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). Women consume pulses or beans most often (Table 7.1). Almost two-thirds of women (64 percent) eat pulses and beans every day, and another 27 percent eat pulses and beans weekly. A majority of women consume each type of vegetable on a daily basis, and 87 percent or more consume each type of vegetable (both green, leafy vegetables and other vegetables) at least once a week. Milk or curd is a common part of the diet for a majority of women, but 27 percent of women consume milk or curd only occasionally or never. Fruits are eaten every day by 28 percent of women, and another 29 percent of women eat fruits at least once a week. Half of women in Delhi (51 percent) never eat chicken, meat, or fish. Fifteen percent eat chicken, meat, or fish at least once a week, and 34 percent of women consume these

Table 7.1 Women's food consumption

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

Type of food	Frequency of consumption					Total percent
	Daily	Weekly	Occasionally	Never	Missing	
Milk or curd	60.4	12.9	21.2	5.4	0.0	100.0
Pulses or beans	64.1	27.2	8.6	0.2	0.0	100.0
Green, leafy vegetables	57.5	29.3	12.9	0.2	0.1	100.0
Other vegetables	61.9	30.9	7.1	0.0	0.1	100.0
Fruits	28.4	29.4	40.7	1.3	0.2	100.0
Eggs	4.8	16.3	33.9	44.9	0.0	100.0
Chicken, meat, or fish	2.2	12.8	33.8	51.0	0.0	100.0

food items occasionally. Eggs are consumed slightly more often than chicken, meat, or fish. Forty-five percent of women say that they never eat eggs.

Table 7.2 shows that there are substantial differentials in food consumption patterns by selected background characteristics. Age does not play an important role in women's consumption patterns. Women in urban Delhi are more likely than women in rural Delhi to include fruits, eggs, and chicken, meat, or fish in their diets. Illiterate women have poorer and less varied diets than literate women, and their diets are particularly deficient in fruits and milk/curd. Muslim women are much more likely than Hindu women to consume eggs and chicken, meat, or fish. Sikh women and women of 'other' religions are far more likely than either Hindu or Muslim women to consume milk/curd and fruits. Only 10–12 percent of Hindu and Sikh women eat chicken, meat, or fish at least once a week. Women from scheduled castes and other backward classes have a relatively poor diet that is particularly deficient in fruits and milk/curd. Women living in households with a high standard of living are much more likely to consume milk/curd and fruits than women living in households with a low standard of living, and somewhat more likely to consume green, leafy and other vegetables.

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, Delhi, 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	71.8	87.2	85.5	91.6	55.7	21.0	14.9	449
25–34	71.6	92.3	86.3	92.2	58.0	23.3	17.2	986
35–49	75.7	91.9	87.8	93.8	58.6	19.2	13.2	1,041
Residence								
Urban	73.5	91.2	86.6	92.8	59.4	21.7	15.7	2,282
Rural	72.1	91.1	88.9	91.6	39.5	14.3	7.5	195
Education								
Illiterate	56.1	86.0	84.8	90.5	35.5	20.4	17.6	721
Literate, < middle school complete	66.4	90.1	86.8	93.1	47.8	23.9	17.8	378
Middle school complete	75.3	91.7	84.1	89.9	58.0	22.4	17.3	284
High school complete and above	86.7	94.9	88.8	94.8	76.1	20.3	11.8	1,093
Religion								
Hindu	72.9	91.3	87.2	92.7	57.0	17.9	11.7	2,106
Muslim	63.8	86.9	80.4	90.0	51.2	44.6	50.0	199
Sikh	89.8	94.9	86.5	95.5	76.7	27.5	10.4	116
Other	92.1	96.2	92.1	98.0	76.1	47.2	25.7	50
Caste/tribe								
Scheduled caste	53.8	87.2	88.5	91.3	41.2	26.8	20.5	451
Other backward class	66.7	87.1	86.7	90.9	48.3	19.4	16.4	385
Other[1]	80.5	93.6	86.5	93.5	65.2	20.1	13.2	1,616
Standard of living index								
Low	36.5	80.0	79.7	84.3	16.9	21.3	18.1	63
Medium	56.2	87.2	84.1	92.0	35.7	22.2	17.7	695
High	81.7	93.2	87.9	93.3	68.3	20.5	13.8	1,638
Total	73.3	91.2	86.8	92.8	57.8	21.2	15.1	2,477

Note: Total includes 22 scheduled-tribe women and 1, 6, 3, and 80 women with missing information on education, religion, caste/tribe, and the standard of living index, respectively, who are not shown separately.
[1]Not belonging to a scheduled caste, scheduled tribe, or other backward class

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 Delhi of 153 cm (2 cm taller than the mean height for women in India as a whole). The mean height ranges from between 150 to 154 cm for women in different population groups, as shown in Table 7.3. Women living in households with a low standard of living are almost 3 cm shorter than women living in households with a high standard of living. Other groups that are slightly shorter than average include illiterate women, women who are literate but have not completed middle school, Muslim women, and scheduled-caste women. Rural women are taller than women in any other group. Ten percent of women are under 145 cm in height. The highest percentage of women in any group who are less than 145 cm tall is 16 percent for Muslim women, followed by 15 percent for women in other backward classes and women living in households with a low 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 and 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 weight in kilograms divided by height in metres squared (kg/m^2). The mean BMI for women in Delhi is 24 (ranging from 20 to 26 for all the groups shown in the table). Chronic energy deficiency is usually indicated by a BMI of less than 18.5. Twelve percent of women in Delhi have a BMI below 18.5. Nutritional problems, as indicated by the BMI, are particularly serious for younger women, illiterate women, women from other backward classes, and women from households with a low or medium standard of living. Women from households with a low or medium standard of living are more than twice as likely to have a low BMI than women from households with a high standard of living. Thirty-four percent of women in Delhi are overweight (BMI ≥ 25.0) and 9 percent are obese (BMI ≥ 30.0) [IIPS and ORC Macro, 2000:Table 7.5].

