CHAPTER 1
INTRODUCTION

1.1 Background of the Survey

India's first National Family Health Survey (NFHS-1) was conducted in 1992–93. 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, maternal and 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 four states (Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh) and for three metro cities (Calcutta, Chennai, 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.

The NFHS-2 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 survey with an overall target sample size of approximately 90,000 ever-married women in the age group 15–49.

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 Indian Institute of Health and Family Welfare (IIHFW) in Hyderabad was selected as the field organization for NFHS-2 in Andhra Pradesh.

1.2 Basic Socioeconomic and Demographic Features of Andhra Pradesh

Andhra Pradesh was the first state in independent India to be formed on a purely linguistic basis, with Hyderabad as its capital. It is the fifth largest state in India in terms of both area and population. It has an area of 275,068 square kilometres. The state is divided into 23 districts distributed in three regions: Coastal Andhra Pradesh, comprising Srikakulam, Vizianagaram, Visakhapatnam, East Godavari, West Godavari, Krishna, Guntur, Prakasam, and Nellore districts; Telangana, comprising Mahbubnagar, Rangareddi, Hyderabad, Medak, Nizamabad, Adilabad, Karimnagar, Warangal, Khammam, and Nalgonda districts; and Rayalseema, comprising Chittoor, Cuddapah, Kurnool, and Anantapur districts. Coastal Andhra Pradesh comprises 34 percent of the total land area of the state, and the other two regions, Telangana and Rayalseema, comprise 42 and 24 percent of the total land area, respectively.
Although Andhra Pradesh is predominantly an agricultural state, the state has been changing rapidly. The contribution of the agricultural sector to the state domestic product declined from 43 percent in 1980-81 to 35 percent in 1996-97. The manufacturing sector contributed around 10 percent to the state domestic product in both time periods, but the share of other sectors increased from 46 percent in 1980-81 to 56 percent in 1996-97 (EPW Research Foundation, 1998). At the time of the 1991 Census, the agricultural sector provided a livelihood to 71 percent of the working population in the state (Office of the Registrar General and Census Commissioner, 1992). Paddy, jowar, bajra, ragi, maize, groundnuts, chilli pepper, tobacco, cotton, castor, and sugarcane are extensively cultivated. Andhra Pradesh leads all other states in the production of tobacco and it has a virtual monopoly of Virginia tobacco. Andhra Pradesh is the largest maritime state in India with a coastline of 970 km. The natural harbour of Visakhapatnam facilitates the export of iron ore to Japan and other countries and also caters to the needs of Madhya Pradesh and Orissa. The export of prawns and fish from this port is steadily increasing due to a rapid increase in pisciculture within the state, as well as increasing numbers of deep-sea fishing trawlers owned by large private companies that are shifting their operations to Visakhapatnam.

Rapid industrial growth in Andhra Pradesh began in the early 1960s. The state experienced significant industrial development during the 1970s and 1980s. The number of registered factories increased from 5,498 in 1970-71 to 14,292 in 1988-89 (Centre for Monitoring Indian Economy, 1993). The state capital, Hyderabad, with its fast-growing software industry, has developed into a major centre of information technology in India. The average annual per capita net domestic product in the state increased from Rs. 1,380 in 1980-81 to Rs. 2,130 in 1996-97 at constant (1980-81) prices or Rs. 9,867 at current prices (EPW Research Foundation, 1998). As per the estimates given by the Planning Commission for 1993-94, 16 percent of the rural population and 38 percent of the urban population in Andhra Pradesh were below the poverty line \(^1\) (Central Statistical Organisation, 1999).

According to the 1991 Census, Andhra Pradesh had a population of 66.5 million, accounting for 8 percent of the total population of India. The total population of the state was 43.5 million in 1971 and 53.6 million in 1981. The decadal growth rate increased from 21 percent in 1961-71 to 23 percent in 1971-81 and 24 percent in 1981-91, which is almost the same as the percentage increase for the country as a whole. Population density per km\(^2\) in Andhra Pradesh increased from 157 in 1971 to 195 in 1981 and 242 in 1991. Although the population density is lower than the density for the country as a whole (273), the increasing density indicates an increasing pressure on land and other resources.

