

## CHAPTER 6

### MORTALITY, MORBIDITY, AND IMMUNIZATION

This chapter presents mortality rates, particularly for infants and young children, and data on the prevalence of certain diseases (morbidity). It also presents information on the prevention and treatment of diseases, especially those that are life-threatening to young children. The chapter also includes information on women's knowledge of AIDS and levels of lead in the blood of young children. This type of information is relevant both to an assessment of the demographic situation and to the design of appropriate health policies and programmes. Mortality estimates are also useful for projecting the future size of the population. Detailed information on mortality and morbidity (by demographic and socioeconomic characteristics) can be used to identify population groups that are at high risk and in need of health services. This chapter primarily presents information on child health, while other chapters of this report, particularly Chapter 8, present information on maternal and reproductive health.

The Government of India has repeatedly taken steps to strengthen maternal and child health services in India, starting during the First and Second Five-Year Plans (1951–56 and 1956–61) under the Ministry of Health, and continuing with the Minimum Needs Programme initiated during the Fifth Five-Year Plan (1974–79). More recently, efforts to improve maternal and child health have been enhanced by activities of the Family Welfare Programme and by the introduction of the Child Survival and Safe Motherhood Programme (Ministry of Health and Family Welfare, 1992). The Ministry of Health and Family Welfare has also sponsored special projects under the Maternal and Child Health Programme, including the Oral Rehydration Therapy (ORT) programme, the establishment of Regional Institutes of Maternal and Child Health in states where infant mortality rates are high, the Universal Immunization Programme, and the Maternal and Child Health Supplemental Programme within the Postpartum Programme (Ministry of Health and Family Welfare, 1992). These programmes are now integrated into the Reproductive and Child Health Programme that was launched in 1996.

Maternal and child health services in rural India are delivered mainly by government-run Community Health Centres, Primary Health Centres and sub-centres. In urban areas, such services are available mainly through government or municipal hospitals, urban health posts, hospitals and nursing homes operated by nongovernmental organizations (NGOs), and private nursing homes and maternity homes

The second National Family Health Survey (NFHS-2) includes questions on mortality and morbidity on both the Household Questionnaire and the Woman's Questionnaire. The Household Questionnaire has questions on individuals in the household suffering from asthma, tuberculosis, jaundice, and malaria, plus questions on deaths occurring to usual residents of the household during the two years preceding the survey. The Woman's Questionnaire collects information on the survival status of all births and the age at death of children who died. The Woman's Questionnaire also contains questions on child immunization coverage and sources; vitamin A supplementation for children; prevalence of acute respiratory infections, fever, and diarrhoea among children and the treatment of these illnesses; and mothers' knowledge of oral rehydration therapy. In Delhi, information was also collected on lead levels in the blood for children under three years of age.

| Table 6.1 Age-specific death rates and crude death rates                                  |                  |                  |        |       |
|---|------------------|------------------|--------|-------|
| Age-specific death rates and crude death rates (CDR) by sex from NFHS-1 and NFHS-2, Delhi |                  |                  |        |       |
| Age   | NFHS-1 (1991–92) | NFHS-2 (1997–98) |        |       |
|   | Total            | Male             | Female | Total |
| < 5   | 18.6             | 10.0             | 5.4    | 7.9   |
| 5–14  | 1.5              | 0.3              | 0.6    | 0.5   |
| 15–49   | 3.0              | 4.4              | 2.5    | 3.5   |
| 50–59   | 10.9             | 14.3             | 7.5    | 10.8  |
| 60+   | 58.9             | 75.5             | 60.9   | 68.8  |
| CDR   | 7.8              | 9.4              | 6.4    | 8.0   |

Note: Age-specific death rates and crude death rates by sex from NFHS-1 and NFHS-2 are based on the annual number of deaths reported for the *de jure* population during the two years preceding the survey. Rates are specified on a per-thousand basis.

The information on child health and health-care practices was collected from mothers for children born since 1 January 1996. If a woman had more than two live births during that period, the information was collected for only the two most recent births. The information on child health presented in this chapter pertains to children born during the three years preceding the survey.

## 6.1 Crude Death Rates and Age-Specific Death Rates

Table 6.1 shows crude death rates (CDR) and age-specific death rates by sex for the usual-resident (*de jure*) population of Delhi from NFHS-2. The table also presents crude death rates and age-specific death rates from NFHS-1 for the total population (both sexes combined). Comparable estimates from India's Sample Registration System (SRS) are not shown because the SRS does not publish estimates for Delhi. The NFHS-1 and NFHS-2 death rates are based on the average annual number of deaths occurring to usual residents of the household during the two-year period preceding the survey (approximately 1991–92 for NFHS-1 and 1997–98 for NFHS-2). The denominators for the NFHS-2 death rates are obtained by projecting the number of usual residents at the time of the survey backwards to the midpoint of the time period on the basis of the intercensal population growth rate in the state. The rural intercensal growth rate is applied to all rural age and sex groups, and the urban intercensal growth rate is applied to all urban age and sex groups. It should be noted that questions on the number of deaths occurring to usual residents in each household during a particular time period have been included in demographic surveys in many countries and have often resulted in a substantial underreporting of deaths. Thus, the mortality estimates in Table 6.1 must be interpreted with caution.

Table 6.1 shows an estimated average annual CDR for Delhi of 8.0 deaths per 1,000 population for 1997–98 based on NFHS-2 data. The NFHS-2 estimate of 8.0 for Delhi is somewhat lower than the NFHS-2 estimate of 9.7 for all India and slightly higher than the NFHS-1 rate of 7.8 for 1991–92. The table also shows age-specific death rates. Between NFHS-1 and NFHS-2, age-specific death rates declined substantially at ages below five, increased substantially at ages 60 and above, and did not change much in intermediate age groups.

In most countries, male death rates are higher than female death rates at nearly all ages. South Asia generally has been an exception in this respect, with higher death rates for females over much of the age span (Tabutin and Willems, 1995; Preston, 1989; Ghosh, 1987). In Delhi, age-specific death rates are slightly higher for females than for males at age 5–14 but substantially lower for females than for males at other ages.

## 6.2 Infant and Child Mortality

Infant and child mortality rates reflect a country's level of socioeconomic development and quality of life and are used for monitoring and evaluating population and health programmes and policies. NFHS-2 asked all ever-married women age 15–49 to provide a complete history of their births including, for each live birth, the sex, month and year of birth, survival status, and age at the time of the survey or age at death. Age at death was recorded in days for children dying in the first month of life, in months for other children dying before their second birthday, and in years for children dying at later ages. This information was used to calculate the following direct estimates of infant and child mortality<sup>1</sup>:

|   |  |
|---|--|
| <b>Neonatal mortality:</b>                          | The probability of dying in the first month of life                                  |
| <b>Postneonatal mortality:</b>                      | The probability of dying after the first month of life but before the first birthday |
| <b>Infant mortality (<math>{}_1q_0</math>):</b>     | The probability of dying before the first birthday                                   |
| <b>Child mortality (<math>{}_4q_1</math>):</b>      | The probability of dying between the first and fifth birthdays                       |
| <b>Under-five mortality (<math>{}_5q_0</math>):</b> | The probability of dying before the fifth birthday                                   |

### Assessment of Data Quality

The reliability of mortality estimates calculated from retrospective birth histories depends upon the completeness with which deaths of children are reported and the extent to which birth dates and ages at death are accurately reported and recorded. Estimated rates of infant and child mortality are subject to both sampling and nonsampling errors. While sampling errors for various mortality estimates are provided in Appendix A, this section describes the results of various checks for nonsampling errors—in particular, underreporting of deaths in early childhood (which would result in an underestimate of mortality) and misreporting of the date of birth or age at death (which could distort the age pattern of under-five mortality). Both problems are likely to be more pronounced for children born further in the past than for children born recently. Underreporting of infant deaths is usually most serious for deaths that occur very early in infancy. If deaths in the early neonatal period are selectively underreported, there will be an abnormally low ratio of deaths under seven days to all neonatal deaths and an abnormally low ratio of neonatal to infant deaths. Changes in these ratios over time can be examined to test the

<sup>1</sup>A detailed description of the method for calculating the probabilities presented here is given in Rutstein (1984). The mortality estimates are not rates, but are true probabilities, calculated according to the conventional life-table approach. Deaths and exposure in any calendar period are first tabulated for the age intervals 0, 1–2, 3–5, 6–11, 12–23, 24–35, 36–47, and 48–59 months. Then age-interval-specific probabilities of survival are calculated. Finally, probabilities of mortality for larger age segments are produced by multiplying the relevant age-interval survival probabilities together and subtracting the product from one:

$${}_nq_x = 1 - \prod_i (1 - q_i)$$

hypothesis that underreporting of early infant deaths is more common for births that occurred further in the past than for births that occurred more recently. Failure to report deaths will result in mortality figures that are too low and if underreporting is more severe for children born further in the past than children born recently, any decline in mortality will tend to be understated.

Results from Table B.5 (Appendix B) suggest that early neonatal deaths have not been seriously underreported in the NFHS-2 in Delhi, inasmuch as the ratios of deaths under seven days to all neonatal deaths are consistently high (between 73 and 88 percent) for the different time periods preceding the survey (a ratio of less than 25 percent is often used as a guideline to indicate underreporting of early neonatal deaths). The ratios of infant deaths that occurred during the neonatal period (Appendix Table B.6) are also consistently high (between 58 and 64 percent) for the different time periods preceding the survey.

Another problem inherent in most retrospective surveys is heaping of the age at death on certain digits, e.g., 6, 12, and 18 months. If the net result of age misreporting is the transference of deaths between age segments for which the rates are calculated, misreporting of the age at death will bias estimates of the age pattern of mortality. For instance, an overestimate of child mortality relative to infant mortality may result if children dying during the first year of life are reported as having died at age one year or older. Thus, heaping at 12 months can bias the mortality estimates because a certain fraction of these deaths may have actually occurred during infancy (i.e., at ages 0–11 months). In such cases, heaping would bias infant mortality ( ${}_1q_0$ ) downward and child mortality ( ${}_4q_1$ ) upward.

In the NFHS-2 in Delhi, there appears to be a slight preference for reporting age at death at 1, 9, and 15 days (Table B.5 in Appendix B). An examination of the distribution of deaths under age two years during the 15 years preceding the survey by month of death (Appendix Table B.6) indicates substantial heaping of deaths at 3 and 6 months of age, but not at 12 months. Thus, misreporting of age at death does not appear to be a serious source of bias.

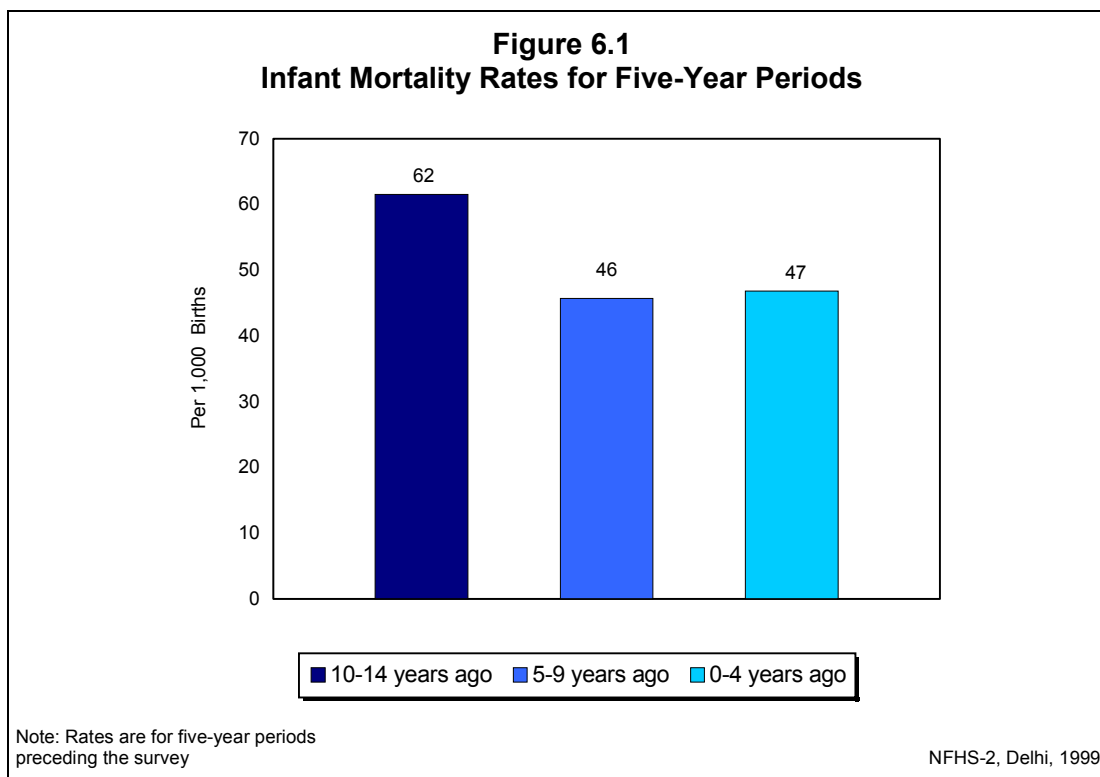
It is seldom possible to establish mortality levels with confidence for a period of more than 15 years before a survey. Even within the recent 15-year period considered here, apparent trends in mortality rates should be interpreted with caution for several reasons. First, there may be differences in the completeness of death reporting related to the length of time before the survey. Second, the accuracy of reports of age at death and of date of birth may deteriorate with time. Third, sampling variability of mortality rates tends to be high, especially for groups with relatively few births. Fourth, mortality rates are truncated as they go back in time because women currently age 50 or above who were bearing children during earlier periods were not included in the survey. This truncation affects mortality trends, in particular. For example, for the period 10–14 years before the survey, the rates do not include any births for women age 40–49 since these women were over age 50 at the time of the survey and were not eligible to be interviewed. Since these excluded births to older women were likely to be at a somewhat greater risk of dying than births to younger women, the mortality rates for the period may be slightly underestimated. Estimates for more recent periods are less affected by truncation bias since fewer older women are excluded. The extent of this bias depends on the proportion of births omitted. Table 4.18 (Chapter 4) shows that, in Delhi, only 3 percent of the children born in the three years before the survey were born to women age 35 and above. Given the small proportion of births excluded, selection bias for infant and child mortality statistics as far back as 15 years before the survey appears to be negligible.

| Table 6.2 Infant and child mortality  |                         |   |                                |                               |                                    |
|---|-------------------------|---|--------------------------------|-------------------------------|------------------------------------|
| Neonatal, postneonatal, infant, child, and under-five mortality rates for five-year periods preceding the survey, Delhi, 1999 |                         |   |                                |                               |                                    |
| Years preceding the survey  | Neonatal mortality (NN) | Postneonatal mortality <sup>1</sup> (PNN) | Infant mortality ( ${}_1Q_0$ ) | Child mortality ( ${}_4Q_1$ ) | Under-five mortality ( ${}_5Q_0$ ) |
| 0–4   | 29.5                    | 17.4                                      | 46.8                           | 9.0                           | 55.4                               |
| 5–9   | 26.0                    | 19.7                                      | 45.7                           | 14.7                          | 59.8                               |
| 10–14   | 36.0                    | 25.5                                      | 61.5                           | 17.2                          | 77.6                               |

Note: The first five-year period preceding the survey does not include the month in which the interview took place. Rates are specified on a per-thousand basis. See text for definition of rates.  
<sup>1</sup>Computed as the difference between the infant and neonatal mortality rates

### Levels, Trends, and Differentials in Infant and Child Mortality

Table 6.2 and Figure 6.1 present various measures of infant and child mortality for the three five-year periods preceding NFHS-2. Infant mortality in Delhi declined from 62 deaths per 1,000 live births during 1984–88 (10–14 years before the survey) to 47 deaths per 1,000 live births during 1994–98 (0–4 years before the survey), an average annual rate of decline of 1.5 infant deaths per 1,000 live births per year. A comparison of the infant mortality rate for the period 0–4 years before NFHS-2 (47 per 1,000) with the infant mortality rate 0–4 years before NFHS-1 (65 per 1,000) indicates an average annual rate of decline of about 3 infant deaths per 1,000 live births over the six years between the two surveys. Thus, the between-survey estimate of the average rate of decline is approximately double the within-survey estimate of the average rate of decline derived from NFHS-2 alone. Of course, these two estimates of average rate of decline are not exactly comparable because they do not pertain to precisely the same time period.



