CHAPTER 10

INFANT FEEDING AND CHILD NUTRITION

Infant feeding practices and child nutrition have significant effects on child survival, maternal health and fertility. Breastfeeding improves the nutritional status of young children and reduces morbidity and mortality. Breast milk not only provides the child with important nutrients but also protects the child against infections. The timing and type of supplementary foods introduced in the infant's diet also have significant effects on the nutritional status of the child. The duration and intensity (i.e., frequency) of breastfeeding have additional effects on the duration of postpartum amenorrhoea, birth intervals, and fertility. This chapter discusses the information collected on infant feeding, including both breastfeeding and supplementary feeding. Also included is a discussion of the nutritional status of children under four years of age as measured by the height and weight of children.

10.1 Breastfeeding and Supplementation

The Innocenti Declaration on the Protection, Promotion and Support of Breastfeeding (1990) and the WHO Working Group on Infant Feeding (World Health Organization, 1991b) have made several recommendations on the feeding of infants and young children. These international recommendations state that infants should be given only breast milk up to 4-6 months of age. Aside from breast milk, no other foods or liquids are needed during this period. At age 4-6 months, adequate and appropriate complementary foods should be added to the infant's diet in order to provide sufficient nutrients for optimal growth. It is recommended that breastfeeding should continue, along with complementary foods, up through the second year of life or beyond. It is further recommended that a feeding bottle with a nipple should not be used at any age, for reasons having to do mainly with sanitation and the prevention of infections. In addition, the Baby Friendly Hospitals Initiative, launched by WHO, recommends the early initiation of breastfeeding, immediately after childbirth.

Several indicators of breastfeeding practices have been suggested by WHO to guide countries in the gathering of information for measuring and evaluating infant feeding practices. These indicators include the ever breastfed rate, the exclusive breastfeeding rate, the timely complementary feeding rate, the continued breastfeeding rate, and the bottle feeding rate. The *exclusive breastfeeding rate* is defined as the proportion of infants under four months who receive only breast milk. The *timely complementary feeding rate* is the proportion of infants age 6-9 months who receive both breast milk and solid or semi-solid food. The *continued breastfeeding rate through one year of age* is the proportion of children age 12-15 months who are still being breastfed. The *continued breastfeeding rate through two years of age* is the proportion of children age 20-23 months who are still being breastfed. The *bottle feeding rate* is the proportion of infants who are fed using a bottle with a nipple. These indicators are highlighted in the presentation of the data on breastfeeding and other feeding practices in this chapter.

In the NFHS, information on breastfeeding and supplementation was obtained from a series of questions in Section 4 of the Woman's Questionnaire. These questions pertain to births in the year of the survey and in the preceding four calendar years. The tabulations, however,

are based on each woman's births in the four years prior to her date of interview. For any given woman, a maximum of three births was included in the analysis.

Table 10.1 contains information on the percentage of children ever breastfed, the timing of the initiation of breastfeeding, and the practice of squeezing the first milk from the breast before beginning breastfeeding. The results are based on 50,001 children born in the four years preceding the survey. Breastfeeding is nearly universal in India, with 95 percent of all children having been breastfed. This is not surprising since breast milk has traditionally been the main source of nutrition for infants and young children in India. The practice of breastfeeding is high in all population subgroups, ranging from 92 to 99 percent.

The initiation of breastfeeding immediately after childbirth is important because it benefits both the mother and the infant. As soon as the infant starts suckling at the breast, the hormone oxytocin is released, resulting in uterine contractions that facilitate the expulsion of the placenta and reduce the risk of postpartum haemorrhage. Breast milk is sufficient for newborn infants; it is not necessary to give them anything else. When the neonate is given anything else, contaminants may cause infection, leading to diarrhoea.

It is also recommended that the first breast milk should be given to the child rather than squeezed from the breast and discarded because it contains colostrum, which provides natural immunity to the child. Table 10.1 shows how soon after birth breastfeeding was initiated. This information was collected for the most recent birth of each woman who had a birth in the four years before the survey (a total of 38,457 births). For a large majority of children in India, the timing of initiation of breastfeeding is later than recommended. Only 10 percent of children began breastfeeding within one hour of birth, and 26 percent began breastfeeding within 24 hours of birth. The practice of squeezing the first milk from the breast is also very common in India. A majority (64 percent) of women squeezed the first milk from the breast before they began breastfeeding their babies. This suggests the importance of launching an educational campaign to inform women about the benefits of providing the first breast milk to their children.

There is virtually no difference in the timing of initiation of breastfeeding by the sex of the child, but urban-rural differences are more substantial. Breastfeeding started within one day of birth for only one-quarter of babies in rural areas, but almost one-third of babies in urban areas. The early initiation of breastfeeding is most evident among women with more education, Christian and Jain women, and women from scheduled tribes. The early initiation of breastfeeding is also more common for children whose birth was assisted by health professionals and children born in a health facility. Even for these groups, however, no more than 4 in 10 children were first breastfed within 24 hours of birth. This is a surprising result since health professionals should be encouraging women to breastfeed their children right from the time of birth.

In general, groups that are less likely to start breastfeeding early are more likely to squeeze the first milk from the breast before breastfeeding begins. The practice of squeezing the first milk from the breast is particularly prevalent in Sikh families and for children whose birth was assisted by a traditional birth attendant.

Table 10.1 Initiation of breastfeeding

Percentage of all children who were ever breastfed, the percentage of last-born children who started breastfeeding within one hour and one day of birth, and percentage of last-born breastfed children whose mothers squeezed the first milk from the breast among children born during the four years preceding the survey, according to selected background characteristics, India, 1992-93

Background characteristic	Among all children:		Among last-born children:				
	Percentage ever breastfed	Number of children	Percent started breastfeeding within first 1 hour of birth	Percent started breastfeeding within 1 day of birth[1]	Number of children	Percent of breastfed children whose mothers squeezed first milk from breast[2]	Number of children[2]
Sex of child							
Male	95.2	25541	9.4	26.3	19890	63.5	13812
Female	95.7	24460	9.6	26.4	18567	63.4	12845
Residence							
Urban	95.5	11359	11.1	32.0	8803	60.0	5929
Rural	95.4	38643	9.0	24.7	29654	64.4	20728
Mother's education							
Illiterate	95.4	33207	8.6	21.9	25248	64.9	17773
Lit., < middle complete	95.6	8298	10.5	31.6	6380	66.1	4187
Middle school complete	95.8	3537	12.1	37.8	2734	60.4	1800
High school and above	95.5	4959	11.6	37.9	4096	52.6	2897
Religion							
Hindu	95.3	39725	9.6	25.7	30789	63.5	20895
Muslim	95.8	7705	7.4	24.1	5679	61.4	4141
Christian	95.8	1001	19.7	58.3	786	58.3	545
Sikh	96.9	835	4.7	25.1	622	86.8	596
Jain	98.5	143	11.1	42.1	117	60.7	90
Buddhist	96.7	353	15.4	33.3	275	53.8	257
Other	95.3	240	14.0	40.4	189	56.8	132
Caste/tribe							
Scheduled caste	94.8	6695	8.5	22.2	5027	66.2	3492
Scheduled tribe	95.6	4764	16.5	35.9	3646	64.9	2283
Other	95.5	38543	8.8	25.9	29785	62.8	20881
Assistance at delivery							
Health professional	95.3	17146	11.7	34.8	13603	60.1	8505
Traditional birth attendant	96.4	17628	7.5	22.3	13416	68.2	9737
Other or none	95.7	14975	9.4	21.2	11319	61.4	8378
Place of delivery							
Public health facility	95.2	7309	12.3	37.2	5730	58.2	3341
Private health facility	95.5	5426	12.0	39.2	4406	54.4	2917
Own home	96.1	30796	8.5	22.6	23431	65.4	17251
Parents' home	96.0	5968	8.7	20.0	4599	67.3	3019
Other	92.0	265	5.9	23.8	205	64.2	126
Total	95.4	50001	9.5	26.3	38457	63.5	26657

