2)	2	(6.5)
p for trend	101	0.2		0.6		0.7		0.4	

There were no marked differences in the BMI or male-female disparity according to the mothers fasting practice (Table 5.26c).

Table 5.26c: Mother's fasting habit with the parents' and grandparents' BMI

BMI (kg/m^2)		Parents					Grandparents				
	N	Father	Mother	*p*	%BMI diff.	N	G'father	G'mother	*p*	%BMI diff.
Once< in a week	39	20.7	19.1	*0.02*	6.0	5	20.6	18.8	*0.3*	8.1
Twice in a month	13	21.2	18.8	*0.01*	10.4	2	17.2	19.1	*0.4*	-10.9
Once < year	7	19.4	18.1	*0.3*	5.2	4	23.2	19.1	*0.1*	16.0
None	31	19.9	18.9	*0.02*	4.4	16	19.9	19.7	*0.8*	-0.6
p for trend	90	0.2	0.6	-	0.6	27	0.9	0.5	-	0.5

5.6.6 Sibling sex parity

The literature review suggested that in north India and Bangladesh second and third born daughters in households with no sons are less well cared for and have poorer nutritional status. Clearly, my study did not include any families with no sons. I did however collect data on sex parity in my families. Sex parity is the position of a sibling amongst the same sex siblings in a house i.e. if a boy is first born male then the sex parity is one.

5.6.6.1 Boys and girls Z scores

Most of the boys were first born amongst the sibling pairs. Boys WAZ and HAZ decreased as their parity for boys increased (Table 5.27a), though this was not statistically significant.

Table 5.27a: Boy's sex parity with the children's Z-scores

Z-score		Weight for Age				Height for Age				Weight for Height			
	N	Boy's Mean	Girl's Mean	*P*	Sam Index	Boy's mean	Girl's mean	P	Sam Index	Boy's Mean	Girl's Mean	p	Sam Index
First	76	-2.1	-2.0	0.3	-0.09	-1.9	-1.8	0.4	-0.1	-1.4	-1.4	0.9	0.01
Second	18	-1.9	-1.9	0.9	-0.03	-1.5	-1.3	0.5	-0.2	-1.4	-1.5	0.3	0.2
Third	4	-2.5	-1.7	0.09	-0.8	-2.6	-2.3	0.5	-0.3	-1.5	-0.4	0.04	-1.1
Fourth<	3	-2.4	-2.2	0.8	-0.1	-2.3	-1.2	0.2	-1.1	-1.3	-2.3	0.1	1.0
p for trend	101	0.7	0.7	-	0.4	0.6	0.4	-	0.2	0.9	0.8	-	0.7

First born girls were marginally worst off than the others, although none of the results were significant (Table 5.27b).

Table 5.27b: Girl's sex parity with the children's Z-scores

Z-score		Weight for Age				Height for Age				Weight for Height			
	N	Boy's Mean	Girl's Mean	*P*	Sam Index	Boy's mean	Girl's mean	p	Sam Index	Boy's Mean	Girl's Mean	p	Sam Index
First	53	-2.1	-2.1	0.7	-0.05	-1.9	-1.8	0.5	-0.1	-1.3	-1.4	0.5	0.08
Second	27	-2.1	-1.9	0.3	-0.2	-1.7	-1.5	0.5	-0.2	-1.5	-1.5	0.7	-0.06
Third	16	-2.2	-2.0	0.5	-0.2	-1.9	-1.7	0.4	-0.2	-1.5	-1.5	0.9	-0.02
Fourth<	5	-2.1	-2.0	0.3	-0.2	-2.1	-1.9	0.5	-0.3	-1.1	-1.1	0.9	0.02
p for trend	101	0.7	0.8	-	0.5	0.8	0.8	-	0.6	0.8	0.8	-	0.6

5.6.6.2 Triceps skinfold thickness with boys and girls sex parity

There were no associations between sex parity and triceps skinfold thickness for either boys (Table 5.27c) or girls (Table 5.27d).

Table 5.27c: Boy's sex parity with the children's triceps skinfold thickness

Triceps skinfold (mm)		Boys				Girls			
	N	≤10 % ile		≥50 % ile		≤10 % ile		≥50 % ile	
		N	(%)	N	(%)	N	(%)	N	(%)
First	76	19	(25.0)	7	(9.2)	29	(38.2)	3	(3.9)
Second	18	5	(27.8)	0	(0.0)	10	(55.6)	0	(0.0)
Third	4	3	(75.0)	0	(0.0)	3	(75.0)	1	(25.0)
Fourth<	3	1	(33.3)	1	(33.3)	1	(33.3)	0	(0.0)
p for trend	101	0.2		0.9		0.2		0.7	

Table 5.27d: Girl's sex parity with the children's triceps skinfold thickness

Triceps skinfold (mm)		Boys				Girls			
	N	≤10 % ile		≥50 % ile		≤10 % ile		≥50 % ile	
		N	(%)	N	(%)	N	(%)	N	(%)
First	53	15	(28.3)	4	(7.5)	22	(41.5)	2	(3.8)
Second	27	7	(25.9)	3	(11.1)	12	(44.4)	1	(3.7)
Third	16	5	(31.3)	1	(6.3)	5	(31.3)	1	(6.3)
Fourth<	5	1	(20.0)	0	(0.0)	4	(80.0)	0	(0.0)
p for trend	101	0.9		0.7		0.6		1.0	

5.6.6.3 Adult BMI with sex parity of boys and girls

Overall no trends in BMI were noted in adults in relation to the boy's sex parity (Table 5.27e).

Table 5.27e: Boy's sex parity with the parents' and grandparents' BMI

BMI (kg/m^2)	Parents					Grandparents				
	N	Father	Mother	*p*	%BMI diff.	N	G'father	G'mother	*p*	%BMI diff.
First	71	20.4	19.0	0.001	5.7	22	20.2	19.5	0.5	1.0
Second	13	20.4	19.2	0.05	5.8	4	21.2	19.4	0.1	8.0
Third	4	20.4	18.1	0.2	10.6	1	20.2	16.1	-	20.1
Fourth<	2	18.8	16.9	0.6	9.7	0	-	-	-	-
p for trend	90	0.6	0.4	-	0.6	27	0.7	0.4	-	0.3

In contrast, the male-female differences for parents increased as the girls' sex parity increased. Fathers' BMI remained unchanged (Table 5.27f).

Table 5.27f: Girl's sex parity with the parents' and grandparents' BMI

BMI (kg/m^2)	Parents					Grandparents				
	N	Father	Mother	*p*	%BMI diff.	N	G'father	G'mother	*p*	%BMI diff.
First	44	20.2	19.1	0.02	3.8	12	20.1	18.9	0.3	4.6
Second	27	20.3	18.9	0.05	6.3	11	20.4	20.2	0.9	-2.8
Third	15	20.8	18.6	0.008	10.1	2	20.6	19.3	0.4	6.1
Fourth <	4	21.6	18.4	0.3	12.7	2	21.4	17.5	0.02	18.5
p for trend	90	0.3	0.4	-	0.1	27	0.6	0.8	-	0.6

5.7 Discussion

Even though the main area of investigation was to look at adult differences in nutritional status I planned to estimate the nutritional status of the whole household in the selected sample.

The Z-scores for all children were negative indicating prevalence of under-nutrition of Indian children in comparison to the NCHS reference population. My study findings were similar to the recently conducted National Family Health Survey (1992-93) in Maharashtra, where children under four years were studied showing 53 percent of children to be underweight (–2SD, weight for age), 46 percent were stunted (–2SD, height for age); and 20 percent were wasted (-2SD, weight for height)(International Institute of Population Sciences (IIPS), 1994).

Interestingly no statistically significant sex differences were noted amongst the Z-scores for brother and sister sibling pairs (Table 5.3, p 90). The mean triceps skinfold thickness for girls was higher than boys, which was as predicted as girls do tend to have higher body fat than boys. However, when percentiles were compared sex difference in brothers and sisters became evident as more girls (43%) than boys (28%) were below the 10th percentile for triceps (Table 5.5, p 91). The Z-scores findings are consistent with the earlier survey conducted by Demographic and Health Surveys in

south-Asian countries (Sommerfelt and Stewart, 1994) which showed boys and girls to have similar Z-scores. I know of no studies comparing sex-specific skinfold measurements among Indian children. An overall conclusion from this study could be that daughters in this village were slightly thinner but not shorter than their brothers, and that there was relatively little evidence of gender disparity.

However, amongst the parents and grandparents, a higher percentage of women suffered from chronic energy deficiency than men. The mean BMI for the mothers (18.8) and grandmothers (19.2) was lower than that for fathers (20.4) and grandfathers (20.2). This reiterated the findings of the Pune Maternal Nutrition Study (PMNS) and was coherent with the reports of the national surveys conducted in India by the National Nutrition Monitoring Bureau (NNMB) (Nadamuni Naidu and Prahlad Rao, 1994). My study suggests that any unfavourable treatment to females affecting their nutritional status manifests more in adult life.

Along with the nutritional status of the household I collected different socio-economic parameters like parental education and occupation details, caste, family type, food related indicators, indicators of availability of external resources and economic indicators. All these have been documented to contribute towards the nutritional status.

Parental education

It is often stressed that improvement in maternal education is essential for improvement in child survival and giving daughters a more even chance for survival and nutrition(Bourne and Walker, 1991). Studies show maternal education has a positive effect on children's health and nutritional status(Desai and Alva, 1998). For example, Bairagi (1980), in his study from rural Bangladesh on child nutrition and maternal education, found that a literate mother used scarce resources more effectively for her child's welfare than did an illiterate mother with higher income(Bairagi, 1980). Sen and Sengupta's (1983) study of two villages in West Bengal showed children of literate mothers faring better in terms of nourishment than those of illiterate mothers(Sen and Sengupta, 1983). However, they stressed that 'education and prosperity go hand in hand' as the beneficial effects of mothers'

education was greatest in villages where there was a higher degree of 'urban integration' i.e. more economic wealth.

Interpretation of the role of maternal education was difficult in my study, as more than half the mothers were illiterate. Improvement in a mother's education related to an increase in her husband's nutritional status but not in her own or that of her children (Table 5.9a-c p97-98). There was no evidence from my study that maternal education influences gender disparity.

Improvement in fathers' educational status was associated with greater gender disparity. There was a marked increase in gender differential, as paternal education improved, daughters becoming lighter and shorter relative to their brothers (Table 5.8a-b, p95-96). It is difficult to compare these findings as few others have studied paternal education and its relation to nutritional status. However, the available findings from a study of paternal literacy and child survival showed male literacy enhanced the female disadvantage as it reduced male child mortality more than the female child mortality(Murthi et al. 1995).

Parental occupation

The poorest nutritional status was amongst farmers, and the most affected were the members of farming families who worked on their own as well as on the land belonging to others (Table 5.14c, p104). These families could be classified as the most vulnerable group who have less land of their own and have to work as paid labourers on other's farm to supplement their income.

Amongst parents and grandparents, maternal and paternal employment in a service or other non-farming occupations was associated with a higher BMI in both men and women (Table 5.14c, 5.15c, p104,106). Few women, however, were employed in such occupations.

Interestingly, households where the mothers were housewives and did not work on the farm, had better nourished children and with less gender difference (Table 5.15 a-b, p105). This can be identified as a direct indicator of better economic status, as the

need for women to work in these homes does not arise. Previous studies have indicated that women's employment leads to gaining decision making power within the household and that women who have high economic value receive larger shares of food and health resources (World Bank, 1991). This was not evident in this study probably due to non-availability of non-farming jobs in the study village.

Caste

Less gender bias is reported in lower than in upper caste groups across India (Sen and Sengupta, 1983), (Beteille, 1990). My study did not show any association between caste and the nutritional status of family members. This was possibly because the majority of households belonged to the farming community of Marathas and Malis, which are in the middle of the caste hierarchy. The smallest male-female differences were found in the 'Mali' caste but the reasons were not clear, as Mali caste families follow a similar lifestyle to Marathas (Table 5.10a-c, p98-99).

Family type

Traditionally in India joint families exist but recent transformation due to family members working away from their home has led to the breaking down of this family type with emergence of nuclear families. My study findings show children to have better skinfolds in nuclear than those in joint families (Table 5.11b, p100). Similarly, mothers and fathers living in a nuclear family had higher BMI than those living in joint families, living in larger households or having in-laws living with them (Table 5.11c, p100). Small nuclear families did influence the nutritional status of the children and adults.

Economic Indicators

Studies on intra-household food distribution show that higher economic status does not necessarily improve the chances of egalitarian food distribution within the household (Basu et al. 1986), and sometimes it may lead to more sex discrimination (Sen and Sengupta, 1983). Bias against females in food distribution has been documented by (den Hartog, 1972), (Kynch and Sen, 1983), (Douglas, 1984).

Several parameters collected in the family survey represent the economic status of the household. Derived socio-economic score showed an increase in children's Z-scores with improving socio-economic score but did not show any association with sex differences amongst the children. However amongst adults, it showed an increase in fathers' BMI, and the thinness of mothers was more pronounced than fathers, in upper socio-economic score households (Table 5.7a-c, p94-95). This pattern repeated itself with other economic indicators.

Ownership of bicycle, scooter or jeep, availability of electricity, land ownership and higher consumption of cooking oil, all economic indicators, were associated with better nutritional status in children, who were either taller or fatter (Table 5.18a, p109 5.17a, p108; 5.23b, p116) These indicators were not related to gender disparity in the children. However they were associated with increased BMI in fathers, and not mothers, leading to greater gender disparity among adults.

Owning bullocks, traditionally a symbol of economic prosperity, was associated with thinness in both adults and children, possibly because of the work involved in caring for these animals (Table 5.19b, p110). Similarly, owning milking animals and poultry were not related to better nutrition in either children or adults (Table 24b-c, p117).

Exposure to the outside world

Dispersion of and access to information in the rural environment is often uneven. The Indian central and state level governments have numerous programmes and policies for rural people but they are not disseminated properly. Therefore to measure if a household had a high exposure to the outside world I combined several parameters. These were ownership of radio or television, as the information is often disseminated via these media; ownership of a motor vehicle, which literally promotes mobility and access to outside world, and use of an iron, as a family or person meeting people from outside the local community needs to iron clothes.

Interestingly, these factors were often associated with less gender disparity amongst the siblings (Table 5.12a-b, p101; 5.18a-b, p109; 5.13a-b, p102). However amongst

adult members of the households, they were associated with a higher BMI in the *fathers only* (Table 5.12c, p101; 5.18c, p110; 5.13c, p102).

Similarly, distance from the main village showed the children and mothers were thinner (Table 5.22a-c, p114), with greater disparity amongst the adult's nutritional status, the further the family stayed from the main village. These findings indicate an influence of the availability of resources on nutritional status. Firstly, mothers and children seldom visited the main village and probably did not have access to snacks. Secondly, non-availability of tap water to villagers living away in hamlets, and the need for women to fetch water from a well is reflected in their lower nutritional status.

5.8 Overall Summary

To summarise, analysis of household socio-economic parameters showed that direct economic indicators e.g. improving parental occupation, land ownership, access to electricity, and ownership of radio/TV, well, iron or motor vehicle, oil consumption and living in a nuclear family were associated with improvement in the children's nutritional status. Amongst adults, these parameters were associated with better nutritional status of the men (fathers and grandfathers) but not that of mothers or grandmothers.

When assessing gender differences in the nutritional status of males and females, the results indicate that in children, increase in father's education was associated with greater disparity, while ownership of a radio or TV, an iron, vehicle and electricity was associated with less disparity. However, in adults, higher socio-economic score, upper caste, owning an iron, consumption of more oil and greater the distance to the main village were all associated with greater thinness of women compared with men.

In using the household questionnaire (chapter six) I moved away from these household-level indicators, to examine gender differences in the day to lives of individual household members.

Chapter 6 The Household Questionnaire

Focus group discussions identified possible reasons why the women in this community were thin. These were related to a heavier workload, both in the home and on the farm; less control of resources and decision making; fasting practices; and changes after marriage and childbearing. According to the community, these have a cumulative adverse effect on the nutritional status of young women.

The anthropometric measurements carried out during the family survey confirmed that women were significantly thinner than their men, and amongst children girls were thinner than boys, at least for skinfold measurements.

For the third phase of my study I used a 'household questionnaire' to collect in-depth information from all members (men and women, girls and boys) of selected households.

6.1 Aims of the Household Questionnaire

- To study at household level differences in behaviour between males and females, picking up the themes identified in the focus groups and family survey.
- To look for evidence that these differences in behaviour contribute to the relative thinness of females compared to males.

6.2 Method

6.2.1 Selection of households

Households were selected based on differences between males and females: households where women and girls were markedly better nourished than the men and boys and vice versa. They were selected from the 101 families who took part in the family survey. The following selection process was used:

a. Households were first divided into two groups according to the mother's BMI, one (group 1 in green) where the mothers were below the median BMI of 18.3 and the other (group 2 in blue) where the mothers were above the median BMI of 18.3 (Figure 6.1). This was done to ensure a wide range of overall nutritional status in my sample households.

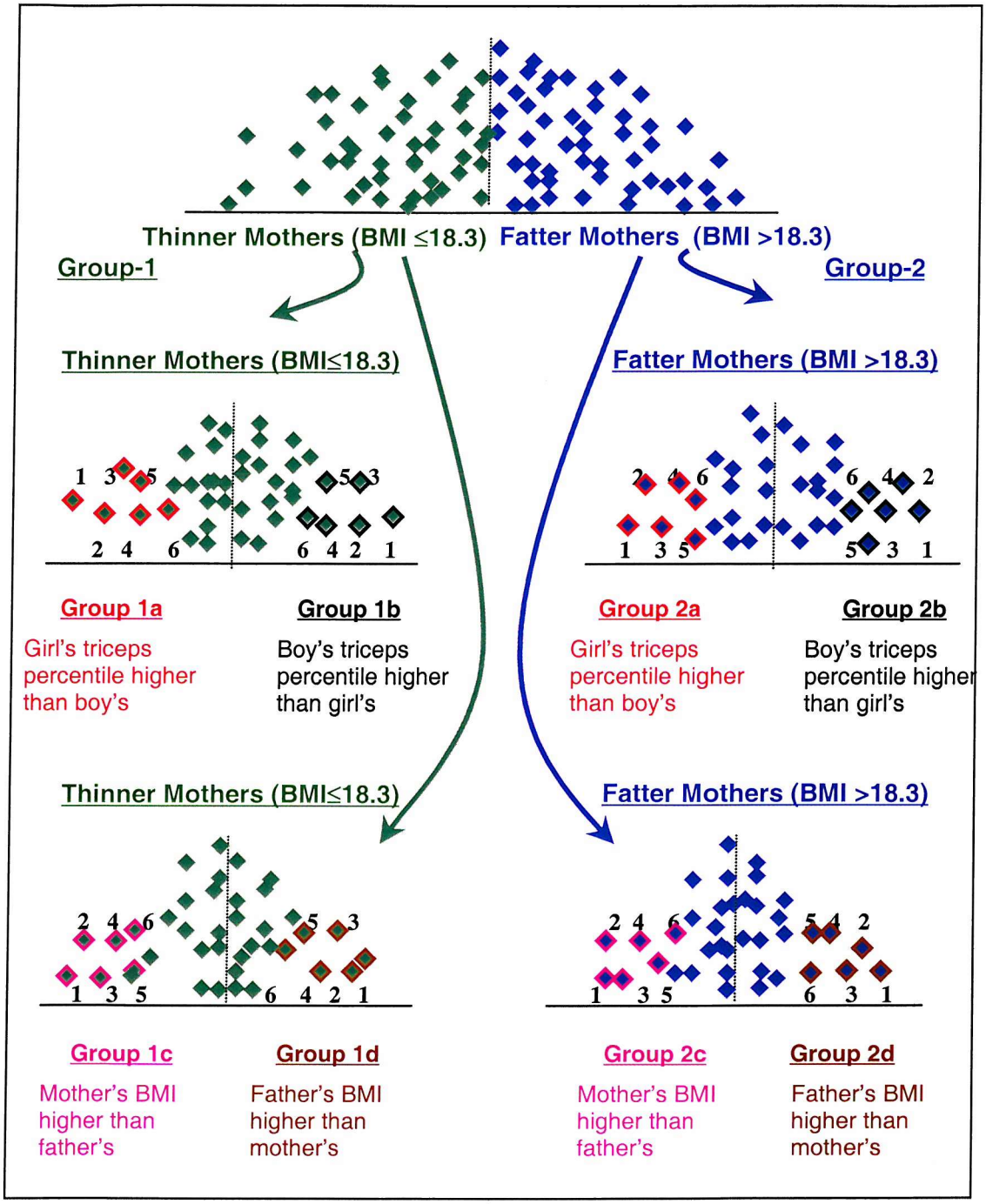


Figure 6.1: Selection of households on the basis of children's triceps and adult's BMI

b. Within each of these two groups of households a further two groups were created:

   i. For each sibling pair the girl's triceps percentile was subtracted from the boy's triceps percentile. These differences between boys and girls were normally distributed. At the lower end of this normal distribution, the girl's triceps was considerably larger than the boy's (group 1a and 2a), and the opposite was true at the higher end (group 1b and 2b). Four groups of households were selected in which boys were better nourished than girls and vice versa (Figure 6.1).

   ii. For each mother-father pair the mother's BMI Z-score was subtracted from the father's BMI Z-score. These differences were also normally distributed. At the lower end of this distribution mother's had a higher BMI than father's (group 1c and 2c), while at the opposite end father's had a higher BMI than mother's (group 1d and 2d). Therefore another four groups of households were selected in which mothers were better nourished than fathers and vice versa (Figure 6.1).