Andhra Pradesh has been undergoing fairly rapid urbanization. The percentage of the total population living in urban areas increased from 19 in 1971 to 23 in 1981 and 27 in 1991, which is about the same as the level of urbanization for India (26 percent).

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\(^1\) The Task Force on “Minimum Needs and Effective Consumption Demand” constituted by the Planning Commission in 1979 defined the poverty line as per capita monthly expenditure of Rs. 49.09 in rural areas and Rs. 56.64 in urban areas at 1973-74 prices, corresponding to the per capita daily calorie requirement of 2,400 in rural areas and 2,100 in urban areas. For subsequent years, the poverty line has been adjusted because of price changes, using the price indices that are implicit in the private consumption expenditure series reported in the National Accounts Statistics. The corresponding levels at 1993-94 prices are Rs. 205.84 for rural areas and Rs. 286.72 for urban areas (Planning Commission figures as reported in Malhotra, 1997).
According to the 1991 Census, the proportions of the total population designated as scheduled castes and scheduled tribes are lower in Andhra Pradesh than in all of India. The scheduled-caste population increased from 13 percent of the total population of Andhra Pradesh in 1971 to 16 percent in 1991. The scheduled-tribe population increased from 4 percent of the total population in 1971 to 6 percent in both 1981 and 1991.

Andhra Pradesh is one of the educationally backward states in India. According to the 1991 Census, the literacy rate among the population age seven and above was 44 percent, compared with 52 percent for India as a whole. The literacy rates were 55 percent for males and 33 percent for females in Andhra Pradesh, compared with 64 and 39 percent for males and females, respectively, for India. The gap in literacy rates between males and females in Andhra Pradesh is only slightly smaller than the gap in India as a whole.

For 1997, the Sample Registration System estimated an infant mortality rate of 63 per 1,000 live births in Andhra Pradesh, compared with 71 in India. For 1996–2001, life expectancy is projected to be 61.6 years for males and 63.7 years for females, a substantial increase from the estimates of 56.1 years for males and 60.0 years for females in 1981–86. The couple protection rate (defined as the percentage of eligible couples effectively protected against pregnancy by various methods of contraception) in Andhra Pradesh was 47 in 1997, compared with 12 percent in 1971. The couple protection rate in 1997 was the same as the estimate for all India.

Between 1971 and 1997, fertility declined substantially in the state. The crude birth rate declined from 34.8 per 1,000 population in 1971 to 22.5 in 1997. The total fertility rate also declined substantially, from 4.6 children per woman in 1971 to 2.5 children per woman in 1997—dropping by 2.1 children in 26 years. The crude death rate also declined, from 14.6 per 1,000 population in 1971 to 8.3 in 1997. The infant mortality rate declined from 106 per 1,000 live births in 1971 to 63 in 1997, a decline of 41 percent.

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 Andhra Pradesh were bilingual, with questions in both Telugu and English.

The Household Questionnaire listed all usual residents in each sample household plus any visitors who slept 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 behaviours—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,

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1 Scheduled castes and scheduled tribes are castes and tribes that the Government of India officially recognizes as socially and economically backward and in need of special protection from injustice and exploitation.
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 before 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 all ever-married women age 15-49 who were usual residents of the sample household or visitors who slept 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 behaviour. Questions are also asked about a woman’s husband, gender roles and the treatment of women in the household.

**Reproductive behaviour 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 about reasons for nonuse and intentions for 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 1995.

**Breastfeeding and health:** Questions cover the length of breastfeeding, immunizations, and recent occurrences of diarrhoea, fever, and cough for the last two births since January 1995.

**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 women's autonomy and violence against women.

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 1995. 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 1995 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 persons 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 Andhra Pradesh was 4,000 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 the state as a whole and for its rural and urban areas separately. The sample is not large enough to provide reliable estimates for individual districts. The required sampling rates for rural and urban areas were determined by allocating the sample proportionally to the population of the two areas.

Sample Design

Within each domain (rural and urban areas), the sample was selected in two stages: the selection of Primary Sampling Units (PSUs), which are villages (in rural areas) or census enumeration blocks (in urban areas), with probability proportional to population size (PPS) at the first stage, followed by the selection of households within each sample area so as to achieve a self-weighting sample of households within each domain (i.e., so as to give every household in the domain the same chance of being included in the survey).

