CHAPTER 7

NUTRITION AND THE PREVALENCE OF ANAEMIA

This chapter focuses on the nutrition of women and young children, examining both the types of food consumed and the consequences of inadequate nutrition and poor feeding practices. NFHS-1 included basic information about feeding practices and the nutritional status of young children. NFHS-2 contains more comprehensive information on these topics, and, for the first time, information on the diet of women. Measurement of height and weight has been expanded to include ever-married women as well as young children. Two additional tests have been included for the first time—anaemia testing for women and young children and the testing of cooking salt to determine the extent of iodization. A specially trained health investigator attached to each interviewing team conducted height and weight measurements and anaemia testing.

7.1 Women's Food Consumption

The consumption of a wide variety of nutritious foods is important for women's health. Adequate amounts of protein, fat, carbohydrates, vitamins, and minerals are required for a well-balanced diet. Meat, fish, eggs, and milk, as well as pulses and nuts, are rich in protein. Green, leafy vegetables are a rich source of iron, folic acid, vitamin C, carotene, riboflavin, and calcium. Many fruits are also good sources of vitamin C. Bananas are rich in carbohydrates. Papayas, mangoes, and other yellow fruits contain carotene, which is converted to vitamin A. Vitamin A is also present in milk and milk products, as well as egg yolks (Gopalan et al., 1996).

NFHS-2 asked ever-married women age 15–49 how often they consume various types of food (daily, weekly, occasionally, or never). The diet of women in Himachal Pradesh is rich in vegetables (including green, leafy vegetables), pulses or beans, and milk or curd. Women consume pulses or beans most often, followed by vegetables (other than green, leafy vegetables) (Table 7.1). Almost all women (99 percent) eat pulses or beans at least once a week, including 94 percent who eat them daily. Eighty-one percent of women consume vegetables (other than green, leafy vegetables) every day, 70 percent consume milk or curd daily, and 62 percent consume green, leafy vegetables daily. Ninety-four percent of women in Himachal Pradesh consume green, leafy vegetables at least once a week, much higher than the rate for India as a whole (85

Table 7.1 Women's food consumption

Percent distribution of ever-married women by frequency of consumption of specific foods, Himachal Pradesh, 1999

Type of food	Frequency of consumption				Total percent
	Daily	Weekly	Occasionally	Never	
Milk or curd	69.6	17.4	11.7	1.3	100.0
Pulses or beans	93.5	5.6	0.9	0.0	100.0
Green, leafy vegetables	62.4	31.9	5.7	0.0	100.0
Other vegetables	81.2	17.6	1.2	0.0	100.0
Fruits	29.1	42.6	28.3	0.1	100.0
Eggs	1.3	13.5	37.0	48.3	100.0
Chicken, meat, or fish	0.2	6.1	45.6	48.2	100.0

percent). In Himachal Pradesh, only 13 percent of women do not consume milk or curd at least once a week, compared with 45 percent of women in India as a whole. Almost three-fourths (72 percent) of women eat fruits at least weekly, with 29 percent eating fruits daily. Notably, almost one-half (48 percent) of ever-married women in Himachal Pradesh never eat eggs or chicken, meat, or fish. The majority of women who do eat these foods only do so occasionally. Less than 1 percent of women eat chicken, meat, or fish daily, and only 6 percent eat these foods at least once a week. Fifteen percent of women eat eggs at least once a week.

Table 7.2 shows that virtually all women in Himachal Pradesh consume vegetables and pulses or beans at least once a week. With the exception of green, leafy vegetables, there is not much variation in the weekly consumption of these food items by selected background characteristics. Consumption of green, leafy vegetables is relatively low among Muslims, Sikhs, scheduled-caste women, and women from households with a low standard of living. In general, age does not play an important role in women's consumption patterns. Women in urban areas are

Table 7.2 Women's food consumption by background characteristics

Percentage of ever-married women consuming specific foods at least once a week by selected background characteristics, Himachal Pradesh, 1999

Background characteristic	Type of food							Number of women
	Milk or curd	Pulses or beans	Green, leafy vegetables	Other vegetables	Fruits	Eggs	Chicken, meat, or fish	
Age								
15–24	88.2	98.6	94.5	99.6	68.8	13.1	5.1	564
25–34	86.4	99.3	94.1	98.0	73.4	15.4	7.1	1,197
35–49	87.0	99.2	94.4	99.3	71.4	14.8	5.9	1,251
Residence								
Urban	90.0	99.6	98.7	99.9	88.8	25.9	14.5	273
Rural	86.7	99.1	93.9	98.7	70.0	13.6	5.4	2,739
Education								
Illiterate	82.7	98.7	91.9	98.4	61.0	12.9	4.6	1,093
Literate, < middle school complete	85.0	99.1	94.7	98.5	69.1	13.5	5.6	840
Middle school complete	88.6	99.3	94.4	99.3	76.2	14.3	5.1	381
High school complete and above	95.3	99.7	97.5	99.6	89.2	19.3	10.0	698
Religion								
Hindu	87.3	99.1	94.6	99.0	72.6	13.7	5.1	2,814
Muslim	85.9	100.0	86.4	95.7	53.9	20.3	12.1	98
Sikh	70.5	100.0	86.8	93.8	44.0	6.5	1.6	40
Buddhist/Neo-Buddhist	88.1	97.0	99.4	100.0	75.6	58.3	52.3	54
Caste/tribe								
Scheduled caste	82.3	98.5	89.4	98.9	61.2	13.7	4.0	662
Other backward class	77.3	99.3	95.8	98.6	62.3	12.5	6.7	568
Other[1]	92.0	99.3	95.7	98.9	78.8	15.8	6.9	1,769
Standard of living index								
Low	75.3	97.3	89.0	98.2	43.9	6.8	1.5	288
Medium	86.4	99.1	93.8	98.7	68.3	14.3	5.4	1,782
High	91.7	99.8	97.0	99.1	87.3	17.4	9.0	920
Total	87.0	99.1	94.3	98.8	71.7	14.7	6.2	3,012

Note: Total includes 5 women belonging to other religions, 13 scheduled-tribe women, and 3 and 23 women with missing information on religion and the standard of living index, respectively, who are not shown separately.
[1]Not belonging to a scheduled caste, a scheduled tribe, or an other backward class

more likely than women in rural areas to include each type of food in their diet, particularly fruits, eggs, and chicken, meat, or fish. The weekly consumption of each specific food increases with education. The relationship is particularly strong in terms of fruit consumption, with 61 percent of illiterate women, compared with 89 percent of women who have completed at least high school, eating fruits at least once a week.

There are notable religious differences in weekly food consumption. The largest religious variations exist for the weekly consumption of fruits, eggs, and chicken, meat, or fish. Virtually all women, irrespective of religion, consume pulses or beans at least once a week. Consumption of vegetables other than green, leafy vegetables is also quite high, with at least 94 percent of women in each religious group consuming these foods weekly. Sikh women are much less likely than other women to consume milk or curd, fruits, eggs, and chicken, meat, or fish on a weekly basis. With the exception of eggs and chicken, meat, or fish, Hindu and Buddhist/Neo-Buddhist women have fairly similar levels of consumption for each food type. These two groups of women are much more likely to consume fruits and vegetables (particularly the green, leafy variety) than Muslim or Sikh women. The majority of Buddhists/Neo-Buddhists consume eggs and chicken, meat, or fish at least once a week—the highest consumption of those foods among all population groups. Sikhs have the lowest proportion of women consuming eggs and chicken, meat, or fish weekly.

By caste/tribe, there is not much variation in the consumption of pulses, beans, eggs, and vegetables (excluding green, leafy vegetables). Scheduled-caste women (89 percent) are less likely to eat green, leafy vegetables at least once a week than other women (96 percent). Women from scheduled castes and other backward classes have similar levels of weekly fruit consumption (61–62 percent), but the two groups consume less than 'other' women (79 percent). Women belonging to other backward classes are also less likely to consume milk or curd (77 percent) than women belonging to scheduled castes (82 percent) or 'other' castes/tribes (92 percent). Household standard of living has a strong positive effect on the consumption of milk or curd, green, leafy vegetables, fruits, eggs, and chicken, meat, or fish. The weekly consumption of pulses, beans, and vegetables (not including green, leafy vegetables) does not vary much by standard of living.

7.2 Nutritional Status of Women

In NFHS-2, ever-married women age 15–49 were weighed using a solar-powered digital scale with an accuracy of ±100 grams. Their height was measured using an adjustable wooden measuring board specially designed to provide accurate measurements (to the nearest 0.1 cm) of women and children in a field situation. The weight and height data were used to calculate several indicators of women's nutritional status, which are shown in Table 7.3. The height of an adult is an outcome of several factors including nutrition during childhood and adolescence. A woman's height can be used to identify women at risk of having a difficult delivery, since small stature is often related to small pelvic size. The risk of having a baby with a low birth weight is also higher for mothers who are short.