All other measures of infant and child mortality presented in Table 6.2 have also declined during the past 15 years. Between the period 10–14 years before the survey and the period 0–4 years before the survey, neonatal mortality in Delhi declined by 18 percent, postneonatal mortality by 32 percent, child mortality by 48 percent, and under-five mortality by 29 percent. Despite the overall decline in infant and child mortality, 1 in every 21 children born during the five years before NFHS-2 died within the first year of life, and 1 in every 18 children died before reaching age five. Although the infant mortality rate in Delhi (47 per 1,000) is much lower than the national IMR of 68 per 1,000, it is much higher than the Kerala infant mortality rate of 16 per 1,000 for the 5-year period before the survey. Kerala has the lowest infant mortality rate of any state in the country.

### Socioeconomic Differentials in Infant and Child Mortality

The probability of dying in early childhood is higher in some population groups than in others. Table 6.3 presents differentials in infant and child mortality rates for the 10-year period preceding the survey by selected background characteristics. The infant mortality rate varies little by urban-rural residence. It declines sharply with increasing education of mothers, from a high of 76 deaths per 1,000 live births for illiterate mothers to a low of 17 deaths per 1,000 live births for mothers who have completed at least high school. Infant mortality rates are slightly

| Table 6.3 Infant and child mortality by background characteristics  |                         |   |  |   |  |
|---|-------------------------|---|--|---|--|
| Neonatal, postneonatal, infant, child, and under-five mortality rates for the 10-year period preceding the survey by selected background characteristics, Delhi, 1999 |                         |   |  |   |  |
| Background characteristic   | Neonatal mortality (NN) | Postneonatal mortality <sup>1</sup> (PNN) | Infant mortality ( <sub>1</sub> q <sub>0</sub> ) | Child mortality ( <sub>4</sub> q <sub>1</sub> ) | Under-five mortality ( <sub>5</sub> q <sub>0</sub> ) |
| <b>Residence</b>  |                         |   |  |   |  |
| Urban   | 27.4                    | 18.6                                      | 45.9   | 13.1  | 58.4   |
| Rural   | (30.3)                  | (19.0)                                    | (49.3)   | (0.0)   | (49.3)   |
| <b>Mother's education</b>   |                         |   |  |   |  |
| Illiterate  | 42.6                    | 33.1                                      | 75.7   | 22.4  | 96.4   |
| Literate, < middle school complete  | (24.8)                  | (15.6)                                    | (40.5)   | (15.7)  | (55.6)   |
| Middle school complete  | (31.3)                  | (11.7)                                    | (43.0)   | (3.0)   | (45.8)   |
| High school complete and above  | 10.5                    | 6.7                                       | 17.2   | 1.2   | 18.3   |
| <b>Religion</b>   |                         |   |  |   |  |
| Hindu   | 30.5                    | 18.7                                      | 49.2   | 11.3  | 59.9   |
| Muslim  | (21.8)                  | (18.4)                                    | (40.2)   | (18.6)  | (58.1)   |
| <b>Caste/tribe</b>  |                         |   |  |   |  |
| Scheduled caste   | 49.6                    | 24.3                                      | 73.8   | 22.5  | 94.7   |
| Other backward class  | 27.0                    | 22.9                                      | 49.9   | 13.2  | 62.4   |
| Other <sup>2</sup>  | 20.1                    | 14.4                                      | 34.4   | 8.0   | 42.1   |
| <b>Standard of living index</b>   |                         |   |  |   |  |
| Medium  | 44.7                    | 25.0                                      | 69.7   | 17.5  | 86.0   |
| High  | 13.7                    | 11.0                                      | 24.7   | 6.6   | 31.1   |
| Total   | 27.6                    | 18.6                                      | 46.2   | 11.9  | 57.6   |

Note: The 10-year period preceding the survey does not include the month in which the interview took place. Rates are specified on a per-thousand basis. See text for definition of rates. Total includes small numbers of Sikh children, scheduled-tribe children, and children with missing information on education, religion, and the standard of living index, who are not shown separately.

( ) Based on 250–499 children surviving to the beginning of the age interval

<sup>1</sup> Computed as the difference between the infant and neonatal mortality rates

<sup>2</sup> Not belonging to a scheduled caste, scheduled tribe, or other backward class

higher for Hindus than for Muslims, but child mortality is higher for Muslims than for Hindus. Children of women belonging to scheduled castes have much higher infant mortality than children of women belonging to other backward classes or children of women not belonging to a scheduled caste, scheduled tribe, or other backward class. Infant mortality is almost three times as high among women with a medium standard of living than among women with a high standard of living. Other mortality indicators in the table vary similarly.

### Demographic Differentials in Infant and Child Mortality

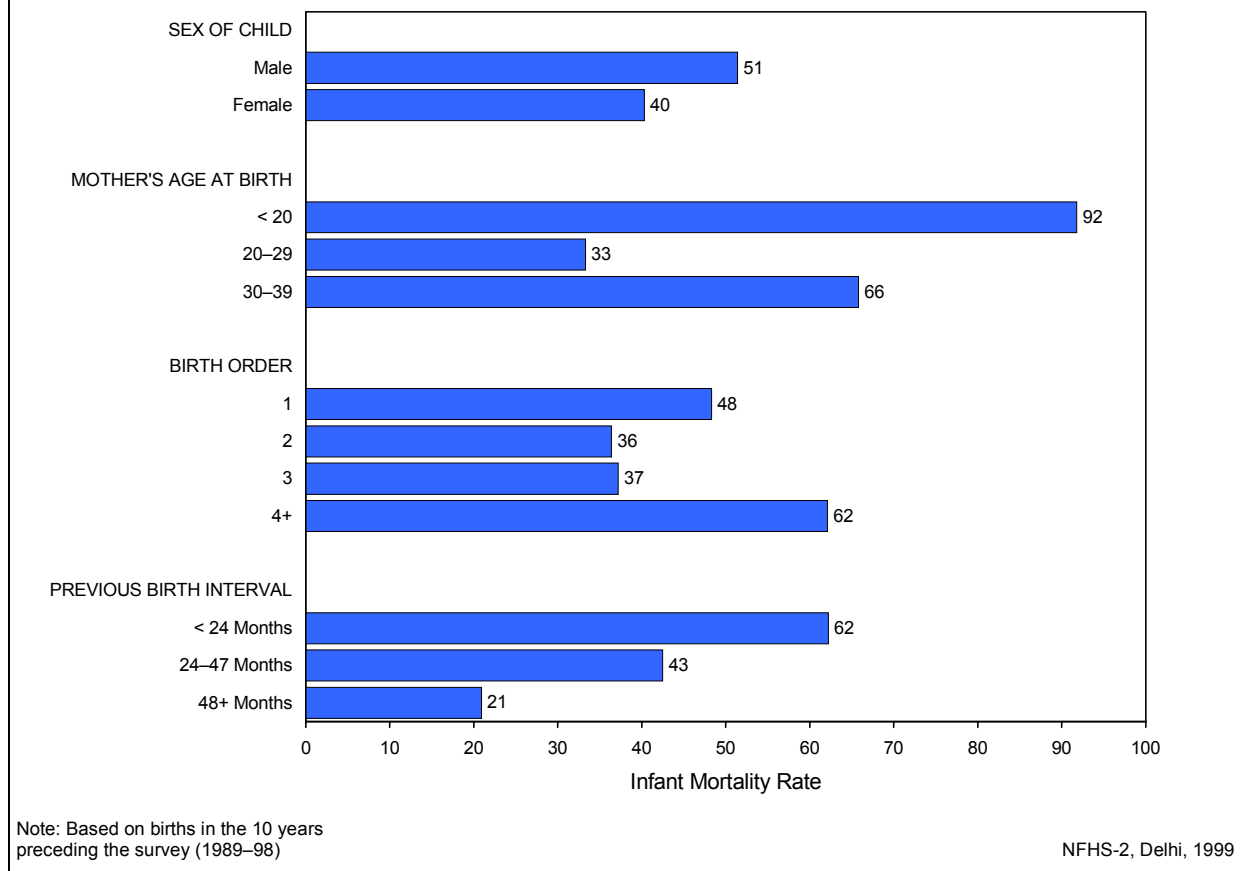
This section examines differentials in early childhood mortality by demographic characteristics of the child and the mother. Table 6.4 and Figure 6.2 present various indicators of infant and child mortality for the 10 years preceding the survey by sex of the child, mother's age at childbirth, birth order, and length of the previous birth interval.

Table 6.4 shows that under-five mortality is somewhat higher for boys than for girls, because of male excess mortality at the neonatal stage, where male mortality is 72 percent higher than female mortality. At the postneonatal (1–11 months) and child (1–4 years) stages, however, female mortality is slightly higher than male mortality, partially offsetting higher male neonatal mortality. The reversal of sex differentials in mortality at 1–11 months and 1–4 years has also been observed in other studies in South Asia and is thought to reflect the relative medical and nutritional neglect of the girl child (Das Gupta, 1987; Basu, 1989).

For both social and biological reasons, infant mortality rates and child mortality rates often exhibit a U-shaped pattern with respect to the mother's age at childbirth, with children of

| <b>Table 6.4 Infant and child mortality by demographic characteristics</b>   |                         |   |  |   |  |
|--|-------------------------|---|--|---|--|
| Neonatal, postneonatal, infant, child, and under-five mortality rates for the 10-year period preceding the survey by selected demographic characteristics, Delhi, 1999   |                         |   |  |   |  |
| Demographic characteristic   | Neonatal mortality (NN) | Postneonatal mortality <sup>1</sup> (PNN) | Infant mortality ( <sub>1</sub> q <sub>0</sub> ) | Child mortality ( <sub>4</sub> q <sub>1</sub> ) | Under-five mortality ( <sub>5</sub> q <sub>0</sub> ) |
| <b>Sex of child</b>  |                         |   |  |   |  |
| Male   | 34.3                    | 17.1                                      | 51.4   | 10.6  | 61.4   |
| Female   | 19.9                    | 20.4                                      | 40.3   | 13.4  | 53.2   |
| <b>Mother's age at birth</b>   |                         |   |  |   |  |
| < 20   | (51.4)                  | (40.4)                                    | (91.8)   | (24.9)  | (114.5)  |
| 20–29  | 21.2                    | 12.1                                      | 33.3   | 8.0   | 41.0   |
| 30–39  | (37.7)                  | (28.1)                                    | (65.8)   | (18.6)  | (83.1)   |
| <b>Birth order</b>   |                         |   |  |   |  |
| 1  | 32.2                    | 16.1                                      | 48.3   | 10.1  | 57.9   |
| 2  | 21.8                    | 14.6                                      | 36.4   | 9.8   | 45.8   |
| 3  | 19.4                    | 17.8                                      | 37.2   | 10.6  | 47.4   |
| 4+   | 35.1                    | 27.1                                      | 62.1   | 17.7  | 78.8   |
| <b>Previous birth interval</b>   |                         |   |  |   |  |
| < 24 months  | 35.5                    | 26.8                                      | 62.2   | 14.7  | 76.1   |
| 24–47 months   | 23.8                    | 18.7                                      | 42.5   | 10.2  | 52.3   |
| 48+ months   | (11.5)                  | (9.5)                                     | (20.9)   | (15.7)  | (36.3)   |
| Note: The 10-year period preceding the survey does not include the month in which the interview took place. Rates are specified on a per-thousand basis. See text for definition of rates. Total includes small numbers of children whose mothers were age 40–49 at the time of birth, who are not shown separately. |                         |   |  |   |  |
| ( ) Based on 250–499 children surviving to the beginning of the age interval   |                         |   |  |   |  |
| <sup>1</sup> Computed as the difference between the infant and neonatal mortality rates  |                         |   |  |   |  |

**Figure 6.2**  
**Infant Mortality Rates by Selected Demographic Characteristics**



the youngest and oldest mothers experiencing higher mortality rates than children whose mothers are in their prime reproductive ages. Children born to young mothers are more likely to be of low birth weight, which is an important factor contributing to their higher neonatal mortality rate. Similarly, children born to mothers above age 30 are at a relatively high risk of experiencing congenital problems. Delhi exhibits the expected U-shaped pattern of mortality by mother's age, with higher infant mortality among children of mothers under age 20 (92 deaths per 1,000 live births) and age 30-39 (66 deaths per 1,000) than among children of mothers age 20-29 (33 deaths per 1,000). Similar U-shaped patterns are observed for neonatal, postneonatal, and child mortality.

Birth order also tends to have a U-shaped relationship to infant deaths, with first births and higher-order births having elevated mortality rates. In Table 6.4, birth order shows the expected U-shaped pattern for neonatal, postneonatal, infant, and under-five mortality rates. This association is likely to reflect not only the effect of birth order but also the effect of the age of the mother at childbirth. There is no substantial difference in the child mortality rate (age 1-4 years) for birth orders 1, 2, and 3. The higher mortality of children of birth order 4 or higher may occur partly because these children are disproportionately from lower socioeconomic groups, in which mortality tends to be higher.

The timing of successive births has a powerful effect on the survival chances of children in Delhi. All the mortality rates shown in Table 6.4 decrease sharply as the length of the previous

birth interval increases, and all the measures are especially high for children born less than 24 months after a previous birth. The infant mortality rate is three times higher for children with a previous birth interval of less than 24 months than for children with a previous interval of 48 months or more (62 deaths compared with 21 deaths per 1,000 live births). Although the length of the previous birth interval is likely to affect mortality risks directly, a substantial portion of the association between birth intervals and mortality risks may reflect the effect of factors that are correlated with birth intervals. For example, shorter birth intervals are likely to occur in large families, and large families tend to come from lower socioeconomic groups that have higher mortality risks. Nevertheless, multivariate analyses of child survival commonly find a strong association between short birth intervals (less than 24 months) and increased mortality even after controlling for other demographic and socioeconomic characteristics (Retherford et al., 1989).

### **6.3 Morbidity**

There is only limited experience in collecting morbidity data from population-based demographic sample surveys. NFHS-1 collected data on five major morbidity conditions—partial and complete blindness, tuberculosis, leprosy, physical impairment of the limbs, and malaria—among all persons in the sample households. The results were found to be generally plausible and useful. For this reason, it was decided to include similar morbidity questions in NFHS-2. In NFHS-2, questions on blindness, leprosy, and physical impairment of the limbs were replaced by questions on asthma and jaundice. The questions on tuberculosis and malaria were retained, and a question on medical treatment of tuberculosis was added to get a better measure of the prevalence of tuberculosis. The household head or other knowledgeable adult in the household reported on morbidity for all household members. No effort was made to do clinical tests for any of the disease conditions.

Table 6.5 shows the prevalence of asthma, tuberculosis, jaundice, and malaria in the household population by age, sex, and residence. There are several reasons why the results of NFHS-2 may understate the prevalence of these conditions. Respondents may underreport diseases, such as tuberculosis, that carry a stigma. Underestimation may also occur because the household respondents are unaware that they or other members of the household have the condition. It is also possible that the respondents know that a household member suffers from a given condition but fail to report it because they do not recognize the term used by the enumerator to describe the condition. On the other hand, a factor contributing to a possible overestimation of prevalence without clinical verification is that some other disease can be mistaken by the respondent as one of the listed diseases; for example, chronic bronchitis may be reported as asthma or tuberculosis, or common flu as malaria.

