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 how often they consume various types of food (daily, weekly, occasionally, or never). A great majority of women in Haryana consume vegetables, milk or curd, and pulses or beans on a daily basis (Table 7.1). Almost all women (99 percent) consume vegetables and pulses or beans at least once a week and 93 percent consume milk or curd at least once a week. Women are somewhat less likely to consume green, leafy vegetables on a daily basis (77 percent) than other vegetables (90 percent). Fruits, which are often available only seasonally, are eaten every day by only 15 percent of women, and only 55 percent of women eat fruits at least once a week. More than 8 out of 10 women in Haryana (83 percent) never eat chicken, meat, or fish. Less than 4 percent eat chicken, meat, or fish at least once a week and only 14 percent of women consume these food items occasionally. Eggs are consumed about as often as chicken, meat, or fish. Eighty percent of women never consume eggs, only 8 percent consume eggs at least once a week, and only 12 percent occasionally consume eggs.

Table 7.2 shows differentials in food consumption patterns by selected background characteristics. Consumption of pulses or beans, green, leafy vegetables, and other vegetables at least once a week is almost universal across all groups of women in Haryana. Consumption of milk or curd is also very high in all groups, but illiterate women, scheduled-caste women, and women from low standard of living households are somewhat less likely than other women to consume milk or curd at least once a week.

Table 7.1 Women's food consumption

Percent distribution of ever-married women by frequency of consumption of specific foods, Haryana, 1998–99

Type of food	Frequency of consumption				Total percent
	Daily	Weekly	Occasionally	Never	
Milk or curd	84.8	8.4	5.6	1.2	100.0
Pulses or beans	79.7	19.6	0.7	0.0	100.0
Green, leafy vegetables	77.4	21.8	0.8	0.0	100.0
Other vegetables	89.5	9.7	0.7	0.1	100.0
Fruits	14.8	40.0	44.6	0.6	100.0
Eggs	0.9	6.7	12.2	80.2	100.0
Chicken, meat, or fish	0.0	3.7	13.8	82.5	100.0

Differentials in the consumption of fruits, eggs, and chicken, meat, or fish are more marked. Urban women are much more likely to eat fruits at least once a week (76 percent) than rural women (46 percent). Consumption of fruits is strongly positively related to women's level of education and their standard of living. Muslim women are less likely to eat fruits at least once a week (47 percent) than Hindu (55 percent) or Sikh (58 percent) women. By caste/tribe, the proportion who eat fruits at least once a week ranges from 40 percent for scheduled-caste women to 49 percent for women belonging to other backward classes and 63 percent for women not belonging to scheduled castes or other backward classes. The proportion of women who eat eggs and chicken, meat, or fish at least once a week is generally small in all groups of women, except Muslims who are much more likely to eat these food items than Hindus or Sikhs. Younger women, urban women, scheduled-caste women, and women from low standard of living households are also more likely than other women to eat eggs and chicken, meat, or fish at least once a week.

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 Haryana of 154 cm (three cm taller than the mean height for women in India as a whole). The mean height varies only slightly (between 153 and 156 cm) for women in different population groups, as shown in Table 7.3. Teenage women, urban women, scheduled-caste women, and women from low standard of living households are slightly shorter than other women. Women working in a family farm or business are slightly taller than women employed by someone else and women who did not work in the 12 months preceding the survey. The mean height of women does not vary much by marital status, religion, or level of

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, Haryana, 1998–99

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	93.4	99.3	99.1	99.3	51.9	9.1	4.3	697
25–34	93.9	99.2	99.0	99.4	55.4	7.8	3.9	1,165
35–49	92.4	99.4	99.4	98.9	56.1	6.6	3.2	1,046
Residence								
Urban	92.9	99.6	99.5	99.0	76.4	13.2	5.6	837
Rural	93.4	99.2	99.1	99.3	46.1	5.4	3.0	2,071
Education								
Illiterate	90.8	99.1	98.9	99.1	44.2	7.0	4.5	1,605
Literate, < middle school complete	92.7	99.2	99.0	98.8	53.4	5.6	2.2	486
Middle school complete	98.7	99.6	100.0	99.6	63.7	6.0	2.2	234
High school complete and above	98.3	99.8	99.8	99.6	81.6	12.0	3.5	583
Religion								
Hindu	93.1	99.3	99.1	99.2	54.9	5.8	2.7	2,590
Muslim	94.0	100.0	100.0	100.0	47.1	40.1	29.0	118
Sikh	94.7	100.0	99.5	98.4	57.6	11.3	2.1	190
Caste/tribe								
Scheduled caste	85.9	98.8	98.8	98.6	39.5	10.1	5.7	597
Other backward class	91.7	99.4	98.9	99.0	48.6	5.8	2.1	629
Other[1]	96.4	99.5	99.4	99.5	62.6	7.5	3.7	1,679
Standard of living index								
Low	80.4	98.6	99.6	99.3	25.3	10.1	5.8	280
Medium	91.0	99.0	98.8	99.1	44.6	7.1	3.9	1,331
High	98.4	99.8	99.5	99.4	71.9	7.7	3.1	1,279
Total	93.2	99.3	99.2	99.2	54.8	7.7	3.8	2,908

Note: Total includes 7 women belonging to other religions, 2 scheduled-tribe women, and 2 and 18 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

education. Five percent of women are under 145 cm in height. The highest percentage of women in any group that are less than 145 cm tall is 8 percent for women who are not currently married.