The cutoff point for height, below which a woman can be identified as nutritionally at risk, varies among populations, but it is usually considered to be in the range of 140–150 centimetres (cm). NFHS-2 found a mean height for women in Himachal Pradesh of 152.7 cm, with the maximum being 154.4 and the minimum being 151.5. Muslim women are the tallest, on

Table 7.3 Nutritional status of women

Among ever-married women, mean height, percentage with height below 145 cm, mean body mass index (BMI), and percentage with BMI below 18.5 kg/m^2 by selected background characteristics, Himachal Pradesh, 1999

Background characteristic	Height			Weight-for-height[1]		
	Mean height (cm)	Percentage below 145 cm	Number of women for height	Mean body mass index (BMI)	Percentage with BMI below 18.5 kg/m^2	Number of women for BMI
Age						
15–19	153.2	9.9	63	19.4	43.4	57
20–24	152.6	6.8	487	19.6	36.3	413
25–29	152.7	6.6	621	19.9	35.3	574
30–34	153.1	4.4	563	20.8	28.0	546
35–49	152.6	6.1	1,235	21.6	25.0	1,231
Marital status						
Currently married	152.8	5.9	2,832	20.7	29.8	2,683
Not currently married	151.8	8.8	138	21.3	27.7	138
Residence						
Urban	153.3	4.0	268	23.1	17.3	258
Rural	152.7	6.3	2,701	20.5	31.0	2,563
Education						
Illiterate	152.2	8.0	1,080	20.3	32.8	1,033
Literate, < middle school complete	152.4	6.5	827	20.7	30.3	789
Middle school complete	152.8	5.5	378	20.6	29.7	360
High school complete and above	153.9	2.8	685	21.7	24.1	640
Religion						
Hindu	152.7	6.0	2,774	20.7	30.2	2,641
Muslim	154.4	4.6	97	20.9	28.8	87
Sikh	153.3	4.9	38	(21.5)	(31.2)	36
Buddhist/Neo-Buddhist	151.5	11.3	54	(22.9)	(5.7)	51
Caste/tribe						
Scheduled caste	151.9	9.3	656	20.0	36.6	617
Other backward class	152.1	7.9	561	20.3	37.4	536
Other[2]	153.2	4.3	1,740	21.2	24.6	1,656
Work status						
Working in family farm/business	151.9	7.1	350	20.5	27.0	339
Employed by someone else	152.5	8.3	254	22.4	19.5	248
Not worked in past 12 months	152.9	5.7	2,354	20.6	31.3	2,223
Standard of living index						
Low	151.6	9.3	286	19.6	43.3	269
Medium	152.5	6.6	1,755	20.3	32.3	1,665
High	153.5	3.8	905	22.1	20.3	866
Total	152.7	6.1	2,969	20.8	29.7	2,821

Note: Total includes small numbers of women belonging to other religions, scheduled-tribe women, women who are self-employed, and women with missing information on religion and the standard of living index, who are not shown separately.
( ) Based on 25–49 unweighted cases
[1]Excludes women who are pregnant and women with a birth in the preceding two months. The body mass index (BMI) is the ratio of the weight in kilograms to the square of the height in metres (kg/m^2).
[2]Not belonging to a scheduled caste, a scheduled tribe, or an other backward class

average, of all population subgroups. Only 6 percent of women in Himachal Pradesh are under 145 cm in height, compared with 13 percent of women in India as a whole. Buddhist/Neo-Buddhist women have the highest proportion under 145 cm (11 percent). Other subgroups with relatively high proportions below 145 cm include women age 15–19, scheduled-caste women, and women from households with a low standard of living. The percentage of women with a height below 145 cm declines sharply with increasing level of education and standard of living.

Table 7.3 also shows two measures of an index that relates a woman's weight to her height. These measures exclude women who were pregnant at the time of the survey or women who gave birth during the two months preceding the survey. The body mass index (BMI) can be used to assess both thinness and obesity. The BMI is defined as the weight in kilograms divided by the height in metres squared (kg/m^2). The mean BMI for women in Himachal Pradesh is 20.8, which is not very different from the national average of 20.3. Chronic energy deficiency is usually indicated by a BMI of less than 18.5. Thirty percent of women in Himachal Pradesh suffer from chronic energy deficiency, compared with 36 percent of women in India as a whole. Nutritional problems, as indicated by the BMI, are particularly serious for women below age 30 (in particular, women age 15–19), illiterate women, scheduled-caste women, women from other backward classes, women who have not worked in the past 12 months, and women with a low standard of living.

Rural women (31 percent) are almost twice as likely as urban women (17 percent) to have a BMI of less than 18.5. All religious groups except Buddhists/Neo-Buddhists have high proportions with a low BMI. Women in the youngest age group and women from households with a low standard of living have the highest percentage of chronic energy deficiency of all the population subgroups represented in Table 7.3.

7.3 Anaemia Among Women

Anaemia is characterized by a low level of haemoglobin in the blood. Haemoglobin is necessary for transporting oxygen from the lungs to other tissues and organs of the body. Anaemia usually results from a nutritional deficiency of iron, folate, vitamin $B_{12,}$ or some other nutrients. This type of anaemia is commonly referred to as iron-deficiency anaemia. Iron deficiency is the most widespread form of malnutrition in the world, affecting more than two billion people (Stolzfus and Dreyfuss, 1998). In India, anaemia affects an estimated 50 percent of the population (Seshadri, 1998).

Anaemia may have detrimental effects on the health of women and children and may become an underlying cause of maternal mortality and perinatal mortality. Anaemia results in an increased risk of premature delivery and low birth weight (Seshadri, 1997). Early detection of anaemia can help to prevent complications related to pregnancy and delivery, as well as child-development problems. Information on the prevalence of anaemia can be useful for the development of health-intervention programmes designed to prevent anaemia, such as iron-fortification programmes.

In India, under the Government's Reproductive and Child Health Programme, iron and folic acid tablets are provided to pregnant women in order to prevent anaemia during pregnancy. Because anaemia is such a serious health problem in India, NFHS-2 undertook direct measurement of the haemoglobin levels of all ever-married women age 15–49 years and their children under three years of age. Measurements were taken in the field using the HemoCue

system.[1] This system uses a single drop of blood from a finger prick (or a heel prick in the case of infants under six months old), which is drawn into a cuvette and then inserted into a portable, battery-operated instrument.[2] In less than one minute, the haemoglobin concentration is indicated on a digital read-out.

Before the anaemia testing was undertaken in a household, the health investigator read a detailed informed consent statement to the respondent, informing her about anaemia, describing the procedure to be followed for the test, and emphasizing the voluntary nature of the test. She was then asked whether or not she would consent to have the test done for herself and her young children, if any. The health investigator then signed the questionnaire at the bottom of the statement to indicate that it had been read to the respondent and recorded her agreement or lack of agreement to the testing. If the test was conducted, at the end of the test the respondent was given a written record of the results for herself and each of her young children. In addition, the health investigator described to her the meaning of the results and advised her if medical treatment was necessary. In cases of severe anaemia, the respondent was read an additional statement asking whether or not she would give her permission for the survey organization to inform a local health official about the problem. For each Primary Sampling Unit, a local health official was given a list of severely anaemic women (and children) who had consented to the referral.

Table 7.4 and Figure 7.1 show anaemia levels for ever-married women age 15–49. Three levels of severity of anaemia are distinguished: mild anaemia (10.0–10.9 grams per decilitre (g/dl) for pregnant women and 10.0–11.9 g/dl for nonpregnant women), moderate anaemia (7.0–9.9 g/dl), and severe anaemia (less than 7.0 g/dl). Appropriate adjustments in these cutoff points were made for women living at altitudes above 1,000 metres and women who smoke, since both of these groups require more haemoglobin in their blood (Centers for Disease Control and Prevention, 1998).

In Himachal Pradesh, haemoglobin levels were tested for 99 percent of eligible women (see Table B.3 in Appendix B). Overall, 41 percent of women in Himachal Pradesh have some degree of anaemia,[3] which is much lower than the level for India as a whole (52 percent). Thirty-one percent of women are mildly anaemic, 8 percent are moderately anaemic, and 1 percent are severely anaemic. Although there are some differences in the prevalence of anaemia by background characteristics, at least 28 percent of women in every population group have some degree of anaemia. The prevalence of anaemia in women does not vary considerably by women's age, place of residence, education, or work status. Surprisingly, anaemia prevalence increases with an increasing standard of living. Thirty-four percent of women from households

[1]The HemoCue instrument has been used extensively throughout the world for estimating the concentration of haemoglobin in capillary blood in field situations. The HemoCue has been found to give accurate results on venous blood samples, comparable to estimates from more sophisticated laboratory instruments (Von Schenk et al., 1986; McNulty et al., 1995; Krenzicheck and Tanseco, 1996). A recent small-scale study in India (Prakash et al., 1999), however, found that the HemoCue provided slightly higher estimates of haemoglobin than the standard blood cell counter (BCC) method.

[2]Because the first 2–3 drops of blood are wiped away to be sure that the sample used for analysis consists of fresh capillary blood, it is actually the third or fourth drop of blood that is drawn into the cuvette.

