

This chapter focuses on the nutrition of young children, women, and men, examining the types of food consumed and the consequences of inadequate nutrition and poor feeding practices. The chapter covers a variety of related nutrition topics, including infant and young child feeding practices, diversity of foods consumed, frequency of feeding, micronutrient intake, and prevalence of anaemia. The sections on nutritional status cover anthropometric assessment of the nutritional status of children less than five years of age, women age 15-49, and men age 15-54.

Adequate nutrition is critical to child development. The period from birth to two years of age is important for optimal growth, health, and development. At this age, children are particularly vulnerable to growth retardation, micronutrient deficiencies, and common childhood illnesses such as diarrhoea and acute respiratory infections (ARI).

Malnutrition in women and men can result in reduced productivity, slow recovery from illnesses, increased susceptibility to infections, and a heightened risk of adverse pregnancy outcomes. A woman's nutritional status has important implications for her health as well as the health of her children. A woman with poor nutritional status, as indicated by a low body mass index (BMI), short stature, anaemia, or other micronutrient deficiencies, has a greater risk of obstructed labour, having a baby with a low birth weight, having adverse pregnancy outcomes, producing lower quality breast milk, death due to postpartum haemorrhage, and illness for herself and her baby.

10.1 NUTRITIONAL STATUS OF CHILDREN

In developing countries, children and adults are vulnerable to malnutrition because of low dietary intakes, infectious diseases, lack of appropriate care, and inequitable distribution of food within the household. To assess nutritional status, NFHS-3 included an anthropometric component, in which all children under five years of age were weighed and measured. Every interviewing team included two health investigators who conducted the anthropometric measurements. Each health investigator carried a scale and a measuring board. The scale was a solar-powered electronic SECA scale with a digital screen designed and manufactured under the guidance of the United Nations Children's Fund (UNICEF). The measuring board was specially designed by Shorr Productions for use in survey settings. Children younger than 24 months were measured lying down on the board (recumbent length); older children were measured while standing.

In previous NFHS surveys, anthropometric measurements were restricted to children born to women interviewed with the Women's Questionnaire. However, the data from those surveys do not represent all children, since they exclude children whose mothers were not in the household (either because they did not live there or because they had died), children whose mothers were not eligible for the individual interview (i.e., they were under age 15 or age 50 and over), and children whose mothers did not complete an individual interview. To overcome these

biases, NFHS-3 included height and weight measurements for all children born in the five years preceding the survey who were listed in the Household Questionnaire.

Evaluation of nutritional status is based on the rationale that in a well-nourished population, there is a statistically predictable distribution of children of a given age with respect to height and weight. In any large population, there is variation in height and weight; this variation approximates a normal distribution. Use of a standard reference population as a point of comparison facilitates the examination of differences in the anthropometric status of subgroups in a population and of changes in nutritional status over time. The use of a 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 before puberty. Until 2006 the most commonly used reference population, which was used in NFHS-1 and NFHS-2, was the U.S. National Center for Health Statistics (NCHS) standard, which was recommended at that time by the World Health Organization (Dibley et al., 1987a; 1987b). The tables in this chapter show estimates based on a new international reference population released by WHO in April 2006 (WHO Multicenter Growth Reference Study Group, 2006) and accepted by the Government of India. However, to facilitate the analysis of changes in nutritional status over time, nutritional status in NFHS-2 has also been recalculated using the new WHO standard.

The new WHO growth standard adopts a prescriptive approach, describing how healthy children should grow. The new standard is based on children around the world (Brazil, Ghana, India, Norway, Oman, and the United States) who are raised in healthy environments, whose mothers do not smoke, and who are fed with recommended feeding practices (exclusive breastfeeding for the first 6 months and appropriate complementary feeding from 6 to 23 months). The WHO growth standard identifies breastfed child as the normative model for growth and development standards, depicts normal early childhood growth under optimal environmental conditions, and can be used to assess children regardless of ethnicity, socioeconomic status, and type of feeding.

Three standard indices of physical growth that describe the nutritional status of children are presented in this report:

- Height-for-age (stunting)
- Weight-for-height (wasting)
- Weight-for-age (underweight)

Each of the three nutritional status indicators is expressed in standard deviation units (*Z*-scores) from the median of the reference population. Each index provides different information about growth and body composition, which is used to assess nutritional status. The height-for-age index is an indicator of linear growth retardation and cumulative growth deficits. Children whose height-for-age *Z*-score is below minus two standard deviations (-2 SD) from the median of the reference population are considered short for their age (stunted) and are chronically malnourished. Children below minus three standard deviations (-3 SD) from the median of the reference population are considered to be severely stunted. Stunting reflects failure to receive adequate nutrition over a long period of time and is also affected by recurrent and chronic illness.

Height-for-age, therefore, represents the long-term effects of malnutrition in a population and does not vary according to recent dietary intake.

The weight-for-height index measures body mass in relation to body length and describes current nutritional status. Children whose Z-score is below minus two standard deviations (-2 SD) from the median of the reference population are considered thin (wasted) for their height and are acutely malnourished. Wasting represents the failure to receive adequate nutrition in the period immediately preceding the survey and may be the result of inadequate food intake or a recent episode of illness causing loss of weight and the onset of malnutrition. Children whose weight-for-height is below minus three standard deviations (-3 SD) from the median of the reference population are considered to be severely wasted.

Weight-for-age is a composite index of height-for-age and weight-for-height. It takes into account both acute and chronic malnutrition. Children whose weight-for-age is below minus two standard deviations from the median of the reference population are classified as underweight. Children whose weight-for-age is below minus three standard deviations (-3 SD) from the median of the reference population are considered to be severely underweight.

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. Height and weight data were collected in all sample households. The survey was not able to measure the height and weight of all eligible children, usually because either the child was not at home at the time of the health investigator's visit or the mother refused to allow the child to be weighed and measured. In India, NFHS-3 did not measure 9 percent of children under age five. Also excluded from the analysis are 8 percent of eligible children whose month and year of birth were not known or who had 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 10.1 shows the percentage of children classified as undernourished by selected demographic characteristics. Almost half of children under five years of age (48 percent) are stunted and 43 percent are underweight. The proportion of children who are severely undernourished (more than three standard deviations below the median of the reference population) is also notable—24 percent according to height-for-age and 16 percent according to weight-for-age. Wasting is also quite a serious problem in India, affecting 20 percent of children under five years of age. Very few children under five years of age are overweight. Less than 2 percent have a weight-for-height estimate more than two standard deviations above the median for the reference population and less than 1 percent are more than two standard deviations above the median on the weight-for-age indicator.

The proportion of children who are stunted or underweight increases rapidly with the child's age through age 20-23 months (see Figure 10.1). Undernutrition decreases thereafter for stunting and levels off for underweight. For both of these measures, undernutrition peaks at age 20 months. Wasting generally decreases throughout the age range. Even during the first six months of life, when most babies are breastfed, 20-30 percent of children are undernourished

Table 10.1 Nutritional status of children

Percentage of children under age five years classified as malnourished according to three anthropometric indices of nutritional status: height-for-age, weight-for-height, and weight-for-age, by background characteristics, India, 2005-06

Background characteristic	Height-for-age			Weight-for-height				Weight-for-age				Number of children
	Percent-age below -3 SD	Percent-age below -2 SD ¹	Mean Z-score (SD)	Percent-age below -3 SD	Percent-age below -2 SD ¹	Percent-age above +2 SD	Mean Z-score (SD)	Percent-age below -3 SD	Percent-age below -2 SD ¹	Percent-age above +2 SD	Mean Z-score (SD)	
Age in months												
<6	8.4	20.4	-0.6	13.1	30.3	4.1	-1.2	10.9	29.5	1.0	-1.4	3,845
6-8	10.8	25.9	-1.0	10.1	29.3	3.1	-1.1	13.7	34.7	0.6	-1.5	2,570
9-11	12.8	32.0	-1.2	10.9	28.9	1.6	-1.2	14.1	36.7	0.2	-1.6	2,086
12-17	21.7	46.9	-1.8	7.3	23.3	1.7	-1.1	14.2	40.2	0.3	-1.7	4,642
18-23	30.4	57.8	-2.2	7.6	22.2	1.1	-1.1	19.5	45.9	0.2	-1.9	4,636
24-35	28.9	55.9	-2.2	5.0	16.7	0.9	-1.0	17.7	44.9	0.4	-1.9	9,335
36-47	27.8	54.3	-2.1	4.7	15.5	1.0	-0.9	16.6	45.6	0.2	-1.9	9,780
48-59	23.9	50.3	-2.0	4.1	15.7	1.3	-1.0	15.3	44.8	0.3	-1.9	9,762
Sex												
Male	23.9	48.1	-1.9	6.8	20.5	1.7	-1.0	15.3	41.9	0.4	-1.8	24,346
Female	23.4	48.0	-1.9	6.1	19.1	1.4	-1.0	16.4	43.1	0.3	-1.8	22,309
Birth interval in months²												
First birth ³	18.0	41.1	-1.6	5.4	17.8	2.0	-0.9	12.1	36.1	0.5	-1.6	13,546
<24	30.4	55.6	-2.2	6.1	18.9	1.4	-1.0	19.0	47.6	0.1	-2.0	8,448
24-47	26.0	51.2	-2.0	7.3	21.8	1.2	-1.1	17.9	46.2	0.3	-1.9	16,976
48+	20.9	44.7	-1.7	6.9	20.4	1.7	-1.1	14.5	40.3	0.5	-1.7	6,367
Birth order²												
1	17.9	41.0	-1.6	5.4	17.8	1.9	-0.9	12.0	36.1	0.5	-1.6	13,473
2-3	22.2	47.8	-1.8	6.3	19.6	1.6	-1.0	14.4	41.4	0.3	-1.8	20,032
4-5	30.4	54.3	-2.1	7.6	21.8	1.0	-1.1	21.2	49.9	0.2	-2.0	7,640
6+	37.2	61.0	-2.3	8.7	24.5	0.9	-1.2	26.3	56.6	0.3	-2.2	4,192
Size at birth²												
Very small	28.2	53.4	-2.1	9.6	28.7	1.0	-1.3	23.6	54.0	0.3	-2.1	2,533
Small	27.3	53.9	-2.0	8.2	25.8	1.5	-1.2	20.5	51.5	0.2	-2.0	6,664
Average or larger	22.7	46.5	-1.8	5.9	18.2	1.6	-1.0	14.5	40.1	0.4	-1.7	35,575
Residence												
Urban	17.6	39.6	-1.6	5.7	16.9	2.5	-0.8	10.8	32.7	0.6	-1.5	11,337
Rural	25.6	50.7	-2.0	6.7	20.7	1.2	-1.1	17.5	45.6	0.3	-1.9	35,318
Mother's education⁴												
No education	31.6	57.2	-2.2	8.0	22.7	1.1	-1.2	22.1	52.0	0.2	-2.1	22,730
<5 years complete	24.1	50.4	-1.9	6.2	20.8	1.1	-1.1	15.6	45.8	0.2	-1.9	3,361
5-7 years complete	20.3	45.6	-1.8	5.5	18.8	1.8	-1.0	12.3	38.5	0.4	-1.7	6,748
8-9 years complete	15.6	40.7	-1.6	5.2	17.5	1.9	-0.9	9.4	34.9	0.3	-1.6	5,514
10-11 years complete	10.9	33.0	-1.4	3.9	14.3	2.2	-0.8	6.5	26.8	0.9	-1.3	3,530
12 or more years complete	7.0	21.9	-1.0	4.0	12.8	2.6	-0.6	4.5	17.9	0.8	-1.0	3,995
Religion												
Hindu	23.4	48.0	-1.9	6.6	20.3	1.5	-1.0	16.1	43.2	0.3	-1.8	36,675
Muslim	26.2	50.3	-2.0	6.1	18.4	1.6	-0.9	15.6	41.8	0.4	-1.8	7,758
Christian	17.9	39.0	-1.5	5.1	15.5	3.1	-0.7	8.7	29.7	0.9	-1.4	929
Sikh	13.4	29.8	-1.3	2.8	11.0	1.9	-0.6	7.8	22.0	0.7	-1.1	619
Buddhist/Neo-Buddhist	23.2	56.1	-1.9	7.0	21.0	3.1	-0.9	14.7	39.2	0.8	-1.7	316
Jain	5.9	31.2	-1.2	5.2	15.8	0.8	-0.9	6.6	24.0	0.0	-1.3	78
Other	34.0	58.5	-2.2	10.5	33.6	1.3	-1.5	35.4	62.7	0.1	-2.4	233
Caste/tribe												
Scheduled caste	27.6	53.9	-2.1	6.6	21.0	1.3	-1.1	18.5	47.9	0.3	-1.9	9,531
Scheduled tribe	29.1	53.9	-2.1	9.3	27.6	1.5	-1.3	24.9	54.5	0.4	-2.1	4,448
Other backward class	24.5	48.8	-1.9	6.6	20.0	1.3	-1.0	15.7	43.2	0.3	-1.8	18,969
Other	17.8	40.7	-1.6	5.2	16.3	2.1	-0.8	11.1	33.7	0.5	-1.5	13,351
Don't know	22.3	45.8	-1.8	3.1	14.1	1.4	-0.9	16.3	35.1	0.0	-1.7	193
Mother's interview status												
Interviewed	23.7	48.1	-1.9	6.5	19.9	1.5	-1.0	15.9	42.6	0.4	-1.8	45,337
Not interviewed but in household	22.8	47.5	-1.7	7.9	18.0	0.3	-1.0	14.9	38.5	0.3	-1.7	541
Not interviewed and not in household ⁵	20.7	45.3	-1.7	4.8	16.4	2.3	-0.9	13.1	36.9	1.0	-1.6	778
Mother's nutritional status												
Underweight (BMI < 18.5)	27.3	53.5	-2.1	7.9	25.2	1.1	-1.3	20.9	52.0	0.2	-2.1	17,656
Normal (BMI 18.5-24.9)	22.5	46.3	-1.8	5.9	17.4	1.7	-0.9	13.6	38.7	0.4	-1.7	24,510
Overweight (BMI ≥ 25)	12.0	31.2	-1.3	2.7	9.3	3.0	-0.5	4.6	20.1	1.0	-1.1	3,159
Mother not measured	28.9	51.7	-1.9	7.7	19.6	1.4	-0.9	19.6	41.3	0.3	-1.7	524

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Table 10.1 Nutritional status of children—Continued

Background characteristic	Height-for-age			Weight-for-height				Weight-for-age				Number of children
	Percent-age below -3 SD	Percent-age below -2 SD ¹	Mean Z-score (SD)	Percent-age below -3 SD	Percent-age below -2 SD ¹	Percent-age above +2 SD	Mean Z-score (SD)	Percent-age below -3 SD	Percent-age below -2 SD ¹	Percent-age above +2 SD	Mean Z-score (SD)	
Child's living arrangements												
Living with both parents	23.9	48.4	-1.9	6.4	19.6	1.5	-1.0	15.9	42.8	0.3	-1.8	38,020
Living with mother (not father)	23.0	46.6	-1.8	7.0	21.2	1.8	-1.0	15.7	41.6	0.4	-1.8	7,858
Living with father (not mother)	25.5	52.4	-1.9	6.8	18.8	3.8	-1.1	19.4	42.4	0.9	-1.8	154
Living with neither parent	19.5	43.5	-1.7	4.3	15.8	1.9	-0.9	11.5	35.6	1.0	-1.6	624
Wealth index												
Lowest	34.2	59.9	-2.3	8.7	25.0	1.0	-1.2	24.9	56.6	0.2	-2.2	11,689
Second	27.9	54.3	-2.1	6.7	22.0	1.1	-1.1	19.4	49.2	0.2	-2.0	10,398
Middle	23.1	48.9	-1.9	6.2	18.8	1.3	-1.0	14.1	41.4	0.3	-1.8	9,449
Fourth	16.5	40.8	-1.6	5.0	16.6	2.1	-0.9	9.5	33.6	0.5	-1.5	8,543
Highest	8.2	25.3	-1.1	4.2	12.7	2.7	-0.7	4.9	19.7	0.8	-1.1	6,577
Total	23.7	48.0	-1.9	6.4	19.8	1.5	-1.0	15.8	42.5	0.4	-1.8	46,655

Note: Table is based on children who stayed in the household the night before the interview. Each of the indices is expressed in standard deviation units (SD) from the median of the 2006 WHO International Reference Population. Table is based on children with valid dates of birth (month and year) and valid measurement of both height and weight. Total includes births with missing information on size at birth, religion, and caste/tribe, who are not shown separately.

¹ Includes children who are below -3 standard deviations (SD) from the International Reference Population median.

² Excludes children whose mothers were not interviewed.

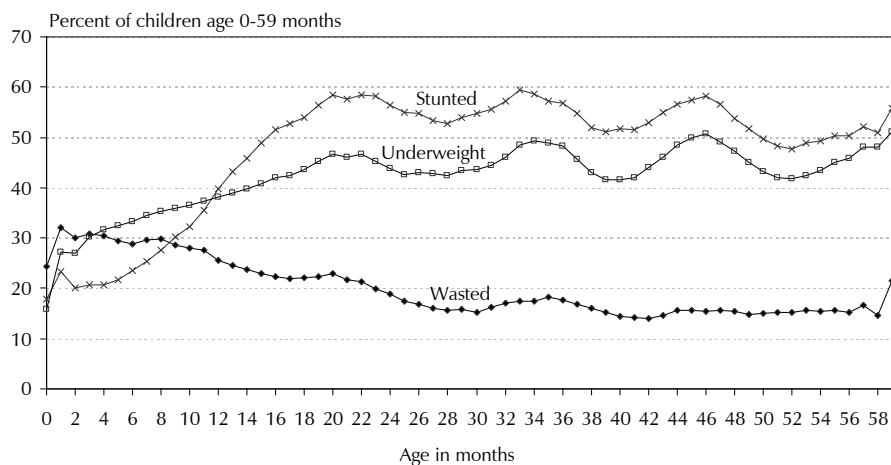
³ First born twins (triplets, etc.) are counted as first births because they do not have a previous birth interval.

⁴ For women who are not interviewed, information is taken from the Household Questionnaire. Excludes children whose mothers are not listed in the household schedule.

⁵ Includes children whose mothers are deceased.

according to the three nutritional indices. It is notable that at age 18-23 months, when many children are being weaned from breast milk, 30 percent of children are severely stunted and one-fifth are severely underweight.

Figure 10.1 Nutritional Status of Children



NFHS-3, India, 2005-06

Overall, girls and boys are about equally undernourished. Undernutrition is generally lower for first births than for subsequent births and consistently increases with increasing birth order for all measures of nutritional status. Short birth intervals are associated with higher levels of undernutrition, except in the case of wasting.

Undernutrition is substantially higher in rural areas than in urban areas. Even in urban areas, however, 40 percent of children are stunted and 33 percent are underweight. Children who are judged by their mother to have been small or very small at the time of birth are more likely to be undernourished than those who were average size or larger. Undernutrition has a strong negative relationship with the mother's education. The percentage of children who are severely underweight is almost five times as high for children whose mothers have no education as for children whose mothers have 12 or more years of education. Hindu and Muslim children are about equally likely to be undernourished, but Christian, Sikh, and Jain children are considerably better nourished. Children belonging to scheduled castes, scheduled tribes, or other backward classes have relatively high levels of undernutrition according to all three measures. Children from scheduled tribes have the poorest nutritional status on almost every measure, and the high prevalence of wasting in this group (28 percent) is of particular concern. There is not much difference in nutritional status for children by whether or not the mother was interviewed, but it is interesting to note that children who do not live with either parent have slightly better nutritional status than those who live with both parents or with only one parent.

The nutritional status of children is strongly related to maternal nutritional status. Undernutrition is much more common for children of mothers whose body mass index is below 18.5 than for children whose mothers are not underweight. All of the measures decrease steadily with an increase in the wealth index of the household. Children from households with a low standard of living are twice as likely to be undernourished as children from households with a high standard of living.

Inadequate nutrition is a problem throughout India, but the situation is considerably better in some states than in others. Table 10.2 shows that undernutrition is most pronounced in Madhya Pradesh, Bihar, and Jharkhand. Nutritional problems are also substantially higher than average in Meghalaya and (for stunting) in Uttar Pradesh. Nutritional problems are least evident in Mizoram, Sikkim, Manipur, and Kerala, and low levels of undernutrition are also notable in Goa and Punjab. Even in these states, however, levels of undernutrition are unacceptably high.