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

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, Delhi, 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	152.0	9.1	55	21.2	24.7	52
20–24	152.4	9.7	351	21.1	20.5	297
25–29	152.2	12.6	462	22.4	14.9	416
30–34	152.7	7.7	434	24.0	10.0	421
35–49	152.7	9.6	932	25.0	8.1	926
Marital status						
Currently married	152.5	9.9	2,145	23.6	11.9	2,024
Not currently married	153.2	9.1	88	23.7	13.5	88
Residence						
Urban	152.4	10.3	2,060	23.7	12.0	1,952
Rural	154.1	4.8	174	22.8	12.0	160
Education						
Illiterate	151.6	12.2	652	22.3	20.1	606
Literate, < middle school complete	151.8	13.9	341	23.3	12.6	325
Middle school complete	152.8	9.3	265	23.6	14.0	244
High school complete and above	153.4	6.9	975	24.7	5.9	936
Religion						
Hindu	152.5	9.6	1,897	23.6	12.1	1,803
Muslim	151.8	16.2	182	23.3	17.5	161
Sikh	153.5	7.5	109	25.5	4.5	106
Other	(154.2)	(2.5)	40	(23.3)	(2.6)	37
Caste/tribe						
Scheduled caste	151.7	9.9	401	22.0	17.0	372
Other backward class	152.3	15.0	343	22.1	20.9	322
Other[2]	152.8	8.7	1,466	24.5	8.2	1,398
Work status						
Working in family farm/business	152.7	6.3	80	23.1	9.0	77
Employed by someone else	152.5	9.7	282	23.1	13.8	266
Self-employed	152.3	7.8	89	24.2	7.9	89
Not worked in past 12 months	152.6	10.1	1,781	23.7	12.0	1,679
Standard of living index						
Low	150.4	14.5	56	(19.7)	(29.7)	46
Medium	151.4	13.2	635	21.9	20.0	592
High	153.1	8.3	1,470	24.5	7.8	1,405
Total	152.5	9.9	2,233	23.7	12.0	2,112

Note: Total includes small numbers of scheduled-tribe women and women with missing information on education, religion, caste/tribe, work status, 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, scheduled tribe, or other backward class

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 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. 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 non-pregnant women), moderate anaemia (7.0–9.9 g/dl), and severe anaemia (less than 7.0 g/dl). Appropriate adjustments in these

[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.

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, Delhi, 1999

Background characteristic	Percentage of women with any anaemia	Percentage of women with: Mild anaemia	Moderate anaemia	Severe anaemia	Number of women
Age					
15–19	46.9	35.3	11.6	0.0	53
20–24	43.8	28.7	13.5	1.7	342
25–29	42.3	29.7	10.9	1.7	460
30–34	36.2	27.6	7.8	0.9	430
35–49	39.9	30.5	8.2	1.2	912
Marital status					
Currently married	40.1	29.2	9.5	1.4	2,110
Not currently married	49.5	38.6	10.9	0.0	87
Residence					
Urban	40.5	29.4	9.8	1.3	2,024
Rural	39.8	32.2	6.4	1.1	173
Education					
Illiterate	45.1	30.9	12.6	1.7	644
Literate, < middle school complete	44.9	33.6	9.6	1.7	335
Middle school complete	41.5	28.8	10.4	2.3	259
High school complete and above	35.5	27.6	7.3	0.5	957
Religion					
Hindu	40.7	29.8	9.5	1.4	1,860
Muslim	36.4	25.3	10.6	0.6	183
Sikh	38.8	27.4	11.4	0.0	108
Other	(52.7)	(47.6)	(2.5)	(2.5)	40
Caste/tribe					
Scheduled caste	49.7	34.7	13.8	1.2	393
Other backward class	44.0	30.0	11.4	2.6	336
Other[1]	37.3	28.2	8.1	1.0	1,446
Work status					
Working in family farm/business	46.1	34.7	7.7	3.7	79
Employed by someone else	42.6	31.7	9.9	1.1	275
Self-employed	45.1	31.6	10.1	3.3	87
Not worked in past 12 months	39.7	29.0	9.6	1.1	1,755
Standard of living Index					
Low	42.9	31.3	9.7	1.9	53
Medium	49.2	34.3	13.7	1.3	627
High	36.6	27.6	7.7	1.3	1,444
Pregnancy/breastfeeding status					
Pregnant	34.7	19.6	14.4	0.7	140
Breastfeeding (not pregnant)	49.1	33.3	13.8	2.0	405
Not pregnant/not breastfeeding	38.8	29.6	8.1	1.2	1,653
Height					
< 145 cm	45.4	33.1	11.0	1.3	222
≥ 145 cm	39.9	29.2	9.4	1.2	1,971

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, Delhi, 1999

Background characteristic	Percentage of women with any anaemia	Percentage of women with: Mild anaemia	Moderate anaemia	Severe anaemia	Number of women
Body mass index					
< 18.5 kg/m^2	55.9	33.9	17.4	4.6	264
≥ 18.5 kg/m^2	38.1	28.9	8.4	0.8	1,919
Fruit and vegetable consumption[2]					
Fruits and vegetables	37.1	28.1	7.3	1.7	1,144
Fruits only	34.7	26.3	8.4	0.0	119
Vegetables only	45.0	32.1	12.0	0.9	764
Neither	47.5	31.0	14.7	1.8	169
Total	40.5	29.6	9.6	1.3	2,197