[3]Anaemia rates for women that are not adjusted for smoking and altitude are: 33.0 percent for any anaemia, 25.8 percent for mild anaemia, 7.1 percent for moderate anaemia, and 0.1 percent for severe anaemia. The large difference in adjusted and unadjusted anaemia rates is expected since 49 out of the 100 PSUs in Himachal Pradesh are above an altitude of 1,000 metres.

with a low standard of living are anaemic, compared with 41 percent of women from households with a medium or high standard of living. By religion, the prevalence of anaemia is much higher for Buddhists/Neo-Buddhists (68 percent) than for Hindus, Sikhs, or Muslims (40–41 percent). Women from other backward classes (51 percent) are more likely to be anaemic than women from scheduled castes (37 percent) and women who do not belong to a scheduled caste, a scheduled tribe, or an other backward class (38 percent).

Table 7.4 Anaemia among women

Percentage of ever-married women classified as having iron-deficiency anaemia by degree of anaemia, according to selected background characteristics, Himachal Pradesh, 1999

Background characteristic	Percentage of women with any anaemia	Percentage of women with:			Number of women
		Mild anaemia	Moderate anaemia	Severe anaemia	
Age					
15–19	43.2	30.4	12.2	0.6	63
20–24	40.4	30.3	9.6	0.5	484
25–29	40.3	31.7	7.8	0.8	621
30–34	40.1	31.2	8.7	0.2	561
35–49	40.6	31.9	7.8	0.9	1,229
Marital status					
Currently married	40.2	31.2	8.3	0.7	2,821
Not currently married	45.4	35.8	8.7	0.9	137
Residence					
Urban	38.5	28.8	9.1	0.7	268
Rural	40.7	31.7	8.3	0.7	2,690
Education					
Illiterate	40.9	30.9	8.8	1.2	1,076
Literate, < middle school complete	40.6	29.7	10.1	0.7	824
Middle school complete	40.0	31.2	8.8	0.0	376
High school complete and above	39.9	34.5	5.3	0.2	682
Religion					
Hindu	39.9	31.5	7.8	0.6	2,763
Muslim	40.6	26.4	14.1	0.0	97
Sikh	(40.3)	(28.3)	(12.1)	(0.0)	38
Buddhist/Neo-Buddhist	67.8	37.4	22.6	7.7	54
Caste/tribe					
Scheduled caste	37.1	29.4	6.7	1.1	653
Other backward class	51.1	39.7	11.4	0.0	559
Other[1]	38.4	29.7	7.9	0.7	1,733
Work status					
Working in family farm/business	39.6	30.5	7.7	1.4	350
Employed by someone else	41.1	32.4	7.0	1.8	251
Not worked in past 12 months	40.6	31.5	8.6	0.5	2,346
Standard of living Index					
Low	34.4	25.7	7.9	0.9	284
Medium	41.4	31.5	9.1	0.7	1,750
High	40.5	32.8	7.0	0.7	901
Pregnancy/breastfeeding status					
Pregnant	31.8	18.3	12.8	0.7	176
Breastfeeding (not pregnant)	47.6	36.5	10.1	1.0	524
Not pregnant/not breastfeeding	39.5	31.3	7.6	0.6	2,258

Contd…

Table 7.4 Anaemia among women (contd.)

Percentage of ever-married women classified as having iron-deficiency anaemia by degree of anaemia, according to selected background characteristics, Himachal Pradesh, 1999

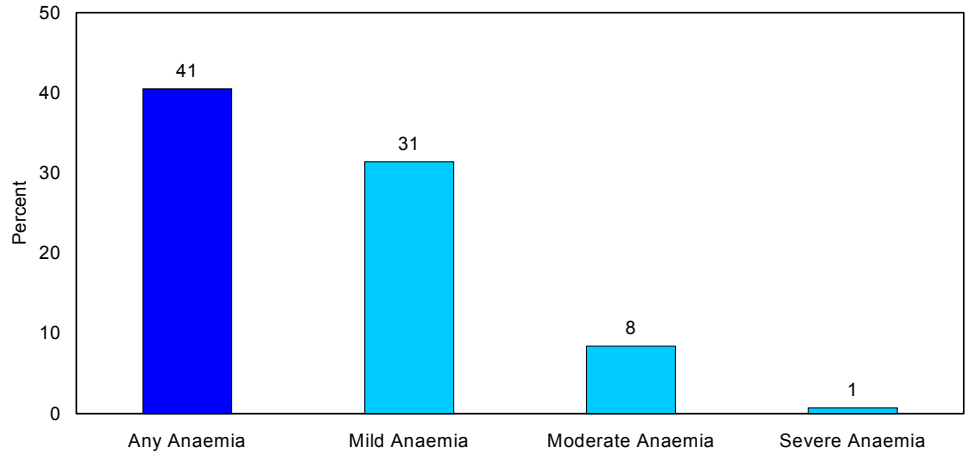
Background characteristic	Percentage of women with any anaemia	Percentage of women with:			Number of women
		Mild anaemia	Moderate anaemia	Severe anaemia	
Height					
< 145 cm	35.3	27.1	6.9	1.4	179
≥ 145 cm	40.8	31.7	8.4	0.6	2,779
Body mass index					
< 18.5 kg/m^2	43.0	32.3	9.6	1.1	855
≥ 18.5 kg/m^2	39.5	31.1	7.9	0.5	2,102
Fruit and vegetable consumption[2]					
Fruits and vegetables	40.6	31.9	8.1	0.6	2,069
Fruits only	(32.7)	(22.9)	(9.8)	(0.0)	52
Vegetables only	42.8	32.4	9.5	0.9	719
Neither	28.1	21.8	5.2	1.0	118
Total	40.5	31.4	8.4	0.7	2,958

Note: The haemoglobin levels are adjusted for altitude of the enumeration area and for smoking when calculating the degree of anaemia. Total includes 3 women belonging to other religions, 13 scheduled-tribe women, 11 self-employed women, and 3, 23, and 1 women with missing information on religion, the standard of living index, and the body mass index, respectively, who are not shown separately.
( ) Based on 25–49 unweighted cases
[1]Not belonging to a scheduled caste, a scheduled tribe, or an other backward class
[2]Based on consumption at least weekly. Vegetables include only green, leafy vegetables.

The prevalence of anaemia is higher for breastfeeding women (48 percent) than for pregnant women (32 percent) and nonpregnant women who are not breastfeeding (40 percent). Since anaemia is often considered to be particularly problematic for pregnant women, it is noteworthy that pregnant women have a lower level of anaemia than other women. The provision of iron and folic acid supplements to pregnant women has undoubtedly reduced the overall prevalence of anaemia in pregnant women (Mothers of 86 percent of births in the three years preceding the survey received IFA tablets or syrup during pregnancy—see Table 8.6). However, the prevalence of moderate anaemia is higher among pregnant women (13 percent) than among other women (8–10 percent). For this reason, anaemia remains a serious problem among pregnant women, and there is a continuing need to promote widespread iron and folic acid supplementation for pregnant women.

Surprisingly, shorter women are less likely to be anaemic than taller women. Women with a low body mass index have a higher prevalence of anaemia (43 percent) than other women (40 percent). The diet of women also plays a role in the likelihood that they have anaemia. Consumption of iron-rich foods can reduce the prevalence or severity of anaemia, and the absorption of iron from the diet can be enhanced (for example, by vitamin C) or inhibited (for example, by tea or coffee) if particular items are consumed around the time that a meal is eaten. In Himachal Pradesh, women who regularly include fruits and/or vegetables in their diet are surprisingly more likely to be anaemic than women who consume neither of these foods on a regular basis.

Figure 7.1
Anaemia Among Women



NFHS-2, Himachal Pradesh, 1999

7.4 Infant Feeding Practices

Infant feeding practices have significant effects on both mothers and children. Mothers are affected through the influence of breastfeeding on the period of postpartum infertility, and hence on fertility levels and the length of birth intervals. These effects vary by both the duration and intensity of breastfeeding. Proper infant feeding, starting from the time of birth, is important for the physical and mental development of the child. Breastfeeding improves the nutritional status of young children and reduces morbidity and mortality. Breast milk not only provides important nutrients but also protects the child against infection. The timing and type of supplementary foods introduced in an infant's diet also have significant effects on the child's nutritional status.

The Baby Friendly Hospitals Initiative, launched by the United Nations Children's Fund (UNICEF), recommends initiation of breastfeeding immediately after childbirth. The World Health Organization (WHO) and UNICEF recommend that infants should be given only breast milk for about the first six months of their life. Under the Reproductive and Child Health Programme, the Government of India recommends that infants should be exclusively breastfed from birth to age four months (Ministry of Health and Family Welfare, n.d.). Most babies do not require any other foods or liquids during this period. By age seven months, adequate and appropriate complementary foods should be added to the infant's diet in order to provide sufficient nutrients for optimal growth. It is recommended that breastfeeding should continue, along with complementary foods, through the second year of life or beyond. It is further recommended that a feeding bottle with a nipple should not be used at any age, for reasons related mainly to sanitation and the prevention of infections.

WHO has suggested several indicators of breastfeeding practices to guide countries in gathering information for measuring and evaluating infant feeding practices. These indicators include the ever breastfed rate, the exclusive breastfeeding rate, the timely complementary feeding rate, the continued breastfeeding rate, and the bottle feeding rate. The *exclusive breastfeeding rate* is defined as the proportion of infants under age four months who receive only

breast milk.[4] The *timely complementary feeding rate* is the proportion of infants age 6–9 months who receive both breast milk and solid or semi-solid food. The *continued breastfeeding rate through one year of age* is the proportion of children age 12–15 months who are still breastfed. The *continued breastfeeding rate until two years of age* is the proportion of children age 20–23 months who are still breastfed. The *bottle feeding rate* is the proportion of infants who are fed using a bottle with a nipple.