Table 10.2 Nutritional status of children by state

Percentage of children under age five years classified as malnourished according to three anthropometric indices of nutritional status: height-for-age, weight-for-height, and weight-for-age, according to state, India, 2005-06

State	Height-for-age			Weight-for-height				Weight-for-age			
	Percent-age below -3 SD	Percent-age below -2 SD ¹	Mean Z-score (SD)	Percent-age below -3 SD	Percent-age below -2 SD ¹	Percent-age above +2 SD	Mean Z-score (SD)	Percent-age below -3 SD	Percent-age below -2 SD ¹	Percent-age above +2 SD	Mean Z-score (SD)
India	23.7	48.0	-1.9	6.4	19.8	1.5	-1.0	15.8	42.5	0.4	-1.8
North											
Delhi	20.4	42.2	-1.6	7.0	15.4	4.0	-0.5	8.7	26.1	1.0	-1.3
Haryana	19.4	45.7	-1.8	5.0	19.1	1.4	-1.0	14.2	39.6	0.2	-1.7
Himachal Pradesh	16.0	38.6	-1.5	5.5	19.3	1.1	-1.0	11.4	36.5	0.5	-1.6
Jammu & Kashmir	14.9	35.0	-1.3	4.4	14.8	2.3	-0.7	8.2	25.6	0.5	-1.3
Punjab	17.3	36.7	-1.5	2.1	9.2	1.5	-0.5	8.0	24.9	0.5	-1.2
Rajasthan	22.7	43.7	-1.7	7.3	20.4	1.6	-1.1	15.3	39.9	0.4	-1.7
Uttaranchal	23.1	44.4	-1.8	5.3	18.8	2.3	-0.9	15.7	38.0	0.3	-1.7
Central											
Chhattisgarh	24.8	52.9	-2.0	5.6	19.5	1.3	-1.1	16.4	47.1	0.0	-1.9
Madhya Pradesh	26.3	50.0	-2.0	12.6	35.0	1.0	-1.6	27.3	60.0	0.1	-2.3
Uttar Pradesh	32.4	56.8	-2.2	5.1	14.8	1.2	-0.8	16.4	42.4	0.1	-1.8
East											
Bihar	29.1	55.6	-2.1	8.3	27.1	0.3	-1.4	24.1	55.9	0.1	-2.2
Jharkhand	26.8	49.8	-1.9	11.8	32.3	0.6	-1.5	26.1	56.5	0.2	-2.2
Orissa	19.6	45.0	-1.7	5.2	19.5	1.7	-1.0	13.4	40.7	0.5	-1.7
West Bengal	17.8	44.6	-1.7	4.5	16.9	1.9	-0.9	11.1	38.7	0.5	-1.6
Northeast											
Arunachal Pradesh	21.7	43.3	-1.6	6.1	15.3	3.4	-0.7	11.1	32.5	0.6	-1.4
Assam	20.9	46.5	-1.8	4.0	13.7	1.2	-0.8	11.4	36.4	0.3	-1.6
Manipur	13.1	35.6	-1.4	2.1	9.0	2.2	-0.6	4.7	22.1	0.5	-1.2
Meghalaya	29.8	55.1	-2.0	19.9	30.7	2.6	-1.2	27.7	48.8	0.2	-2.0
Mizoram	17.7	39.8	-1.6	3.5	9.0	4.3	-0.3	5.4	19.9	1.2	-1.1
Nagaland	19.3	38.8	-1.4	5.2	13.3	4.7	-0.5	7.1	25.2	0.8	-1.2
Sikkim	17.9	38.3	-1.4	3.3	9.7	8.3	-0.1	4.9	19.7	1.3	-0.9
Tripura	14.7	35.7	-1.5	8.6	24.6	2.2	-1.2	15.7	39.6	0.1	-1.7
West											
Goa	10.2	25.6	-1.1	5.6	14.1	4.3	-0.7	6.7	25.0	1.9	-1.1
Gujarat	25.5	51.7	-2.0	5.8	18.7	1.2	-1.0	16.3	44.6	0.1	-1.8
Maharashtra	19.1	46.3	-1.8	5.2	16.5	2.8	-0.9	11.9	37.0	0.9	-1.6
South											
Andhra Pradesh	18.7	42.7	-1.7	3.5	12.2	2.2	-0.7	9.9	32.5	0.6	-1.5
Karnataka	20.5	43.7	-1.7	5.9	17.6	2.6	-1.0	12.8	37.6	0.5	-1.6
Kerala	6.5	24.5	-1.1	4.1	15.9	1.2	-0.9	4.7	22.9	0.4	-1.2
Tamil Nadu	10.9	30.9	-1.1	8.9	22.2	3.6	-1.0	6.4	29.8	1.9	-1.3

Note: Table is based on children who stayed in the household the night before the interview. Each of the indices is expressed in standard deviation units (SD) from the median of the 2006 WHO International Reference Population. Table is based on children with valid dates of birth (month and year) and valid measurements of both height and weight.

¹ Includes children who are below -3 standard deviations (SD) from the International Reference Population median.

In NFHS-2, the nutritional status of children was measured only for the last two children under three years of age of ever-married women who were interviewed, whereas in NFHS-3 all children in the household under five years of age were eligible to be measured. Therefore, in comparing nutritional indicators in the two surveys, it is necessary to restrict the calculations to the NFHS-2 criteria for eligibility (as has been done in Table 10.3 and Figure 10.2). The proportion of children under three years of age who are underweight decreased from 43 percent in NFHS-2 to 40 percent in NFHS-3, and the proportion severely underweight decreased from 18 percent to 16 percent. Stunting decreased by a larger margin, from 51 percent to 45 percent. Severe stunting also decreased, from 28 percent to 22 percent. However, the improvement in height-for-age combined with a somewhat slower improvement in weight-for-age actually produced an increase in wasting and severe wasting over time. The decrease in stunting over time was greater in rural areas than urban areas. The prevalence of underweight in children who were underweight decreased slightly more in urban areas than rural areas, but there was very little improvement in the percentage of children who were severely underweight in urban areas.

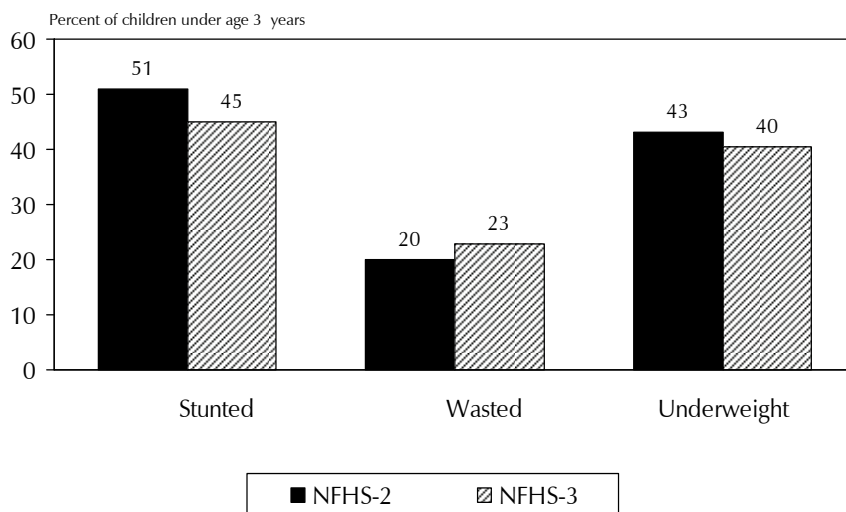
Table 10.3 Trends in nutritional status of children

Percentage of children under age three years born to ever-married women classified as malnourished according to three anthropometric indices of nutritional status: height-for-age, weight-for-height, and weight-for-age, by residence, India, NFHS-3 and NFHS-2

Measure of nutrition	NFHS-3 (2005-06)			NFHS-2 (1998-99)		
	Urban	Rural	Total	Urban	Rural	Total
Height-for-age						
Percentage below -3 SD	16.4	23.8	22.0	19.7	30.2	27.7
Percentage below -2 SD ¹	37.4	47.2	44.9	41.1	54.0	51.0
Weight-for-height						
Percentage below -3 SD	6.8	8.3	7.9	5.3	7.1	6.7
Percentage below -2 SD ¹	19.0	24.1	22.9	16.3	20.7	19.7
Weight-for-age						
Percentage below -3 SD	10.6	17.4	15.8	11.3	19.6	17.6
Percentage below -2 SD ¹	30.1	43.7	40.4	34.1	45.3	42.7
Number of children	6,436	20,105	26,541	5,741	18,475	24,215

Note: Table is based on children who stayed in the household the night before the interview. Each of the indices is expressed in standard deviation units (SD) from the median of the 2006 WHO International Reference Population. Table is based on children with valid dates of birth (month and year) and valid measurements of both height and weight.
¹ Includes children who are below -3 standard deviations (SD) from the International Reference Population median.

Figure 10.2 Trends in Nutritional Status of Children



10.2 BREASTFEEDING AND SUPPLEMENTATION

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 the duration and intensity of breastfeeding. Proper infant feeding, starting from the time of birth, is important for the physical and mental development of children. 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.

10.2.1 Initiation of Breastfeeding

The Government of India recommends that initiation of breastfeeding should begin immediately after childbirth, preferably within one hour (Ministry of Women and Child Development, 2006). Early initiation of breastfeeding is encouraged for a number of reasons. Mothers benefit from early suckling because it stimulates breast milk production and facilitates the release of oxytocin, which helps the contraction of the uterus and reduces postpartum blood loss. The first breast milk (colostrum) is highly nutritious and has antibodies that protect the newborn from diseases. Late initiation of breastfeeding not only deprives the child of valuable colostrum, but becomes a reason for introduction of prelacteal feeds (that is, something other than breast milk) like glucose water, honey, *ghutti*, animal milk, or powdered milk that are potentially harmful and contribute to diarrhoea in the newborn.

In NFHS-3, data on breastfeeding and complementary feeding were obtained from a series of questions in the Women's Questionnaire. These questions were asked for all children born since January of the fifth calendar year before the survey, but the tables are restricted to children born in the five years preceding the survey.

Tables 10.4 and 10.5 show the percentage of children born during the five years before the survey who were ever breastfed and who started breastfeeding soon after birth. These tables also give the percentage of children who received a prelacteal feed during the first three days after delivery.

Although breastfeeding is nearly universal in India, very few children are put to the breast immediately after birth. Ninety-six percent of children under age five have ever been breastfed, but only one-quarter of last-born children who were ever breastfed started breastfeeding within one hour of birth, as is recommended (Table 10.4). Almost half (45 percent) did not start breastfeeding within one day of birth. Timely initiation of breastfeeding was not common for any group, but it was highest for children born to urban women, more educated women, Christian and Buddhists/Neo-Buddhist women, and women whose birth was attended by health personnel, children not born at home, and children born to women in households in the highest wealth quintile. Ever-breastfed children were least likely to be put to the breast within the first hour after birth if the mother was Sikh, if she was not educated, or if the baby was delivered by a *dai*.

Most mothers (57 percent) gave their last-born child something to drink other than breast milk in the three days after delivery. Prelacteal feeds were more common in rural areas than in urban areas, and among women with no education, Muslims, Sikhs, OBCs, women in the lowest two wealth quintiles, and women whose child was born at home or whose birth was assisted by someone other than health personnel.

Table 10.4 Initial breastfeeding

Percentage of children born in the five years preceding the survey who were ever breastfed, and for last-born children born in the five years preceding the survey who were ever breastfed, percentage who started breastfeeding within half an hour, one hour, and one day of birth and percentage who received a prelacteal feed, by background characteristics, India, 2005-06

Background characteristic	Percentage ever breastfed	Number of children	Percentage who started breastfeeding:			Percentage who received a prelacteal feed ³	Number of last-born ever breastfed children
			Within half an hour of birth	Within one hour of birth ¹	Within one day of birth ²		
Residence							
Urban	96.0	14,303	29.4	30.3	64.5	50.2	10,333
Rural	95.7	42,135	21.4	22.4	51.9	59.8	28,255
Sex							
Male	95.6	29,415	23.7	24.7	55.5	57.3	20,775
Female	95.9	27,022	23.4	24.3	55.0	57.0	17,813
Mother's education							
No education	95.5	28,237	15.9	16.7	43.1	67.5	18,251
<5 years complete	95.4	4,100	27.6	28.6	61.4	51.7	2,791
5-7 years complete	96.0	8,189	27.0	27.9	61.8	51.4	5,690
8-9 years complete	95.8	6,723	31.6	32.8	67.7	46.9	4,773
10-11 years complete	96.0	4,282	33.3	34.4	69.8	45.7	3,166
12 or more years complete	96.7	4,905	33.5	34.6	71.6	43.4	3,915
Religion							
Hindu	95.7	44,152	23.4	24.4	55.0	57.2	30,434
Muslim	96.1	9,641	21.3	21.7	52.6	62.4	6,325
Christian	95.9	1,109	48.7	49.5	82.5	25.7	790
Sikh	93.3	716	12.3	13.1	49.6	61.9	483
Buddhist/Neo-Buddhist	94.2	377	49.9	50.9	79.5	25.1	245
Jain	100.0	87	22.5	23.1	74.0	38.5	76
Other	95.5	306	18.9	19.6	60.5	46.1	198
Caste/tribe							
Scheduled caste	95.3	11,693	21.9	23.2	51.8	59.1	7,709
Scheduled tribe	96.6	5,442	27.8	28.5	62.6	43.2	3,671
Other backward class	95.9	22,716	21.1	21.9	50.2	62.7	15,471
Other	95.5	16,176	26.3	27.2	61.9	53.5	11,432
Don't know	97.9	220	31.4	32.1	67.9	45.2	158
Assistance at delivery							
Health personnel ⁴	95.7	26,293	31.0	32.1	68.1	45.7	19,150
Dai (TBA)	95.7	20,618	14.7	15.4	43.4	69.2	13,331
Other/no one	96.0	9,449	19.7	20.5	41.4	67.3	6,087
Place of delivery							
Health facility	95.5	21,570	33.0	34.0	71.3	42.6	15,746
At home	95.9	34,461	16.9	17.8	44.1	67.5	22,578
Other	93.6	340	30.9	31.4	65.7	47.7	249
Wealth index							
Lowest	96.0	14,377	17.2	17.9	45.3	64.9	9,321
Second	95.2	12,654	19.7	20.6	47.1	63.3	8,348
Middle	95.6	11,181	25.6	26.4	57.1	55.4	7,579
Fourth	95.9	10,154	27.7	29.0	64.4	51.0	7,052
Highest	96.1	8,072	31.0	32.1	68.7	46.9	6,288
Total	95.7	56,438	23.6	24.5	55.3	57.2	38,588

Note: Table is based on children born in the last five years whether the children are living or dead at the time of interview. Total includes children with missing information on mother's education, religion, caste/tribe, assistance at delivery, and place of delivery, who are not shown separately.

TBA = Traditional birth attendant

¹ Includes children who started breastfeeding within half an hour of birth.

² Includes children who started breastfeeding within half an hour and one hour of birth.

³ Children given something other than breast milk during the first three days of life.

⁴ Doctor, nurse, midwife, auxiliary nurse midwife, lady health visitor, or other health personnel.

Mothers who gave their child anything to drink other than breast milk in the three days after delivery were asked what was given to the child. By far, the most common prelacteal liquid is milk other than breast milk (Figure 10.3). Other common prelacteal liquids are honey (often given as part of a blessing ceremony), sugar or glucose water, and plain water.

Figure 10.3 Prelacteal Liquids

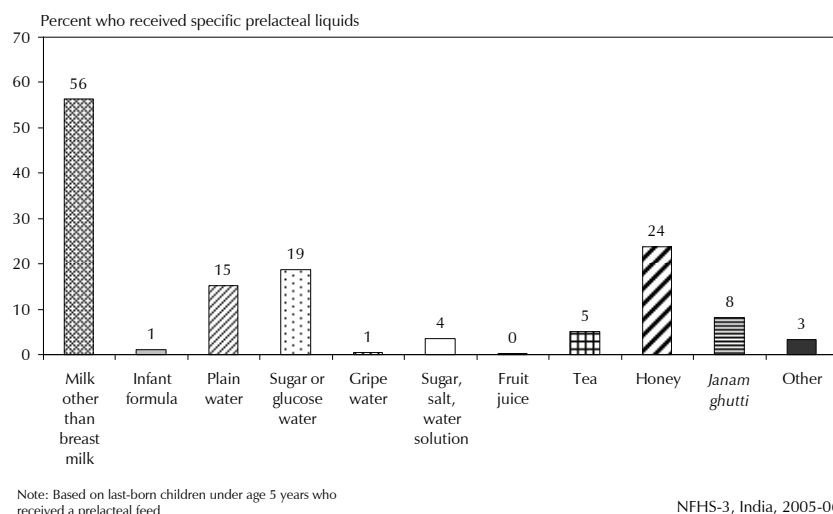


Table 10.5 presents data on feeding practices for individual states. The percentage of children under age five who were ever breastfed is almost universal in every state, with a slightly lower percentage in Uttaranchal (90 percent) and Himachal Pradesh (92 percent). There is considerable variation, however, in the amount of time after birth that breastfeeding started. The percentage who started breastfeeding with one hour of birth ranges from 4 percent in Bihar and 7 percent in Uttar Pradesh to 66 percent in Mizoram. The majority of women in most states in the Northeast and West Regions, and in Tamil Nadu, Kerala, and Orissa begin breastfeeding their baby within one hour of birth. In those regions, at least 75 percent of mothers start breastfeeding within one day of delivery in almost every state. Prelacteal feeding also varies substantially from one state to another. Prelacteal feeding is most common in Bihar (91 percent) and Uttar Pradesh (86 percent) and least common in Kerala and Sikkim (11-12 percent).

Table 10.5 Initial breastfeeding by state

Percentage of children born in the five years preceding the survey who were ever breastfed, and for last-born children born in the five years preceding the survey who were ever breastfed, percentage who started breastfeeding within half an hour, one hour, and one day of birth and percentage who received a prelacteal feed, according to state, India, 2005-06

State	Among last-born children born in the last 5 years who were ever breastfed				
	Percentage ever breastfed	Percentage who started breastfeeding:			Percentage who received a prelacteal feed ³
		Within half an hour of birth	Within one hour of birth ¹	Within one day of birth ²	
India	95.7	23.6	24.5	55.3	57.2
North					
Delhi	95.6	21.0	21.0	67.9	45.5
Haryana	95.8	19.2	22.1	63.0	53.9
Himachal Pradesh	92.3	44.1	45.4	77.6	21.7
Jammu & Kashmir	95.2	31.5	31.6	72.3	36.6
Punjab	94.1	11.4	12.7	44.5	62.9
Rajasthan	96.0	13.7	14.1	54.0	71.6
Uttaranchal	90.1	30.0	33.5	71.0	44.9
Central					
Chhattisgarh	96.3	22.7	25.0	63.6	23.3
Madhya Pradesh	95.7	14.7	15.9	52.6	58.1
Uttar Pradesh	96.0	7.2	7.3	23.7	86.0
East					
Bihar	94.4	2.8	3.7	30.0	90.6
Jharkhand	95.4	10.3	10.7	45.1	66.3
Orissa	94.6	50.7	54.8	82.3	42.1
West Bengal	96.2	22.5	23.5	72.9	47.8
Northeast					
Arunachal Pradesh	95.5	58.1	58.6	87.0	16.7
Assam	96.4	49.5	50.9	74.7	32.7
Manipur	96.0	57.4	57.8	79.8	37.5
Meghalaya	96.5	57.2	57.8	90.8	31.2
Mizoram	98.0	66.1	66.4	90.6	23.3
Nagaland	96.1	54.1	54.2	82.9	53.8
Sikkim	98.1	42.7	42.9	88.4	12.3
Tripura	97.1	33.7	34.6	77.1	36.4
West					
Goa	96.7	59.1	59.4	82.0	38.3
Gujarat	96.8	25.2	27.8	58.0	57.3
Maharashtra	97.1	51.5	52.0	78.4	32.2
South					
Andhra Pradesh	95.5	24.4	24.6	58.1	42.7
Karnataka	96.3	35.1	35.7	74.6	29.2
Kerala	97.4	56.1	56.5	95.7	10.8
Tamil Nadu	94.5	57.7	58.8	91.0	20.6

Note: Table is based on births in the last five years whether the children are living or dead at the time of interview.

¹ Includes children who started breastfeeding within half an hour of birth.

² Includes children who started breastfeeding within half an hour and one hour of birth.

³ Children given something other than breast milk during the first three days of life.

10.2.2 Breastfeeding Status by Age

The Government of India recommends that children should be exclusively breastfed for the first six months of life (that is, the child should be given only breast milk and nothing else, not even water) and that children should be given appropriate and adequate complementary feeding in addition to continued breastfeeding from six months of age (Ministry of Women and

Child Development, 2006). Exclusive breastfeeding is recommended because breast milk is uncontaminated and contains all the nutrients necessary for children in the first few months of life. In addition, the mother's antibodies in breast milk give the child considerable immunity to diseases. Early supplementation is discouraged for several reasons. First, it exposes infants to pathogens and increases their risk of infection, especially disease. Second, it decreases infants' intake of breast milk and therefore suckling, which reduces breast milk production. Third, in a harsh socioeconomic environment, supplementary food is often nutritionally inferior.

The purpose of complementary feeding is to complement the breast milk and sustain the growth and development of the child. Information on supplementation was obtained by asking mothers about the current breastfeeding status of all children under five years of age and, for the youngest child born in the three-year period before the survey and living with the mother, about food (liquids or solids) given to the child the day before the survey.

Table 10.6 shows the percent distribution of youngest children less than three years of age living with the mother by breastfeeding status and the percentage of all children under three years of age using a bottle with a nipple, according to age in months. Children who received nothing but breast milk during the previous day or night are classified as being exclusively breastfed. Only 69 percent of children under two months of age are exclusively breastfed. Exclusive breastfeeding drops to 51 percent at 2-3 months of age and 28 percent at 4-5 months of age. Overall, slightly less than half of children under six months of age are exclusively breastfed. Twenty-two percent of children under six months of age received only breast milk and plain water and 15 percent drank both breast milk and other milk.

