

CHAPTER 1

INTRODUCTION

1.1 Background of the Survey

India's first National Family Health Survey (NFHS-1) was conducted in 1992–93 (International Institute for Population Sciences, 1995). The Ministry of Health and Family Welfare (MOHFW) subsequently designated the International Institute for Population Sciences (IIPS), Mumbai, as the nodal agency to initiate a second survey (NFHS-2), which was conducted in 1998–99. An important objective of NFHS-2 is to provide state-level and national-level information on fertility, family planning, infant and child mortality, reproductive health, child health, nutrition of women and children, and the quality of health and family welfare services. Another important objective is to examine this information in the context of related socioeconomic and cultural factors. The survey is also intended to provide estimates at the regional level for five states (Bihar, Jammu and Kashmir, Madhya Pradesh, Rajasthan, and Uttar Pradesh) and estimates for three metro cities (Chennai, Kolkata, and Mumbai), as well as slum areas in Mumbai. This information will assist policymakers and programme administrators in planning and implementing strategies for improving population, health, and nutrition programmes. Comparative state results from NFHS-2 have already been published (International Institute for Population Sciences and ORC Macro, 2000). The current report provides a more comprehensive picture of the findings for Delhi.

The NFHS-2 national sample covers more than 99 percent of India's population living in all 26 states. It does not cover the union territories. NFHS-2 is a household sample survey with an overall sample size of 90,303 ever-married women in the age group 15–49 living in 92,486 households.

NFHS-2 was conducted with financial support from the United States Agency for International Development (USAID), with additional funding from UNICEF. Technical assistance was provided by ORC Macro, Calverton, Maryland, USA, and the East-West Center, Honolulu, Hawaii, USA. Thirteen field organizations were selected to collect the data. Eight of the field organizations are private-sector organizations and five are Population Research Centres (PRCs) established by the Government of India in various states. Each field organization had responsibility for collecting the data in one or more states. The Population Research Centre, Institute of Economic Growth, Delhi, was selected as the field organization for NFHS-2 in Delhi.

1.2 Basic Socioeconomic and Demographic Features of Delhi

In recent decades, Delhi, which is not only a state but also the capital city of the country, has grown rapidly, both in population and economically, and it has become a major industrial and trading centre. Very rapid population growth, due to large flows of rural migrants into the city, has led to increasing numbers of population in slum settlements characterized by unhygienic conditions due to insufficient sewerage and potable water as well as considerable in-house air pollution due to polluting biomass fuels (wood and dung) used for cooking in poorly ventilated huts.

Despite the rise of slums, Delhi's per capita net state domestic product (NSDP) increased from Rs. 4,030 in 1980–81 to Rs. 6,049 in 1995–96 at 1980–81 prices and to Rs. 19,779 at current prices—almost double the all-India value of Rs. 9,725 (EPW Research Foundation, 1998). Since 1980–81, the share of the other/tertiary sector in Delhi's NSDP has been fairly constant, ranging between 75–78 percent. The manufacturing sector's contribution to Delhi's NSDP, however, has increased from 18 percent in 1980–81 to 22 percent in 1995–96. During the same period, the share of agriculture declined from 4 percent to 0.7 percent.

Delhi's population was 4.1 million in 1971, 6.2 million in 1981, 9.4 million in 1991, and 13.4 million in 2001, implying decadal growth rates of 53 percent during 1961–71, 53 percent during 1971–81, 51 percent during 1981–91, and 46 percent during 1991–2001. Thus, population growth, though still very rapid, is decelerating. Delhi's population growth rate is approximately double that for all-India.

Delhi has total land area of 1,483 square kilometres. Its population density in 2001 was 9,294 persons per square kilometre, compared with 324 for all India. Delhi's population density has increased by almost three and a half times since 1971. Some consequences have been proliferating slum settlements, skyrocketing rental values, greatly increased vehicular traffic, haphazard sprawl of industrial units, increasing solid and semi-solid wastes, and increasing air and water pollution. The proportion of population living in urban areas of Delhi was 93 percent in 1981, then declined slightly to 90 percent in 1991, and again increased to 93 percent in 2001.