Note: Table is based on children born in the four years preceding the survey, whether living or dead at the time of interview. Total includes children with missing information on place of delivery and assistance at delivery, who are not shown separately.

[1]Includes children who started breastfeeding within one hour of birth

[2]Excludes Andhra Pradesh, Himachal Pradesh, Madhya Pradesh, Tamil Nadu and West Bengal

Table 10.2 shows state differentials in the timing of the initiation of breastfeeding and the practice of squeezing the first milk from the breast. There are substantial differentials in the timing of initiation of breastfeeding by state. The small northeastern states of Nagaland and Arunachal Pradesh come closest to meeting the international recommendations. At the other end of the spectrum, fewer than one in five children start breastfeeding the first day in Uttar Pradesh, Bihar, Maharashtra and Karnataka. In every state, the first milk is squeezed from the breast for more than two-fifths of breastfed children. This practice is most common in the

Table 10.2 Initiation of breastfeeding by state

Percentage of last-born children who started breastfeeding within one hour and one day of birth and percentage of last-born breastfed children whose mothers squeezed the first milk from the breast, according to state, India, 1992-93

State	Percent started breastfeeding within first 1 hour of birth	Percent started breastfeeding within 1 day of birth[a]	Percentage whose mothers squeezed first milk from breast
India	9.5	26.3	63.5[b]
North			
Delhi	6.1	39.5	71.2
Haryana	2.7	43.9	57.0
Himachal Pradesh	12.2	42.3	U
Jammu Region of J & K	7.1	41.0	88.0
Punjab	5.3	23.7	92.9
Rajasthan	7.9	30.3	56.6
Central			
Madhya Pradesh	11.0	27.7	U
Uttar Pradesh	4.7	11.6	60.9
East			
Bihar	1.5	11.8	60.1
Orissa	17.7	36.3	78.8
West Bengal	10.8	33.8	U
Northeast			
Arunachal Pradesh	40.6	79.8	43.7
Assam	20.0	53.2	70.3
Manipur	12.1	24.9	69.4
Meghalaya	8.3	69.1	64.4
Mizoram	29.9	68.1	78.8
Nagaland	64.3	83.8	49.3
Tripura	7.3	28.0	68.9
West			
Goa	28.8	44.1	61.9
Gujarat	14.0	25.7	57.2
Maharashtra	7.4	18.2	70.5
South			
Andhra Pradesh	20.0	27.5	U
Karnataka	5.4	18.2	61.9
Kerala	14.3	77.5	48.5
Tamil Nadu	21.8	54.5	U

Note: Table is based on children born in the four year preceding the survey, whether living or dead at the time of the interview.
U: Not available
[a]Includes children who started breastfeeding within one hour of birth
[b]Excludes Andhra Pradesh, Himachal Pradesh, Madhya Pradesh, Tamil Nadu and West Bengal

predominantly Sikh state of Punjab (93 percent), Jammu (88 percent), and Mizoram and Orissa (79 percent each). The practice is least evident in Arunachal Pradesh (44 percent), and Kerala and Nagaland (49 percent each).

For children currently being breastfed, mothers were asked if the child had been given other liquids or solid foods at any time during the day or night before the interview. The results are shown in Table 10.3 and Figure 10.1 according to the child's age. Children who received nothing but breast milk in the previous 24 hours are defined as being *exclusively breastfed*, while *full breastfeeding* refers to both those given only breast milk and those who received breast milk and plain water only. In India, exclusive breastfeeding is quite common for very young children, but even at age 0-1 month more than one-third of babies are given water or other supplements. On average, 51 percent of infants under four months are given only breast milk, while 73 percent receive full breastfeeding. The percentage of babies being exclusively breastfed drops off rapidly after the first few months of life, to less than 10 percent for children age 8 months and older. Supplements other than plain water are given in addition to breast milk to 16 percent of children less than 1 month of age. The percentage given supplements increases steadily to more than 80 percent at age 11 months. Breastfeeding typically continues for long durations. A majority of children are still being breastfed at the time of their second birthday and breastfeeding continues for three years or more for more than one-quarter of children. Even at four years of age (47 months), 14 percent of children are reported to be receiving some breast milk along with supplementary food.

Table 10.4 and Figure 10.2 show in more detail the types of food supplementation received by currently breastfeeding last-born children under four years of age during the 24 hours before the interview. The use of infant formula is rare in India. The percentage of children given infant formula increases steadily from less than 1 percent for children under 2 months of age to a maximum of only 11 percent at age 9 months. Overall, only 6 percent of breastfeeding children under four years of age are given infant formula in addition to breast milk. Supplementation of breast milk by other milk rises steadily with age to 46 percent at age 8 months and remains fairly constant (at 45-55 percent) in most of the older age groups. Supplementation by other liquids, such as juice or tea, rises steadily to 75 percent at 16 months of age and remains more or less constant at older ages. Supplementation by solid or mushy food shows a rise from only 17 percent at 6 months of age to 79 percent by age 15 months and a slower rise thereafter to more than 90 percent for children who are four years old. Less than one-third of infants age 6-9 months received both breast milk and solid/mushy foods, as recommended (derived from Tables 10.3 and 10.4). While 95 percent of the infants in this age group were being breastfed, most did not receive complementary foods.

The use of a bottle with a nipple to feed children is of interest to both demographers and health personnel. 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. In addition, because it is often difficult to sterilize the nipple properly, the use of feeding bottles with nipples exposes children to an increased risk of developing diarrhoea and other diseases. The use of bottles with nipples is relatively rare in India for breastfeeding children, increasing from 4 percent in the first month after birth to a high of 15 percent for children age 5-6 months, after which it declines slowly to near zero for children approaching four years of age.