Table 10.6 Breastfeeding status by age

Percent distribution of youngest children under three years living with the mother by breastfeeding status and percentage of all children under three years using a bottle with a nipple, according to age in months, India, 2005-06

Age in months	Not breast-feeding	Exclusively breastfed	Breastfeeding and consuming:				Total	Number of youngest children under three years	Percentage using a bottle with a nipple ¹	Number of children
			Plain water only	Non-milk liquids/juice	Other milk	Complementary foods				
<2	2.7	69.0	16.2	2.6	7.8	1.7	100.0	1,268	5.4	1,276
2-3	1.5	50.9	23.1	4.9	14.6	5.0	100.0	1,848	13.3	1,864
4-5	1.5	27.6	25.6	6.4	20.2	18.6	100.0	1,966	16.4	1,987
6-8	4.0	9.7	18.8	3.2	11.6	52.7	100.0	2,918	17.0	2,933
9-11	6.2	2.9	9.8	1.7	5.7	73.6	100.0	2,324	18.2	2,343
12-17	12.5	0.7	2.7	1.2	1.7	81.3	100.0	5,077	14.6	5,211
18-23	23.2	0.2	1.3	0.6	0.8	74.0	100.0	4,748	12.5	5,208
24-35	45.5	0.3	0.3	0.1	0.3	53.6	100.0	7,657	8.3	10,383
<4	2.0	58.3	20.3	4.0	11.8	3.7	100.0	3,115	10.1	3,140
<6	1.8	46.4	22.4	4.9	15.0	9.5	100.0	5,081	12.5	5,127
6-9	4.2	8.2	17.2	3.1	10.6	56.7	100.0	3,803	17.2	3,822
12-23	17.7	0.4	2.0	0.9	1.3	77.8	100.0	9,825	13.6	10,419

Note: Breastfeeding status refers to a "24-hour" period (yesterday and last night). Children who are classified as *breastfeeding and consuming plain water only* consumed no liquid or solid supplements. The categories of not breastfeeding, exclusively breastfed, breastfeeding and consuming plain water, non-milk liquids/juice, other milk, and complementary foods (solids and semi-solids) are hierarchical and mutually exclusive, and their percentages add to 100 percent. Thus any children who get complementary food are classified in that category as long as they are breastfeeding as well. Children who receive breast milk and non-milk liquids and who do not receive complementary foods are classified in the non-milk liquid category even though they may also get plain water.

¹ Based on all children under three years.

At age 6-8 months, only about half of children (53 percent) are given timely complementary feeding (breast milk and complementary food). The timely complementary feeding rate increases to 74 percent at age 9-11 months and 81 percent at age 12-17 months. The proportion of children given both breast milk and complementary foods decreases thereafter as children are weaned from the breast and their food consumption no longer supplements breast milk.

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. In India, the use of bottles with nipples is not common. Bottle feeding increases from 5 percent under age two months to 18 percent at age 9-11 months and declines at older ages.

10.2.3 Duration and Frequency of Breastfeeding

Both duration and frequency of breastfeeding can affect the length of postpartum amenorrhoea. It is important that breastfeeding is continued for two years or more because breast milk provides useful amounts of energy, good quality protein, and other nutrients. Table 10.7 shows the median duration of breastfeeding for last-born children born in the three years preceding the survey by background characteristics. The estimates of median durations of breastfeeding are based on current status data, that is, the proportion of last-born children in the three years preceding the survey who were being breastfed at the time of the survey. Information on current status is usually more accurate than information based on mother's recall. The median duration of any breastfeeding is 24 months. Supplementation begins relatively early, however. The median length of exclusive breastfeeding is only 2 months and the median length of predominant breastfeeding (that is, breastfeeding plus receiving plain water and/or non-milk liquids only) is 5 months. The median duration of breastfeeding is two months shorter for girls than for boys. The duration of breastfeeding is also shorter in urban areas, and it decreases steadily with the mother's education and the wealth index. The duration of breastfeeding is relatively high for children from scheduled castes and scheduled tribes.

Table 10.7 also shows that almost all breastfeeding children under six months old were fed six or more times during the day or night before the survey. The average number of feeds during the daylight hours ranges narrowly from 6.1 to 7.7. Similarly, the number of night-time feeds ranges from 5.3-6.3. On average, women breastfed their babies 12 times during the day and night before the survey.

The median durations and frequency of breastfeeding in each state are shown in Table 10.8. The median duration of breastfeeding is 20 months or more in every state except Tamil Nadu (16 months) and Nagaland (19 months). The longest median durations (more than 32 months) are in Orissa, Jharkhand, Manipur, West Bengal, Tripura, and Assam. Chhattisgarh has the longest median duration of exclusive breastfeeding. At least 89 percent of breastfeeding children under age six months were breastfed six or more times in the day and night before the survey in every state. The mean number of daytime feeds is between five and seven in 20 states and the mean number of night feeds is between four and six in 20 states. The number of times children were fed during the day and night preceding the survey is particularly high (18-19) in Orissa and Tripura.

Table 10.7 Median duration and frequency of breastfeeding

Median duration of any breastfeeding, exclusive breastfeeding, and predominant breastfeeding among last-born children born in the three years preceding the survey, percentage of breastfeeding children under six months of age living with the mother who were breastfed six or more times in the 24 hours preceding the survey, and mean number of feeds (day/night), by background characteristics, India, 2005-06

Background characteristic	Median duration (months) of breastfeeding among last-born children born in the last three years ¹				Frequency of breastfeeding among children under six months ²			
	Any breast-feeding	Exclusive breast-feeding	Predomi-nant breast-feeding ³	Number of children	Percentage breastfed 6+ times in last 24 hours	Mean number of day feeds	Mean number of night feeds	Number of children
Sex								
Male	25.4	2.1	5.1	17,335	96.7	6.7	5.6	2,462
Female	23.6	1.9	5.1	15,780	96.7	6.6	5.4	2,500
Residence								
Urban	22.0	1.7	4.2	8,357	95.9	6.5	5.3	1,188
Rural	25.7	2.1	5.4	24,757	97.0	6.7	5.5	3,774
Mother's education								
No education	26.5	2.0	5.9	15,989	96.6	6.5	5.3	2,366
<5 years complete	25.3	2.8	5.9	2,285	96.1	7.4	5.7	354
5-7 years complete	24.1	1.8	4.9	4,977	97.1	6.6	5.6	752
8-9 years complete	23.0	2.0	4.6	4,145	97.9	6.9	5.9	653
10-11 years complete	22.4	1.9	3.7	2,635	97.1	6.7	5.5	375
12 or more years complete	20.6	1.8	3.4	3,082	95.2	6.4	5.4	462
Religion								
Hindu	24.9	2.0	5.1	25,925	96.7	6.7	5.5	3,912
Muslim	23.8	2.0	5.3	5,616	97.5	6.6	5.3	837
Christian	21.8	2.6	4.4	663	98.4	6.8	6.3	90
Sikh	21.9	0.6	2.7	428	91.0	6.1	5.3	57
Buddhist/Neo-Buddhist	24.8	1.4	7.7	230	92.8	6.1	5.5	32
Jain	15.6	2.0	2.0	53	*	*	*	3
Other	0.0	2.0	6.1	167	94.3	7.7	5.6	26
Caste/tribe								
Scheduled caste	26.3	2.4	5.3	6,807	96.8	6.5	5.4	1,026
Scheduled tribe	26.1	2.9	6.2	3,161	96.1	6.8	5.6	502
Other backward class	23.9	1.7	5.2	13,366	97.2	6.6	5.3	2,042
Other	23.8	1.9	4.3	9,549	96.0	6.8	5.6	1,353
Wealth index								
Lowest	27.7	2.5	6.3	8,331	97.5	6.9	5.5	1,279
Second	25.8	2.3	5.5	7,432	97.0	7.0	5.8	1,143
Middle	25.0	1.8	5.2	6,518	96.5	6.4	5.3	1,007
Fourth	22.8	1.6	4.4	6,032	97.0	6.3	5.4	878
Highest	20.8	1.4	3.3	4,802	94.6	6.5	5.3	654
Total	24.4	2.0	5.1	33,114	96.7	6.6	5.5	4,962
Mean for all children	24.7	3.7	6.4	na	na	na	na	na

Note: Median and mean durations are based on current status. Table includes children living and deceased at the time of the survey. Total includes children whose mothers do not know their caste/tribe, and children with missing information on mother's education, religion, and caste/tribe, which are not shown separately.

na = Not applicable

* Figure not shown; based on fewer than 25 unweighted cases.

¹ It is assumed that children not currently living with the mother are not currently breastfeeding.

² Excludes children for whom there is not a valid answer on the number of times breastfed. The 24-hour period refers to the day and night preceding the survey.

³ Either exclusively breastfed or received breast milk and plain water and/or non-milk liquids only.

Table 10.8 Median duration and frequency of breastfeeding by state

Median duration of any breastfeeding, exclusive breastfeeding, and predominant breastfeeding among last-born children born in the three years preceding the survey, percentage of children under three years using a bottle with a nipple, percentage of breastfeeding children under six months of age living with the mother who were breastfed six or more times in the 24 hours preceding the survey, and mean number of feeds (day/night), according to state, India, 2005-06

State	Median duration (months) of breastfeeding among last-born children in the last three years ¹				Frequency of breastfeeding among children under six months ²		
	Any breast-feeding	Exclusive breast-feeding	Predomi- nant breast-feeding ³	Percentage using a bottle with a nipple	Percentage breastfed 6+ times in last 24 hours	Mean number of day feeds	Mean number of night feeds
India	24.4	2.0	5.1	6.5	96.7	6.6	5.5
North							
Delhi	21.2	1.1	2.6	15.0	89.4	5.8	4.5
Haryana	25.7	1.0	5.1	6.2	97.8	6.5	5.8
Himachal Pradesh	23.4	1.1	3.9	11.0	93.4	6.0	4.5
Jammu & Kashmir	21.9	0.6	0.7	11.8	92.1	5.8	3.7
Punjab	21.5	0.9	3.6	14.0	95.9	5.9	5.2
Rajasthan	23.6	1.4	7.1	5.0	94.6	5.2	4.2
Uttaranchal	25.0	0.7	3.1	16.8	88.7	5.5	5.4
Central							
Chhattisgarh	29.6	5.8	6.9	3.3	96.5	6.3	4.9
Madhya Pradesh	23.3	0.6	5.5	3.9	98.8	6.1	4.7
Uttar Pradesh	25.4	2.4	5.5	9.3	96.5	6.1	5.0
East							
Bihar	25.4	0.7	3.7	4.6	98.0	7.6	5.9
Jharkhand	34.8	2.9	5.6	3.4	96.6	7.0	4.7
Orissa	35.2	2.3	5.1	3.5	98.5	11.1	8.3
West Bengal	33.7	3.2	4.7	7.8	95.6	8.1	6.6
Northeast							
Arunachal Pradesh	29.8	3.0	4.1	4.0	98.8	8.0	6.5
Assam	32.8	3.5	4.8	2.0	99.3	6.8	5.6
Manipur	34.1	3.4	4.5	4.2	97.1	7.9	5.4
Meghalaya	20.7	0.7	2.5	9.2	98.5	6.8	6.3
Mizoram	21.2	2.0	5.1	8.1	98.4	7.8	7.8
Nagaland	18.9	0.6	3.4	9.7	97.2	6.3	5.3
Sikkim	28.1	0.7	3.1	8.8	98.1	7.2	5.0
Tripura	33.3	1.7	4.5	13.2	96.8	9.0	9.0
West							
Goa	20.4	0.5	0.7	22.4	89.9	5.4	4.5
Gujarat	22.9	2.1	5.2	3.9	95.5	6.6	5.8
Maharashtra	22.2	2.6	6.5	3.7	95.5	6.7	5.6
South							
Andhra Pradesh	23.2	3.5	4.9	4.2	99.8	5.6	6.4
Karnataka	20.5	3.1	4.1	6.5	95.9	6.1	4.9
Kerala	25.2	3.0	3.4	8.5	100.0	7.2	6.9
Tamil Nadu	15.5	1.1	2.5	12.1	99.2	6.8	6.0

Note: Median and mean durations are based on current status. Durations include children living and deceased at the time of the survey.

¹ It is assumed that children not currently living with the mother are not currently breastfeeding.

² Excludes children for whom there is not a valid answer on the number of times breastfed. The 24-hour period refers to the day and night preceding the survey.

³ Either exclusively breastfed or received breast milk and plain water, and/or non-milk liquids only.

10.2.4 Types of Supplemental Food

Table 10.9 shows the types of food given to the youngest child under three years of age living with the mother on the day and night preceding the survey, according to their breastfeeding status. For many breastfeeding children the introduction of liquids other than breast milk takes place earlier than the recommended age of six months. Even among the

youngest breastfeeding children (less than two months), 9 percent drink milk other than breast milk, 1 percent are given infant formula, and 4 percent consume other liquids. Two percent of breastfeeding children under two months of age are given solid or semi-solid food. Consumption of milk other than breast milk increases steadily through age 18-23 months and decreases slightly at age 24-35 months. For nonbreastfeeding children, consumption of milk other than breast milk decreases after 9-11 months of age. Consumption of other liquids generally increases with age for both breastfeeding and nonbreastfeeding children. By age 12-17 months, 45 percent of breastfeeding children are given other milk and 58 percent are given other liquids. Infant formula is not commonly given to breastfeeding children, but it is much more likely to be given to nonbreastfeeding children. More than one-quarter of nonbreastfeeding children age 4-11 months are given infant formula.

Table 10.9 Foods and liquids consumed by children in the day and night preceding the interview

Percentage of youngest children under age three years living with the mother who consumed specific types of foods in the day and night preceding the interview, by breastfeeding status and age, India, 2005-06

Age in months	Liquids			Solid or semi-solid foods										Number of children
	Infant formula	Other milk ¹	Other liquids ²	Fortified baby food	Food made from grains ³	Fruits and vegetables rich in vitamin A ⁴	Other fruits and vegetables	Food made from roots	Food made from beans, peas, lentils, nuts	Meat, fish, poultry, eggs	Cheese, yogurt, other milk products	Any solid or semi-solid food	Food made with oil, fat, ghee, butter	
BREASTFEEDING CHILDREN														
<2	0.7	8.5	3.9	0.7	0.9	0.4	0.2	0.4	0.2	0.3	0.4	1.7	0.2	1,234
2-3	3.1	15.1	8.7	2.4	2.4	0.2	0.2	0.1	0.1	0.1	0.4	5.1	0.2	1,819
4-5	6.2	27.1	14.8	7.3	11.5	1.6	1.1	1.1	1.1	0.5	1.8	18.9	0.7	1,935
6-8	10.0	35.7	28.8	15.2	43.9	7.4	4.5	4.3	3.8	2.1	5.6	54.8	3.9	2,801
9-11	11.9	42.1	39.2	17.5	69.6	22.0	8.8	13.1	11.1	6.6	8.7	78.4	8.5	2,178
12-17	8.7	45.4	58.1	14.5	86.6	39.7	17.9	28.0	16.4	13.0	11.5	92.9	16.3	4,444
18-23	7.2	49.1	64.1	13.7	89.8	48.8	21.1	32.6	19.0	16.0	12.6	96.3	17.6	3,646
24-35	6.1	46.2	71.4	11.8	93.3	56.0	26.1	41.1	22.5	20.0	12.9	98.3	22.6	4,175
6-23	9.1	43.8	50.4	14.9	75.5	32.4	14.4	21.7	13.5	10.4	10.1	83.3	12.7	13,069
Total	7.3	38.5	45.2	11.9	63.1	29.7	13.5	20.6	12.3	10.0	8.5	69.6	11.8	22,233
NON-BREASTFEEDING CHILDREN														
<2	(4.4)	(58.8)	(14.3)	(4.4)	(0.1)	(0.0)	(0.2)	(0.0)	(3.0)	(0.0)	(0.2)	(7.6)	(0.2)	34
2-3	(21.7)	(75.4)	(7.5)	(16.1)	(11.5)	(3.0)	(0.0)	(0.0)	(1.2)	(0.2)	(0.2)	(20.7)	(8.8)	28
4-5	(27.3)	(78.3)	(24.6)	(22.7)	(20.0)	(5.5)	(2.7)	(1.1)	(5.4)	(0.4)	(4.3)	(30.4)	(4.3)	30
6-8	28.9	82.5	44.9	37.2	58.6	9.4	11.1	6.7	10.5	2.6	16.1	75.1	3.1	117
9-11	30.1	82.7	54.1	35.3	80.2	26.2	17.8	21.6	17.1	11.1	11.9	91.9	17.8	145
12-17	19.1	82.4	66.5	22.8	91.7	44.0	20.4	24.5	16.6	15.7	18.2	95.3	20.5	633
18-23	13.5	69.3	65.7	17.6	91.2	56.1	23.7	33.6	23.4	19.0	18.3	97.3	21.9	1,102
24-35	9.9	63.3	76.0	14.1	94.2	59.3	30.0	35.7	24.6	22.7	19.4	99.0	24.0	3,482
6-23	17.4	75.2	63.9	21.7	88.6	47.4	21.5	28.3	20.1	16.4	17.7	95.0	20.0	1,997
Total	12.7	67.7	70.6	16.8	90.8	54.1	26.5	32.4	22.6	20.1	18.5	96.2	22.3	5,571

Note: Breastfeeding status and food consumed refer to a '24-hour' period (yesterday and last night).

() Based on 25-49 unweighted cases.

¹ Other milk includes tinned, powdered, and fresh animal milk.

² Does not include plain water.

³ Includes fortified baby food.

⁴ Includes pumpkin, carrots, sweet potatoes that are yellow or orange inside, dark green leafy vegetables, ripe mangoes, papayas, cantaloupe, or jackfruit.

WHO recommends the introduction of solid or semi-solid food to infants around the age of six months because by that age breast milk by itself is no longer sufficient to maintain a child's optimal growth. The percentage of breastfeeding children receiving solid or semisolid food increases with the age of the child. The largest increase is from 19 percent at age 4-5 months to 55 percent at 6-8 months. This rapid increase is consistent with the recommendation that solid or semi-solid food should be introduced around six months of age. Nevertheless, it is

disconcerting to note that even at 6-8 months of age, almost half of breastfeeding children are not given any solid or semi-solid food.

The most common types of solid or semi-solid foods fed to both breastfeeding and nonbreastfeeding children under three years of age are foods made from grains (including bread, *roti*, *chapati*, rice, noodles, biscuits, and *idli*), fruits and vegetables rich in vitamin A, and food made from roots (not including root foods that are yellow or orange inside). However, only one-third of breastfeeding children and half of nonbreastfeeding children age 6-23 months ate fruits and vegetables that are rich in vitamin A during the day or night before the survey. Only 10 percent of breastfeeding children and 20 percent of nonbreastfeeding children under three years of age consume meat, fish, poultry, or eggs. Milk products, such as cheese and yogurt, are even less likely to be given to young children, and foods made with oil, fat, *ghee*, or butter, are also not commonly given to young children. As expected, every type of solid or semi-solid food is more likely to be consumed by nonbreastfeeding children than breastfeeding children.

10.2.5 Infant and Young Child Feeding Practices

Tables 10.10 and 10.11 and Figure 10.4 provide information about adherence to appropriate feeding practices for the youngest child age 6-23 months living with the mother. The percentage of children who are fed with appropriate feeding practices is calculated on the basis of the number of food groups and the number of times the children were fed during the day or night preceding the survey. The results are shown separately for children who are breastfed and children who are not breastfed because appropriate feeding practices are different for these two groups. It is recommended that breastfeeding children age 6-23 months should be fed from three or more different food groups. Moreover, infants age 6-8 months should be fed at least twice a day and children age 9-23 months should be fed at least three times a day. Nonbreastfeeding children age 6-23 months should be fed milk or milk products every day; in addition, they should be fed from at least four food groups and they should be fed four or more times a day. Table 10.10 shows that only 44 percent of breastfed children are fed at least the minimum number of times recommended, but only half of them also consume food from three or more food groups. Feeding recommendations are even less likely to be followed for nonbreastfeeding children age 6-23 months. More than four out of five children in this group were given milk or milk products the day before the survey, but only 31 percent consumed food from four or more food groups, as recommended. Even fewer children (27 percent) are fed four or more times a day. Only 12 percent of nonbreastfed children are fed with all three infant and young child feeding (IYCF) practices. When breastfeeding and nonbreastfeeding children are combined, it is clear that most children age 6-23 months are not fed according to the IYCF recommendations. Only 21 percent are fed appropriately according to all three recommended IYCF practices. The percentage of children given food from the appropriate number of food groups and the percentage fed with all three IYCF practices increase steadily with age and the wealth index and generally increase with the mother's education. Feeding practices are somewhat better in urban areas than in rural areas. Feeding practices are better among Jains and Christians than among other religious groups. Among the caste/tribe groups, feeding practices are worst among scheduled tribes and scheduled castes. Differences in feeding practices for girls and boys are minor.

