NATIONAL FAMILY HEALTH SURVEY

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The NFHS BULLETIN summarizes findings from the 1992–93 National Family Health Survey. The NFHS collected information from nearly 90,000 Indian women on a range of demographic and health topics. The survey was conducted under the auspices of the Indian Ministry of Health and Family Welfare to provide national and state-level estimates of fertility, infant and child mortality, family planning practice, maternal and child health, and the utilization of services available to mothers and children.

The International Institute for Population Sciences (IIPS), Bombay, conducted the NFHS in cooperation with various consulting organizations and 18 population research centres throughout India and with the East-West Center in Honolulu, Hawaii, and Macro International in Calverton, Maryland. The U.S. Agency for International Development provided funding for the NFHS and for this publication.

Fertility and Contraceptive Use in Tamil Nadu, Andhra Pradesh, and Uttar Pradesh

Tamil Nadu and Andhra Pradesh are success stories in fertility and family planning. Uttar Pradesh, by contrast, has by far the highest fertility of any state in India. This issue of the *NFHS BULLETIN* compares findings from these three states to see if any lessons can be drawn about how to bring down fertility in Uttar Pradesh and other high-fertility states.

Fertility and contraceptive use in the three states

Table 1 shows differences in fertility and contraceptive use among Tamil Nadu, Andhra Pradesh, and Uttar Pradesh. The total fertility rate, or TFR, is 2.5 children per woman in Tamil Nadu and 2.6 in Andhra Pradesh—both fairly close to the replacement level of about 2.2. In contrast, the TFR in Uttar Pradesh is 4.8. Table 1 also shows the wanted TFR. This is somewhat lower than the actual TFR, indicating that some fertility is unwanted. The level of unwanted fertility is especially high in Uttar Pradesh, where the difference between the actual TFR and the wanted TFR is 1.0 child per woman.

Differences in contraceptive use among the three states parallel the differences in fertility. The contraceptive use rate is about 50% in Tamil Nadu and Andhra Pradesh but only 20% in Uttar Pradesh. Sterilization, mainly of women, accounts for 79% of all contraceptive use in Tamil Nadu and 95% in Andhra Pradesh, but only 66% in Uttar Pradesh.

Why is fertility so much lower and contraceptive use so much higher in Tamil Nadu and Andhra Pradesh than in Uttar Pradesh? Findings from the NFHS shed some light on this question.

One well-known predictor of fertility is infant mortality. When infant mortality is low more children survive and women do not need as many births to achieve their wanted family size. Indeed, Table 1 shows that infant mortality is much lower in Tamil Nadu and Andhra Pradesh than in Uttar Pradesh, paralleling differences in fertility and contraceptive use.

Another factor that frequently influences fertility is age at marriage. Average age at marriage is higher in Tamil Nadu than in the other two states, but Andhra Pradesh's

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relatively low fertility cannot be accounted for by higher age at marriage. The median age at marriage in Andhra Pradesh is the same as in Uttar Pradesh, and the median age at first birth is actually lower. Table 1 shows that women in Andhra Pradesh not only start childbearing early but also complete their families early. The median age at sterilization is only 24.5 years—the lowest of any state of India.

A third factor that often influences fertility and contraceptive use is utilization of maternal and child health (MCH) services. Table 1 shows that a much higher percentage of mothers receive antenatal care in Tamil Nadu and Andhra Pradesh than in Uttar Pradesh. In Tamil Nadu and Andhra Pradesh, births are also more likely to be delivered by health professionals, and children are more likely to be vaccinated. By contrast, Andhra Pradesh is closer to Uttar Pradesh in terms of the percentage of births delivered in a health facility. For the most part, however, differences in utilization of MCH services parallel the differences in fertility and contraceptive use. The strength of MCH services—as measured by utilization rates—can be viewed as an indirect indicator of the strength of family planning services since to a considerable extent both services are provided by the same health and family welfare workers, most notably the auxiliary nurse-midwives.