   By this method, a total eight groups of households were created representing families across a wide spectrum of overall nutrition in which either girls were better nourished than boys or vice versa; and mothers were better nourished than fathers or vice versa.

c. Every household held a rank in each of these eight sets. These ranks started from the extreme ends of each set (shown by outlined diamonds). Wherever there was an overlap in the ranking they were sorted according to where the household held a worst rank. For example if a household had thinner daughter (with rank 3) and a thinner father (with rank 7) then the rank denoting more under-nutrition or thinness (i.e. girl's rank) for the household was selected. Appendix C 1 shows all the selected households with different ranks.

This ranking of households was carried out by Ms. Sam Kellingray, statistician, and were given to me ordered by rank number so that I, as the interviewer, was blind to which group the household belonged to, to avoid any interviewer bias at the time of data collection. While interviewing I selected the households as they were ordered in this list and interviewed the first 48 households (with a possible six households from each set).

6.3 Data Collection

6.3.1 Designing the questionnaire

The questionnaire was designed to collect information on workload, household chores, leisure activities, eating habits, fasting rituals and 'worries'.

The majority of the questions were structured, closed-ended, where the respondent had to answer the number of times a particular activity was performed (for example work on the farm, cooking food, spending time with friends). Some questions were semi-structured and allowed me to record the response in particular categories, of which the interviewee was unaware. In these questions, since it was difficult to predict all the possible categories, a blank field was left for writing answers that would not fit any pre-determined categories. Some open-ended questions were also included and mostly related to reasons given for a particular behaviour e.g. reasons for quitting the practise of fasting.

The questionnaire was formulated in two parts, one for all members of the household, and the other for the siblings' mother only. The following section describes in detail the rationale for each part of the questionnaire:

6.3.2 Individual questionnaire for all household members

Almost all of the questions related to activities performed in the past *one month* to obtain accurate recall. Only questions related to illness, visits to the doctor and expenditure on medical treatment related to the past *three months* as these events were significant enough to be remembered accurately over this period. Also, questions regarding continuous or habitual activities such as fasting related to the respondent's *current* practice.

6.3.2.1 Work

In this section the respondent's main occupation was classified. Traditionally in a rural Indian village farming is the main activity but the focus groups and the family

survey revealed that many villagers would work on their own land and to supplement income would sometime work as labourers on other's land or work on non-farming activities. Therefore three detailed questions were designed to record the respondent's work on their own farm, other's farm and other work besides farming.

Question	Categories	Codes
1.1 **What is your main occupation?** **Note: For retired, their occupation before retirement and children were automatically recorded as 'siblings' i.e. they were not expected to have a profession.**	**Unemployed**	**1**
	Labourer (On Other's Farm)	**2**
	Labourer (On Own & Others Farm)	**3**
	Petty Employee	**4**
	Artisan	**5**
	Business/ Trader	**6**
	Owner Cultivator	**7**
	Service/ Profession	**8**
	Housewife	**9**
	Sibling	**10**
In the last month		
1.2 **How often did you work on your own land?**	**Every Day**	**6**
	Four To Six Days A Wk.	**5**
	Twice To Thrice A Wk.	**4**
	Once A Wk.	**3**
	Once A Fortnight	**2**
	Once A Month	**1**
	Never	**0**
1.3 **Did you usually work a full day or half-day?**	**Whole Day**	**2**
	Half Day	**1**
	N/A	**9**
1.4 **How often did you work on other people's land?**	**Every Day**	**6**
	Four To Six Days A Wk.	**5**
	Twice To Thrice A Wk.	**4**
	Once A Wk.	**3**
	Once A Fortnight	**2**
	Once A Month	**1**
	Never	**0**
1.5 **Did you usually work a full day or half-day on other people's land?**	**Whole Day**	**2**
	Half Day	**1**
	N/A	**9**
1.6 **How often did you do other work (besides farming)?** **For example: Tailor; mason; labourer; carpenter; mechanic; worker in a factory; driver; conductor; shopkeeper; priest etc.**	**Every Day**	**6**
	Four To Six Days A Wk.	**5**
	Twice To Thrice A Wk.	**4**
	Once A Wk.	**3**
	Once A Fortnight	**2**
	Once A Month	**1**
	Never	**0**

1.7 **Did you usually work a full day or half-day at this work?**	**Whole Day** **Half Day** **N/A**	**2** **1** **9**

6.3.2.2 Household chores

Household chores constitute a major part of the life of villagers because they cannot afford modern energy-saving devices such as washing machines or gas cookers. These chores are labour intensive and needed to be included in a summary of workload.

Question	Categories	Codes
2.1 **How often did you prepare food or help in preparing food?**	**Thrice Every Day** **Twice Every Day** **Once Every Day** **Four to Six days a Wk.** **Twice to Thrice a Wk.** **Once a Wk.** **Once a Fortnight** **Once a Month** **Less than once a Month** **Never**	**9** **8** **7** **6** **5** **4** **3** **2** **1** **0**
2.2 **How often did you wash clothes?**	**Thrice Every Day** **Twice Every Day** **Once Every Day** **Four to Six days a Wk.** **Twice to Thrice a Wk.** **Once a Wk.** **Once a Fortnight** **Once a Month** **Less than once a Month** **Never**	**9** **8** **7** **6** **5** **4** **3** **2** **1** **0**
2.3 **How often did you wash utensils?**	**Thrice Every Day** **Twice Every Day** **Once Every Day** **Four to Six days a Wk.** **Twice to Thrice a Wk.** **Once a Wk.** **Once a Fortnight** **Once a Month** **Less than once a Month** **Never**	**9** **8** **7** **6** **5** **4** **3** **2** **1** **0**

2.4 **How often did you go to fetch water?**	**Thrice Every Day** **Twice Every Day** **Once Every Day** **Four to Six days a Wk.** **Twice to Thrice a Wk.** **Once a Wk.** **Once a Fortnight** **Once a Month** **Less than once a Month** **Never**	**9** **8** **7** **6** **5** **4** **3** **2** **1** **0**
2.5 **How often did you tend the animals?** **(For example: feeding, milking, washing the animals; also taking them for grazing to the fields)**	**Thrice Every Day** **Twice Every Day** **Once Every Day** **Four to Six days a Wk.** **Twice to Thrice a Wk.** **Once a Wk.** **Once a Fortnight** **Once a Month** **Less than once a Month** **Never**	**9** **8** **7** **6** **5** **4** **3** **2** **1** **0**
2.6 **How often did you clean the animal shed?** **(For example: clearing the cow dung, sweeping the shed and cleaning the animal shed area)**	**Thrice Every Day** **Twice Every Day** **Once Every Day** **Four to Six days a Wk.** **Twice to Thrice a Wk.** **Once a Wk.** **Once a Fortnight** **Once a Month** **Less than once a Month** **Never**	**9** **8** **7** **6** **5** **4** **3** **2** **1** **0**
2.7 **How often did you collect firewood?**	**Thrice Every Day** **Twice Every Day** **Once Every Day** **Four to Six days a Wk.** **Twice to Thrice a Wk.** **Once a Wk.** **Once a Fortnight** **Once a Month** **Less than once a Month** **Never**	**9** **8** **7** **6** **5** **4** **3** **2** **1** **0**
2.8 **How often did you cut firewood?**	**Thrice Every Day** **Twice Every Day** **Once Every Day** **Four to Six days a Wk.** **Twice to Thrice a Wk.** **Once a Wk.** **Once a Fortnight** **Once a Month** **Less than once a Month** **Never**	**9** **8** **7** **6** **5** **4** **3** **2** **1** **0**

2.9 **How many times did you run errands for the household?** **(For example: go to the local shop, market)**	**Thrice Every Day** **Twice Every Day** **Once Every Day** **Four to Six days a Wk.** **Twice to Thrice a Wk.** **Once a Wk.** **Once a Fortnight** **Once a Month** **Less than once a Month** **Never**	**9** **8** **7** **6** **5** **4** **3** **2** **1** **0**
2.10 **How many times in a month did you go to Pabal village?**	**Thrice Every Day** **Twice Every Day** **Once Every Day** **Four to Six days a Wk.** **Twice to Thrice a Wk.** **Once a Wk.** **Once a Fortnight** **Once a Month** **Less than once a Month** **Never**	**9** **8** **7** **6** **5** **4** **3** **2** **1** **0**
2.11 **How many times in a month did you go to school?** **(maybe to drop your children at school)**	**Thrice Every Day** **Twice Every Day** **Once Every Day** **Four to Six days a Wk.** **Twice to Thrice a Wk.** **Once a Wk.** **Once a Fortnight** **Once a Month** **Less than once a Month** **Never**	**9** **8** **7** **6** **5** **4** **3** **2** **1** **0**

6.3.2.3 Leisure time

An individual's time spent in sleep or rest periods can indicate activity level. The focus groups reported that women spend less time than men in leisure. Villagers do not have clocks, so they were asked how often they went to bed or got up 'first' or 'last' in the family. Besides sleep, activities during 'free' time like an afternoon siesta or watching TV, or time spent with friends, were recorded.

Question	Categories	Codes
3.1 **What time did you usually go to bed at night?**		|_|_|: |_|_|

3.2 How often did you go to bed last in the house?	Every Day Four To Six Days A Wk. Twice To Thrice A Wk. Once A Wk. Once A Fortnight Once A Month Less Than Once A Month Never	7 6 5 4 3 2 1 0
3.3 How often did you get up first in the house?	Every Day Four To Six Days A Wk. Twice To Thrice A Wk. Once A Wk. Once A Fortnight Once A Month Less Than Once A Month Never	7 6 5 4 3 2 1 0
3.4 How often did you watch TV Programmes uninterrupted? (Do not count watching TV while doing other chores)	Every Day Four To Six Days A Wk. Twice To Thrice A Wk. Once A Wk. Once A Fortnight Once A Month Less Than Once A Month Never	7 6 5 4 3 2 1 0
3.5 How often did you spend time with your friends? (Include only time spent sitting down and relaxing, not while working)	Every Day Four To Six Days A Wk. Twice To Thrice A Wk. Once A Wk. Once A Fortnight Once A Month Less Than Once A Month Never	7 6 5 4 3 2 1 0
3.6 Do you usually relax/or sleep after work? (For example: siesta in the afternoon)	Yes No	1 0

6.3.2.4 Food intake

Meal patterns

This section was devised to gain an insight into the different meals patterns and types of food eaten by the members of the house. Assessment relied on the frequency of consumption pattern in the last month.

Question	Categories	Codes
4.1 How many times have you not eaten (missed/skipped) your breakfast?	Every Day	7
	Four To Six Days A Wk.	6
	Twice To Thrice A Wk.	5
	Once A Wk.	4
	Once A Fortnight	3
	Once A Month	2
	Less Than Once A Month	1
	Never Missed B F	0
4.2 How many times have you not eaten (missed/skipped) your lunch?	Every Day	7
	Four To Six Days A Wk.	6
	Twice To Thrice A Wk.	5
	Once A Wk.	4
	Once A Fortnight	3
	Once A Month	2
	Less Than Once A Month	1
	Never Missed Lunch	0
4.3 How many times have you not eaten (missed/skipped) your dinner?	Every Day	7
	Four To Six Days A Wk.	6
	Twice To Thrice A Wk.	5
	Once A Wk.	4
	Once A Fortnight	3
	Once A Month	2
	Less Than Once A Month	1
	Never Missed Dinner	0
4.4 How many times have you eaten food or snacks prepared outside the home?	Thrice Every Day	9
	Twice Every Day	8
	Once Every Day	7
	Four To Six Days A Wk.	6
	Twice To Thrice A Wk.	5
	Once A Wk.	4
	Once A Fortnight	3
	Once A Month	2
	Less Than Once A Month	1
	Never	0
4.5 How often have you been the first in the house to eat?	Thrice Every Day	9
	Twice Every Day	8
	Once Every Day	7
	Four To Six Days A Wk.	6
	Twice To Thrice A Wk.	5
	Once A Wk.	4
	Once A Fortnight	3
	Once A Month	2
	Less Than Once A Month	1
	Never	0

4.6 **How often have you been the last in the house to eat?**	**Thrice Every Day** **Twice Every Day** **Once Every Day** **Four To Six Days A Wk.** **Twice To Thrice A Wk.** **Once A Wk.** **Once A Fortnight** **Once A Month** **Less Than Once A Month** **Never**	**9** **8** **7** **6** **5** **4** **3** **2** **1** **0**

Vegetarian and non-vegetarian eating habits

The Pune Maternal Nutrition Study conducted in this region showed that a major determinant of birth weight was the consumption of green leafy vegetables, fruits and milk. Therefore a question on consumption of these foods was included. A separate question for consumption of tea with milk was included as the unavailability of milk makes some households consume tea without milk.

The list of green leafy vegetables and fruits were taken from the Pune Maternal Nutrition Study food questionnaire, which was already validated and listed all food items available in this area (appendix C2).

Question	Categories	Codes
4.7 **How often did you eat non-vegetarian foods? (Meats, Chicken & Fish)**	**Thrice Every Day** **Twice Every Day** **Once Every Day** **Four to Six days a Wk.** **Twice to Thrice a Wk.** **Once a Wk.** **Once a Fortnight** **Once a Month** **Less than once a Month** **Never**	**9** **8** **7** **6** **5** **4** **3** **2** **1** **0**
4.8 **How often did you eat green leafy vegetables?**	**Thrice Every Day** **Twice Every Day** **Once Every Day** **Four to Six days a Wk.** **Twice to Thrice a Wk.** **Once a Wk.** **Once a Fortnight** **Once a Month** **Less than once a Month** **Never**	**9** **8** **7** **6** **5** **4** **3** **2** **1** **0**

4.9 **How often did you eat fruits?**	**Thrice Every Day** **Twice Every Day** **Once Every Day** **Four to Six days a Wk.** **Twice to Thrice a Wk.** **Once a Wk.** **Once a Fortnight** **Once a Month** **Less than once a Month** **Never**	**9** **8** **7** **6** **5** **4** **3** **2** **1** **0**
4.10 **How often did you eat eggs?**	**Thrice Every Day** **Twice Every Day** **Once Every Day** **Four To Six Days A Wk.** **Twice To Thrice A Wk.** **Once A Wk.** **Once A Fortnight** **Once A Month** **Less Than Once A Month** **Never**	**9** **8** **7** **6** **5** **4** **3** **2** **1** **0**
4.11 **How often did you drink milk?** **(Include milk products like chass, lassi, dahi, srikhand but not tea)**	**Thrice Every Day** **Twice Every Day** **Once Every Day** **Four To Six Days A Wk.** **Twice To Thrice A Wk.** **Once A Wk.** **Once A Fortnight** **Once A Month** **Less Than Once A Month** **Never**	**9** **8** **7** **6** **5** **4** **3** **2** **1** **0**
4.12 **How often did you drink tea with milk?**	**Thrice Every Day** **Twice Every Day** **Once Every Day** **Four To Six Days A Wk.** **Twice To Thrice A Wk.** **Once A Wk.** **Once A Fortnight** **Once A Month** **Less Than Once A Month** **Never**	**9** **8** **7** **6** **5** **4** **3** **2** **1** **0**

6.3.2.5 Fasting

The focus group discussions highlighted that villagers often kept fasts. I inquired about the types of fasting currently practiced by each family member. If anyone

answered that they were not following fasting or had given up, further questions were asked about why they gave up fasting or never started.

Question	Categories	Codes
5.1 **How often do you fast?** **(if never then go to question 5.5, questions 5.2,5.3,5.4 become not applicable(9)**	**Three or more times a Week.** **Twice a Wk.** **Once a Wk.** **Once a Fortnight** **Once a Month** **Less than once a month** **Never**	**6** **5** **4** **3** **2** **1** **0**
5.2 **How many meals do you have on a fasting day?**	**Eat nothing in the Day** **Eat once a Day** **Eat twice a Day** **N/A (Never fasted)**	**3** **2** **1** **9**
5.3 **When did you start to fast?**	**Before Marriage** **After Marriage** **N/A (Never Fasted)**	**1** **2** **9**
5.4 **Can you tell me why you fast or used to fast?**		**Yes** **N/A** **1** **9**
Responses not to be suggested, **Can give more than one response**	**6.61.Religious Reasons** **6.62.Follow Family Tradition** **6.63.Rest to Stomach** **6.64.Follow Peer Group** **6.65.Health of Family** **6.66. For Dietary Variety** **6.67._____**	
5.5 **Only to respondents who answered that they have given up fasting: Why did you stop fasting?**		
5.6 **If answered 'Never' fasted: Why did you not fast?** **If answered the above questions then not applicable**		

6.3.2.6 Illness related behaviour

The literature review indicated gender differences in seeking treatment for illness. Households have to spend money to access treatment, which may lead to neglect for the 'less desired' individuals in the family.

This section was to try and note any difference in seeking medical advice between men and women or boys and girls. The time period this question referred to was increased to three months to account for the lower frequency of events such as illness

of seeking medical treatment. Also, as the households would have spent money for travel and treatment, recall is likely to be good.

Question	Categories	Codes
6.1 **How often did you see a doctor in the last three months?**	**4 or More** **3 Times** **2 Times** **Once** **Less Than Once** **Never**	**5** **4** **3** **2** **1** **0**
6.2 **How much money was spent on your health in the last three months? (Include visit to doctors, health provider and the cost of medicines)**		**Rs.__ __ __**
6.3 **What health problem did you suffer from?**		

6.3.2.7 Tobacco consumption

Tobacco products suppress appetite. Focus groups reported that women often ended up eating 'misry' (roasted and ground tobacco) instead of food when they are working on the farm. They felt this habit was linked to women not eating meals on time.

Question	Categories	Codes
7.1 **Do you consume any of these?** **N/A for children** **(Respondents can give more than one response)**	 **1.Cigarettes** **2.Bidis** **3.Raw Tobacco** **4.Misry(Ground)** **5.Gutka** **6.Others (Alcohol)**	**Yes No N/A** **1 0 9**
7.2 **Do you use tobacco to suppress hunger or replace food?**	**Yes** **No** **Do Not Know** **N/A**	**1** **0** **2** **9**
7.3 **Do the women in your village use 'misry' to suppress hunger?**	**Yes** **No** **Do Not Know** **N/A**	**1** **0** **2** **9**

6.3.2.8 Worries

This question was asked as the focus groups emphasised that 'worries' in the daily life of women affected their nutritional status. These included uncertainties regarding outcome of farming, crop failure, children including sons' and daughters' future, unfinished chores and money problems.

Question	Categories	Codes
8.1 Do you have worries? **If 'no' or 'not known', omit rest of the questions**	**Yes** **No** **Not Known**	**1** **0** **2**
8.2 **What do you worry about?** **(open question)** **(Can have more than one response)**	**Not To Suggest** **1.Crop Failure** **2.Son's Future** **3.Daughter's Future** **4.Unfinished Chores** **5.Unpaid Debts** **6. _____(other)**	**Yes N/A** **1 9**

6.3.2.9 Additional question for women

Questions regarding bride price and dowry were asked only to women in the household i.e. mothers and grandmothers. This was to inquire about the prevalent practice followed at the time of marriage.

9.1 **Was bride price given at the time of your marriage? (Includes money, grains, equipment)**	**Yes** **No** **Do Not Know**	**1** **0** **2**
9.2 **Was dowry given at the time of your marriage?**	**Yes** **No** **Do Not Know**	**1** **0** **2**

6.3.2 Questionnaire for mothers only

This part of the questionnaire was only administered once for every household, to the mother of the sibling pair. This was done because some of the information related to the household as a whole, also because some important information related only to women, such as the increase in workload after marriage.

Question	Categories	Codes
H 1.1 Do you have family (first kin) members settled outside the village who send you monetary help?	Yes No	1 0
H 1.2 Does your family normally own a colocassia plot?	In House In Farm Both No	1 2 3 0
H 1.3 Does your family normally keep hens and chickens?	Yes No	1 0
H 1.4 Is the family vegetarian?	Yes No	1 0
H 1.5 Is the family vegetarian for purely religious reasons?	Yes No N/A	1 0 9
H 1.6 What is your usual source of drinking water?	Tap Hand Pump Well River Or Pond Other	1 2 3 4 5
H 1.7 What is your usual source of washing water?	Tap Hand Pump Well River Or Pond Other	1 2 3 4 5
H 1.8 Distance of source of drinking water from the house	Within house compound Within 100 Meters Within 101-500 Meters 500+Within Hamlet / Village Outside Village / Hamlet	1 2 3 4 5
H 1.9 Distance of source of washing water from the house	Within house compound Within 100 Meters Within 101-500 Meters 500+Within Hamlet / Village Outside Village / Hamlet	1 2 3 4 5
H 1.10 Distance of house from the village	House in the village Within 1 Km of the house 1-3Kms More than 3 Kms from the house	1 2 3 4
H 1.11 Distance from house to school	House in the village/Hamlet With School Within 1 Km of the House 1- 3 Kms More Than 3 Kms From The House	1 2 3 4
H 1.12 How did your workload change after marriage?	Increase Decrease Same	2 1 0

I tested this questionnaire in the pilot study village to refine the format of the questions. I had it written in the local Marathi language script to maintain consistency in the way each question was asked. The pilot study helped me to time interviews, to find out whether small children could answer the questions or not, and to find out whether the pre-coded answers were sufficient to record all the answers given by the respondent. I asked certain questions (visits to the doctor and food items eaten) by the child from *the mother* as young children were unable to answer.

6.4 Conducting the Interviews

The CHW and I visited the homes usually in the early morning or evenings. Family photographs taken by me during the family survey helped to re-introduce me to the families. Most families were very helpful and agreed to answer the questionnaire, which took approximately one and a half-hours to complete. Data were double-entered in the computer section at the Diabetes Unit of the KEM hospital in Pune.

Household questionnaire interview with a mother

Household questionnaire interview with a grandfather

6.5 Questionnaire Responses: All Household Members

6.5.1 Sample subjects

I visited 48 households and data was collected from 45. Three households were not interviewed either because one sibling had changed residence i.e. living outside with a relative, or had a disability.