Table 10.10 Infant and young child feeding (IYCF) practices

Percentage of youngest children age 6-23 months living with the mother who are fed with appropriate feeding practices based upon number of food groups and times they are fed during the day or night preceding the survey by breastfeeding status and background characteristics, India, 2005-06

Background characteristic	Among breastfed children 6-23 months, percentage fed:				Among nonbreastfed children 6-23 months, percentage fed:					Among all children 6-23 months, percentage fed:				
	Three or more food groups ¹	Minimum number of times ²	3+ food groups and minimum number of times	Number of children	Milk or milk products ³	Four or more food groups ¹	Four or more times	With 3 IYCF practices ⁴	Number of children	Breast milk, or milk products ³	Appropriate number of food groups ⁵	Minimum times ⁶	With 3 IYCF practices	Number of children
Age in months														
6-8	10.3	40.7	9.2	2,801	88.4	6.0	21.6	5.4	117	99.5	10.1	39.9	9.0	2,918
9-11	26.0	28.8	13.5	2,178	91.3	20.0	15.6	5.0	145	99.5	25.6	28.0	13.0	2,324
12-17	44.5	45.1	25.6	4,444	88.5	31.1	26.1	13.3	633	98.6	42.9	42.7	24.0	5,077
18-23	51.3	53.3	32.9	3,646	75.8	35.2	28.9	12.7	1,102	94.4	47.5	47.6	28.2	4,748
Sex														
Male	36.2	43.2	21.8	6,944	81.5	33.3	28.7	13.5	1,036	97.6	35.8	41.3	20.7	7,979
Female	35.8	44.3	22.4	6,126	82.0	28.8	24.4	10.1	961	97.6	34.8	41.6	20.8	7,087
Residence														
Urban	42.1	48.4	27.2	3,024	85.4	35.1	25.3	13.7	833	96.8	40.6	43.4	24.3	3,857
Rural	34.1	42.3	20.6	10,046	79.1	28.3	27.5	10.5	1,163	97.8	33.5	40.8	19.5	11,209
Mother's education														
No education	28.5	40.3	17.2	6,417	71.4	19.9	23.0	6.1	671	97.3	27.7	38.7	16.2	7,088
<5 years complete	36.3	42.0	22.8	907	83.8	30.4	23.4	10.5	115	98.2	35.6	39.9	21.4	1,022
5-7 years complete	38.7	42.7	22.4	2,050	81.5	30.1	29.1	12.7	252	98.0	37.7	41.2	21.3	2,302
8-9 years complete	42.4	47.2	26.1	1,555	83.5	38.4	27.2	15.5	311	97.2	41.8	43.9	24.4	1,866
10-11 years complete	47.8	50.6	29.6	1,002	89.4	35.9	27.5	12.6	233	98.0	45.6	46.3	26.4	1,235
12 or more years complete	53.7	55.3	36.4	1,137	92.2	41.8	30.9	18.0	416	97.9	50.5	48.8	31.5	1,553
Religion														
Hindu	36.1	43.7	22.1	10,239	82.9	31.1	28.0	12.7	1,498	97.8	35.5	41.7	20.9	11,737
Muslim	34.8	42.8	21.0	2,206	77.5	29.2	21.2	8.3	372	96.8	34.0	39.7	19.2	2,578
Christian	44.9	60.9	34.9	255	74.3	39.9	32.7	12.3	66	94.7	43.9	55.1	30.2	321
Sikh	42.2	31.0	22.9	157	94.4	36.7	19.8	15.4	40	98.9	41.1	28.8	21.4	197
Buddhist/Neo-Buddhist	20.6	41.1	15.2	100	61.1	41.3	3.7	2.2	7	97.6	21.9	38.8	14.4	106
Jain	61.1	53.2	41.0	16	100.0	33.1	19.8	18.3	10	100.0	50.4	40.4	32.3	26
Other	25.9	49.6	19.3	82	9.6	6.9	41.2	1.3	5	94.6	24.7	49.1	18.3	87
Caste/tribe														
Scheduled caste	33.2	43.0	19.6	2,768	76.3	30.0	29.5	11.7	324	97.5	32.9	41.6	18.8	3,092
Scheduled tribe	23.9	42.4	14.3	1,335	50.2	26.3	34.3	10.9	127	95.7	24.1	41.7	14.0	1,462
Other backward class	37.0	44.2	23.4	5,154	84.7	31.0	27.3	12.0	796	97.9	36.2	42.0	21.9	5,950
Other	40.8	44.0	24.9	3,720	86.0	32.4	23.7	12.3	735	97.7	39.4	40.7	22.8	4,455
Don't know	48.5	42.1	24.2	49	*	*	*	*	12	98.1	48.8	35.9	19.6	61
Wealth index														
Lowest	26.8	41.4	16.3	3,448	63.7	25.4	26.8	10.5	275	97.3	26.7	40.4	15.9	3,723
Second	33.6	41.7	20.6	3,042	71.5	24.6	25.3	8.3	298	97.5	32.8	40.3	19.5	3,340
Middle	37.1	41.3	21.5	2,573	81.4	28.5	27.2	10.9	347	97.8	36.1	39.7	20.2	2,920
Fourth	40.1	45.1	24.6	2,307	86.0	31.5	22.5	9.8	446	97.7	38.7	41.4	22.2	2,753
Highest	51.5	53.7	33.9	1,699	91.4	37.8	29.7	16.2	631	97.7	47.8	47.2	29.1	2,330
Total	36.0	43.7	22.1	13,069	81.7	31.1	26.6	11.9	1,997	97.6	35.3	41.5	20.7	15,066

Note: Total includes children with missing information on mother's education, religion, and caste/tribe, who are not shown separately.

* Percentage not shown; based on fewer than 25 unweighted cases.

¹ Food groups are:

a. infant formula, milk other than breast milk, cheese or yogurt or other milk products; b. foods made from grains or roots, including porridge or gruel, fortified baby food; c. vitamin A-rich fruits and vegetables; d. other fruits and vegetables; e. eggs; f. meat, poultry, fish, shellfish, or organ meats; g. beans, peas, lentils, or nuts; h. foods made with oil, fat, ghee, or butter.

² At least twice a day for breastfed infants 6-8 months and at least three times a day for breastfed children 9-23 months.

³ Commercially produced infant formula; tinned, powdered, or fresh animal milk; cheese; yogurt; or other milk products.

⁴ Non-breastfed children ages 6-23 months are considered to be fed with three IYCF practices if they receive milk or milk products and are fed at least the minimum number of times per day with at least the minimum number of food groups.

⁵ Three or more food groups for breastfed children and four or more food groups for non-breastfed children.

⁶ Fed solid or semi-solid food at least twice a day for infants 6-8 months, 3 or more times for other breastfed children, and 4 or more times for non-breastfed children.

Differentials in infant and young child feeding practices among states are shown in Table 10.11. Adherence to appropriate IYCF practices varies widely among the states. Appropriate feeding practices are followed most often in Kerala and Sikkim, but even in these two states a large percentage of children are not fed appropriately according to all three IYCF practices. Other states with much better than average feeding practices are Goa, Manipur, Himachal Pradesh, and Delhi. Compliance with all recommended feeding practices is lowest in Andhra Pradesh and Maharashtra, where only 1 in 10 children are fed according to all three IYCF practices.

Table 10.11 Infant and young child feeding (IYCF) practices by state

Percentage of youngest children age 6-23 months living with the mother who are fed with appropriate feeding practices based upon number of food groups and times they are fed during the day or night preceding the survey, according to state, India, 2005-06

State	Among breastfed children 6-23 months, percentage fed:			Among nonbreastfed children 6-23 months, percentage fed:				Among all children 6-23 months, percentage fed:			
	Three or more food groups ¹	Mini- mum number of times ²	3+ food groups and minimum number of times	Milk or milk products ³	Four or more food groups ¹	Four or more times	With 3 IYCF practices ⁴	Breast milk, milk, or milk products ³	Appro- priate number of food groups ⁵	Mini- mum times ⁶	With 3 IYCF practices
India	36.0	43.7	22.1	81.7	31.1	26.6	11.9	97.6	35.3	41.5	20.7
North											
Delhi	51.5	58.1	39.5	87.4	38.1	43.5	17.8	96.9	48.2	54.5	34.2
Haryana	31.3	35.0	18.8	85.3	23.2	22.3	6.4	97.3	29.8	32.7	16.5
Himachal Pradesh	69.2	49.0	41.2	91.6	55.8	34.3	33.5	98.5	66.9	46.4	39.8
Jammu & Kashmir	46.8	40.4	27.6	93.7	46.8	26.0	18.9	98.9	46.8	37.9	26.1
Punjab	39.9	32.7	21.2	94.5	32.3	23.9	15.5	98.8	38.3	30.7	19.9
Rajasthan	20.8	38.7	15.7	92.2	15.3	28.3	6.6	99.0	20.1	37.4	14.6
Uttaranchal	47.9	40.4	27.6	89.7	49.5	33.9	16.8	98.3	48.2	39.3	25.9
Central											
Chhattisgarh	34.2	53.2	27.2	*	*	*	*	98.1	34.1	51.9	26.5
Madhya Pradesh	23.5	45.7	18.0	75.5	23.5	42.7	18.3	97.4	23.5	45.4	18.1
Uttar Pradesh	36.1	35.2	18.7	83.6	30.9	16.7	8.2	98.0	35.4	33.0	17.4
East											
Bihar	34.9	54.8	24.3	78.0	20.9	41.1	11.9	97.9	33.6	53.5	23.1
Jharkhand	28.5	44.3	18.0	(71.9)	(21.4)	(26.7)	(5.1)	97.8	27.9	43.0	17.0
Orissa	44.9	56.3	30.6	(77.9)	(33.9)	(45.9)	(19.9)	98.7	44.2	55.7	30.0
West Bengal	58.7	40.1	29.5	81.9	62.1	16.3	12.2	98.9	58.9	38.6	28.5
Northeast											
Arunachal Pradesh	33.8	63.9	28.4	*	*	*	*	97.8	33.9	63.0	27.9
Assam	32.7	41.1	16.4	*	*	*	*	98.8	32.1	40.8	16.1
Manipur	55.3	66.1	42.9	(53.6)	(47.9)	(34.1)	(15.0)	96.1	54.6	63.4	40.5
Meghalaya	35.3	43.9	22.7	50.1	34.8	35.8	6.6	90.2	35.2	42.3	19.5
Mizoram	35.0	56.1	20.9	(59.9)	(38.8)	(33.0)	(21.3)	93.7	35.6	52.5	20.9
Nagaland	27.7	63.9	22.6	60.6	35.2	44.7	21.1	90.5	29.5	59.3	22.2
Sikkim	70.1	66.2	51.1	*	*	*	*	100.0	70.6	63.7	49.4
Tripura	56.8	46.2	31.1	*	*	*	*	99.4	56.3	43.3	29.4
West											
Goa	65.2	61.5	48.3	95.4	62.6	43.4	32.5	98.6	64.3	55.8	43.3
Gujarat	35.3	44.7	23.8	87.9	25.5	26.7	5.4	97.8	33.5	41.5	20.5
Maharashtra	20.4	35.9	11.9	71.6	20.8	23.3	7.8	95.8	20.5	34.1	11.3
South											
Andhra Pradesh	29.1	29.7	12.2	78.0	17.0	5.9	2.0	95.7	26.7	25.1	10.2
Karnataka	42.2	48.4	25.0	82.0	49.2	22.8	18.2	96.1	43.7	42.9	23.5
Kerala	73.6	79.7	62.2	(86.7)	(76.7)	(76.7)	(50.0)	98.7	73.9	79.4	61.0
Tamil Nadu	47.6	62.7	33.7	86.8	43.6	35.5	19.9	95.4	46.2	53.1	28.9

() Based on 25-49 unweighted cases.

* Percentage not shown; based on fewer than 25 unweighted cases.

¹ Food groups are: a. infant formula, milk other than breast milk, cheese or yogurt or other milk products; b. foods made from grains or roots, including porridge or gruel, fortified baby food; c. vitamin A-rich fruits and vegetables; d. other fruits and vegetables; e. eggs; f. meat, poultry, fish, shellfish, or organ meats; g. beans, peas, lentils, or nuts; h. foods made with oil, fat, ghee, or butter.

² At least twice a day for breastfed infants 6-8 months and at least three times a day for breastfed children 9-23 months.

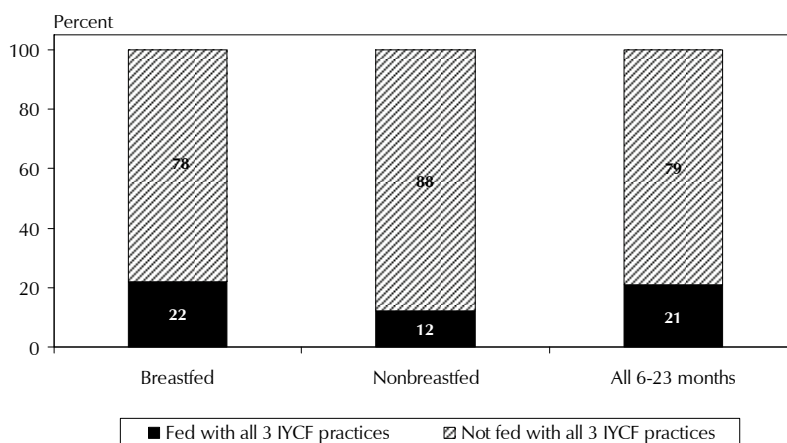
³ Commercially produced infant formula; tinned, powdered, or fresh animal milk; cheese; yogurt; or other milk products.

⁴ Non-breastfed children ages 6-23 months are considered to be fed with three IYCF practices if they receive milk or milk products and are fed at least the minimum number of times per day with at least the minimum number of food groups.

⁵ Three or more food groups for breastfed children and four or more food groups for non-breastfed children.

⁶ Fed solid or semi-solid food at least twice a day for infants 6-8 months, 3 or more times for other breastfed children, and 4 or more times for non-breastfed children.

Figure 10.4 Infant and Young Child (IYCF) Feeding Practices



NFHS-3, India, 2005-06

10.3 PREVALENCE OF ANAEMIA IN CHILDREN

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 in young children is a serious concern 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. One of the most vulnerable groups is children age 6-23 months.

Because anaemia is such a serious health problem in India, NFHS-3 undertook direct measurement of the haemoglobin levels of all children under age five years, women age 15-49, and men age 15-54. Measurements were taken in the field using the HemoCue Hb 201+ analyzer¹. This system uses a single drop of blood from a finger prick (or 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. In less than one minute, the haemoglobin concentration is indicated on a digital read-out.

¹ The HemoCue analyzer 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, comparable to estimates from more sophisticated laboratory instruments (Gehring et al., 2002; Von Schenk et al., 1986; McNulty et al., 1995; Krenzischek and Tanseco, 1996; Medina et al., 2005; Rosenblit et al., 1999; Lardi et al., 1998; Gupta et al., 2007). The HemoCue Hb 201+ analyzer that was used in NFHS-3 has been validated against major automatic cell counters and was found to agree well with all tested systems (Bäck et al., 2004). However, several studies in India have found differences in the haemoglobin results estimated by different methods, with the HemoCue usually yielding somewhat higher estimates of haemoglobin than standard laboratory tests (Agarwal et al., 2006; Pathak et al., 2004; Prakash et al., 1999; Bhaskaram et al., 2003; Saxena and Malik, 2002; Kapoor et al., 2002). Some of these studies compared the HemoCue estimates to estimates based on the indirect cyanmethaemoglobin method (using filter paper cards), which was found to seriously overestimate anaemia in a study published in the Bulletin of the World Health Organization (Sari et al., 2001).

Before anaemia testing among children was undertaken in a household, the health investigator read a detailed informed consent statement to the child's parent or an adult who was responsible for the child's care, informing that person about anaemia, describing the procedure to be followed for the test, and emphasizing the voluntary nature of the test. The person was then asked whether or not he/she would consent to having the test done for eligible children. The health investigator then signed the questionnaire to indicate that the informed consent statement had been read to the parent/responsible adult and recorded the agreement or lack of agreement to the testing. If the test was performed, at the end of the test the parent/responsible adult was given a written record of the results for each eligible child who was tested for anaemia. In addition, the health investigator described the meaning of the results for each child and advised the parent/responsible adult if medical treatment was necessary. In cases of severe anaemia, an additional statement was read to the parent/responsible adult to determine whether or not he/she would give permission for the research organization conducting the survey 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 children for whom consent had been given for a referral².

Tables 10.12-10.14 show anaemia levels for children age 6-59 months. Table 10.12 shows that 70 percent of these children are anaemic, including 26 percent who are mildly anaemic (10.0-10.9 g/dl), 40 percent who are moderately anaemic (7.0-9.9 g/dl), and 3 percent who are severely anaemic (less than 7.0 g/dl). Appropriate adjustments in these cutoff points have been made for children living at altitudes above 1,000 metres because these children require more haemoglobin in their blood (Centers for Disease Control and Prevention, 1998)³. Although there are differentials in the prevalence of anaemia by background characteristics, more than half of children in every subgroup shown in the table are anaemic. Anaemia increases slightly from age 6-8 months to age 12-17 months, and declines steadily at older ages. The prevalence of anaemia does not vary by the sex of the child. Anaemia increases with the birth order of the child, but the relationship is not strong. Anaemia is considerably higher in rural areas than in urban areas, for children of women with no education, for disadvantaged groups (particularly scheduled tribes), and for children in households in the lower wealth quintiles. The prevalence of anaemia is relatively low, but still substantial, for Jains, Christians, and Sikhs. Children's anaemia status is closely linked with the anaemia status of the mother. However, even for mothers who are not anaemic, 62 percent of their children age 6-59 months are anaemic. The prevalence of children's anaemia rises steadily with the mother's level of anaemia, reaching 82 percent for children of mothers who are severely anaemic. Children of mothers who are severely anaemic are seven times as likely to be severely anaemic as children of mothers who are not anaemic. Children who are not living with their mother are somewhat less likely to be anaemic than children living with their mother, but this is probably because children not living with their mother are more likely to be in the older age groups, in which anaemia is less prevalent.

² See Chapter 1, Section 1.6 for additional information on blood collection for both anaemia and HIV testing.

³ Haemoglobin measurements that are not adjusted for the altitude of the enumeration area yield only a slightly lower level of anaemia than the adjusted estimates (69.1 percent instead of 69.5 percent), with a maximum difference of 8 percentage points in Uttarakhand and Sikkim.

Table 10.12 Prevalence of anaemia in children

Percentage of children age 6-59 months classified as having anaemia, by background characteristics, India, 2005-06

Background characteristic	Anaemia status by haemoglobin level			Any anaemia (<11.0 g/dl)	Number of children
	Mild (10.0-10.9 g/dl)	Moderate (7.0-9.9 g/dl)	Severe (<7.0 g/dl)		
Age in months					
6-8	27.5	50.5	1.6	79.7	2,204
9-11	27.6	51.7	2.4	81.7	2,066
12-17	24.0	56.0	4.6	84.5	4,599
18-23	23.8	53.4	4.4	81.6	4,679
24-35	26.6	44.1	3.9	74.6	9,355
36-47	27.3	33.1	2.7	63.0	9,797
48-59	26.9	24.9	1.2	53.0	9,688
Sex					
Male	25.7	40.2	3.2	69.0	22,400
Female	27.1	40.2	2.7	69.9	19,989
Birth order					
1	25.4	37.4	2.4	65.2	11,955
2-3	26.8	40.2	2.8	69.9	18,003
4-5	26.0	44.6	3.4	74.0	7,059
6+	27.2	43.3	3.9	74.5	3,836
Residence					
Urban	25.6	34.2	3.1	63.0	10,133
Rural	26.5	42.1	2.9	71.5	32,255
Mother's education¹					
No education	26.3	44.7	3.6	74.5	20,778
<5 years complete	28.2	38.5	2.1	68.8	3,077
5-7 years complete	26.5	39.7	3.1	69.4	6,082
8-9 years complete	26.1	36.1	2.5	64.8	4,933
10-11 years complete	26.6	33.6	1.5	61.8	3,184
12 or more years complete	24.3	29.7	1.4	55.4	3,440
Religion					
Hindu	26.1	40.7	3.0	69.7	33,462
Muslim	28.4	38.5	2.8	69.7	6,929
Christian	25.6	32.5	1.9	60.0	811
Sikh	22.3	35.9	5.7	63.8	553
Buddhist/Neo-Buddhist	15.9	49.9	0.2	66.0	305
Jain	20.1	36.1	0.0	56.2	69
Other	26.4	48.7	3.9	78.9	216
Caste/tribe					
Scheduled caste	24.9	43.7	3.6	72.2	8,743
Scheduled tribe	26.3	47.2	3.3	76.8	4,150
Other backward class	26.7	40.5	3.0	70.3	17,208
Other	26.9	34.8	2.1	63.8	11,966
Don't know	27.5	34.8	3.5	65.8	169
Mother's interview status					
Interviewed	26.3	40.4	2.9	69.6	40,853
Not interviewed but in household	27.4	37.4	3.1	67.9	642
Not interviewed and not in household ²	27.6	31.1	2.8	62.1	894
Child's living arrangements					
Living with both parents	26.5	40.2	3.0	69.7	34,752
Living with mother (not father)	25.5	41.4	2.4	69.4	6,743
Living with father (not mother)	24.2	32.5	4.4	61.1	184
Living with neither parent	28.5	30.8	2.8	62.1	710
Mother's anaemia status					
Not anaemic	26.8	33.1	1.6	61.5	16,166
Mildly anaemic	27.3	43.0	2.7	73.0	16,707
Moderately anaemic	23.2	50.0	5.6	78.8	7,189
Severely anaemic	21.6	49.7	10.5	81.9	711
Wealth index					
Lowest	27.7	45.8	3.0	76.4	10,832
Second	26.9	43.4	3.3	73.6	9,570
Middle	26.2	39.7	3.4	69.3	8,469
Fourth	24.9	37.3	2.6	64.8	7,663
Highest	25.0	29.2	2.1	56.2	5,855
Total	26.3	40.2	2.9	69.5	42,388

Note: Table is based on children who stayed in the household the night before the interview. Prevalence of anaemia, based on haemoglobin levels, is adjusted for altitude using formula in CDC (1998). Haemoglobin in g/dl = grams per decilitre. Total includes children with missing information on mother's education, religion, caste/tribe, mother's interview status, and mother's anaemia status, who are not shown separately. Table excludes Nagaland.