In NFHS-2, data on breastfeeding and complementary feeding were obtained from a series of questions in the Woman's Questionnaire. These questions pertain to births since January 1996, but the tables are restricted to children born in the three years preceding the survey. For any given woman, information was obtained for a maximum of two births.

Initiation of breastfeeding immediately after childbirth is important because it benefits both the mother and the infant. As soon as the infant starts suckling at the breast, the hormone oxytocin is released, resulting in uterine contractions that facilitate expulsion of the placenta and reduce the risk of postpartum haemorrhage. It is also recommended that the first breast milk (colostrum) should be given to the child rather than squeezed from the breast and discarded, because it provides natural immunity to the child.

Table 7.5 shows the percentage of children born during the three years before the survey who started breastfeeding within one hour and one day of birth. The table also gives the percentage of children whose mothers squeezed the first milk from the breast before breastfeeding, which is not the recommended practice. Although breastfeeding is nearly universal in Himachal Pradesh, few children are put to the breast immediately after birth. Twenty-one percent of children began breastfeeding within one hour of birth, and 42 percent began breastfeeding within one day of birth. The vast majority (86 percent) of women squeezed the first milk from the breast before they began breastfeeding.

Differentials in the early initiation of breastfeeding and in squeezing the first milk from the breast are also shown in Table 7.5. Less than 27 percent of children in all population groups were put to the breast within one hour of birth and no more than 58 percent started breastfeeding within one day of birth. Rural areas have a higher proportion of children who started breastfeeding within one hour of birth than urban areas. However, urban areas have a higher proportion that started breastfeeding within one day of birth. The proportion of children breastfed within one hour of birth does not vary consistently by mother's education. However, the likelihood of being breastfed within one day of birth increases substantially with mother's education, ranging from 36 percent for children of illiterate mothers to 48 percent for mothers who have completed at least high school. Working mothers employed by someone else are much more likely to initiate breastfeeding within one day of birth (57 percent) than women who work on a family farm or in a family business (23 percent) or women who did not work in the 12 months before the survey (21 percent). Early initiation of breastfeeding decreases slightly with increasing household standard of living. Forty-four percent of children born to mothers in households with a low standard of living are breastfed within one day of birth, compared with 40 percent of children born to mothers living in households with a high standard of living. Although the number of births to Muslim women is very small, the data suggest that Muslim children are

[4]International recommendations have recently been revised to promote exclusive breastfeeding up to six months of age.

Table 7.5 Initiation of breastfeeding

Percentage of children born during the three years preceding the survey who started breastfeeding within one hour and within one day of birth and percentage whose mother squeezed the first milk from her breast before breastfeeding by selected background characteristics, Himachal Pradesh, 1999

Background characteristic	Percentage started breastfeeding within one hour of birth	Percentage started breastfeeding within one day of birth[1]	Percentage whose mother squeezed first milk from breast	Number of children
Residence				
Urban	16.5	45.7	81.6	69
Rural	21.0	42.0	86.5	843
Mother's education				
Illiterate	21.4	36.4	88.2	231
Literate, < middle school complete	20.8	39.6	87.4	217
Middle school complete	15.3	43.3	87.3	145
High school complete and above	22.6	48.0	83.3	319
Religion				
Hindu	21.4	43.8	86.6	842
Muslim	(6.4)	(15.4)	(85.1)	39
Caste/tribe				
Scheduled caste	20.6	36.5	84.8	192
Other backward class	17.5	42.1	88.9	188
Other[2]	21.9	44.7	85.5	526
Mother's work status				
Working in family farm/business	10.5	22.5	88.0	84
Employed by someone else	26.6	57.4	78.8	54
Not worked in past 12 months	21.4	43.4	86.5	774
Standard of living index				
Low	20.7	43.8	83.6	85
Medium	22.7	42.8	87.2	563
High	16.0	39.5	84.2	255
Assistance during delivery				
Health professional[3]	21.0	47.3	86.2	367
Dai (TBA)	17.7	36.4	86.6	516
Place of delivery				
Public health facility	21.9	50.3	85.6	212
Private health facility	19.5	38.3	82.3	52
Own home	20.6	38.6	86.3	554
Parents' home	17.6	46.7	89.7	89
Total	20.7	42.3	86.2	912

Note: Table includes only the two most recent births during the three years preceding the survey, whether living or dead at the time of interview. Total includes 17 Sikh children, 15 Buddhist/Neo-Buddhist children, 6 scheduled-tribe children, 1 child whose mother is self-employed, 29 children whose births were assisted by 'other' persons, 5 children delivered at other places of delivery, and 10 children with missing information on the standard of living index, who are not shown separately.
TBA: Traditional birth attendant
( ) Based on 25–49 unweighted cases
[1]Includes children who started breastfeeding within one hour of birth
[2]Not belonging to a scheduled caste, a scheduled tribe, or an other backward class
[3]Includes doctor, auxiliary nurse midwife, nurse, midwife, lady health visitor, and other health professionals

much less likely to be breastfed early than Hindu children. By caste/tribe status, children from other backward classes (18 percent) are less likely than other children (21–22 percent) to be breastfed within one hour of birth, whereas children from scheduled castes (37 percent) are less likely to be breastfed within one day of birth than other children (42–45 percent).

The circumstances surrounding the delivery of the baby can have an important effect on the early initiation of breastfeeding. In Himachal Pradesh, children whose deliveries were attended by health professionals were more likely to be breastfed within one hour or one day of birth than children whose deliveries were attended by a *dai* (TBA). There is not a clear relationship between early initiation of breastfeeding and place of delivery, although children who were born in public health facilities were much more likely to be breastfed early than other children.

The custom of squeezing the first milk from the breast before breastfeeding a child is widely practised in every group, and differentials between groups are very small in most cases. Overall, the first milk was squeezed from the breast in 86 percent of the cases, contrary to recommendations for infant feeding. Even among institutional births and births assisted by a health professional, the first milk was squeezed from the breast in 82–87 percent of the cases.

Mothers of children born in the three years before the survey were asked if the child had been given plain water, other liquids, or solid or mushy (semi-solid) food at any time during the day or night before the interview. Results are shown in Tables 7.6 and 7.7. Children who received nothing but breast milk at any time during the day or night before the interview are defined as being *exclusively breastfed*. The introduction of supplementary foods before four months of age may put infants at risk of malnutrition because other liquids and solid foods are nutritionally inferior to breast milk. Consumption of liquids and solid or mushy foods at an early age also increases children's exposure to pathogens and consequently puts them at a greater risk of getting diarrhoea. However, a recent study based on findings from NFHS-1 (Anandaiah and Choe, 2000) concluded that breastfeeding with supplements is more beneficial than exclusive breastfeeding even for children at very young ages (less than four months). That report suggests that mothers who are not well nourished and who are in poor health themselves may not be able to provide adequate breast milk for their infants.

In Himachal Pradesh, only 18 percent of children under four months of age are exclusively breastfed, 48 percent receive breast milk plus water, and 32 percent receive supplements along with breast milk (Table 7.6). Given the small number of cases in most of the two-month age groups presented in Table 7.6, the age-specific proportions discussed in this paragraph should be interpreted with caution. According to NFHS-2, the percentage of infants exclusively breastfed drops considerably by age 2–3 months: from 37 percent for children under two months of age to 6 percent for children age 2–3 months and 2 percent for children age 4–5 months. By age 6–7 months, no children are exclusively breastfed. The proportion of children receiving breast milk and supplements increases from 16 percent for children less than two months of age to 42 percent for children age 2–3 months. The proportion continues to increase, peaking at 88 percent among children age 6–9 months, but it declines thereafter as children are weaned from the breast and their food consumption no longer supplements breast milk. However, breastfeeding generally continues for a long period. Seventy-nine percent of children age 12–13 months are still being breastfed, as are 65 percent of children age 22–23 months. For

Table 7.6 Breastfeeding status by child's age

Percent distribution of children under age 3 years by breastfeeding status, according to child's age in months, Himachal Pradesh, 1999

Age in months	Breastfeeding status				Total percent	Number of living children
	Not breastfeeding	Exclusively breastfeeding	Breastfeeding and receiving:			
			Plain water only	Supplements		
< 2	(4.1)	(37.4)	(42.9)	(15.7)	100.0	38
2–3	1.0	5.8	51.7	41.5	100.0	65
4–5	(5.5)	(2.4)	(30.8)	(61.3)	100.0	52
6–7	3.0	0.0	9.3	87.7	100.0	53
8–9	8.5	0.0	3.8	87.6	100.0	66
10–11	9.5	0.0	4.8	85.7	100.0	53
12–13	(21.2)	(0.0)	(0.0)	(78.8)	100.0	31
14–15	30.2	0.0	0.0	69.8	100.0	54
16–17	(32.6)	(0.0)	(0.0)	(67.4)	100.0	53
18–19	(40.4)	(0.0)	(0.0)	(59.6)	100.0	42
20–21	(46.7)	(0.0)	(0.0)	(53.3)	100.0	43
22–23	35.2	0.0	0.0	64.8	100.0	65
24–25	59.4	0.0	0.0	40.6	100.0	58
26–27	(61.0)	(0.0)	(0.0)	(39.0)	100.0	31
28–29	(51.8)	(0.0)	(0.0)	(48.2)	100.0	40
30–31	(80.1)	(0.0)	(0.0)	(19.9)	100.0	54
32–33	(83.3)	(0.0)	(0.0)	(16.7)	100.0	45
34–35	(84.3)	(0.0)	(0.0)	(15.7)	100.0	36
< 4 months	2.2	17.5	48.4	31.9	100.0	103
4–6 months	3.7	1.7	24.1	70.5	100.0	77
7–9 months	7.6	0.0	5.3	87.1	100.0	95

Note: Table includes only surviving children from among the two most recent births during the three years preceding the survey. Breastfeeding status refers to the day or night before the interview. Children classified as 'breastfeeding and receiving plain water only' receive no supplements.
( ) Based on 25–49 unweighted cases

the majority of children in Himachal Pradesh, breastfeeding usually stops at about 24–25 months of age, but 16 percent of children age 34–35 months are still breastfed.