Table 7.3 also shows two measures of an index that relates a woman's weight to her height. These indices 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 Haryana is 21.3. The mean BMI varies within a narrow range of 19–24 for all the groups shown in the table. Urban women, women with at least a high school education, and women from high standard of living households have noticeably higher mean BMIs than other women. Chronic energy deficiency is usually indicated by a BMI of less than 18.5. More than one in four women in Haryana (26 percent) have a BMI below 18.5, indicating a high prevalence of nutritional deficiency. Nutritional problems, as indicated by the percentage with a BMI below 18.5, are more serious for women in their twenties, compared with their younger and older counterparts. The proportion of women with a BMI below 18.5 is

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, Haryana, 1998–99

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	153.3	6.9	171	19.8	27.0	150
20–24	153.9	5.9	497	19.7	35.4	431
25–29	154.2	5.8	589	20.4	30.1	523
30–34	154.7	3.0	540	21.5	25.1	523
35–49	154.5	3.9	1,013	22.4	19.8	1,003
Marital status						
Currently married	154.3	4.5	2,707	21.3	25.8	2,526
Not currently married	154.4	7.5	103	21.0	26.7	103
Residence						
Urban	153.3	5.7	809	23.4	13.7	761
Rural	154.7	4.2	2,001	20.4	30.8	1,869
Education						
Illiterate	154.4	5.1	1,548	20.4	30.4	1,450
Literate, < middle school complete	154.0	5.2	467	21.0	29.2	435
Middle school complete	154.7	4.8	233	21.8	19.5	215
High school complete and above	154.2	2.7	562	23.5	13.4	530
Religion						
Hindu	154.3	4.9	2,503	21.2	25.7	2,348
Muslim	154.2	1.8	112	20.1	36.5	99
Sikh	154.6	3.2	187	22.3	22.3	175
Caste/tribe						
Scheduled caste	153.2	7.3	575	19.8	35.4	526
Other backward class	154.5	4.0	609	20.8	28.3	570
Other[2]	154.6	3.9	1,624	21.9	21.6	1,532
Work status						
Working in family farm/business	155.5	2.1	94	19.9	30.9	91
Employed by someone else	154.4	4.3	238	22.2	20.8	226
Not worked in past 12 months	154.2	4.8	2,456	21.2	26.2	2,292
Standard of living index						
Low	153.6	5.8	274	19.4	45.4	244
Medium	154.0	5.6	1,282	20.3	30.2	1,191
High	154.7	3.4	1,237	22.6	17.5	1,179
Total	154.3	4.6	2,810	21.3	25.9	2,630

Note: Total includes a small number 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.
[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 meters (kg/m^2).
[2]Not belonging to a scheduled caste, a scheduled tribe, or an other backward class

much higher in rural areas (31 percent) than in urban areas (14 percent). Nutritional status of women is strongly negatively related to their educational level and the standard of living. Illiterate women and women with less than a middle school education are much more likely to have a low BMI than women with middle school or more education. By standard of living, the proportion with a low BMI ranges from 45 percent among women from low standard of living households to 18 percent among

women from high standard of living households. Muslim women, scheduled-caste women, and women working in a family farm or business are also much more likely to suffer from nutritional problems than other women.

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

[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.

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 (PSU), 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. The table and figure distinguish three levels of severity of anaemia: mild anaemia (10.0–10.9 grams/decilitre 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 Haryana, haemoglobin levels were tested for 94 percent of women (see Table B.3 in Appendix B), compared with 88 percent of women in India as a whole. Overall, 47 percent of women have some degree of anaemia[3]. Thirty-one percent of women are mildly anaemic, 15 percent are moderately anaemic, and 2 percent are severely anaemic. There are some differences in the prevalence of anaemia by background characteristics, but anaemia is substantial for women in every population group. Prevalence is slightly higher for women under age 30 than for older women (age 30–49). The prevalence of anaemia is higher for currently married women (47 percent) than for women who are not currently married (40 percent). It is also slightly higher for rural women (48 percent) than for urban women (46 percent). Differences by education, religion, caste/tribe, work status, and standard of living are more pronounced. Illiterate women and women with less than middle school complete education have a higher prevalence of anaemia than more educated women. The prevalence of anaemia is considerably higher among Muslim women (56 percent) than among Hindu or Sikh women (47 percent each). By caste/tribe, scheduled-caste women are more likely to be anaemic (53 percent) than women not from scheduled castes or other backward classes (47 percent) and women from other backward classes (42 percent). By work status, the prevalence is lower for women employed by someone else than for women working in a family farm or business or for women who did not work in the 12 months preceding the survey. By living standard, the prevalence of anaemia ranges from 54 percent for women from low standard of living households to 44 percent for women from high standard of living households.

The prevalence of anaemia is considerably higher for pregnant and breastfeeding women (56 percent each) than for women who are not pregnant and not breastfeeding (43 percent). Since anaemia is often considered to be particularly problematic for pregnant women, it is noteworthy that these women have substantially higher than average levels of anaemia. The provision of iron and folic acid supplements to pregnant women has undoubtedly reduced the overall prevalence of anaemia in pregnant women to some extent (67 percent of pregnant women received IFA tablets or syrup during pregnancy for births in the three years preceding the survey—see

[3]The rates that are not adjusted for altitude and smoking, are almost the same as the corresponding adjusted rates (with at most a 0.1 decimal point difference in any rate). This is to be expected since, in Haryana, the proportion of women who smoke is very small (see Table 2.12), and all of the sample PSUs are at an altitude below 1,000 metres.