¹ For women who are not interviewed, information is taken from the Household Questionnaire. Excludes children whose mothers are not listed in the household schedule.

² Includes children whose mothers are deceased.

Although state differentials in the prevalence of anaemia are marked, a high prevalence of anaemia is found in every state (Table 10.13). The only states in which less than half of children are anaemic are Goa (38 percent), Manipur (41 percent), Mizoram (44 percent), and Kerala (45 percent). The highest prevalence of anaemia is found in Bihar (78 percent), Madhya Pradesh and Uttar Pradesh (74 percent each), Haryana (72 percent), and Chhattisgarh (71 percent). Severe anaemia is most prevalent in Rajasthan and Punjab.

Table 10.13 Prevalence of anaemia in children by state

Percentage of children age 6-59 months classified as having anaemia, according to state, India, 2005-06

State	Anaemia status by haemoglobin level			Any anaemia (<11.0 g/dl)
	Mild (10.0-10.9 g/dl)	Moderate (7.0-9.9 g/dl)	Severe (<7.0 g/dl)	
India¹	26.3	40.2	2.9	69.5
North				
Delhi	26.3	30.0	0.7	57.0
Haryana	25.8	42.2	4.3	72.3
Himachal Pradesh	25.7	26.8	2.2	54.7
Jammu & Kashmir	25.8	30.4	2.4	58.6
Punjab	21.7	38.1	6.6	66.4
Rajasthan	22.8	40.2	6.7	69.7
Uttaranchal	28.5	30.6	2.3	61.4
Central				
Chhattisgarh	24.0	45.2	2.0	71.2
Madhya Pradesh	27.1	43.6	3.4	74.1
Uttar Pradesh	25.4	45.0	3.6	73.9
East				
Bihar	29.6	46.8	1.6	78.0
Jharkhand	29.3	39.1	1.9	70.3
Orissa	28.9	34.5	1.6	65.0
West Bengal	30.0	29.4	1.5	61.0
Northeast				
Arunachal Pradesh	27.1	29.1	0.8	56.9
Assam	28.7	38.7	2.2	69.6
Manipur	25.6	15.2	0.3	41.1
Meghalaya	31.7	31.7	1.0	64.4
Mizoram	23.5	20.0	0.6	44.2
Sikkim	28.9	29.5	0.8	59.2
Tripura	27.5	34.6	0.7	62.9
West				
Goa	19.5	17.1	1.5	38.2
Gujarat	25.0	41.1	3.6	69.7
Maharashtra	21.9	39.6	1.8	63.4
South				
Andhra Pradesh	23.7	43.5	3.6	70.8
Karnataka	28.6	38.6	3.2	70.4
Kerala	23.5	20.5	0.5	44.5
Tamil Nadu	27.1	34.6	2.6	64.2

Note: Table is based on children who stayed in the household the night before the interview. Prevalence of anaemia, based on haemoglobin levels, is adjusted for altitude using formula in CDC (1998). Haemoglobin in g/dl = grams per decilitre.

¹ Excludes Nagaland.

To allow a comparison of NFHS-2 and NFHS-3 anaemia estimates, it is necessary to restrict the analysis to only the last two children age 6-35 months of ever-married women who were interviewed (see Table 10.14). In this group, the prevalence of anaemia increased from 74 percent in NFHS-2 to 79 percent in NFHS-3. The increase is seen primarily in rural areas, where anaemia rose from 75 percent to 81 percent.

Table 10.14 Trends in children's anaemia
Percentage of children age 6-35 months classified as having anaemia by residence, NFHS-3 and NFHS-2, India

Anaemia status by haemoglobin level	NFHS-3 (2005-06)			NFHS-2 (1998-99)		
	Urban	Rural	Total	Urban	Rural	Total
Mild (10.0-10.9 g/dl)	25.8	25.7	25.7	23.7	22.7	22.9
Moderate (7.0-9.9 g/dl)	42.0	51.7	49.4	42.0	47.1	45.9
Severe (<7.0 g/dl)	4.4	3.5	3.7	5.1	5.5	5.4
Any anaemia (<11.0 g/dl)	72.2	80.9	78.9	70.8	75.3	74.3
Number of children	5,404	17,498	22,903	4,642	15,374	20,016

Note: Table includes only the last two children age 6-35 months of ever-married women who were interviewed. Prevalence of anaemia, based on haemoglobin levels, is adjusted for altitude using formulae in CDC (1998). Haemoglobin in g/dl = grams per decilitre. NFHS-3 estimates of anaemia exclude Nagaland.

10.4 MICRONUTRIENT INTAKE AMONG CHILDREN

Micronutrient deficiency is a serious contributor to childhood morbidity and mortality. Children can receive micronutrients from food, food fortification, and direct supplementation. Vitamin A is an essential micronutrient for the immune system and plays an important role in maintaining the epithelial tissue in the body. Severe vitamin A deficiency (VAD) can cause eye damage. VAD can also increase the severity of infections such as measles and diarrhoeal diseases in children and slow recovery from illness. The human liver can store an adequate amount of the vitamin for four to six months. Periodic dosing with vitamin A supplements (usually every six months) is one method of ensuring that children at risk do not develop VAD. The Government of India recommends that children should be given vitamin A supplements every six months until they reach three years of age, starting at age 9 months. Some states have decided to extend that period to include children until they reach age five years, as recommended by the World Health Organization.

NFHS-3 collected information on the consumption of vitamin A-rich foods and on the administration of vitamin A supplements. For the youngest child age 6-35 months living with the mother, Table 10.15 shows that 47 percent consumed foods rich in vitamin A in the day or night preceding the survey. These foods include meat, organ meat, fish, poultry, eggs, pumpkin, carrots, sweet potatoes that are yellow or orange inside, dark green leafy vegetables, ripe mango, papaya, cantaloupe, and jackfruit. The consumption of foods rich in vitamin A generally increases with the age of the child, the mother's education, and the wealth index of the household. Other groups that are much more likely to consume foods rich in vitamin A are Christians and children who are not breastfeeding.

Table 10.15. Micronutrient intake among children

Percentage of youngest children age 6-35 months living with the mother who consumed vitamin A-rich and iron-rich foods in the day or night preceding the survey, percentage of children age 12-35 months and 6-59 months who were given vitamin A supplements in the six months preceding the survey, percentage of children age 6-59 months who were given iron supplements in the past seven days, who were given deworming medication in the six months preceding the survey, and who live in households using adequately iodized salt, by background characteristics, India, 2005-06

Background characteristic	Youngest children age 6-35 months living with their mother			Children age 12-35 months			Children age 6-59 months			Children age 6-59 months in households with salt tested		
	Percentage who vitamin A in last 24 hours ¹	Percentage who consumed iron in last 24 hours ²	Number of children	Percentage given vitamin A supplements in last 6 months	Percentage given iron supplements in last 7 days	Percentage given deworming medication in last 6 months ³	Percentage given vitamin A supplements in last 6 months	Percentage given iron supplements in last 7 days	Percentage living in households using adequately iodized salt ⁴	Number of children	Number of children	Number of children
Age in months												
6-8	8.8	2.1	2,918	na	na	na	9.9	4.5	2.5	2,933	45.8	2,908
9-11	25.0	6.9	2,324	na	na	na	27.0	5.0	2.2	2,343	46.3	2,326
12-17	45.2	13.4	5,077	36.4	5,211	5,211	36.4	5.8	8.4	5,211	48.3	5,169
18-23	56.0	16.7	4,748	24.8	5,208	5,208	24.8	4.4	12.1	5,208	48.2	5,149
24-35	64.0	21.2	7,657	19.6	10,383	10,383	19.6	4.7	14.1	10,383	47.6	10,282
36-47	na	na	na	na	na	na	13.6	4.5	14.8	10,829	47.0	10,744
48-59	na	na	na	na	na	na	10.0	4.4	13.3	10,835	47.9	10,712
Sex												
Male	46.8	14.2	12,206	25.4	11,056	11,056	18.5	4.9	12.4	25,077	48.1	24,831
Female	47.3	15.0	10,516	24.8	9,746	9,746	18.0	4.4	11.4	22,664	46.9	22,460
Birth order												
1	46.9	16.6	6,616	30.0	6,337	6,337	21.7	6.1	13.8	14,381	54.3	14,256
2-3	48.9	16.0	10,188	25.9	9,192	9,192	18.9	4.8	12.1	20,825	48.6	20,650
4-5	45.5	10.5	3,784	20.9	3,395	3,395	15.0	3.3	9.3	8,070	39.9	7,991
6+	41.5	9.0	2,135	12.6	1,879	1,879	10.1	1.7	9.8	4,466	34.0	4,394
Breastfeeding status												
Breastfeeding	42.4	12.7	17,244	27.9	12,455	12,455	23.5	4.3	9.5	20,063	46.1	19,878
Not breastfeeding	61.7	20.5	5,443	20.9	8,275	8,275	14.4	5.0	13.8	27,418	48.5	27,153
Residence												
Urban	50.3	18.8	5,948	26.9	5,436	5,436	19.7	7.0	13.3	12,417	67.9	12,308
Rural	45.9	13.1	16,775	24.5	15,366	15,366	17.7	3.8	11.5	35,324	40.3	34,983
Mother's education												
No education	42.4	9.9	10,813	18.1	10,018	10,018	13.1	2.6	8.8	23,535	36.0	23,262
<5 years complete	51.1	18.5	1,536	26.4	1,389	1,389	19.3	4.5	12.0	3,444	49.9	3,419
5-7 years complete	47.2	17.7	3,411	28.9	3,153	3,153	21.2	5.1	12.4	6,991	48.3	6,944
8-9 years complete	49.9	18.6	2,838	33.4	2,629	2,629	24.7	6.4	14.7	5,749	55.3	5,710
10-11 years complete	54.0	19.3	1,865	33.9	1,714	1,714	25.3	7.2	16.9	3,745	68.2	3,720
12 or more years complete	57.2	21.0	2,258	35.4	1,899	1,899	25.9	10.8	20.3	4,277	78.8	4,235
Religion												
Hindu	45.9	11.9	17,765	25.3	16,204	16,204	18.4	4.7	10.3	37,241	45.8	36,899
Muslim	49.9	24.4	3,864	24.2	3,595	3,595	17.6	3.9	18.4	8,227	50.6	8,132
Christian	65.5	40.8	466	30.2	436	436	22.2	8.0	24.6	965	63.8	961
Sikh	45.2	8.7	287	18.0	272	272	13.7	5.2	6.8	615	72.0	608
Buddhist/Neo-Buddhist	37.1	13.9	157	27.7	137	137	16.9	2.6	12.5	320	58.9	318
Jain	59.6	8.2	48	34.6	44	44	21.5	7.8	8.0	84	90.4	84
Other	63.4	19.2	117	22.0	94	94	14.1	3.9	10.6	246	52.8	246

Continued...

Table 10.15 Micronutrient intake among children—Continued

Background characteristic	Youngest children age 6-35 months living with their mother			Children age 12-35 months		Children age 6-59 months			Children age 6-59 months in households with salt tested	
	Percentage who consumed vitamin A in last 24 hours ¹	Percentage who consumed iron in last 24 hours ²	Number of children	Percentage given vitamin A supplements in last 6 months	Number of children	Percentage given iron supplements in last 7 days	Percentage given deworming medication in last 6 months ³	Number of children	Percentage living in households using adequately iodized salt ⁴	Number of children
Caste/tribe										
Scheduled caste	46.0	14.0	4,621	24.6	4,232	3.3	9.3	9,761	42.9	9,612
Scheduled tribe	43.8	13.3	2,144	21.3	1,910	4.3	7.3	4,503	36.7	4,471
Other backward class	45.8	11.3	9,047	23.1	8,350	4.7	11.0	19,231	43.2	19,084
Other	50.5	19.7	6,750	29.4	6,167	5.6	16.4	13,900	60.0	13,785
Don't know	50.9	29.1	83	25.5	76	10.0	24.9	186	48.4	181
Wealth index										
Lowest	42.2	10.0	5,620	19.8	5,158	2.2	8.7	11,888	31.7	11,733
Second	46.9	13.0	4,989	21.9	4,596	3.6	10.6	10,503	37.7	10,415
Middle	45.4	15.4	4,368	27.1	4,076	4.3	11.1	9,455	42.1	9,385
Fourth	47.9	18.0	4,181	28.5	3,815	6.1	14.8	8,771	58.3	8,694
Highest	55.9	19.1	3,565	31.8	3,158	9.3	16.8	7,125	82.0	7,065
Total	47.1	14.6	22,723	25.1	20,802	4.7	11.9	47,742	47.5	47,291

Note: Information on iron supplements and deworming medication is based on the mother's recall. Information on vitamin A supplementation is based on the vaccination card and mother's recall. Total includes children with missing information on breastfeeding status, mother's education, religion, and caste/tribe, who are not shown separately.

na = Not applicable

¹ Includes meat and organ meats, fish, poultry, eggs, pumpkin, carrots, sweet potatoes that are yellow or orange inside, dark green leafy vegetables, ripe mango, papaya, cantaloupe, and jackfruit.

² Includes meat and organ meats, fish, poultry, or eggs.

³ Deworming for intestinal parasites.

⁴ Salt containing 15 parts per million or more of iodine. Excludes children in households in which salt was not tested. Includes children whose mothers were not interviewed.

The consumption of iron-rich foods (such as meat, organ meat, fish, poultry, and eggs) is considerably lower than the consumption of foods rich in vitamin A in all groups. Overall, only 15 percent of children ate foods rich in iron during the day or night before the survey. The patterns of consumption for different subgroups are quite similar to the patterns in the consumption of foods rich in vitamin A.

The percentage of children given vitamin A supplements in the last six months is shown for children age 12-35 months and children age 6-59 months in Table 10.15. Only one-quarter of children age 12-35 received vitamin A supplements in the six months before the survey. This figure drops further, to only 18 percent, among children age 6-59 months. Children age 12-17 months are most likely to have received vitamin A supplementation in the last six months.

Very few children age 6-59 months (only 5 percent) were given an iron supplement in the seven days before the survey. The administration of deworming medication is somewhat more common, but only 12 percent of children age 6-59 months received deworming medication in the six months preceding the survey. The use of all types of supplements and medication listed in the table decreases with increasing birth order and increases with mother's education and the wealth status of the household. Girls and boys are about equally likely to receive these items. Differences between urban and rural areas are small, but the percentages are consistently slightly higher in urban areas. Christians are most likely to give deworming medication to their young children, and Jains and Christians are most likely to use food supplements. Disadvantaged groups (scheduled castes, scheduled tribes, and other backward classes) are somewhat less likely than others to give their young children supplements and deworming medication, but the differences are not large.

Just under half of children age 6-59 months live in households using adequately iodized salt. The percentage is much higher in urban areas (68 percent) than in rural areas (40 percent). The percentage of children living in households that use adequately iodized salt rises sharply with the mother's education and the wealth index of the household. The use of adequately iodized salt by the household is much higher for Jain and Sikh children and for children who do not belong to a scheduled caste, a scheduled tribe, or an other backward class.

Table 10.16 shows the micronutrient intake among young children by state. The consumption of food rich in vitamin A and iron is relatively high in all of the states in the Northeast Region, plus Kerala, Goa, West Bengal, Tamil Nadu, and Jammu and Kashmir. Among the remaining states, consumption of foods rich in vitamin A is much higher than average in Himachal Pradesh and Orissa. The states with the poorest consumption of foods rich in vitamin A and iron are Rajasthan, Haryana, and Maharashtra. In Bihar, the consumption of iron-rich foods is much lower than average, but the consumption of foods rich in vitamin A is slightly better than average. Vitamin A supplementation for young children is low in most states, reaching a maximum of only 48 percent for children age 12-35 months in West Bengal and Kerala. Fewer than 1 in 10 children were given iron supplementation in the last seven days in all states except Mizoram (22 percent), Goa (17 percent), Karnataka (13 percent), and Gujarat and Tamil Nadu (10 percent each). The percentage of children living in households using adequately iodized salt is high in all of the states in the Northeast Region, as well as Himachal Pradesh, Delhi, Punjab, Kerala, and Jammu and Kashmir.

Table 10.16 Micronutrient intake among children by state

Percentage of youngest children age 6-35 months living with their mother who consumed vitamin A-rich and iron-rich foods in the day or night preceding the survey, percentage of children age 12-35 months and 6-59 months who were given vitamin A supplements in the six months preceding the survey, percentage of children age 6-59 months who were given iron supplements in the past seven days, who were given deworming medication in the six months preceding the survey, and who live in households using adequately iodized salt, by state, India, 2005-06

State	Youngest children age 6-35 months living with their mother		Children age 12-35 months		Children age 6-59 months		Children age 6-59 months
	Percentage who consumed foods rich in vitamin A in last 24 hours ¹	Percentage who consumed foods rich in iron in last 24 hours ²	Percentage given vitamin A supplements in last 6 months	Percentage given vitamin A supplements in last 6 months	Percentage given iron supplements in last 7 days	Percentage given deworming medication in last 6 months ³	Percentage living in households using adequately iodized salt ⁴
India	47.1	14.6	25.1	18.2	4.7	11.9	47.5
North							
Delhi	48.6	15.8	20.2	13.8	9.3	9.5	79.7
Haryana	33.0	2.7	15.9	11.0	4.2	3.2	50.2
Himachal Pradesh	61.6	10.1	33.4	29.4	4.1	4.8	80.5
Jammu & Kashmir	58.8	24.3	17.2	12.7	5.3	23.3	69.8
Punjab	44.1	10.3	20.8	16.8	5.4	5.2	72.8
Rajasthan	28.8	1.3	16.4	10.0	1.0	1.6	35.1
Uttaranchal	53.4	13.2	20.4	14.5	4.1	8.3	39.6
Central							
Chhattisgarh	53.0	13.5	14.4	9.1	3.1	6.3	49.5
Madhya Pradesh	40.5	4.1	20.1	14.1	3.5	4.0	32.5
Uttar Pradesh	40.9	6.9	8.7	6.1	1.5	8.1	32.6
East							
Bihar	51.1	6.4	32.6	26.4	2.9	20.6	64.4
Jharkhand	50.3	11.4	28.1	20.1	3.5	5.4	51.1
Orissa	61.4	14.8	30.6	21.9	5.2	15.8	38.0
West Bengal	68.7	47.6	48.1	32.4	4.5	25.6	65.2
Northeast							
Arunachal Pradesh	65.6	34.3	19.0	16.4	4.1	28.4	83.0
Assam	51.1	24.0	19.3	12.9	0.8	15.0	68.1
Manipur	76.4	58.8	19.2	11.3	2.3	14.7	92.4
Meghalaya	66.6	40.3	21.2	15.0	4.8	20.6	76.8
Mizoram	64.1	31.5	46.5	40.9	22.1	41.0	82.7
Nagaland	54.4	38.4	8.9	6.7	3.1	23.2	81.0
Sikkim	66.5	23.1	24.7	19.4	9.8	26.9	73.2
Tripura	69.0	45.6	41.4	29.4	3.1	41.5	72.5
West							
Goa	75.7	48.0	43.8	32.1	16.7	57.1	67.1
Gujarat	42.2	5.6	20.6	14.8	10.3	7.1	53.2
Maharashtra	34.0	9.3	37.8	25.2	7.1	8.2	58.4
South							
Andhra Pradesh	34.8	15.7	29.8	21.4	7.1	7.7	28.7
Karnataka	53.1	19.8	22.9	16.2	12.5	16.6	37.8
Kerala	78.4	60.5	47.9	35.6	6.4	44.7	70.2
Tamil Nadu	63.1	32.8	44.8	38.5	10.0	12.0	39.0

Note: Information on iron supplements and deworming medication is based on the mother's recall. Information on vitamin A supplementation is based on the vaccination card and mother's recall.

¹ Includes meat and organ meats, fish, poultry, eggs, pumpkin, carrots, sweet potatoes that are yellow or orange inside, dark green leafy vegetables, ripe mango, papaya, cantaloupe, and jackfruit.

² Includes meat and organ meats, fish, poultry, or eggs.

³ Deworming for intestinal parasites.

⁴ Salt containing 15 parts per million or more of iodine. Excludes children in households in which salt was not tested. Includes children whose mothers were not interviewed.

10.5 SALT IODIZATION

Iodine is an important micronutrient. A lack of iodine in the diet can lead to Iodine Deficiency Disorders (IDD), which can cause miscarriages, stillbirths, brain disorders, and retarded psychomotor development, speech and hearing impairments, and depleted levels of energy in children. 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 (Vir, 2002) and more than 71 million suffer from goiter and other iodine deficiency disorders (MOHFW, 2005). 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. All states and union territories were advised to issue notifications banning the sale of edible salt that is not iodized. The ban on non-iodized salt was lifted in September, 2000, but it was reimposed in November, 2005. However, the reimposed ban did not take effect until May, 2006 (after most of the NFHS-3 fieldwork had been completed).