Table 7.7 shows in more detail the types of food consumed by children under age three years during the day or night before the interview. Because of the small number of non-breastfeeding children, age categories have been combined into broader age groups. Powdered milk is rarely given to young children at any age, but the consumption of other milk (such as cow's milk or buffalo's milk) is quite common in Himachal Pradesh, even among infants. At least 94 percent of non-breastfeeding children in each age group were given these other types of milk the day or night before the interview. Eighty-one percent of children age 6–9 months received non-powdered milk. The proportion of breastfeeding children receiving non-powdered milk peaks at age 18–23 months (91 percent). The percentage of children being given other milk is much higher in Himachal Pradesh at every age than in the country as a whole. For example, for the country as a whole, 15 percent of all children age 0–3 months and 40 percent of all children age 6–9 months received non-powdered milk in the night or day before the interview. Corresponding figures for Himachal Pradesh are 33 percent and 81 percent, respectively.

Other liquids, such as juice or tea, are given to children much less often than milk in Himachal Pradesh. Nonetheless, these other liquids are given more frequently in Himachal Pradesh than in the country as a whole. For example, 37 percent of all children age 6–9 months in Himachal Pradesh receive liquids other than milk, compared with an all-India estimate of 24

Table 7.7 Type of food received by children

Percentage of children under age 3 years who received specific types of food the day or night before the interview and percentage using a bottle with a nipple by current breastfeeding status and child's age in months, Himachal Pradesh, 1999

Age in months	Type of food received						Using bottle with a nipple	Number of living children
	Powdered milk	Any other milk	Any other liquid	Green, leafy vegetables	Fruits	Any solid or mushy food[1]		
BREASTFEEDING CHILDREN								
< 2	(1.8)	(14.6)	(0.0)	(0.0)	(0.0)	(0.0)	(6.2)	37
2–3	0.0	41.4	4.4	0.0	2.0	5.9	19.9	64
4–5	(0.7)	(50.8)	(11.6)	(0.0)	(7.7)	(20.4)	(28.1)	49
6–7	0.0	77.5	28.6	0.6	33.1	56.9	49.4	52
8–9	0.0	82.2	44.3	18.1	42.7	72.4	31.3	61
10–11	(0.0)	(57.0)	(49.1)	(20.2)	(45.3)	(88.2)	(25.6)	48
12–13	(0.0)	(82.0)	(39.8)	(29.9)	(52.5)	(93.7)	(22.0)	25
14–15	(0.0)	(86.7)	(57.0)	(39.2)	(41.4)	(89.1)	(33.1)	38
16–17	(0.0)	(81.4)	(59.7)	(34.4)	(42.3)	(89.4)	(14.7)	36
18–23	0.0	91.2	49.8	51.1	46.8	94.4	27.8	90
24–29	0.6	84.4	55.5	51.8	47.0	100.0	31.2	55
30–35	*	*	*	*	*	*	*	24
< 4 months	0.6	31.7	2.8	0.0	1.3	3.7	14.9	101
4–5 months	(0.7)	(50.8)	(11.6)	(0.0)	(7.7)	(20.4)	(28.1)	49
6–9 months	0.0	80.0	37.1	10.1	38.3	65.3	39.6	112
NON-BREASTFEEDING CHILDREN								
< 18	5.5	97.2	50.9	33.4	40.0	74.9	69.9	58
18–23	0.0	97.9	56.8	46.5	54.2	95.8	45.5	60
24–29	1.7	96.2	63.3	51.2	60.5	99.6	29.5	74
30–35	0.3	94.3	60.2	57.3	50.9	97.8	26.2	111
ALL CHILDREN								
< 2	(1.7)	(17.2)	(0.0)	(0.0)	(0.0)	(0.0)	(9.2)	38
2–3	0.0	42.0	4.4	0.0	2.0	5.8	20.7	65
4–5	(0.6)	(53.5)	(10.9)	(0.0)	(9.6)	(21.6)	(32.1)	52
6–7	0.6	78.2	27.8	0.6	32.1	55.2	50.9	53
8–9	4.3	83.7	44.3	16.5	44.7	72.4	36.7	66
10–11	0.0	61.1	46.8	20.7	43.3	86.9	30.2	53
12–13	(0.0)	(85.8)	(47.4)	(28.6)	(50.5)	(87.0)	(30.5)	31
14–15	0.0	90.7	62.4	42.4	39.5	87.8	41.7	54
16–17	(0.0)	(85.1)	(55.8)	(38.5)	(44.0)	(90.5)	(30.1)	53
18–23	0.0	93.9	52.6	49.2	49.7	95.0	34.9	150
24–29	1.2	91.2	60.0	51.4	54.8	99.7	30.2	129
30–35	0.2	94.4	61.6	54.5	48.0	98.2	25.7	135
< 4 months	0.6	32.8	2.8	0.0	1.2	3.7	16.4	103
4–5 months	(0.6)	(53.5)	(10.9)	(0.0)	(9.6)	(21.6)	(32.1)	52
6–9 months	2.6	81.2	36.9	9.4	39.1	64.8	43.0	120

Note: Table includes only surviving children from among the two most recent births during the three years preceding the survey.
( ) Based on 25–49 unweighted cases
*Percentage not shown; based on fewer than 25 unweighted cases
[1]Includes green, leafy vegetables and fruits

percent for children in the same age category. The consumption of green, leafy vegetables is nonexistent among children less than six months old, but it increases rapidly thereafter with age. Less than 10 percent of children age 0–5 months consume fruits, but 39 percent of children age 6–9 months consume fruits. Approximately half of children age 18–35 months receive any green, leafy vegetables or fruits.

From about six months of age, the introduction of complementary food is critical for meeting the protein, energy, and micronutrient needs of children. For the majority of children in Himachal Pradesh, solid or mushy food is introduced at the recommended stage. Sixty-five

percent of breastfeeding children age 6–9 months consume solid or mushy food (much higher than the all-India figure of 36 percent). This proportion rises rapidly to 72 percent for children age 8–9 months and continues to increase substantially thereafter. By age 24–29 months, 100 percent of breastfeeding children receive solid or mushy foods in addition to breast milk. Notably, however, breastfeeding children age 6–9 months are more likely to receive milk other than breast milk or powdered milk (80 percent) than solid or mushy food (65 percent).

Bottle feeding has a direct effect on the mother's exposure to the risk of pregnancy because the period of amenorrhoea may be shortened when breastfeeding is reduced or replaced by bottle feeding. Because it is often difficult to sterilize the nipple properly, the use of bottles with nipples also exposes children to an increased risk of getting diarrhoea and other diseases. The use of a bottle with a nipple is very common for children who are not being breastfed, but this practice declines sharply with age. Even among children who are being breastfed, the use of bottles with nipples is fairly common at certain ages. For example, 20 percent of breastfeeding children age 2–3 months were fed from a bottle with a nipple in the day or night before the interview. This proportion is as high as 49 percent in the age group 6–7 months.

Table 7.8 shows several statistics that describe the duration of breastfeeding. Estimates of both means and medians are based on the current proportions of children breastfeeding in each age group because information on current status is usually more accurate than information based on mother's recall. The median length of any breastfeeding in Himachal Pradesh is 24.1 months, one month shorter than the median length of any breastfeeding for the country as a whole (25.4 months). Supplementation also begins relatively early in Himachal Pradesh. The median length of exclusive breastfeeding is only 0.6 months (compared with almost two months in India as a whole), and the median length of exclusive breastfeeding or breastfeeding with water only is 2.8 months. The mean durations of exclusive breastfeeding (1.6 months) and exclusive breastfeeding

Table 7.8 Median duration of breastfeeding

Median duration of breastfeeding among children under age 3 years by sex of child and residence, and mean duration of breastfeeding, Himachal Pradesh, 1999

Background characteristic	Median duration (months)[1]			Number of children
	Any breastfeeding	Exclusive breastfeeding	Exclusive breastfeeding or breastfeeding plus water only	
Sex of child				
Male	25.3	(0.5)	2.3	497
Female	23.3	(0.7)	3.4	415
Residence				
Urban	(19.9)	*	(1.7)	69
Rural	24.7	0.6	2.9	843
Median duration	24.1	0.6	2.8	912
Mean duration (months)[1]	22.4	1.6	4.2	912
Prevalence/incidence mean	22.5	0.8	3.7	912

Note: Table includes only the two most recent births during the three years preceding the survey.
( ) Based on 25–49 unweighted cases
*Median not shown; based on fewer than 25 unweighted cases
[1]Based on current status

or breastfeeding with water only (4.2 months) are longer than the median durations for both of those measures, but the mean duration of any breastfeeding (22.4 months) is shorter than the median duration for that measure.