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, Haryana, 1998–99

Background characteristic	Percentage of women with any anaemia	Percentage of women with:			Number of women
		Mild anaemia	Moderate anaemia	Severe anaemia	
Age					
15–19	49.8	26.9	21.8	1.1	168
20–24	53.5	29.0	22.6	1.8	487
25–29	49.1	31.9	14.9	2.3	575
30–34	42.3	29.9	11.6	0.7	521
35–49	44.6	32.4	10.6	1.6	984
Marital status					
Currently married	47.2	30.9	14.7	1.6	2,639
Not currently married	40.0	29.7	10.3	0.0	96
Residence					
Urban	45.8	34.1	10.4	1.3	787
Rural	47.5	29.6	16.2	1.7	1,948
Education					
Illiterate	49.7	32.6	15.3	1.8	1,503
Literate, < middle school complete	47.1	28.3	16.9	1.9	457
Middle school complete	39.3	25.9	12.2	1.3	230
High school complete and above	42.6	30.6	11.3	0.7	545
Religion					
Hindu	46.6	30.8	14.4	1.4	2,433
Muslim	56.4	36.9	18.6	0.9	111
Sikh	46.7	29.0	12.9	4.8	183
Caste/tribe					
Scheduled caste	52.5	33.1	17.1	2.3	558
Other backward class	41.9	27.0	13.1	1.8	597
Other[1]	47.0	31.6	14.1	1.2	1,578
Work status					
Working in family farm/business	48.3	32.9	13.3	2.1	89
Employed by someone else	37.3	28.9	8.0	0.4	234
Not worked in past 12 months	48.0	31.0	15.3	1.7	2,391
Standard of living Index					
Low	53.5	37.0	14.3	2.2	267
Medium	48.5	30.0	16.7	1.7	1,250
High	43.9	30.3	12.3	1.3	1,203
Pregnancy/breastfeeding status					
Pregnant	55.5	20.6	33.1	1.8	174
Breastfeeding (not pregnant)	56.1	33.3	20.3	2.5	649
Not pregnant/not breastfeeding	43.1	31.0	10.8	1.3	1,912
Height					
< 145 cm	57.1	37.8	16.9	2.4	127
≥ 145 cm	46.5	30.6	14.4	1.5	2,607

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, Haryana, 1998–99

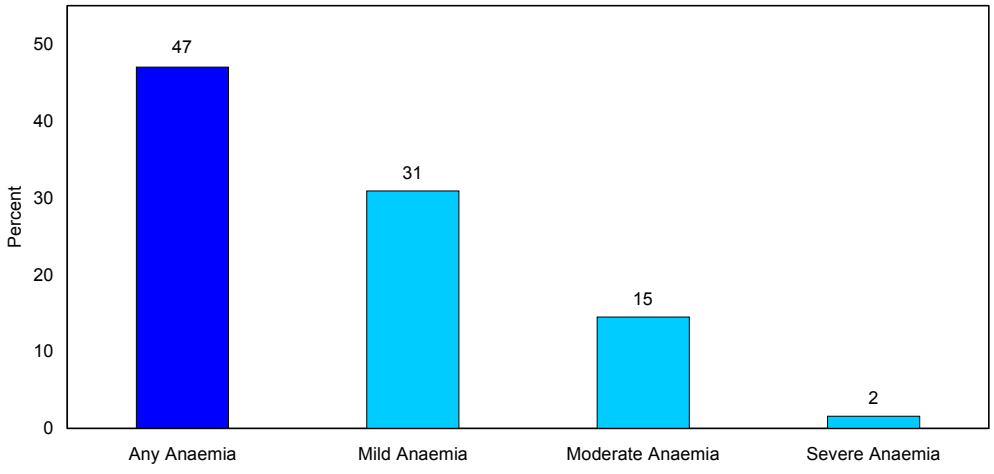
Background characteristic	Percentage of women with any anaemia	Percentage of women with:			Number of women
		Mild anaemia	Moderate anaemia	Severe anaemia	
Body mass index					
< 18.5 kg/m^2	52.4	32.9	17.5	2.1	702
≥ 18.5 kg/m^2	45.1	30.2	13.5	1.4	2,031
Fruit and vegetable consumption[2]					
Fruit and vegetables	43.2	29.9	12.0	1.4	1,497
Vegetables only	51.4	32.3	17.3	1.8	1,216
Total	47.0	30.9	14.5	1.6	2,735

Note: The haemoglobin levels are adjusted for smoking when calculating the degree of anaemia. No adjustment for altitude of the enumeration areas was made because all of the primary sampling units in Haryana are at an altitude below 1,000 metres. Total includes 7 women belonging to other religions, 2 scheduled-tribe women, 21 women who are self-employed, 3 women who consume fruit only, 19 women who consume neither fruits nor vegetables, and 2, 14, 1, and 2 women with missing information on religion, the standard of living index, height, and the body mass index, respectively, who are not shown separately.

[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.

Figure 7.1
Anaemia Among Women



NFHS-2, Haryana, 1998–99

Table 8.6). However, by far the highest levels of moderate or severe anaemia are experienced by pregnant women (35 percent), indicating that anaemia remains a serious problem among pregnant women.

Shorter women and women with a low body mass index have a higher prevalence of anaemia than other women. 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 Haryana, women who eat both fruits and green, leafy vegetables at least once a week have lower levels of anaemia (43 percent) than women who eat green, leafy vegetables regularly, but not fruits (51 percent).

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. 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 1995, 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 contains colostrum, which provides natural immunity to the child.

Table 7.5 shows the percentage of children born during the three years preceding the survey who started breastfeeding within one hour and one day of birth. It also gives the percentage of children whose mothers squeezed the first milk from the breast before breastfeeding, which is not recommended. Although breastfeeding is nearly universal in Haryana, very few children are put to the breast immediately after birth. Only 12 percent of children begin breastfeeding within one hour of birth, and only 31 percent begin breastfeeding within one day of birth. Three out of every four women (77 percent) who gave birth to children during the three years preceding the survey 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. No more than 21 percent of children in any group shown in the table were put to the breast within one hour of birth and, with the notable exception of births that took place in a public health facility, no more than 39 percent started breastfeeding within one day of birth. For births that occurred in public health facilities, a substantially higher proportion of children than average started breastfeeding within one day of birth. Urban women, literate women, Sikh women, women from other backward classes, and women from higher standard of living households are more likely than other women to start breastfeeding their children early. Initiation of breastfeeding does not depend much on type of assistance at the time of delivery.