In the 45 households visited I interviewed 204 members i.e. a sibling pair (brother and sister), parents (mother and father) and grandparents (grandfather and grandmother) (Table 6.1).

Table 6.1: Total number of members interviewed from the 45 households

Total Interviewed	G'father	G'mother	Father	Mother	Son	Daughter
204	9	17	43	45	45	45

All the mothers and sibling pairs were available. Two fathers were not living in the village at the time of interviews. Not all households had surviving grandparents; nine grandfathers and seventeen grandmothers were interviewed.

6.5.2 Work

31% of mothers worked on the farm 28 days a month compared to only 14% of fathers. Five households had no land of their own and in these households the women worked on others' farms as daily wage labourers. There were 9 housewives who never or rarely went out to work on the farm (Table 6.2).

Table 6.2: (Question 1.1) What is your main occupation?

	G'father N *(%)*	G'mother N *(%)*	Father N *(%)*	Mother N *(%)*
Labourer (Only on other's farm)		1 *(6)*	2 *(5)*	5 *(11)*
Labourer (On own & other's farm)	1 *(11)*	2 *(12)*	8 *(19)*	11 *(24)*
Petty Employee			5 *(12)*	
Artisan		1 *(6)*	4 *(9)*	1 *(2)*
Business/ Trader	1 *(11)*	1 *(6)*	7 *(16)*	3 *(7)*
Owner Cultivator	7 *(78)*	12 *(71)*	13 *(30)*	15 *(33)*
Service/ Profession			4 *(9)*	1 *(2)*
Housewife				9 *(20)*
	9 *(100)*	17 *(100)*	43 *(100)*	45 *(100)*

More mothers than fathers worked for 28 days (i.e. full time) on their own farms. Grandmothers also worked regularly on the family's land (Table 6.3).

Table 6.3: (Question 1.3) How often did you work on your own land?

	G'father	G'mother	Father	Mother	Son	Daughter
None	5 *(56)*	7 *(41)*	21 *(49)*	17 *(38)*	44 *(98)*	42 *(94)*
≤5 days	2 *(22)*	2 *(12)*	4 *(10)*	6 *(14)*	1 *(2)*	3 *(6)*
5-14 days	2 *(22)*	3 *(18)*	7 *(16)*	5 *(11)*		
15-25 days		2 *(12)*	5 *(12)*	3 *(7)*		
25-28 days		3 *(18)*	6 *(14)*	14 *(31)*		

More mothers than fathers worked on others' farms. Only one grandmother reported working on others' land (Table 6.4).

Table 6.4: (Question 1.4) How did you work on other people's land?

	G'father	G'mother	Father	Mother	Son	Daughter
None	**9** *(100)*	**16** *(94)*	**37** *(86)*	**30** *(67)*	**45** *(100)*	**45** *(100)*
≤5 days			**3** *(7)*	**2** *(4)*		
5-14 days		**1** *(6)*	**2** *(5)*	**6** *(13)*		
15-25 days			**1** *(2)*	**5** *(11)*		
26-28 days				**2** *(4)*		

Most fathers but few mothers did some non-farming work, for example working as an employee in the main village shop or going to the nearby industrial area. The one grandfather and grandmother who did non-farming work had their own shops in the main village (Table 6.5).

Table 6.5: (Question1.6) How often did you work (besides farming)?

	G'father	G'mother	Father	Mother	Son	Daughter
None	**8** *(88)*	**15** *(88)*	**18** *(42)*	**37** *(82)*	**44** *(98)*	**45** *(100)*
≤5 days			**1** *(2)*	**3** *(6)*	**1** *(2)*	
5-14 days			**8** *(19)*			
15-25 days		**1** *(6)*	**9** *(21)*	**3** *(7)*		
26-28 days	**1** *(11)*	**1** *(6)*	**7** *(16)*	**2** *(4)*		

6.5.3 Household chores

None of the boys or grandfathers and only one of the fathers played a part in preparing food. All the women prepared food, at least once a day, with 13% of daughters providing help in food preparation. Food preparation was an almost entirely female task (Table 6.6).

Table 6.6: (Question 2.1) How often did you prepare food or help in preparing food?

	G'father	G'mother	Father	Mother	Son	Daughter
< Once/month – Never	**9** *(100)*	**7** *(41)*	**42** *(98)*		**45** *(100)*	**39** *(87)*
Once/ wk- once/month		**1** *(6)*	**1** *(2)*			**2** *(4)*
2-6 days/ week				**2** *(4)*		**3** *(7)*
1-3/ day		**9** *(53)*		**43** *(96)*		**1** *(2)*

36% of girls were washing clothes, but only 7% were doing it frequently. Only one of the boys helped in washing clothes. The majority of women were washing clothes at least once a day and only two men washed clothes once a week or more. No grandfathers and very few grandmothers participated in this activity probably as it is a high intensity activity and needs travelling with clothes to the water source. Washing clothes is again a female task and though a few girls helped it was mainly carried out by the mothers (Table 6.7).

Table 6.7: (Question 2.2) How often did you wash clothes?

	G'father	G'mother	Father	Mother	Son	Daughter
< Once/month – Never	**9** *(100)*	**14** *(82)*	**41** *(95)*	**7** *(16)*	**44** *(98)*	**29** *(64)*
Once/ wk- once/month		**1** *(6)*	**2** *(5)*		**1** *(2)*	**13** *(29)*
2-6 days/ week		**2** *(12)*		**10** *(22)*		**3** *(7)*
1-3/ day				**28** *(62)*		

62% of girls washed utensils more than once a week. Only two boys ever washed utensils. The majority (64%) of women washed utensils once a day while none of the men did this activity. Washing utensils was again reported as a young womens' task in the village and daughters helped their mothers (Table 6.8).

Table 6.8: (Question 2.3) How often did you wash utensils?

	G'father	G'mother	Father	Mother	Son	Daughter
< Once/month – Never	**9** *(100)*	**14** *(82)*	**43** *(100)*	**9** *(20)*	**43** *(96)*	**8** *(18)*
Once/ wk- once/month		**3** *(18)*		**2** *(4)*	**1** *(2)*	**9** *(20)*
2-6 days/ week				**5** *(11)*	**1** *(2)*	**13** *(29)*
1-3/ day				**29** *(64)*		**15** *(33)*

78% of mothers and 33% of girls fetched water once a day or more, compared with no fathers and 4% of boys. In contrast to cooking and washing more men did some fetching of water (29%). However 78% of boys, 81% of men and all of the grandfathers never collected water. Fetching water is again a task for females although sometimes done by men (Table 6.9).

Table 6.9: (Question 2.4) How often did you fetch water?

	G'father	G'mother	Father	Mother	Son	Daughter
< Once/month – Never	**9** *(100)*	**16** *(94)*	**35** *(81)*	**5** *(11)*	**35** *(78)*	**16** *(36)*
Once/ wk- once/month		**1** *(6)*	**6** *(14)*	**1** *(2)*	**5** *(11)*	**6** *(13)*
2-6 days/ week			**2** *(5)*	**4** *(9)*	**3** *(7)*	**8** *(18)*
1-3/ day				**35** *(78)*	**2** *(4)*	**15** *(33)*

Tending to animals included feeding, watering and milking them, and taking them for grazing to the fields. Everybody in the family contributed to this task. Grandfathers were quite active in this and other family members shared equally (Table 6.10).

Table 6.10: (Question 2.5) How often do you tend to animals?

	G'father	G'mother	Father	Mother	Son	Daughter
< Once/month – Never	**3** *(33)*	**11** *(65)*	**24** *(56)*	**17** *(38)*	**41** *(92)*	**37** *(82)*
Once/ wk- once/month	**2** *(22)*	**1** *(6)*		**1** *(2)*	**2** *(4)*	**1** *(2)*
2-6 days/ week	**1** *(11)*	**1** *(6)*		**4** *(9)*	**2** *(4)*	**5** *(11)*
1-3/ day	**3** *(33)*	**4** *(24)*	**19** *(44)*	**23** *(51)*		**2** *(4)*

Cleaning the animal shed was a mucky and unpleasant task, as one had to sweep the floor, make cow-dung cakes for fuel and clear up the feeding and sitting area for the animals. Usually, the cow-dung is used to plaster the walls and floor of the house. In contrast to tending to the animals this task was mainly done by mothers (Table 6.11).

Table 6.11: (Question 2.6) How often did you clean the animal shed?

	G'father	G'mother	Father	Mother	Son	Daughter
< Once/month – Never	**9** *(100)*	**17** *(100)*	**43** *(100)*	**25** *(56)*	**44** *(98)*	**43** *(96)*
Once/ wk- once/month				**1** *(2)*	**1** *(2)*	**1** *(2)*
2-6 days/ week				**3** *(7)*		**1** *(2)*
1-3/ day				**16** *(36)*		

In the village old tree trimmings, twigs and bark are used as fuel for cooking. This task involves collecting and cutting this wood from fields and stacking it. Sometimes wood blocks are bought. Fewer people were cutting firewood than collecting. Again, this is mainly a task for women (Table 6.12 & 6.13).

Table 6.12: (Question 2.7) How often did you collect firewood?

	G'father	G'mother	Father	Mother	Son	Daughter
< Once/month – Never	**9** *(100)*	**12** *(71)*	**37** *(86)*	**15** *(33)*	**45** *(100)*	**37** *(82)*
Once/ wk-once/month		**2** *(12)*	**6** *(14)*	**9** *(20)*		**5** *(11)*
2-6 days/ week		**2** *(12)*		**8** *(18)*		**3** *(7)*
1-3/ day		**1** *(6)*		**13** *(29)*		

Table 6.13: (Question 2.8) How often did you cut firewood?

	G'father	G'mother	Father	Mother	Son	Daughter
< Once/month – Never	**9** *(100)*	**15** *(82)*	**40** *(93)*	**26** *(58)*	**45** *(100)*	**44** *(98)*
Once/ wk- once/month		**1** *(6)*	**3** *(7)*	**9** *(20)*		**1** *(2)*
2-6 days/ week		**1** *(6)*		**6** *(13)*		
1-3/ day				**4** *(9)*		

Errands included getting milk, groceries or matches from the local shop. Most of the children and fathers ran errands. Amongst boys and girls it was an equally shared task, although more fathers did this task than mothers (Table 6.14).

Table 6.14: (Question 2.9) How many times did you run errands for the household?

Run Errands	G'father	G'mother	Father	Mother	Son	Daughter
< Once/month – Never	**9** *(78)*	**12** *(71)*	**23** *(54)*	**33** *(73)*	**20** *(44)*	**14** *(31)*
Once/ wk- once/month	**1** *(11)*	**3** *(18)*	**11** *(26)*	**7** *(16)*	**10** *(22)*	**17** *(38)*
2-6 days/ week	**1** *(11)*	**2** *(12)*	**7** *(16)*	**5** *(11)*	**13** *(29)*	**11** *(24)*
1-3/ day			**2** *(5)*		**2** *(4)*	**3** *(7)*

A high percentage of mothers and grandmothers reported not to have visited the main village in the last month, whereas 65% of fathers and 44% of grandfathers visited the village every day (Table 6.15). No difference was seen between boys and girls in the frequency with which they visited the village.

Table 6.15: (Question 2.10) How many times in a month did you go to Pabal village?

	G'father	G'mother	Father	Mother	Son	Daughter
< Once/month – Never	**1** *(11)*	**7** *(41)*	**2** *(5)*	**16** *(36)*	**24** *(53)*	**27** *(60)*
Once/ wk- once/month	**3** *(33)*	**9** *(53)*	**5** *(12)*	**27** *(60)*	**16** *(36)*	**14** *(31)*
2-6 days/ week	**1** *(11)*		**8** *(19)*	**2** *(4)*	**2** *(4)*	**3** *(7)*
1-3/ day	**4** *(44)*	**1** *(6)*	**28** *(65)*		**3** *(7)*	**1** *(2)*

90% of children were attending school. Some of the parents, mainly fathers went to drop children to school (Table 6.16).

Table 6.16: (Question 2.11) How many times in a month did you go to school?

	G'father	G'mother	Father	Mother	Son	Daughter
< Once/month – Never	**9** *(100)*	**17** *(100)*	**33** *(77)*	**41** *(36)*	**3** *(7)*	**4** *(9)*
Once/ wk- once/month			**3** *(7)*			
2-6 days/ week			**4** *(9)*	**2** *(4)*	**4** *(9)*	**2** *(4)*
1-3/ day			**3** *(7)*	**2** *(4)*	**38** *(84)*	**39** *(87)*

6.5.4 Leisure time

Bedtime was difficult to assess, as many respondents did not have watches or clocks.

Table 6.17: (Question 3.1) What time do you usually go to bed at night?

	G'father	G'mother	Father	Mother	Son	Daughter
Before 9 PM	**2** *(22)*			**3** *(7)*	**32** *(73)*	**24** *(53)*
Between 9-10 PM	**4** *(44)*	**9** *(53)*	**9** *(21)*	**9** *(20)*	**11** *(25)*	**19** *(42)*
After 10 PM	**3** *(33)*	**8** *(47)*	**34** *(79)*	**33** *(73)*	**1** *(2)*	**2** *(4)*

The household members reported similar times to have gone to bed and woken up. Replies were often inconsistent within a household, i.e. both mother and father saying they went to bed last. I therefore have some doubts as to the reliability of this information (Table 6.18).

Table 6.18: (Question 3.2) How often did you go to bed last in the house?

	G'father	G'mother	Father	Mother	Son	Daughter
< Once/month – Never	**6** *(67)*	**7** *(41)*	**12** *(28)*	**11** *(24)*	**43** *(96)*	**44** *(98)*
Once/ wk- once/month	**1** *(11)*	**1** *(6)*	**5** *(12)*	**3** *(7)*	**1** *(2)*	**1** *(2)*
2-6 days/ week	**2** *(22)*	**5** *(29)*	**8** *(19)*	**8** *(18)*	**1** *(2)*	
1-3/ day		**4** *(24)*	**18** *(42)*	**23** *(51)*		

Most mothers reported that they wake up first most days (Table 6.19).

Table 6.19: (Question 3.3) How often did you get up first in the house?

	G'father	G'mother	Father	Mother	Son	Daughter
< Once/month – Never	**4** *(44)*	**6** *(35)*	**22** *(51)*	**2** *(4)*	**44** *(98)*	**43** *(96)*
Once/ wk- once/month	**1** *(11)*	**3** *(18)*	**4** *(9)*	**3** *(7)*	**1** *(2)*	**1** *(2)*
2-6 days/ week	**3** *(33)*	**5** *(29)*	**11** *(26)*	**9** *(20)*		**1** *(2)*
1-3/ day	**1** *(11)*	**3** *(18)*	**6** *(14)*	**31** *(69)*		

Grandparents didn't watch television often. 2-6 days per week was the most common rate of watching television. Amongst mothers 47% never watched TV and only 11% watched daily. 21% of men watched daily. There were no differences between boys and girls (Table 6.20).

Table 6.20: (Question 3.4) How often did you watch TV programmes uninterrupted?

	G'father	G'mother	Father	Mother	Son	Daughter
< Once/month – Never	**8** *(89)*	**9** *(53)*	**8** *(19)*	**21** *(47)*	**7** *(16)*	**10** *(22)*
Once wk- once month		**6** *(35)*	**11** *(26)*	**12** *(27)*	**17** *(38)*	**14** *(31)*
2-6 days/ week	**1** *(11)*	**2** *(12)*	**1** *(35)*	**7** *(16)*	**12** *(27)*	**15** *(33)*
1-3/ day			**9** *(21)*	**5** *(11)*	**9** *(20)*	**6** *(13)*

The percentage of time spent with friends was very different for men and women. Women answered saying that they had friends at their parents' home but since marriage they had not been able to make similar friends. 33% of mothers and 24% of grandmothers reported spending time with friends rarely (Table 6.21).

Table 6.21: (Question 3.5) How often did you spend time with friends?

	G'father	G'mother	Father	Mother	Son	Daughter
< Once/month – Never	**1** *(11)*	**4** *(24)*	**2** *(5)*	**15** *(33)*		**5** *(11)*
Once/ wk- once/month	**1** *(11)*	**10** *(59)*	**7** *(16)*	**18** *(40)*	**1** *(2)*	**5** *(11)*
2-6 days/ week	**3** *(33)*	**2** *(12)*	**5** *(12)*	**7** *(16)*	**5** *(11)*	**16** *(36)*
1-3/ day	**4** *(44)*	**1** *(6)*	**29** *(67)*	**5** *(11)*	**39** *(87)*	**19** *(42)*

Most of the children did not have an afternoon rest as they have full-day school (till 5pm) during the week. Men take more rest in the afternoon than women (Table 6.22).

Table 6.22: (Question 3.6) Do you usually relax/ or sleep after work?

	G'father	G'mother	Father	Mother	Son	Daughter
No	2 *(22)*	10 *(59)*	18 *(42)*	37 *(82)*	39 *(87)*	44 *(98)*
Yes	7 *(78)*	7 *(41)*	25 *(58)*	8 *(18)*	6 *(13)*	1 *(2)*

6.5.5 Food intake

6.5.5.1 Meal patterns

Most children ate all three meals and the numbers were similar for boys and girls Grandmothers, mothers and fathers often missed breakfast and to a similar degree. Grandfathers and fathers missed lunch frequently. Overall, men got fewer meals, as many skipped lunch or breakfast. Almost no one missed dinner (Table 6.23).

Table 6.23: (Question 4.1,4.2,4.3) How many times have you not eaten (missed/skipped) your breakfast, lunch or dinner?

	G'father	G'mother	Father	Mother	Son	Daughter
Missed Breakfast						
< Once/month – Never	8 *(88)*	11 *(65)*	23 *(54)*	29 *(64)*	39 *(87)*	40 *(89)*
Once/ wk- once/month			6 *(14)*	7 *(16)*	3 *(7)*	2 *(4)*
2-6 days/ week	1 *(11)*	1 *(6)*	4 *(9)*	2 *(4)*	2 *(4)*	2 *(4)*
1-3/ day		5 *(29)*	10 *(23)*	7 *(16)*	1 *(2)*	1 *(2)*
Missed Lunch						
< Once/month – Never	1 *(11)*	12 *(71)*	27 *(63)*	32 *(71)*	43 *(96)*	41 *(91)*
Once/ wk- once/month	1 *(11)*	1 *(6)*	8 *(19)*	7 *(16)*	2 *(4)*	3 *(7)*
2-6 days/ week	1 *(11)*	1 *(6)*	1 *(2)*	4 *(9)*		1 *(2)*
1-3/ day	6 *(67)*	3 *(18)*	7 *(16)*	2 *(4)*		
Missed Dinner						
< Once/month – Never	9 *(100)*	16 *(94)*	43 *(100)*	42 *(93)*	44 *(98)*	40 *(89)*
Once/ wk- once/month				2 *(4)*	1 *(2)*	*(11)*
2-6 days/ week				1 *(2)*		
1-3/ day		1 *(6)*				

Boys and girls got similar numbers of snacks, sons slightly more than daughters. Fathers ate snacks more often than mothers and 49% of mothers reported never eating

any. This relates directly to mobility and access, as men would often visit the main market or village snack bars. Also, men are the ones who keep the cash and can purchase snacks (Table 6.24).

Table 6.24: (Question 4.4) How many times have you eaten food or snacks prepared outside home?

	G'father	G'mother	Father	Mother	Son	Daughter
< Once/month – Never	2 *(22)*	7 *(41)*	8 *(19)*	22 *(49)*	8 *(18)*	12 *(27)*
Once/ wk- once/month	4 *(44)*	9 *(53)*	18 *(42)*	19 *(42)*	25 *(56)*	29 *(64)*
2-6 days/ week	3 *(33)*	1 *(6)*	10 *(23)*	3 *(7)*	10 *(22)*	2 *(4)*
1-3/ day			7 *(16)*	1 *(2)*	2 *(4)*	2 *(4)*

Grandfathers and children usually ate food first at meal times (Table 6.25 and 6.26). Similar numbers of fathers and mothers reported eating last.

Table 6.25: (Question 4.5) How often have you been first in the house to eat?

	G'father	G'mother	Father	Mother	Son	Daughter
< Once/month – Never	2 *(22)*	11 *(65)*	26 *(61)*	38 *(84)*	8 *(18)*	13 *(29)*
Once/ wk- once/month	1 *(11)*	2 *(12)*	6 *(14)*	3 *(7)*		1 *(2)*
2-6 days/ week	1 *(11)*	3 *(18)*	2 *(5)*		8 *(18)*	9 *(20)*
1-3/ day	5 *(56)*	1 *(6)*	9 *(21)*	4 *(9)*	29 *(64)*	22 *(49)*

Table 6.26: (Question 4.6) How often have you been last in the house to eat?

	G'father	G'mother	Father	Mother	Son	Daughter
< Once/month – Never	8 *(89)*	7 *(41)*	23 *(54)*	13 *(29)*	44 *(98)*	41 *(91)*
Once/ wk- once/month	1 *(11)*	2 *(12)*	3 *(7)*	3 *(11)*	1 *(2)*	
2-6 days/ week		3 *(18)*	7 *(16)*	7 *(7)*		1 *(2)*
1-3/ day		5 *(29)*	10 *(23)*	10 *(23)*		3 *(7)*

6.5.5.2 Vegetarian and non-vegetarian eating habits

Due to the high cost of meat products and lack of refrigeration facilities non-vegetarian foods were eaten rarely, never more than once per week (Table 6.27). I observed that due to religious vows the grandparents reported to have stopped eating

non-vegetarian foods at the time of data collection. Amongst the rest of the family members non-vegetarian foods were shared equally between the sexes (Table 6.27).

Table 6.27: (Question 4.7) How often did you eat non-vegetarian foods (meat/chicken/fish)?