The proportion of population that is from scheduled castes is slightly higher in Delhi (19 percent) than in all India (17 percent). The proportion from scheduled castes increased from 16 percent in 1971 to 18 percent in 1981 and 19 percent in 1991. The proportion of population that is from scheduled tribes is negligible in Delhi.

Educational levels are much higher in Delhi than in all India. According to the 2001 Census, the literacy rate among the population age 7 and over is 82 percent, compared with 65 percent for India as a whole. The literacy rate is 87 percent for males and 75 percent for females in Delhi, compared with 76 percent for males and 54 percent for females in India as a whole.

In 1999, the Sample Registration System estimated the infant mortality rate in Delhi at 31 per 1,000 live births, which is much lower than the rate of 70 for all India. The sex ratio of the population (number of females per 1,000 males) in Delhi increased slightly from 801 in 1971 to 808 in 1981 and 827 in 1991, and then declined slightly to 821 in 2001. The proportion of the population age 0–14 years was 39 percent in 1971, 36 percent in 1981, and 35 percent in 1991. The proportion of the population age 65 and over has been fairly stable at around 2.5 percent in the population censuses since 1971.

According to official figures, the couple protection rate (defined as the percentage of eligible couples effectively protected against pregnancy by various methods of contraception) in Delhi increased steadily from 19 percent in 1971 to 35 percent in 1981 and 40 percent in 1991, but then declined to 30 percent in 1998—much lower than the rate of 45 percent for all India in 1998. As will be seen later in this report, NFHS-2 yields an estimated contraceptive prevalence rate that is considerably higher.

Between 1971 and 1999, fertility declined substantially in Delhi. According to estimates from the Sample Registration System, the crude birth rate declined from 34 per 1,000 population in 1971 to 27 in 1981, 24 in 1990, and 20 in 1999.

The crude death rate for Delhi has declined steadily since 1971. It has declined from 7.6 in 1971 to 7.1 in 1981, 6.2 in 1990, and 4.8 in 1999. The infant mortality rate, defined as deaths under 12 months of age per 1,000 live births, declined from 75 in 1981 to 31 in 1999. The decline in the infant mortality rate has been much steeper in Delhi than in India as a whole.

1.3 Questionnaires

NFHS-2 used three types of questionnaires: the Household Questionnaire, the Woman's Questionnaire, and the Village Questionnaire. The overall content and format of the questionnaires were determined through a series of workshops held at IIPS in Mumbai in 1997 and 1998. The workshops were attended by representatives of a wide range of organizations in the population and health fields, as well as experts working on gender issues. The questionnaires in Delhi were bilingual, with questions in both Hindi and English.

The Household Questionnaire listed all usual residents in each sample household plus any visitors who stayed in the household the night before the interview. For each listed person, the survey collected basic information on age, sex, marital status, relationship to the head of the household, education, and occupation. The Household Questionnaire also collected information on the prevalence of asthma, tuberculosis, malaria, and jaundice, as well as three risk behaviors—chewing *paan masala* or tobacco, drinking alcohol, and smoking. Information was also collected on the usual place where household members go for treatment when they get sick, the main source of drinking water, type of toilet facility, source of lighting, type of cooking fuel, religion of the household head, caste/tribe of the household head, ownership of a house, ownership of agricultural land, ownership of livestock, and ownership of other selected items. In addition, a test was conducted to assess whether the household uses cooking salt that has been fortified with iodine. Finally, the Household Questionnaire asked about deaths occurring to household members in the two years preceding the survey, with particular attention to maternal mortality. The information on the age, sex, and marital status of household members was used to identify eligible respondents for the Woman's Questionnaire.

The Woman's Questionnaire collected information from ever-married women age 15–49 who were usual residents of the sample household or visitors who stayed in the sample household the night before the interview. The questionnaire covered the following topics:

Background characteristics: Questions on age, marital status, education, employment status, and place of residence provide information on characteristics likely to influence demographic and health behavior. Questions are also asked about the background characteristics of a woman's husband.