The custom of squeezing the first milk from the breast before breastfeeding a child is widely practised in every group, but it is particularly common for children born to Muslim and Sikh mothers (86–89 percent) and for children born to mothers who gave birth at their parents' homes (91 percent). It should be stressed, however, that contrary to recommendations regarding infant feeding, mothers in Haryana squeeze the first milk from the breast before breastfeeding for at least 66 percent of children in every group.

Mothers of children born in the three years preceding 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 during that period 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

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, Haryana, 1998–99

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	13.4	39.0	77.8	246
Rural	11.2	28.7	76.1	814
Mother's education				
Illiterate	12.2	28.3	79.1	540
Literate, < middle school complete	11.6	31.5	72.4	206
Middle school complete	14.8	37.0	72.9	95
High school complete and above	9.2	34.9	75.4	219
Religion				
Hindu	10.8	30.4	74.8	913
Muslim	15.2	30.6	88.9	73
Sikh	20.5	38.0	85.7	69
Caste/tribe				
Scheduled caste	9.0	24.3	78.5	268
Other backward class	14.8	35.2	75.5	257
Other[2]	11.6	32.6	75.9	535
Mother's work status				
Working in family farm/business	(16.4)	(32.9)	(73.0)	30
Employed by someone else	14.5	30.8	66.0	56
Not worked in past 12 months	11.5	31.1	77.1	968
Standard of living index				
Low	6.5	25.4	71.9	138
Medium	11.1	30.2	78.0	531
High	14.6	34.2	76.1	385
Assistance during delivery				
Health professional[3]	10.5	32.2	73.9	446
Dai (TBA)	12.7	30.2	78.2	613
Place of delivery				
Public health facility	17.6	55.7	77.7	63
Private health facility	8.8	31.5	65.8	173
Own home	12.1	29.2	77.8	777
Parents' home	(9.0)	(29.1)	(91.2)	45
Total	11.7	31.1	76.5	1,060

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 4 children of mothers belonging to other religions, 1 scheduled-tribe child, 6 children whose mothers are self-employed, 2 children whose mothers were assisted by persons other than a health professional or a TBA during delivery, 1 child delivered in a nongovernmental organization or trust hospital/clinic, 1 child delivered at another place of delivery, and 1 and 6 children with missing information on religion and the standard of living index, respectively, 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

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.

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, Haryana, 1998–99

Age in months	Breastfeeding status				Total percent	Number of living children
	Not breastfeeding	Exclusively breastfeeding	Breastfeeding and: Receiving Plain water only	Breastfeeding and: Receiving supplements		
< 2	(2.0)	(59.5)	(21.3)	(17.1)	100.0	47
2–3	0.0	38.6	31.5	29.9	100.0	67
4–5	0.0	15.1	31.6	53.3	100.0	79
6–7	4.0	9.9	17.4	68.7	100.0	51
8–9	(2.0)	(2.2)	(13.0)	(82.8)	100.0	47
10–11	(2.5)	(2.3)	(4.7)	(90.5)	100.0	42
12–13	9.5	0.0	5.4	85.0	100.0	54
14–15	13.2	0.0	1.4	85.4	100.0	76
16–17	21.6	0.0	1.4	77.0	100.0	69
18–19	32.2	0.0	0.0	67.8	100.0	50
20–21	(15.5)	(0.0)	(2.5)	(81.9)	100.0	39
22–23	(28.4)	(0.0)	(0.0)	(71.6)	100.0	46
24–25	(41.8)	(0.0)	(0.0)	(58.2)	100.0	36
26–27	64.6	0.0	0.0	35.4	100.0	62
28–29	61.4	0.0	0.0	38.6	100.0	85
30–31	66.2	0.0	0.0	33.8	100.0	65
32–33	(52.7)	(0.0)	(0.0)	(47.3)	100.0	36
34–35	(55.5)	(0.0)	(0.0)	(44.5)	100.0	43
< 4 months	0.8	47.2	27.3	24.6	100.0	114
4–6 months	0.9	14.6	28.1	56.5	100.0	110
7–9 months	3.0	3.1	13.5	80.5	100.0	67

Note: Table includes only surviving children from among the two most recent births in 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

In Haryana, nearly one-half of children (47 percent) under four months of age are exclusively breastfed (somewhat less than the national level of 55 percent), 27 percent receive breast milk plus water, and 25 percent receive supplements along with breast milk (Table 7.6). The percentage of infants exclusively breastfed drops off after three months to 15 percent at age 4–6 months and 3 percent at age 7–9 months. Exclusive breastfeeding does not continue beyond the first year of life. The proportion of children receiving supplements along with breast milk increases from 17 percent for children under two months of age to 91 percent for children age 10–11 months, and declines thereafter as children are weaned from the breast and their food consumption is no longer supplementing their consumption of breast milk. However, breastfeeding generally continues for a long period. Ninety-one percent of children are still being breastfed at 12–13 months of age, as are 72 percent of children age 22–23 months. For the majority of children in Haryana, breastfeeding usually stops at about 26–27 months of age, but 45 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 the day or night before the interview. Because of the small number of non-breastfeeding children, the two-month age categories have been combined into broader age groups for the younger children. Powdered milk is rarely given to young children at any age, but other milk (such as cow's milk or buffalo's milk) is given to young children more often. At least 9 out of 10