Table 10.3 Breastfeeding status by child's age

Percent distribution of living children by breastfeeding status, according to child's age in months, India, 1992-93

Age in months	Percentage among all living children						Number of living children
	Not breast-feeding	Exclu-sively breast-feeding	Breastfeeding and			Total percent	
			Plain water only	Supple-ments	DK supple-ments		
<1	4.9	60.5	18.2	15.9	0.5	100.0	605
1	0.7	58.0	20.5	20.4	0.4	100.0	1060
2	2.4	48.6	22.8	25.9	0.3	100.0	1141
3	0.9	41.9	24.5	32.2	0.6	100.0	1163
4	3.0	35.3	25.3	36.0	0.4	100.0	1190
5	3.8	23.2	28.9	43.7	0.4	100.0	1087
6	3.6	20.2	24.6	51.1	0.5	100.0	1157
7	4.1	11.9	21.8	61.8	0.5	100.0	1134
8	5.6	8.9	15.5	69.5	0.5	100.0	1024
9	5.3	6.8	15.2	72.1	0.5	100.0	959
10	5.1	4.4	11.5	79.0	--	100.0	839
11	7.1	4.4	7.9	80.4	0.1	100.0	767
12	12.2	2.8	8.7	76.3	--	100.0	956
13	9.6	2.5	4.9	82.3	0.7	100.0	1156
14	15.1	1.8	5.4	77.6	0.1	100.0	1108
15	13.1	1.4	3.5	81.9	0.1	100.0	1129
16	14.2	1.8	3.7	80.0	0.2	100.0	1144
17	17.2	1.2	2.8	78.4	0.3	100.0	1081
18	22.4	1.2	2.2	74.1	0.2	100.0	1064
19	25.4	0.6	1.9	71.3	0.8	100.0	954
20	29.1	0.5	3.4	66.9	0.1	100.0	907
21	34.1	0.7	1.6	63.2	0.3	100.0	865
22	31.7	1.3	4.2	62.0	0.9	100.0	740
23	39.2	0.4	1.0	58.4	1.1	100.0	749
24	43.4	--	0.8	55.0	0.8	100.0	937
25	49.7	0.4	0.9	48.5	0.6	100.0	1070
26	48.0	0.4	0.5	50.3	0.8	100.0	994
27	55.7	0.3	0.8	42.1	1.1	100.0	890
28	58.7	0.1	0.6	39.9	0.7	100.0	977
29	60.6	0.7	1.4	37.0	0.4	100.0	874
30	61.5	0.3	0.3	37.5	0.4	100.0	916
31	66.0	0.2	1.4	31.5	0.9	100.0	825
32	68.5	0.4	0.5	30.2	0.4	100.0	806
33	65.9	--	0.4	32.9	0.8	100.0	818
34	67.6	0.3	0.2	30.8	1.1	100.0	807
35	64.2	--	0.2	34.6	1.0	100.0	733
36	71.8	0.1	0.3	27.2	0.6	100.0	885
37	78.7	0.3	0.2	19.5	1.2	100.0	1101
38	77.7	0.2	0.4	21.5	0.3	100.0	1001
39	82.7	0.1	--	16.8	0.4	100.0	1051
40	83.7	--	0.2	15.3	0.8	100.0	908
41	80.0	0.2	0.2	19.2	0.6	100.0	961
42	84.2	0.1	0.1	14.5	1.1	100.0	1024
43	84.3	0.1	0.2	14.8	0.6	100.0	975
44	84.9	--	0.3	14.5	0.3	100.0	921
45	85.0	0.1	0.2	14.6	0.2	100.0	979
46	85.1	--	0.1	14.2	0.5	100.0	827
47	85.6	0.1	--	13.7	0.6	100.0	801

Note: Breastfeeding status refers to last 24 hours. Children classified as "Breastfeeding and plain water only" receive no supplements.
DK: Don't know
-- Less than 0.05 percent

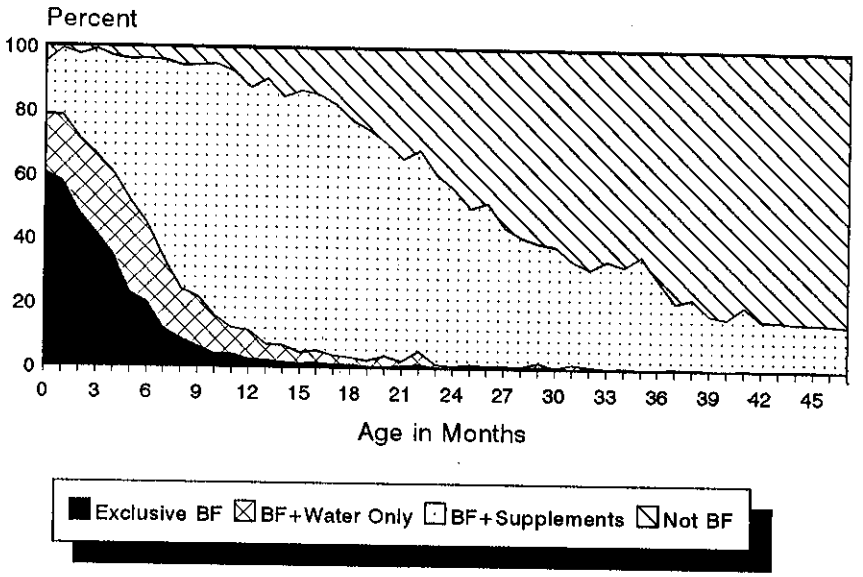
Table 10.4 Type of supplementation by child's age

Percentage of last-born breastfeeding children receiving food supplementation by type and percentage using a bottle with a nipple, according to child's age in months, India, 1992-93

Age in months	Percentage of breastfeeding children who are:					Number of breastfeeding children
	Receiving supplement				Using bottle with a nipple	
	Infant formula	Other milk	Other liquid	Solid/ mushy food		
<1	0.5	8.1	10.9	0.4	4.0	575
1	1.0	12.0	12.3	0.8	7.3	1051
2	2.7	15.2	13.3	2.0	9.5	1114
3	3.9	21.2	15.0	2.0	11.5	1152
4	4.4	26.3	17.8	6.1	14.1	1152
5	6.6	30.6	24.7	9.3	15.3	1042
6	8.1	34.9	30.1	17.2	15.2	1114
7	8.3	39.3	37.3	30.2	14.5	1085
8	9.3	45.8	45.7	38.6	14.4	966
9	11.3	44.4	50.3	49.6	11.6	905
10	9.0	45.6	54.9	55.5	11.3	796
11	9.6	49.6	59.5	64.3	14.1	712
12	8.3	48.2	59.7	68.2	10.9	839
13	5.7	48.6	66.2	73.1	9.2	1043
14	5.2	48.1	67.3	73.7	7.8	939
15	5.0	51.6	71.8	79.0	6.1	981
16	7.6	49.0	74.8	81.3	7.3	980
17	6.4	50.9	72.7	82.3	5.9	892
18	5.7	48.3	73.3	83.2	4.0	825
19	6.0	52.1	73.8	84.7	5.7	707
20	5.8	48.8	73.7	81.8	4.7	643
21	7.8	46.1	72.9	85.9	5.9	568
22	4.7	51.7	72.7	80.2	4.2	503
23	6.4	50.0	75.3	88.3	6.9	448
24	4.1	49.2	78.4	89.2	2.8	524
25	3.7	50.9	77.0	88.7	5.9	533
26	4.5	54.0	82.2	90.9	3.4	509
27	4.8	53.0	81.5	90.5	5.1	387
28	4.9	46.1	71.9	89.2	4.2	397
29	4.8	48.0	75.3	89.4	3.1	342
30	3.5	51.9	83.1	90.8	2.4	351
31	4.4	55.6	79.3	92.0	4.6	274
32	8.8	47.3	75.1	87.9	5.5	250
33	3.0	55.9	76.4	94.5	3.2	275
34	3.3	45.6	80.5	91.9	1.9	253
35	3.6	53.8	81.1	94.7	3.2	255
36	2.5	47.1	77.6	88.6	2.1	244
37	5.0	55.5	73.8	94.9	2.7	204
38	2.4	46.8	76.2	91.6	2.0	220
39	3.3	53.2	82.6	96.3	4.3	177
40	3.2	53.0	76.8	93.4	0.1	143
41	1.5	45.5	78.3	94.8	--	187
42	4.1	33.6	79.9	95.0	2.0	152
43	3.0	41.3	71.9	95.9	1.6	148
44	3.6	42.9	76.1	95.7	1.5	137
45	6.0	45.2	79.7	93.6	0.1	146
46	5.7	45.8	76.6	94.0	2.0	119
47	1.9	38.7	79.8	96.7	0.3	111