Table 1. Demographic and health indicators

Indicator	Tamil Nadu	Andhra Pradesh	Uttar Pradesh
TFR	2.5	2.6	4.8
Wanted TFR	1.8	2.1	3.8
CPR, any method	50	47	20
% sterilized	40	45	13
% contraceptive use due to sterilization	79	95	66
Infant mortality (deaths/1,000 births)	68	70	100
Median age at:			
Marriage (women age 25–49)	18.1	15.1	15.1
First birth (women age 25–49)	20.1	17.9	19.5
Sterilization	26.2	24.5	29.6
For births in past four years, % of:			
Mothers receiving antenatal care	94	86	45
Mothers receiving two doses tetanus toxoid vaccine	90	75	37
Births delivered in a health facility	63	33	11
Births delivered by a health professional	71	50	17
% of children (12–23 months) fully immunized	65	45	20

Turning to socioeconomic factors, urban-rural differences do not appear to play a major role in accounting for the differences in fertility and contraceptive use. Table 2 shows that all three states have a similar proportion of women living in urban areas. Differences in women's educational attainment may account for some of the differences in fertility and contraception, but only between Tamil Nadu and Uttar Pradesh. Rather surprisingly, the percentage of females age 6 and over who are illiterate is almost as high in Andhra Pradesh as it is in Uttar Pradesh, and the percentage of girls age 6–14 who are attending school is almost as low.

The percentage of ever-married women who work (other than their own housework) is much higher in Tamil Nadu and Andhra Pradesh than in Uttar Pradesh. The percentage of women who "work for someone else" (as opposed to working on a family farm or business or being self-employed) is also much higher. Women who work for someone else often work outside the home and tend to have lower fertility and higher rates of contraceptive use, in part because work competes with childcare for their time and attention. The differences among the three states in women's work patterns may explain some of the differences in fertility and contraceptive use.

Table 2. Economic and social development indicators

Indicator	Tamil Nadu	Andhra Pradesh	Uttar Pradesh
% urban (1991)	34	27	20
% illiterate (females age 6+)	44	62	69
% attending school (females age 6–14)	79	55	48
% working (ever-married women)	47	53	13
% "working for someone else" (ever-married women)	35	29	3
% landless (rural households)	22	56	59
% with electricity (households)	64	62	32
% regularly exposed to mass media (ever-married women)	78	75	35
% population below poverty line (1987–88)	34	32	35

According to the Centre for Monitoring Indian Economy, the percentage of the population below the poverty line in 1987–88 was about the same in all three states. Table 2 shows that fewer rural women are landless in Tamil Nadu than in Andhra Pradesh or Uttar Pradesh. However, the percentage landless is about the same in the other two states, indicating that differences in land ownership do not explain differences in fertility and contraceptive use.

Overall, differences in living standards are small. The three states differ little in terms of several additional indicators of poverty or wealth (not shown)—the percentage of households that obtain drinking water from a pump or pipe, have toilet facilities, use wood as a cooking fuel, own various consumer goods, or have *pucca* houses (built of high-quality materials).