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, Haryana, 1998–99

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	(0.0)	(17.5)	(2.1)	(0.0)	(0.0)	(0.0)	(0.0)	46
2–3	0.0	28.5	2.9	0.0	0.0	0.0	16.4	67
4–5	1.2	48.1	7.7	2.6	5.1	8.9	12.9	79
6–7	(0.0)	(55.2)	(30.8)	(6.2)	(6.1)	(28.7)	(14.4)	49
8–9	(0.0)	(67.0)	(36.8)	(24.1)	(21.9)	(58.3)	(28.0)	46
10–11	(0.0)	(78.0)	(41.9)	(19.6)	(29.4)	(83.0)	(19.5)	41
12–13	(2.0)	(73.7)	(55.2)	(34.6)	(26.8)	(75.4)	(16.7)	49
14–15	3.0	86.5	61.9	54.6	27.1	87.9	18.2	66
16–17	0.0	83.4	51.6	44.4	29.6	85.2	20.5	54
18–23	2.0	86.9	56.8	47.9	23.1	91.1	19.2	100
24–29	1.4	93.4	60.2	62.1	34.2	96.0	9.1	76
30–35	1.7	84.4	79.1	65.5	32.6	96.5	13.7	58
< 4 months	0.0	24.0	2.6	0.0	0.0	0.0	9.7	113
4–5 months	1.2	48.1	7.7	2.6	5.1	8.9	12.9	79
6–9 months	0.0	60.9	33.7	14.9	13.8	43.1	21.0	95
NON-BREASTFEEDING CHILDREN								
< 17	(0.0)	(100.0)	(74.2)	(54.3)	(51.9)	(91.3)	(72.0)	35
18–23	(0.0)	(91.5)	(76.9)	(62.8)	(40.3)	(97.3)	(37.2)	35
24–29	0.9	93.4	79.4	63.4	34.7	94.3	23.4	107
30–35	0.0	89.6	71.0	64.2	34.9	96.6	15.1	86
ALL CHILDREN								
< 2	(0.0)	(19.2)	(4.1)	(0.0)	(0.0)	(0.0)	(0.0)	47
2–3	0.0	28.5	2.9	0.0	0.0	0.0	16.4	67
4–5	1.2	48.1	7.7	2.6	5.1	8.9	12.9	79
6–7	0.0	57.0	33.6	6.0	5.8	29.5	17.8	51
8–9	(0.0)	(67.7)	(38.1)	(23.6)	(21.5)	(59.2)	(29.5)	47
10–11	(0.0)	(78.6)	(43.4)	(19.1)	(31.2)	(83.4)	(21.5)	42
12–13	1.8	76.2	55.6	38.9	31.9	75.8	22.8	54
14–15	2.6	88.2	63.1	55.2	31.4	89.5	25.0	76
16–17	0.0	87.0	56.2	47.8	33.4	88.4	30.6	69
18–23	1.5	88.1	62.0	51.8	27.6	92.7	23.9	135
24–29	1.1	93.4	71.5	62.8	34.5	95.0	17.5	183
30–35	0.7	87.5	74.2	64.7	33.9	96.6	14.6	144
< 4 months	0.0	24.6	3.4	0.0	0.0	0.0	9.6	114
4–5 months	1.2	48.1	7.7	2.6	5.1	8.9	12.9	79
6–9 months	0.0	62.1	35.8	14.4	13.3	43.8	23.4	98

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
[1]Includes green, leafy vegetables and fruits

non-breastfeeding children age less than 35 months old were given these other types of milk the day or night before the interview. About 67–93 percent of breastfeeding children age 8–35 months received non-powdered milk in addition to breast milk. For all children under three years, other liquids, such as juice or tea, are given much less often than milk. The consumption of green, leafy vegetables generally increases with age, from 3 percent at age 4–5 months to 65 percent at age 30–35 months for all children. The consumption of fruits for all children increases from 6 percent or less below 8 months to 28–35 percent for children age 10 months or more.

From about six months of age, the introduction of complementary food is critical for meeting the protein, energy, and micronutrient needs of children. However, in Haryana the introduction of complementary food is delayed for a substantial proportion of children. Less than one-third (29 percent) of breastfeeding children age 6–7 months consume solid or mushy foods. This proportion rises to more than 75 percent at age 10–35 months. Only 43 percent of breastfeeding children age 6–9 months receive solid or mushy foods, as recommended, compared with 35 percent for India as a whole.

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. For children who are being breastfed, the use of bottles with nipples is not common in Haryana. In most age groups, less than one-fifth of breastfeeding children drank anything from a bottle with a nipple during the day or night before the interview (Table 7.7). The use of a bottle with a nipple is more common for children who are not being breastfed.

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 Haryana is slightly more than two years (24.3 months). Supplementation begins relatively early, however. The median length of exclusive breastfeeding is 1.2 months, and the median length of exclusive breastfeeding or breastfeeding with water only is 3.9 months.

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, Haryana, 1998–99

Background characteristic	Median duration (months)[1]			Number of children
	Any breastfeeding	Exclusive breastfeeding	Exclusively breastfeeding or breastfeeding plus water only	
Sex of child				
Male	25.8	1.0	3.5	584
Female	23.5	1.4	4.8	476
Residence				
Urban	(24.0)	(1.1)	(3.1)	246
Rural	24.4	1.2	4.1	814
Median duration	24.3	1.2	3.9	1,060
Mean duration (months)[1]	25.1	2.9	5.3	1,060
Prevalence/incidence mean	24.5	2.4	5.1	1,060

Note: Table includes only the two most recent births in the three years preceding the survey.
[1]Based on current status

The mean durations of any breastfeeding, exclusive breastfeeding, and exclusive breastfeeding or breastfeeding with water only are 25.1 months, 2.9 months, and 5.3 months, respectively. The mean durations are slightly higher than the median durations for all three measures because the mean is affected by extreme values of the duration of breastfeeding for some children, whereas the median is not.

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 each measure of breastfeeding, the prevalence-incidence mean is about the same as the mean calculated in the conventional manner.

The median duration of breastfeeding is two months shorter for girls than for boys. This pattern is often observed in societies where son preference is strong, because the 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). The median length of breastfeeding is also slightly shorter in urban areas than in rural areas. In both urban and rural areas, children are exclusively breastfed for a very short median period of about one month.