	G'father	G'mother	Father	Mother	Son	Daughter
<Once/month – Never	8 *(89)*	12 *(71)*	18 *(42)*	23 *(51)*	21 *(47)*	21 *(47)*
Once wk- once month	1 *(11)*	5 *(30)*	25 *(58)*	22 *(49)*	24 *(53)*	24 *(53)*
2-6 days/ week						
1-3/ day						

Most household members ate green leafy vegetables only weekly or less. No major disparity was noted within the families and this food item was shared equally between the sexes (Table 6.28).

Table 6.28: (Question 4.8) How often did you eat green leafy vegetables?

	G'father	G'mother	Father	Mother	Son	Daughter
<Once/month – Never						
Once wk- once month	2 *(22)*	5 *(29)*	10 *(23)*	10 *(23)*	11 *(24)*	13 *(29)*
2-6 days/ week	7 *(78)*	11 *(11)*	32 *(74)*	32 *(71)*	31 *(69)*	30 *(67)*
1-3/ day		1 *(6)*	1 *(2)*	3 *(7)*	3 *(7)*	2 *(4)*

Less than half the families ate fruits more than once a week. There was a higher intake of fruits for fathers as compared to the rest of the household (Table 6.29).

Table 6.29: (Question 4.9) How often did you eat fruits?

	G'father	G'mother	Father	Mother	Son	Daughter
< Once/month – Never	2 *(22)*	4 *(24)*	3 *(7)*	6 *(13)*	1 *(2)*	
Once/ wk- once/month	5 *(56)*	12 *(71)*	21 *(49)*	32 *(71)*	32 *(71)*	38 *(84)*
2-6 days/ week	2 *(22)*	1 *(6)*	18 *(42)*	7 *(16)*	11 *(24)*	7 *(16)*
1-3/ day			1 *(2)*		1 *(2)*	

No major differences in the vegetable and fruit food frequency questionnaire were noted. The results are presented in appendix C 2.

I was interested in asking about consumption of eggs as they are nutritious, cheap and do not require special storage. Many villagers kept hens and chicken for household

consumption as well as for selling them. Eggs were consumed more often than meat products. Grandparents rarely consumed eggs, but otherwise they were shared equally between family members (Table 6.30).

Table 6.30: (Question 4.10) How often did you eat eggs?

	G'father	G'mother	Father	Mother	Son	Daughter
< Once/month – Never	**8** *(89)*	**16** *(94)*	**21** *(49)*	**26** *(58)*	**21** *(47)*	**20** *(44)*
Once/ wk- once/month	**1** *(11)*	**1** *(6)*	**16** *(37)*	**9** *(20)*	**16** *(36)*	**18** *(40)*
2-6 days/ week			**6** *(14)*	**10** *(22)*	**7** *(16)*	**7** *(16)*
1-3/ day					**1** *(2)*	

The majority of grandfathers and children reported consuming milk and milk products on a daily basis. Sons consumed slightly more than daughters. Most women (both grandmothers and mothers- 60%) consumed milk rarely (Table 6.31).

Table 6.31: (Question 4.11) How often did you drink milk or milk products?

	G'father	G'mother	Father	Mother	Son	Daughter
<Once/month – Never	**3** *(33)*	**10** *(59)*	**16** *(37)*	**28** *(62)*	**15** *(33)*	**21** *(47)*
Once/ wk- once/month		**3** *(18)*	**7** *(16)*	**5** *(11)*	**3** *(7)*	**3** *(7)*
2-6 days/ week	**2** *(22)*	**1** *(6)*	**7** *(16)*	**5** *(11)*	**4** *(9)*	**5** *(11)*
1-3/ day	**4** *(44)*	**3** *(18)*	**13** *(30)*	**7** *(16)*	**23** *(51)*	**16** *(36)*

Due to unavailability of a milking animal or a dairy nearby families living away from the main village often consume tea without milk. The majority of men had tea with milk probably as they visited the main village almost daily (Table 6.32).

Table 6.32: (Question 4.12) How often did you drink tea with milk?

	G'father	G'mother	Father	Mother	Son	Daughter
< Once/month – Never		**2** *(12)*	**1** *(2)*	**5** *(11)*	**9** *(20)*	**8** *(18)*
Once/ wk- once/month			**1** *(2)*		**1** *(2)*	
2-6 days/ week						**1** *(2)*
1-3/ day	**9** *(100)*	**15** *(88)*	**41** *(95)*	**40** *(89)*	**35** *(78)*	**36** *(80)*

6.5.6 Fasting

The majority of mothers and grandmothers reported fasting at least once a week. Although fewer men fasted this often, 33% of grandfathers and 33% of fathers reported fasting at least once week. Fasting was rare for both boys and girls (Table 6.33).

Table 6.33: (Question 5.1) How often do you fast?

	G'father	G'mother	Father	Mother	Son	Daughter
< Once/ month – Never	**3** *(33)*	**2** *(12)*	**15** *(35)*	**16** *(36)*	**43** *(96)*	**44** *(98)*
Once/fortnight-once/month	**3** *(33)*	**3** *(18)*	**14** *(33)*	**5** *(11)*	**2** *(4)*	**1** *(2)*
Once / week	**2** *(22)*	**7** *(41)*	**12** *(28)*	**19** *(42)*		
2 or more days/ week	**1** *(11)*	**5** *(29)*	**2** *(5)*	**5** *(11)*		

On a fasting day, the majority of people ate two meals where one meal is comprised of eating a fasting snack (usually a roasted sweet potato or a sago vada). However 24% of grandmothers and 29% of mothers ate only one meal, compared with 5% of fathers (Table 6.34).

Table 6.34: (Question 5.2) How many meals do you have on a fasting day?

	G'father	G'mother	Father	Mother	Son	Daughter
Eat once a day		**4** *(24)*	**2** *(5)*	**13** *(29)*		
Eat twice a day	**7** *(78)*	**12** *(71)*	**29** *(67)*	**18** *(40)*	**2** *(4)*	**1** *(2)*
Do not eat			**1** *(2)*			
Not applicable	**2** *(22)*	**1** *(6)*	**11** *(26)*	**14** *(31)*	**43** *(96)*	**44** *(98)*

The majority of women reported starting to fast after marriage. Fathers and grandfathers tended to start fasting before marriage (Table 6.35).

Table 6.35: (Question 5.3) When did you start to fast?

	G'father	G'mother	Father	Mother	Son	Daughter
Before marriage	**5** *(56)*	**3** *(18)*	**17** *(40)*	**6** *(13)*	**2** *(4)*	**1** *(2)*
After marriage	**2** *(22)*	**13** *(77)*	**15** *(35)*	**25** *(56)*		
Not applicable	**2** *(22)*	**1** *(6)*	**11** *(26)*	**14** *(31)*	**43** *(96)*	**44** *(98)*

Religious faith and following family tradition were the main reasons for fasting. Fathers often fasted to give 'rest the stomach', or for 'dietary variety', whereas women fasted more because the other women in the family and neighbourhood fasted (Table 6.36).

Table 6.36: (Question 5.4) Can you tell me why you fast or used to fast?

	G'father	G'mother	Father	Mother	Son	Daughter
Religious reasons	3	5	16	8		
Family tradition	2	3	10	9	1	1
Rest to the stomach	1	4	12	1		
Follow peer group	2	5	4	14		
Health of the family		1				
For dietary variety	1	3	8	3	1	
To thank for 'a son'		1		1		

Very few respondents, mainly mothers, said they have given up fasting. Reasons included feeding the newborn, feeling hungry or weak, stopped after childbirth and no social pressure. It was interesting to note that after childbirth the women felt less need to fast (Table 6.37).

Table 6.37: (Question 5.5) Why did you stop fasting?

	G'father	G'mother	Father	Mother
As Lactating Mother				2
Due to Old Age	1			
Feel Hungry / weak				3
Stopped after childbirth				3
Due to Injury/ Ill health		1		
No Social Pressure	1		2	3

Nine fathers and two mothers said they had never fasted. The reasons given by men were that they felt hungry on the fasting day and could not do it. The women said they had no social pressure to fast. One family belonged to Gujarat and did not follow the fasting habits of this region. Very few children fasted, the reason given being that they were too young to start. A few children followed the fasting ritual with their parents (Table 6.38).

Table 6.38: (Question 5.6) Why did you not fast?

	G'father	G'mother	Father	Mother	Son	Daughter
No Social Pressure		1	2	2		
Due to Hunger / Illness			5			
Different Ritual followed			2	1	3	2
Too Young to start fasting					40	42

6.5.6 Illness related behaviour

Sons visited the doctor more often than daughters. Amongst the adults, grandfathers visited the doctor more often than grandmothers but there were no differences between mothers and fathers. There were no reported differences in the money spent on illness for children and adults. There were no marked differences in expenditure for medical treatment between sexes (Table 6.39 & 6.40).

Table 6.39: (Question 6.1) How often did you see a doctor in the last three months?

	G'father	G'mother	Father	Mother	Son	Daughter
Never	6 *(67)*	10 *(59)*	29 *(67)*	30 *(67)*	28 *(62)*	37 *(82)*
1-3 times	2 *(22)*	7 *(41)*	13 *(30)*	14 *(31)*	15 *(33)*	8 *(18)*
≥4 times	1 *(11)*		1 *(2)*	1 *(2)*	2 *(4)*	

Table 6.40: (Question 6.1) How much money was spent on your health in the last three months?

In Rupees	G'father	G'mother	Father	Mother	Son	Daughter
None	6 *(67)*	8 *(47)*	29 *(67)*	31 *(69)*	28 *(62)*	37 *(82)*
Less than 50	1 *(11)*	1 *(6)*	4 *(9)*	5 *(11)*	6 *(13)*	6 *(13)*
51-100		3 *(18)*	3 *(7)*	1 *(2)*	7 *(15)*	1 *(2)*
101-250		3 *(18)*	3 *(8)*	4 *(9)*	3 *(6)*	1 *(2)*
251-2000	2 *(22)*	2 *(12)*	4 *(9)*	4 *(9)*	1 *(2)*	

6.5.7 Tobacco consumption

A very high consumption of 'misry' and raw tobacco was seen amongst the adults, including women, both grandmothers and mothers. Only men smoked 'bidis' or

cigarettes and fathers were the only ones who reported use of alcohol. The previously urban habit of chewing 'gutka' (a mixture of tobacco soaked in opium) was seen in 12% of men (Table 6.41). Only four of the fathers reported consuming liquor.

Table 6.41: (Question 7.1) Do you consume any of these?

'Yes for'	G'father	G'mother	Father	Mother
Cigarettes			**4** *(9)*	
Bidis	**3** *(33)*			
Raw Tobacco	**6** *(67)*	**7** *(41)*	**27** *(63)*	**6** *(13)*
Misry	**3** *(33)*	**14** *(82)*	**24** *(56)*	**25** *(56)*
Gutka	**1** *(11)*		**5** *(12)*	
Alcohol			**4** *(9)*	

The majority did not feel that tobacco was used as hunger suppressant and only 18% of mothers and 5% of fathers answered 'yes' to this question (Table 6.42 and 6.43).

Table 6.42: (Question 7.2) Do you use tobacco to suppress hunger or replace food?

	G'father	G'mother	Father	Mother
No	**8** *(89)*	**17** *(100)*	**35** *(81)*	**24** *(53)*
Yes			**2** *(5)*	**7** *(16)*
Do not use tobacco	**1** *(11)*		**6** *(14)*	**14** *(31)*

Table 6.43: (Question 7.3) Do the women in your village use 'misry' to suppress hunger?

	G'father	G'mother	Father	Mother
No	**4** *(44)*	**13** *(77)*	**25** *(58)*	**24** *(53)*
Yes			**2** *(5)*	**8** *(18)*
Do not know/ cannot say	**5** *(56)*	**4** *(33)*	**16** *(37)*	**13** *(29)*

6.5.8 Worries

In the focus group discussions people stated that women in the village worry more than men, and these worries make them thin. I therefore inquired about worries even though this issue was very subjective (Table 6.44). About half the adults respondents reported worries.

Table 6.44: (Question 8.1) Do you have worries?

	G'father	G'mother	Father	Mother	Son	Daughter
No	**3** *(33)*	**9** *(53)*	**28** *(65)*	**20** *(44)*	**12** *(27)*	**18** *(40)*
Yes	**6** *(66)*	**8** *(47)*	**15** *(35)*	**25** *(56)*	**2** *(4)*	**4** *(9)*
Not known					**31** *(69)*	**23** *(51)*

Mothers reported worries more often than fathers. Both worried about their children's future and about unpaid debts. Unfinished chores were a major source of worries for mothers. Some of the children reported worries too, mainly regarding studies (Table 6.45).

Table 6.45: (Question 8.2) What do you worry about?

	G'father	G'mother	Father	Mother	Son	Daughter
Crop Failure	**1**		**2**	**2**		
Son's Future	**1**	**1**	**4**	**11**		
Daughter's future	**1**	**2**	**6**	**13**		
Unfinished Chores	**1**	**3**	**2**	**9**		
Unpaid Debts/ Money Problems	**3**	**1**	**8**	**11**		
Own Health	**1**	**3**		**1**	**1**	
Studies and Future					**2**	**3**

6.5.9 Additional question for women

60% of mothers but only 13% of grandmothers reported that dowry was given to their in-law's family at the time of marriage. Similarly, none of the mothers but 76% of grandmothers reported receiving bride price from their in-laws at the time of their marriage (Table 6.46).

Table 6.46: (Question 9.1 and 9.2) Was 'Bride Price' taken or 'Dowry' given at time of your marriage?

	Bride Price taken by parents		Dowry given by parents	
	Grandmothers	Mothers	Grandmothers	Mothers
Yes	**13** *(75)*	**0** -	**2** *(13)*	**27** *(60)*
No	**4** *(25)*	**45** *(100)*	**15** *(87)*	**18** *(40)*

6.6 Questionnaire responses from mothers only

Economic help from relatives

Eighteen percent of households had kin settled outside the village who sent monetary help. Usually this would be a male member of the family working in a city or a large town.

Colocassia cultivation

Out of 45 households 16 had a colocassia plot, usually near the house (27%). In some households, lack of water or not enough plot to cultivate were the reasons for not growing colocassia. I observed that houses living in a group usually had a successful cultivation of colocassia, probably because more bathing water could drain to the plot.

Poultry

Forty percent of households kept poultry. The villagers sell eggs and hens at the local market. The cross tabulation (Table 6.47) showed owning hens and chicken was associated with more eating, but many families who had hens did not eat eggs.

Table 6.47: Cross tabulation of responses of frequency of eating eggs (Question 4.10) with hen ownership (Question H 1.3)

Eat eggs	Own hen											
	G'father		G'mother		Father		Mother		Son		Daughter	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
< Once/month – Never	4	4	10	6	7	14	8	18	5	16	4	16
Once/ wk- once/month	1			1	4	12	3	6	7	9	8	10
2-6 days/ week					6		7	3	5	2	6	1
1-3/ day									1			

Consumption patterns were similar for sons and daughters in eating eggs.

Vegetarianism

Only 24% of households were vegetarian and only 16% of these houses followed vegetarianism for religious reasons. The rest could not afford non-vegetarian foods.

Source and distance to water

In this area water is scarce and the majority of households shared a water source with other families. Tap water was available to people living in the main village and in larger hamlets. Households who did not have access to tap water usually washed clothes either near a well or in the river (Table 6.48). Half the households did not have access to tap water and had to fetch water from a well or a hand pump.

Table 6.48: (Question H1.6 and H1.7) What are your usual sources of water?

	Drinking Water N *(%)*	Washing Water N *(%)*
Tap	**23** *(51)*	**23** *(51)*
Hand Pump	**2** *(4)*	**2** *(4)*
Well	**19** *(42)*	**13** *(29)*
Pond/ River reservoir	**1** *(2)*	**6** *(13)*
Other (bought water)		**1** *(2)*

Most families had access to water within 100 meters, but a substantial percentage (40%) had to travel more than 100 meters (Table 6.49).

Table 6.49: (Question H1.8 and H1.9) Distance of drinking and washing water source from the house?

	Drinking Water N *(%)*	Washing Water N *(%)*
Within the house compound	**11** *(24)*	**13** *(29)*
Within 100 meters	**16** *(36)*	**18** *(40)*
Within 101-500 meters	**14** *(31)*	**11** *(24)*
500 meters but within hamlet	**3** *(7)*	**2** *(4)*
Outside the village or hamlet	**1** *(2)*	**1** *(2)*

Distance of main village and local school

Only 31% of households were living within the main village. Most of the study households were in hamlets, nearer to their farmland (Table 6.50).

Table 6.50: (Question H1.10) Distance of house from the village?

	N *(%)*
House in the village	**14** *(31)*
Within 1 km of the house	**6** *(13)*
1-3 kms	**16** *(36)*
More than 3 kms	**9** *(20)*

27% of children travelled more than 1 km to go to school. There were primary schools near the hamlets but there was a senior school only in the main village (Table 6.).

Table 6.51: (Question H 1.11) Distance of house to school?

	N *(%)*
House in the village	**22** *(49)*
Within 1 km of the house	**11** *(24)*
1-3 kms	**12** *(27)*
More than 3 kms	**- -**

Workload after marriage

71% of mothers reported an increase in workload after marriage, while only 29% reported a similar or decreased workload.

6.7 Summary

Workload

Mothers worked more on the farm than men. 31% women worked six or more days on farmland compared to 14% of men. Men opted to work in shops and nearby factories;

16% of men worked as petty employees or in service, compared to 4% of women (Table 6.2-6.5, p146-147).

Woman going to the field in the morning, carrying lunch and water for herself and her family

Household chores were predominantly a female activity. Preparation of food, washing and cleaning the animal shed were activities solely done by women, though some men shared in fetching water and taking care of the animals (Table 6.6-6.10, p147-149).

Forty percent of households had to travel more than 100 meters to get water. Tap water was only available in the main village; others had to either fetch water from a well or a river reservoir (Table 6.48-6.49, p163).

Most mothers reported an increase in workload after marriage.

Both daughters and sons shared household chores, although sons did less than daughters (Table 6.6-6.9, p147-149).

Son and daughters help in peeling potatoes

Daughter helping mother in chopping vegetables

Leisure Time

Women spend less time resting and at leisure; 18% of women reported taking rest in the afternoon compared to 58% of men. Only 11% of women spent time with friends on a daily basis compared to 67% of men. Women spent less time in the main village than men. Time spent watching TV was similar for both sexes (Table 6.20-6.22, p152-153).

Diet and Food Intake

There were no major sex differences in dietary intakes within the household. Both fathers and mothers ate a similar number of meals in a day (Table: 6.23, p153). Men tended to consume more milk and fruits. This could be due to them having access the main market where these foods are available. Also, consumption of 'snacks eaten outside home' was considerably higher for men (Table 6.24, p154).

Sugarcane juice shop in the main village

Households that owned hens and chicken did consume more eggs (Table 6.47, p162). This could be an excellent source of diet supplementation.

Fasting

Fasting means abstaining from one or two meals in the day. 53% of women fasted once a week or more compared to 33 percent men, and 29 percent women ate one meal compared to 4 percent men on a fasting day (Table 6.33-34, p157).

Women fast mainly to maintain 'family tradition', and for 'health and betterment of the family and children'. Men reported 'rest to stomach' and 'for dietary variety' as the reasons (Table 6.36, p158). The majority of women started to fast after marriage (Table 6.35, p157) and many gave up fasting after the birth of children especially sons. Children were considered too young to begin fasting.

Seeking Health Care

No major differences between the sexes were noted in seeking health care or in the amount of money spent on illness (Table 6.39-6.40, p159).

Worries

Worries were reported by almost half the respondents, both men and women. Major worries involved the future of children, unpaid debts and unfinished chores (Table 6.45, p161).

Shift from 'Bride Price' to 'Dowry'

A change from 'bride price' to 'dowry' was reported by young mothers and grandmothers. Younger generation mothers had not received any bride price, rather, seventy percent had given dowry at the time of their marriage. In comparison, all the older women were given bride price at the time of marriage and none had given dowry (Table 6.46, p161).

6.8 Statistical analysis of questionnaire data

I designed my questionnaire as a qualitative tool rather than a quantitative one. However, after summarising the data in the previous section, I wanted to try to identify questionnaire variables that were influential in predicting differences in the nutritional status of adult men and women, using a statistical analysis.

6.8.1 Method

I chose to use a multivariate method, Principal Components Analysis rather than multiple regression analysis, because often many variables act in combination to influence nutritional status, and may be highly correlated with each other.

In Principal Components Analysis, the original set of variables are transformed into a new set of variables known as principal components (Joliffe, 1992). These are linear combinations of the original variables. Each principal component is uncorrelated with the other principal components.

The first principal component accounts for as much of the variation in the original data as possible, and the next few components contain nearly all the remaining variation. The main objective of principal component analysis is to reduce dimentionality and to identify meaningful underlying variables.

Variables were derived from the household questionnaire (separate observations for men and women) and from the family survey (household data). They were selected with an emphasis on activity, food patterns and socio-economic background.

To reduce the number of variables, I combined some similar questions to form 'scores'. This was done by adding up values of individual variables, for example, household chores, leisure, fruit and vegetable intake etc (Table 6.52). In total, six household variables and 13 parent variables each for mothers and fathers were included in the analysis.

The sample selected for this analysis were the 42 households which had complete responses from the fathers and mothers.