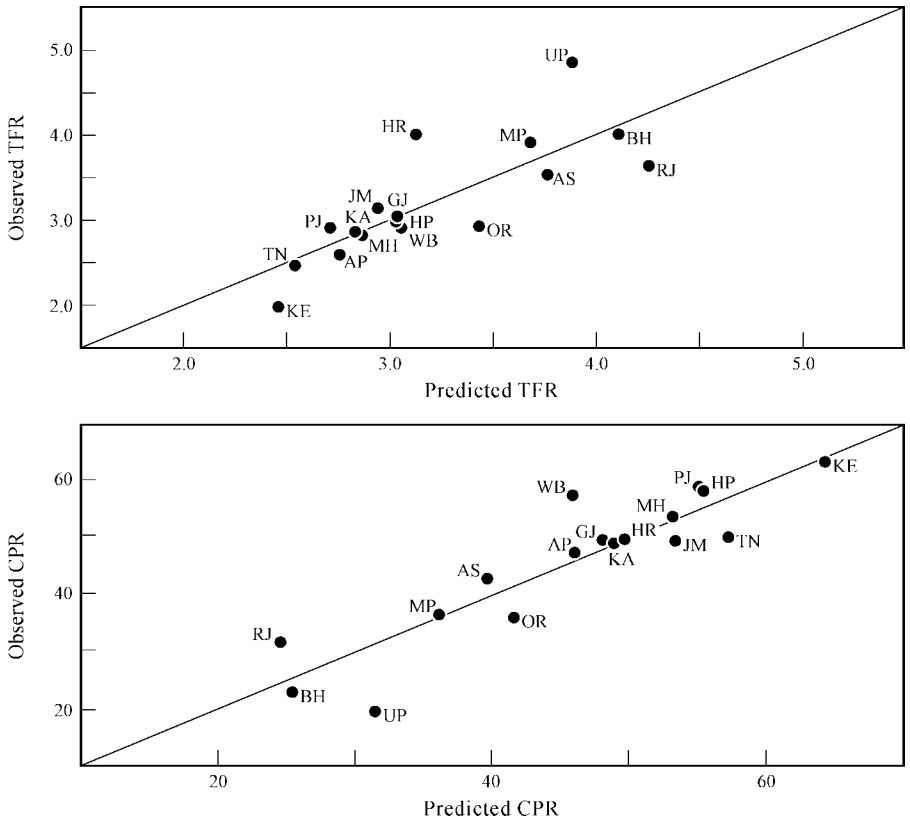
Two specific socioeconomic indicators do show strong differences, however. In Tamil Nadu and Andhra Pradesh, many more households have electricity and many more ever-married women are regularly exposed to the mass media than in Uttar Pradesh. Electrification and media exposure are linked of course, because the main sources of media exposure—televisions and radios—are usually powered by electricity.

Analysis of data from 17 states

It is hazardous to generalize from findings for only three states. We therefore decided to undertake a multiple regression analysis of data from 17 states to see if the conclusions reached from the three-state comparison could be confirmed. This analysis is based on aggregate, state-level data from Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Himachal Pradesh, Jammu region, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Uttar Pradesh, Tamil Nadu, and West Bengal.

We consider two response variables: total fertility rate (TFR) and contraceptive prevalence rate (CPR), which is defined as the percentage of currently married women age 13–49 who are currently using any method of contraception. We include 12 predictor variables in the analysis: percentage literate (of females age 6+), percentage attending school (of females age 6–14), percentage urban (of ever-married women age 13–49), percentage below the poverty line, infant mortality rate (of births that occurred during the five years before the survey), percentage "working for someone else" (of ever-married women age 13–49), percentage of households with electricity, percentage regularly exposed to mass media (of ever-married women age 13–49), percentage of women age 20–24 who married before age 18, percentage of births during the four years before the survey that received antenatal care, percentage of births during the four years before the survey that were delivered by a health professional, and percentage of children age 12–23 months who are fully immunized.

Figure 1. Scatterplot of observed TFR and CPR by predicted TFR and CPR for 17 states of India: National Family Health Survey, 1992–93



Notes: Predicted values of TFR are calculated from the regression TFR = 5.11135 - .02729 ANC. Predicted values of CPR are from the regression CPR = .362 + .379 SCHOOL + .288 ANC. State designations are: Andhra Pradesh (AP), Assam (AS), Bihar (BH), Gujarat (GJ), Haryana (HR), Himachal Pradesh (HP), Jammu (JM), Karnataka (KA), Kerala (KE), Madhya Pradesh (MP), Maharashtra (MH), Orissa (OR), Punjab (PJ), Rajasthan (RJ), Uttar Pradesh (UP), Tamil Nadu (TN), West Bengal (WB).