An alternative measure of the duration of breastfeeding is the prevalence-incidence mean, which is calculated as the 'prevalence' of breastfeeding divided by its 'incidence'. In this case, prevalence is defined as the number of children whose mothers were breastfeeding at the time of the survey, and incidence is defined as the average number of births per month (averaged over a 36-month period to overcome problems of seasonality of births and possible reference-period errors). For any breastfeeding, the prevalence-incidence mean is almost identical to the mean calculated in the conventional manner, whereas the prevalence-incidence mean for the other two measures is lower than the conventional mean.

In societies with a strong son preference, parents may stop breastfeeding a girl at a younger age to increase their chances of having another child earlier (with the hope that the next child will be a boy). This appears to be the case in Himachal Pradesh, where the median duration of breastfeeding is 2 months shorter for girls than for boys. The median duration of breastfeeding is almost 5 months longer in rural areas than in urban areas.

7.5 Nutritional Status of Children

Nutritional status is a major determinant of the health and well-being of children. Inadequate or unbalanced diets and chronic illness are associated with poor nutrition among children. To assess their nutritional status, measurements of weight and height/length were obtained for children born in the three years preceding the survey. Children were weighed and measured with the same type of scales and measuring boards used for women. Children under two years of age were measured lying down and older children were measured standing up. Data on weight and height/length were used to calculate the following three summary indices of nutritional status:

- weight-for-age
- height-for-age
- weight-for-height

The nutritional status of children calculated according to these three measures is compared with the nutritional status of an international reference population recommended by the World Health Organization (Dibley et al., 1987a; 1987b). The use of this reference population is based on the empirical finding that well-nourished children in all population groups for which data exist follow very similar growth patterns (Martorell and Habicht, 1986). A scientific report from the Nutrition Foundation of India (Agarwal et al., 1991) has concluded that the WHO standard is generally applicable to Indian children.

The three indices of nutritional status are expressed in standard deviation units (z-scores) from the median for the international reference population. Children who are more than two standard deviations below the reference median on any of the indices are considered to be *undernourished*, and children who fall more than three standard deviations below the reference median are considered to be *severely undernourished*.

Each of these indices provides somewhat different information about the nutritional status of children. Weight-for-age is a composite measure that takes into account both chronic and acute undernutrition. Children who are more than two standard deviations below the reference median on this index are considered to be *underweight*. The height-for-age index measures linear growth retardation. Children who are more than two standard deviations below the median of the reference population in terms of height-for-age are considered short for their age or *stunted*. The percentage in this category indicates the prevalence of chronic undernutrition, which often results from a failure to receive adequate nutrition over a long period of time or from chronic or recurrent diarrhoea. Height-for-age, therefore, does not vary appreciably by the season in which data are collected.

The weight-for-height index examines body mass in relation to body length. Children who are more than two standard deviations below the median of the reference population in terms of weight-for-height are considered too thin or *wasted*. The percentage in this category indicates the prevalence of acute undernutrition. Wasting is associated with a failure to receive adequate nutrition in the period immediately before the survey and may be the result of seasonal variations in food supply or recent episodes of illness.

The validity of these indices is determined by many factors, including the coverage of the population of children and the accuracy of the anthropometric measurements. The survey was not able to measure the height and weight of all eligible children, usually because the child was not at home at the time of the health investigator's visit or because the mother refused to allow the child to be weighed and measured. In Himachal Pradesh, NFHS-2 did not measure 3 percent of children under age three (see Table B.3 in Appendix B), much better than the national nonresponse rate of 13 percent. Also excluded from the analysis are children whose month and year of birth were not known and those with grossly improbable height or weight measurements. In addition, two of the three indices (weight-for-age and height-for-age) are sensitive to misreporting of children's ages, including heaping on preferred digits.

Table 7.9 shows the percentage of children classified as undernourished by selected demographic characteristics. Forty-four percent of the children under age three in Himachal Pradesh are underweight (low weight-for-age) and 41 percent are stunted (low height-for-age). The proportion of children who are severely stunted (18 percent) is higher than the proportion of children who are severely underweight (12 percent). Wasting (low weight-for-height) is less common than stunting or underweight. Seventeen percent of children under three years of age are wasted and 3 percent are severely wasted. The proportion of children under three years of age who are underweight has not declined since NFHS-1. Height information was not collected in Himachal Pradesh for NFHS-1. As a result, it is not possible to examine trends over time with respect to stunting and wasting using NFHS-1 and NFHS-2 data.

The proportion of children who are undernourished increases with the child's age. For example, the proportion of children who are underweight increases from 13 percent for children below 6 months of age to 52–55 percent for children at ages 12–35 months. Stunting prevalence increases from 14 percent for children below 6 months of age to 57 percent for children age 12–23 months. It then declines to 43 percent for children age 24–35 months. It is also of great concern that even at age 24–35 months, when most children have been weaned from breast milk, 18 percent are severely stunted or severely underweight. Wasting prevalence peaks at 19–20 percent for children age 12–35 months and is 12–13 percent for younger children.

Table 7.9 Nutritional status of children by demographic characteristics

Percentage of children under age 3 years classified as undernourished on three anthropometric indices of nutritional status, according to selected demographic characteristics, Himachal Pradesh, 1999

Demographic characteristic	Weight-for-age		Height-for-age		Weight-for-height		Number of children
	Percentage below –3 SD	Percentage below –2 SD[1]	Percentage below –3 SD	Percentage below –2 SD[1]	Percentage below –3 SD	Percentage below –2 SD[1]	
Age of child							
< 6 months	1.2	13.1	7.0	13.8	5.7	12.7	130
6–11 months	7.5	35.8	11.5	34.6	3.6	11.8	158
12–23 months	14.5	54.9	27.0	56.6	2.7	19.1	273
24–35 months	18.0	52.0	18.1	43.2	2.6	20.1	247
Sex of child							
Male	12.4	45.2	20.1	46.2	3.3	17.0	434
Female	11.7	41.7	15.7	35.7	3.3	16.9	374
Birth order							
1	9.6	40.4	11.5	35.8	2.3	19.3	282
2–3	11.4	42.4	19.6	42.6	3.2	15.0	410
4–5	16.7	56.0	24.1	48.7	4.4	16.6	84
6+	(30.6)	(54.5)	(39.6)	(54.7)	(11.3)	(22.6)	33
Previous birth interval[2]							
First birth	9.9	40.9	11.4	35.9	2.3	19.5	284
< 24 months	14.1	45.0	21.8	43.4	5.2	12.8	144
24–47 months	13.0	46.2	23.0	44.6	3.5	17.7	286
48+ months	12.6	41.7	17.3	44.6	3.0	13.3	94
Total	12.1	43.6	18.1	41.3	3.3	16.9	808

Note: Each index is expressed in standard deviation units (SD) from the median of the International Reference Population.
( ) Based on 25–49 unweighted cases
[1]Includes children who are below –3 SD from the International Reference Population median
[2]First-born twins (triplets, etc.) are counted as first births because they do not have a previous birth interval.

Boys are more likely to be stunted and underweight, although girls and boys are equally likely to be wasted. Stunting and underweight increase sharply with increasing birth order. Overall, there is a U-shaped relationship between wasting and birth order, although the prevalence of severe wasting increases with birth order. Wasting (including severe wasting) is highest among births of order six or higher. Among second-order and higher-order births, the likelihood of being underweight is lowest for children born at least 48 months after the previous birth. For births of order two or higher, stunting prevalence does not vary considerably by length of the previous birth interval. The likelihood of being wasted is lower (13 percent) for children born after a short birth interval (less than 24 months) and after a very long birth interval (48 or more months), than for children born after a birth interval of 24–47 months (18 percent).