Sample Selection in Rural Areas

In rural areas, the 1991 Census list of villages served as the sampling frame. The list was stratified by a number of variables. The first level of stratification was geographic, with districts being subdivided into the following six contiguous regions.

Region I: Srikakulam, Vizianagaram, Visakhapatnam
Region II: East Godavari, West Godavari, Krishna, Guntur
Region III: Prakasam, Nellore
Region IV: Chittoor, Cuddapah, Anantapur, Kurnool
Region V: Mahbubnagar, Rangareddi, Hyderabad, Medak, Nizamabad, Adilabad, Nalgonda
Region VI: Karimnagar, Warangal, Khammam
In each region, villages were further divided into a number of strata considering village size and the proportion of population designated as scheduled castes or scheduled tribes. Table 1.1 provides details of the stratification along with the population of each stratum. The final level of stratification was implicit for all the strata, consisting of an ordering of the villages within each stratum by the level of female literacy (obtained from the 1991 Census Village Directory). From the list so arranged, villages were selected systematically with probability proportional to the 1991 Census population of the village. Small villages with 5–49 households were linked with an adjoining village to form PSUs with a minimum of 50 households. Villages with fewer than five households were excluded from the sampling frame.

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

\[
f = \frac{n}{N}
\]

where \( n \) = number of women to be interviewed in rural or urban areas adjusted upward to account for nonresponse and other loss,
$N =$ projected population of eligible women in September 1999.

A total of 97 rural PSUs were selected in the state. The probability of selecting a PSU ($f_i$) from rural Andhra Pradesh was computed as:

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

where $a =$ number of PSUs to be selected from rural areas,  
$s_i =$ population size of a specific PSU,  
$\sum s_i =$ total rural population of the state.

A mapping and household listing operation carried out in each sample area provided the necessary frame for selecting households at the second stage. 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 500 households were segmented, and two segments were selected randomly using the PPS method. Household listing in these PSUs was carried out only in the selected segments. The work was carried out by 10 teams, each comprising 1 lister and 1 mapper, under the supervision of 3 field supervisors and 2 field executives. The teams were trained from 18–20 September 1998 in Hyderabad by an official from IIHFW, Hyderabad, who was earlier trained in a workshop conducted by IIPS. The mapping and household listing operation was carried out between September and December 1998. The households to be interviewed were selected with equal probability from the household list in each area using systematic sampling.

The probability of selecting a household from a selected PSU ($f_2$) is computed as:

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

The interval applied for the selection was determined to obtain a self-weighting sample of households. On average, 30 households were initially 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 households which were selected were contacted during the main survey, and no replacement was made if a selected household was absent during data collection. However, if a PSU was inaccessible, a replacement PSU with similar characteristics was selected by IIPS and provided to the field organization.

**Sample Selection in Urban Areas**

The procedure adopted in urban areas was similar to the one followed in rural areas. The 1991 Census list of wards 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 size. Next, one census enumeration block, consisting of approximately 150–200 households, was selected from each selected ward using the PPS method. In Andhra Pradesh, 36 wards were
selected. As in rural areas, a household listing operation was carried out in the selected blocks and, on average, 30 households per block were targeted for selection.

The probability of selecting a ward \( f_i \) was computed as:

\[
f_i = \frac{a \times s_i}{\sum s_i}
\]

where \( a \) = number of wards selected from the domain,
\( s_i \) = population size of the selected ward,
\( \sum s_i \) = the total urban population of the state.

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 block from a selected ward \( f_2 \) was computed as:

\[
f_2 = \frac{s_i}{\sum s_i}
\]

where \( s_i \) = population size of a specific block
\( \sum s_i \) = total population of the ward.

The probability of selecting a household from a selected block \( f_3 \) is computed as:

\[
f_3 = \frac{f}{f_1 \times f_2}
\]

**Sample Weights**

Sample weights for households and women have been calculated to adjust 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 household and eligible women’s response rates, respectively. Then the household weight \( w_{Hi} \) is calculated as follows:

\[
w_{Hi} = \frac{W_{Di}}{R_{Hi}}
\]

where \( w_{Di} \) = the design weight.