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 types 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 Haryana, NFHS-2 failed to measure 4 percent of children under age three (see Table B.3 in Appendix B), a much lower nonresponse rate than the national 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. More than one-third (35 percent) of children under three years of age are underweight and one-half (50 percent) are stunted. Corresponding estimates at the national level are 47 and 46 percent, respectively. The proportion of children who are severely undernourished is also very high—10 percent according to weight-for-age and 24 percent according to height-for-age. In addition, wasting is also evident in Haryana, affecting 5 percent of children under three years of age, although this percentage is much lower than the national estimate of 16 percent. The proportion of children under three years of age who are underweight remained at 35 percent between NFHS-1 and NFHS-2, but the proportion severely underweight increased from 8 percent to 10 percent. The prevalence of wasting also remained at about the same level between the two surveys. The prevalence of stunting increased from 43 percent in NFHS-1 to 50 percent in NFHS-2, and the prevalence of severe stunting increased from 16 percent in NFHS-1 to 24 percent in NFHS-2.

The proportion of children who are undernourished increases steadily with the child's age through age 12–23 months, where it peaks at 46 percent for underweight, 64 percent for stunting, and 9 percent for wasting. Even during the first six months of life, when most babies are breastfed, 3–16 percent of children are undernourished, according to the three nutritional indices. It is notable that at age 24–35 months, when most children have been weaned from breast milk, 30 percent are severely stunted and 11 percent are severely underweight.

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, Haryana, 1998–99

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	1.3	7.2	6.0	16.4	0.0	3.2	152
6–11 months	7.7	21.4	12.3	32.2	0.8	3.8	129
12–23 months	14.5	46.1	33.5	64.2	1.7	9.1	297
24–35 months	11.3	42.8	29.6	60.8	0.3	3.3	298
Sex of child							
Male	11.0	31.8	24.4	47.5	1.0	5.9	486
Female	9.0	38.1	24.2	53.1	0.5	4.6	391
Birth order							
1	9.3	27.7	19.8	44.4	0.4	4.6	256
2–3	7.1	33.7	20.8	46.4	1.3	5.6	405
4–5	17.6	44.0	37.4	62.0	0.0	4.6	156
6+	14.5	45.8	32.5	67.2	1.5	8.3	61
Previous birth interval[2]							
First birth	9.2	27.6	19.8	44.2	0.4	4.6	257
< 24 months	14.4	45.1	25.9	62.8	1.2	6.4	168
24–47 months	9.0	35.5	27.7	50.4	0.9	4.4	342
48+ months	9.0	31.9	21.8	42.7	0.9	8.2	110
Total	10.1	34.6	24.3	50.0	0.8	5.3	877

Note: Each index is expressed in standard deviation units (SD) from the median of the International Reference Population.
[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.

Overall, girls are more likely than boys to be underweight and stunted, whereas boys are slightly more likely to be wasted. Undernutrition generally increases with increasing birth order. Young children in families with six or more children are nutritionally the most disadvantaged. First births have lower than average levels of undernutrition on all three measures. Children born after a short birth interval (<24 months) are more likely than other children to be underweight and stunted.

Table 7.10 shows the nutritional status of children by selected background characteristics. Children in rural areas are more likely to be stunted and underweight than children in urban areas. Even in urban areas, however, two-fifths of children (40 percent) are stunted and about one-third (31 percent) are underweight. Children whose mothers are illiterate are twice as likely to be stunted as children whose mothers have at least completed high school (see Figure 7.2). The proportion underweight also declines sharply with an increasing level of mother's education. Sikh children are much less likely to be underweight or stunted than Hindu children or Muslim children, but Sikh children are more likely to be severely wasted than other children. Children belonging to scheduled castes or other backward classes have considerably higher levels of undernutrition according to weight-for-age and height-for-age than other children. The proportion underweight and the proportion stunted do not vary much by mother's work status, but the proportion wasted is much higher for children of mothers working in a family farm or business than for children of mothers employed by someone else or children of mothers who did not work in the 12 months preceding the survey.

Table 7.10 Nutritional status of children by background characteristics

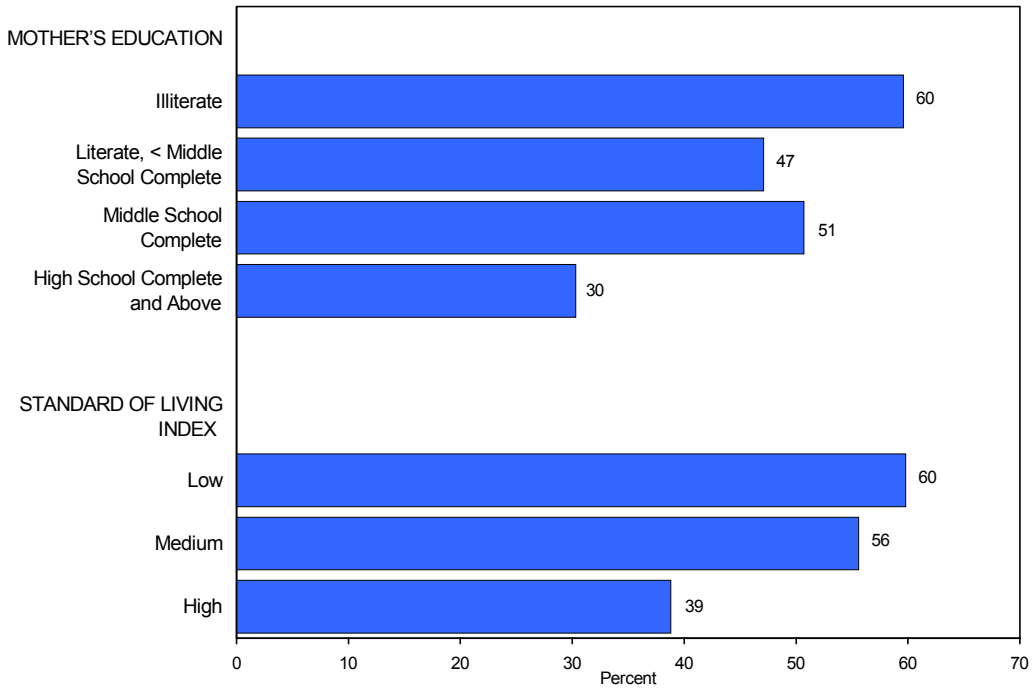
Percentage of children under age 3 years classified as undernourished on three anthropometric indices of nutritional status, according to selected background characteristics, Haryana, 1998–99