NFHS-3, with its representative sample of households throughout the country, is an ideal vehicle for measuring the degree of iodization of salt used in households in India. 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-3, 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 interviewers were instructed to squeeze two drops of the starch solution onto a sample of cooking salt obtained from the household. If the colour changed (from light blue through dark violet), the interviewer matched the colour of the salt as closely as possible to a colour chart provided with the test kit and recorded the iodine level as <15 or >15 ppm. If the initial test was negative (no change in colour), the interviewer was required to conduct a second confirmatory test, adding an 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.

Table 10.17 shows the extent of salt iodization at the household level. Overall, 99 percent of households had their salt tested in the survey (data not shown). The remaining households did not have their salt tested either because the household did not have any salt (0.9 percent) or because the household had salt but a test was not done (0.3 percent). Among the households that had their salt tested, just over half (51 percent) were using salt that was adequately iodized. There was virtually no change since the time of NFHS-2, when 50 percent of households were using adequately iodized salt. In NFHS-3, one-quarter of households were using salt that was inadequately iodized, and the remaining one-quarter were using salt that was not iodized at all. The use of adequately iodized salt was much higher in urban areas (72 percent) than in rural areas (41 percent). There is a sharp and steady rise in the use of adequately iodized salt as the wealth of the household increases. Eighty-five percent of households in the highest wealth quintile use adequately iodized salt, compared with only 30 percent of households in the lowest wealth quintile. Among the religious groups, the use of adequately iodized salt is highest in households in which the head of the household is Jain (84 percent), followed by Sikh (74 percent), and Christian (63 percent). Slightly less than half of Hindu households use adequately iodized salt. By caste/tribe, the use of adequately iodized salt is highest in households where the head does not belong to a scheduled caste, scheduled tribe, or other backward class, and lowest in scheduled tribe households.

Table 10.17 Presence of iodized salt in household
Percent distribution of households with salt tested for iodine content, by level of iodine in salt (parts per million), according to background characteristics, India, 2005-06

Background characteristic	Iodine content of salt			Total	Number of households
	None (0 ppm)	Inadequate (<15 ppm)	Adequate (15+ ppm)		
Residence					
Urban	12.8	15.7	71.5	100.0	34,950
Rural	29.3	29.5	41.2	100.0	72,504
Religion of household head					
Hindu	25.4	25.1	49.4	100.0	87,703
Muslim	18.1	27.1	54.8	100.0	13,394
Christian	17.5	19.8	62.7	100.0	2,918
Sikh	13.6	12.7	73.8	100.0	1,691
Buddhist/Neo-Buddhist	24.1	17.1	58.9	100.0	925
Jain	8.0	8.0	84.0	100.0	365
Other	5.6	41.9	52.5	100.0	436
Caste/tribe of household head					
Scheduled caste	26.5	28.7	44.8	100.0	20,637
Scheduled tribe	35.7	27.6	36.7	100.0	9,110
Other backward class	27.1	27.3	45.7	100.0	42,592
Other	15.5	19.2	65.3	100.0	34,310
Don't know	27.3	30.2	42.5	100.0	479
Wealth index					
Lowest	33.6	36.0	30.4	100.0	22,137
Second	31.2	32.0	36.8	100.0	21,347
Middle	29.5	28.0	42.5	100.0	21,310
Fourth	18.5	20.1	61.4	100.0	21,013
Highest	6.7	8.6	84.7	100.0	21,648
Total	23.9	25.0	51.1	100.0	107,455

Note: Only 1 percent of households did not have any salt in the household. Total includes households with missing information on religion and caste/tribe of household head, which are not shown separately.
ppm = parts per million

The use of iodized salt varies dramatically from one state to another (Table 10.18). The variations are due to a number of factors, including the scale of salt production, transportation requirements, enforcement efforts, differences in state regulations, the pricing structure, and storage patterns. The use of adequately iodized salt is uniformly high (72 percent or higher) throughout the Northeast Region, in most states in the North Region, and in Kerala, reaching a high of 94 percent in Manipur. The use of adequately iodized salt is lowest (less than 40 percent) in Andhra Pradesh, Madhya Pradesh, Uttar Pradesh, and Orissa. Despite the fact that the overall use of adequately iodized salt has not changed since NFHS-2, several states have made substantial improvements over time but the situation has deteriorated in other states. The largest gains have been made in Kerala (from 39 percent in NFHS-2 to 74 percent in NFHS-3), Goa (from 42 percent to 65 percent), Jammu and Kashmir (from 53 percent to 76 percent), Tamil Nadu (from 21 percent to 41 percent), Meghalaya (from 63 percent to 82 percent), and Nagaland (from 67 percent to 83 percent). The states in which the use of adequately iodized salt has deteriorated substantially are Haryana (from 71 percent to 55 percent), Himachal Pradesh (from 91 percent to 83 percent), and Assam (from 80 percent to 72 percent).

Table 10.18 Presence of iodized salt in household by state				
Percent distribution of households with salt tested for iodine content, by level of iodine in salt (parts per million), according to state, India, 2005-06				
State	Iodine content of salt			Total
	None (0 ppm)	Inadequate (<15 ppm)	Adequate (15+ ppm)	
India	23.9	25.0	51.1	100.0
North				
Delhi	8.1	5.9	86.0	100.0
Haryana	28.2	16.5	55.3	100.0
Himachal Pradesh	5.9	11.6	82.5	100.0
Jammu & Kashmir	9.5	14.7	75.8	100.0
Punjab	14.2	11.2	74.6	100.0
Rajasthan	36.7	22.5	40.8	100.0
Uttaranchal	29.0	25.1	45.9	100.0
Central				
Chhattisgarh	21.0	24.1	54.9	100.0
Madhya Pradesh	41.2	22.4	36.3	100.0
Uttar Pradesh	23.4	40.2	36.4	100.0
East				
Bihar	5.3	28.6	66.1	100.0
Jharkhand	7.3	39.1	53.6	100.0
Orissa	23.9	36.5	39.6	100.0
West Bengal	6.7	24.2	69.1	100.0
Northeast				
Arunachal Pradesh	1.2	15.2	83.6	100.0
Assam	2.8	25.4	71.8	100.0
Manipur	1.2	5.0	93.8	100.0
Meghalaya	2.9	15.2	81.9	100.0
Mizoram	1.2	12.9	85.9	100.0
Nagaland	2.2	14.5	83.3	100.0
Sikkim	2.9	18.8	78.3	100.0
Tripura	2.9	21.7	75.5	100.0
West				
Goa	22.7	12.5	64.8	100.0
Gujarat	27.9	16.4	55.7	100.0
Maharashtra	25.8	13.3	61.0	100.0
South				
Andhra Pradesh	40.0	29.0	31.0	100.0
Karnataka	34.0	22.7	43.3	100.0
Kerala	17.4	8.7	73.9	100.0
Tamil Nadu	34.5	24.2	41.3	100.0

10.6 FOOD CONSUMPTION OF WOMEN AND MEN

The consumption of a wide variety of nutritious foods is important for women's and men'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. Dark 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-3 asked women and men how often they consume various types of food (daily, weekly, occasionally, or never). Among these food groups, women consume dark green, leafy vegetables most often (Table 10.19). Almost two-thirds of women consume dark green, leafy vegetables daily and an additional 29 percent consume them weekly. More than half of women

(53 percent) consume pulses or beans daily and an additional 37 percent consume them weekly. Milk or curd is consumed daily by 40 percent of women and weekly by 16 percent of women, but 11 percent never consume milk or curd and 33 percent consume milk or curd only occasionally. Consumption of fruits is less common. Sixty percent of women do not consume fruits even once a week. Very few women consume chicken, meat, fish, or eggs on a daily basis, although more than one-quarter of women consume these types of food weekly.

Table 10.19 Women's and men's food consumption						
Percent distribution of women age 15-49 and men age 15-49 by frequency of consumption of specific foods, India, 2005-06						
Type of food	Frequency of consumption				Total	Number
	Daily	Weekly	Occasionally	Never		
WOMEN						
Milk or curd	39.8	15.6	33.2	11.4	100.0	124,385
Pulses or beans	52.7	36.8	9.6	0.9	100.0	124,385
Dark green, leafy vegetables	64.2	28.7	6.8	0.3	100.0	124,385
Fruits	12.7	27.2	56.6	3.5	100.0	124,385
Eggs	3.5	28.8	32.9	34.8	100.0	124,385
Fish	6.3	21.9	34.3	37.5	100.0	124,385
Chicken or meat	0.9	21.8	42.2	35.1	100.0	124,385
Fish or chicken/meat	6.8	28.5	32.0	32.6	100.0	124,385
MEN						
Milk or curd	46.7	20.5	25.8	7.0	100.0	69,751
Pulses or beans	52.1	38.6	8.4	0.9	100.0	69,751
Dark green, leafy vegetables	59.1	34.5	6.0	0.4	100.0	69,751
Fruits	13.1	34.4	50.0	2.6	100.0	69,751
Eggs	5.2	36.1	35.3	23.3	100.0	69,751
Fish	6.2	25.1	38.2	30.5	100.0	69,751
Chicken or meat	1.2	27.1	46.0	25.6	100.0	69,751
Fish or chicken/meat	6.9	34.1	35.1	23.9	100.0	69,751

The pattern of food consumption by men is similar to that of women, but men are more likely than women to consume milk or curd regularly. Men are less likely than women to completely abstain from eating chicken, meat, fish, or eggs. The last row of each panel shows the frequency of consumption of fish, chicken, or meat. Overall, 33 percent of women and 24 percent of men are vegetarians according to this measure.

Tables 10.20.1 and 10.20.2 show the consumption of each type of food at least once a week according to background characteristics. There are substantial differentials in food consumption patterns by selected background characteristics. Age does not play an important role in the consumption patterns of women or men. Women and men in urban areas are more likely than those in rural areas to include every type of food in their diet, particularly nutritious foods such as fruits and milk or curd. Persons in urban areas are also much more likely to eat fish, chicken, meat, or eggs. Women and men with no education have poorer and less varied diets than those with an education, and their diet is particularly deficient in the consumption of fruits. Christians are more likely than any other religious group to eat chicken, meat, fish, or eggs at least once a week. Jains and Sikhs rarely eat chicken, meat, fish, or eggs, but they are more likely than persons in any other religious group to consume milk or curd. Jains are more likely than women in any other religious group to eat fruits at least once a week.

Table 10.20.1 Women's food consumption

Percentage of women age 15-49 consuming specific foods at least once a week by background characteristics, India, 2005-06

Background characteristic	Type of food								Number of women
	Milk or curd	Pulses or beans	Dark green, leafy vegetables	Fruits	Eggs	Fish	Chicken or meat	Fish or chicken/meat	
Age									
15-19	54.4	89.9	92.3	40.4	31.8	26.2	21.8	33.4	24,811
20-29	56.0	90.0	93.3	41.0	33.8	29.3	24.4	36.9	43,196
30-39	54.6	88.9	93.0	38.4	32.1	28.3	22.1	35.2	33,522
40-49	56.6	89.0	92.7	39.1	30.1	28.2	21.2	34.9	22,856
Marital status									
Never married	57.6	89.0	91.9	46.9	34.0	28.3	23.7	36.1	25,462
Currently married	55.4	89.9	93.3	38.3	31.9	28.2	22.5	35.3	93,089
Widowed	47.5	85.6	91.7	32.6	30.6	25.7	18.7	32.0	4,023
Divorced/separated/deserted	44.7	84.7	91.5	34.4	33.7	30.8	23.1	39.1	1,811
Maternity status									
Pregnant	56.5	90.1	93.3	39.6	28.1	24.8	21.2	31.6	6,429
Breastfeeding	48.5	89.9	92.5	29.9	29.0	27.1	19.2	32.8	23,490
Neither	57.1	89.4	93.0	42.3	33.4	28.7	23.6	36.3	94,466
Residence									
Urban	62.8	91.5	94.2	58.9	39.2	31.5	30.9	41.2	40,817
Rural	51.8	88.6	92.3	30.5	28.9	26.6	18.7	32.5	83,568
Education									
No education	44.5	88.4	92.5	22.8	25.9	21.7	18.3	28.9	50,487
<5 years complete	47.3	86.5	93.2	32.5	39.0	38.8	24.5	45.7	9,918
5-7 years complete	56.2	90.6	93.6	40.0	36.0	30.9	24.8	38.5	18,820
8-9 years complete	59.7	89.4	92.4	47.5	35.9	33.8	24.1	40.3	17,383
10-11 years complete	71.4	91.0	93.0	61.6	37.4	31.3	28.0	39.6	12,887
12 or more years complete	78.1	92.6	93.9	74.5	36.0	30.6	27.4	36.9	14,882
Religion									
Hindu	57.1	90.3	93.3	39.6	29.2	25.5	19.0	31.1	100,151
Muslim	44.8	87.9	92.4	37.2	48.6	42.3	40.7	58.3	16,936
Christian	52.6	77.3	87.9	58.5	58.4	56.4	51.9	70.7	3,053
Sikh	74.0	87.7	87.7	39.0	8.6	1.8	3.2	3.8	2,222
Buddhist/Neo-Buddhist	45.0	87.9	91.7	44.0	51.3	40.5	44.9	49.3	1,010
Jain	86.2	96.2	96.1	81.0	1.7	0.9	0.8	0.9	406
Other	15.3	63.8	80.9	25.0	21.3	26.2	18.0	30.7	484
Caste/tribe									
Scheduled caste	45.3	88.2	92.6	32.0	34.7	30.2	22.1	37.2	23,125
Scheduled tribe	33.5	83.3	89.2	27.4	30.9	26.0	22.0	32.5	10,119
Other backward class	60.6	89.5	93.7	39.0	29.7	22.0	22.5	30.4	48,880
Other	60.4	91.8	93.1	48.4	34.1	34.7	23.1	40.6	41,207
Don't know	63.3	92.1	92.9	48.6	45.5	39.5	32.2	52.8	649
Wealth index									
Lowest	31.4	84.5	90.5	16.2	23.8	23.4	12.8	27.0	21,718
Second	45.2	89.2	93.3	23.9	28.9	26.7	17.1	32.2	23,616
Middle	56.1	88.5	93.4	32.5	34.9	28.6	24.2	37.8	25,088
Fourth	63.3	90.8	93.2	46.9	37.3	31.9	28.6	41.5	26,106
Highest	74.8	93.3	93.8	71.8	34.6	29.5	28.1	36.7	27,856
Total	55.4	89.5	92.9	39.8	32.3	28.2	22.7	35.4	124,385

Note: Total includes women with missing information on education, religion, and caste/tribe, who are not shown separately.

Women and men from scheduled tribes have a relatively poor diet that is particularly deficient in fruits and milk or curd. Women and men from scheduled castes also have relatively poor diets compared with those in the 'other' category. As expected, poverty has a strong negative effect on the consumption of nutritious types of food. Women and men in households with a low standard of living are less likely than others to eat each type of food listed, and their diet is particularly deficient in fruits and milk or curd.

Table 10.20.2 Men's food consumption

Percentage of men age 15-49 consuming specific foods at least once a week by background characteristics, India, 2005-06

Background characteristic	Type of food								Number of men
	Milk or curd	Pulses or beans	Dark green, leafy vegetables	Fruits	Eggs	Fish	Chicken or meat	Fish or chicken/meat	
Age									
15-19	69.1	90.1	92.5	49.1	40.1	28.3	26.4	37.8	13,008
20-29	68.3	91.0	93.5	49.7	45.1	32.6	31.5	43.7	22,842
30-39	65.3	91.3	94.3	46.5	40.7	32.1	28.2	41.2	19,045
40-49	66.1	90.1	93.9	43.6	37.4	30.7	25.3	39.1	14,855
Marital status									
Never married	69.8	90.2	93.2	53.3	45.0	32.7	31.1	43.5	25,307
Currently married	65.9	91.1	93.9	44.4	39.5	30.7	26.9	39.7	43,501
Widowed	58.0	85.9	89.0	25.2	25.2	18.6	18.0	26.1	530
Divorced/separated/ deserted	58.5	88.9	90.2	34.2	34.8	23.1	21.6	33.2	411
Residence									
Urban	74.5	93.0	95.4	63.2	48.7	34.7	37.5	47.3	25,504
Rural	62.9	89.4	92.5	38.3	37.1	29.3	23.1	37.3	44,247
Education									
No education	52.4	88.0	90.5	24.8	33.8	26.5	22.7	35.9	12,571
<5 years complete	53.8	86.8	92.9	33.8	42.7	37.1	27.2	46.6	7,109
5-7 years complete	64.6	90.2	93.9	42.6	42.7	31.4	29.2	42.3	11,523
8-9 years complete	68.4	90.7	93.7	47.7	41.9	31.9	27.8	40.5	14,398
10-11 years complete	76.6	93.0	94.7	60.1	43.7	32.1	31.6	42.1	10,380
12 or more years complete	81.4	94.0	95.6	69.3	44.0	31.2	31.4	41.0	13,754
Religion									
Hindu	68.3	91.4	93.8	46.5	38.7	29.2	24.7	37.2	57,112
Muslim	59.3	88.1	93.1	47.0	56.1	42.2	47.5	62.2	8,747
Christian	58.9	76.6	87.6	59.6	67.4	58.7	59.0	74.1	1,567
Sikh	89.0	98.0	97.6	71.4	32.1	12.3	18.4	19.1	1,270
Buddhist/Neo-Buddhist	59.2	94.6	91.1	50.9	51.3	39.7	48.2	54.7	596
Jain	88.9	96.9	99.2	87.1	3.5	1.9	1.5	2.2	213
Other	24.5	74.8	95.2	31.6	29.4	40.2	25.8	45.7	232
Caste/tribe									
Scheduled caste	60.0	89.4	92.9	39.3	43.2	33.3	27.7	43.5	13,188
Scheduled tribe	41.8	87.6	91.0	30.5	37.1	31.4	25.9	39.6	5,725
Other backward class	73.6	90.3	93.7	49.3	39.7	25.9	27.4	35.6	27,219
Other	70.1	92.8	94.5	54.0	43.1	36.2	30.1	45.9	23,214
Don't know	76.8	96.2	95.5	55.3	48.8	33.3	38.4	50.6	177
Wealth index									
Lowest	42.6	85.5	88.8	19.3	29.5	26.7	15.2	31.3	11,031
Second	59.2	89.5	93.3	31.3	36.1	29.2	20.5	36.3	12,666
Middle	68.1	89.8	93.8	43.2	43.7	31.6	29.6	42.9	14,301
Fourth	74.2	92.1	95.0	56.9	49.1	35.7	36.9	49.1	15,493
Highest	82.6	94.7	95.6	73.7	43.9	31.4	34.0	41.6	16,260
Total age 15-49	67.2	90.7	93.6	47.4	41.3	31.3	28.3	40.9	69,751
Age 50-54	65.5	90.5	93.8	44.0	33.9	30.8	24.7	38.5	4,618
Total age 15-54	67.1	90.7	93.6	47.2	40.9	31.2	28.1	40.8	74,369

Note: Total includes men with missing information on education, religion, and caste/tribe, who are not shown separately.

Changes in consumption patterns between NFHS-2 and NFHS-3 can be compared for ever-married women. Between the two surveys, there has been an increase in the consumption at least once a week of each comparable food category except milk or curd. The largest percentage increases have been in the consumption of dark green, leafy vegetables and fruit.

The consumption of pulses and beans, as well as dark green, leafy vegetables is common in every state (Tables 10.21.1-10.21.2). The consumption of pulses and beans at least once a week ranges from 50 percent for women in Meghalaya and 57 percent for men in Tamil Nadu to 98-99 percent for women and men in Karnataka and men in Punjab. At least three-quarters of

women and men eat dark green, leafy vegetables at least once a week in every state except Kerala. The consumption of other types of food varies widely across the states. The frequent consumption of milk and curd is most common in the Northern and Southern Regions, as well as in Sikkim and Gujarat.