Table 6.52: List of variables used in the principle component analysis

	Household Variables		Range
1.	**House Type** (Hut, Kutcha, Mixed Pucca, Pucca, Rented)	1-5	Hut-1, Rented-5
2.	**Transport** (None, Bicycle, Two-wheeler, Four-wheeler)	0-3	None-0, 4 wheeler-3
3.	**Possessions** (TV/Radio and Iron ownership)	0-2	0-None, 2-both
4.	**Oil per person** (Oil consumption per household)	0.10-1.25	Kilograms
5.	**Money received from outside**	0-1	No-0, Yes-1
6.	**Water Source** (Distance to drinking and washing water)	1-10	Near-1, Far-10
	Fathers and Mothers		
1.	**Education**	0-5	Illiterate-0, Graduate-5
2.	**Work on farm land** (Includes work on own and other's farmland)	0-28	Less-0, More-28
3.	**Other work besides farming**	0-28	Less-0, More-28
4.	**Household Chores** (cooking, washing clothes and utensils, fetching water, tending to animals, cleaning animal shed, collect firewood, cut firewood and run errands)	0-27	Less-0, More-27
5.	**Leisure Score** (watching TV, spending time with friends and afternoon siesta)	0-3	Less-0, More-3
6.	**Sleep Score** (last to go to bed and first to wake up)	0-6	More Sleep-0, Less sleep-6
7.	**Missed meals score** (times breakfast, lunch, dinner was missed)	0-9	None missed-0, Missed all-9
8.	**Eating Score** (meals eaten first and never eaten last)	0-6	Eaten last & never first-0, Eaten first & never last-6
9.	**Non-vegetarian Foods** (meat, eggs and milk foods)	0-9	Less-0, More-9
10.	**Fruit and vegetable score** (fruits and green leafy vegetables)	0-6	Less-0, More-6
11.	**Eaten snacks prepared or purchased outside**	0-3	Less-0, More-3
12.	**Fasting frequency**	0-4	Less-0, More-4
13.	**Worries score**	0-1	No-0, Yes-1

6.8.2 Results

The first principal component explained 17% of the total variation in the data, the second 11%, third 8%. However, the amount of variation explained should be treated with caution as some of the variables were binary.

The larger the loading of a given variable the greater the contribution of that variable to the specific component. Within a component, positive loading indicates direct association with the component, and negative loading indicates that variable is inversely associated with the component. I selected variables which loaded 0.4 or greater for simplicity, and considered them to be making contribution towards the component (Table 6.53).

Table 6.53: Component loadings of selected variables for the whole household, fathers and mothers on component 1 and 2

Variables	1(17%) 'non-farmer'	2 (11%) 'well off households'
Transport		.641
Possessions (TV/radio, iron)	.448	
Oil per person per household	.738	
Money received from outside		
Water Source		-.553
Father		
Education	.510	
Work on farm land	-.739	
Other work besides farming	.707	
Household chores	-.596	
Leisure score		
Lack of sleep score		
Eating score		
Non vegetarian foods		.416
Fruit and vegetable score		.434
Missed meals score		
Eaten snacks from outside		
Fasting frequency		
Worries		-.574
Mother		
Education	.673	
Work on farm land	-.765	
Other work besides farming	.444	
Household chores	-.669	
Leisure score	.574	
Lack of sleep score		-.407
Eating score		
Non vegetarian foods		.497
Fruit and vegetable score		
Missed meals score	.405	-.531
Eaten snacks from outside	.412	
Fasting frequency		
Worries		-.541

Loadings below 0.4 not shown

First component

High scores on the first component represented households which:

- Consumed more oil, owned a TV or radio and an iron,
- fathers and mothers were more educated, did non-farming work and less household chores,
- the mothers had more time at leisure, missed more meals and ate snacks.

These households can be called 'non-farming' households ('Non-farmers').

Second component

High scores on the second component represented households with:

- transport and a water source near the house,
- mothers and fathers did not report any worries, had a higher intake of non vegetarian foods, and fruits and vegetables,
- the mothers did not report lack of sleep, and did not miss meals.

These households can be classified as better off households ('well-off households').

6.8.3 Relationship of principal components with adult nutritional status

To examine associations between the principal components and the nutritional status of the fathers and mothers, I then used regression analysis to predict the absolute BMI of mothers and fathers, and the percent difference between their BMI (Table 6.54).

The first component i.e. non-farmers, was related to fathers' and mothers' absolute BMI, therefore higher score on this component predicted higher BMI of mothers ($p=0.01$) and fathers ($p<0.001$). This component did not have a significant effect on the BMI difference between mothers and fathers.

The second component was not related to fathers' and mothers' absolute BMI but borderline significance at 10% (p=0.08) was seen for the difference between the percent BMI of fathers–mothers. Higher scores on this component i.e. 'well-off households' predicted a greater difference in parental BMI.

Table 6.54: Principal components as predictor of adult BMI

	Component 1 'non-farmer'		**Component 2 'well off households'**	
	β	p	β	p
Mothers BMI	**1.1**	(0.01)	**-.5**	(0.3)
Fathers BMI	**2.0**	(<0.001)	**.5**	(0.4)
% difference in BMI	**3.1**	(0.3)	**5.2**	(0.08)

Values are β(p) from univariate regression

6.8.4 Summary

The first component 'non-farmer' highlighted that households that were non-farming had mothers and fathers with better BMI. However, the difference between the adults BMI was not significant. The characteristics of these households besides having lower farm workload was that both the parents were more educated.

The second component 'well off households', these households had better intake of protein rich foods e.g. transport. Higher scores on the second component were associated with a greater BMI difference between the mothers and fathers.

Chapter 7 Discussion and Conclusions

This study aimed to identify and explore socio cultural factors to explain the fact that rural Indian women are less-nourished than their male counterparts.

The rationale for conducting this study was:

> Firstly, this region of India is considered to be economically better developed than the rest of the country i.e. indicated by lower rates of poverty, therefore it was expected that women would have a better nutritional status. However the Pune Maternal Nutrition Study contradicted this premise and showed the women to be under-nourished, both in absolute terms and relative to their menfolk.
>
> Secondly, India being a vast country with different regional ethos and the scarcity of previous data on the socio cultural factors relating to women's under-nutrition from this area, identifying these factors and assessing whether it was feasible to intervene. The long-term goal of the study was identifying possible interventions to improve women's nutrition in this area(KEM Hospital Research Centre, 1998).

To determine these socio cultural factors, a detailed investigation at both community and household level was carried out. The study objectives were:

- To identify and explore the reasons as perceived by the community itself to account for the lower nutritional status of women in the village.
- To locate households within the village where gender differences exist, through an examination of nutritional status of its members.
- To select households, based on their members' nutritional status, and to investigate the differences in behaviour frequencies and patterns of the members of these households.

7.1 Data Collection Outline

The data collection was planned in three phases to investigate the above objectives (Figure 7.1).

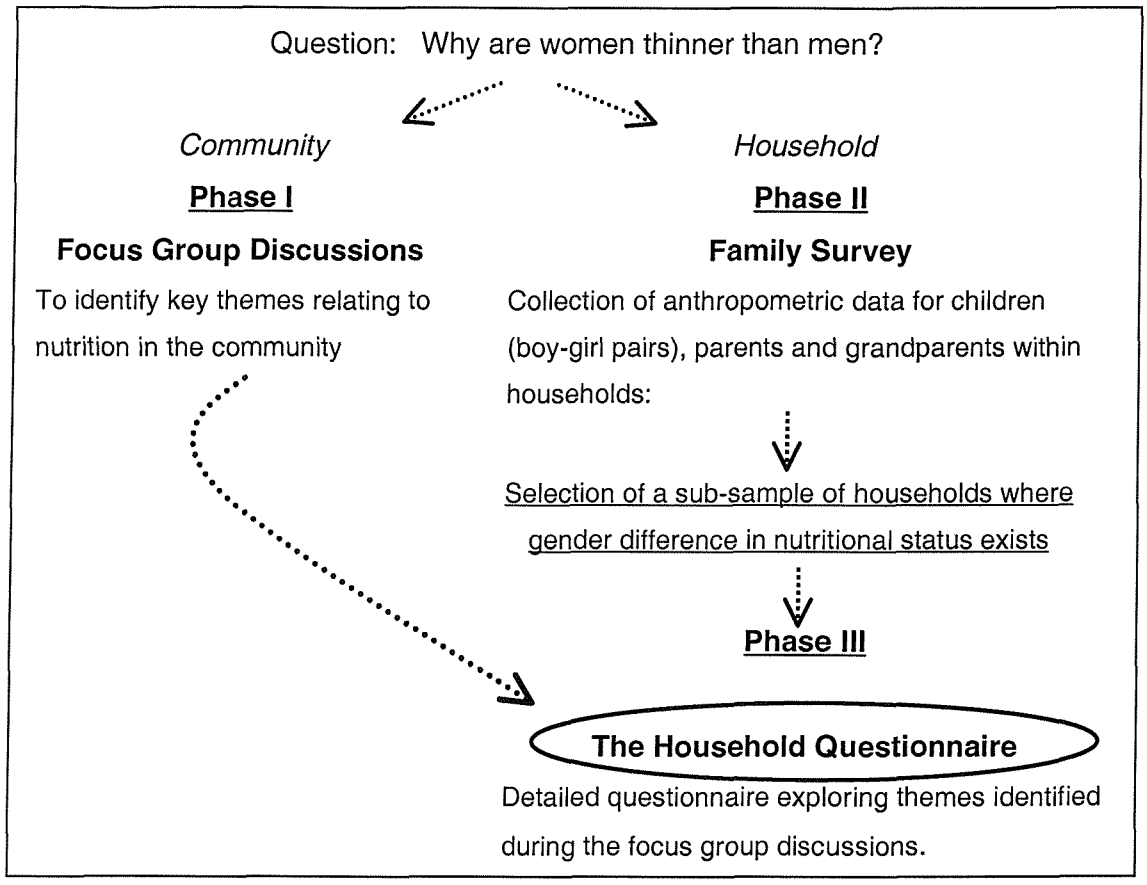


Figure 7.1: Study outline

7.1.1 Phase I Focus group discussions (chapter four, p 52)

Focus group discussions were organised in the village with grandfathers, grandmothers, fathers and mothers. The discussions highlighted five main themes. These were:

- *Young women as a burden* Villagers perceived that due to the recent shift to dowry from bride price, the increasing cost of marriage was a reason to view ones daughters as burden.

- *Young women as workers* Women worked both on the farm and in the house. Marriage was thought to initiate more workload for the newly married women.

- *Young women as decision makers and consumers* In comparison to men, women seldom kept cash and did not visit the main village as regularly as men. This was believed to give them limited access to resources and supplement their food intake.

- *Young women's responsibility for the family's health and success* By starting to fast, which begins at the time of marriage. Also, women were seen as worrying too much which was inferred to be the cause of their thinness.

- *Young women as mothers* The young bride was expected to bear a child within a year of marriage.

7.1.2 Phase II Family survey (chapter five, p 81)

To maintain a comparative perspective in exploring gender differences in nutritional status, I assessed the nutritional status of all the members of households having boy and girl sibling pairs in the age group of 3-8 years using anthropometric measurements. Also, basic socio-economic details were collected to assess if they played a part in nutritional differences. The main findings were:

- Most of the children were undernourished. Boy-girl sex differences in weight and height Z-scores were not statistically significant, but girls were significantly thinner than boys. Amongst adults, a higher percentage of women suffered from chronic energy deficiency, and mothers and grandmothers were strikingly thinner than fathers and grandfathers.

- The nutritional status of children improved with improving parental occupation, land ownership, access to electricity, and ownership of radio or TV, well or motor vehicle, oil consumption and living in a nuclear family. Amongst the adults these were associated with higher BMI in fathers and not generally in mothers.

- Gender disparity amongst children was highest with increase in paternal education and least in households owning radio/TV, iron and electricity. In adults, higher socio-economic score, upper caste, owning an iron and consumption of more oil

and further the distance of house from the main village were indicators for greater gender difference.

7.1.3 Phase III The household questionnaire (chapter six, p 128)

To further investigate the findings from the focus groups and family survey, I administered a detailed questionnaire in households showing gender differences in nutritional status. This was done to achieve links found at the community level and findings at the household level regarding work, diet and leisure patterns of members in a household. Also, specific questions about fasting rituals, health seeking behaviour, tobacco consumption, and worries were asked. The main findings were:

- Women worked on both the farm and at home, and had a higher workload than men. More women did farm work, while men tended to work in shops and factories. Women spent less time at leisure i.e. resting in the afternoon or time spent with friends. Children, especially girls, share household chores with the mother.

- No major gender differences in dietary intakes were noted, with the exception of men eating more snacks prepared outside, and more fruits and milk, due to regular access to the main village. Grandparents and children were the ones eating meals first in the house.

- Women fasted more than men. Reasons for fasting given by women were for maintaining 'family tradition' and 'health and betterment of family and children' whereas men fasted for 'rest to stomach' and 'dietary variety'. Children were considered too young to begin fasting.

- No major differences in seeking health care were noted amongst the household members. Worries were reported were regarding future of children, unpaid debts, and unfinished chores.

- A change from a traditional practice of 'bride price' to 'dowry' was expressed by both mothers and grandmothers.

- The results from a principal component analysis showed households where men and women were not involved in farming and mothers were educated, had better nutritional status. Greater male-female differences were increased in households having more economic resources, fewer worries and consuming more non-vegetarian foods, fruits and vegetables.

7.2 Discussion

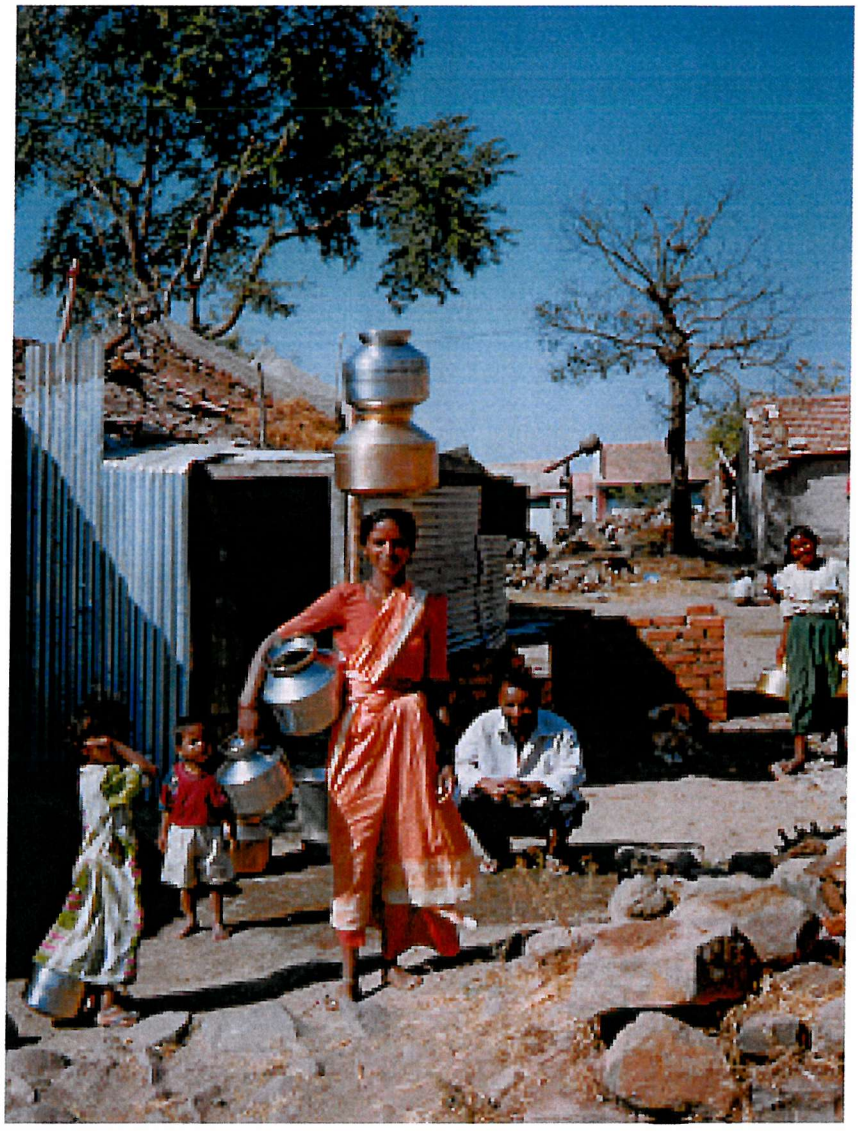
The following four reasons came forward as playing an important role in the thinness of young women:

Reason 1: Excessive workload for women

Everyone in the focus group discussions agreed that women worked harder than men and that excess physical work is the main cause of womens' thinness in this area. Women did heavy household chores like fetching water, washing clothes and collecting firewood, as well as farmwork involving tasks like weeding, sowing and cutting crops.

Women removing weeds in the fields

Batliwala (1982) has earlier reported from south India that when women's field and domestic labour was taken into account, the women had a higher daily calorie expenditure than men in the same household(Batliwala, 1982). This appears to be in direct contrast to the statistical picture, which shows women in India to have lower labour force participation than women in other developing and industrial countries. Indian women's share of the adult labour force is only 31%, as compared with 42% for Bangladesh, 40% for Nepal, and 43% for Myanmar (United Nations, 1995), apparently suggesting that Indian women work less than elsewhere. It is more likely, however that the rural Indian women's work is not rewarded in cash and hence not counted in the statistics.



Woman with her daughter going to fetch water

During the discussions male respondents reported that women were often working very hard and as a result they became too tired to eat or had too little time to eat. This is in contrast to a study finding from Uttar Pradesh where men reported women do not work as hard as men and often, like children, simply eat food and do nothing economically(Jeffery et al. 1989). Thus unlike the men in Uttar Pradesh, men from this area did recognise the intense physical labour put in by women.

Results from the household questionnaire reaffirmed the focus group findings highlighting the excess work demands faced by women. Women also took less time off work than men, who spent leisure activities with friends or slept more in the afternoon.

Men playing cards at the common hall in a hamlet

This increase in women's work is due to recent industrialisation in the study area. Findings from the household questionnaire, where the frequency, number of tasks performed and time spent were measured, showed women were working more on the farm and men tended to do other work e.g. in shops and nearby factories.

People in the community believed that another reason for young women being so thin was the sudden increase in their workload after marriage. The discussions ascertained that after marriage, women's change in food intake was not as significant as their increase in work and responsibility. The study area follows a patrilineal marriage system where a bride goes to her husband's village after marriage. She knows no one in this new village and does not know her way around. She is therefore completely reliant on her new family. This shift to a new place and change in the young woman's status also brings new responsibility and chores. The elder women of the family assign work to the new bride. This was confirmed by participants in the focus group discussions who described the heaviest household chores like fetching water and washing clothes being given to or taken up by the young bride, whilst the older women shift to chores that are not as tedious nor as physically demanding. Women re-ascertained this finding in the responses from the household questionnaire as the majority reported an increase in workload after marriage. Though almost undocumented in the research literature in south Asia, it was clear to the participants in the discussions that this excessive workload soon after marriage for the young women played a large part in making them thin.

Grandmother sorting grain as her husband and grandson looks on

Reason 2: Unequal access to resources

Focus group discussions highlighted that men were the ones who kept cash and had better access to village resources. The daily wage earned by the woman was given to the eldest male or her husband. The reason for women not keeping cash was that they never visited the market therefore they did not need it. The men were the ones who travelled to the main village and did the necessary shopping for the household. Basu has previously stated that the physical restrictions on women's movements, combined with limited access to resources within the household reduces their access to health care (Basu, 1990).

Weekly village market to purchase fruits and vegetables

The focus group discussions suggested that women's access to supplementary food sources might also be restricted, and the household questionnaire reiterated that the

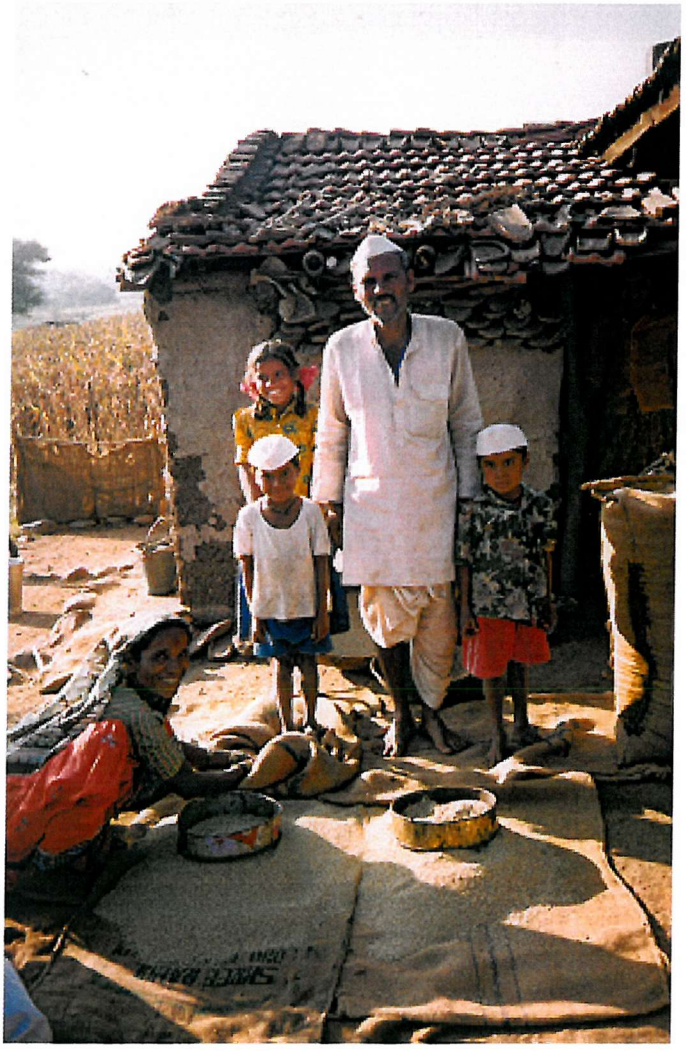
men were visiting the main village more often than the women. When men went to the village to visit the market or conduct routine business, this also involved a visit to the snack shop. Here they would buy 'bhel', a snack rich in vitamin C and iron, and tea with milk and sugar. As women seldom visited the main village, these supplements to the staple diet would not be available to them. This access to extra food was recognised by focus group participants as an important reason for better nutritional status among men. The household questionnaire reported no variation in the number of meals eaten at home by men and women but men did eat fruits and snacks prepared outside the house. Therefore sheer access to the village led to important additional nutrition, as well as making men more secure and confident socially.