Note: The haemoglobin levels are adjusted for smoking when calculating the degree of anaemia. The usual adjustment for altitude of the enumeration area was not made because all of the Primary Sampling Units in Delhi are at an altitude below 1,000 metres. Total includes 20 scheduled-tribe women and 1, 6, 2, 1, 74, 4, 15, and 1 women with missing information on education, religion, caste/tribe, work status, the standard of living index, height, body mass index, and fruit and vegetable consumption, respectively, who are not shown separately.
( ) Based on 25–49 unweighted cases
[1]Not belonging to a scheduled caste, scheduled tribe, or other backward class
[2]Based on consumption at least weekly. Vegetables include only green, leafy vegetables.

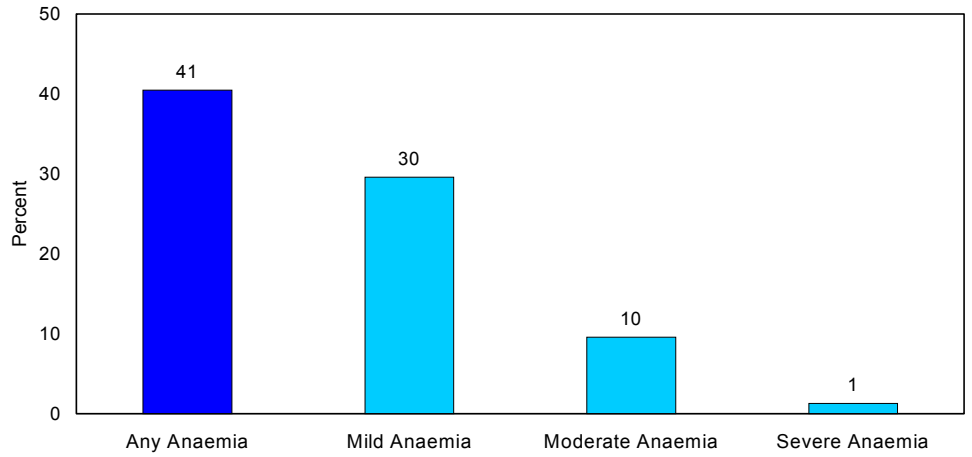
cutoff points were made for women who smoke, since women in this group require more haemoglobin in their blood (Centers for Disease Control and Prevention, 1998).

In Delhi, the haemoglobin levels were tested for 89 percent of women (see Table B.3 in Appendix B), compared with 88 percent of women in India as a whole. Overall, 41 percent of women have some degree of anaemia.[3] Thirty percent of women are mildly anaemic, 10 percent are moderately anaemic, and 1 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 higher for women under age 30 than for older women. It is higher for ever-married women not currently married (50 percent) than for currently married women (40 percent). The prevalence of anaemia is relatively high for scheduled-caste women, women from other backward classes, illiterate women, women with less than a middle school education, women who work in a family farm/business, and women who are self-employed. Hindu women are slightly more likely to be anaemic than Muslim women or Sikh women. Anaemia is higher among women from households with a medium standard of living (49 percent) or a low standard of living (43 percent) than among women from households with a high standard of living (37 percent).

The prevalence of anaemia is lower for pregnant women than for women who are both nonpregnant and nonbreastfeeding, but not by much. The provision of iron and folic acid supplements to pregnant women has undoubtedly reduced the overall prevalence of anaemia in pregnant women, 78 percent of whom received IFA tablets or syrup during pregnancy for

[3]Rates that are not adjusted for smoking (40.4 percent for any anaemia, 29.7 percent for mild anaemia, 9.3 percent for moderate anaemia, and 1.3 percent for severe anaemia) are slightly lower than the corresponding adjusted rates. The small impact of the adjustment factor is to be expected since, in Delhi, the proportion of women who smoke is very small (see Table 2.12).

Figure 7.1
Anaemia Among Women



NFHS-2, Delhi, 1999

births in the three years preceding the survey (see Table 8.6). Prevalence of anaemia is highest among women who are breastfeeding but not pregnant, suggesting that these women should also be targeted for iron and folic acid supplementation.

Shorter women and women with a low body mass index have a higher prevalence of anaemia than other women. A woman's diet also affects the likelihood that she is anaemic. 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 Delhi, differentials in anaemia by fruit and vegetable consumption are significant. Women who eat fruits (alone or in addition to vegetables) at least weekly have a lower prevalence of anaemia than women who do not eat fruits regularly. Women who do not consume either fruits or vegetables at least once a week have the highest prevalence of anaemia.

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. These indicators of breastfeeding and other feeding practices are presented in this section.

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 (the two most recent 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 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 before the survey who started breastfeeding within one hour and within 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 Delhi, few children are put to the breast immediately after birth. Only one-fourth (24 percent) of children begin breastfeeding within one hour of birth, and only one-half (51 percent) begin breastfeeding within one day of birth. Moreover, three out of every five women who gave birth during the three years preceding the survey squeezed the first milk from the breast before they began breastfeeding.