#### **Asthma**

Asthma is a chronic respiratory disease characterized by sudden attacks of laboured breathing, chest constriction, and coughing. There has been a rapid increase in asthma cases in recent years in many parts of the world. In Delhi, about one percent of the population was reported to be suffering from asthma at the time of NFHS-2. The reported level of asthma (1,204 per 100,000 population) in Delhi is just half of the level reported for India as a whole (2,468 per 100,000 population). The prevalence of asthma in Delhi is slightly higher among males (1,313 per 100,000) than among females (1,081 per 100,000). Age differences are marked, with the

| <b>Table 6.5 Morbidity</b>  |   |                           |                                |                                    |                                  |                           |
|---|---|---------------------------|--------------------------------|------------------------------------|----------------------------------|---------------------------|
| Number of persons per 100,000 usual household residents suffering from asthma, tuberculosis, jaundice, or malaria by selected background characteristics, Delhi, 1999 |   |                           |                                |                                    |                                  |                           |
| Background characteristic   | Number of persons per 100,000 suffering from: |                           |                                |                                    |                                  | Number of usual residents |
|   | Asthma  | Tuberculosis <sup>1</sup> | Medically treated tuberculosis | Jaundice during the past 12 months | Malaria during the past 3 months |                           |
| <b>Age</b>  |   |                           |                                |                                    |                                  |                           |
| < 15  | 228   | 189                       | 168                            | 1,250                              | 546                              | 4,804                     |
| 15–59   | 1,238   | 629                       | 542                            | 835                                | 654                              | 8,989                     |
| 60+   | 5,664   | 1,011                     | 1,011                          | 100                                | 420                              | 982                       |
| <b>Sex</b>  |   |                           |                                |                                    |                                  |                           |
| Male  | 1,313   | 559                       | 496                            | 1,013                              | 707                              | 7,793                     |
| Female  | 1,081   | 459                       | 402                            | 817                                | 487                              | 6,983                     |
| <b>Residence</b>  |   |                           |                                |                                    |                                  |                           |
| Urban   | 1,216   | 548                       | 483                            | 946                                | 592                              | 13,579                    |
| Rural   | 1,068   | 92                        | 92                             | 639                                | 725                              | 1,196                     |
| <b>Total</b>  | <b>1,204</b>                                  | <b>511</b>                | <b>451</b>                     | <b>921</b>                         | <b>603</b>                       | <b>14,775</b>             |

<sup>1</sup>Includes medically treated tuberculosis

prevalence of asthma increasing from 228 per 100,000 at age 0–14 to 5,664 per 100,000 at age 60 and over. Asthma is somewhat more prevalent in urban Delhi than in rural Delhi.

## Tuberculosis

Tuberculosis, which is resurgent worldwide, is an infectious disease that affects the lungs and other body tissues. Tuberculosis of the lungs, the most commonly occurring form, is characterized by coughing up mucus and sputum, fever, weight loss, and chest pain. According to NFHS-2, the overall prevalence of tuberculosis in Delhi is 511 per 100,000 population, almost the same as the national estimate of 544. The prevalence of tuberculosis of 511 per 100,000 in Delhi in NFHS-2 is substantially higher than the prevalence reported in NFHS-1 (190 per 100,000). The prevalence rate is somewhat higher for males (559 per 100,000) than for females (459 per 100,000). The prevalence of tuberculosis increases rapidly with age. It is substantially higher among persons age 60 and above (1,011 per 100,000) than among those age 15–59 (629 per 100,000) or age 0–14 (189 per 100,000).

Medically treated tuberculosis is expected to give a more reliable measure of the prevalence of active tuberculosis than the measure based on all reported cases considered in the preceding paragraph. As expected, the prevalence of medically treated tuberculosis is lower (451 per 100,000) than the prevalence based on all reported cases (511 per 100,000). Differentials in the prevalence of medically treated tuberculosis by age and sex are similar to differentials in the prevalence of all reported cases.

The prevalence of tuberculosis is much higher in urban Delhi than in rural Delhi. The very large urban-rural difference may be due partly to sampling error, since the rural sample is quite small.

## **Jaundice**

Jaundice is characterized by yellowish discolouration of the eyes and skin, fever, liver enlargement, and abdominal pain. NFHS-2 asked household respondents if any member of the household had suffered from jaundice at any time during the 12 months preceding the survey. In Delhi, 921 persons per 100,000 population were reported to have suffered from jaundice during the 12 months preceding the survey, considerably lower than the rate of 1,361 for India as a whole. Jaundice is more common among males (1,013 per 100,000) than among females (817 per 100,000). Jaundice is the only condition measured that does not increase steadily with age. The prevalence of jaundice is highest at age 0–14 (1,250 per 100,000), followed by age 15–59 (835 per 100,000) and age 60 and above (100 per 100,000). Prevalence of jaundice is also higher in urban Delhi than in rural Delhi.

## **Malaria**

Malaria is characterized by recurrent high fever with shivering. NFHS-2 asked household respondents whether any member of their household suffered from malaria at any time during the three months preceding the survey. In Delhi, 603 persons per 100,000 population are reported to have suffered from malaria during the three months preceding the survey, much lower than the national rate of 3,697 per 100,000 population. Because the prevalence of malaria is known to vary considerably by season, the NFHS-2 estimates should not be interpreted as representative of the level throughout the year. However, in Delhi it is possible to compare this estimate with the NFHS-1 estimate because the months of the year comprising the reference period for the malaria estimates from the two surveys are almost the same. According to the two surveys, the prevalence rate of malaria was slightly lower in Delhi in NFHS-1 (550 per 100,000 population). Prevalence of malaria is higher in rural Delhi than in urban Delhi, as expected.

## **6.4 Child Immunization**

The vaccination of children against six serious but preventable diseases (tuberculosis, diphtheria, pertussis, tetanus, poliomyelitis, and measles) has been a cornerstone of the child health care system in India. As part of the National Health Policy, the National Immunization Programme is being implemented on a priority basis. The Expanded Programme on Immunization (EPI) was initiated by the Government of India in 1978 with the objective of reducing morbidity, mortality, and disabilities from these six diseases by making free vaccination services easily available to all eligible children. Immunization against poliomyelitis was introduced in 1979–80, and tetanus toxoid for school children was added in 1980–81. Immunization against tuberculosis (BCG) was brought under the EPI in 1981–82. In 1985–86, immunization against measles was added to the programme (Ministry of Health and Family Welfare, 1991).

The Universal Immunization Programme (UIP) was introduced in 1985–86 with the following objectives: to cover at least 85 percent of all infants against the six vaccine-preventable diseases by 1990 and to achieve self-sufficiency in vaccine production and the manufacture of cold-chain equipment (Ministry of Health and Family Welfare, 1991). This scheme has been introduced in every district of the country, and the target now is to achieve 100 percent immunization coverage. Pulse polio immunization campaigns began in December 1995 as part of a major national effort to eliminate polio. The standard immunization schedule developed for the child immunization programme specifies the age at which each vaccine is to be administered, the number of doses to be given, and the route of vaccination (intramuscular, oral,

Table 6.6 Childhood vaccinations by source of information

Percentage of children age 12–23 months who received specific vaccinations at any time before the interview and before 12 months of age by source of information on vaccination history, Delhi, 1999

| Source of information                              | Percentage vaccinated |         |      |      |      |       |      |      |         |                  |      | Number of children |
|--|-----------------------|---------|------|------|------|-------|------|------|---------|------------------|------|--------------------|
|  | BCG                   | Polio 0 | DPT  |      |      | Polio |      |      | Measles | All <sup>1</sup> | None |                    |
|  |                       |         | 1    | 2    | 3    | 1     | 2    | 3    |         |                  |      |                    |
| <b>Vaccinated at any time before the interview</b> |                       |         |      |      |      |       |      |      |         |                  |      |                    |
| Vaccination card                                   | 98.3                  | 69.4    | 99.2 | 98.3 | 94.0 | 99.2  | 98.3 | 94.0 | 87.5    | 85.8             | 0.0  | 120                |
| Mother's report                                    | 87.2                  | 11.7    | 84.4 | 80.6 | 68.9 | 89.7  | 86.5 | 71.0 | 69.6    | 57.4             | 9.0  | 155                |
| Either source                                      | 92.0                  | 36.9    | 90.8 | 88.3 | 79.9 | 93.8  | 91.7 | 81.0 | 77.5    | 69.8             | 5.1  | 275                |
| Vaccinated by 12 months of age <sup>2</sup>        | 91.2                  | 36.9    | 89.3 | 86.8 | 77.0 | 92.2  | 90.1 | 78.1 | 66.3    | 59.7             | 5.9  | 275                |

Note: Table includes only surviving children from among the two most recent births in the three years preceding the survey.

<sup>1</sup>BCG, measles, and three doses each of DPT and polio vaccines (excluding Polio 0)

<sup>2</sup>For children whose information was based on the mother's report, the proportion of vaccinations given by 12 months of age is assumed to be the same as for children with a written record of vaccinations.

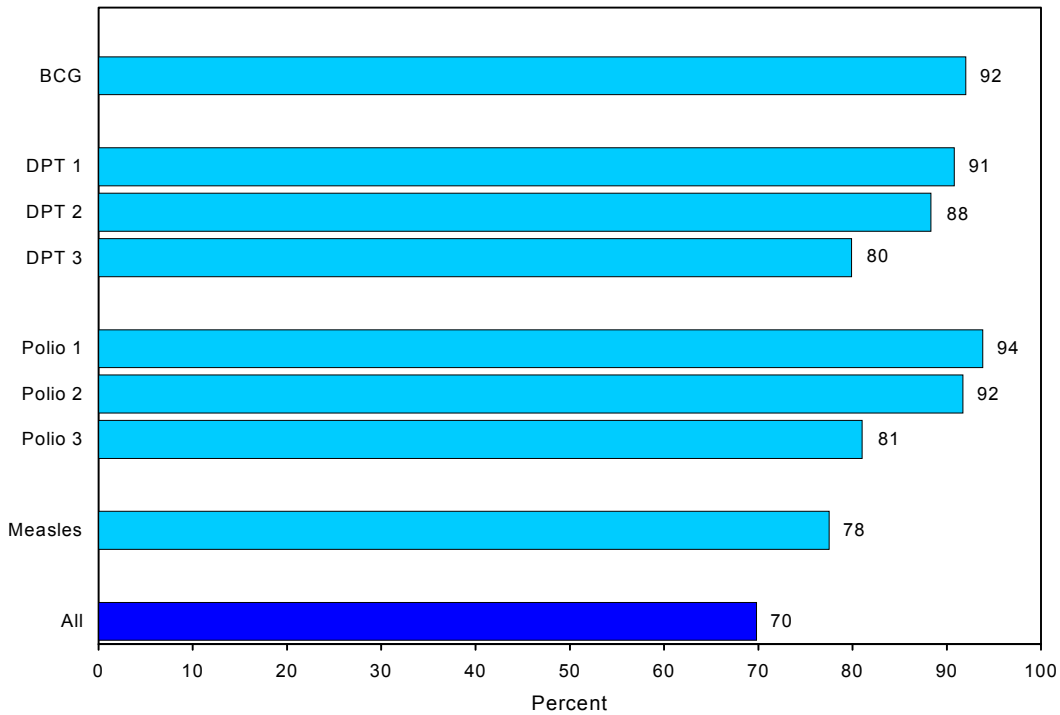
or subcutaneous). Routine vaccinations received by infants and children are usually recorded on a vaccination card that is issued for the child.

NFHS-2 asked mothers in Delhi whether they had a vaccination card for each child born since January 1996. If a card was available, the interviewer was required to copy carefully the dates when the child received vaccinations against each disease. For vaccinations not recorded on the card, the mother's report that the vaccination was or was not given was accepted. If the mother could not show a vaccination card, she was asked whether the child had received any vaccinations. If any vaccination had been received, the mother was asked whether the child had received a vaccination against tuberculosis (BCG); diphtheria, whooping cough (pertussis), and tetanus (DPT); poliomyelitis (polio); and measles. For DPT and polio, information was obtained on the number of doses of the vaccine given to the child. Mothers were not asked the dates of vaccinations. To distinguish Polio 0 (polio vaccine given at the time of birth) from Polio 1 (polio vaccine given about six weeks after birth), mothers were also asked whether the first polio vaccine was given just after birth or later<sup>2</sup>.

Table 6.6 gives the percentages of children age 12–23 months who received specific vaccinations at any time before the interview and before 12 months of age, according to whether a vaccination card was shown to the interviewer or the mother was the source of all vaccination information. The 12–23-month age group was chosen for analysis because both international and Government of India guidelines specify that children should be fully immunized by the time they complete their first year of life. Because the date of vaccination was not asked of the mother if she could not show a vaccination card, the proportion of vaccinations given during the first year

<sup>2</sup>Because mothers sometimes report that the first dose was given just after birth even if it was given several weeks later, an adjustment was made to the estimates of the number of polio vaccinations given, based on reports of the number of DPT vaccinations. This adjustment is based on the fact that when children receive a DPT vaccination, they are almost always given a polio vaccination at the same time. Thus, if the number of polio vaccinations was reported to be less than the number of DPT vaccinations and the first polio vaccination was reported to be given just after birth, then Polio 0 is assumed to really be Polio 1, Polio 1 is assumed to be Polio 2, etc. For comparative purposes, this same adjustment was made to the NFHS-1 vaccination estimates.

**Figure 6.3**  
**Percentage of Children Age 12–23 Months**  
**Who Have Received Specific Vaccinations**



NFHS-2, Delhi, 1999

of life to children whose information is based on the mother’s report is assumed to be the same as the proportion of vaccinations given during the first year of life to children with an exact date of vaccination on the card.

In NFHS-2, children who have received BCG, measles, and three doses each of DPT and polio (excluding Polio 0) are considered to be fully vaccinated. Based on information obtained from a card or reported by the mother (‘either source’), 70 percent of children age 12–23 months are fully vaccinated, and only 5 percent have not received any vaccinations at all. Coverage for each vaccination except Polio 0 is higher than the percentage fully vaccinated. BCG, the first dose of DPT, and the first and second doses of polio vaccine have each been received by more than 90 percent of children (see Figure 6.3). Nearly 80 percent of children have received three doses of DPT and polio vaccines.

Not all children who begin the DPT and polio vaccination series go on to complete them. The difference between the percentages of children receiving the first and third doses is 11 percentage points for DPT and 13 percentage points for polio. Moreover, only 78 percent of children age 12–23 months have been vaccinated against measles. The relatively low percentages vaccinated against measles and receiving all three doses of DPT vaccines are primarily responsible for lowering the percentage fully vaccinated.

There has been considerable improvement in full vaccination coverage in Delhi since the time of NFHS-1 when the proportion of children fully vaccinated was 58 percent. The coverage of each specific vaccination has also improved since NFHS-1.

According to the immunization schedule, all primary vaccinations, including measles, should be completed by the time a child is 12 months old. Table 6.6 shows that only 60 percent of all children (86 percent of fully vaccinated children) were fully vaccinated by age 12 months. The percentages of children who received BCG, the third dose of DPT, and the third dose of polio by age 12 months are only slightly lower than the percentages who received these vaccines at any time before the survey. For measles vaccination, however, which is supposed to be given when the child is nine months old, the gap is wider (78 percent at any time before the survey, compared with 66 percent by age 12 months). Fourteen percent of children who were vaccinated against measles received the vaccination after their first birthday.

Table 6.7 and Figure 6.4 present vaccination coverage rates (according to the vaccination card or the mother) for children age 12–23 months by selected background characteristics. The table also shows the percentage of children with vaccination cards that were shown to the interviewer. Mothers showed vaccination cards for only 44 percent of children age 12–23 months. Vaccination cards were shown for 44 percent of children in urban areas and 38 percent in rural areas. As expected, vaccination coverage is higher for children for whom a vaccination card was shown than for other children (see Table 6.6).