Reproductive behavior and intentions: Questions cover dates and survival status of all births, current pregnancy status, and future childbearing intentions of each woman.

Quality of care: Questions assess the quality of family planning and health services.

Knowledge and use of contraception: Questions cover knowledge and use of specific family planning methods. For women not using family planning, questions are included on reasons for not using contraception and intentions concerning future use.

Sources of family planning: Questions determine where a user obtained her family planning method.

Antenatal, delivery, and postpartum care: The questionnaire collects information on whether women received antenatal and postpartum care, who attended the delivery, and the nature of complications during pregnancy for the last two births since January 1996.

Breastfeeding and health: Questions cover feeding practices, the length of breastfeeding, immunization coverage, and recent occurrences of diarrhoea, fever, and cough for young children.

Reproductive health: Questions assess various aspects of women's reproductive health and the type of care sought for health problems.

Status of women: The questionnaire asks about gender roles, women's autonomy, and violence against women.

Knowledge of AIDS: Questions assess women's knowledge of AIDS and the sources of their knowledge, as well as their knowledge about ways to avoid getting AIDS.

In addition, the health investigator on each survey team measured the height and weight of each woman and each of her children born since January 1996. This height and weight information is useful for assessing levels of nutrition prevailing in the population. The health investigators also took blood samples from each woman and each of her children born since January 1996, to assess haemoglobin levels. This information is useful for assessing prevalence rates of anaemia among women and children. Haemoglobin levels were measured in the field at the end of each interview using portable equipment (the HemoCue) that provides test results in less than one minute. Severely anaemic women and children were referred to local medical authorities for treatment.

For each village selected in the NFHS-2 sample, the Village Questionnaire collected information on the availability of various facilities in the village (especially health and education facilities) and amenities such as electricity and telephone connections. Respondents to the Village Questionnaire were also asked about development and welfare programmes operating in the village. The village survey included a short, open-ended questionnaire that was administered to the village head, with questions on major problems in the village and actions that could be taken to alleviate the problems.

1.4 Survey Design and Sample Implementation

Sample Size and Reporting Domains

The overall target sample size for Delhi was 3,000 completed interviews with eligible women. The NFHS-1 nonresponse rates at the household and individual levels were used to estimate the sample size that would be required to achieve the target number of completed interviews in NFHS-2.

The sample was designed to provide estimates for Delhi as a whole and for its urban and rural areas separately. The required sampling fractions for urban and rural areas were determined by allocating the sample proportionally to the population of the two areas and taking into account their expected nonresponse rates (based on nonresponse rates of NFHS-1).

Sample Design

Within each of the two sampling domains (urban and rural areas), a systematic, multi-stage stratified sampling design was employed. In urban areas, a three-stage sampling procedure was followed. In the first stage, wards were selected with probability proportional to size (PPS). From each selected ward, one census enumeration block (CEB) was selected with PPS in the second stage, followed by selection of households using systematic sampling within each selected CEB in the third stage. In rural areas, again a three-stage sampling procedure was followed. In the first stage, the 1991 Census list of villages served as the sampling frame. The first level of stratification was geographic, with villages classified into two strata with contiguity being the inbuilt criterion for stratification. Within each stratum, villages were further stratified by population size of village (obtained from 1991 Census Village Directory) and level of female literacy as an implicit stratification variable. From the list so arranged, villages were selected with probability proportional to the 1991 Census population of the villages. Small villages were linked together to form rural PSUs of a certain minimum size. Also, sample villages with more than 600 households were segmented and two segments per village were selected using the PPS method. Thereby the households were selected using a systematic sampling procedure within each selected rural PSU.

Sample Selection in Rural Areas

In rural areas, the 1991 Census list of villages served as the sampling frame. The villages were stratified into two strata with contiguity being the inbuilt criterion. At the second stage, the villages or group of villages (in the case of small linked villages) were selected as PSUs with probability proportional to size (PPS). The selection of households at the third stage was done by systematic sampling. Table 1.1 provides details of the sample stratification in rural areas along with the population of each stratum.