Note: Supplementation refers to the last 24 hours. Percentage by type of supplement among breastfeeding children may sum to more than 100.0 because children may have received more than one type of supplement.
-- Less than 0.05 percent

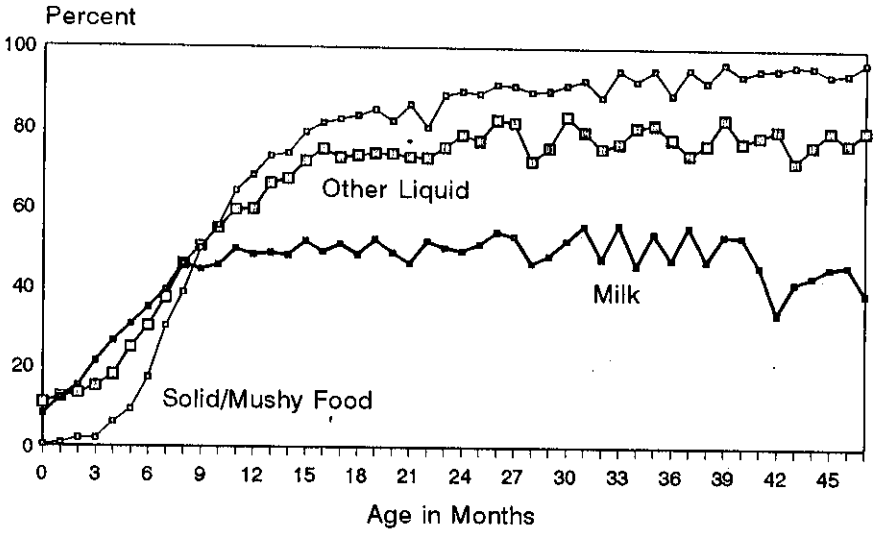
Figure 10.1
Distribution of Children by Breast-feeding (BF) Status According to Age



Note: BF + Supplements includes
BF + DK (Don't know) Supplements

NFHS, India, 1992-93

Figure 10.2
Percentage of Children Given Milk, Other Liquid, or Solid/Mushy Food the Day Before the Interview



Note: Based on youngest child under age four being breastfed;
Milk refers to fresh milk and tinned/powdered milk

NFHS, India, 1992-93

The duration of breastfeeding is a widely studied indicator of breastfeeding. Several statistics describing the length of breastfeeding (the median duration of exclusive breastfeeding, full breastfeeding and breastfeeding of any kind including partial breastfeeding) are shown by selected background characteristics in Table 10.5. Also shown is the percentage of children under 6 months of age who were breastfed six or more times in the 24 hours preceding the survey interview. The median length of breastfeeding overall is slightly over two years. Supplementation begins early, however. The median length of exclusive breastfeeding is only 1.4 months, and the median length of full breastfeeding is 4.7 months. The mean length of breastfeeding (26 months) is slightly longer than the median length, reflecting the fact that some children are breastfed for very long periods of time. Estimates of both the means and the medians are based on the current proportions of children breastfeeding in each age group rather than on the mother's recall, because current status information is usually more accurate.

An alternative measure of the duration of breastfeeding is the prevalence-incidence mean, which is calculated as the "prevalence" of breastfeeding divided by its "incidence". In this case, prevalence is defined as the number of children whose mothers were breastfeeding at the time of the survey and incidence is defined as the average number of births per month (averaged over a 48-month period to overcome problems of the seasonality of births and possible reference period errors). For each measure of breastfeeding, the prevalence-incidence mean is very close to the mean calculated in the conventional manner.

Children of more "modernized" women (urban women, educated women, and those who are exposed to mass media) have shorter durations of breastfeeding than other children, but children of working women have a slightly longer duration. It should be noted that working mothers come disproportionately from rural areas where breastfeeding durations are relatively long. Male children are breastfed slightly longer than female children (25.3 months compared to 23.6 months), but the duration of exclusive breastfeeding and full breastfeeding is slightly longer for female children because male children start receiving water or supplements at an earlier age. Other groups with relatively long breastfeeding durations include scheduled tribes and children whose birth was not attended by a health professional.

In addition to the length of breastfeeding, the frequency with which mothers breastfeed can affect the duration of postpartum amenorrhoea and also the health and nutritional status of the child. There is a high intensity of breastfeeding in India. Ninety-two percent of children under six months of age were breastfed six or more times on the day before the interview (Table 10.5). The frequency of breastfeeding is slightly lower in urban areas and for children whose mothers had received a high school education, but the differences among groups are not large.

State differentials in the duration and frequency of breastfeeding are shown in Table 10.6. The median duration of breastfeeding is exceptionally long in Tripura (34 months) and West Bengal (33 months). The shortest median durations of breastfeeding (17-18 months) are found in Goa, Tamil Nadu, Mizoram, Punjab and Meghalaya. Arunachal Pradesh is the only state in which the majority of children are exclusively breastfed for the recommended period of four months. The frequency of breastfeeding is high in every state. The percentage of children under six months of age who were breastfed six or more times the day before the interview varies from 75-76 percent in Goa and Tamil Nadu (the same states that have the shortest median durations of breastfeeding) to 100 percent in Nagaland.