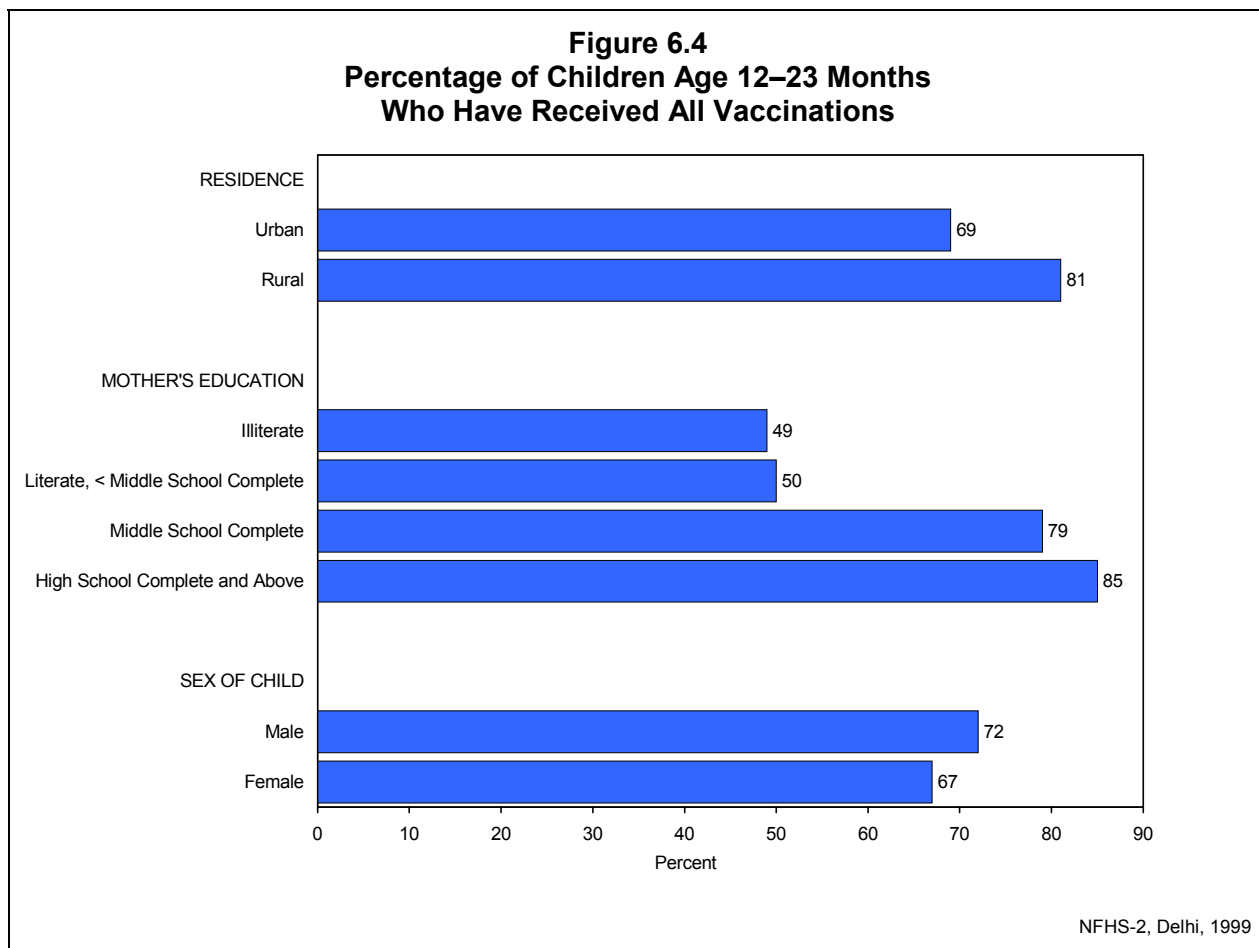


Table 6.7 Childhood vaccinations by background characteristics

Percentage of children age 12–23 months who received specific vaccinations at any time before the interview (according to the vaccination card or the mother) and percentage with a vaccination card that was shown to the interviewer by selected background characteristics, Delhi, 1999

| Background characteristic          | Percentage vaccinated |         |        |        |        |        |        |        |         |                  |       | Percentage showing vaccination card | Number of children |
|------------------------------------|-----------------------|---------|--------|--------|--------|--------|--------|--------|---------|------------------|-------|-------------------------------------|--------------------|
|                                    | BCG                   | Polio 0 | DPT    |        |        | Polio  |        |        | Measles | All <sup>1</sup> | None  |                                     |                    |
|                                    |                       |         | 1      | 2      | 3      | 1      | 2      | 3      |         |                  |       |                                     |                    |
| <b>Sex of child</b>                |                       |         |        |        |        |        |        |        |         |                  |       |                                     |                    |
| Male                               | 93.6                  | 42.2    | 91.5   | 88.3   | 80.6   | 96.1   | 93.6   | 83.2   | 79.5    | 71.8             | 2.6   | 48.2                                | 157                |
| Female                             | 90.0                  | 29.9    | 89.9   | 88.4   | 78.9   | 90.8   | 89.1   | 78.2   | 74.8    | 67.2             | 8.3   | 37.7                                | 118                |
| <b>Birth order</b>                 |                       |         |        |        |        |        |        |        |         |                  |       |                                     |                    |
| 1                                  | 97.7                  | 36.4    | 98.8   | 96.7   | 87.7   | 98.8   | 96.7   | 86.6   | 90.1    | 83.4             | 1.2   | 48.4                                | 91                 |
| 2                                  | 96.4                  | 49.5    | 96.2   | 93.7   | 82.4   | 96.3   | 96.3   | 85.1   | 80.0    | 68.7             | 2.5   | 48.2                                | 79                 |
| 3                                  | (93.2)                | (27.8)  | (90.9) | (90.9) | (78.7) | (95.6) | (93.0) | (80.8) | (76.6)  | (69.4)           | (2.1) | (46.4)                              | 43                 |
| 4+                                 | 77.4                  | 27.8    | 72.4   | 67.5   | 66.0   | 82.2   | 77.6   | 67.9   | 56.3    | 51.7             | 16.2  | 29.2                                | 62                 |
| <b>Residence</b>                   |                       |         |        |        |        |        |        |        |         |                  |       |                                     |                    |
| Urban                              | 92.0                  | 38.0    | 90.7   | 88.3   | 79.3   | 94.4   | 92.4   | 81.1   | 76.7    | 68.6             | 4.8   | 44.3                                | 248                |
| Rural                              | (92.2)                | (26.7)  | (92.2) | (88.4) | (84.7) | (88.4) | (84.7) | (80.9) | (84.7)  | (80.9)           | (7.8) | (38.4)                              | 27                 |
| <b>Mother's education</b>          |                       |         |        |        |        |        |        |        |         |                  |       |                                     |                    |
| Illiterate                         | 77.2                  | 13.5    | 74.3   | 74.3   | 63.4   | 81.2   | 79.9   | 66.1   | 53.9    | 48.5             | 16.1  | 29.7                                | 74                 |
| Literate, < middle school complete | (94.1)                | (44.2)  | (94.0) | (82.8) | (68.9) | (96.9) | (91.5) | (74.8) | (63.5)  | (49.9)           | (3.1) | (52.8)                              | 36                 |
| Middle school complete             | (97.2)                | (36.6)  | (94.2) | (91.3) | (84.9) | (97.2) | (91.0) | (82.1) | (91.1)  | (78.9)           | (2.8) | (39.6)                              | 33                 |
| High school complete and above     | 98.5                  | 48.2    | 98.5   | 97.0   | 90.8   | 99.2   | 98.5   | 90.9   | 91.0    | 84.9             | 0.0   | 50.2                                | 132                |
| <b>Religion</b>                    |                       |         |        |        |        |        |        |        |         |                  |       |                                     |                    |
| Hindu                              | 92.0                  | 37.9    | 91.0   | 87.9   | 80.1   | 93.3   | 91.1   | 80.7   | 77.2    | 70.9             | 5.3   | 46.7                                | 223                |
| Muslim                             | (85.5)                | (28.5)  | (81.8) | (81.8) | (74.6) | (92.7) | (89.1) | (74.7) | (67.6)  | (60.4)           | (7.3) | (32.1)                              | 28                 |
| <b>Caste/tribe</b>                 |                       |         |        |        |        |        |        |        |         |                  |       |                                     |                    |
| Scheduled caste                    | 84.1                  | 15.5    | 78.7   | 78.7   | 65.1   | 87.7   | 87.7   | 75.6   | 61.5    | 53.1             | 10.7  | 38.1                                | 57                 |
| Other backward class               | (90.5)                | (19.6)  | (88.0) | (85.5) | (83.1) | (88.1) | (85.6) | (83.2) | (76.1)  | (73.7)           | (9.5) | (31.9)                              | 41                 |
| Other <sup>2</sup>                 | 94.9                  | 47.6    | 95.4   | 92.0   | 83.8   | 97.2   | 94.4   | 82.2   | 82.9    | 74.2             | 2.3   | 48.0                                | 175                |
| <b>Standard of living index</b>    |                       |         |        |        |        |        |        |        |         |                  |       |                                     |                    |
| Medium                             | 84.1                  | 24.9    | 81.4   | 79.0   | 73.0   | 86.5   | 84.1   | 73.4   | 60.6    | 55.9             | 11.0  | 37.3                                | 81                 |
| High                               | 96.6                  | 41.8    | 95.5   | 93.8   | 84.6   | 97.2   | 96.1   | 85.7   | 86.5    | 77.5             | 2.3   | 46.6                                | 181                |
| Total                              | 92.0                  | 36.9    | 90.8   | 88.3   | 79.9   | 93.8   | 91.7   | 81.0   | 77.5    | 69.8             | 5.1   | 43.7                                | 275                |

Note: Table includes only surviving children from among the two most recent births in the three years preceding the survey. Total includes 15 Sikh children, 6 children belonging to 'other' religions, 1 child belonging to a scheduled tribe, 8 children from households with a low standard of living index, and 3 and 6 children with missing information on religion and the standard of living index, respectively, who are not shown separately.

( ) Based on 25–49 unweighted cases

<sup>1</sup>BCG, measles, and three doses each of DPT and polio vaccines (excluding Polio 0)

<sup>2</sup>Not belonging to a scheduled caste, scheduled tribe, or other backward class

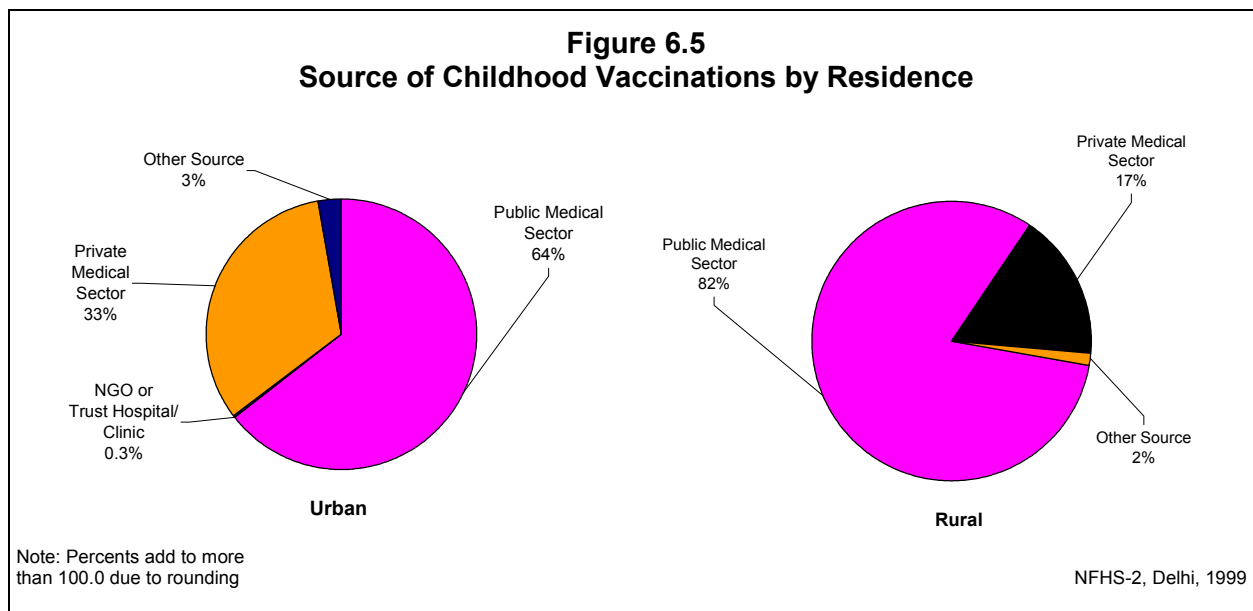
Boys (72 percent) are more likely than girls (67 percent) to be fully vaccinated. Boys are also more likely than girls to have received each of the individual vaccinations, except DPT-2, where the percentage vaccinated is slightly higher for girls. Mothers showed vaccination cards for 48 percent of boys and 38 percent of girls. In NFHS-1, vaccination coverage was also higher for boys than for girls, and a vaccination card was shown for a higher proportion of boys than for girls. Vaccination coverage is much lower for children of birth order 4 and above than for children of lower birth order.

Only 49 percent of children of illiterate mothers are fully vaccinated, compared with 85 percent of children whose mothers have at least completed high school. Hindu children are more likely than Muslim children to have received each of the recommended vaccinations, a pattern that is also evident at the national level. Children from scheduled castes are less likely than other children to have received each vaccination. The standard of living of the household has a strong positive relationship with vaccination coverage. Only 56 percent of children from households with a medium standard of living are fully vaccinated, compared with 78 percent of children from households with a high standard of living.

Table 6.8 shows the percentage of children age 12–35 months with a vaccination card that was shown to the interviewer and the percentage who received various vaccinations during the first year of life by current age of the child. The table shows that there has been some improvement in vaccination coverage over a short period of time. The proportion vaccinated during the first year of life is estimated separately for children in each age group. The row labelled ‘No vaccinations’ indicates the percentage of children who have not received any vaccination by 12 months of age.

The proportion of children whose vaccination status was determined from a vaccination card declines substantially with the age of the child. This may reflect an upward trend in the use

| Table 6.8 Childhood vaccinations received by 12 months of age  |              |              |
|--|--------------|--------------|
| Percentage of children age 12–23 months and 24–35 months with a vaccination card that was shown to the interviewer and percentage who received specific vaccinations by 12 months of age, according to child's current age, Delhi, 1999  |              |              |
| Vaccination status   | 12–23 months | 24–35 months |
| Vaccination card shown to interviewer  | 43.7         | 29.9         |
| <b>Percentage vaccinated by 12 months of age<sup>1</sup></b>   |              |              |
| BCG  | 91.2         | 88.5         |
| Polio 0  | 36.9         | 24.7         |
| DPT  |              |              |
| 1  | 89.3         | 86.2         |
| 2  | 86.8         | 85.4         |
| 3  | 77.0         | 76.4         |
| Polio  |              |              |
| 1  | 92.2         | 88.2         |
| 2  | 90.1         | 88.2         |
| 3  | 78.1         | 79.3         |
| Measles  | 66.3         | 64.1         |
| All vaccinations <sup>2</sup>  | 59.7         | 53.2         |
| No vaccinations  | 5.9          | 10.8         |
| Number of children   | 275          | 262          |
| Note: Table includes only surviving children from among the two most recent births in the three years preceding the survey.<br><sup>1</sup> Information was obtained either from the vaccination card or from the mother if there was no written record. For children whose information was based on the mother's report, the proportion of vaccinations given by 12 months of age is assumed to be the same as for children with a written record of vaccinations.<br><sup>2</sup> BCG, measles, and three doses each of DPT and polio vaccines (excluding Polio 0) |              |              |



of vaccination cards as well as an upward trend in overall vaccination coverage. On the other hand, vaccination cards may have been lost or discarded, especially for older children who have received all their vaccinations. The proportion of children fully vaccinated by age 12 months increases slightly from 53 percent for children age 24–35 months to 60 percent for children age 12–23 months. This pattern is observed for all vaccines except Polio 3, where a slight decline is observed.

Table 6.9 and Figure 6.5 show the percent distribution of children under age three years who have received any vaccinations by the source of most of the vaccinations, according to selected background characteristics. The public sector is the primary provider of childhood vaccinations in Delhi. Sixty-six percent of all children who have received vaccinations received them from a public-sector source, and 31 percent received them from a private-sector source (compared with 82 and 13 percent, respectively, for all India).

Children of more educated mothers and children belonging to households with a high standard of living are more likely than other children to receive vaccinations from the private medical sector. Hindu children are more likely to receive vaccinations from the private medical sector than are Muslim children. Children from scheduled castes and other backward classes are less likely than other children to receive vaccinations from the private medical sector.