Table 7.10 shows the nutritional status of children by selected background characteristics. According to all three nutritional measures, undernutrition is substantially higher in rural areas than in urban areas. Nevertheless, undernutrition is still a problem in urban areas, where 29 percent of children are underweight, 31 percent are stunted, and 10 percent are wasted. In general, undernutrition among children is expected to decrease as mother's education increases. In Himachal Pradesh, children whose mothers completed at least high school have much lower levels of underweight, stunting, and wasting than other children. Children whose mothers are illiterate are at least one and a half times as likely to be stunted and underweight, and almost twice as likely to be wasted as children whose mothers have completed at least high school (see

Table 7.10 Nutritional status of children by background characteristics

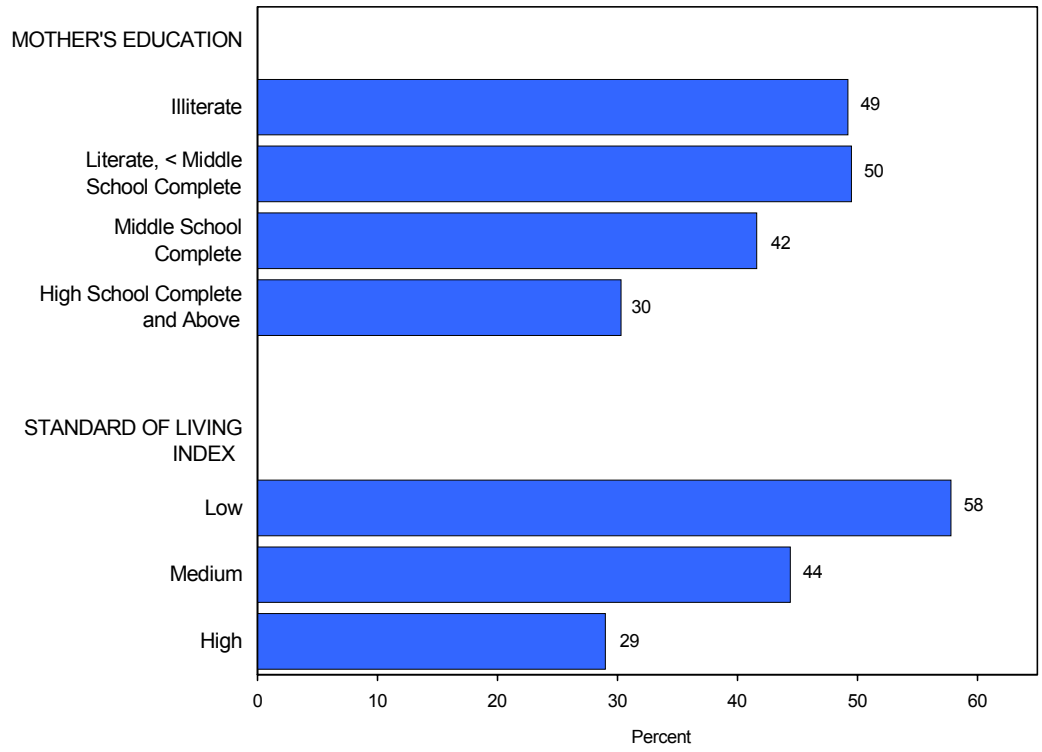
Percentage of children under age 3 years classified as undernourished on three anthropometric indices of nutritional status, according to selected background characteristics, Himachal Pradesh, 1999

Background characteristic	Weight-for-age		Height-for-age		Weight-for-height		Number of children
	Percentage below –3 SD	Percentage below –2 SD[1]	Percentage below –3 SD	Percentage below –2 SD[1]	Percentage below –3 SD	Percentage below –2 SD[1]	
Residence							
Urban	6.3	28.7	9.5	30.5	1.0	9.9	63
Rural	12.6	44.8	18.8	42.2	3.5	17.5	745
Mother's education							
Illiterate	17.8	47.1	27.1	49.2	3.2	18.9	198
Literate, < middle school complete	12.9	55.7	19.5	49.5	6.1	20.9	190
Middle school complete	15.1	48.5	15.3	41.6	3.7	22.6	135
High school complete and above	6.1	30.7	12.1	30.3	1.4	10.3	286
Religion							
Hindu	12.3	44.1	18.0	41.4	3.6	17.3	750
Muslim	(12.9)	(44.3)	(23.0)	(59.0)	(0.0)	(12.9)	34
Caste/tribe							
Scheduled caste	17.4	52.2	23.7	54.9	3.8	18.2	172
Other backward class	16.9	59.2	14.5	42.4	5.1	25.8	169
Other[2]	8.5	34.7	17.5	35.7	2.5	13.5	462
Mother's work status							
Working in family farm/business	15.6	48.4	20.9	39.9	5.1	20.5	72
Employed by someone else	6.2	24.3	11.1	24.0	0.0	11.4	47
Not worked in past 12 months	12.1	44.4	18.2	42.6	3.4	17.0	689
Mother's height							
< 145 cm	20.8	62.5	40.4	61.3	4.0	14.4	64
≥ 145 cm	11.3	42.0	16.1	39.6	3.3	17.2	744
Mother's body mass index							
< 18.5 kg/m^2	16.1	53.7	18.3	45.3	3.9	22.7	294
≥ 18.5 kg/m^2	9.7	37.8	18.0	39.1	3.0	13.7	513
Standard of living index							
Low	27.1	57.7	37.3	57.8	0.0	21.7	75
Medium	11.8	46.3	18.5	44.4	3.8	17.3	498
High	6.5	33.1	10.2	29.0	3.4	14.9	226
Total	12.1	43.6	18.1	41.3	3.3	16.9	808

Note: Each index is expressed in standard deviation units (SD) from the median of the International Reference Population. Total includes 14 Sikh children, 11 Buddhist/Neo-Buddhist children, 6 scheduled-tribe children, 1 child of a self-employed mother, and 1 and 10 children with missing information on mother's body mass index and the standard of living index, respectively, who are not shown separately.
( ) Based on 25–49 unweighted cases
[1]Includes children who are below –3 SD from the International Reference Population median
[2]Not belonging to a scheduled caste, a scheduled tribe, or an other backward class

Figure 7.2). Despite the small number of children under age three who are Muslim, the data suggest that Muslim children are less likely to be wasted but much more likely to be stunted than Hindu children. Hindu and Muslim children are equally likely to be underweight. Children who do not belong to scheduled castes, scheduled tribes, or other backward classes are much less likely than other children to be undernourished. Children from scheduled castes are most likely to be stunted, but children from other backward classes are most likely to be underweight and wasted.

Figure 7.2
Stunting Among Children Under Three Years by Mother's Education and SLI



The nutritional status of children is strongly related to maternal nutritional status. For example, undernutrition is more common for children whose mothers have a body mass index below 18.5 than for other children. Similarly, children born to women whose height is below 145 cm are more likely to be underweight and stunted but less likely to be wasted than other children. All three nutritional measures have a strong negative association with the household's standard of living. Although children in households with a low standard of living have exceptionally high levels of undernutrition (58 percent are underweight, 58 percent are stunted, and 22 percent are wasted), a large proportion of children from households with a high standard of living are also undernourished (33 percent are underweight, 29 percent are stunted, and 15 percent are wasted).

7.6 Anaemia Among Children

Anaemia is a serious concern for young children because it can result in impaired cognitive performance, behavioural and motor development, coordination, language development, and scholastic achievement, as well as increased morbidity from infectious diseases (Seshadri, 1997). One of the most vulnerable groups is children age 6–24 months (Stoltzfus and Dreyfuss, 1998).

Table 7.11 and Figure 7.3 show anaemia levels for children age 6–35 months. In Himachal Pradesh, 70 percent of children age 6–35 months have some level of anaemia, including 29 percent who are mildly anaemic (10.0–10.9 g/dl), 39 percent who are moderately

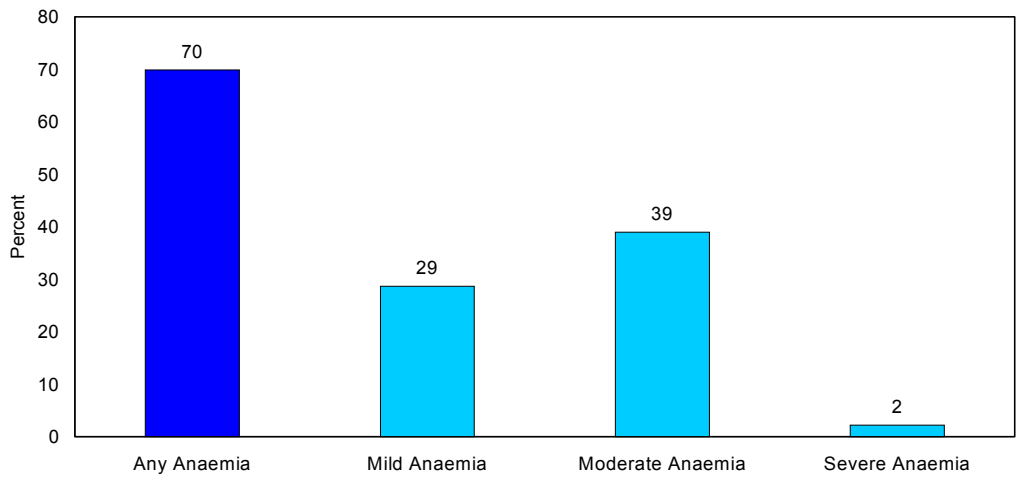
Table 7.11 Anaemia among children

Percentage of children age 6–35 months classified as having iron-deficiency anaemia by selected background characteristics, Himachal Pradesh, 1999