The domain sampling fraction, i.e., the probability of selecting a woman (f) in rural Delhi, was computed as:

$$f = \frac{n}{N}$$

Table 1.1 Sampling stratification		
Sampling stratification procedure in rural areas, Delhi		
Stratum	Stratification variables	
	Village size (population)	Population ¹
1	≤ 9,500	479,052
2	> 9,500	469,938
Total	NA	948,990
Note: The level of female literacy is used for implicit stratification. NA: Not applicable ¹ The population shown is the 1991 Census population, excluding persons living in villages with fewer than five households.		

where n = number of rural women to be interviewed (after upward adjustment to account for nonresponse and other loss),

N = projected rural population of eligible women in Delhi in May 1999.

The probability of selecting a PSU from rural Delhi (f_i) was computed as:

$$f_i = \frac{a \times s_i}{\sum s_i}$$

where a = number of rural PSUs to be selected from Delhi,

s_i = population size of the i^{th} PSU,

$\sum s_i$ = total rural population of Delhi.

A mapping and household listing operation carried out in each sample area provided the necessary frame for selecting households. The household listing operation involved preparing up-to-date notional and layout sketch maps of each selected PSU, assigning numbers to structures, recording addresses of these structures, identifying residential structures, and listing the names of heads of all the households in residential structures in the selected PSUs. Sample villages larger than 600 households were segmented into three or more segments, and two segments were selected randomly using the PPS method. The household listing in these PSUs was carried out only in the selected segments. The work was carried out by five teams, each comprising one lister and one mapper, under the supervision of one field supervisor and one field executive. The teams were trained from 18–20 January 1999 in Delhi by an official from the Population Research Centre, who was earlier trained in a workshop conducted by IIPS. The mapping and household listing operation was carried out from 21 January to 17 February 1999.

The probability of selecting a household from a selected rural PSU (f_2) was computed as:

$$f_2 = \frac{f}{f_1}$$

On average, 30 households were targeted for selection in each selected enumeration area. To avoid extreme variations in the workload, minimum and maximum limits were put on the

number of households that could be selected from any area, at 15 and 60, respectively. All the selected households were visited during the main survey, and no replacement was made if a selected household was absent during data collection.

Sample Selection in Urban Areas

The 1991 Census list of urban wards in each of the five major regions was arranged according to districts and within districts by the level of female literacy, and a sample of wards was selected systematically with probability proportional to population size. Next, one census enumeration block, consisting of approximately 150–200 households, was selected from each selected ward using the PPS method. As in rural areas, a household listing operation was carried out in the selected CEBs and, on average, 30 households per block were targeted for selection.

The domain sampling fraction, i.e., the probability of selecting a woman in urban Delhi (f), was computed as:

$$f = \frac{n}{N}$$

where n = number of urban women to be interviewed (after upward adjustment to account for nonresponse and other loss),

N = projected urban population of eligible women in Delhi in May 1999.

The probability of selecting an urban ward (f_1) was computed as:

$$f_1 = \frac{a \times s_i}{\sum s_i}$$

where a = number of wards selected from the domain,
 s_i = population size of the i^{th} ward in the domain,
 $\sum s_i$ = total population of the domain.

The probability of selecting a census enumeration block from a selected ward (f_2) was computed as:

$$f_2 = \frac{B_i}{\sum B_i}$$

where B_i = population size of the i^{th} block,
 $\sum B_i$ = total population of the ward.

A household listing operation carried out in each selected census enumeration block provided the necessary frame for selecting households in the third stage of sample selection. The probability of selecting a household from a selected CEB (f_3) was computed as:

$$f_3 = \frac{f}{f_1 \times f_2}$$

Sample Weights

Sample weights for households and women are based on design weights, adjusted for the effect of differential nonresponse in different geographical areas. The method of calculating the weights is specified below.