## 6.5 Vitamin A Supplementation

Vitamin A deficiency is one of the most common nutritional deficiency disorders in the world, affecting more than 250 million children worldwide (Bloem et al., 1997). The National Programme on Prevention of Blindness targets children under age five years for administration of oral doses of vitamin A every six months starting at age nine months. NFHS-2 asked mothers of children born during the three years before the survey whether their children ever received a dose of vitamin A. Those who said that their child had received at least one dose of vitamin A were asked how long ago the last dose of vitamin A was given. Table 6.10 shows the percentage of children age 12–35 months who received at least one dose of vitamin A and the percentage who received a dose of vitamin A within the past six months by selected background

**Table 6.9 Source of childhood vaccinations**

Percent distribution of children under age 3 who have received any vaccinations by source of most of the vaccinations, according to selected background characteristics, Delhi, 1999

| Background characteristic          | Source                |                               |                        |       | Total percent | Number of children |
|------------------------------------|-----------------------|-------------------------------|------------------------|-------|---------------|--------------------|
|                                    | Public medical sector | NGO or trust hospital/ clinic | Private medical sector | Other |               |                    |
| <b>Age of child</b>                |                       |                               |                        |       |               |                    |
| < 12 months                        | 62.0                  | 0.4                           | 34.0                   | 3.6   | 100.0         | 224                |
| 12–23 months                       | 63.3                  | 0.4                           | 34.0                   | 2.3   | 100.0         | 263                |
| 24–35 months                       | 72.1                  | 0.0                           | 25.9                   | 2.0   | 100.0         | 249                |
| <b>Sex of child</b>                |                       |                               |                        |       |               |                    |
| Male                               | 67.6                  | 0.0                           | 30.2                   | 2.1   | 100.0         | 432                |
| Female                             | 63.5                  | 0.6                           | 32.7                   | 3.2   | 100.0         | 304                |
| <b>Birth order</b>                 |                       |                               |                        |       |               |                    |
| 1                                  | 59.7                  | 0.4                           | 36.6                   | 3.3   | 100.0         | 239                |
| 2                                  | 60.9                  | 0.0                           | 37.0                   | 2.2   | 100.0         | 225                |
| 3                                  | 68.7                  | 0.0                           | 29.0                   | 2.3   | 100.0         | 131                |
| 4+                                 | 81.9                  | 0.7                           | 15.2                   | 2.2   | 100.0         | 142                |
| <b>Residence</b>                   |                       |                               |                        |       |               |                    |
| Urban                              | 64.4                  | 0.3                           | 32.7                   | 2.7   | 100.0         | 669                |
| Rural                              | 81.5                  | 0.0                           | 16.9                   | 1.5   | 100.0         | 67                 |
| <b>Mother's education</b>          |                       |                               |                        |       |               |                    |
| Illiterate                         | 78.6                  | 0.5                           | 18.4                   | 2.5   | 100.0         | 199                |
| Literate, < middle school complete | 79.1                  | 0.0                           | 16.6                   | 4.3   | 100.0         | 119                |
| Middle school complete             | 71.1                  | 1.1                           | 23.6                   | 4.2   | 100.0         | 93                 |
| High school complete and above     | 51.8                  | 0.0                           | 46.7                   | 1.5   | 100.0         | 324                |
| <b>Religion</b>                    |                       |                               |                        |       |               |                    |
| Hindu                              | 65.7                  | 0.2                           | 32.1                   | 2.0   | 100.0         | 607                |
| Muslim                             | 67.9                  | 0.0                           | 24.7                   | 7.4   | 100.0         | 80                 |
| Sikh                               | (66.8)                | (0.0)                         | (33.2)                 | (0.0) | 100.0         | 36                 |
| <b>Caste/tribe</b>                 |                       |                               |                        |       |               |                    |
| Scheduled caste                    | 74.4                  | 0.6                           | 21.8                   | 3.2   | 100.0         | 158                |
| Other backward class               | 72.9                  | 0.0                           | 23.4                   | 3.7   | 100.0         | 136                |
| Other <sup>1</sup>                 | 60.3                  | 0.2                           | 37.4                   | 2.1   | 100.0         | 437                |
| <b>Standard of living index</b>    |                       |                               |                        |       |               |                    |
| Low                                | (68.1)                | (0.0)                         | (23.8)                 | (8.0) | 100.0         | 37                 |
| Medium                             | 77.7                  | 0.4                           | 20.1                   | 1.8   | 100.0         | 227                |
| High                               | 59.5                  | 0.2                           | 37.7                   | 2.6   | 100.0         | 460                |
| Total                              | 65.9                  | 0.3                           | 31.2                   | 2.6   | 100.0         | 736                |

Note: Table includes only surviving children from among the two most recent births in the three years preceding the survey. Total includes 8 children belonging to other religions, 5 scheduled-tribe children, and 5 and 12 children with missing information on religion and the standard of living index, respectively, who are not shown separately.  
 NGO: Nongovernmental organization  
 ( ) Based on 25–49 unweighted cases  
<sup>1</sup> Not belonging to a scheduled caste, scheduled tribe, or other backward class

**Table 6.10 Vitamin A supplementation for children**

Percentage of children age 12–35 months who received at least one dose of vitamin A and who received at least one dose of vitamin A within the six months preceding the survey by selected background characteristics, Delhi, 1999

| Background characteristic          | Percentage who received vitamin A |  | Number of children |
|------------------------------------|-----------------------------------|--|--------------------|
|                                    | At least one dose                 | At least one dose within past six months |                    |
| <b>Age of child</b>                |                                   |  |                    |
| 12–23 months                       | 32.4                              | 22.2                                     | 275                |
| 24–35 months                       | 33.0                              | 12.3                                     | 262                |
| <b>Sex of child</b>                |                                   |  |                    |
| Male                               | 33.8                              | 18.3                                     | 312                |
| Female                             | 31.1                              | 16.1                                     | 225                |
| <b>Birth order</b>                 |                                   |  |                    |
| 1                                  | 37.0                              | 22.9                                     | 170                |
| 2                                  | 28.0                              | 11.0                                     | 157                |
| 3                                  | 33.9                              | 20.6                                     | 92                 |
| 4+                                 | 31.7                              | 15.4                                     | 118                |
| <b>Residence</b>                   |                                   |  |                    |
| Urban                              | 32.1                              | 16.5                                     | 486                |
| Rural                              | 38.2                              | 26.2                                     | 52                 |
| <b>Mother's education</b>          |                                   |  |                    |
| Illiterate                         | 23.1                              | 9.9                                      | 161                |
| Literate, < middle school complete | 28.4                              | 13.2                                     | 84                 |
| Middle school complete             | 20.5                              | 11.9                                     | 69                 |
| High school complete and above     | 44.9                              | 26.1                                     | 224                |
| <b>Religion</b>                    |                                   |  |                    |
| Hindu                              | 34.5                              | 18.1                                     | 438                |
| Muslim                             | 15.0                              | 10.0                                     | 59                 |
| Sikh                               | (37.7)                            | (20.5)                                   | 30                 |
| <b>Caste/tribe</b>                 |                                   |  |                    |
| Scheduled tribe                    | 21.1                              | 7.9                                      | 112                |
| Other backward class               | 36.9                              | 22.4                                     | 96                 |
| Other <sup>1</sup>                 | 35.3                              | 19.3                                     | 328                |
| <b>Standard of living index</b>    |                                   |  |                    |
| Low                                | (20.8)                            | (10.5)                                   | 28                 |
| Medium                             | 24.8                              | 15.0                                     | 173                |
| High                               | 38.5                              | 19.7                                     | 328                |
| <b>Total</b>                       | <b>32.7</b>                       | <b>17.4</b>                              | <b>537</b>         |

Note: Table includes only surviving children from among the two most recent births in the three years preceding the survey. Total includes 6 children belonging to other religions, 2 scheduled-tribe children, and 4 and 9 children with missing information on religion and the standard of living index, respectively, who are not shown separately.

( ) Based on 25–49 unweighted cases

<sup>1</sup>Not belonging to a scheduled caste, scheduled tribe, or other backward class

characteristics. In Delhi as a whole, only 33 percent of children age 12–35 months received at least one dose of vitamin A, and only 17 percent received a dose within the past six months. This indicates that a large majority of children in Delhi have not received vitamin A supplementation at all, and that even fewer children receive vitamin A supplementation regularly.

Children living in rural areas, children whose mothers completed at least high school, and children living in households with a high standard of living are considerably more likely than other children to receive vitamin A supplementation. Boys are somewhat more likely than girls to receive vitamin A supplementation, but the differences are small. Children from groups that are less likely to have received at least one dose of vitamin A supplementation are also less likely to have received a dose in the past six months.

## **6.6 Child Morbidity and Treatment**

This section discusses the prevalence and treatment of acute respiratory infection (ARI), fever, and diarrhoea. Mothers of children less than three years old were asked if their children suffered from cough, fever, or diarrhoea during the two weeks preceding the survey and, if so, the type of treatment given. The accuracy of all these measures is affected by the reliability of the mother's recall of when the disease episode occurred. The two-week recall period is thought to be most suitable for ensuring that there will be an adequate number of cases to analyze and that recall errors will not be too serious. Table 6.11 shows the percentage of children with cough accompanied by fast breathing (symptoms of acute respiratory infection), fever, and diarrhoea during the two weeks preceding the survey and the percentage with acute respiratory infection who were taken to a health facility or provider, by selected background characteristics.

### **Acute Respiratory Infection**

Acute respiratory infection, primarily pneumonia, is a major cause of illness among infants and children and the leading cause of childhood mortality throughout the world (Murray and Lopez, 1996). Early diagnosis and treatment with antibiotics can prevent a large proportion of ARI/pneumonia deaths. NFHS-2 found that 17 percent of children under age three in Delhi suffered from acute respiratory infection (cough accompanied by short, rapid breathing) at some time during the two-week period before the survey. Table 6.11 shows that ARI was more common among boys (21 percent) than girls (12 percent). For reasons that are unclear, the prevalence of ARI varies rather irregularly by most socioeconomic characteristics. Children living in households that use a water filter to purify water have a lower prevalence of ARI than households that use other methods or no method to purify water.

Table 6.11 also shows the percentage of children suffering from ARI symptoms in the two weeks before the survey who were taken to a health facility or provider. Eighty-three percent of children received advice or treatment from a health facility or health provider when ill with ARI.

### **Fever**

Fever is the most common of the three conditions examined in Table 6.11, with 36 percent of children suffering from fever during the two weeks preceding the survey. The prevalence of fever is lower among children age 24–35 months (30 percent) than among younger children (38–39 percent). Fever is also less common for girls than for boys and for children whose mothers

completed at least high school. Fever is relatively high for Muslim children, children from scheduled castes, and children from households with a low or medium standard of living. Children living in households that use a water filter to purify water have a lower prevalence of fever than households that use other methods or no method to purify water.

## Diarrhoea

Diarrhoea is the second most important killer of children under age five worldwide, following acute respiratory infection. Deaths from acute diarrhoea are most often caused by dehydration due to loss of water and electrolytes. Nearly all dehydration-related deaths can be prevented by

Table 6.11 Prevalence of acute respiratory infection, fever, and diarrhoea

Percentage of children under age 3 who were ill with a cough accompanied by fast breathing (symptoms of acute respiratory infection—ARI), fever, or diarrhoea during the two weeks preceding the survey and percentage with ARI who were taken to a health facility or provider, by selected background characteristics, Delhi, 1999

| Background characteristic          | Percentage of children suffering in past two weeks from: |        |                            |                      | Number of children | Percentage with ARI taken to a health facility or provider | Number of children with ARI |
|------------------------------------|--|--------|----------------------------|----------------------|--------------------|--|-----------------------------|
|                                    | Cough accompanied by fast breathing (ARI)                | Fever  | Any diarrhoea <sup>1</sup> | Diarrhoea with blood |                    |  |                             |
| <b>Age of child</b>                |  |        |                            |                      |                    |  |                             |
| 1–5 months                         | 19.5   | 37.6   | 39.5                       | 0.0                  | 99                 | *  | 19                          |
| 6–11 months                        | 15.9   | 38.9   | 39.1                       | 1.4                  | 138                | *  | 22                          |
| 12–23 months                       | 17.6   | 39.1   | 31.4                       | 1.8                  | 275                | (90.0)   | 48                          |
| 24–35 months                       | 15.8   | 29.9   | 20.5                       | 2.2                  | 262                | (78.4)   | 41                          |
| <b>Sex of child</b>                |  |        |                            |                      |                    |  |                             |
| Male                               | 20.6   | 39.8   | 29.7                       | 1.1                  | 450                | 82.8   | 93                          |
| Female                             | 11.9   | 30.1   | 30.6                       | 2.4                  | 324                | (84.6)   | 39                          |
| <b>Birth order</b>                 |  |        |                            |                      |                    |  |                             |
| 1                                  | 18.2   | 31.4   | 29.0                       | 2.0                  | 245                | (87.0)   | 45                          |
| 2                                  | 12.6   | 34.5   | 28.5                       | 0.8                  | 231                | (82.7)   | 29                          |
| 3                                  | 18.8   | 34.7   | 32.0                       | 0.0                  | 137                | (76.3)   | 26                          |
| 4+                                 | 19.7   | 45.1   | 32.4                       | 3.6                  | 162                | (84.4)   | 32                          |
| <b>Residence</b>                   |  |        |                            |                      |                    |  |                             |
| Urban                              | 17.1   | 36.0   | 29.9                       | 1.7                  | 700                | 82.6   | 120                         |
| Rural                              | 15.2   | 33.4   | 32.1                       | 1.4                  | 74                 | *  | 11                          |
| <b>Mother's education</b>          |  |        |                            |                      |                    |  |                             |
| Illiterate                         | 17.9   | 41.0   | 34.2                       | 4.8                  | 224                | (82.3)   | 40                          |
| Literate, < middle school complete | 20.1   | 37.7   | 33.3                       | 0.0                  | 128                | (69.2)   | 26                          |
| Middle school complete             | 24.3   | 37.4   | 32.5                       | 1.0                  | 97                 | *  | 24                          |
| High school complete and above     | 12.8   | 30.8   | 25.3                       | 0.3                  | 324                | (88.2)   | 41                          |
| <b>Religion</b>                    |  |        |                            |                      |                    |  |                             |
| Hindu                              | 17.4   | 34.6   | 30.1                       | 1.9                  | 631                | 85.6   | 110                         |
| Muslim                             | 19.2   | 49.3   | 36.3                       | 1.1                  | 94                 | *  | 18                          |
| Sikh                               | (5.7)  | (19.1) | (19.4)                     | (0.0)                | 36                 | *  | 2                           |
| <b>Caste/tribe</b>                 |  |        |                            |                      |                    |  |                             |
| Scheduled caste                    | 18.2   | 39.9   | 35.8                       | 1.7                  | 169                | (87.2)   | 31                          |
| Other backward class               | 18.0   | 31.9   | 36.9                       | 4.1                  | 145                | (76.9)   | 26                          |
| Other <sup>2</sup>                 | 15.7   | 35.0   | 25.6                       | 0.9                  | 452                | 86.2   | 71                          |
| <b>Standard of living index</b>    |  |        |                            |                      |                    |  |                             |
| Low                                | (15.8)   | (38.6) | (45.6)                     | (9.0)                | 43                 | *  | 7                           |
| Medium                             | 22.3   | 41.7   | 30.2                       | 3.2                  | 250                | 75.1   | 56                          |
| High                               | 14.7   | 32.6   | 28.4                       | 0.2                  | 468                | 89.8   | 69                          |

Contd...

Table 6.11 Prevalence of acute respiratory infection, fever, and diarrhoea (contd.)

Percentage of children under age 3 who were ill with a cough accompanied by fast breathing (symptoms of acute respiratory infection—ARI), fever, or diarrhoea during the two weeks preceding the survey and percentage with ARI who were taken to a health facility or provider, by selected background characteristics, Delhi, 1999

| Background characteristic                | Percentage of children suffering in past two weeks from: |             |             |                      | Number of children | Percentage with ARI taken to a health facility or provider | Number of children with ARI |
|--|--|-------------|-------------|----------------------|--------------------|--|-----------------------------|
|  | Cough accompanied by fast breathing (ARI)                | Fever       | Diarrhoea   | Diarrhoea with blood |                    |  |                             |
| <b>Source of drinking water</b>          |  |             |             |                      |                    |  |                             |
| Piped water                              | 15.8   | 36.3        | 29.8        | 1.3                  | 664                | 83.7   | 105                         |
| Ground water                             | 21.4   | 31.0        | 35.2        | 4.1                  | 97                 | *  | 21                          |
| <b>Purification of water<sup>3</sup></b> |  |             |             |                      |                    |  |                             |
| Straining by cloth                       | (8.6)  | (53.8)      | (56.8)      | (0.0)                | 35                 | *  | 3                           |
| Water filter                             | 8.5  | 26.1        | 21.4        | 0.0                  | 105                | *  | 9                           |
| Boiling                                  | 15.5   | 40.4        | 41.1        | 0.9                  | 110                | *  | 17                          |
| Nothing                                  | 19.1   | 36.5        | 30.3        | 2.2                  | 526                | 80.1   | 100                         |
| <b>Total</b>                             | <b>16.9</b>  | <b>35.7</b> | <b>30.1</b> | <b>1.6</b>           | <b>774</b>         | <b>83.3</b>  | <b>131</b>                  |

Note: Table includes only surviving children age 1–35 months from among the two most recent births in the three years preceding the survey. Total includes a small number of children whose mothers belong to other religions, scheduled-tribe children, children in households using well water or 'other' sources of drinking water, children in households using alum, electronic water purifiers, or 'other' methods to purify water, and children with missing information on religion and the standard of living index, who are not shown separately.