Table 10.5 Median duration and frequency of breastfeeding by background characteristics

Median durations of any, exclusive and full breastfeeding among children under four years and the percentage of children under six months of age who were breastfed six or more times in the 24 hours preceding the interview, by selected background characteristics, India, 1992-93

Background characteristic	Median durations (months)[1]				Children under 6 months	
	Any breast-feeding	Exclusive breast-feeding	Full breast-feeding[2]	Number of children	Breastfed 6+ times in last 24 hours	Number of children
Sex of child						
Male	25.3	1.3	4.3	25541	91.6	3116
Female	23.6	1.6	5.1	24460	91.5	3131
Residence						
Urban	20.9	0.6	2.9	11359	86.4	1293
Rural	25.4	1.9	5.2	38643	92.9	4953
Mother's education						
Illiterate	25.9	2.1	5.8	33207	92.9	4163
Literate., < middle complete	23.4	0.7	3.4	8298	89.2	1033
Middle school complete	22.0	1.2	2.4	3537	92.3	423
High school and above	18.2	0.6	2.0	4959	85.9	628
Religion						
Hindu	25.0	1.6	4.7	39725	91.6	4892
Muslim	22.8	1.3	4.8	7705	91.2	1011
Christian	19.4	1.7	3.4	1001	89.6	135
Sikh	18.5	0.4	3.0	835	91.5	107
Jain	11.7	0.5	0.7	143	*	20
Buddhist	25.4	0.6	6.6	353	(99.0)	55
Other	23.0	1.2	4.2	240	87.1	27
Caste/tribe						
Scheduled caste	24.8	2.0	5.4	6695	92.0	893
Scheduled tribe	26.3	2.0	6.8	4764	92.5	594
Other	24.1	1.3	4.3	38543	91.3	4760
Mother's work status						
Not working	23.6	1.3	4.5	36225	91.5	4948
Working in family farm/business	27.3	1.7	5.2	5893	91.6	581
Employed by someone else	26.2	1.9	5.4	6654	91.3	599
Self-employed	23.7	2.0	4.2	1229	94.7	119
Mother's exposure to media						
Exposed to media	22.4	0.9	3.4	23494	90.2	2802
Watches television weekly	20.4	0.7	2.6	13093	88.6	1542
Listens to radio weekly	22.5	1.2	3.5	19289	90.3	2360
Visits cinema/theatre monthly	21.5	0.8	3.1	6628	86.4	789
Not exposed to any of the media	25.9	1.9	5.9	26507	92.7	3445
Assistance at delivery						
Health professional	21.4	0.7	2.9	17146	88.0	2087
Traditional birth attendant	25.5	1.8	5.3	17628	93.0	2219
Other or none	26.3	2.3	6.0	14975	93.7	1933
Total	24.4	1.4	4.7	50001	91.6	6247
Mean for all children[1]	26.1	3.8	6.4	NA	NA	NA
P/I for all children[3]	26.1	3.3	6.2	NA	NA	NA

Note: Total includes children with missing information on assistance at delivery, who are not shown separately.
NA: Not applicable
() Based on fewer 25-49 unweighted cases
* Percentage not shown; based on fewer than 25 unweighted cases
[1]Medians and means are based on current status
[2]Either exclusively breastfed or received breast milk and plain water only
[3]Prevalence-incidence mean

Table 10.6 Median duration and frequency of breastfeeding by state

Median durations of any, exclusive and full breastfeeding among children under four years and the percentage of children under six months of age who were breastfed six or more times in the 24 hours preceding the interview, by state, India, 1992-93

State	Median durations (months)[1]			Percentage of children under 6 months breastfed 6+ times in last 24 hours
	Any breast-feeding	Exclusive breast-feeding	Full breast-feeding[2]	
India	24.4	1.4	4.7	91.6
North				
Delhi	20.9	0.5	1.7	87.6
Haryana	23.0	0.7	2.0	90.2
Himachal Pradesh	21.7	0.7	2.6	84.9
Jammu Region of J & K	22.1	0.5	1.4	88.2
Punjab	18.4	0.4	2.6	92.7
Rajasthan	24.2	2.9	6.5	91.2
Central				
Madhya Pradesh	24.7	0.6	5.7	82.7
Uttar Pradesh	24.9	2.5	5.4	95.5
East				
Bihar	26.6	1.5	7.5	94.9
Orissa	27.6	1.2	3.7	95.1
West Bengal	32.8	0.6	1.7	88.6
Northeast				
Arunachal Pradesh	27.8	4.0	5.1	98.8
Assam	27.8	3.1	3.6	95.5
Manipur	28.5	3.8	4.1	94.6
Meghalaya	18.4	0.5	0.5	88.6
Mizoram	18.2	1.6	5.0	97.3
Nagaland	21.2	0.7	5.4	100.0
Tripura	33.8	1.2	1.8	89.0
West				
Goa	16.5	0.4	0.6	75.2
Gujarat	19.7	0.6	5.1	95.3
Maharashtra	23.0	0.7	5.5	90.1
South				
Andhra Pradesh	26.4	2.6	4.9	88.9
Karnataka	21.4	3.2	4.6	93.9
Kerala	23.5	2.1	2.1	93.1
Tamil Nadu	16.9	1.9	2.6	75.6

[1]Medians and means are based on current status
[2]Either exclusively breastfed or received breast milk and plain water only

The extent to which feeding practices in India conform to the international recommendations is summarized in Table 10.7. The table presents a very mixed picture of infant and child feeding practices. On the positive side, the duration of breastfeeding is relatively long and the use of feeding bottles with nipples is infrequent. On the negative side, only half of children less than four months old are exclusively breastfed and the introduction of solid or mushy food to the diet is typically much later than recommended. The timely complementary feeding rate for India as a whole is only 31 percent. Even at one year of age (12 months), almost one-third of breastfeeding children are not receiving solid or mushy food in addition to breast milk (see Table 10.4). This poses a serious problem for the health and

development of India's children, which must be urgently addressed. Effective programmes to educate parents about proper feeding practices are essential if the situation is to improve.

The statewide indicators of feeding practices shown in Table 10.7 can help to identify important emphases for educational programmes in each state. For example, Goa has extraordinarily high usage of feeding bottles (almost twice as high as any other state) and very poor achievement of the goals for exclusive breastfeeding and a long duration of breastfeeding. Punjab, Jammu and Meghalaya also have an exceptionally low proportion of children under four months of age who are exclusively breastfed. Children in Rajasthan, Bihar and Uttar Pradesh are very unlikely to be given solid or mushy food at the appropriate age. Some feeding problems are universal, however. No state comes even close to achieving the recommendations

Table 10.7 Recommended feeding indicators

Recommended feeding indicators for children age 0-23 months by state, India, 1992-93