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	7.6	31.3	18.1	40.3	1.0	5.5	209
Rural	10.9	35.6	26.2	53.0	0.7	5.3	668
Mother's education							
Illiterate	15.4	43.4	33.6	59.6	0.9	5.3	426
Literate, < middle school complete	7.3	29.5	17.7	47.1	0.0	4.0	180
Middle school complete	8.0	33.5	18.3	50.7	1.2	6.9	86
High school complete and above	1.6	19.6	11.9	30.3	1.2	6.0	184
Religion							
Hindu	10.3	34.5	23.5	49.6	0.6	5.6	756
Muslim	11.7	43.8	40.6	67.4	0.0	1.6	59
Sikh	7.0	26.9	19.6	41.1	1.7	3.4	56
Caste/tribe							
Scheduled caste	12.8	40.3	29.6	56.3	0.5	3.9	211
Other backward class	11.5	42.8	28.3	55.3	0.4	5.8	217
Other[2]	8.2	28.0	19.9	44.6	1.1	5.7	448
Mother's work status							
Working in family farm/business	(15.8)	(40.6)	(15.8)	(51.5)	(7.7)	(15.6)	25
Employed by someone else	(11.8)	(33.3)	(23.9)	(55.6)	(0.0)	(2.6)	41
Not worked in past 12 months	9.9	34.5	24.7	49.8	0.6	5.0	808
Mother's height							
< 145 cm	15.2	53.2	43.8	64.5	1.8	7.5	53
≥ 145 cm	9.8	33.4	23.0	49.1	0.7	5.2	823
Mother's body mass index							
< 18.5 kg/m^2	13.1	45.6	26.5	52.0	1.0	5.9	282
≥ 18.5 kg/m^2	8.7	29.4	23.2	49.0	0.7	5.0	595
Standard of living index							
Low	14.6	42.8	32.9	59.8	0.0	4.6	110
Medium	13.2	40.8	27.7	55.6	1.1	5.7	436
High	4.0	23.5	16.3	38.8	0.6	4.9	325
Total	10.1	34.6	24.3	50.0	0.8	5.3	877

Note: Each index is expressed in standard deviation units (SD) from the median of the International Reference Population. Total includes 4 children whose mothers belong to other religions, 1 scheduled-tribe child, 3 children whose mothers are self employed, and 1 and 6 children with missing information on religion 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

The nutritional status of children is strongly related to maternal nutritional status. Undernutrition is more common for children of mothers whose height is less than 145 cm or whose body mass index is below 18.5 than for other children. The proportion underweight and the proportion stunted are strongly negatively associated with the standard of living of the household. Children from households with a low standard of living are more than one and half times as likely to be stunted or underweight as children from households with a high standard of living. The

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



NFHS-2, Haryana, 1998–99

association between the household standard of living and the proportion severely underweight or the proportion severely stunted is even stronger.

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. Overall, more than four-fifths (84 percent) of these children have some level of anaemia, including 18 percent who are mildly anaemic (10.0–10.9 g/dl), 59 percent who are moderately anaemic (7.0–9.9 g/dl), and 7 percent who are severely anaemic (less than 7.0 g/dl). Notably, a much larger proportion of children than women are anaemic, and the difference is particularly pronounced for moderate to severe anaemia.

Several groups of children have particularly high levels of moderate to severe anaemia. These include children age 12–35 months (an age at which children are often being weaned), boys, rural children, scheduled-caste children, and children from poor families. The prevalence of moderate to severe anaemia is lower among children whose mothers have at least completed high school education than among children whose mothers are illiterate or have less than a high school education. As expected, there is a strong positive relationship between the prevalence of

Table 7.11 Anaemia among children

Percentage of children age 6–35 months classified as having iron-deficiency anaemia by selected background characteristics, Haryana, 1998–99