Although all of these predictor variables have theoretical relevance, one cannot include 12 predictor variables in a multiple regression with only 17 data points and expect to get statistically significant results. We therefore employed stepwise regression to retain only those variables with coefficients that were statistically significant at the 5% level.

The percentage of births that received antenatal care (ANC) turned out to be the most powerful predictor of the total fertility rate. No other variable, when added as a second predictor, had a coefficient that was statistically significant at the 5% level. The final equation therefore turned out to be bivariate:

$$TFR = 5.11135 - .02729\ ANC, \quad R^2 = .64$$

This equation says that an increase of 10 points in the percentage receiving antenatal care results in a reduction in the total fertility rate of 0.3 child.

Mean values of the variables for the 17 states are 3.21 children per woman for TFR and 69.8% for ANC.

Stepwise regression indicated that two variables could be retained as predictors of contraceptive prevalence rate: antenatal care and the percentage of girls age 6–14 attending school (SCHOOL). The final equation was:

$$CPR = .362 + .379\ SCHOOL + .288\ ANC,\ R^2 = .81$$

This equation says that, with antenatal care held constant, an increase of 10 points in the percentage of girls age 6–14 attending school raises the contraceptive prevalence rate by 4 percentage points. With school attendance held constant, an increase of 10 points in the percentage receiving antenatal care raises the contraceptive prevalence rate by 3 percentage points. Mean values of the variables for the 17 states are 45.7% for CPR, 66.5% for SCHOOL, and 69.8% for ANC.

The values of R^2, which measure how well the model fits the data, are fairly high—0 denotes no fit at all; 1 denotes a perfect fit. This is not surprising since the data points are averages for states, and this eliminates a lot of statistical noise. One can also examine goodness of fit by looking at scatterplots, as shown in Figure 1. These scatterplots, like the R^2 values, show that the fit is better for contraceptive prevalence than for total fertility.

Most of the other predictor variables, although omitted from the final regressions, are highly correlated with both contraceptive prevalence and total fertility. However, they are also highly correlated with antenatal care and school attendance, so their influence is not statistically significant when these two variables are controlled.

A more far-reaching analysis would utilize multilevel regression methods based on individual-level data as well as aggregate measures. Nevertheless, the fact that antenatal care turned out to be the most powerful predictor in this simple multiple regression analysis strengthens our earlier conclusion—based on the three-state comparison—about the importance of antenatal care in predicting fertility and contraceptive use.

The importance of women's education in predicting contraceptive use is consistent with the results of many other studies. Andhra Pradesh is an outlier in this regard, inasmuch as this state has somehow managed to achieve quite low fertility despite low levels of female education and literacy. This is an interesting result, suggesting that high levels of literacy and education are not a necessary condition for achieving replacement-level fertility.

Conclusions

The analysis shows that the most powerful predictors of total fertility and contraceptive prevalence are the percentage of women who receive antenatal care and the percentage of girls age 6–14 who are attending school. The importance of antenatal care, as indicated in both the three-state comparison and the multiple regression analysis, probably reflects the dual role of auxiliary nurse-midwives in delivering both health and family planning services. It is worth noting that, up to the time of the NFHS in 1992–93, the family welfare programme placed considerable pressure on auxiliary nurse-midwives to meet sterilization targets.

The case of Andhra Pradesh defies the conventional wisdom. Evidently a strong family welfare programme can bring fertility close to replacement levels without much economic or social development.

What lessons can be drawn on how to bring down fertility in Uttar Pradesh and other high-fertility states? These results suggest that a potentially effective strategy should include strengthening the health and family welfare programmes, which are known to be weak in such states. Improving literacy and education levels, especially of girls, is another important, complementary, approach. Present efforts in these directions seem to be on the right track.

The **International Institute for Population Sciences** was established at Bombay in 1956 as the regional institute for training and research in population studies for the Asia and Pacific region of the United Nations. Now also a deemed university, it is an autonomous institution sponsored jointly by the Government of India, the United Nations Population Fund, and Sir Dorabji Tata Trust.

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