The eligible women’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 the 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 who were weighed or measured.

**Sample Implementation**

A total of 133 PSUs were selected, of which 36 (27 percent) were urban and 97 (73 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 succeeded in achieving a high overall response rate of 98 percent. Contrary to expectations, the overall response rate is higher in urban areas (99 percent) than in rural areas (97 percent).

Of the 4,034 households selected in Andhra Pradesh, interviews were completed in 96 percent of the cases, 2 percent of the selected households were absent, and 2 percent were found to be vacant. The household response rate—the number of households interviewed per 100 occupied households—was 99 percent in both urban and rural areas.

In the interviewed households, 4,105 women were identified as eligible for the individual interview. Interviews were successfully completed with 98 percent of the eligible women. The response rate for women was slightly higher in urban areas (99 percent) than in rural areas (98 percent). Nonresponse at the individual level was primarily due to eligible women not being at home despite repeated household visits. Very few eligible women refused to be interviewed.

**1.5 Recruitment, Training, and Fieldwork**

Field staff for the main survey were trained in Hyderabad by officials of IIHFW, who were trained earlier in a Training of Trainers Workshop conducted by IIPS. Training in Andhra Pradesh consisted of classroom training, general lectures, and demonstration and practice interviews, as well as field practice and additional training for field editors and supervisors. Health investigators attached to interviewing teams were given additional specialized training on
measuring height and weight and testing for anaemia in a centralized training programme conducted by IIPS in collaboration with the All India Institute of Medical Sciences (AIIMS), New Delhi. This specialized training took place in New Delhi. It included classroom training and extensive field practice in schools, _anganwadis_, and communities.

Five interviewing teams conducted the main fieldwork, each team consisting of one field supervisor, one female field editor, four female interviewers, and one health investigator. The fieldwork was carried out between 26 November 1998 and 4 March 1999. Coordinators and senior staff of IIHF mon grated and supervised 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 Field Problems

As is the case with every survey, unforeseen circumstances can have an impact on the progress of fieldwork. The major problems encountered during the fieldwork in Andhra Pradesh are discussed below. However, these problems do not appear to have adversely affected the quality of the survey in Andhra Pradesh.

The houselisting operation, which was started in the third week of September 1998, could not be completed before the start of fieldwork for the main survey due to weather conditions. Coastal Andhra Pradesh was hit by a cyclonic storm, followed by heavy rains for about two weeks in October and November 1998. Due to flood damage, some of the PSUs in Krishna, East Godavari, and Guntur districts were inaccessible by road for some period of time. Hence, the houselisting operation was slowed down in November. After the situation returned to normal, a few additional enumerators were recruited to complete the houselisting work by the middle of December 1998.

Because of the late arrival of tenderlette lancets and other essential anaemia-testing items, measurement of haemoglobin levels could not be carried out in 12 PSUs in 5 districts during the first phase of the fieldwork. However, health investigators and field interviewers were sent to those PSUs towards the final stages of the survey work to complete the anaemia testing on respondents already interviewed.

Because the fieldwork in coastal districts was carried out during the harvest season, a significant number of respondents had migrated temporarily from their place of residence to nearby places for agricultural work. This temporary absenteeism resulted in a significant number of noncontacts with households and eligible women during the first three visits. Selected PSUs were revisited for a fourth time after the Sankranti festival to contact the ‘not-at-home’ households to improve the overall response rate. In addition, during the harvest season, many rural women left for the fields early in the morning and did not return until late in the evening. In order to interview these women, the interviewing teams had to reach the village before 6:00 a.m. and had to conduct many interviews after 7:00 p.m. as well.

Finally, some minor difficulties with transportation and accommodations for the survey teams were encountered during the initial period of the fieldwork. However, these problems were solved at an early stage and the cooperation extended by District Medical and Health Officers in providing transport and accommodation facilities to the field staff was extremely good.
1.7 Data Processing

Completed questionnaires were sent to the IIHFW office in Hyderabad 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 by six data entry operators under the supervision of two senior staff at IIHFW who were trained at a data-processing workshop in Hyderabad. Data entry and editing operations were completed by March 1999. Tabulations for the preliminary report as well as for the present final report were carried out at IIPS in Mumbai.