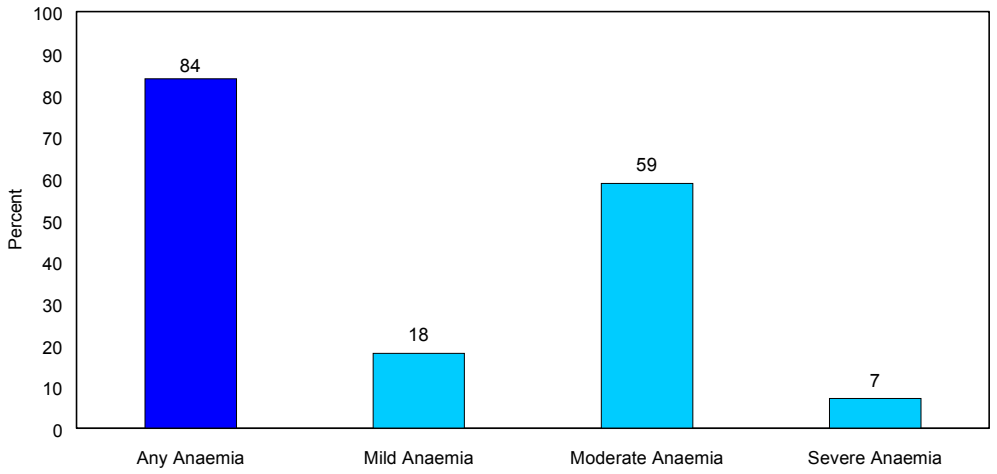
Background characteristic	Percentage of children with any anaemia	Percentage of children with:			Number of children
		Mild anaemia	Moderate anaemia	Severe anaemia	
Age of child					
6–11 months	73.9	26.4	43.8	3.7	130
12–23 months	86.8	13.9	65.2	7.7	309
24–35 months	85.3	18.6	58.7	8.0	298
Sex of child					
Male	86.3	18.1	59.9	8.3	407
Female	81.0	17.9	57.4	5.7	330
Birth order					
1	84.1	21.4	58.5	4.2	211
2–3	83.1	17.8	57.7	7.6	338
4–5	85.1	14.1	61.1	9.9	133
6+	85.4	15.9	60.4	9.1	54
Residence					
Urban	86.6	23.4	56.4	6.8	182
Rural	83.0	16.2	59.6	7.2	555
Mother's education					
Illiterate	84.3	14.3	61.5	8.5	371
Literate, < middle school complete	83.4	18.2	57.9	7.3	148
Middle school complete	82.7	15.0	59.9	7.8	65
High school complete and above	84.0	28.2	52.5	3.2	153
Religion					
Hindu	84.1	18.6	57.7	7.8	632
Muslim	82.4	15.5	66.9	0.0	52
Sikh	(81.4)	(12.4)	(62.3)	(6.7)	47
Caste/tribe					
Scheduled caste	87.3	12.1	63.0	12.2	186
Other backward class	81.0	16.7	58.0	6.3	178
Other[1]	83.6	21.6	56.9	5.0	371
Mother's work status					
Employed by someone else	(86.6)	(27.4)	(51.5)	(7.8)	37
Not worked in past 12 months	83.8	17.2	59.4	7.2	677
Standard of living index					
Low	84.7	12.6	66.8	5.3	94
Medium	85.4	16.2	60.3	8.9	365
High	81.6	22.2	54.3	5.1	274
Mother's anaemia status					
Not anaemic	81.7	22.1	56.4	3.3	342
Mildly anaemic	82.2	14.4	58.9	9.0	221
Moderately anaemic	91.2	15.5	63.7	11.9	157
Total	83.9	18.0	58.8	7.1	737

Note: The haemoglobin levels are not adjusted for altitude when calculating the degree of anaemia among children because all of the primary sampling units in Haryana are at an altitude below 1,000 metres. Total includes 4 children whose mothers belong to other religions, 1 scheduled-tribe child, 3 children whose mothers are self employed, 17 children whose mothers are severely anaemic, and 1 and 3 children with missing information on religion and the standard of living 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

Figure 7.3
Anaemia Among Children



NFHS-2, Haryana, 1998–99

anaemia among children and the prevalence of moderate to severe anaemia among mothers. Despite these differentials, anaemia is very widespread in Haryana. More than 74 percent of children in every group shown in the table are anaemic, and more than 48 percent in every group are moderately to severely anaemic.

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 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 Haryana, 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 of a weak acid-based solution. The interviewer squeezes one drop of the starch solution on a sample of cooking salt obtained from the household respondent. 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, 7 out of 10 households in Haryana (71 percent) use cooking salt that is iodized at the recommended level of 15 ppm or more (much higher than the national average of 49 percent). However, this level is low in light of the government regulations on salt iodization that were in effect at the time of the survey. One out of five households (20 percent) use salt that is not iodized at all and 9 percent use salt that is inadequately iodized (less than 15 ppm). Differentials in salt iodization by background characteristics are pronounced. More than 9 out of 10 households in small cities and towns use salt with 15 ppm or more of iodine, compared with 62 percent of households in rural areas. Households with Muslim heads are less likely to use iodized salt than households with either Hindu or Sikh heads. The use of adequately iodized salt (15 ppm or more) is relatively low in households headed by persons from scheduled castes or other backward classes, compared with households headed by persons from other castes. The widest differentials are observed for the standard of living index. Eighty-four percent of households with a high standard of living use adequately iodized salt, compared with only 53 percent of households with a low standard of living.

Table 7.12 Iodization of salt

Percent distribution of households by degree of iodization of salt, according to selected background characteristics, Haryana, 1998–99

Background characteristic	Not iodized	7 ppm	15 ppm	30 ppm	Missing	Total percent	Number of households
Type of place of residence							
Small city	8.6	2.9	6.5	81.9	0.2	100.0	596
Town	4.7	2.0	4.7	88.6	0.0	100.0	301
Rural area	25.1	12.3	17.6	44.7	0.3	100.0	1,944
Religion of household head							
Hindu	19.6	9.4	13.9	56.9	0.2	100.0	2,513
Muslim	30.0	8.5	18.7	42.0	0.8	100.0	117
Sikh	12.4	7.5	12.3	67.7	0.0	100.0	201
Caste/tribe of household head							
Scheduled caste	21.3	13.2	15.5	49.8	0.2	100.0	606
Other backward class	23.2	10.5	17.0	48.9	0.5	100.0	608
Other[1]	17.5	7.3	12.2	62.8	0.2	100.0	1,624
Standard of living index							
Low	28.7	17.6	16.4	36.3	0.9	100.0	340
Medium	24.0	11.4	17.3	47.2	0.2	100.0	1,350
High	11.3	4.2	9.3	75.1	0.1	100.0	1,138
Total	19.5	9.2	13.9	57.1	0.2	100.0	2,841

Note: Total includes 7 households with a household head belonging to other religions, 3 households with a household head belonging to scheduled tribes, and 2 and 13 households with missing information on religion and the standard of living index, respectively, who are not shown separately.
ppm: Parts per million
[1]Not belonging to a scheduled caste, a scheduled tribe, or an other backward class