Another important finding from the household questionnaire was that the grandmothers tend to visit the main village more often than the young mothers. There are two probable reasons. First, compared to younger women the older women in the household have more time to spare, and second, as a woman gains more control on her environment, she tends to access the main village. Monica Das Gupta (1995) explains patterns of household formation and inheritance and its influence on gender inequality. She explains that the strength of 'intergenerational bonds' in the Indian joint family system de-emphasises the 'conjugal bond' arising from marriage. Therefore young brides are considered subordinate both to men and older women in the household. She has further explained that a woman's status within a family rises with her age (Das Gupta, 1995).

The focus group discussions provided an insight into recent changes in the Indian family structure. The young women stated that they preferred to be in a nuclear family rather than the joint family, traditional in rural India, because they felt that they had better control over resources and their husbands behaved more responsibly when in a nuclear household. This may reflect a woman's need to overcome the strong intergenerational bond existing between mother-in-law (parents-in-law) and son and to make a stronger conjugal bond between herself and her husband. I observed that this change from joint to nuclear families is taking place in this area, as in a span of one year of my data collection three families out of 48 had broken away from the original joint household, becoming nuclear.

Joint family: Grandparents, two sons and daughters-in-laws, unmarried sister, granddaughter and four grandsons

In the focus group discussions young women expressed wanting to have a nuclear household as that leads them to have better control of their money, even though this meant more work at home as there were no sisters-in-law or mothers-in-law to share the work. Women believed that if they were part of a nuclear family they would be happier, as young women living in a joint family never took part in decision making versus a nuclear family where women feel they have authority to ask their husband about his spending. Interestingly, women living in a nuclear family were nutritionally better off (had higher BMI) than those in joint families, perhaps because access to resources plays an important role in being nutritionally better.



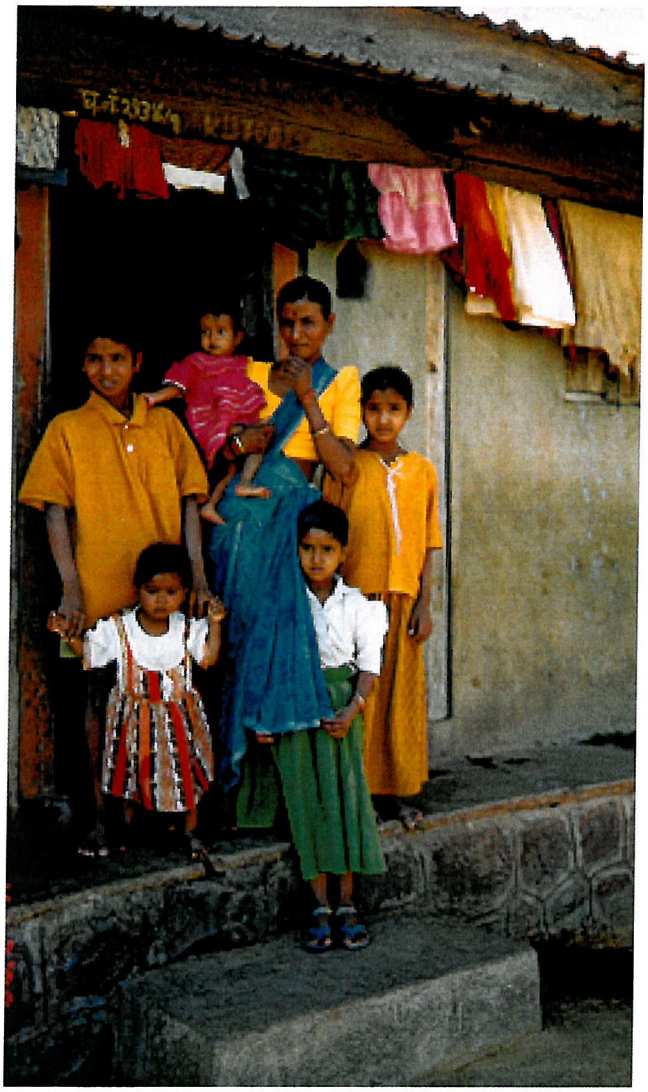
Nuclear family: Father, mother, with a daughter and two sons

Reason 3: Responsibility for the family's health and success on women

The focus group discussions emphasised that young women bore the responsibility for the whole family's physical and spiritual health. This burden of responsibility seemed to take two forms. First, young women were expected to fast regularly, and second, they appeared to worry for the well being of the whole family.

Fasting habits may decrease the quality and quantity of food consumed, at a time when their workload is increasing and when they may have less time to eat. Hinduism promotes self-sacrifice as a way of pleasing the Gods and Goddesses, and preventing bad luck. In India, men and women adopt fasting practices not only for religious reasons but also for social rituals and health. In the present study area, all family members fast to some extent, but young women fast more regularly and more strictly.

The household questionnaire indicated that women mostly kept fast for 'health and betterment of the family' whereas the men fasted for 'dietary variety' and to give 'rest to stomach'.



Mother with her children

Therefore the primary responsibility for fasting and for the family's spiritual welfare falls on the young women. From early childhood, girls in India are encouraged to follow their 'sanskriti' (culture), a set of religious beliefs and traditions which dictate that the ideal woman is self-denying and lives simply to serve her family. Because throughout life a woman is dependent on men for social and economic security, she has an interest in ensuring their continuing health and welfare. She is taught that one way of doing this is through fasting. Barbara Harriss (1995) has explained in her investigation on 'Intra-family distribution of hunger in South Asia' that there are

strong gender differences in fasting, the male fasts for individual spiritual purpose and the female fasts for auspiciousness of the household (i.e. for husband, son and brother)(Harriss, 1995). Harriss further states that the most probable person fasting at least once a week is the senior female in the household. However in my study it was noted that the young bride takes up this ritual more strictly.

The household questionnaire revealed that women started to fast soon after marriage and often gave up fasting when they are lactating. The women reported that they would also give up fasting when either they have completed their child bearing or when they feel that fasting is taking a toll on their health or impairing their work in the fields. When a woman has acquired autonomy and power as an important family member by proving her fertility and achieving the required number and sex of children, this gives her confidence to take decisions. She comments *'I work hard enough so why fast'* and this reflects her becoming comfortable with her surroundings.

Fasting in this area did not necessarily mean to eat nothing. It was earlier reported by Karve that during pilgrimage, Maharashtrians' have ritual regulations about eating food and considered it 'complicated business' as some had one-meal a day, some abstained from salt and sometimes special fasting food was prepared for men(Karve, 1962). Harriss has also stated that fasting involves abstinence from 'exciting foods e.g. spices, fried or salty foods, and changing the source of energy intake but not always reducing it(Harriss, 1995). In my study area, strict fasting involved eating one meal a day. However, women were more likely to follow this regime than men, and they sometimes fast two days in a week. Men who fast will usually get the opportunity to supplement their fasting diet with snacks made from fasting foods available in the main village. The household questionnaire responses showed that men tended to eat more meals, or a fasting snack, on a fasting day compared to women. Therefore through fasting young women might become progressively less nourished then men-folk.

Young women's burden of worries was also a reason given for their thinness during the focus group discussions. Many participants in the focus groups felt that the women worried about the future for their children, the success of their farm, and

unfinished chores both at home and on the farm. Participant's felt that the amount women worry was bad for their health. Their anxiety made them miss meals and work too hard. Men also had worries but felt that they dealt with them differently. If they were worried about something they would talk it over with their friends, but in general they tried to accept things as they were. Women seemed unable to do this. Their way of coping with problems was to work even harder and to take on extra duties. Young women's lack of decision-making power in the family meant that events were often beyond their control. They had no way of resolving problems except through worrying and working even harder. This belief projected in the focus group discussions was difficult to investigate. It is difficult to measure worries. However, I feel that young women in the study area took on the role of 'conscience' for the family, and in seeing to it that the house remains functional with food and other necessities tended to have extra worries. There was no relation of worries to nutritional status in my study.

Reason 4: Marriage and early motherhood

Focus groups revealed that parents of girls perceived them to be a burden, the main problem being the cost of getting a daughter married, and a shift from 'bride price' to 'dowry' in this area. These two cultural phenomena have different origins and different consequences for the bride. Traditionally, in India due to the patrilineal system of marriage the bride moves to the groom's family. The bride's family therefore have a socially and ritually inferior position to the groom's family thus necessitating the provision of dowry. In comparison, in a matrilineal family system followed in some southern Indian Hindu families, where the daughters marry the mother's brothers or the mother's brother's son, a tradition which is accompanied by bride price. However, even in southern India, recent social, economic and demographic developments have made marriages between close relatives difficult and bride price has given way to dowry (Caldwell et al. 1983). The results from the household questionnaire further corroborated a change in my study area as the majority of the grandmothers reported to have received 'bride price' at the time of their marriage whereas all the young mothers reported to have given dowry and none received any 'bride price'.

In my study, people attributed the rise in dowry to two factors. Firstly, girls were now being educated. Girls therefore wanted to marry educated grooms and there were few of these in this farming community. The demand was outstripping the supply and the trend of 'paying-up' to the groom's family had begun. The second reason was that parents knew that a farming lifestyle meant a lot of hard work for their daughters. They would therefore choose to marry her to a groom who was a not a farmer. Families who could not afford dowry had to marry their daughters to farm labourers or peasant farmers (Figure 7.2). It is very upsetting to portray this picture as development and opportunity has been of benefit to only males and females have ended up being secondary. Miller has argued that "the dowry demands are high when fewer females are employed for the agricultural sector, but where demand for female agricultural labour is greater, smaller dowries are accepted by the groom" (Miller, 1987,p95). The burden borne by the families in the study area trying to marry their daughters out of agricultural labour was therefore high, and often necessitated taking loans or selling of land. Tambiah studied bride-wealth and dowry practises in Africa and amongst Hindus of north India, and supports the view that families give larger dowry when they marry their daughters to upper class families and to secure their daughters' comfort (Tambiah, 1989).

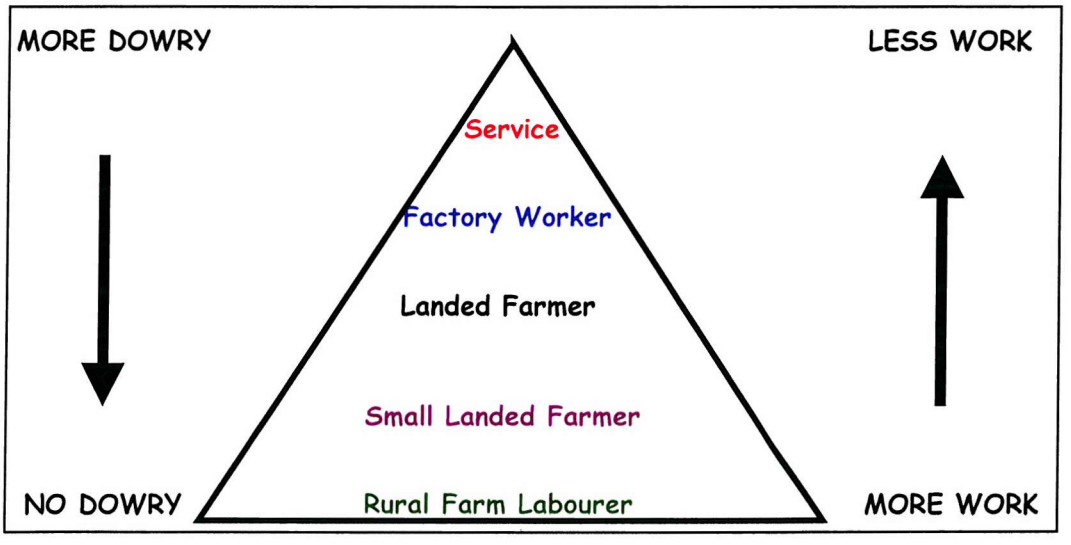


Figure 7.2: Reasons for increase in dowry system and its relation with workload for young bride

Early marriage may be a particular issue for young women in my study area because they appear to be getting married at a younger age than they used to. Though people knew that marriage was illegal below the age of eighteen, the men who took part in the focus groups felt that they had to marry their daughters earlier than this in order to protect the family name. Waiting until girls were eighteen would give them more opportunity to have sex and fall pregnant before they were married, thus bringing disgrace upon themselves and their families. Historically, women in India have married at very young ages, almost as soon as they achieve menarche. A family planning report suggests that, although the age of Indian brides has risen in the last hundred years, many still marry at ages younger than the minimum set by law. An analysis conducted by the Family Planning Foundation of India showed 46 percent of rural women were married at age 15 or younger and 64 percent were married prior to age eighteen (Ramabhadran, 1987).

Once married young, the bride is expected to bear a child within a year. The focus group participants knew that this might undermine the health of women. Despite this knowledge, there was intense social pressure on newly married couples to prove their fertility. Previous studies have reported the high expectations on newly wed women to conceive (Ramanamma and Bambawale, 1980), and there is tremendous social and medical harassment faced by women who have not born any child. Childless women have also been reported to have less access to health care and are socially isolated (Winkvist and Akhtar, 2000).

Often very young women may still be growing at the age at which they get married in this region. Their own need for nutrients may compete with the needs of the growing fetus, further compromising the women's nutritional status and resulting in smaller babies (WHO, 1994), (Martorell et al. 1998; Merchant et al. 1990b; Merchant et al. 1990a). Another study conducted in this region of Maharashtra found that 25 percent of the girls under the age of eighteen had low birth weight babies (Pratinidhi, 1992). Gopalan showed that a higher percentage of rural girls fall in the high-risk category if they became pregnant at the age of 14 than 18 years (Gopalan, 1989).

Although young womens' contraceptive use was not investigated in this study, available data from the Family Planning Programme widely implemented in this area

shows a high number of women using family planning methods, but they were the ones who had already had a child or completed their families (KEM Hospital Research Centre, 1997). Therefore, the reasons for a decline in fertility in the area could be an active sterilisation campaign in the community, rather promotion of services among young brides.

Woman (wearing a saree) in her eight month of pregnancy bringing water from nearby well

This study clearly identifies the first year of marriage for a young woman a time of increased physical work, and possibly reduced food intake by way of fasting, and bearing a child at this time may be especially damaging. Especially as during pregnancy there is little reduction in workload and women tend to work till the last trimester(Rao et al. 2001), (Jeffery et al. 1989). The focus groups highlighted that women are seldom or never advised to reduce their work during pregnancy as mothers-in-law felt that working throughout pregnancy led to an easier delivery. One might speculate that this advice is simply convenient since if women were to stop work or reduce work once they became pregnant, there would be no one to run the household or help on the farm. It is unlikely to be good for women to work so hard whilst pregnant.

No Evidence of Deliberate Gender Bias

Studies from the Indian sub-continent as described in the literature review, document that the neglect of girls manifests as disparity in health care for girls and boys(George et al. 1992), (Basu, 1989), (Miller, 1989; Das Gupta, 1987), (Kielmann et al. 1983). A previously conducted study in my study area showed bias against female children in seeking treatment and a health referral (Ganatra and Hirve, 1994). However, in my study, no differences were reported in seeking healthcare for sons and daughter when the household questionnaire was assessed for illness and visits to the doctor.

Participants in the focus groups admitted that every household should have at least one son, to inherit the farm and to continue the family name. The existence of son preference for rights of asset ownership has been described throughout the Indian sub-continent(Das Gupta, 1987). Vlassoff (1991) studied a village in Satara district of Maharashtra and showed that a constraint on fertility limitation was the need for sons (Vlassoff, 1991). Exploring this issue further in the group discussions, the parents said that they did not consciously neglect their daughters in this region. They rejected and resented any implication that they loved their daughters less than their sons.

Some of the comments, however implied that families may not have been as quick to seek health care for daughters as they would be for sons, especially in houses where

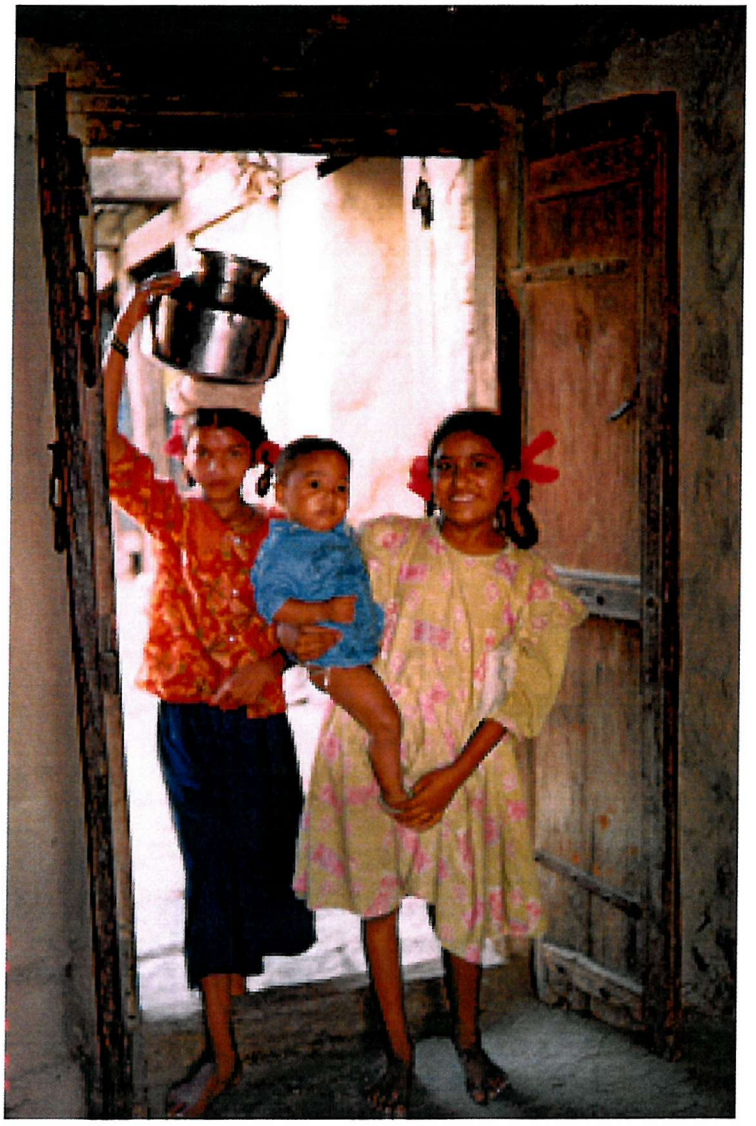
their were many daughters. They were more likely to indulge their sons than their daughters by giving the boys extra gifts and sweets. But none of the participants in the focus groups suggested that parents in this region actually consciously neglected their daughters.

Mother with her children

It is reported that often gender differences against girls are accentuated when there are more girls in a household, particularly in families having more daughters than sons (Das Gupta, 1987). This has also been identified in Bangladesh, where girls with older

sisters were 5.8 times more likely to die than girls without elder sisters (Muhuri and Preston, 1991). However, in my study, no similar trends were seen when children's nutritional status was compared according to the sex parity. The data showed that the more the number of girls born in a family the higher the male-female difference in BMI amongst the parents but overall no major significant differences were noted relating to children's nutritional status.

The household questionnaire findings revealed that both sons and daughters helped in completing the household chores, although daughters reported to be doing them more often than sons.



Daughters helping in fetching water and taking care of a sibling

Also, both boys and girls were attending school and neither of them were kept at home to complete household chores. No major dietary intake differences were reported in between sons and daughters.

Mother with her two children eating breakfast before going to school

Therefore I can conclude that evident sex differences in health care were not noted for children in the family survey and the household questionnaire but a preference to have at least one male child was expressed by the participants from the focus group discussions. Regarding gender differences in seeking health care amongst adults there again were no major differences noted in the household questionnaire responses from mothers, fathers and grandparents.

7.3 Strengths and Weaknesses of this Study

Focus Group Discussions

This qualitative method helped me begin the process of investigating the study problem. It was an excellent way to approach the village and provided an early acceptance of me by the participants.

The discussions yielded important findings, and a direction to further explore the study problem. I would call my findings from these discussions as 'rich source of information'. These methods should be used extensively to establish and plan interventions.

Family Survey

The family survey provided anthropometric assessment on nutritional status and the basic socio-economic background details for members of the household. For children's skinfold thickness data I had to use centiles rather than direct Z-scores which is not ideal.

Involving children and grandparents did expand this study and double the task of data collection and the study became big. If I were doing my study again, I would omit measurements on the children and grandparents, leaving more time for increasing my sample size for the household questionnaire. Nevertheless the collected information did provide vital information about their prevalent nutritional status and that no strong sex bias against the girl child exists in this area.

The Household Questionnaire

The sample for the household questionnaire was selected by an elaborate system aimed at getting households with the most extreme discrepancy between sexes. In retrospect, this may have been unnecessarily complex, and little or no better than a simple random selection.

In general I was happy with people's responses and the data obtained using the questionnaire were an other rich source of information. Exceptions were the section on worries and that pertaining to health seeking behaviour. Both were, I felt, too simplistic and superficial to obtain meaningful data. An investigation of 'worries' would require more focus group work and in-depth participatory interviews. Health care was not the main area of investigation, and would require more detailed questions, and ideally prospectively collected data.

Possibly due to a small sample size, statistical analysis of my data was inconclusive. This was unsatisfying, but is not a major criticism of the study since a statistical explanation of maternal BMI was not my primary aim.