Table 10.21.1 Women's food consumption by state

Percentage of women age 15-49 consuming specific foods at least once a week by state, India, 2005-06

State	Type of food							
	Milk or curd	Pulses or beans	Dark green, leafy vegetables	Fruits	Eggs	Fish	Chicken or meat	Fish or chicken/meat
India	55.4	89.5	92.9	39.8	32.3	28.2	22.7	35.4
North								
Delhi	65.6	96.5	94.3	73.4	22.0	9.2	11.4	14.1
Haryana	71.5	93.5	90.0	33.3	3.3	1.3	1.1	1.5
Himachal Pradesh	74.0	93.6	75.3	48.6	6.4	2.2	3.6	4.1
Jammu & Kashmir	70.7	71.6	90.5	49.6	20.4	3.0	44.0	44.4
Punjab	70.7	85.0	85.2	37.6	8.8	1.8	3.8	4.3
Rajasthan	68.7	85.0	89.9	22.9	5.7	1.8	3.7	4.3
Uttaranchal	66.3	94.7	84.1	48.5	15.5	6.7	8.9	10.2
Central								
Chhattisgarh	25.2	90.9	93.7	30.4	25.3	17.7	13.6	19.7
Madhya Pradesh	48.0	93.2	88.1	35.0	12.1	7.7	6.5	9.5
Uttar Pradesh	52.0	94.5	94.0	24.1	13.6	6.3	9.7	11.3
East								
Bihar	57.8	95.9	97.2	34.1	20.6	16.9	11.6	18.3
Jharkhand	22.5	81.0	85.7	24.7	19.1	19.7	16.5	23.7
Orissa	25.6	91.8	97.5	12.6	32.2	51.8	15.5	53.2
West Bengal	30.7	87.4	97.4	26.6	64.4	85.9	27.5	86.9
Northeast								
Arunachal Pradesh	24.5	70.2	94.9	38.7	44.9	53.5	48.2	62.2
Assam	33.4	86.5	96.6	32.9	56.1	72.5	35.0	73.6
Manipur	28.3	77.0	97.0	68.6	37.3	65.0	18.5	70.7
Meghalaya	26.2	50.4	88.5	57.8	46.7	55.9	59.1	70.4
Mizoram	21.8	66.9	92.0	48.4	34.5	15.5	46.0	49.8
Nagaland	33.7	62.2	89.3	45.3	43.4	39.5	42.7	50.8
Sikkim	80.2	90.1	94.2	47.7	39.3	27.0	41.7	44.7
Tripura	49.0	87.5	96.9	40.7	61.9	82.5	30.3	83.6
West								
Goa	53.1	85.9	83.1	80.9	37.0	87.4	20.4	88.3
Gujarat	74.1	95.8	97.5	49.6	15.3	11.1	11.0	14.9
Maharashtra	53.4	92.6	94.0	55.9	35.9	28.1	30.6	33.1
South								
Andhra Pradesh	69.0	96.5	96.2	47.6	66.5	36.6	63.6	67.4
Karnataka	87.4	98.4	96.5	70.4	42.7	20.8	31.3	38.2
Kerala	61.6	73.1	57.5	65.7	43.8	85.8	28.3	87.2
Tamil Nadu	65.8	57.9	95.4	59.6	65.0	42.3	48.8	58.9

Table 10.21.2 Men's food consumption by state

Percent distribution of men age 15-49 consuming specific foods at least once a week by state, India, 2005-06

State	Type of food							
	Milk or curd	Pulses or beans	Dark green, leafy vegetables	Fruits	Eggs	Fish	Chicken or meat	Fish or chicken/meat
India	67.2	90.7	93.6	47.4	41.3	31.3	28.3	40.9
North								
Delhi	77.8	96.4	94.1	64.6	34.3	12.3	21.9	23.9
Haryana	87.8	97.6	95.3	63.2	9.6	3.7	5.3	5.5
Himachal Pradesh	83.4	95.0	84.7	62.5	17.4	4.3	9.8	11.5
Jammu & Kashmir	79.8	77.0	94.5	57.4	31.7	7.0	46.9	48.1
Punjab	85.7	98.6	98.7	71.5	33.0	14.0	18.7	20.1
Rajasthan	81.2	87.1	87.2	31.0	15.3	2.7	10.1	11.0
Uttaranchal	76.7	95.4	91.1	60.0	24.9	8.6	13.5	15.8
Central								
Chhattisgarh	35.3	93.4	95.4	31.8	37.9	28.7	19.4	30.3
Madhya Pradesh	71.2	94.3	85.1	38.2	19.2	13.5	10.2	16.4
Uttar Pradesh	70.1	93.7	94.3	38.4	23.5	9.9	11.6	14.7
East								
Bihar	66.4	95.9	91.9	30.8	25.4	24.3	18.1	27.6
Jharkhand	34.0	90.6	94.2	23.5	32.3	29.2	20.4	32.1
Orissa	39.2	94.7	99.2	16.6	46.5	56.9	26.2	58.7
West Bengal	37.5	90.7	98.5	27.4	67.3	82.7	29.5	84.3
Northeast								
Arunachal Pradesh	25.2	71.6	98.4	40.2	57.5	53.5	44.7	59.1
Assam	33.4	66.6	95.7	41.3	61.8	83.1	42.3	84.8
Manipur	36.2	84.2	96.6	67.5	44.0	63.3	40.2	72.0
Meghalaya	41.1	62.4	92.6	58.6	59.3	70.7	69.6	79.4
Mizoram	30.4	83.6	95.7	42.1	44.0	18.4	54.3	57.2
Nagaland	38.3	70.7	92.8	34.7	43.8	38.7	42.7	51.4
Sikkim	66.4	92.3	95.3	46.7	38.3	15.5	42.2	44.9
Tripura	44.1	91.8	95.3	38.9	67.3	83.3	32.6	85.8
West								
Goa	62.9	89.1	94.5	76.0	58.5	89.6	39.8	90.7
Gujarat	82.1	95.8	99.4	48.4	16.8	9.8	9.2	12.4
Maharashtra	63.6	95.7	94.8	59.7	48.0	33.4	43.9	48.4
South								
Andhra Pradesh	83.9	95.7	90.6	56.0	75.0	30.6	66.1	69.5
Karnataka	90.4	98.8	98.7	74.9	53.8	25.2	38.2	45.9
Kerala	60.9	73.5	71.5	79.6	56.6	87.6	46.7	89.6
Tamil Nadu	77.7	56.9	93.7	78.8	77.1	51.9	53.9	66.1

10.7 NUTRITIONAL STATUS OF WOMEN AND MEN

NFHS-3 collected information on the height and weight of women age 15-49 and men age 15-54. The same scales and measuring boards used to measure children were used for women and men. In this report, two indicators of nutritional status are presented for adults—height and body mass index (BMI). The height of an adult is an outcome of several factors, including nutrition during childhood and adolescence. Women'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). A cutoff point of 145 cm is used for NFHS-3.

The height and weight measurements in NFHS-3 are used to calculate the BMI. The BMI is defined as weight in kilograms divided by height in metres squared (kg/m^2). This index

excludes women who were pregnant at the time of the survey and women who gave birth during the two months preceding the survey. A cut-off point of 18.5 is used to define thinness or acute undernutrition and a BMI of 25 or above indicates overweight or obesity.

Table 10.22.1 Nutritional status of women

Percentage of women age 15-49 below 145 cm, mean body mass index (BMI), and percentage with specific BMI levels, by background characteristics, India, 2005-06

Background characteristic	Height		Body Mass Index (BMI) ¹ in kg/m ²								Number of women
	Percentage below 145 cm	Number of women	Mean BMI	Thin			Overweight/obese				
				18.5-24.9 (normal)	<18.5 (total thin)	17.0-18.4 (mildly thin)	<17.0 (moderately/severely thin)	≥25.0 (overweight or obese)	25.0-29.9 (overweight)	≥30.0 (obese)	
Age											
15-19	11.7	23,679	19.0	50.8	46.8	25.9	20.9	2.4	2.1	0.2	22,147
20-29	10.9	41,332	20.0	53.7	38.1	21.7	16.4	8.2	6.8	1.4	36,413
30-39	10.9	32,233	21.1	51.6	31.0	17.0	14.0	17.4	13.5	3.9	31,321
40-49	12.8	21,975	21.9	49.8	26.4	14.1	12.3	23.7	17.4	6.4	21,900
Marital status											
Never married	10.3	24,043	19.3	50.6	44.9	24.0	20.9	4.5	3.8	0.7	24,053
Currently married	11.4	89,578	20.8	52.1	33.0	18.5	14.4	14.9	11.5	3.4	82,145
Widowed	14.8	3,872	20.8	52.1	33.5	18.2	15.3	14.4	11.1	3.2	3,865
Divorced/separated/deserted	16.0	1,726	20.7	51.7	33.9	19.8	14.1	14.4	10.7	3.7	1,718
Residence											
Urban	9.8	38,115	22.0	51.5	25.0	13.2	11.8	23.5	17.4	6.1	36,366
Rural	12.1	81,104	19.8	51.9	40.6	22.9	17.8	7.4	6.2	1.3	75,416
Education											
No education	14.1	48,381	19.7	51.1	41.7	23.0	18.6	7.3	5.9	1.4	44,926
<5 years complete	13.8	9,647	20.2	52.2	37.2	21.3	15.9	10.7	8.6	2.1	9,120
5-7 years complete	11.5	18,175	20.7	51.7	34.1	18.8	15.4	14.2	10.7	3.5	17,032
8-9 years complete	10.3	16,779	20.6	51.0	35.0	19.4	15.6	14.0	10.9	3.1	15,781
10-11 years complete	7.1	12,340	21.3	52.5	29.4	16.0	13.4	18.1	13.3	4.8	11,718
12 or more years complete	5.2	13,890	22.1	54.5	21.8	12.3	9.4	23.8	18.4	5.4	13,198
Religion											
Hindu	11.6	96,441	20.4	51.8	36.4	20.2	16.2	11.8	9.3	2.6	90,593
Muslim	10.7	15,787	20.6	50.7	35.1	19.3	15.9	14.1	10.7	3.5	14,510
Christian	11.8	2,929	21.6	58.6	23.2	13.2	10.0	18.2	14.7	3.6	2,788
Sikh	2.8	2,160	23.2	50.6	17.8	11.0	6.8	31.6	21.5	10.1	2,080
Buddhist/Neo-Buddhist	14.7	981	20.0	49.5	40.4	19.6	20.8	10.1	8.6	1.5	939
Jain	7.1	354	22.2	51.5	21.8	9.9	11.9	26.6	20.4	6.2	348
Other	19.0	456	19.5	54.9	41.1	25.2	15.9	3.9	3.0	0.9	421
Caste/tribe											
Scheduled caste	15.0	22,264	19.9	50.0	41.1	22.6	18.5	8.9	7.3	1.6	20,728
Scheduled tribe	12.7	9,810	19.1	49.9	46.6	25.3	21.2	3.5	3.0	0.5	9,067
Other backward class	11.4	46,968	20.4	52.6	35.7	20.0	15.7	11.6	9.1	2.5	43,916
Other	8.9	39,177	21.3	52.3	29.4	16.3	13.1	18.3	13.8	4.5	37,131
Don't know	10.1	613	20.1	51.1	39.1	21.4	17.7	9.7	7.7	2.0	583
Wealth index											
Lowest	15.9	20,863	18.7	46.7	51.5	28.5	23.0	1.8	1.6	0.2	18,995
Second	14.6	22,803	19.2	49.8	46.3	25.7	20.6	3.9	3.4	0.5	21,106
Middle	11.7	24,342	19.9	54.3	38.3	21.1	17.3	7.4	6.5	0.9	22,867
Fourth	9.5	25,141	21.0	55.7	28.9	16.2	12.7	15.4	12.5	2.9	23,756
Highest	6.5	26,070	22.9	51.3	18.2	10.2	8.0	30.5	22.0	8.4	25,058
Total	11.4	119,219	20.5	51.8	35.6	19.7	15.8	12.6	9.8	2.8	111,781

Note: Total includes women with missing information on education, religion, and caste/tribe, who are not shown separately.

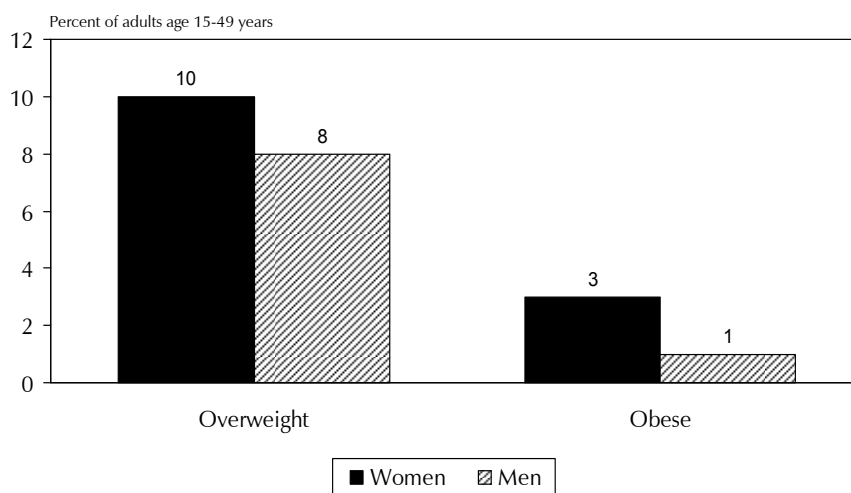
¹ Excludes pregnant women and women with a birth in the preceding 2 months.

Table 10.22.1 presents the mean values of height for women and Tables 10.22.1 and 10.22.2 show the proportions of women and men falling into high-risk categories of the body mass index, according to background characteristics. Persons for whom there was no information

on height and/or weight or for whom a BMI could not be estimated are excluded from the analysis. Table 10.22.1 shows that 11 percent of women are under 145 cm in height. To compare measures of nutritional status over time, it is necessary to restrict the analysis to ever-married women because NFHS-2 did not include never married women. Twelve percent of ever-married women are below 145 cm, a slight improvement from 13 percent in NFHS-2 (data not shown). The percentage of women who are below 145 cm does not vary much by age. There is a strong negative relationship between this measure of height and both education and the standard of living index. The percentage of women who are short is slightly higher in rural areas than in urban areas. Sikh women are much less likely than women of other religions to have a height below 145 cm. By caste/tribe, scheduled caste women are shortest, on average, followed by scheduled tribe women and OBC women.

Table 10.22.1 also shows several levels of the body mass index. The mean BMI for women age 15-49 in India is 20.5 (varying within the narrow range of 19-23 for the different groups shown in the table). Chronic energy deficiency is usually indicated by a BMI of less than 18.5. More than one-third (36 percent) of women have a BMI below 18.5, indicating a high prevalence of nutritional deficiency. Among women who are thin, almost half (45 percent) are moderately or severely thin. The proportion of *ever-married* women who are thin (33 percent) has decreased slightly from 36 percent in NFHS-2 (data not shown). Nutritional problems measured in NFHS-3 are particularly serious for rural women, women with no education, scheduled tribe and scheduled caste women, and women in households in the lowest two wealth quintiles.

Figure 10.5 Overweight and Obesity among Adults



NFHS-3, India, 2005-06

Thirteen percent of women are overweight or obese (10 percent are overweight and 3 percent are obese; see Figure 10.5). This is a growing problem in India, with the percentage of *ever-married* women age 15-49 who are overweight or obese increasing from 11 percent in NFHS-2 to 15 percent in NFHS-3 (data not shown). Overweight and obesity have become

Table 10.22.2 Nutritional status of men

Among men age 15-49, mean body mass index (BMI) and percentage with specific BMI levels by background characteristics, India, 2005-06

Background characteristic	Body Mass Index (BMI) in kg/m ²								Number of men
	Mean BMI	Thin				Overweight/obese			
		18.5-24.9 (normal)	<18.5 (total thin)	17.0-18.4 (mildly thin)	<17.0 (moderately/severely thin)	≥25.0 (overweight or obese)	25.0-29.9 (overweight)	≥30.0 (obese)	
Age									
15-19	18.3	40.2	58.1	28.8	29.3	1.7	1.4	0.2	12,251
20-29	20.1	60.4	33.0	21.8	11.3	6.5	5.8	0.7	21,396
30-39	21.0	61.4	25.5	16.7	8.9	13.0	11.2	1.8	18,015
40-49	21.2	58.6	26.2	15.8	10.4	15.2	12.9	2.3	14,079
Marital status									
Never married	19.2	50.7	45.1	24.2	20.9	4.2	3.7	0.5	23,578
Currently married	20.8	59.9	27.8	18.1	9.7	12.2	10.5	1.7	41,274
Widowed	19.7	58.6	35.6	21.5	14.1	5.8	5.1	0.7	499
Divorced/separated/deserted	19.5	50.4	44.5	27.2	17.3	5.2	4.7	0.4	391
Residence									
Urban	21.2	57.6	26.5	15.0	11.5	15.9	13.5	2.4	23,304
Rural	19.7	56.0	38.4	23.4	15.1	5.6	5.0	0.6	42,438
Education									
No education	19.4	56.1	40.3	25.8	14.5	3.6	3.3	0.3	11,828
<5 years complete	19.7	57.1	37.5	23.4	14.2	5.3	4.7	0.6	6,720
5-7 years complete	19.8	55.0	38.6	22.5	16.0	6.5	5.5	1.0	10,949
8-9 years complete	19.8	53.3	39.5	22.1	17.4	7.2	6.2	1.0	13,695
10-11 years complete	20.6	56.0	31.6	17.7	13.9	12.5	10.5	1.9	9,741
12 or more years complete	21.8	62.0	19.3	12.2	7.1	18.8	16.3	2.5	12,794
Religion									
Hindu	20.2	56.3	34.8	20.7	14.1	8.9	7.7	1.2	54,099
Muslim	20.2	57.1	34.5	21.3	13.2	8.4	7.4	1.1	7,926
Christian	21.2	64.3	22.1	13.6	8.5	13.6	11.9	1.7	1,505
Sikh	22.4	56.6	17.8	10.8	7.1	25.5	20.9	4.7	1,224
Buddhist/Neo-Buddhist	19.7	49.3	41.6	20.4	21.2	9.0	8.5	0.6	572
Jain	22.5	55.2	16.6	9.9	6.8	28.2	24.6	3.5	187
Other	19.5	55.2	42.5	31.0	11.5	2.3	2.3	0.1	216
Caste/tribe									
Scheduled caste	19.7	54.7	39.1	23.0	16.1	6.3	5.6	0.7	12,531
Scheduled tribe	19.3	55.3	41.3	26.1	15.2	3.3	3.0	0.3	5,500
Other backward class	20.2	57.0	34.6	20.6	14.0	8.4	7.4	1.1	25,805
Other	20.9	57.5	28.9	17.1	11.8	13.5	11.5	2.1	21,533
Don't know	19.9	47.5	44.0	27.8	16.2	8.5	7.5	1.0	164
Wealth index									
Lowest	18.8	50.3	48.3	29.6	18.7	1.4	1.3	0.1	10,531
Second	19.2	55.4	42.4	25.7	16.7	2.2	1.9	0.2	12,077
Middle	19.7	57.6	37.4	22.1	15.3	5.0	4.6	0.4	13,666
Fourth	20.6	60.3	29.6	17.2	12.4	10.2	9.1	1.0	14,544
Highest	22.2	57.3	19.1	11.2	7.9	23.6	19.6	4.0	14,923
Total age 15-49	20.2	56.5	34.2	20.4	13.8	9.3	8.0	1.3	65,742
Age 50-54	21.2	57.5	26.1	15.0	11.1	16.4	14.0	2.4	4,389
Total age 15-54	20.3	56.6	33.7	20.1	13.6	9.7	8.4	1.3	70,130

Note: Total includes men with missing information on education, religion, and caste/tribe, who are not shown separately.

substantial problems among several groups of women in India, particularly older women, women living in urban areas, women who are well educated, women in households in the highest wealth quintile, and Sikhs. About one-quarter or more of women in each of these groups have a BMI of 25 or more and 5-10 percent have a BMI of 30 or more. In addition to being relatively tall, Sikh women are more likely than women in any other group to be obese. Thus, Indian women suffer from a dual burden of malnutrition, with nearly half (48 percent) being either too thin or overweight. The proportion of women who are too thin or overweight is fairly constant across all

subgroups shown in Table 10.22.1, indicating that as undernutrition decreases, overnutrition increases by approximately the same amount. Therefore, nutrition programmes in India need to tackle both of these problems on a priority basis.

The mean body mass index is similar for men (20.2) and women (20.5) age 15-49 (Tables 10.22.1 and 10.22.2). As in the case of women, the mean BMI for men varies within a narrow range across population subgroups. Thirty-four percent of men age 15-49 are thin, compared with 36 percent of women. Forty percent of men who are thin are considered to be moderately or severely thin. The patterns of thinness for subgroups of men are similar to the patterns for women. The percentage overweight or obese is somewhat lower for men age 15-49 (9 percent) than for women age 15-49 (13 percent). Men are also less likely to be obese (1 percent) than women (3 percent). Again, the pattern of differentials in the percentage overweight or obese is similar for men and women. One-quarter of Sikh and Jain men and men in households in the highest wealth quintile are overweight or obese. Only 57 percent of men and 52 percent of women have a BMI within the normal range of 18.5-24.9.

In addition, Table 10.22.2 shows the nutritional indicators for men age 50-54. Men age 50-54 have a slightly higher mean BMI than younger men. They are much less likely than younger men to be too thin, but are much more likely than younger men to be overweight or obese.

State differentials in nutritional status for women and men are shown in Tables 10.23.1 and 10.23.2. The percentage of women who are short (height less than 145 cm) is highest in Meghalaya (22 percent) and Tripura (19 percent) and lowest (4-5 percent) in Haryana, Punjab, Jammu and Kashmir, and Rajasthan. The mean BMI varies very little from one state to another. The proportion of women who are too thin is particularly high in Bihar (45 percent) and Chhattisgarh and Jharkhand (43 percent each), and lowest in Delhi, Punjab, and several of the small northeastern states. The percentage of women who are overweight or obese is highest in Punjab (30 percent), followed by Kerala (28 percent) and Delhi (26 percent). The mean BMI for men does not vary much by state, but the percentage of men who are too thin varies substantially among the states. Over 40 percent of men age 15-49 are too thin in Tripura, Madhya Pradesh, and Rajasthan. Once again, Punjab, Kerala, and Delhi are the states with the highest level of overweight and obesity.