( ) Based on 25–49 unweighted cases

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

<sup>1</sup>Includes diarrhoea with blood

<sup>2</sup>Not belonging to a scheduled caste, scheduled tribe, or other backward class

<sup>3</sup>Numbers of children living in households with each method of water purification add to more than the total because multiple methods of purification of water could be recorded.

prompt administration of rehydration solutions. Because deaths from diarrhoea are a significant proportion of all child deaths, the Government of India has launched the Oral Rehydration Therapy Programme as one of its priority activities for child survival. One major goal of this programme is to increase awareness among mothers and communities about the causes and treatment of diarrhoea. Oral rehydration salt (ORS) packets are made widely available, and mothers are taught how to use them. NFHS-2 asked mothers of children less than three years old a series of questions about episodes of diarrhoea suffered by their children in the two weeks before the survey, including questions on feeding practices during diarrhoea, the treatment of diarrhoea, and their knowledge and use of ORS.

Table 6.11 shows that 30 percent of children under age three suffered from diarrhoea in the two-week period before the survey. There are seasonal variations in the prevalence of diarrhoea, however, so that the percentages shown in Table 6.11 cannot be assumed to reflect the situation throughout the year.

Among children age 1–35 months, those age 24–35 months are least susceptible to diarrhoea. Prevalence of diarrhoea is also relatively low among Hindu children, children whose mothers completed at least high school, and children living in households with a high standard of living. Differentials by sex and birth order are small. Consistent with expectations, the prevalence of diarrhoea is relatively low among children living in households that use piped water for drinking. Children living in households that use a water filter to purify water have a

lower prevalence of diarrhoea than households that use other methods or no method to purify water.

Two percent of all children age 1–35 months (5 percent of children who suffered from diarrhoea in the two weeks preceding the survey) had diarrhoea with blood, a symptom of dysentery. Bloody diarrhoea is relatively high among children of illiterate women, children from other backward classes, and children in households that get their drinking water from ground water.

Table 6.12 shows that 74 percent of mothers with births during the three years preceding the survey know about ORS packets, virtually the same as NFHS-1, when the proportion was 73 percent. Knowledge of ORS packets rises somewhat with mother's age. As expected, knowledge is considerably higher among urban mothers than among rural mothers, and higher among more educated mothers. Knowledge of ORS is lower among Muslim mothers (64 percent) than among Hindu mothers (75 percent). Knowledge of ORS packets is much lower among mothers who are not regularly exposed to any mass media than among mothers who are exposed to some media. Knowledge of ORS packets does not vary much by caste/tribe.

In order to assess mothers' knowledge of children's need for extra fluids during episodes of diarrhoea, all mothers of children born in the three years preceding the survey were asked: 'When a child has diarrhoea, should he/she be given less to drink than usual, about the same amount, or more than usual?' Table 6.12 shows the responses of mothers to this question, by selected background characteristics. In Delhi, 65 percent of mothers report that children should be given more to drink than usual during an episode of diarrhoea. Contrary to the standard recommendation, 15 percent report that children should be given less to drink. This suggests that many mothers in Delhi still need education about the proper treatment of diarrhoea. The proportion reporting correctly that children with diarrhoea should be given more to drink is relatively low among illiterate mothers, Muslim mothers, mothers belonging to a scheduled caste, and especially mothers not regularly exposed to any mass media.

To assess whether mothers are aware of one or more signs associated with diarrhoea that indicate the need for medical treatment, mothers were also asked: 'When a child is sick with diarrhoea, what signs of illness would tell you that he or she should be taken to a health facility or health worker?' All answers given by the respondent were recorded. The signs warranting medical treatment include repeated watery stools, repeated vomiting, blood in the stools, fever, marked thirst, not eating or drinking well, getting sicker or very sick, and not getting better. Table 6.12 shows that only 33 percent of mothers were able to name two or more signs that indicate that a child with diarrhoea should be given medical treatment. There are no clear-cut age differentials, but contrary to expectation, the percentage is slightly lower among urban than among rural mothers. The percentage is also relatively low among Hindu mothers and scheduled-caste mothers. Overall, Table 6.12 shows that knowledge of two or more signs of diarrhoea that indicate the need for medical treatment is universally low across all demographic and socioeconomic groups. This lack of knowledge suggests a need for further educating mothers about children's diarrhoea so that they are better able to recognize the signs of diarrhoea for which a health provider should be consulted.

Table 6.12 Knowledge of diarrhoea care

Among mothers with births during the three years preceding the survey, percentage who know about oral rehydration salt (ORS) packets, percent distribution by quantity to be given to drink during diarrhoea, and percentage who know two or more signs of diarrhoea that indicate the need for medical treatment by selected background characteristics, Delhi, 1999

| Background characteristic          | Percentage who know about ORS packets | Reported quantity to be given to drink |             |             |                    |              | Total percent | Percentage who know two or more signs for medical treatment of diarrhoea <sup>1</sup> | Number of mothers |
|------------------------------------|---------------------------------------|--|-------------|-------------|--------------------|--------------|---------------|---|-------------------|
|                                    |                                       | Less                                   | Same        | More        | Don't know/missing |              |               |   |                   |
| <b>Age</b>                         |                                       |  |             |             |                    |              |               |   |                   |
| 20–24                              | 69.9                                  | 16.6                                   | 14.5        | 64.0        | 4.9                | 100.0        | 35.6          | 261   |                   |
| 25–29                              | 75.3                                  | 12.9                                   | 17.3        | 65.8        | 4.0                | 100.0        | 29.3          | 275   |                   |
| 30–34                              | 77.2                                  | 17.4                                   | 12.7        | 66.7        | 3.2                | 100.0        | 38.4          | 126   |                   |
| 35–49                              | (73.5)                                | (17.5)                                 | (17.3)      | (62.9)      | (2.2)              | 100.0        | (35.4)        | 45  |                   |
| <b>Residence</b>                   |                                       |  |             |             |                    |              |               |   |                   |
| Urban                              | 75.4                                  | 15.3                                   | 15.7        | 65.0        | 4.1                | 100.0        | 33.0          | 657   |                   |
| Rural                              | 59.2                                  | 12.1                                   | 16.8        | 63.6        | 7.5                | 100.0        | 35.0          | 68  |                   |
| <b>Education</b>                   |                                       |  |             |             |                    |              |               |   |                   |
| Illiterate                         | 56.9                                  | 18.6                                   | 20.0        | 51.6        | 9.8                | 100.0        | 29.7          | 212   |                   |
| Literate, < middle school complete | 82.0                                  | 18.4                                   | 12.8        | 64.5        | 4.3                | 100.0        | 32.5          | 116   |                   |
| Middle school complete             | 77.6                                  | 17.9                                   | 17.1        | 61.6        | 3.4                | 100.0        | 38.1          | 88  |                   |
| High school complete and above     | 81.5                                  | 10.4                                   | 13.7        | 75.0        | 1.0                | 100.0        | 34.7          | 307   |                   |
| <b>Religion</b>                    |                                       |  |             |             |                    |              |               |   |                   |
| Hindu                              | 74.7                                  | 14.5                                   | 15.5        | 65.4        | 4.6                | 100.0        | 31.7          | 590   |                   |
| Muslim                             | 64.2                                  | 17.6                                   | 18.8        | 59.3        | 4.4                | 100.0        | 41.0          | 90  |                   |
| Sikh                               | (94.0)                                | (18.0)                                 | (14.8)      | (67.2)      | (0.0)              | 100.0        | (33.2)        | 33  |                   |
| <b>Caste/tribe</b>                 |                                       |  |             |             |                    |              |               |   |                   |
| Scheduled caste                    | 74.6                                  | 17.6                                   | 15.7        | 57.5        | 9.1                | 100.0        | 24.2          | 155   |                   |
| Other backward class               | 68.5                                  | 13.4                                   | 18.0        | 62.7        | 5.9                | 100.0        | 38.8          | 133   |                   |
| Other <sup>2</sup>                 | 75.5                                  | 14.3                                   | 15.2        | 68.5        | 2.0                | 100.0        | 35.1          | 429   |                   |
| <b>Exposure to media</b>           |                                       |  |             |             |                    |              |               |   |                   |
| Exposed to any media               | 75.5                                  | 13.8                                   | 15.6        | 66.9        | 3.8                | 100.0        | 33.1          | 659   |                   |
| Watches television weekly          | 75.9                                  | 13.1                                   | 15.7        | 67.7        | 3.6                | 100.0        | 33.1          | 642   |                   |
| Listens to radio weekly            | 81.3                                  | 13.4                                   | 16.6        | 66.6        | 3.4                | 100.0        | 37.3          | 384   |                   |
| Visits cinema/theatre monthly      | 79.6                                  | 7.8                                    | 18.3        | 70.1        | 3.7                | 100.0        | 41.7          | 103   |                   |
| Reads newspaper/magazine weekly    | 84.8                                  | 12.3                                   | 18.0        | 68.4        | 1.2                | 100.0        | 37.9          | 322   |                   |
| Not regularly exposed to any media | 58.5                                  | 26.7                                   | 17.9        | 44.9        | 10.5               | 100.0        | 34.4          | 66  |                   |
| <b>Total</b>                       | <b>73.9</b>                           | <b>15.0</b>                            | <b>15.8</b> | <b>64.9</b> | <b>4.4</b>         | <b>100.0</b> | <b>33.2</b>   | <b>725</b>  |                   |

Note: Total includes 18 mothers age 15–19, 8 mothers belonging to other religions, 8 scheduled-tribe mothers, and 1 and 4 mothers with missing information on education and religion, respectively, who are not shown separately.

( ) Based on 25–49 unweighted cases

<sup>1</sup>Percentage who know two or more signs of illness that indicate that a child should be taken to a health facility or health worker

<sup>2</sup>Not belonging to a scheduled caste, scheduled tribe, or other backward class

Table 6.13 shows the percentage of children under age three with diarrhoea during the two weeks preceding the survey who were taken to a health facility or provider, the percentage who received various types of oral rehydration therapy (ORT), and the percentage who received other types of treatment, by selected background characteristics. Eighty percent of children in Delhi who suffered from diarrhoea during the two weeks preceding the survey were taken to a health facility or provider for medical advice or treatment. Eighteen percent of children with diarrhoea did not receive any treatment at all. Boys with diarrhoea were slightly more likely than

**Table 6.13 Treatment of diarrhoea**

Among children under age 3 who had diarrhoea in the past two weeks, percentage taken to a health facility or provider, percentage who received various types of oral rehydration therapy (ORT), and percentage who received other treatments by selected background characteristics, Delhi, 1999

| Background characteristic          | Taken to a health facility or provider | Oral rehydration                    |        |                                    |                  |               | Other treatment |           |                              |                             |              | Number of children with diarrhoea |
|------------------------------------|--|-------------------------------------|--------|------------------------------------|------------------|---------------|-----------------|-----------|------------------------------|-----------------------------|--------------|-----------------------------------|
|                                    |  | Oral rehydration salt (ORS) packets | Gruel  | Homemade sugar-salt-water solution | Increased fluids | ORT not given | Pill or syrup   | Injection | Intravenous (IV/drip/bottle) | Home remedy/herbal medicine | No treatment |                                   |
| <b>Age of child</b>                |  |                                     |        |                                    |                  |               |                 |           |                              |                             |              |                                   |
| 1–11 months                        | 80.5                                   | 26.7                                | 22.4   | 8.6                                | 32.4             | 43.0          | 49.6            | 8.6       | 1.1                          | 9.7                         | 26.9         | 93                                |
| 12–23 months                       | 86.2                                   | 50.3                                | 30.8   | 13.8                               | 41.2             | 25.5          | 55.4            | 12.7      | 1.1                          | 9.1                         | 9.2          | 86                                |
| 24–35 months                       | 69.8                                   | 42.5                                | 29.6   | 15.3                               | 43.0             | 25.3          | 53.7            | 11.2      | 0.0                          | 12.9                        | 18.3         | 54                                |
| <b>Sex of child</b>                |  |                                     |        |                                    |                  |               |                 |           |                              |                             |              |                                   |
| Male                               | 81.8                                   | 37.6                                | 24.4   | 13.6                               | 38.1             | 31.5          | 48.1            | 6.8       | 1.5                          | 9.6                         | 21.7         | 134                               |
| Female                             | 77.9                                   | 41.0                                | 30.9   | 10.1                               | 38.1             | 33.6          | 58.8            | 15.9      | 0.0                          | 11.1                        | 13.9         | 99                                |
| <b>Mother's education</b>          |  |                                     |        |                                    |                  |               |                 |           |                              |                             |              |                                   |
| Illiterate                         | 77.8                                   | 30.9                                | 20.7   | 6.6                                | 32.6             | 43.0          | 49.7            | 10.4      | 1.4                          | 11.7                        | 24.4         | 77                                |
| Literate, < middle school complete | (71.7)                                 | (32.1)                              | (23.2) | (20.7)                             | (37.0)           | (35.3)        | (53.8)          | (6.8)     | (2.2)                        | (11.6)                      | (16.3)       | 43                                |
| Middle school complete             | (93.9)                                 | (46.5)                              | (40.2) | (9.8)                              | (31.2)           | (24.8)        | (56.2)          | (9.3)     | (0.0)                        | (9.3)                       | (12.5)       | 32                                |
| High school complete and above     | 81.3                                   | 47.4                                | 30.2   | 13.6                               | 46.4             | 24.0          | 53.5            | 13.6      | 0.0                          | 8.5                         | 16.0         | 82                                |
| <b>Religion</b>                    |  |                                     |        |                                    |                  |               |                 |           |                              |                             |              |                                   |
| Hindu                              | 81.0                                   | 40.7                                | 30.3   | 13.2                               | 38.3             | 29.7          | 49.3            | 10.5      | 1.0                          | 11.0                        | 18.3         | 190                               |
| Muslim                             | (73.3)                                 | (25.8)                              | (11.3) | (9.1)                              | (35.1)           | (47.4)        | (70.8)          | (14.7)    | (0.0)                        | (8.7)                       | (17.6)       | 34                                |
| <b>Caste/tribe</b>                 |  |                                     |        |                                    |                  |               |                 |           |                              |                             |              |                                   |
| Scheduled caste                    | 85.2                                   | 29.4                                | 37.7   | 13.3                               | 30.0             | 34.2          | 43.2            | 6.6       | 1.5                          | 11.3                        | 17.9         | 61                                |
| Other backward class               | 75.0                                   | 33.7                                | 20.6   | 15.4                               | 47.4             | 31.8          | 55.0            | 11.4      | 0.0                          | 9.5                         | 18.7         | 53                                |
| Other <sup>1</sup>                 | 81.9                                   | 47.6                                | 25.4   | 10.2                               | 39.0             | 30.0          | 57.9            | 12.8      | 0.9                          | 10.3                        | 16.3         | 116                               |
| <b>Standard of living index</b>    |  |                                     |        |                                    |                  |               |                 |           |                              |                             |              |                                   |
| Medium                             | 76.4                                   | 36.7                                | 26.3   | 10.7                               | 38.4             | 35.2          | 46.2            | 9.3       | 2.6                          | 13.2                        | 23.5         | 76                                |
| High                               | 82.3                                   | 40.2                                | 27.4   | 13.6                               | 38.3             | 32.3          | 58.6            | 11.3      | 0.0                          | 9.7                         | 12.9         | 133                               |
| Total                              | 80.1                                   | 39.1                                | 27.2   | 12.1                               | 38.1             | 32.4          | 52.7            | 10.7      | 0.8                          | 10.2                        | 18.3         | 233                               |

Note: Table includes only surviving children age 1–35 months from among the two most recent births in the three years preceding the survey. Total includes 7 Sikh children, 1 child belonging to an 'other' religion, 3 scheduled-tribe children, 19 children from households with a low standard of living index, and 1 and 5 children with missing information on religion and the standard of living index, respectively, who are not shown separately.

( ) Based on 25–49 unweighted cases

<sup>1</sup> Not belonging to a scheduled caste, scheduled tribe, or other backward class

girls to be taken to a health facility or provider, similar to the pattern for the treatment of ARI. Overall, the likelihood of seeking treatment does not vary much by socioeconomic characteristics.

Thirty-nine percent of the children age 1–35 months who suffered from diarrhoea during the two weeks preceding the survey were treated with a solution made from ORS packets. This is up from 19 percent in NFHS-1, indicating a major increase in the use of ORS packets in Delhi for the treatment of childhood diarrhoea. It is much higher than the NFHS-2 national level of 27 percent. On the other hand, only 38 percent of children in Delhi received increased fluids when sick with diarrhoea, and only 27 percent received gruel. Almost one-third of children with diarrhoea (32 percent) did not receive any of the various types of oral rehydration therapy (ORT).

The proportion not given any ORT is especially high for very young children (age 1–11 months) and children of illiterate mothers. Differentials in the proportion not given any ORT by other socioeconomic and demographic characteristics shown in Table 6.13 are small.