Let R_{Hi} and R_{Wi} be the response rates for households and eligible women, respectively. Then the household weight (w_{Hi}) is calculated as follows:

$$w_{Hi} = \frac{w_{Di}}{R_{Hi}}$$

where w_{Di} = the design weight for the i^{th} domain, calculated as the ratio of the overall sampling fraction ($F = n/N$) and the sampling fraction for the i^{th} domain ($f = n_i/N_i$). Note that $n = \sum n_i$ and $N = \sum N_i$.

The eligible woman's weight (w_{Wi}) is calculated as follows:

$$w_{Wi} = \frac{w_{Di}}{R_{Hi} \times R_{Wi}}$$

After adjustment for nonresponse, the weights are normalized so that the total number of weighted cases is equal to the total number of unweighted cases. The final weights for households and eligible women are:

$$W_{Hi} = \frac{\sum n_i}{\sum w_{Hi} \times n_i} \times w_{Hi}$$

$$W_{Wi} = \frac{\sum n_i}{\sum w_{Wi} \times n_i} \times w_{Wi}$$

where n_i refers to the actual number of cases (households or eligible women) interviewed in the i^{th} domain.

For the tabulations on anaemia and height/weight of women and children, two separate sets of weights were calculated using a similar procedure. In this case, however, the response rates for anaemia (for both women and children) are based on the percentage of eligible women whose haemoglobin level was measured, and the response rates for height/weight (for both women and children) are based on the percentage of eligible women whose height or weight was measured.

Sample Implementation

A total of 100 PSUs were selected for the sample, of which 90 (90 percent) were urban and 10 (10 percent) were rural. Table 1.2 shows response rates for households and individuals and reasons for nonresponse. Nonresponse can occur at the stage of the household interview or at the stage of the woman's interview. The last row of the table shows the overall effect of nonresponse at the two stages. The survey achieved an overall response rate of 82.9 percent (82.6 percent in urban areas and 87.5 percent in rural areas).

Table 1.2 Sample results						
Sample results for households and ever-married women age 15–49 by residence, Delhi, 1999						
Result	Urban		Rural		Total	
	Number	Percent	Number	Percent	Number	Percent
Households selected	2,847	100.0	216	100.0	3,063	100.0
Households completed (C)	2,564	90.1	199	92.1	2,763	90.2
Households with no household member at home or no competent respondent at home at the time of interview (HP)	184	6.5	14	6.5	198	6.5
Households absent for extended period (HA)	14	0.5	0	0.0	14	0.5
Households postponed (P)	1	0.0	0	0.0	1	0.0
Households refused (R)	58	2.0	2	0.9	60	2.0
Dwelling vacant/address not a dwelling (DV)	18	0.6	1	0.5	19	0.6
Dwelling destroyed (DD)	2	0.1	0	0.0	2	0.1
Dwelling not found (DNF)	3	0.1	0	0.0	3	0.1
Other (O)	3	0.1	0	0.0	3	0.1
Households occupied	2,810	100.0	215	100.0	3,025	100.0
Households interviewed	2,564	91.2	199	92.6	2,763	91.3
Households not interviewed	246	8.8	16	7.4	262	8.7
Household response rate (HRR) ¹	NA	91.2	NA	92.6	NA	91.3
Eligible women	2,527	100.0	201	100.0	2,728	100.0
Women interviewed (EWC)	2,287	90.5	190	94.5	2,477	90.8
Women not at home (EWNH)	202	8.0	10	5.0	212	7.8
Women postponed (EWP)	1	0.0	0	0.0	1	0.0
Women refused (EWR)	27	1.1	0	0.0	27	1.0
Women partly interviewed (EWPC)	4	0.2	1	0.5	5	0.2
Other (EWO)	6	0.2	0	0.0	6	0.2
Eligible women's response rate (EWRR) ²	NA	90.5	NA	94.5	NA	90.8
Overall response rate (ORR) ³	NA	82.6	NA	87.5	NA	82.9

Note: Eligible women are defined as ever-married women age 15–49 who stayed in the household the night before the interview (including both usual residents and visitors). This table is based on the unweighted sample; all other tables are based on the weighted sample unless otherwise specified.