State	Recommended feeding indicators				
	Percent of children 0-3 months exclusively breastfed	Percent of children 6-9 months receiving breast milk and solid/mushy food	Percent of children 12-15 months breastfed	Percent of children 20-23 months breastfed	Percent of last-born children <12 months bottle fed
India	51.0	31.4	87.5	66.6	14.2
North					
Delhi	20.0	25.1	74.6	52.8	36.3
Haryana	37.5	38.5	89.0	58.3	20.0
Himachal Pradesh	36.4	39.9	80.2	54.7	24.6
Jammu Region of J & K	16.9	44.8	83.4	51.8	38.3
Punjab	3.3	37.3	77.9	40.4	27.1
Rajasthan	65.9	9.4	87.3	74.8	8.9
Central					
Madhya Pradesh	31.4	27.7	90.2	65.4	7.3
Uttar Pradesh	60.3	19.4	89.7	73.8	12.1
East					
Bihar	51.6	18.1	92.0	79.3	10.0
Orissa	45.7	30.2	91.5	78.9	14.5
West Bengal	40.0	53.6	91.9	83.6	21.7
Northeast					
Arunachal Pradesh	73.9	35.8	98.0	73.0	7.2
Assam	65.0	39.2	94.8	82.5	12.8
Manipur	70.4	50.0	89.5	61.5	7.2
Meghalaya	18.0	56.3	63.6	51.4	24.4
Mizoram	45.5	64.3	81.6	37.9	14.7
Nagaland	61.1	43.5	70.3	46.9	23.7
Tripura	47.9	65.0	98.1	74.2	29.5
West					
Goa	10.8	33.9	53.1	40.0	66.7
Gujarat	36.3	22.9	85.8	48.1	9.2
Maharashtra	37.1	25.0	85.2	62.2	11.2
South					
Andhra Pradesh	70.5	47.8	86.9	67.7	12.5
Karnataka	65.6	38.2	84.3	54.5	13.5
Kerala	59.2	69.3	84.0	61.7	26.2
Tamil Nadu	55.8	56.5	65.4	35.5	30.7

for exclusive breastfeeding of children under 4 months of age or the supplementation of breast milk with solid or mushy food at age 6-9 months. These poor feeding practices are undoubtedly a factor in the nutritional deficiencies that are illustrated in the next section.

10.2 Nutritional Status of Children

One of the major contributions of the NFHS to the study of child health is the anthropometric data collected for children under four years of age. Both weight and height measurements were obtained for each child. For first phase states (Andhra Pradesh, Himachal Pradesh, Madhya Pradesh, Tamil Nadu and West Bengal), only weight was measured, because height measuring boards were not available at that time[1]. The weight of each child was measured using a Salter scale, which is a hanging spring balance. For the measurement of height/length, children under two years of age were measured lying down on an adjustable measuring board, while those age two years and above were measured in a standing position. The guidelines given in the United Nations Manual, "How to Weigh and Measure Children" (United Nations, 1986), were followed when training the field staff on measurement of the height and weight of children. Weight was measured to the nearest 100 grams. Height or length was measured to the nearest 0.1 centimetres. The data on weight and height were used to calculate three summary indices of nutritional status, which affects children's susceptibility to disease and their chances of survival. These indices are:

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

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

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

Each of the indices provides somewhat different information about the nutritional status of children. The height-for-age index measures linear growth retardation among children. Children who are more than two standard deviations below the median of the reference

[1]The lack of height measurements for these states should not substantially bias the national estimates of height-for-age and weight-for-height since these five states cluster closely around the national estimate of the percentage of children who are underweight (which is the only nutritional index that can be calculated for these states).

population in terms of height-for-age are considered short for their age or *stunted*. The percentage in this category indicates the prevalence of chronic undernutrition which often leads to chronic or recurrent diarrhoea. Stunting is typically associated with inadequate food intake resulting from poor feeding practices or from the lack of sufficient food, as well as the existence of adverse environmental conditions for an extended period of time. Height-for-age, therefore, is a measure of the long-term effects of undernutrition.

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

Weight-for-age is a composite measure which takes into account both chronic and acute undernutrition. Children who are more than two standard deviations below the reference median on this index are considered *underweight*.

The validity of these indices is determined by many factors, including the coverage of the population of children and accurate anthropometric measurements. In the NFHS, about 16 percent of living children under age four were not weighed and measured (see Table D.3 in Appendix D), usually because the child was not at home or because the mother refused to allow the measurements to be taken. Also excluded from the analysis are children whose month and year of birth were not reported by the mother, and those with grossly improbable weight and height measurements. In addition, two of the three indices (height-for-age and weight-for-age) are sensitive to misreporting of children's ages, including heaping on preferred digits. The weight-for-height index is the only one which does not depend on accurate age reporting.

Table 10.8 presents the percentage of children classified as undernourished according to weight-for-age, height-for-age, and weight-for-height by selected demographic characteristics. Both chronic and acute undernutrition are prevalent in India. Slightly more than half (53 percent) of all children are underweight and a similar proportion (52 percent) are stunted. The proportion of children who are severely undernourished is also notable -- 21 percent in the case of weight-for-age and 29 percent in the case of height-for-age. Wasting is also quite evident in India, affecting more than one in every six children. These levels of undernutrition are among the highest in the world (see, for example, Sommerfelt and Stewart, 1994).

As the age of children increases, there is a marked increase in the prevalence of undernutrition in the first year of life that continues on into the second year of life and, for stunting, into the third and fourth year as well. Undernutrition is lowest in the first six months of life, when most babies are being fully breastfed. As indicated in Figure 10.3, the percentage of children who are underweight reaches its highest value (63 percent) at age 1 year and declines slightly thereafter. The prevalence of stunting, however, continues to grow, reaching a peak of 67 percent among three-year-old children. The prevalence of wasting, on the other hand, reaches a maximum (28 percent) for children who are one year old and declines rapidly thereafter.

Table 10.8 Nutritional status by demographic characteristics

Among children under four years of age, the percentage classified as undernourished according to three anthropometric indices of nutritional status, by demographic characteristics, India, 1992-93

Demographic characteristic	Weight-for-age			Height-for-age		Weight-for-height		
	Percentage below -3 SD	Percentage below -2 SD[1]	Number of children[2]	Percentage below -3 SD	Percentage below -2 SD[1]	Percentage below -3 SD	Percentage below -2 SD[1]	Number of children[3]
Child's age								
<6 months	2.8	15.6	4406	5.7	15.7	2.0	9.5	3225
6-11 months	14.1	43.3	4792	14.3	34.3	2.9	15.7	3176
12-23 months	26.3	63.4	9560	30.7	56.6	5.6	28.0	6945
24-35 months	25.9	62.2	8406	34.6	60.2	2.5	16.6	6033
36-47 months	21.8	58.5	8643	40.7	66.7	1.8	11.6	6204
Sex								
Male	20.2	53.3	18208	28.4	52.3	3.7	18.8	13040
Female	21.0	53.4	17599	29.4	51.7	2.6	16.1	12543
Birth order								
1	17.4	49.4	9719	24.8	48.1	3.0	16.5	6630
2-3	19.5	52.2	15209	27.3	49.8	3.2	17.4	10634
4-5	23.7	57.7	6848	32.6	56.6	3.6	19.1	5125
6+	26.8	59.8	4031	36.6	60.0	2.9	17.4	3194
Previous birth interval[4]								
First birth	17.5	49.5	9762	24.8	48.1	3.0	16.5	6664
< 24 months	23.3	56.9	6106	33.1	56.9	3.7	16.3	4549
24-47 months	21.5	55.2	14713	30.4	53.9	2.9	18.0	10677
48+ months	20.7	51.5	5227	26.4	47.3	3.6	19.2	3694
Total	20.6	53.4	35807	28.9	52.0	3.2	17.5	25584

Note: Figures are for children born 1-47 months prior to the survey. Each of the indices is expressed in standard deviation units (SD) from the median of the International Reference Population. The percentages of children who are more than three and more than two standard deviation units below the median of the International Reference Population (-3SD and -2SD) are shown according to selected characteristics.