Table 10.23.1 Nutritional status of women by state

Percentage of women age 15-49 below 145 cm, mean body mass index (BMI), and percentage with specific BMI levels, by state, India, 2005-06

State	Body Mass Index (BMI) ¹ in kg/m ²								
	Height Percentage below 145 cm	Mean BMI	Thin				Overweight/obese		
			18.5-24.9 (normal)	<18.5 (total thin)	17.0-18.4 (mildly thin)	<17.0 (moderately/ severely thin)	≥25.0 (overweight or obese)	25.0-29.9 (over- weight)	≥30.0 (obese)
India	11.4	20.5	51.8	35.6	19.7	15.8	12.6	9.8	2.8
North									
Delhi	6.9	22.9	58.7	14.8	9.1	5.8	26.4	18.6	7.8
Haryana	4.4	21.1	51.2	31.3	16.8	14.5	17.4	13.0	4.4
Himachal Pradesh	6.1	20.8	56.6	29.9	16.7	13.2	13.5	11.4	2.1
Jammu & Kashmir	4.8	21.4	58.6	24.6	15.5	9.1	16.7	13.4	3.3
Punjab	4.5	22.9	51.2	18.9	11.4	7.5	29.9	20.8	9.1
Rajasthan	5.0	20.1	54.4	36.7	21.5	15.2	8.9	7.1	1.8
Uttaranchal	7.5	20.8	57.2	30.0	18.3	11.7	12.8	10.1	2.7
Central									
Chhattisgarh	11.9	19.5	51.0	43.4	24.4	19.0	5.6	4.3	1.3
Madhya Pradesh	8.4	19.7	50.8	41.7	22.8	18.9	7.6	6.2	1.4
Uttar Pradesh	14.4	20.1	54.8	36.0	21.1	14.9	9.2	7.5	1.7
East									
Bihar	15.9	19.4	50.4	45.1	25.9	19.2	4.6	4.0	0.6
Jharkhand	18.0	19.5	51.7	43.0	25.0	18.0	5.4	4.5	0.9
Orissa	13.1	19.7	52.0	41.4	23.1	18.3	6.6	5.5	1.1
West Bengal	14.3	20.2	49.6	39.1	21.4	17.6	11.4	9.4	2.0
Northeast									
Arunachal Pradesh	13.3	21.1	74.8	16.4	11.0	5.4	8.8	7.7	1.1
Assam	15.8	20.0	55.7	36.5	21.4	15.2	7.8	6.9	0.9
Manipur	8.0	21.5	72.0	14.8	11.6	3.1	13.3	11.4	1.9
Meghalaya	21.6	21.0	80.1	14.6	9.8	4.8	5.3	4.5	0.8
Mizoram	9.2	21.2	75.0	14.4	10.3	4.1	10.6	9.4	1.2
Nagaland	7.0	20.8	76.2	17.4	13.0	4.4	6.4	5.7	0.7
Sikkim	12.0	22.1	73.5	11.2	7.9	3.2	15.4	12.4	3.0
Tripura	19.2	19.9	55.9	36.9	20.8	16.1	7.1	6.4	0.7
West									
Goa	10.1	21.5	51.9	27.9	13.4	14.5	20.2	15.4	4.8
Gujarat	8.7	20.8	47.0	36.3	17.7	18.6	16.7	12.1	4.6
Maharashtra	10.6	20.6	49.3	36.2	19.3	17.0	14.5	10.9	3.6
South									
Andhra Pradesh	12.1	20.9	50.9	33.5	17.8	15.6	15.6	11.5	4.1
Karnataka	9.9	20.7	49.2	35.5	18.6	16.9	15.3	11.6	3.7
Kerala	8.6	22.6	53.9	18.0	9.6	8.4	28.1	23.1	5.0
Tamil Nadu	9.5	21.6	50.6	28.4	14.9	13.5	20.9	15.8	5.1

¹ Excludes pregnant women and women with a birth in the preceding 2 months.

Table 10.23.2 Nutritional status of men by state
Among men age 15-49, mean body mass index (BMI) and percentage with specific BMI levels, by state, India, 2005-06

State	Body Mass Index (BMI) in kg/m ²							
	Mean BMI	Thin				Overweight/obese		
		18.5-24.9 (normal)	<18.5 (total thin)	17.0-18.4 (mildly thin)	<17.0 (moderately/severely thin)	≥25.0 (overweight or obese)	25.0-29.9 (overweight)	≥30.0 (obese)
India	20.2	56.5	34.2	20.4	13.8	9.3	8.0	1.3
North								
Delhi	22.0	67.4	15.7	11.6	4.1	16.8	14.3	2.6
Haryana	20.5	58.3	30.9	17.4	13.5	10.8	8.9	1.8
Himachal Pradesh	20.5	59.7	29.7	17.0	12.7	10.6	9.7	0.9
Jammu & Kashmir	20.3	65.8	28.0	18.3	9.7	6.2	5.5	0.7
Punjab	22.0	57.2	20.6	12.8	7.8	22.2	18.2	4.0
Rajasthan	19.7	53.3	40.5	24.5	16.0	6.2	5.4	0.8
Uttaranchal	20.5	63.7	28.4	15.8	12.6	7.9	6.7	1.2
Central								
Chhattisgarh	19.6	56.6	38.5	25.2	13.3	4.9	4.4	0.5
Madhya Pradesh	19.5	54.1	41.6	24.9	16.7	4.3	4.0	0.3
Uttar Pradesh	19.8	54.4	38.3	23.5	14.7	7.3	6.3	1.0
East								
Bihar	19.9	58.5	35.3	21.5	13.7	6.3	5.5	0.8
Jharkhand	19.6	56.5	38.6	24.8	13.8	4.9	4.4	0.5
Orissa	19.8	58.3	35.7	23.2	12.5	6.0	4.9	1.1
West Bengal	20.0	59.4	35.2	21.7	13.5	5.5	5.1	0.4
Northeast								
Arunachal Pradesh	20.9	77.6	15.2	11.0	4.2	7.1	7.1	0.0
Assam	19.8	59.5	35.6	23.1	12.5	5.0	4.6	0.4
Manipur	21.0	74.5	16.3	12.7	3.6	9.2	8.3	0.9
Meghalaya	21.2	79.9	14.1	11.6	2.5	5.9	5.6	0.3
Mizoram	21.5	79.4	9.2	7.5	1.7	11.4	10.9	0.5
Nagaland	20.8	80.2	14.2	10.4	3.8	5.7	5.2	0.5
Sikkim	21.8	75.9	12.2	9.0	3.2	11.9	10.8	1.2
Tripura	19.6	53.5	41.7	23.4	18.3	4.8	4.8	0.0
West								
Goa	21.2	59.9	24.6	13.0	11.7	15.4	13.2	2.3
Gujarat	20.3	52.6	36.1	19.2	16.9	11.3	9.3	2.0
Maharashtra	20.5	54.6	33.5	18.0	15.5	11.9	10.3	1.6
South								
Andhra Pradesh	20.8	55.6	30.8	19.1	11.7	13.6	11.7	1.9
Karnataka	20.4	55.1	33.9	19.0	14.9	10.9	9.2	1.7
Kerala	21.6	60.6	21.5	11.4	10.1	17.8	15.7	2.1
Tamil Nadu	21.1	58.4	27.1	14.8	12.3	14.5	12.5	2.0

10.8 ANAEMIA AMONG WOMEN AND MEN

The same equipment and procedures used to measure anaemia in children were employed to measure anaemia in women and men, except for persons whose blood was also collected for HIV testing. For those persons, the first 3-5 drops of blood were collected on filter paper cards for HIV testing and the next drop was collected in a microcuvette for anaemia testing. Three levels of severity of anaemia are distinguished: mild anaemia (10.0-10.9 grams/decilitre for pregnant women, 10.0-11.9 g/dl for nonpregnant women, and 12.0-12.9 g/dl for men), moderate anaemia (7.0-9.9 g/dl for women and 9.0-11.9 g/dl for men), and severe anaemia (less than 7.0 g/dl for women and less than 9.0 g/dl for men). Appropriate adjustments in these cutoff points were made for respondents living at altitudes above 1,000 metres and respondents who smoke, since both of these groups require more haemoglobin in their blood (Centers for Disease Control and Prevention, 1998).

Tables 10.24.1 and 10.24.2 show anaemia levels for women and men. Fifty-five percent of women and 24 percent of men whose haemoglobin level was tested were found to be anaemic⁴. Thirty-nine percent of women are mildly anaemic, 16 percent are moderately anaemic, and 2 percent are severely anaemic. To compare anaemia over time, it is necessary to restrict the analysis to ever-married women because NFHS-2 did not include never married women. The prevalence of anaemia for ever-married women has increased from 52 percent in NFHS-2 to 56 percent in NFHS-3. Therefore, the anaemia situation has worsened over time for both women and young children.

Background characteristic	Anaemia status by haemoglobin level			Any anaemia (<12.0 g/dl) ²	Number of women
	Mild (10.0-11.9 g/dl) ¹	Moderate (7.0-9.9 g/dl)	Severe (<7.0 g/dl)		
Age					
15-19	39.1	14.9	1.7	55.8	23,206
20-29	38.5	16.0	1.7	56.1	40,449
30-39	38.1	14.4	1.8	54.2	31,703
40-49	38.9	14.1	2.0	55.0	21,497
Marital status					
Never married	37.3	12.9	1.7	51.9	23,539
Currently married	38.9	15.4	1.7	56.0	87,841
Widowed	40.1	16.2	2.8	59.0	3,784
Divorced/separated/deserted	37.7	18.3	3.1	59.1	1,691
Maternity status					
Pregnant	25.8	30.6	2.2	58.7	6,028
Breastfeeding	44.9	16.6	1.7	63.2	22,109
Neither	37.9	13.5	1.7	53.2	88,718
Number of children ever born					
0	37.0	13.9	1.8	52.6	33,044
1	38.6	16.2	1.7	56.4	13,847
2-3	38.1	15.0	1.7	54.9	41,578
4-5	40.6	15.5	1.9	58.0	18,995
6+	42.1	16.2	1.6	59.9	9,391
Residence					
Urban	35.8	13.6	1.5	50.9	36,967
Rural	39.8	15.7	1.9	57.4	79,888
Education					
No education	40.8	17.2	2.1	60.1	47,466
<5 years complete	39.6	16.2	2.2	58.1	9,510
5-7 years complete	38.9	15.3	1.9	56.0	17,827
8-9 years complete	37.2	13.7	1.5	52.4	16,498
10-11 years complete	35.6	12.4	1.2	49.2	12,086
12 or more years complete	33.9	9.9	0.9	44.6	13,462
Religion					
Hindu	39.1	15.0	1.8	55.9	94,783
Muslim	38.3	15.1	1.3	54.7	15,340
Christian	32.0	16.2	2.2	50.3	2,747
Sikh	27.6	10.3	1.3	39.2	2,129
Buddhist/Neo-Buddhist	35.4	15.2	1.9	52.5	961
Jain	29.9	8.0	0.9	38.8	338
Other	49.5	19.9	2.3	71.7	448

Continued...

⁴ Haemoglobin measurements that are not adjusted for the altitude of the enumeration area or the smoking status of the respondent yield only a slightly lower level of anaemia than the adjusted estimates (54.9 percent instead of 55.3 percent for women and 22.9 percent instead of 24.2 percent for men), with maximum differences of 13 percentage points for women and 5 percentage points for men in Sikkim and 7 percentage points for women and 6 percentage points for men in Uttaranchal.

Table 10.24.1 Prevalence of anaemia in women—*Continued*

Background characteristic	Anaemia status by haemoglobin level			Any anaemia (<12.0 g/dl) ²	Number of women
	Mild (10.0-11.9 g/dl) ¹	Moderate (7.0-9.9 g/dl)	Severe (<7.0 g/dl)		
Caste/tribe					
Scheduled caste	39.3	16.8	2.2	58.3	21,921
Scheduled tribe	44.8	21.3	2.4	68.5	9,568
Other backward class	38.2	14.5	1.7	54.4	46,182
Other	37.0	12.9	1.4	51.3	38,216
Don't know	34.5	19.7	1.7	55.9	589
Wealth index					
Lowest	43.6	18.7	2.0	64.3	20,524
Second	41.4	16.8	2.1	60.3	22,449
Middle	38.3	15.5	2.2	56.0	23,886
Fourth	36.9	13.8	1.6	52.2	24,696
Highest	34.0	11.1	1.0	46.1	25,300
Smoking status					
Smokes cigarettes/tobacco	41.6	18.8	2.9	63.2	12,789
Does not smoke	38.2	14.5	1.6	54.4	104,060
Total	38.6	15.0	1.8	55.3	116,855
Total for ever-married women					
NFHS-3	38.9	15.5	1.8	56.2	93,316
NFHS-2	35.0	14.8	1.9	51.8	79,633

Note: Table is based on women who stayed in the household the night before the interview. Prevalence is adjusted for altitude and for smoking status, if known, using formulae in CDC (1998). Totals include women with missing information on education, religion, caste/tribe, and smoking status, who are not shown separately. Haemoglobin in g/dl = grams per decilitre. NFHS-3 estimates of anaemia exclude Nagaland.

¹ For pregnant women, the value is 10.0-10.9 g/dl.

² For pregnant women, the value is <11.0 g/dl.

Anaemia is pervasive among women age 15-49 in every subgroup shown in Table 10.24.1. More than half of women are anaemic in every group except for women in households in the highest wealth quintile, women with 10 or more years of education, and Jain and Sikh women. By marital status, anaemia is lowest for women who have never been married and highest for women who are widowed, divorced, separated, or deserted. The prevalence of anaemia is similar throughout the age range. Anaemia tends to increase with the number of children ever born and decreases with education and the household's wealth. Anaemia is more prevalent for women who are breastfeeding (63 percent) and women who are pregnant (59 percent) than for other women (53 percent). The prevalence of anaemia is also high for rural women, women from scheduled tribes, women who smoke, and women belonging to "other" religions.

The pattern of anaemia by characteristics is similar for men and women, except for the differentials by age. Age is not an important determinant of anaemia for women, but anaemia varies substantially by age for men. The prevalence of anaemia is more than 50 percent higher for men age 15-19 than for men age 20-24. After age 20-24, anaemia increases steadily to a maximum of 33 percent for men age 50-54. Severe anaemia is particularly high for both men and women who are widowed, divorced, separated, or deserted.

Background characteristic	Anaemia status by haemoglobin level			Any anaemia (<13.0 g/dl)	Number of men
	Mild (12.0-12.9 g/dl)	Moderate (9.0-11.9 g/dl)	Severe (<9.0 g/dl)		
Age					
15-19	16.7	12.1	1.4	30.2	12,108
20-29	10.8	7.4	1.0	19.3	21,080
30-39	12.0	9.8	1.3	23.1	17,702
40-49	14.4	12.0	1.6	27.9	13,846
Marital status					
Never married	13.2	9.6	1.2	23.9	23,226
Currently married	12.8	9.9	1.3	24.1	40,638
Widowed	18.2	19.8	3.5	41.5	489
Divorced/separated/deserted	13.9	16.4	3.0	33.2	383
Residence					
Urban	10.8	6.2	0.7	17.7	22,773
Rural	14.2	11.9	1.6	27.7	41,963
Education					
No education	17.0	14.7	1.9	33.7	11,654
<5 years complete	15.8	12.9	1.7	30.4	6,639
5-7 years complete	13.2	11.1	1.5	25.8	10,811
8-9 years complete	13.4	9.0	1.3	23.7	13,510
10-11 years complete	11.0	7.9	0.8	19.6	9,595
12 or more years complete	8.8	5.3	0.7	14.8	12,512
Religion					
Hindu	13.4	10.1	1.3	24.8	53,409
Muslim	11.8	8.7	1.2	21.6	7,736
Christian	10.5	9.6	1.0	21.0	1,400
Sikh	8.1	7.0	0.8	15.9	1,213
Buddhist/Neo-Buddhist	11.5	9.4	0.3	21.2	566
Jain	3.5	1.6	0.0	5.1	184
Other	14.5	27.6	2.9	45.0	214
Caste/tribe					
Scheduled caste	14.0	11.0	1.6	26.6	12,387
Scheduled tribe	20.4	18.1	1.1	39.6	5,378
Other backward class	12.0	9.0	1.3	22.3	25,507
Other	11.7	8.1	1.1	20.9	21,103
Don't know	10.7	10.7	3.4	24.8	157
Wealth index					
Lowest	19.2	16.8	2.0	37.9	10,410
Second	15.2	13.1	1.9	30.2	11,949
Middle	13.1	10.2	1.5	24.8	13,481
Fourth	10.9	7.0	1.0	18.8	14,315
Highest	8.9	4.9	0.4	14.2	14,582
Smoking status					
Smokes cigarettes/tobacco	13.7	10.8	1.4	25.9	37,101
Does not smoke	12.1	8.7	1.1	21.9	27,635
Total age 15-49	13.0	9.9	1.3	24.2	64,736
Age 50-54	15.0	15.1	2.5	32.6	4,327
Total age 15-54	13.1	10.2	1.4	24.7	69,064

Note: Table is based on men who stayed in the household the night before the interview. Prevalence is adjusted for altitude and for smoking status, if known, using formulae in CDC (1998). Totals include men with missing information on education, religion, and caste/tribe, who are not shown separately. Haemoglobin in g/dl = grams per decilitre. Table excludes Nagaland.

Although the prevalence of anaemia varies considerably among the states, it is widespread in every Indian state (Table 10.25). The prevalence of anaemia for both women and men is very high in all of the states in the East Region, especially Jharkhand and Bihar where more than two-thirds of women and one-third of men are anaemic. Other states with particularly

high levels of anaemia are Tripura and Assam (for both women and men), Andhra Pradesh and Sikkim (for men), and Meghalaya (for women). Kerala, Manipur, Goa, and Punjab have the lowest prevalence of anaemia for both women and men. Even in these states, however, more than one-third of women are anaemic. Severe anaemia is most prevalent in Assam for both women and men.

Table 10.25 Prevalence of anaemia in women and men by state

Percentage of women and men age 15-49 with anaemia by state, India, 2005-06

State	Women				Men			
	Mild anaemia (10.0-11.9 g/dl) ¹	Moderate anaemia (7.0-9.9 g/dl)	Severe anaemia (<7.0 g/dl)	Any anaemia (<12.0 g/dl) ²	Mild anaemia (12.0-12.9 g/dl)	Moderate anaemia (9.0-11.9 g/dl)	Severe anaemia (<9.0 g/dl)	Any anaemia (<13.0 g/dl)
India³	38.6	15.0	1.8	55.3	13.0	9.9	1.3	24.2
North								
Delhi	35.2	8.8	0.2	44.3	10.5	6.8	0.4	17.8
Haryana	37.6	16.7	1.7	56.1	12.8	5.9	0.5	19.2
Himachal Pradesh	31.6	10.5	1.2	43.3	10.6	8.1	0.2	18.9
Jammu & Kashmir	37.3	13.1	1.6	52.1	11.7	6.3	1.4	19.5
Punjab	26.2	10.4	1.4	38.0	6.6	5.5	1.5	13.6
Rajasthan	35.2	15.4	2.5	53.1	12.0	10.6	1.0	23.6
Uttaranchal	40.4	13.3	1.5	55.2	17.0	11.4	0.7	29.2
Central								
Chhattisgarh	39.9	15.7	1.9	57.5	14.4	11.5	1.1	27.0
Madhya Pradesh	40.8	14.1	1.0	56.0	15.1	9.5	1.1	25.6
Uttar Pradesh	35.1	13.2	1.6	49.9	11.9	10.4	2.0	24.3
East								
Bihar	50.5	15.9	1.0	67.4	19.7	13.2	1.4	34.3
Jharkhand	49.6	18.6	1.3	69.5	18.5	17.7	0.3	36.5
Orissa	44.9	14.9	1.5	61.2	17.3	15.4	1.2	33.9
West Bengal	45.8	16.4	1.0	63.2	18.3	13.3	0.7	32.3
Northeast								
Arunachal Pradesh	36.6	12.5	1.6	50.6	13.8	13.0	1.2	28.0
Assam	44.8	21.2	3.4	69.5	18.9	17.9	2.9	39.6
Manipur	30.1	5.1	0.5	35.7	6.8	4.2	0.4	11.4
Meghalaya	32.8	12.6	1.8	47.2	15.7	20.4	0.7	36.7
Mizoram	29.1	8.8	0.7	38.6	10.0	9.0	0.3	19.4
Sikkim	42.1	16.2	1.7	60.0	11.6	12.2	1.3	25.0
Tripura	49.0	14.8	1.3	65.1	19.2	15.5	0.8	35.5
West								
Goa	29.6	7.8	0.6	38.0	6.2	3.4	0.8	10.4
Gujarat	36.2	16.5	2.6	55.3	12.0	9.2	1.0	22.2
Maharashtra	32.8	13.9	1.7	48.4	10.1	5.9	0.8	16.8
South								
Andhra Pradesh	39.0	20.6	3.3	62.9	12.0	9.5	1.8	23.3
Karnataka	34.4	15.1	2.0	51.5	9.5	7.6	1.9	19.1
Kerala	25.8	6.5	0.5	32.8	3.8	3.7	0.4	8.0
Tamil Nadu	37.4	13.6	2.2	53.2	9.2	5.9	1.5	16.5

Note: Table is based on persons who stayed in the household the night before the interview. Prevalence is adjusted for altitude and for smoking status, if known, using formulas in CDC (1998). Haemoglobin in g/dl = grams per decilitre.

¹ For pregnant women, the value is 10.0-10.9 g/dl.

² For pregnant women, the value is <11.0 g/dl.

³ Excludes Nagaland.