[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, Delhi, 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	24.2	50.8	60.5	738
Rural	20.3	54.3	54.7	81
Mother's education				
Illiterate	20.5	39.9	63.6	247
Literate, < middle school complete	20.4	44.2	57.9	137
Middle school complete	18.6	50.4	51.6	100
High school complete and above	29.3	62.7	60.6	334
Religion				
Hindu	24.3	52.3	61.9	666
Muslim	18.7	38.5	59.2	103
Sikh	(30.3)	(62.8)	(34.7)	37
Caste/tribe				
Scheduled caste	18.8	37.3	57.3	185
Other backward class	16.3	47.0	63.0	153
Other[2]	28.0	57.5	59.7	474
Work status				
Employed by someone else	21.7	45.9	53.5	80
Not worked in past 12 months	24.5	51.8	61.1	705
Standard of living index				
Low	(22.5)	(32.5)	(61.3)	47
Medium	17.4	41.5	61.3	274
High	27.0	57.4	59.0	481
Assistance during delivery				
Health professional[3]	29.1	61.7	57.7	540
Dai (TBA)	15.0	31.4	64.8	249
Place of delivery				
Public health facility	30.8	67.8	54.9	241
Private health facility	31.6	60.6	62.1	240
Own home	13.9	33.2	63.3	290
Total	23.8	51.2	59.9	820

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 8 children belonging to other religions, 8 scheduled-tribe children, 16 children whose mothers work in a family farm/business, 19 children whose mothers are self-employed, 22 children whose mothers were assisted by other persons other than a health professional or a TBA during delivery, 3 children delivered in nongovermental organization or trust hospitals/clinics, 18 children delivered in parent's home, 17 children delivered in 'other' places of delivery, and 1, 5, 17, 8, and 11 children with missing information on mother's education, religion, the standard of living index, assistance during delivery, and place of delivery, 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, scheduled tribe, or other backward class
[3]Includes doctor, auxiliary nurse midwife, nurse, midwife, lady health visitor, and other health professionals

Table 7.5 also shows differentials in the early initiation of breastfeeding and in squeezing the first milk from the breast. Sikh women, women who have completed high school, women who do not belong to a scheduled caste, scheduled tribe, or other backward class, and women who live in households with a high standard of living are more likely than other women to start breastfeeding their children early. The circumstances surrounding delivery of the baby also have an important effect on early initiation of breastfeeding. Children whose delivery was assisted by a health professional and children born in public or private medical institutions are much more likely to begin breastfeeding early than other children.

The custom of squeezing the first milk from the breast before breastfeeding a child is widely practised in Delhi in every group, but it is somewhat more common among illiterate women, women from other backward classes, women whose child was delivered by a traditional birth attendant, and women who gave birth in their own home. On the whole, differentials in the percentage who squeezed the first milk from the breast before breastfeeding are rather small. In this regard it should be stressed that, contrary to recommendations regarding infant feeding, mothers squeeze the first milk from the breast before breastfeeding for at least 52 percent of children in almost 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

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, Delhi, 1999

	Breastfeeding status					
			Breastfeeding and:			
Age in months	Not breastfeeding	Exclusively breastfeeding	Receiving plain water only	Receiving supplements	Total percent	Number of living children
< 4	5.8	13.2	37.9	43.1	100.0	68
4–5	(5.0)	(0.0)	(40.1)	(54.9)	100.0	40
6–7	(13.3)	(4.2)	(21.7)	(60.9)	100.0	46
8–9	15.6	0.0	15.3	69.2	100.0	53
10–11	(12.3)	(2.4)	(13.2)	(72.1)	100.0	39
12–13	38.8	3.9	9.6	47.6	100.0	49
14–15	(20.3)	(0.0)	(6.1)	(73.6)	100.0	49
16–17	38.8	0.0	9.4	51.8	100.0	54
18–19	46.9	0.0	5.8	47.3	100.0	52
20–21	(35.2)	(0.0)	(2.7)	(62.1)	100.0	34
22–23	(44.9)	(0.0)	(2.6)	(52.6)	100.0	36
24–25	(62.4)	(0.0)	(5.4)	(32.2)	100.0	34
26–27	(72.8)	(0.0)	(3.0)	(24.3)	100.0	33
28–29	65.5	0.0	0.0	34.5	100.0	60
30–31	63.0	0.0	0.0	37.0	100.0	58
32–33	(65.6)	(0.0)	(2.6)	(31.8)	100.0	38
34–35	(75.0)	(2.4)	(2.6)	(20.0)	100.0	39
< 4 months	5.8	13.2	37.9	43.1	100.0	68
4–6 months	6.3	3.0	34.3	56.4	100.0	64
7–9 months	16.4	0.0	16.3	67.3	100.0	75