[1]Also includes the children who are more than 3 standard deviations below the International Reference Population median

[2]Number of children for calculation of weight-for-age

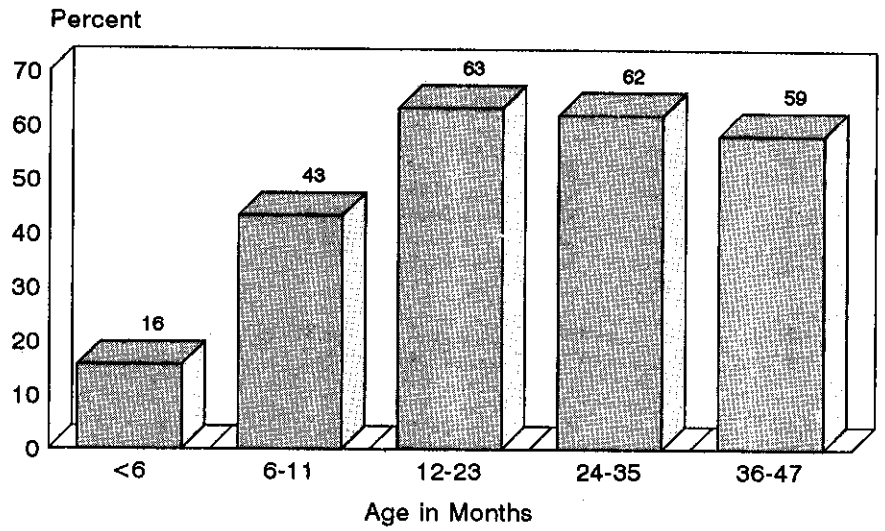
[3]Number of children for calculation of height-for-age and weight-for-height, excluding Andhra Pradesh, Himachal Pradesh, Madhya Pradesh, Tamil Nadu and West Bengal

[4]In the case of first-born twins, both twins are counted as first births because neither has a previous birth interval.

Male and female children are about equally disadvantaged nutritionally, although males are slightly more subject to wasting. Undernourishment increases somewhat with increasing birth order. Young children in families with four or more children are the most nutritionally disadvantaged. The pattern of undernourishment associated with the length of the preceding birth interval depends on the particular measure which is being examined. For the two age-related measures, undernutrition is slightly higher for children with short birth intervals, but the opposite is true for the measure of wasting. For all three measures, however, the differentials are relatively small.

Table 10.9 shows nutritional status by selected background characteristics. All the measures indicate that undernutrition is more of a problem in rural areas than in urban areas (Figure 10.4). Even in urban areas, however, nearly half of young children are underweight

Figure 10.3
Percentage of Children Under Age Four Who Are Underweight by Age



Note: Percentage of children more than 2 standard deviations below the median of the International Reference Population

NFHS, India, 1992-93

and almost half are stunted. The most serious nutritional problem (wasting) is only slightly lower in urban areas than in rural areas. The differentials in undernutrition by mother's educational level are very large. Children whose mothers are illiterate are twice as likely to be underweight or stunted as children whose mothers have completed at least high school. According to these same measures, children whose mothers are illiterate are about three times as likely to be severely undernourished as those whose mothers have completed at least high school. The differentials are only half as large, but still substantial, in the case of wasting.

The other differentials in Table 10.9 are considerably smaller. Hindu, Muslim and Buddhist children are about equally likely to be undernourished. The levels of undernutrition are much lower for Christians, Sikhs and Jains. Scheduled caste and scheduled tribe children have slightly higher levels of undernutrition than other children, but the differences among these groups are generally small.

These results suggest that the mother's level of education is the most important characteristic associated with children's nutritional status. Unfortunately, a large majority of young children (65 percent) in India have mothers who are illiterate; they are consequently at a high risk of suffering undernutrition. Programmes designed to eliminate female illiteracy are, therefore, likely to be of crucial importance for improving the nutrition status and survival of children in India. Nevertheless, it should be noted that levels of undernutrition remain unacceptably high even for children whose mothers are highly educated. This finding suggests that targeted programmes about proper feeding practices for children are necessary for parents

Table 10.9 Nutritional status by background characteristics

Among children under four years of age, the percentage classified as undernourished according to three anthropometric indices of nutritional status, by selected background characteristics, India, 1992-93

Background characteristic	Weight-for-age			Height-for-age		Weight-for-height		
	Percentage below -3 SD	Percentage below -2 SD[1]	Number of children[2]	Percentage below -3 SD	Percentage below -2 SD[1]	Percentage below -3 SD	Percentage below -2 SD[1]	Number of children[3]
Residence								
Urban	14.8	45.2	8464	22.0	44.8	2.9	15.8	5884
Rural	22.4	55.9	27343	30.9	54.1	3.2	18.0	19700
Mother's education								
Illiterate	24.7	59.2	22946	34.5	58.5	3.4	18.8	16639
Lit., < middle complete	16.7	50.4	6251	22.6	46.4	3.0	16.8	4260
Middle school complete	12.4	43.5	2765	17.9	39.3	2.7	14.7	1905
High school and above	7.8	30.3	3844	12.2	30.0	2.3	12.3	2780
Religion								
Hindu	21.0	53.7	28450	29.2	52.5	3.3	17.7	19897
Muslim	21.2	55.4	5440	31.4	54.5	3.0	17.2	4065
Christian	7.9	38.3	737	15.9	34.2	1.8	11.1	523
Sikh	12.6	40.2	670	13.1	34.9	2.4	17.4	656
Jain	9.6	29.9	106	12.6	25.8	0.3	6.4	78
Buddhist	22.8	54.3	262	31.7	59.5	2.0	22.2	251
Other	23.0	59.7	143	25.6	51.2	3.9	15.6	113
Caste/tribe								
Scheduled caste	23.7	57.5	4664	33.2	58.0	3.4	18.5	3347
Scheduled tribe	25.3	56.8	3203	28.8	52.8	4.1	22.0	2085
Other	19.5	52.3	27940	28.1	50.9	3.0	16.8	20152
Total	20.6	53.4	35807	28.9	52.0	3.2	17.5	25584

Note: Figures are for children born 1-47 months prior to the survey. Each of the indices is expressed in standard deviation units (SD) from the median of the International Reference Population. The percentages of children who are more than three and more than two standard deviation units below the median of the International Reference Population (-3SD and -2SD) are shown according to selected characteristics.