7.4 Conclusion

I conclude from my study that in this rural community households with better economic resources had children and men with better nutritional status but women often showed no benefit. This finding has a both positive and negative side to it, as improving the nutritional status of the children can be achieved by providing better economic sources to a household but the same cannot be said about improving the nutritional status of women.

Gender bias against women was often indirect and not deliberate. Women were believed by the men in the community to neglect themselves because of lack of time. I discovered a chain of events that led to thinness of young women after marriage; this includes excessive workload, a social milieu of responsibilities and fasting, early childbearing and few opportunities to increase their food intake (Figure 7.3).

After marriage, the bride shifts her residence to her husband's home, which is usually a joint family. In this new environment (often a different village), she starts to follow the chores allotted to her by her seniors (usually by her mother-in-law or elder sister-in-law) and does what she is told. Being new she is given simple but arduous tasks like fetching water, washing and working on the farm. She takes the responsibility for the betterment of family and is expected to fast to show her commitment to the family. This excess workload and dietary restriction is accentuated when she is

expected to prove her ability to procreate and conceive her first child within a year. These actions are necessary to improve her status in the house.

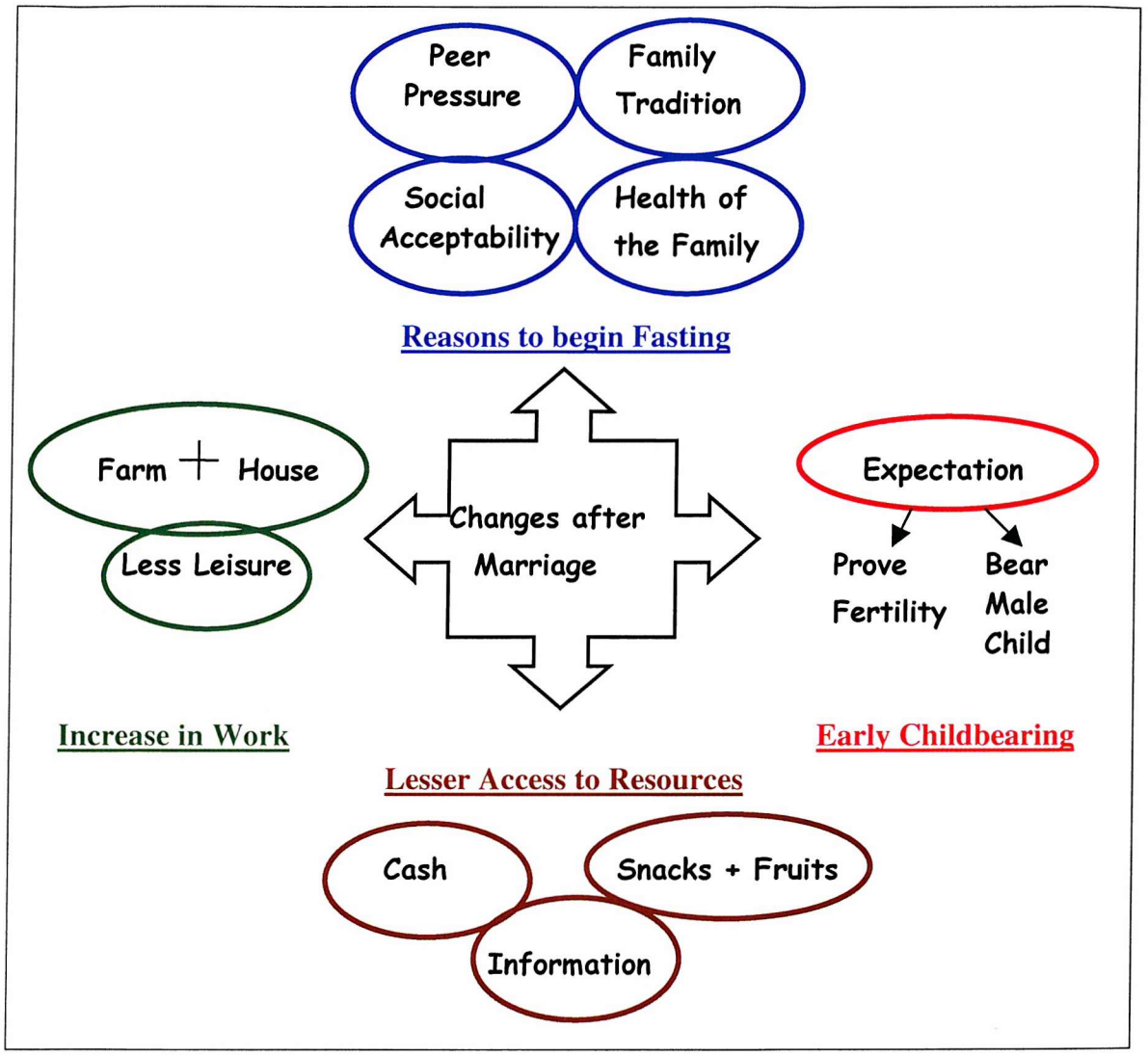


Figure 7.3: Framework of events leading to thinness of young women after marriage

As discussed, autonomy is achieved by young woman via bearing the required number of children or and shifting from joint to nuclear household leading to concurrent access to resources. This autonomy leads to an improvement in her status and control in the household and she starts to take her own decisions. Therefore even though the situation regarding their lower nutritional status is alarming, changes in

behaviour which happen later on life for the young woman, if made to happen earlier, could help overcome the extreme under-nutrition of young women in this area.

7.5 Main Study Findings

- No major gender differences in nutritional status were found amongst the children but women were thinner than men highlighting that changes in adulthood played a greater role towards women's thinness.

- Recent industrialisation near the study area was a major contributor leading to a higher work demand for women as men have started to work in factories leaving their classical farming role, giving this responsibility to the women to work both on the farm and the house.

- Changes after marriage for a young bride were responsible for making her thin. These include a drastic increase in work, fasting and early childbearing. With age and after proving her fertility, a woman holds a better place and authority, in turn giving her autonomy to take her own decisions and choices.

- There was no evidence of deliberate gender bias; the men were aware of the difficulties faced by the women and were interested in ways of improving this situation for them.

7.6 Recommendations to improve the nutritional status of young women

Measures to reduce workload for women

Drudgery of domestic and farm work was a major feature of the lives of young women in this area. Measures to reduce this drudgery would help in improving

nutritional status. Provision of drinking and washing water near the house, inculcating the use of bicycles and transport by women, modern cultivation equipment and time saving devices in cooking at home are a few which could give more time and save energy for the young women.

Provision of opportunities to earn

Opportunities to earn and make a living in allied fields besides farming can provide women with extra income and resources to improve their life. For example, cottage industry using natural resources available to the village. This could help lower workload for pregnant women, by involving them in less demanding activity while still providing for the family, and increasing resourcefulness.

Involving young men to achieve change

The primary area for intervention according to my assessment is to involve the to-be-bridegrooms, and the parents-in-law of the future bride to delay the birth of the first child (usually expected to be within a year of marriage). The study revealed that: first, as the young woman gets more exposed to her new (married) home and village, she tends to gain more control and autonomy over decisions regarding herself; second, the men do want betterment and seemed ready to participate in improving the situation for women, and third and most importantly, progeny are highly valued in this area, as a child carries the family's name forward.

Therefore, if the whole community is involved in a public health campaign aiming at improving ones' progeny, and highlighting that the option exists, this may improve the future health of the next generation. This is not a new message, previous public health campaigns have laid importance on improvements in maternal health and nutrition, but often this message is given after the child has been conceived, usually when a pregnant women attends a ante-natal clinic.

Young adolescent girls might have been told about this in her school or by a health worker in her own village but as she gets married and comes to a married home (often

in a new village), it is difficult to express her views to make an effective change in her reproductive life.

The main suggestion is that family planning measures need to be adopted or encouraged to be used by young husbands because it is difficult for the young bride to assert their use in the new environment. A woman who herself seeks contraception is often assumed to be a 'loose woman' which can deter a young woman even when she knows about contraception.

The strategy has to be to be towards 'message development', to create groups of young men who can influence the use of contraception amongst their fellow friends. If the public health message revolves around making the to-be-married or newly married groom feel responsible for not having a child early, it can alter the whole dynamics of the household, supporting delaying birth.

The question arises, is it appropriate to shift the emphasis from empowerment of women to the greater involvement of men. Why would the men be bothered? From the focus group discussions it was seen that often men were the ones who asked about ways to improve their women's health. I found that often women gave up a socially motivated habit like fasting once she had a child. Acclimatising to the new village and becoming comfortable in her environment can provide women enough power and autonomy to let her make decisions (and help her rejuvenate her nutritional status). Delay in conceiving the first child could give young women enough time to gain control over their immediate environment, adjust accordingly, have autonomy in making decisions for example, whether to fast, may help in improving the nutritional status of young women.

Appendix

A. Focus Group Discussions

A.1. Question route for focus group discussions

Equipment check- Audio tape recorder, audio cassettes, batteries, extension cord, printed question route and pen.

WELCOME & INTRODUCTION (Spoken in Marathi)

Thank you very much for coming over here to attend this group discussion. Let me start by introducing myself- my name is Ginny Chorghade and I am doing a project to know the food eating practises in the village, my friend with me is Savita Kanade, she is here to help me take down the points of our discussion.

Today we are all gathered here to have a discussion on local perceptions of "health" and "food eating patterns and beliefs" which people in the village share. In today's discussion, We will discuss about lifestyle norms in the village community and what everyone follows.

I would be very grateful if everyone could share with me some of your insights about your personal experiences. And enrich my knowledge and help me understand the food eating habits.

Also can I have your permission to switch on the tape recorder; this recording is to help me writing up the talk later on. Do I have your permission? Record yes or no.

This discussion will last approximately an hour as informed to you earlier. It will be very helpful if one person speaks at a time, as this will help all of us to express our views and others to understand better.

Brief Introductions and Breaking the ice: This was done by asking the name of each participant, asking their age, years of marriage.

Participant Information Sheet

Group: Hamlet name: Date:

Name		
~	~	~

1. Family-decision making

1.1 Can you tell me as who is the most important person in the house?

1.2 And who is the second most important person in the house:

Why? Reasons given were? Who in the family has special? Requirement, when it comes to distribution of resources. Why is it so?

1.5 According to you who are better families- Who are likely to have a better lifestyle in your village? Explain: By not taking names but the characteristic that they have joint families and nuclear families.

1.6 Who usually does the hardest work within the families?

Who do you believe gets most food in the families, Why?

Who does the grocery shopping for the households (most of the times)?

The shopping is done everyday/ weekly/monthly?

1.10 How is the decision made to decide what to buy (Especially food products like green leafy vegetables, fruits, milk etc.)?

1.11 Budget distribution of rupees hundred are to be distributed for the weekly shopping. Please suggest a spending pattern: distribution, In the Village (i.e. do it the same way?) If different then how, explain?

1.12 When are special foods cooked in the village (How is a decision made to cook special foods, whose decision is it)?

1.13 How much money do you spend on yourself per week?

1.14 What do you do with it?

1.15 How much does your spouse spend?

1.16 What does she/he do with it?

1.17 Do boys get money to spend on food or buying food?

1.18 Do girls get money to buy food or for buying food? How much

1.19 Who are the family members responsible for cooking and allocation of foods in the families? Please give the order of eating meals in the household:

1.20 Is it the same in the village or different amongst households.

2. Health seeking behaviour for sons and daughters

2.1. What does one do when your son or grand son has fever or diarrhoea what would you do / when he gets sick?

2.2 What does one do when ones daughter / grand daughter has fever or diarrhoea what would you do? Or gets sick?

2.3 any difference in taking son/ daughter for treatment? (When asked about the views of a local practitioner 'some parents delay treatment to daughters', as to why is it so?)

2.4 When you were a child what did your parents do? How have things changed now?

2.5 What sorts of worries do you have for your sons?

2.6 What sorts of worries do you have for your daughters?

3. Marriage

3.1 What changes happen when one gets married for a women and men?

3.2 Food intake

3.3 Workload

3.4 General health wise (i.e. for young women the difference from mothers home to in-laws). Where was health/ life better in what ways? Please explain?

3.5 Criteria for selection of daughter-in-law in your village what do you think are the qualities looked by the in-laws? Will a more educated girl get married to less educated boy: How did the change occur in the dowry, i.e. earlier it was not and now it is present.

3.6 To grand mothers/ grand fathers-Do you think life has changed from your times to the present times? When you were young and now when you have daughter- in-laws.

3.7 Only to mothers and grand mothers, does one change the diet when one gets pregnant? Did you change your diet when you got pregnant?

3.8 Did you eat and avoided any foods?

3.9 Who in the family usually advises on which foods to take and which not to take at that time? By what ways do you think one can achieve an easy delivery? Or a healthy baby: Does one follow the advice:

3.10 Are their any hot and cold foods that are to be avoided by?

4. Fasting beliefs and practises (with reference to men and women)

4.1 Which all days do you fast?

4.2 How often: eat once/twice?

4.3 For what purpose does one fast?

4.4 How are the fasts different amongst men/women, Please state when do women start to fast?

4.5 How are the fasts different? Amongst older men/ older women

4.6 It was seen in the survey conducted that a lot of people were keeping fasts: more women fast as compared to men. Do men and women fast equally?

4.7 How is it different from women's fasting? What are the differences?

4.8 What does one do if one feels hungry when fasting? Any other problems faced while fasting, i.e. nausea, vomiting, cramps etc?

4.9 At what age did you started doing the fasts (and at what age did you stop if you have stopped)? How is it followed in the village?

Extra question for grand mothers: Does your daughter in law fast like you did when you were young; if different then what are they? What have been the changes?

5. Low nutritional status of women--In some villages of Maharashtra, young women are thinner than young men?

5.1 Do you all agree with this statement?

5.2 Why is it so? What is the reason for it? (especially as they are themselves the ones who cook food?)

5.3 Please give a justification on if women are working on field similar to men and are eating less as compared to them.

5.4 How do you explain this (justification of food eating of men and women in a family)

5.5 What are the ways to improve this situation? How? Ask in depth?

Thank you for your participation!

Appendix B Family Survey

B 1 Socio-economic status similar to the format of Pune maternal nutrition study

House No:____ ____ ___ SOCIO-ECONOMIC STATUS

1.	Occupation of the head of household	
	Labour (agriculture, casual, household etc)	1
	Petty employee	2
	Caste occupation (artisan, potter etc)	3
	Business / trade (milk/dairy, shop etc)	4
	Owner cultivator	5
	Service/ profession (eg. in government)	6
2.	Caste of the Family	
	Scheduled caste/ tribe/ nomadic tribe	1
	Lower caste	2
	Artisan caste	3
	Agricultural caste	4
	Prestige caste	5
	Dominant caste	6
3.	Education of the household	
	Illiterate	0
	Can read & write	1
	Primary Schooling	2
	Secondary schooling	3
	Junior college	4
	Graduate	6
4.	Type of family	
	Nuclear	1
	Joint	2
	Size	
	Adults <=5	1
	Adults >5	2
	Any distinctive features	
	i. Any graduates in the family/ any other major supplementary source of livelihood.	2

5.	Farm Power	
	Does not have any drought animals	0
	1-2 bullocks	2
	3-4 bullocks	4
	5-6 bullocks or tractor	6
6.	Milch Animals	
	No cows/ buffaloes	0
	1 cow/ buffalo or 6 goats	2
	2-3 cows/ buffaloes or 12-18 goats	3
	>=4 cows/ buffaloes or >=18 goats	6
7.	Land ownership (by family)	
	No land	0
	Total land<1 acre or irrigated land < .5 acre	1
	1-5 acres or irrigated .5 – 2.5 acre	2
	5-10 acres or irrigated 2.5 – 5 acres	3
	10-15 acres or irrigated 5-7.5 acres	4
	15-20 acres or irrigated 7.5 – 10 acres	5
	>=20 acres or irrigated >=10 acres	6
8.	Material Possession	
	Bullock cart	1
	Cycle	1
	Tape recorder/ two-in-one	1
	Electricity	1
	Two wheeler	1
	Iron/ private well	1
9.	Type of house	
	No house	0
	Hut (1 room, mud walls, thatched roof)	1
	Kutcha house (>1 room, mud walls, thatched roof)	2
	Mixed house (cement used between stone wall, mud wall plaster or tiled roof)	3
	Pucca house (stone or bricks with concrete or stone house, cement wall plaster)	4
	Mansion (>5 rooms and > 1 storey)	6

Total score: _____Categorisation of total score into SE status

Upper Class	>=43	Middle Class	24-32	Lower Middle Class	13-23
Upper Middle Class	33-43			Lower Class	<=12

B 2. Detailed protocol for anthropometric measurements

Amongst the children (3-9 years) height, weight, mid-upper arm circumference and triceps and subscapular skinfold thickness were measured.

Weight

Instrument used: Weighing scale, smallest measurement 0.5 kg

Method

Take time to place the weighing scales on the most level and stable piece of ground possible. Instruct the subject to remove shoes and any extra clothing like woollen sweaters etc. The subject should now be standing with bare feet on the weighing scale and care should be taken that his head is not bending to look at the scale.

Purpose: Weight indicates child's growth and is most commonly used anthropometric measure.

Height (stature)

Instrument used: Portable Harpendum Stadiometer, smallest measurement 0.2 cm. Stadiometer is a vertical board with an attached metric rule and a horizontal headboard that can be brought in contact with the most superior point on the head.

Method

The subject is barefoot and wears minimum clothing so that positioning of body can be seen. The subject stands on a flat surface of the base plate that is at the right angle to the vertical board/ tape of the stadiometer. The weight of the subject should distribute evenly on both feet, and the head is positioned in the Frankfurt Horizontal Plane (Frankfurt Horizontal plane is that imaginary line joining the upper margin of the external auditory meatus and the lower border of the orbit of the eye is horizontal). Also, instruct the subject to stand as tall as possible with feet together and arms loosely at the side). The arms hang freely by the sides of the trunk, with the palms facing the thighs. The subject places the heels together, with both heels touching the base of the vertical board. The movable headboard is brought onto the most superior point on the head with sufficient pressure to compress the hair. The measurement is recorded by adjusting the spirit level on the headboard that checks for horizontality of the board. Measure to the nearest 0.1-cm. Two readings are taken to take an average. Take care of digit preference. It is essential for the measurer to bend properly or best is to go on one's knees when measuring a small child.

Purpose: Stature is a major indicator of general body size and bone length. It is important in screening for disease or malnutrition and in the interpretation of weight variation from the normal range can have social consequences, in addition to their associations with disease.

Mid-upper arm circumference (MUAC)

Instrument used: A standardised fibreglass (in elastic) measuring tape with minimum of 0.1 cm marking. Preferably the tape should start after about 10-cm distance from one end.

Method

Remove clothing on the left arm to measure the mid-upper arm circumference. To locate mid point, the subjects arm is flexed to 90 with the palm facing superiorly. The measurer stands behind the subject to locate the lateral tip of the acromion by palpitating laterally along the superior surface of the spinous process of the scapula. A small mark is essential to make at this point to identify this point. The most distal point on the acromial process is located and marked with the arm bent. Measuring tape is now placed on these two points so that a total length is noted. The midpoint is now marked after taking half of the total measurement and is marked with a horizontal line. Now let the arm relax and the elbow extended and hanging just away from the side of the trunk and the palm facing the thigh, place the tape around the marked horizontal line. Take care not to compress the soft tissues and neither keeping it too loose (Caution: The tape should not be bent or curled). The tape is positioned perpendicular to the long axis of the arm at the marked mid point. The reading should be taken at the nearest 0.1 cm. Care should be taken not to have a digit preference or avoidance for specific numbers.

Purpose: Mid-upper arm circumference provides with an index of body energy stores and protein mass. Although it can be used as individual measure, often it is combined with skinfold thickness to calculate arm - muscle circumference and areas of arm muscle and adipose tissue.

Skinfold Thickness

Instrument used: Harpenden calliper, good marking pens and a measuring tape.

Method

Skinfold thickness or "fatfold" thicknesses are actually the THICKNESS of double folds of skin and subcutaneous adipose tissue at specific sites on the body. A spring-loaded callipers are used which exert a standardised pressure per unit of calliper jaw surface are used.

The utility of skinfold thickness as they provide a relatively simple and non- invasive methods of estimating general fatness.

Purpose: Skinfold thickness determines the amount of subcutaneous fat of an individual and is an indicator to total body fat.

Triceps skinfold thickness

The triceps skinfold is measured half-way down the left upper arm (which should hang relaxed at the subject's side). The subject stands with back to the measurer, arm flexxed at 90. The tip of the acromion (the point of the shoulder) and the olecranon are palpated and a point half-way is marked with a marker. The skinfold should be picked up over the posterior surface of the triceps

muscle on a vertical line passing upwards from the olecranon in the axix of the limb, and the caliper jaws are applied at the marked level. Keeping the subjects arm flexed, use a tape measure to mark a halfway vertical point on the skin. This mark should be vertical as the skinfold has to be measured. Remember the arm has to be flexed otherwise the mid-point is too high up. Then ask the subject to relax the arm, with the arm now hanging downwards.

Subscapular skinfold thickness

Sub-scapular skinfold thickness is picked up just below the angle of the left scapula with the fold either in a vertical line or slightly inclined, in the natural cleavage line of the skin.

For adults (parents and grandparents) weight and height were recorded

WEIGHT

Instrument used: Weighing scale

Method

Take time to place the weighing scales on the most level and stable piece of ground possible. Instruct the subject to remove shoes and any extra clothing like caps, turbans, woollen sweaters and shawls. Also, if any heavy jewellery. The subject should now be standing with bare feet on the weighing scale and care should be taken that his head is not bending to look at the scale. The observer can instruct the subject that the exact weight will be told to him/her respectively after the measurement.

Purpose: Weight indicates an individual's body mass index and is most commonly used anthropometric measure.