The use of antibiotics and other antidiarrhoeal drugs is not generally recommended for the treatment of childhood diarrhoea. Yet 53 percent of the children who had diarrhoea in the two weeks before NFHS-2 were treated with pills or syrup, and 11 percent received an injection. These figures indicate poor knowledge about the proper treatment of diarrhoea not only among mothers but also among health-care providers. The results underscore the need for informational programmes for mothers and supplemental training for health-care providers that emphasize the importance of ORT, increased fluid intake, and continued feeding, and discourage the use of

| <u>Table 6.14 Source of ORS packets</u>   |         |
|---|---------|
| Among children under age 3 who were treated with a solution made from oral rehydration salt (ORS) packets for diarrhoea in the two weeks preceding the survey, percent distribution of children by source of ORS packets, Delhi, 1999   |         |
| Source  | Percent |
| <b>Public medical sector</b>  | 26.0    |
| Government/municipal hospital   | 14.0    |
| Government dispensary   | 8.6     |
| UHC/UHP/UFWC  | 1.1     |
| Sub-centre  | 2.2     |
| <b>Private medical sector</b>   | 50.1    |
| Private hospital/clinic   | 4.3     |
| Private doctor  | 20.5    |
| Private paramedic   | 3.3     |
| Pharmacy/drugstore  | 21.9    |
| <b>Other source</b>   | 23.9    |
| Shop  | 20.8    |
| Husband   | 3.1     |
| Total percent   | 100.0   |
| Number of children treated with ORS   | 91      |
| Note: Table includes only surviving children age 1–35 months from among the two most recent births in the three years preceding the survey. Table excludes children with missing information on source of ORS packets.<br>UHC: Urban health centre; UHP: Urban health post; UFWC: Urban family welfare centre |         |

drugs to treat childhood diarrhoea. The use of unnecessary antidiarrhoeal drugs is widespread across all socioeconomic groups.

Table 6.14 shows the percent distribution of children who were treated with ORS for diarrhoea in the two weeks before NFHS-2 by the source of the ORS packets. For 26 percent of children who were treated with ORS, the packets were obtained from public-sector medical sources, for 50 percent the packets were obtained from private-sector medical sources, and for 24 percent the packets were obtained from other sources (primarily shops). Among the public-sector medical sources, government/municipal hospitals are mentioned most often, followed by government dispensaries. Among the private-sector medical sources, ORS packets were usually obtained from a private doctor. The pharmacy/drugstore category accounts for 22 percent of all cases. If this category is added to the 'shop' category, the proportion purchasing ORS packets from shops, pharmacies, or drugstores is 43 percent.

## **6.7 HIV/AIDS**

Acquired Immune Deficiency Syndrome (AIDS) is an illness caused by the HIV virus, which weakens the immune system and leads to death through secondary infections such as tuberculosis or pneumonia. The virus is generally transmitted through sexual contact, through contact with contaminated needles (injections) or blood, or from an HIV-infected mother to her child during pregnancy, during delivery, or through breastfeeding. HIV and AIDS prevalence in India have been on the rise for more than a decade and have reached alarming levels in recent years. The Government of India established a National AIDS Control Organization (NACO) under the Ministry of Health and Family Welfare in 1989 to deal with the epidemic. Since then there have been various efforts to prevent HIV transmission, such as public health education through the media and the activities of many nongovernmental organizations (NGOs).

NFHS-2 included a set of questions on knowledge of AIDS and AIDS prevention. Ever-married women age 15–49 were first asked if they had ever heard of an illness called AIDS. Respondents who had heard of AIDS were asked further questions about their sources of information on AIDS, whether they believe that AIDS is preventable, and if so, what precautions, if any, a person can take to avoid infection.

### **Knowledge of AIDS**

Table 6.15 shows the proportion of women who have heard about AIDS by background characteristics. Twenty-one percent of women in Delhi have never heard of AIDS, down from 64 percent in NFHS-1. The proportion who have never heard of AIDS is much lower in Delhi (21 percent) than in all India (60 percent).

In Delhi in NFHS-2, knowledge of AIDS does not vary much by woman's age, but there are substantial differentials by other background characteristics. Eighty-one percent of women in urban areas have heard of AIDS, compared with 62 percent in rural areas. The difference in knowledge of AIDS by woman's educational level is dramatic. Knowledge of AIDS ranges from 47 percent for illiterate women to 97 percent for women who have completed at least a high school education. There is also a strong positive relationship between knowledge of AIDS and household standard of living. Sikhs are much more likely to know about AIDS (96 percent) than either Hindus (79 percent) or Muslims (67 percent). Knowledge of AIDS is much lower among women from scheduled castes and other backward classes (64–65 percent) than among 'other'

Table 6.15 Source of knowledge about AIDS

Percentage of ever-married women who have heard about AIDS and among women who have heard about AIDS, percentage who received information from specific sources by selected background characteristics, Delhi, 1999

| Background characteristic          | Percentage who have heard about AIDS | Number of women | Among those who have heard about AIDS, percentage who received information from: |             |             |                    |                 |               |                           |                 |                |              | Number of women who have heard about AIDS |
|------------------------------------|--------------------------------------|-----------------|--|-------------|-------------|--------------------|-----------------|---------------|---------------------------|-----------------|----------------|--------------|---|
|                                    |                                      |                 | Radio  | Television  | Cinema      | Newspaper/magazine | Poster/hoarding | Health worker | Adult education programme | Friend/relative | School/teacher | Other source |   |
| <b>Age</b>                         |                                      |                 |  |             |             |                    |                 |               |                           |                 |                |              |   |
| 15-24                              | 78.8                                 | 449             | 35.7   | 94.7        | 11.1        | 31.6               | 19.2            | 2.2           | 0.3                       | 12.1            | 0.3            | 2.3          | 354                                       |
| 25-34                              | 82.9                                 | 986             | 32.4   | 97.5        | 13.7        | 39.1               | 22.9            | 2.5           | 0.5                       | 15.4            | 0.7            | 3.8          | 817                                       |
| 35-49                              | 76.0                                 | 1,041           | 40.2   | 97.2        | 13.6        | 41.8               | 21.3            | 2.4           | 0.4                       | 13.9            | 0.7            | 2.7          | 791                                       |
| <b>Residence</b>                   |                                      |                 |  |             |             |                    |                 |               |                           |                 |                |              |   |
| Urban                              | 80.7                                 | 2,282           | 37.1   | 97.2        | 13.6        | 39.9               | 22.3            | 2.4           | 0.4                       | 14.1            | 0.7            | 3.1          | 1,842                                     |
| Rural                              | 61.6                                 | 195             | 20.5   | 92.2        | 6.0         | 22.3               | 10.2            | 1.7           | 0.0                       | 15.6            | 0.0            | 2.6          | 120                                       |
| <b>Education</b>                   |                                      |                 |  |             |             |                    |                 |               |                           |                 |                |              |   |
| Illiterate                         | 47.3                                 | 721             | 22.8   | 93.8        | 2.7         | 2.0                | 2.0             | 1.1           | 0.0                       | 14.9            | 0.0            | 0.9          | 341                                       |
| Literate, < middle school complete | 80.0                                 | 378             | 25.1   | 93.5        | 7.3         | 16.0               | 14.7            | 1.7           | 0.0                       | 14.4            | 0.0            | 1.0          | 302                                       |
| Middle school complete             | 90.4                                 | 284             | 32.8   | 97.7        | 5.4         | 26.5               | 12.6            | 1.9           | 0.0                       | 12.0            | 0.0            | 0.4          | 257                                       |
| High school complete and above     | 97.1                                 | 1,093           | 44.4   | 98.7        | 20.1        | 60.2               | 32.1            | 3.1           | 0.8                       | 14.5            | 1.2            | 5.0          | 1,061                                     |
| <b>Religion</b>                    |                                      |                 |  |             |             |                    |                 |               |                           |                 |                |              |   |
| Hindu                              | 79.3                                 | 2,106           | 36.1   | 97.1        | 13.0        | 39.1               | 21.7            | 2.3           | 0.2                       | 14.1            | 0.6            | 2.7          | 1,670                                     |
| Muslim                             | 66.7                                 | 199             | 26.3   | 91.8        | 9.1         | 18.9               | 9.8             | 2.2           | 1.5                       | 12.5            | 0.0            | 3.1          | 133                                       |
| Sikh                               | 95.8                                 | 116             | 41.3   | 99.0        | 16.1        | 54.5               | 29.0            | 3.5           | 0.9                       | 14.6            | 0.9            | 6.2          | 111                                       |
| Other                              | 91.8                                 | 50              | (51.8)   | (97.9)      | (23.6)      | (49.8)             | (34.2)          | (2.1)         | (2.1)                     | (22.0)          | (2.1)          | (8.5)        | 46  |
| <b>Caste/tribe</b>                 |                                      |                 |  |             |             |                    |                 |               |                           |                 |                |              |   |
| Scheduled caste                    | 65.5                                 | 451             | 31.4   | 96.9        | 4.7         | 18.5               | 12.8            | 0.0           | 0.0                       | 13.5            | 0.0            | 1.4          | 295                                       |
| Other backward class               | 64.3                                 | 385             | 25.2   | 94.8        | 8.1         | 21.0               | 13.5            | 0.8           | 0.4                       | 10.5            | 0.0            | 1.2          | 248                                       |
| Other <sup>1</sup>                 | 86.5                                 | 1,616           | 38.9   | 97.3        | 15.9        | 46.4               | 24.9            | 3.2           | 0.5                       | 15.1            | 0.9            | 3.8          | 1,398                                     |
| <b>Standard of living index</b>    |                                      |                 |  |             |             |                    |                 |               |                           |                 |                |              |   |
| Low                                | 23.3                                 | 63              | *  | *           | *           | *                  | *               | *             | *                         | *               | *              | *            | 15  |
| Medium                             | 64.8                                 | 695             | 25.1   | 93.1        | 3.8         | 16.9               | 12.8            | 1.5           | 0.2                       | 15.7            | 0.2            | 1.1          | 451                                       |
| High                               | 87.5                                 | 1,638           | 39.2   | 98.2        | 16.0        | 45.8               | 24.3            | 2.6           | 0.5                       | 13.6            | 0.8            | 3.8          | 1,433                                     |
| <b>Exposure to mass media</b>      |                                      |                 |  |             |             |                    |                 |               |                           |                 |                |              |   |
| Exposed to any media               | 82.8                                 | 2,297           | 36.8   | 97.7        | 13.5        | 40.0               | 22.2            | 2.4           | 0.4                       | 13.6            | 0.6            | 3.2          | 1,902                                     |
| Listens to radio weekly            | 87.5                                 | 1,341           | 50.9   | 97.9        | 18.9        | 48.2               | 25.1            | 3.0           | 0.6                       | 14.6            | 0.9            | 4.2          | 1,174                                     |
| Watches television weekly          | 83.6                                 | 2,232           | 36.6   | 98.1        | 13.6        | 40.2               | 22.3            | 2.4           | 0.4                       | 13.2            | 0.7            | 3.2          | 1,865                                     |
| Goes to cinema/theatre monthly     | 95.0                                 | 358             | 51.9   | 97.1        | 36.9        | 62.2               | 38.2            | 6.4           | 1.8                       | 17.7            | 2.4            | 10.1         | 340                                       |
| Reads newspaper/magazine weekly    | 95.6                                 | 1,242           | 44.5   | 98.1        | 19.1        | 58.6               | 30.1            | 3.0           | 0.6                       | 14.6            | 1.0            | 4.4          | 1,188                                     |
| Not regularly exposed to any media | 33.3                                 | 180             | 15.3   | 69.9        | 3.5         | 1.6                | 3.5             | 3.4           | 0.0                       | 35.0            | 0.0            | 0.0          | 60  |
| <b>Total</b>                       | <b>79.2</b>                          | <b>2,477</b>    | <b>36.1</b>  | <b>96.9</b> | <b>13.2</b> | <b>38.8</b>        | <b>21.6</b>     | <b>2.4</b>    | <b>0.4</b>                | <b>14.2</b>     | <b>0.6</b>     | <b>3.1</b>   | <b>1,962</b>                              |

Note: Total includes small numbers of scheduled-tribe women and women with missing information on education, religion, caste/tribe, and the standard of living index, who are not shown separately.

( ) Based on 25-49 unweighted cases

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

<sup>1</sup>Not belonging to a scheduled caste, scheduled tribe, or other backward class

women (87 percent). The effect of media exposure on knowledge of AIDS is very strong. Only 33 percent of women who are not regularly exposed to any mass media have heard about AIDS, compared with 95 percent of women who go to the cinema/theatre at least monthly and 96 percent of women who read a newspaper or magazine at least weekly.

### **Source of Knowledge About AIDS**

As part of its AIDS prevention programme, the Government of India has been using mass media, especially electronic media, extensively to create awareness among the general public about AIDS and its prevention. NFHS-2 asked women who had heard of AIDS about their sources of AIDS information. Table 6.15 shows the percentage of ever-married women who have heard about AIDS from specific sources. Television, mentioned by 97 percent of the women, is by far the most important source of information about AIDS among ever-married women in Delhi. Other important sources of information about AIDS are radio (36 percent) and newspapers or magazines (39 percent). Only 2 percent report that they received information about AIDS from a health worker. Friends and relatives are an important source of AIDS information for women who are not regularly exposed to any media (35 per cent).

### **Knowledge of Ways to Avoid AIDS**

Respondents who had heard of AIDS were asked if a person can do anything to avoid becoming infected. Those who reported that something can be done were asked what a person can do to avoid AIDS. Table 6.16 shows the percentage of ever-married women who know of no way to avoid AIDS and the percentages who report that AIDS can be avoided in specific ways, by selected background characteristics.

Among women who have heard about AIDS, 24 percent do not know any way to avoid infection, compared with 34 percent for India as a whole. The proportion who do not know any way to avoid infection is considerably higher among Muslim women (40 percent) than among Hindu women (23 percent) or Sikh women (13 percent). Illiterate women are much more likely not to know a way (52 percent) than women who have completed at least high school (12 percent). The proportion not knowing a way also varies sharply by household standard of living. Women from scheduled castes and other backward classes are much more likely not to know any way to avoid infection than 'other' women. Women not regularly exposed to any media are much more likely not to know of any way to avoid infection than women who go the cinema/theatre at least monthly.

Among women who know of at least one way to avoid infection, the most commonly mentioned ways are having only one sex partner (54 percent), using condoms (52 percent), and avoiding injections or using clean needles (42 percent). Substantial proportions of respondents (17–30 percent) also mention avoiding blood transfusions, avoiding sex with commercial sex workers, and abstaining from sex completely. Only 7 percent of women mention avoiding sex with homosexuals as a way of avoiding AIDS, and even fewer women mention avoiding intravenous drug use. Level of education and household standard of living are positively associated with women mentioning almost every way of avoiding AIDS. The use of condoms as a way of avoiding AIDS is mentioned most often by women who have completed at least high school, women from households with a high standard of living, Sikh women, and women who are regularly exposed to cinema, print media, and radio broadcasts.