Background characteristic	Percentage of children with any anaemia	Percentage of children with anaemia			Number of children
		Mild anaemia	Moderate anaemia	Severe anaemia	
Age of child					
6–11 months	71.1	28.5	40.0	2.6	170
12–23 months	71.3	27.3	40.9	3.2	279
24–35 months	67.7	30.4	36.3	1.0	254
Sex of child					
Male	70.8	27.5	40.5	2.8	401
Female	68.8	30.3	37.0	1.5	303
Birth order					
1	67.1	31.0	34.6	1.5	250
2–3	71.3	27.7	40.7	3.0	359
4–5	73.2	28.6	42.8	1.8	70
Residence					
Urban	66.0	28.2	34.3	3.5	57
Rural	70.3	28.8	39.4	2.1	646
Mother's education					
Illiterate	66.7	24.0	41.9	0.8	165
Literate, < middle school complete	72.4	28.6	40.3	3.5	172
Middle school complete	72.8	25.0	44.3	3.5	117
High school complete and above	69.1	33.6	33.7	1.8	250
Religion					
Hindu	69.8	29.6	37.8	2.4	651
Muslim	(73.2)	(24.4)	(48.8)	(0.0)	29
Caste/tribe					
Scheduled caste	63.8	23.7	38.1	2.0	154
Other backward class	77.9	31.5	43.9	2.6	146
Other[1]	69.1	28.9	37.9	2.2	399
Mother's work status					
Working in family farm/business	54.5	22.3	32.2	0.0	67
Employed by someone else	69.1	26.0	43.1	0.0	47
Not worked in past 12 months	71.8	29.7	39.4	2.7	589
Standard of living index					
Low	67.9	21.7	40.9	5.3	71
Medium	71.3	29.2	40.7	1.3	425
High	67.9	30.1	34.6	3.1	200
Mother's anaemia status					
Not anaemic	62.2	28.3	32.2	1.7	376
Mildly anaemic	74.7	31.1	41.5	2.2	246
Moderately anaemic	91.8	23.1	63.4	5.2	73
Total	69.9	28.7	39.0	2.2	703

Note: Haemoglobin levels are adjusted for altitude when calculating the degree of anaemia. Total includes 25 children of birth order 6 or more, 13 Sikh children, 11 Buddhist/Neo-Buddhist children, 4 scheduled-tribe children, 9 children whose mothers are severely anaemic, and 8 children with missing information on the standard of living index, who are not shown separately.
( ) Based on 25–49 unweighted cases
[1]Not belonging to a scheduled caste, a scheduled tribe, or an other backward class

Figure 7.3
Anaemia Among Children



NFHS-2, Himachal Pradesh, 1999

anaemic (7.0–9.9 g/dl), and 2 percent who are severely anaemic (less than 7.0 g/dl).[5] Notably, a much larger proportion of children than women are anaemic, which is due primarily to the high prevalence of moderate anaemia in children. Thirty-nine percent of children age 6–35 months are moderately anaemic, compared with only 8 percent of women. The overall prevalence of anaemia among children in Himachal Pradesh (70 percent) is lower than the corresponding estimate for India as a whole (74 percent).

Several groups of children have particularly high levels of anaemia. These include children who are fourth- or fifth-order births, children whose mothers are literate but have not completed high school, Muslim children, children belonging to other backward classes, and children whose mothers are anaemic. Children whose mothers are moderately anaemic have a higher rate of anaemia (92 percent) than any other population subgroup. The strong positive relationship between the anaemia status of mothers and the prevalence of anaemia among children is to be expected. Nevertheless, even among children whose mothers are not anaemic, 62 percent are anaemic and 34 percent have moderate to severe anaemia.

7.7 Iodization of Salt

Iodine is an important micronutrient. A lack of iodine in the diet can lead to Iodine Deficiency Disorders (IDD), which, according to the World Health Organization, can cause miscarriages, brain disorders, cretinism, and retarded psychomotor development. Iodine deficiency is the single most important and preventable cause of mental retardation worldwide.

It has been estimated that 200 million people in India are exposed to the risk of iodine deficiency and 70 million suffer from goitre and other IDDs (IDD & Nutrition Cell, 1998). In addition, about one-fifth of pregnant women are at considerable risk of giving birth to children

[5]Corresponding anaemia rates for children that are not adjusted for altitude are: 62 percent for any anaemia, 26.3 percent for amild anaemia, 35.1 percent for moderate anaemia, and 0.6 percent for severe anaemia.

who will not reach their optimum physical and mental potential because of maternal iodine deficiency (Vir, 1995).

Iodine deficiency can be avoided by using salt that has been fortified with iodine. In 1983–84, the Government of India adopted a policy to achieve universal iodization of edible salt by 1992. In 1988, the Prevention of Food Adulteration Act was amended to fix the minimum iodine content of salt at 30 parts per million (ppm) at the manufacturing level and 15 ppm at the consumer level (Ministry of Health and Family Welfare, 1994). The Government of India advised all states and union territories to issue notifications banning the sale of edible salt that is not iodized. However, the ban on non-iodized salt was lifted in September 2000.

NFHS-2, with its representative sample of households throughout Himachal Pradesh, is an ideal vehicle for measuring the degree of salt iodization in the state. Iodine levels in salt can be measured in the laboratory using a standard titration test or in the field using a rapid-test kit. In NFHS-2, interviewers measured the iodine content of cooking salt in each interviewed household using a rapid-test kit. The test kit consists of ampoules of a stabilized starch solution and a weak acid-based solution. The interviewer squeezes one drop of the starch solution onto a sample of cooking salt obtained from the household. If the colour changes (from light blue through dark violet), the interviewer matches the colour of the salt as closely as possible to a colour chart on the test kit and records the iodine level as 7, 15, or 30 ppm. If the initial test is negative (no change in colour), the interviewer is required to conduct a second confirmatory test on a new salt sample, using the acid-based solution in addition to the starch solution. This test is necessary because the starch solution will not show any colour change even on iodized salt if the salt is alkaline or is mixed with alkaline free-flow agents. If the colour of the salt does not change even after the confirmatory test, the salt is not iodized. Because of uncertainties and subjective judgement in the matching process, the rapid test should not be seen as giving an exact quantitative estimate of salt iodization, but it does provide useful information on whether or not salt is iodized, as well as the extent of iodization. A recent multicentric study in eight centres in India concluded that the rapid-test kit can be used for semi-quantitative estimation of the iodine content of salt to monitor the quality of salt being used in a community (Kapil et al., 1999).

Table 7.12 shows the extent of salt iodization at the household level. Overall, 91 percent of households in Himachal Pradesh use cooking salt that is iodized at the recommended level of 15 ppm or more. Thus, Himachal Pradesh is not far from achieving the national goal of universal iodization of cooking salt. The state's level of salt iodization is much higher than the level for the country as a whole (49 percent). Only 3 percent of households in Himachal Pradesh use salt that is not iodized, and 6 percent use salt that is inadequately iodized (less than 15 ppm).

Differentials in salt iodization by household characteristics are not pronounced. Ninety-eight percent of households in small cities, 97 percent of households in towns, and 90 percent of households in rural areas use salt with 15 ppm or more of iodine. Differences by religion are relatively small, although households whose heads are Buddhist/Neo-Buddhist are more likely to use adequately iodized salt (97 percent) than other households (90 percent). Eighty-seven percent of households with heads belonging to other backward classes, 89 percent of households with heads belonging to scheduled castes, and 92 percent of households with heads that do not belong to scheduled castes, scheduled tribes, or other backward classes use adequately iodized salt. The

Table 7.12 Iodization of salt

Percent distribution of households by degree of iodization of salt, according to selected background characteristics, Himachal Pradesh, 1999

Background characteristic	Not iodized	7 ppm	15 ppm	30 ppm	Missing	Total percent	Number of households
Type of place of residence							
Small city	0.3	1.4	4.9	93.1	0.3	100.0	117
Town	1.4	1.2	7.9	89.3	0.3	100.0	250
Rural area	3.5	6.7	15.8	73.8	0.1	100.0	3,077
Religion of household head							
Hindu	3.3	6.2	14.6	75.8	0.1	100.0	3,207
Muslim	4.3	6.2	31.5	58.0	0.0	100.0	105
Sikh	3.8	3.1	16.6	73.5	3.0	100.0	43
Buddhist/Neo-Buddhist	0.0	3.3	3.8	92.9	0.0	100.0	78
Caste/tribe of household head							
Scheduled caste	4.1	6.3	15.5	73.9	0.2	100.0	771
Other backward class	3.4	9.4	15.6	71.5	0.1	100.0	597
Other[1]	2.8	5.1	14.5	77.6	0.1	100.0	2,055
Standard of living index							
Low	5.3	11.8	24.0	58.2	0.7	100.0	421
Medium	3.6	6.1	15.5	74.8	0.0	100.0	2,070
High	1.4	3.9	9.0	85.8	0.0	100.0	923
Total	3.2	6.2	14.9	75.6	0.1	100.0	3,443

Note: Total includes 5 households with a household head belonging to other religions, 20 households with a household head belonging to a scheduled tribe, and 4 and 29 households with missing information on religion and the standard of living index, respectively, which are not shown separately.
ppm: Parts per million
[1]Not belonging to a scheduled caste, a scheduled tribe, or an other backward class

widest differentials in salt iodization are observed by the standard of living index. Ninety-five percent of households with a high standard of living use adequately iodized salt, compared with 82 percent of households with a low standard of living and 90 percent of households with a medium standard of living.