Height (STATURE)

Instrument used: Stadiometer is a vertical board with an attached metric rule and a horizontal headboard that can be brought in contact with the most superior point on the head. Available in Fixed and Portable models.

Method

The subject is barefoot and wears minimum clothing so that positioning of body can be seen (especially in women care to be taken with saris and the hair plait or bun as they might obstruct the tape). The subject stands on a flat surface of the base plate that is at the right angle to the vertical board/ tape of the stadiometer. The weight of the subject should be distributed evenly on both feet, and the head is positioned in the Frankfurt Horizontal Plane. The arms hang freely by

the sides of the trunk, with the palms facing the thighs. The subject places the heels together, with both heels touching the base of the vertical board. The movable headboard is brought onto the most superior point on the head with sufficient pressure to compress the hair (especially in men). The measurement is recorded by adjusting the spirit level on the headboard that checks for horizontality. Measure to the nearest 0.1-cm. Two readings are taken to take an average. Take care of digit preference. If a short observer is measuring a tall subject, considerable error can be introduced when reading off the height scale, due to parallax. Measurer should be aware of this and aim to read the scale from as level a position as possible. Use of stable chair or a stool is essential.

Purpose: Stature is a major indicator of general body size and bone length. It is important in screening for disease or malnutrition and in the interpretation of weight. variations from the normal range can have social consequences, in addition to their associations with disease.

B 3. Inter and Intra observer study conducted in January 1998

Before starting the anthropometric data collection an inter- and intra-observer variation study was conducted at Vadu hospital in January 1998.

There were ten subjects (local school/ village children aged 4-8) measured by the two observers (Sangeeta and Ginny). Each subject was measured twice after a gap of 1 hour. Measurements included height, weight, mid-upper arm circumference, triceps and subscapular skinfolds. The results showed very less variation for height, weight, mid-upper arm circumference and triceps skinfolds thickness. The largest variation was seen in the subscapular skinfolds thickness.

Table B 3.1: Comparing Ginny and Sangeeta for data with children, January 1998

	Height	Weight	MUAC	Triceps	Subscapular
Mean	117.3	19.2	16.2	5.8	5.8
Subject Range	-13.9, 9.8	-4.6, 3.4	-1.8, 1.0	-0.7, 0.7	-1.0, 0.9
Obs. Sum of squares	0.01	0.01	0.8	0.04	2.8
Subject sum of squares	1285.4	150.1	19.3	6.0	11.8
% variation due to observer	0.0008%	0.006%	0.0004%	0.6%	18.0%
p-value (obs.)	p=0.71	p=0.63	p=0.0.001	p=0.037	p=0.000
SD (obs. Diff.)	0.03	0.03	0.29	0.06	0.57
SD/mean (%)	0.02%	0.1%	1.8%	1.1%	9.8%
Observer range	-0.02,0.02	-0.02,0.02	-0.22, 0.19	-0.04, 0.05	-0.4, 0.4

Table B 3.2: Mean square differences between measurement occasions

Observer	Height(1)	Weight(2)	MUAC(3)	Triceps(4)	Subscapular(5)
Ginny	0.18	0.08	0.04	0.06	0.12
Sangeeta	0.15	0.04	0.02	0.05	0.06

B 4. Definitions for the Household Survey Household Intake Form

F 1. Pune Maternal Nutrition Study House No.

This is the maternal nutrition study household number from which this study will select the sample. This number is to verify and identify the household from the study area.

F 2. New House No: This number will be my study number given to every household which has been selected from the PMNS no. This H No is the total number of households who according to PMNS survey have sibling pairs in the age range of 4-8 years. New number (i.e. households who have shifted residence and have been located will be given this number; Also household who were earlier joint and now have two more nuclear household having separate kitchen). These houses will be visited and a further verification of date of birth, residential status, mortality of the sibling pairs.

F 3. Hamlet Name & Code: The hamlet (called wadi or wasti) records the location of the house. Although this number is present on the MNS codes but if the new coding system will not have this classification then in future the retrieval will be easier with this name and code.

F 4. Family name: The family name of the household will be recorded, as can be matched with the MNS database. Also, an important parameter in identifying the subjects and families.

F 5. Name of Informant: To know as to who has answered the intake form, should be an adult member of the household, ideally the head of the household.

F 6. Relation to the Household: The relationship code to be applied here (mentioned on the Adult Intake form)

FD 1. Caste

Scheduled Tribe	**1**	**Maratha (Dominant caste)**	**4**
Scheduled Caste	**2**	**Brahmin**	**5**
Other agricultural class	**3**		

FD 2. Residential Site

Gaothan (In the Village)	**1**	**Wadi / Wasti (In a hamlet)**	**2**

To identify the exact location of the household; also for approach to utilities and services like Health centre, hospital, school, convenience, grocery shops etc.

FD 3. Family Type

Nuclear	**1**	**Extended**	**2**	**Joint**	**3**

A Nuclear family is that which has a husband and wife with unmarried children living under one roof and eating from the same kitchen. An Extended family will be that which has in addition to

a nuclear household other married or unmarried siblings living under the same roof and eating from the same kitchen. A Joint family is that which has more than two married generation couple living under the same roof and eating from the same kitchen. I.e. a widowed mother and her son-daughter-in-laws also in this

FD 5. Family size

No. of Adults (>18yrs) ___|___ **No. of Children (<18 yr.)** ___|___

Number of adults and children living in a family. If a newly married daughter in law is even under 18 years but here will be classified as an adult.

FD 6. Land Classification

Dry Land ____|____.___ **Wet Land** ____|____.___

This classification is to get the exact cultivation the family has as the wet land is more cultivable and gives a better year round crop than dry land.

FD 7. Animal

a.	**No.of Cows**	___|___	**c.**	**No. of Goats**	___|___
b.	**No. of Buffaloes**	___|___	**d.**	**No. of Bullocks**	___|___

FD 8. Material Possession		**Yes**	**No**			**Yes**	**No**
a.	**Bullock cart**	**1**	**0**	**e.**	**Two Wheeler**	**1**	**0**
b.	**Bicycle**	**1**	**0**	**f.**	**Private well**	**1**	**0**
c.	**Tape recorder / 2in1**	**1**	**0**	**g.**	**4 wheeler/ Tempo**	**1**	**0**
d.	**Electricity**	**1**	**0**	**h.**	**Tractor**	**1**	**0**
				I.	**Iron**	**1**	**0**

FD 9. Type of House

a. Hut (1 room, mud walls, thatched roof) 1

b. Kutcha House (>1 room, mud walls, thatched roof/ tiled roof) 2

c. Mixed Pucca House (Cement used and stone wall/ mud-wall plaster and tiled roof) 3

d. Pucca House (Stone /bricks with concrete or cement wallplaster) 4

f. Rented/ not own house 5

FD 10. Cooking oil consumption |___| ___|-|___| **Kgs / month**

B 5. Adult Intake Form **New House No: ___ ___ ___**

1.Mem.No |_ | _ | _ | _| _| _| _| This will be a derived unique number for each family member

2. PMNS No- K-1 ___ ____ ____ ____ ____

3. Name: _____ _____ _____

First name Husband / Father's name Family name

4. PRESENT RESIDENT STATUS

Resident **1** **Non-resident** **2**

5. RELATIONSHIP CODE: ____ ____ ____ Relationship to head of household

Head of Household HOH		**Daughter (n)**	**DA 1**	**Grandson (n)**	**GS 1**
Spouse (Usually Wife)(n)WF/ HB 1		**Son in Law (n)**	**SL 1**	**Granddaughter (n)**	**GD 1**
		Brother (n)	**BR 1**	**Granddaughter in law**	**GL 1**
Son (n)	**SO 1**	**Sister(n) SS 1**		**Others (n)**	**OT 1**
Daughter in Law (n)	**DL 1**				

The eldest living person in the house will be the HOH (e.g. a widowed wife will become the HOH after the death of the HOH)

6. GENDER

Male **1** **Female** **2**

7. <u>Age in years</u> |_____| _____| **yr.** (To derive a age the following formulae will be used Women's eldest child's age + Years after marriage that child was born + 13 years)

8. <u>DOB</u> **(DD/ MM/YY)** |___|___| |___|___| **19** |___|___|

9. PRESENT MARITAL STATUS

Unmarried	**1**	**Divorced**	**3**
Married	**2**	**Widowed**	**4**

10. EDUCATION COMPLETED

Illiterate	**1**	**Secondary Schooling (8-10th)**	**4**
Read & Write (neo-literate)	**2**	**Senior Secondary (10-12th)**	**5**
Primary Schooling (<8th)	**3**	**Graduation (BA/BSc/other)**	**6**

11. OCCUPATION

Labourer (Others Farm)(Rs: __|__/day)	**1**	**Owner Cultivator**	**6**
Labour+Farm (Own & Others)	**2**	**Service/ Profession**	**7**
Petty Employee	**3**	**At Home or Unemployed**	**8**
Artisan	**4**	**Student**	**9**
Business/ Trader Rs:_ _ _ _/month	**5**		

Occupation – Description

Labourer (work on other's farm only): in this other labourer work daily wage will also be included. If the daily income is told, it was noted down.

Labourer and Farmer (work on own & other's farm): will include the families who have less land and have to work on other's farm also.

Petty Employee: will include the people working as peon in schools, temple or other shops or offices. Income per month will be recorded. RS/month.

Artisan: For example potter, carpenter, mason, driver etc. will be in this category. If income will be mentioned then can be recorded. Rs./month earned.

Business/ Trader: Shop owners, buyers of the crop from the farmers to sell at the markets in town, drivers with own vehicle Rs./month earned.

Owner Cultivator: who works in their own farm, this will include women who do domestic chores and then go to the farm to work.

Service/ Profession: work in police, government a clerk, bus conductor or any permanent jobs will come in this category. Rs./month earned.

At Home or Unemployed: old people, women who stay at home, unemployed youth (not working on farm). They would be doing household chores, taking care of animals, sorting grains and taking animals for grazing in nearby areas.

Student: adults in the household who are studying in the high school or in college or pursuing further education.

VEGETARIAN/ NON-VEG STATUS

Only Veggie (No- eggs, meat products) 1 Mixed Non Veg (eggs,meat) 2

(The people who answered that they could afford to eat meat products will be included here)

13. FASTING DAYS

Once a Week	**1**	**Twice a month**	**3**	**None**	**5**
Twice or more in a week	**2**	**Once or Twice a Year**	**4**		

ANTHROPOMETRIC MEASUREMENTS

A. Height		B. Weight	
16. |__|__|__| |__|	cm	18. |__|__| |__|	kg
17. |__|__|__| |__|	cm	19. |__|__| |__|	kg

B 6. Sibling anthropometry form **New H No: ___ ___ ___**

1. MEM.NO |___|___|___|___ |___|___|___| **2. MNS No K-1** ___ ___ ___ ___ ___

3. NAME: _____ (First) _____(Father's) _____(Family name)

4. Std: B / I / II / III / IV/ V/VI |School: P1, P2, PH, FV, AV, NV, TV, PV, GN, AS

P1	Pabal Primary sch (boys)	AV	Aikerimala Balwadi	NV	Narhebend Pri./ Balwadi
P2	Pabal Primary sch (girls)	PV	PimpleVadi Balwadi	TV	Thapewadi Pri./ Balwadi
PH	Pabal High Sch	GN	Ganesh Nagar Balwadi	AS	Ashram-Khatala Balwadi
FV	Futanvadi Primary School				

Their are 7 balwadi's in Pabal, 7 primary school where a child studies till standard IV and after that migrates to the village high school located in the main village centre.

5. Interview Date: |___|___| ___| ___| 1998This will derive the age of the child.

6. Date Of Birth |___|___| _ _|___| 19 ___|___|

Collected from the parents, from date of birth certificate or the antenatal card on which the DOB is written with the parent's names. The priority for valid DOB will be this card, where this card is misplaced then the school record will be taken for the DOB.

7. Age on Interview Date: |___|___| **dd** |___|___| **mm** |___| **y**

This will be derived by taking a month as 30 days constant and the date of measurement at the time of data entry a computer program derived this age.

ANTHROPOMETRIC MEASUREMENTS Measurements are collected by trained ANM.

A. Height

8. |___|___|___| |___| cm
9. |___|___|___| |___| cm

B. Weight

10. |___|___| |___| kg
11. |___|___| |___| kg

C. Mid Upper Arm Circ.

12. |___|___| |___| cm
13. |___|___| |___| cm
14. |___|___| |___| cm

D. Triceps Skinfold

15. |___|___| |__| cm
16. |___|___| |__| cm
17. |___|___| |__| cm

E. Subscapular Skinfold

18. |___|___| |__| cm
19. |___|___| |__| cm
20. |___|___| |__| cm

21. Sibling Parity No: ____(ex. 4) or (ex. 2)

The hierarchical status of the particular child e.g. a child can be the 4th child in the household, the present status of parity.

22. Sex: ____ | M / F

This will indicate whether the child i.e.4th child in the household and first boy (e.g.1,M or 2,F)

B 7. Data Coding Technique

The data is collected for the sibling, their parents and grand parents. A method was devised to identify the person in the data file according to relation in the family.

REFERENCE FILE

A reference file is made which includes the family members to be studied.

House No: ___ ___ ___ (3 digits), PMNS (couple no): K1 _ _ _ _ _ (6 Digits)

This code has 5 columns	Grandparent	Parent	Spouse	Sib.	Sex (m-1,f-2)
Grandfather	1	0	0	0	1
Grandmother	1	0	0	0	2
Father (Second Child)	1	2(*)	0	0	1
Mother	1	2	1(@)	0	2
Eldest child (Daughter)	1	2	1	1	2
Second child (Son)	1	2	1	2	1
Father (Fourth Child)	1	4	0	0	1
Mother (His first wife)	1	4	1	0	2
Eldest child (Daughter from first wife)	1	4	1	1	2
Mother (His second wife)	1	4	2	0	2
Eldest child (Son from second wife)	1	4	2	1	1
If married or widowed sister/daughter also lives with the family, her code will be:					
Sister	1	3	0	0	2
Her husband	1	3	1	0	1
Her eldest child (Son)	1	3	1	1	1
Her second child (Daughter)	1	3	1	2	2

(*Amongst cousins, this number will be different to identify the siblings)

(@- In the study area it is a common practise to have two wives so one can identify the sibling mother by this number.)

Every member in the family has a unique number with the House number:

All grandfathers will be	10001	Children from first wife:		Children from second wife:	
All grand mothers	10002	Daughter (eldest child)	11112	Son (eldest child):	11211
Fathers	11001	Son (second child)	11121	Daughter (second child):	11222
Mothers (First wife)	11102	Daughter	11132		
Mother (Second wife)	11202				

The data on siblings who are to be studied will only be entered.

Appendix C The Household Questionnaire

C 1 Households ranks list

C.1.1 The detailed rank of the first 15 households in each category selected for analysis

CHILDRENS TRICEPS								ADULT BMI							
Girls With Better Triceps				Boys With Better Triceps				Mothers With Better BMI				Fathers With Better BMI			
Thinner Mothers		Fatter Mothers		Thinner Mothers		Fatter Mothers		Thinner Mothers		Fatter Mothers		Thinner Mothers		Fatter Mothers	
Hno	Rank	Hno	Rank	Hno	Rank	Hno	Rank	Hno	Rank	Hno	Rank	Hno	Rank	Hno	Rank
49	1	39	1	107	1	61	1	64	1	21	1	93	1	174	1
76	2					152	2	135	2					23	2
98	3	24	3	162	3	149	3	128	3	115	3	4	3	58	3
26	4	91	4	154	4			69	4			79	4	171	4
		175	5	147	5	28	5	66	5	74	5	12	5	40	5
34	6	1	6	145	6	141	6	143	6	11	6	114	6	172	6
44	7	15	7	123	7	77	7					157	7		
56	8	46	8	9	8			102	8	36	8	83	8	57	8
		65	9	165	9			82	9	70	9	168	9	97	9
122	10	101	10	116	10			85	10			144	10	52	10
3	11					25	11	126	11	73	11				
94	12									92	12			22	12
161	13	87	13	150	13	19	13			32	13	138	13	167	13
35	14	166	14			8	14	72	14					170	14
		169	15	140	15	6	15	67	15						

Hno-House number, Rank- Rank of the house

Each household held a rank in these eight sets. These ranks started from the extreme ends of each set. Wherever there was an overlap in the ranking they were sorted according to where the household held a worst rank. The first five households were selected from each rank to be interviewed in the household questionnaire.

C 2 Fruit and vegetable food frequency data

I had collected the fruit and vegetable food frequency data for someone else working on the Pune maternal nutrition study data.

C 2.1: (Question 4.8a) What sorts of green leafy vegetables did you eat in the last one month?

	Yes	(%)	G'father		G'mother		Father		Mother		Son		Daughter	
1. Spinach	138	(68)	5	(56)	12	(71)	27	(63)	35	(78)	30	(67)	29	(64)
2. Fenugreek	199	(98)	9	(100)	17	(100)	41	(95)	44	(98)	44	(98)	44	(98)
3. Amaranthas	10	(5)	-	(-)	2	(12)	2	(5)	5	(11)	1	(2)	-	(-)
4. Safflower	26	(13)	1	(11)	3	(18)	5	(12)	8	(18)	4	(9)	5	(11)
5. Onion Stalk	119	(58)	5	(56)	12	(71)	25	(58)	30	(67)	24	(53)	23	(51)
6. Bengal Gram leaves	84	(41)	5	(56)	9	(53)	18	(42)	23	(51)	13	(29)	16	(36)
7. Colocassia	42	(21)	1	(11)	2	(12)	8	(19)	13	(29)	9	(20)	9	(20)
8. Coriander	154	(76)	7	(78)	13	(77)	32	(74)	36	(80)	33	(73)	33	(73)
9. Shepu	52	(26)	1	(11)	6	(35)	12	(28)	12	(27)	11	(24)	10	(22)
10. Amaranthas Spined	3	(2)	-	(-)	-	(-)	1	(2)	1	(2)	1	(2)	-	(-)
11. Hatga	7	(3)	-	(-)	1	(6)	-	(-)	2	(4)	3	(7)	1	(2)
12. Chilu	11	(5)	1	(11)	2	(12)	-	(-)	3	(7)	2	(4)	3	(7)
13. Chuka/ Chakawat	15	(7)	-	(-)	2	(12)	1	(2)	5	(11)	5	(11)	2	(4)
14. Other Leafy veg.	45	(22)	4	(44)	5	(29)	9	(21)	10	(22)	9	(20)	8	(18)

C 2.2: (Question 4.9a) What sorts of fruits did you eat in the last one month?

	Yes (%)	G'father	G'mother	Father	Mother	Son	Daughter
1.Zyzapus	81 (43)	0 (-)	3 (23)	16 (39)	20 (51)	18 (41)	24 (53)
2.Guava	65 (34)	1 (14)	3 (23)	18 (44)	13 (33)	17 (39)	13 (29)
3.Orange	17 (9)	0 (0)	0 (0)	2 (5)	3 (8)	5 (11)	7 (16)
4.Sweet Lime	12 (6)	1 (14)	0 (0)	3 (7)	1 (3)	3 (7)	4 (9)
5.Amla	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)
6.Tamarind	26 (14)	1 (14)	0 (0)	2 (5)	5 (13)	6 (14)	12 (27)
7.Custard Apple	6 (3)	1 (14)	0 (0)	1 (2)	1 (3)	0 (0)	3 (7)
8.Banana	139 (74)	5 (71)	10 (77)	30 (73)	30 (73)	33 (75)	31 (69)
9.Sapota	61 (32)	1 (14)	3 (23)	15 (37)	12 (31)	18 (41)	12 (27)
10.Tomato	58 (31)	3 (43)	5 (39)	22 (54)	8 (21)	7 (16)	13 (29)
11.Cucumber	16 (9)	1 (14)	2 (15)	6 (15)	2 (5)	4 (9)	1 (1)
12.Maize	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)
13.Raw Mango	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)
14.Papaya	29 (15)	2 (28)	2 (15)	5 (12)	5 (13)	7 (16)	8 (18)
15. Water Melon	8 (4)	0 (0)	0 (0)	3 (7)	2 (5)	1 (2)	2 (4)
16. Apple	19 (10)	0 (0)	0 (0)	3 (7)	5 (13)	6 (14)	5 (11)
17. Rose Apple	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)
18. Grapes	73 (39)	3 (43)	4 (31)	16 (39)	17 (44)	16 (36)	17 (38)
19. Pomegranate	8 (4)	0 (0)	0 (0)	1 (2)	2 (5)	2 (5)	3 (7)
20. Wood Apple	2 (1)	0 (0)	0 (0)	0 (0)	1 (3)	0 (0)	1 (2)
21. Pineapple	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)
22. Karonda	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)
23. Fig	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)
24. Umbar	8 (4)	0 (0)	1 (8)	4 (10)	0 (0)	2 (5)	1 (2)
25.Lemon	58 (31)	3 (43)	4 (31)	21 (51)	20 (51)	4 (9)	6 (13)
26.Carrot	75 (40)	1 (14)	6 (46)	21 (51)	14 (36)	16 (36)	17 (38)
27.Sugarcane	17 (9)	0 (0)	0 (0)	10 (24)	1 (3)	3 (7)	3 (8)
28.Bullock's Heart	26 (14)	1 (14)	1 (8)	7 (17)	4 (10)	7 (16)	6 (13)
29.Gr.gram (T)	2 (1)	0 (0)	0 (0)	0 (0)	1 (3)	1 (3)	0 (0)
30.Dry Fruits	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)
31.Jackfruit	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)
32.B.Gram (T)	12 (6)	0 (0)	1 (8)	6 (15)	1 (3)	2 (5)	2 (4)
33.Ripe Mango	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)
34.Coconut water	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)

(T)-Tender

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