() Based on 25-49 unweighted cases

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

[1]Also includes the children who are more than 3 standard deviations below the International Reference Population median

[2]Number of children for calculation of weight-for-age

[3]Number of children for calculation of height-for-age and weight-for-height, excluding Andhra Pradesh, Himachal Pradesh, Madhya Pradesh, Tamil Nadu and West Bengal

in all segments of the population.

Variations in nutritional status by state are shown in Table 10.10 and Figure 10.5. Even in the state with the best record on nutritional status for children (Kerala), more than one-quarter of young children are underweight and more than one-quarter are stunted. Other states with relatively low levels of undernutrition are Manipur, Mizoram, Nagaland and Goa. Nutritional problems are particularly serious in Bihar and Uttar Pradesh. The problem of wasting is most evident in Bihar and Orissa, which not coincidentally have among the highest infant mortality rates in India.

Table 10.10 Nutritional status by state

Among children under four years of age, the percentage classified as undernourished according to three anthropometric indices of nutritional status, by state, India, 1992-93

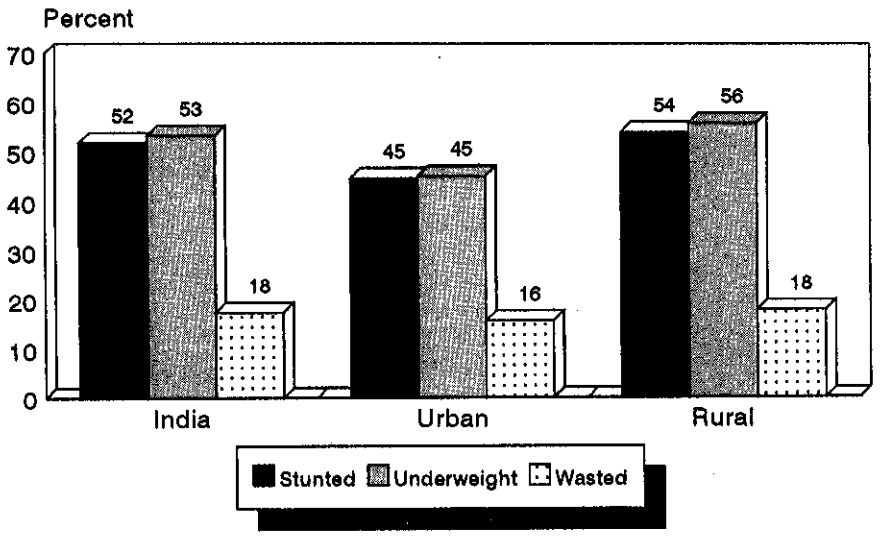
State	Weight-for-age		Height-for-age		Weight-for-height	
	Percentage below -3 SD	Percentage below -2 SD[1]	Percentage below -3 SD	Percentage below -2 SD[1]	Percentage below -3 SD	Percentage below -2 SD[1]
India	20.6	53.4	28.9	52.0	3.2	17.5
North						
Delhi	12.0	41.6	19.3	43.2	2.7	11.9
Haryana	9.0	37.9	19.3	46.7	0.6	5.9
Himachal Pradesh	12.9	47.0	U	U	U	U
Jammu Region of J & K	13.8	44.5	18.6	40.8	3.4	14.8
Punjab	14.2	45.9	15.7	40.0	2.8	19.9
Rajasthan	19.2	41.6	26.6	43.1	5.2	19.5
Central						
Madhya Pradesh	22.3	57.4	U	U	U	U
Uttar Pradesh	24.6	59.0	35.6	59.5	2.7	16.1
East						
Bihar	31.1	62.6	39.5	60.9	4.1	21.8
Orissa	22.7	53.3	25.2	48.2	3.6	21.3
West Bengal	18.4	56.8	U	U	U	U
Northeast						
Arunachal Pradesh	14.5	39.7	27.9	53.9	3.6	11.2
Assam	18.7	50.4	26.3	52.2	1.7	10.8
Manipur	7.2	30.1	16.0	33.6	1.2	8.8
Meghalaya	17.2	45.5	38.4	50.8	4.8	18.9
Mizoram	5.3	28.1	16.0	41.3	0.6	2.2
Nagaland	7.6	28.7	13.2	32.4	2.3	12.7
Tripura	18.6	48.8	21.3	46.0	0.7	17.5
West						
Goa	8.9	35.0	11.0	32.5	2.4	15.3
Gujarat	17.6	50.1	25.3	48.2	3.7	18.9
Maharashtra	21.3	54.2	23.5	48.5	4.2	20.2
South						
Andhra Pradesh	15.6	49.1	U	U	U	U
Karnataka	19.4	54.3	22.7	47.6	2.6	17.4
Kerala	6.1	28.5	9.0	27.4	1.3	11.6
Tamil Nadu	13.3	48.2	U	U	U	U

Note: Figures are for children born 1-47 months prior to the survey. Each of the indices is expressed in standard deviation units (SD) from the median of the International Reference Population. The percentages of children who are more than three and more than two standard deviation units below the median of the International Reference Population (-3SD and -2SD) are shown according to selected characteristics.

U: Not available because children's height/length was not measured

[1]Also includes the children who are below -3 standard deviations from the International Reference Population median

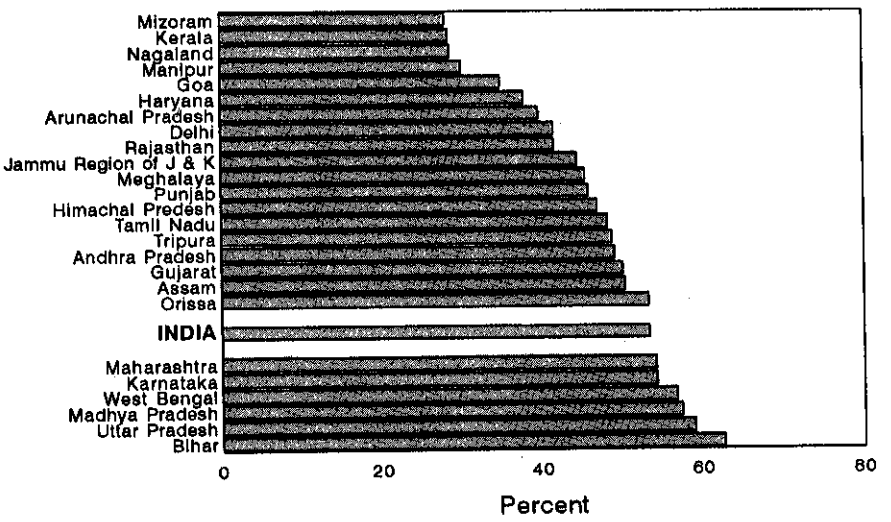
Figure 10.4
Undernutrition Among Children Under Four Years of Age



Note: Percentage of children more than 2 standard deviations below the median of the International Reference Population

NFHS, India, 1992-93

Figure 10.5
Percentage of Children Under Age Four Who Are Underweight by State



Note: Percentage of children more than 2 standard deviations below the median of the International Reference Population

NFHS, India, 1992-93