NA: Not applicable

¹Using the number of households falling into specific response categories, the household response rate (HRR) is calculated as:

$$\text{HRR} = \frac{C}{C + \text{HP} + \text{P} + \text{R} + \text{DNF}} \times 100$$

²Using the number of eligible women falling into specific response categories, the eligible women' response rate (EWRR) is calculated as:

$$\text{EWRR} = \frac{\text{EWC}}{\text{EWC} + \text{EWNH} + \text{EWP} + \text{EWR} + \text{EWPC} + \text{EWO}} \times 100$$

³The overall response rate (ORR) is calculated as:

$$\text{ORR} = \frac{\text{HRR} \times \text{EWRR}}{100}$$

Of the 3,063 households selected in Delhi, interviews were completed in 90 percent of cases, 6.5 percent of the selected households had no household member or no competent respondent was at home at the time of interview, and 0.5 percent of the selected households were absent for an extended period (Table 1.2). The household response rate—the number of households interviewed per 100 occupied households—was 91 percent.

In the interviewed households, 2,728 women were identified as eligible for the individual interview. Interviews were successfully completed with 91 percent of the eligible women. Nonresponse at the individual level was primarily due to eligible women not being at home despite repeated household visits (8 percent). One percent of eligible women refused to be interviewed.

1.5 Recruitment, Training, and Fieldwork

Field staff for the main survey were trained at the Population Research Centre (PRC), Institute of Economic Growth, New Delhi, by faculty members of the PRC, who were trained earlier in a Training of Trainers Workshop conducted by IIPS. The training in Delhi consisted of classroom training, general lectures, and demonstration and practice interviews, as well as actual field practice and additional training for field editors and supervisors. The classroom training included instructions in interviewing techniques and survey field procedures, a detailed review of each item in the questionnaires, instruction and practice in weighing and measuring women and children, and mock interviews between participants. Special guest lectures on family planning and on reproductive and child health were also arranged. Health investigators attached to interviewing teams were given additional specialized training on measuring height and weight and anaemia and on lead testing in a centralized training programme conducted by the All India Institute of Medical Sciences (AIIMS), New Delhi, in collaboration with IIPS. This specialized training took place in Mumbai. It included classroom training and extensive field practice in schools, *anganwadis*, and communities.

Eleven interviewing teams conducted the main fieldwork in Delhi, each team consisting of one field supervisor, one female field editor, four female interviewers, and one health investigator. The fieldwork was carried out between 10 March 1999 and 18 April 1999. The coordinators and senior staff of the Population Research Centre, Delhi, carried out monitoring and supervision of the data collection operations. IIPS also appointed one Research Officer to help with monitoring throughout the training and fieldwork period in order to ensure that correct survey procedures were followed and data quality was maintained. From time to time, project coordinators, senior research officers, and other faculty members from IIPS, as well as staff members from ORC Macro and the East-West Center, visited the field sites to monitor the data collection operation. Medical health coordinators appointed by IIPS monitored the nutritional component of the survey. Field data were quickly entered into microcomputers, and field-check tables were produced to identify certain types of errors that might have occurred in eliciting information and filling out questionnaires. Information from the field-check tables was fed back to the interviewing teams and their supervisors so that they could improve their performance.

1.6 Data Processing

All completed questionnaires for NFHS-2 in Delhi were sent to the office of the Population Research Centre, Institute of Economic Growth, Delhi, for data processing, which consisted of office editing, coding, data entry, and machine editing, using the Integrated System for Survey Analysis (ISSA) software. Data entry was done in New Delhi by 10 data entry operators under the supervision of a staff member of the Population Research Centre, Delhi, who was trained at a data-processing workshop in IIPS, Mumbai. Data entry and editing operations were completed by June 1999. Tabulations for the preliminary report as well as for the present final report were carried out at IIPS in Mumbai.