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

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 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 7.7 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, Delhi, 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								
< 4	6.3	36.5	3.1	0.0	1.5	3.0	37.6	64
4–5	(2.7)	(47.2)	(10.5)	(0.0)	(5.2)	(18.6)	(26.0)	38
6–7	(2.4)	(43.1)	(30.4)	(10.1)	(15.0)	(42.3)	(27.9)	40
8–9	(4.5)	(62.2)	(42.4)	(10.7)	(21.8)	(44.1)	(39.5)	45
10–11	(8.6)	(58.7)	(49.7)	(14.5)	(46.6)	(58.6)	(46.5)	35
12–13	(6.4)	(58.4)	(45.2)	(25.9)	(55.2)	(67.8)	(45.2)	30
14–15	(2.4)	(64.0)	(54.3)	(41.3)	(56.8)	(72.3)	(28.1)	39
16–17	(0.0)	(60.8)	(57.4)	(42.7)	(54.4)	(66.8)	(27.7)	33
18–23	2.9	57.8	49.8	32.2	45.8	74.1	25.5	70
24–29	(2.6)	(53.7)	(46.5)	(53.7)	(48.7)	(81.6)	(18.7)	43
30–35	(2.1)	(57.9)	(46.2)	(49.0)	(48.9)	(77.8)	(15.6)	44
< 4 months	6.3	36.5	3.1	0.0	1.5	3.0	37.6	64
4–5 months	(2.7)	(47.2)	(10.5)	(0.0)	(5.2)	(18.6)	(26.0)	38
6–9 months	3.5	53.2	36.7	10.4	18.6	43.2	34.0	84
NON-BREASTFEEDING CHILDREN								
< 12	(27.6)	(72.4)	(35.7)	(8.1)	(20.6)	(48.0)	(88.2)	25
12–15	(6.8)	(90.0)	(40.7)	(48.1)	(48.0)	(83.0)	(89.7)	29
16–23	5.2	91.8	60.0	42.2	69.3	82.0	83.5	74
24–29	3.6	82.2	66.8	54.6	69.2	88.4	59.1	85
30–35	6.5	72.8	74.8	66.2	60.7	90.3	42.0	91
ALL CHILDREN								
< 4	7.4	35.8	2.9	0.0	1.4	2.8	38.4	68
4–5	(5.0)	(49.8)	(15.0)	(2.5)	(4.9)	(22.6)	(29.7)	40
6–7	(6.5)	(46.2)	(28.5)	(8.8)	(15.2)	(43.3)	(37.5)	46
8–9	5.7	68.1	39.8	9.1	22.5	43.2	48.9	53
10–11	(12.3)	(59.0)	(53.4)	(15.4)	(45.9)	(61.2)	(50.6)	39
12–13	5.9	70.6	43.7	34.3	56.0	74.3	60.4	49
14–15	(3.9)	(69.5)	(51.2)	(42.9)	(51.3)	(73.9)	(42.7)	49
16–17	3.6	72.4	62.9	35.3	62.7	72.1	48.4	54
18–23	3.2	72.6	52.2	39.7	54.8	77.8	50.9	122
24–29	3.3	72.6	60.0	54.3	62.4	86.1	45.6	127
30–35	5.1	67.9	65.4	60.6	56.8	86.2	33.3	135
< 4 months	7.4	35.8	2.9	0.0	1.4	2.8	38.4	68
4–5 months	(5.0)	(49.8)	(15.0)	(2.5)	(4.9)	(22.6)	(29.7)	40
6–9 months	6.1	57.9	34.6	8.9	19.1	43.3	43.6	99

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

In Delhi, only 13 percent of children under four months of age are exclusively breastfed (much lower than the national level of 55 percent), 38 percent receive breast milk plus water, and 43 percent receive supplements along with breast milk (Table 7.6). The proportion of infants exclusively breastfed falls to 3 percent by age 4–6 months and to 0 percent at age 7–9 months. The proportion of children receiving supplements along with breast milk increases from 43 percent at 0–3 months to 69 percent at 8–9 months. It fluctuates thereafter until age 20–21 months, after which it declines as children are weaned from the breast. A majority of children in Delhi have stopped breastfeeding by 24–25 months of age, but as late as age 30–31 months, 37 percent of children are still breastfed. These results must be interpreted cautiously, however, due to the small number of cases in most of the age groups shown in the table.

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, two-month age categories have been combined into broader age groups for the younger children. Also in the case of breastfeeding children, the sample size is less than 50 for most of the age groups, so that results are discussed for all children only.

The table shows that 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. More than two-thirds of all children age 16–17 months or older were given these other types of milk the day or night before the interview. Other liquids, such as juice or tea, were given somewhat less often than milk. The consumption of green, leafy vegetables generally increases with age, from 9 percent at age 8–9 months to 61 percent at age 30–35 months for all children. The consumption of fruit increases from 1 percent at age 0–3 months to 63 percent at age 16–17 months.

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 Delhi the introduction of complementary food is delayed for a substantial proportion of children. Only 43 percent of all children age 8–9 months consume any solid or mushy foods. This proportion rises to 86 percent at age 24–35 months. At age 6–9 months, only 43 percent of breastfeeding children receive solid or mushy food as recommended (which is higher, however, than the level of 36 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 quite common in Delhi. Both at age 0–3 months and at age 6–9 months, approximately two-fifths of the children drank from a bottle with a nipple during the day or night before the interview (Table 7.7). As expected, the use of a bottle with a nipple is much more common for children who are not being breastfed than for breastfed children, particularly in the first two years of life.

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 Delhi is slightly less than two

Table 7.8 Median duration of breastfeeding

Median duration of breastfeeding among children under age 3 years by sex of child and mean duration of breastfeeding, Delhi, 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	22.6	(0.5)	2.1	472
Female	19.4	(0.5)	0.7	348
Median duration	22.6	0.5	1.7	820
Mean duration (months)[1]	21.4	1.5	5.4	820
Prevalence/incidence mean	20.8	0.6	4.4	820

Note: Table includes only the two most recent births during the three years preceding the survey.
( ) Based on 25–49 unweighted cases
[1]Based on current status

years (22.6 months). Supplementation begins relatively early. The median length of exclusive breastfeeding is 0.5 month. The median length of exclusive breastfeeding or breastfeeding with water is 1.7 months.

The mean durations of any breastfeeding and of exclusive breastfeeding or breastfeeding with water only are 21.4 months and 5.4 months, respectively. The mean duration is more than three months longer than the median duration in the case of exclusive breastfeeding or breastfeeding plus water only, but is about one month shorter in the case of the overall duration of breastfeeding. These differences between the mean and the median occur because the mean is influenced by extreme values while the median is not, and because the extreme values are skewed in different directions in the two cases.