Table 6.16 Knowledge about avoidance of AIDS

Among ever-married women who have heard about AIDS, percentage who believe AIDS can be avoided in specific ways by selected background characteristics, Delhi, 1999

| Background characteristic          | Percentage who believe AIDS can be avoided by: |               |                             |  |                                |                             |   |                      |            | Knows no way to avoid AIDS | Number of women |
|------------------------------------|--|---------------|-----------------------------|--|--------------------------------|-----------------------------|---|----------------------|------------|----------------------------|-----------------|
|                                    | Abstaining from sex                            | Using condoms | Having only one sex partner | Avoiding sex with commercial sex workers | Avoiding sex with homo-sexuals | Avoiding blood transfusions | Avoiding injections/using clean needles | Avoiding IV drug use | Other ways |                            |                 |
| <b>Age</b>                         |  |               |                             |  |                                |                             |   |                      |            |                            |                 |
| 15–24                              | 14.8   | 49.9          | 49.6                        | 17.6                                     | 4.0                            | 26.8                        | 41.3                                    | 0.9                  | 4.2        | 28.6                       | 354             |
| 25–34                              | 18.0   | 52.6          | 57.4                        | 20.8                                     | 8.6                            | 33.8                        | 44.8                                    | 1.2                  | 2.2        | 22.4                       | 817             |
| 35–49                              | 18.1   | 52.4          | 53.4                        | 22.8                                     | 6.7                            | 28.1                        | 39.9                                    | 1.6                  | 6.1        | 22.9                       | 791             |
| <b>Residence</b>                   |  |               |                             |  |                                |                             |   |                      |            |                            |                 |
| Urban                              | 17.8   | 52.4          | 54.5                        | 20.8                                     | 7.0                            | 30.4                        | 41.9                                    | 1.4                  | 4.3        | 23.8                       | 1,842           |
| Rural                              | 12.8   | 47.0          | 53.2                        | 24.0                                     | 7.6                            | 28.3                        | 46.1                                    | 0.0                  | 0.8        | 23.1                       | 120             |
| <b>Education</b>                   |  |               |                             |  |                                |                             |   |                      |            |                            |                 |
| Illiterate                         | 7.7  | 23.4          | 34.1                        | 15.8                                     | 2.0                            | 9.8                         | 19.9                                    | 0.3                  | 2.0        | 52.2                       | 341             |
| Literate, < middle school complete | 13.7   | 39.5          | 42.0                        | 14.6                                     | 4.6                            | 20.9                        | 31.7                                    | 0.3                  | 3.9        | 33.7                       | 302             |
| Middle school complete             | 15.9   | 48.5          | 50.2                        | 15.0                                     | 4.6                            | 22.4                        | 38.2                                    | 0.8                  | 2.7        | 25.0                       | 257             |
| High school complete and above     | 22.0   | 65.6          | 65.4                        | 25.9                                     | 9.8                            | 41.4                        | 53.3                                    | 2.1                  | 5.2        | 11.5                       | 1,061           |
| <b>Religion</b>                    |  |               |                             |  |                                |                             |   |                      |            |                            |                 |
| Hindu                              | 17.1   | 52.4          | 55.4                        | 21.2                                     | 6.6                            | 30.0                        | 42.4                                    | 1.3                  | 4.0        | 23.2                       | 1,670           |
| Muslim                             | 14.4   | 35.5          | 37.7                        | 14.2                                     | 6.0                            | 23.5                        | 34.1                                    | 1.5                  | 1.5        | 40.2                       | 133             |
| Sikh                               | 27.8   | 63.1          | 59.6                        | 22.5                                     | 10.8                           | 36.2                        | 47.1                                    | 0.8                  | 6.1        | 12.6                       | 111             |
| Other                              | (15.1)   | (60.8)        | (55.9)                      | (32.5)                                   | (17.2)                         | (43.1)                      | (47.6)                                  | (2.1)                | (8.8)      | (19.5)                     | 46              |
| <b>Caste/tribe</b>                 |  |               |                             |  |                                |                             |   |                      |            |                            |                 |
| Scheduled caste                    | 15.1   | 37.1          | 44.5                        | 15.6                                     | 2.7                            | 19.1                        | 28.4                                    | 0.3                  | 1.7        | 38.1                       | 295             |
| Other backward class               | 14.5   | 44.0          | 46.9                        | 15.4                                     | 7.2                            | 27.2                        | 40.8                                    | 0.8                  | 2.0        | 31.5                       | 248             |
| Other <sup>1</sup>                 | 18.7   | 56.8          | 57.9                        | 23.1                                     | 7.9                            | 33.4                        | 45.4                                    | 1.7                  | 4.9        | 19.3                       | 1,398           |
| <b>Standard of living index</b>    |  |               |                             |  |                                |                             |   |                      |            |                            |                 |
| Medium                             | 11.1   | 34.0          | 39.6                        | 17.1                                     | 4.2                            | 16.8                        | 27.8                                    | 0.0                  | 2.0        | 41.7                       | 451             |
| High                               | 19.3   | 58.0          | 58.7                        | 22.4                                     | 8.1                            | 34.9                        | 47.0                                    | 1.8                  | 4.7        | 18.1                       | 1,433           |
| <b>Exposure to mass media</b>      |  |               |                             |  |                                |                             |   |                      |            |                            |                 |
| Exposed to any media               | 17.8   | 52.9          | 54.8                        | 21.1                                     | 7.2                            | 30.7                        | 42.9                                    | 1.4                  | 4.2        | 23.0                       | 1,902           |
| Listens to radio weekly            | 20.6   | 61.1          | 56.1                        | 23.3                                     | 8.8                            | 31.7                        | 46.8                                    | 2.1                  | 5.7        | 18.2                       | 1,174           |
| Watches television weekly          | 18.0   | 53.2          | 55.0                        | 21.2                                     | 7.2                            | 30.9                        | 43.1                                    | 1.4                  | 4.2        | 22.7                       | 1,865           |
| Goes to cinema/theatre monthly     | 26.1   | 69.6          | 60.3                        | 28.3                                     | 13.3                           | 36.5                        | 52.5                                    | 3.9                  | 6.1        | 12.3                       | 340             |
| Reads newspaper/magazine weekly    | 21.6   | 65.5          | 62.2                        | 25.2                                     | 9.9                            | 38.5                        | 52.3                                    | 2.0                  | 5.6        | 13.6                       | 1,188           |
| Not regularly exposed to any media | 5.2  | 23.7          | 41.7                        | 17.2                                     | 1.8                            | 15.1                        | 19.8                                    | 0.0                  | 1.6        | 48.0                       | 60              |
| <b>Total</b>                       | 17.4   | 52.0          | 54.4                        | 21.0                                     | 7.0                            | 30.2                        | 42.2                                    | 1.3                  | 4.1        | 23.7                       | 1,962           |

Note: Total includes 18 scheduled-tribe women, 15 women from households with a low standard of living index, and 1, 2, 3, and 63 women with missing information on education, religion, caste/tribe, and the standard of living index, respectively, who are not shown separately.

( ) Based on 25–49 unweighted cases

<sup>1</sup>Not belonging to a scheduled caste, scheduled tribe, or other backward class

## 6.8 Lead Levels Among Children

Lead is a toxicant that affects virtually every system in the body (Centers for Disease Control and Prevention, 1991). It is particularly harmful to the developing brain and the central nervous system of young children. High levels of lead in the blood ( $\geq 80.0$  micrograms/decilitre) can cause severe brain damage or death. Even relatively low blood lead levels (as low as  $10.0 \mu\text{g}/\text{dl}$ ) decrease intelligence and the ability to learn. Lead poisoning also contributes to anaemia, decreases growth, and causes hearing impairment.

Childhood lead poisoning is thought to be widespread in India. Although few studies have been conducted, previous research indicates that more than half of young children in India may have blood lead levels  $\geq 10.0 \mu\text{g}/\text{dl}$  (George Foundation, 1999). Blood lead levels above  $10.0 \mu\text{g}/\text{dl}$  indicate a potentially serious medical condition. Recognizing the threat that widespread lead exposure poses for the nation's physical and economic health, the Government of India has made a commitment to phase out the use of leaded petrol throughout the country. The sale of leaded petrol was banned in Delhi starting from 1 September 1998 (before the NFHS-2 fieldwork) and in the whole National Capital Region of Delhi starting from 1 September 1999 (after the NFHS-2 fieldwork). However, even after those deadlines, a considerable amount of leaded petrol continued to be burned by vehicles in Delhi, especially by trucks that are fueled up outside the city. The use of unleaded and low-leaded petrol was made mandatory throughout India on 1 April 2000.

Many other lead exposure sources besides petrol are also common in India, including uncontrolled industrial emissions, cottage industries (e.g., battery recycling, papier mache-making, and jewellery-making), traditional medicines that include heavy metals, cosmetics used by women and children, and home flour mills with leaded grinding wheels (Tandon, 1999; Shah et al., 1991; Dunbadin et al., 1992; Gogte et al., 1991; Kachru et al., 1989; Wahid et al., 1997).

In Delhi and Mumbai, NFHS-2 included an additional test for lead in the blood, administered to children under three years of age. The test was done in the field, using approximately 2–3 drops of capillary blood ( $50 \mu\text{l}$ ) taken just after a single drop of blood was taken for the anaemia test, using the same finger prick or heel prick. Before any blood was taken, an expanded informed consent statement was read to the child's mother requesting her consent for the child to receive both the anaemia test and the lead test. If she agreed to the lead test, the child's hands were first washed thoroughly with soap and water before the blood was taken. The blood for the lead test was mixed with a treatment reagent. The blood and reagent mixture was then transferred to a sensor using a pipette and the sensor was introduced into a LeadCare analyzer. In three minutes, the test results were displayed digitally by the analyzer. The mothers were given the results of the test in the field right after the test was completed and the results were explained to them in simple terms. Arrangements were made to provide free medical treatment for any child with a lead level of at least  $45 \mu\text{g}/\text{dl}$ , but that level of lead poisoning was detected in only one child, who was immediately referred for medical treatment.

To ensure that the LeadCare analyzer performed well under Indian conditions, a validation study of the LeadCare analyzer was carried out by the All India Institute of Medical Sciences, New Delhi, and the Industrial Toxicology Research Centre, Lucknow, before NFHS-2 lead testing was undertaken. Blood samples were collected from 79 subjects, and each sample was analyzed under controlled conditions in the laboratory first using the established technique

of Graphite Furnace Atomic Absorption Spectrophotometry (GFAAS) and then using the LeadCare instrument. The validation study concluded that the LeadCare analyzer can be utilized for estimation of lead levels in the field in India (All India Institute of Medical Sciences, 1999).

Table 6.17 shows the percent distribution of children under three years of age by lead level in the blood. Overall, 45 percent of children in Delhi have elevated levels of lead in their blood (10 µg/dl or higher), including 10 percent who have a level of 20 µg/dl or higher and 0.2 percent who have a level of 45 µg/dl or higher.<sup>3</sup> The proportion with a lead level of 10 µg/dl or higher varies by background characteristics. By age, it varies from 34 percent of children under 12 months of age to 53 percent of children age 24–35 months, possibly reflecting the cumulative effects of exposure to lead over time as well as the fact that younger children are less likely to be exposed to lead outside of the home. The likelihood of having elevated blood lead levels increases sharply with birth order (probably because children of higher birth order come disproportionately from poorer families that tend to live in more polluted environments) and declines substantially with the mother's education. It also declines substantially with standard of living, from 74 percent for children in households with a low standard of living to 39 percent for children in households with a high standard of living. It does not vary much by caste/tribe, child's anaemia status, or child's breastfeeding status. Type of cooking fuel, on the other hand, makes a big difference. The proportion with a lead level of 10 µg/dl or higher varies from 40 percent of children in households that use liquid petroleum gas as the main cooking fuel to 62 percent of children in households that use kerosene, probably reflecting the greater use of liquid petroleum gas among more well-to-do households that tend to be located in less polluted areas of the city. Despite these differentials, the high prevalence of elevated lead levels in all subgroups of young children clearly indicates that lead in the environment, especially in the poorer areas of Delhi, is a serious public health problem requiring government action.

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<sup>3</sup>By way of comparison, a slightly higher percentage of children in Mumbai have lead levels of 10 µg/dl or higher (50 percent), but a slightly lower percentage (8 percent) have levels of 20 µg/dl or higher.

**Table 6.17 Lead levels among children**

Percent distribution of children under three years of age by lead level in the blood, according to selected background characteristics, Delhi, 1999

| Background characteristic            | Percent of children with specific levels of lead in their blood |                 |                 |                 | Total percent | Number of children |
|--------------------------------------|---|-----------------|-----------------|-----------------|---------------|--------------------|
|                                      | Less than 10.0 µg/dL  | 10.0–19.9 µg/dL | 20.0–44.9 µg/dL | 45.0–65.0 µg/dL |               |                    |
| <b>Age of child</b>                  |   |                 |                 |                 |               |                    |
| < 12 months                          | 65.9  | 28.7            | 5.4             | 0.0             | 100.0         | 197                |
| 12–23 months                         | 52.4  | 35.7            | 11.9            | 0.0             | 100.0         | 212                |
| 24–35 months                         | 46.8  | 41.0            | 11.7            | 0.5             | 100.0         | 215                |
| <b>Sex of child</b>                  |   |                 |                 |                 |               |                    |
| Male                                 | 56.2  | 33.6            | 10.2            | 0.0             | 100.0         | 362                |
| Female                               | 52.7  | 37.8            | 9.1             | 0.4             | 100.0         | 262                |
| <b>Birth order</b>                   |   |                 |                 |                 |               |                    |
| 1                                    | 60.9  | 29.5            | 9.1             | 0.5             | 100.0         | 199                |
| 2–3                                  | 55.3  | 34.2            | 10.5            | 0.0             | 100.0         | 308                |
| 4–5                                  | 49.3  | 42.0            | 8.7             | 0.0             | 100.0         | 88                 |
| 6+                                   | (23.8)  | (66.4)          | (9.8)           | (0.0)           | 100.0         | 30                 |
| <b>Mother's education</b>            |   |                 |                 |                 |               |                    |
| Illiterate                           | 43.1  | 48.9            | 8.0             | 0.0             | 100.0         | 176                |
| Literate, < middle school complete   | 50.4  | 36.8            | 11.8            | 1.0             | 100.0         | 105                |
| Middle school complete               | 56.1  | 36.2            | 7.7             | 0.0             | 100.0         | 86                 |
| High school complete and above       | 64.1  | 25.1            | 10.8            | 0.0             | 100.0         | 256                |
| <b>Religion</b>                      |   |                 |                 |                 |               |                    |
| Hindu                                | 55.9  | 33.7            | 10.2            | 0.2             | 100.0         | 507                |
| Muslim                               | 43.0  | 49.2            | 7.8             | 0.0             | 100.0         | 79                 |
| Sikh                                 | (55.9)  | (33.0)          | (11.2)          | (0.0)           | 100.0         | 27                 |
| <b>Caste/tribe</b>                   |   |                 |                 |                 |               |                    |
| Scheduled caste                      | 51.4  | 36.6            | 12.0            | 0.0             | 100.0         | 137                |
| Other backward class                 | 57.3  | 35.8            | 6.0             | 0.9             | 100.0         | 117                |
| Other <sup>1</sup>                   | 55.5  | 34.3            | 10.2            | 0.0             | 100.0         | 366                |
| <b>Standard of living index</b>      |   |                 |                 |                 |               |                    |
| Low                                  | (26.6)  | (61.9)          | (11.6)          | (0.0)           | 100.0         | 33                 |
| Medium                               | 49.0  | 42.8            | 7.7             | 0.5             | 100.0         | 200                |
| High                                 | 60.5  | 29.0            | 10.4            | 0.0             | 100.0         | 380                |
| <b>Child's anaemia status</b>        |   |                 |                 |                 |               |                    |
| Not anaemic                          | 56.5  | 31.5            | 11.4            | 0.6             | 100.0         | 191                |
| Mildly anaemic                       | 58.3  | 31.1            | 10.6            | 0.0             | 100.0         | 138                |
| Moderately anaemic                   | 53.7  | 38.3            | 8.0             | 0.0             | 100.0         | 271                |
| <b>Main type of cooking utensils</b> |   |                 |                 |                 |               |                    |
| Aluminium                            | (42.0)  | (49.6)          | (8.5)           | (0.0)           | 100.0         | 48                 |
| Stainless steel                      | 55.8  | 34.1            | 9.9             | 0.2             | 100.0         | 574                |
| <b>Main type of cooking fuel</b>     |   |                 |                 |                 |               |                    |
| Kerosene                             | 38.1  | 51.9            | 9.2             | 0.8             | 100.0         | 129                |
| Liquid petroleum gas                 | 60.6  | 29.5            | 9.9             | 0.0             | 100.0         | 456                |
| <b>Breastfeeding status</b>          |   |                 |                 |                 |               |                    |
| Currently breastfeeding              | 55.5  | 37.2            | 7.0             | 0.3             | 100.0         | 379                |
| Breastfed only in the past           | 52.6  | 33.0            | 14.5            | 0.0             | 100.0         | 211                |
| <b>Total</b>                         | <b>54.7</b>   | <b>35.3</b>     | <b>9.8</b>      | <b>0.2</b>      | <b>100.0</b>  | <b>624</b>         |

Note: Total includes 6 children belonging to other religions, 4 scheduled-tribe children, 23 children who are severely anaemic, 1 child belonging to a household using brass/copper as main cooking utensils, 17, 1, 10, 2, 3, 5, and 1 child belonging to a household using wood, crop residues, dung cakes, coal/coke/lignite, charcoal, electricity, and bio-gas, respectively, as the main type of cooking fuel, 17 children who have never been breastfed, and 5, 11, and 11 children with missing information on religion, standard of living index, and breastfeeding status, respectively, who are not shown separately.  
 ( ) Based on 25–49 unweighted cases  
<sup>1</sup>Not belonging to a scheduled caste, scheduled tribe, or other backward class.