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 slightly lower than the mean calculated in the conventional manner.

The median duration of breastfeeding is about three 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 in order to increase their chances of having another child earlier (with the hope that the next child will be a boy).

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 Delhi, NFHS-2 did not measure 14 percent of children under age three (see Table B.3 in Appendix B), a slightly higher 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. Thirty-five percent of children under three years of age are underweight, and 37 percent are stunted. Similar estimates at the national level are 47 and 46 percent, respectively. The proportion of children who are severely undernourished is 10 percent in the case of weight-for-age and 18 percent in the case of height-for-age. Wasting is also quite evident in Delhi, affecting 13 percent of children under three years of age, somewhat lower than the national estimate of 16 percent. The proportion of children under three years of age who are underweight decreased from 41 percent in NFHS-1 to 35 percent in NFHS-2, and the proportion severely underweight decreased from 13 percent to 10 percent. The extent of stunting also decreased slightly, from 40 percent in NFHS-1 to 37 percent in NFHS-2. The extent of wasting remained constant at 13 percent in both surveys.

The proportion of children who are undernourished generally increases steadily with child's age in the cases of weight-for-age and height-for-age. However, the extent of wasting differs little by age and is lowest at age 24–35 months. Even during the first six months of life, when most babies are breastfed, 7–15 percent of children are undernourished, according to the

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, Delhi, 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	1.3	6.6	1.2	7.7	4.0	14.6	76
6–11 months	8.0	29.4	11.1	26.3	5.9	13.8	100
12–23 months	10.6	38.2	22.4	45.7	4.3	14.0	209
24–35 months	13.8	44.3	23.3	43.8	3.0	9.4	202
Sex of child							
Male	10.1	36.8	18.6	35.7	4.1	13.4	338
Female	10.0	31.9	17.2	38.3	4.0	11.2	249
Birth order							
1	6.1	29.2	16.5	35.4	2.2	9.8	187
2–3	10.3	34.4	17.0	33.1	4.1	10.8	288
4–5	13.9	40.4	25.4	48.7	6.9	20.4	87
6+	(23.8)	(59.7)	(15.7)	(48.5)	(7.8)	(24.5)	25
Previous birth interval[2]							
First birth	6.1	29.2	16.5	35.4	2.2	9.8	187
< 24 months	19.0	40.9	26.7	50.4	4.7	14.4	84
24–47 months	11.5	39.5	17.7	38.0	4.8	14.5	209
48+ months	7.2	30.2	14.7	26.5	5.3	11.8	108
Total	10.1	34.7	18.0	36.8	4.1	12.5	587

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.

three nutritional indices. It is notable that at age 24–35 months, when most children have been weaned from breast milk, 23 percent children are severely stunted and 14 percent are severely underweight.

Overall, girls are slightly more likely than boys to be stunted, whereas boys are slightly more likely than girls to be underweight. There is almost no difference between the sexes in the extent of wasting. Undernutrition tends to increase with birth order. Undernutrition is much less evident for first births than for higher-order births. Undernutrition tends to increase as previous birth interval decreases in the cases of underweight and stunting, but the effect is small and inconsistent in the case of wasting.

Table 7.10 shows the nutritional status of children by selected background characteristics. Undernutrition is substantially higher in rural Delhi than in urban Delhi. Even in urban Delhi, however, 33 percent of children are underweight and 35 percent are stunted. Children whose mothers are illiterate are much more likely to be undernourished than children whose mothers have completed at least high school (see also Figure 7.2). As mother's education increases, the percentages underweight, stunted and wasted decline substantially. Hindu children are more likely to be undernourished on all three indicators than Muslim children, but the differences are quite small. Children belonging to scheduled castes and other backward classes have higher levels of undernutrition on all three measures than children not belonging to a scheduled caste, scheduled tribe, or other backward class. Undernutrition is lower for children whose mothers have not worked in the past 12 months than for children of mothers who work for someone else. This is not unexpected in the Indian situation where nonworking women are likely to be from better-off families.

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

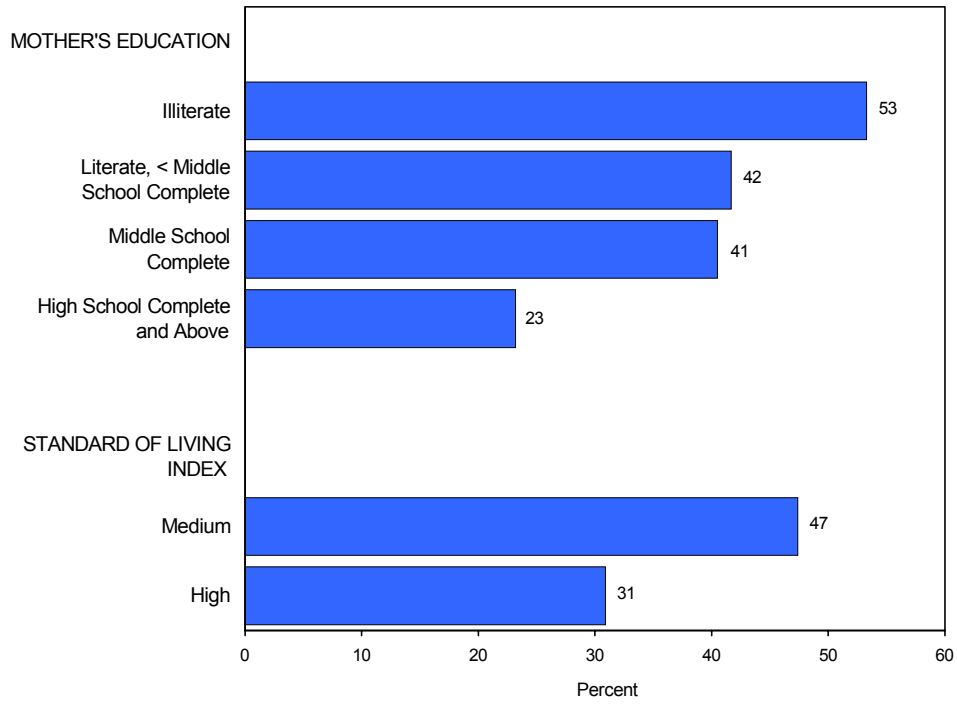


Table 7.10 Nutritional status of children by background characteristics

Percentage of children under age 3 years classified as undernourished on three anthropometric indices of nutritional status, according to selected background characteristics, Delhi, 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	8.2	32.8	17.5	35.4	3.1	10.7	532
Rural	27.6	52.5	23.5	50.6	12.9	29.4	56
Mother's education							
Illiterate	19.1	50.4	26.0	53.3	7.6	21.7	158
Literate, < middle school complete	9.8	36.9	24.0	41.7	3.0	12.0	101
Middle school complete	9.6	37.9	19.0	40.5	1.1	9.7	80
High school complete and above	4.6	22.9	10.2	23.2	3.2	7.7	248
Religion							
Hindu	10.8	35.6	19.0	38.9	4.3	13.1	481
Muslim	9.4	34.9	13.8	32.7	3.0	12.3	67
Sikh	(0.0)	(21.3)	(14.0)	(21.4)	(0.0)	(3.5)	29
Caste/tribe							
Scheduled caste	13.1	41.3	23.7	47.7	1.6	11.5	127
Other backward class	20.7	44.7	22.4	46.3	8.1	20.7	113
Other[2]	5.3	28.8	14.7	30.1	3.4	9.4	344
Mother's work status							
Employed by someone else	23.4	41.8	25.3	45.0	8.2	15.7	52
Not worked in past 12 months	8.5	33.5	17.0	35.8	3.9	12.3	506
Mother's height							
< 145 cm	11.7	43.4	29.4	57.8	0.0	12.1	67
≥ 145 cm	9.9	33.5	16.6	34.3	4.6	12.4	519
Mother's body mass index							
< 18.5 kg/m^2	22.2	54.3	25.2	49.1	4.5	22.2	106
≥ 18.5 kg/m^2	7.4	30.4	16.6	34.1	4.0	10.2	479
Standard of living index							
Medium	15.1	49.5	24.0	47.4	5.2	16.1	191
High	7.2	26.6	15.1	30.9	3.0	9.7	366
Total	10.1	34.7	18.0	36.8	4.1	12.5	587

Note: Each index is expressed in standard deviation units (SD) from the median of the International Reference Population. Total includes 5 children belonging to other religions, 4 scheduled-tribe children, 12 children whose mothers work in a family farm/ business, 18 children whose mothers are self-employed, 21 children from households with a low standard of living index, and 5, 2, 3, and 10 children with missing information on religion, mother's height, 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, scheduled tribe, or 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 centimetres, and more common for children of mothers whose body mass index is below 18.5, than for other children. All three measures of undernutrition are strongly related to the household's standard of living. Children from households with a low standard of living are much more likely to be underweight, stunted, or wasted than children from households with a high standard of living.

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 two-thirds (69 percent) of these children have some level of anaemia, including 22 percent who are mildly anaemic (10.0–10.9 g/dl), 43 percent who are moderately anaemic (7.0–9.9 g/dl), and 4 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 especially pronounced for moderate to severe anaemia.

Several groups of children have particularly high levels of anaemia. These include children age 6–23 months (an age at which children are often weaned), children whose mothers have less than a high school education, children of scheduled caste mothers, children of mothers from other backward classes, and children whose mothers are from households with a low or medium standard of living. As expected, there is a strong positive relationship between the anaemia status of mothers and prevalence of anaemia among children. Despite these differentials, anaemia is very widespread in Delhi. At least 55 percent of children in every group shown in the table are anaemic.

Figure 7.3
Anaemia Among Children

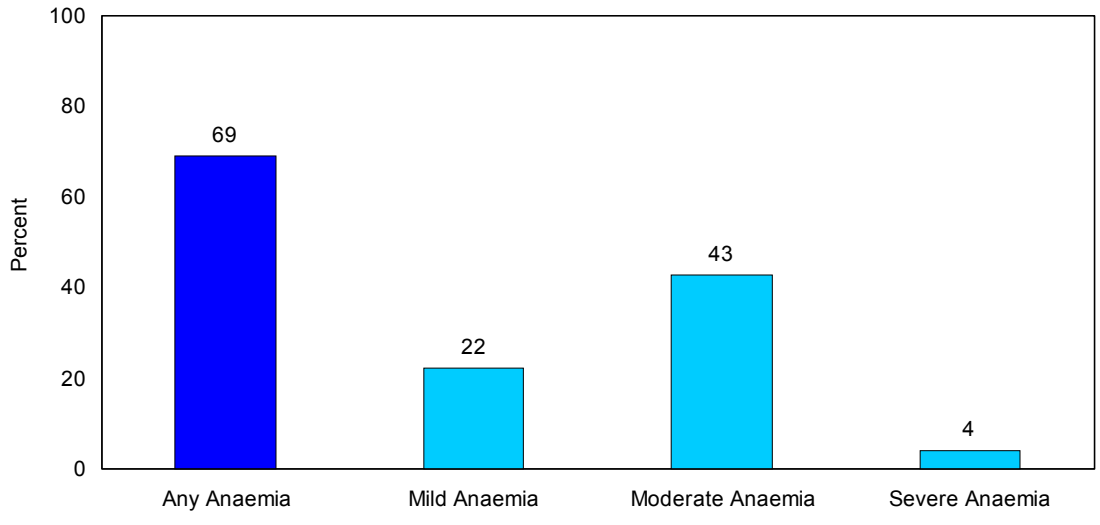


Table 7.11 Anaemia among children

Percentage of children age 6–35 months classified as having iron-deficiency anaemia by selected background characteristics, Delhi, 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	72.9	26.3	43.8	2.8	113
12–23 months	74.1	23.6	44.7	5.8	223
24–35 months	62.0	18.6	40.8	2.7	222
Sex of child					
Male	70.3	21.2	43.7	5.4	316
Female	67.4	23.5	41.9	2.0	243
Birth order					
1	63.5	20.3	39.2	4.0	175
2–3	70.0	24.2	43.3	2.6	270
4–5	73.3	19.8	48.9	4.7	87
6+	(81.1)	(22.4)	(44.2)	(14.5)	27
Residence					
Urban	69.1	22.4	42.7	4.0	503
Rural	68.0	19.7	44.7	3.6	56
Mother's education					
Illiterate	78.6	27.2	46.4	4.9	163
Literate, < middle school complete	76.2	18.2	56.9	1.0	90
Middle school complete	77.9	15.3	58.8	3.8	79
High school complete and above	56.3	22.5	29.4	4.4	227
Religion					
Hindu	69.4	23.0	42.8	3.6	456
Muslim	72.1	17.7	52.6	1.8	65
Sikh	(54.7)	(14.3)	(32.9)	(7.6)	27
Caste/tribe					
Scheduled caste	80.4	28.9	46.4	5.0	117
Other backward class	75.6	21.3	51.2	3.0	102
Other[1]	63.2	20.3	39.1	3.8	337
Mother's work status					
Employed by someone else	(68.5)	(26.2)	(36.1)	(6.1)	49
Not worked in past 12 months	69.7	22.5	43.9	3.3	481
Standard of living index					
Low	(82.7)	(24.6)	(54.9)	(3.2)	28
Medium	78.2	23.5	51.3	3.3	183
High	62.9	21.3	38.1	3.5	337
Mother's anaemia status					
Not anaemic	59.8	22.3	35.9	1.7	303
Mildly anaemic	77.7	25.2	47.2	5.2	168
Moderately anaemic	84.8	15.5	61.5	7.8	78
Total	69.0	22.2	42.9	3.9	559

Note: Haemoglobin levels are not adjusted for altitude when calculating the degree of anaemia among children because all of the Primary Sampling Units in Delhi are at an altitude below 1,000 metres. Total includes 6 children belonging to other religions, 3 scheduled-tribe children, 11 children whose mothers work in a family farm/business, 18 children whose mothers are self-employed, 8 children whose mothers are severely anaemic, and 5, 11, and 2 children with missing information on religion, the standard of living index, and mother's anaemia status, respectively, who are not shown separately.

( ) Based on 25–49 unweighted cases

[1] Not belonging to a scheduled caste, scheduled tribe, or other backward class

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 Delhi, 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 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, 89 percent of households use cooking salt that is iodized at the recommended level of 15 ppm or more. Only 6 percent of households use salt that is not iodized at all, and 5 percent use salt that is inadequately iodized (less than 15 ppm). Differentials in salt iodization by background characteristics are pronounced. Ninety percent of households in urban Delhi use salt with 15 ppm or more of iodine, compared with 82 percent of households in rural Delhi. Muslim households are less likely to use iodized salt than households of other religions. The widest differentials are

Table 7.12 Iodization of salt

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

Background characteristic	Not iodized	7 ppm	15 ppm	30 ppm	Missing	Total percent	Number of households
Residence							
Urban	5.9	4.2	13.0	76.8	0.1	100.0	2,550
Rural	9.1	8.6	19.7	62.6	0.0	100.0	213
Religion of household head							
Hindu	5.9	4.3	13.2	76.5	0.1	100.0	2,329
Muslim	12.2	9.3	15.8	62.7	0.0	100.0	230
Sikh	1.6	0.8	11.8	85.8	0.0	100.0	126
Other	1.5	2.9	14.7	80.9	0.0	100.0	68
Caste/tribe of household head							
Scheduled caste	9.3	7.0	15.9	67.5	0.4	100.0	490
Scheduled tribe	(0.0)	(20.1)	(12.0)	(68.0)	(0.0)	100.0	25
Other backward class	9.9	7.6	17.8	64.8	0.0	100.0	412
Other	4.6	3.0	12.0	80.5	0.0	100.0	1,834
Standard of living index							
Low	34.9	9.1	26.5	29.5	0.0	100.0	87
Medium	9.1	10.1	17.0	63.7	0.1	100.0	815
High	3.3	1.8	11.1	83.8	0.0	100.0	1,767
Total	6.1	4.5	13.5	75.7	0.1	100.0	2,763

Note: Total includes 9, 3, and 94 households with missing information on religion of household head, caste/tribe of household head, and the standard of living index, respectively, which are not shown separately.
ppm: Parts per million
( ) Based on 25–49 unweighted cases

observed by standard of living index. Thirty-five percent of households with a low standard of living use non-iodized salt, compared with 3 percent of households with a high standard of living.