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FUTURE FERTILITY PROSPECTS FOR INDIA*

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Foreword

India's population, which was approximately 350 million at independence in 1947, has grown to 1.2 billion in 2009, having officially passed the one billion mark in May of 2000. It is anticipated that India will become the world's largest country in population, surpassing China, before 2030 (United Nations, 2009). As a result, prospects for the country's future fertility and mortality trends are of considerable interest. The national total fertility rate in 2007 was 2.7 (Registrar General of India (RGI)¹, 2009) and life expectancy at birth in 2002-2006 was 62.6 years for males and 64.2 for females (RGI, 2008). While the concern of this paper is fertility, it is worth noting that there is considerable room for improvement in mortality.

Fertility decline has been substantial in India albeit relatively gradual compared to other less developed countries (LDCs) such as Brazil, Iran, and Thailand. Decline has also been rather uneven, with much greater decrease in the more socio-economically advanced states. Unlike many other LDCs, India may be thought of more as a collection of individual countries, analogous to Europe. There are 22 major ("scheduled") languages and considerable cultural differences among the states. Many state boundaries are roughly drawn along linguistic lines although that had been contrary to the wishes of the first Prime Minister, Jawaharlal Nehru. India's governance is distinctly decentralized. States operate quite independently from the national (Centre) government in Delhi and many states have their own political parties along with their own independent attitudes and agendas. Consequently, the formation of the Centre government can be quite difficult, often requiring considerable compromise among coalition partners. In considering many questions, such as the likely success or failure of the country's population policy, the contemporary political situation should always be kept in view.

India's recent national elections (2009) were something of a political milestone. The Congress Party and its allies were returned to power with a larger majority than before the election and Prime Minister Manmohan Singh remained in his position. Mr. Singh is well known for easing India's restrictive laws on foreign direct investment when he was Finance Minister in the early 1990s and is often credited with stimulating the country's comparatively spectacular economic growth since that time. He has now turned his attention to improving health and family planning services in areas of the country where those have lagged considerably behind and appointed Ministers in his government who will be held strictly accountable for their performance. Divisive politics and widespread corruption remain, however.

Given its decentralized governance, India's practice of creating new states is another factor to keep in mind. In 2000, the largely tribal areas of Bihar and Madhya Pradesh were separated into the states of Jharkhand and Chhattisgarh, respectively. While the effect of these demarcations is difficult to assess, they do require the establishment of a new government structure. Also in 2000, the new state of Uttarakhand² was formed from the hill districts of Uttar Pradesh.

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Source: Registrar General of India (map not to scale)

A. BACKGROUND

1. Population policy development

Before considering fertility prospects in India, some background describing the country's demographic scene would be of value. India first initiated a national goal to slow population growth in 1951 (Jain, 1998), the first LDC to do so, as a part of its first Five Year Plan. The country's death rate had begun a gradual decline in response to the spread of public health measures, immunization programs, and more modern medical care, particularly in the post World War II period. In that era, there was widespread concern that the famines and disease experienced in the past might return with a resultant rise in mortality (United Nations, 1951). This did not, however, occur. In fact, the census year 1921 is often referred to as the "Year of the Great Divide," which marked the final change from a nearly stationary population size to a period of growth that continues to the present time.

As was observed in many LDCs, declines in the death rate were not necessarily accompanied by complementary declines in the birth rate. In the early 1950s, India's total fertility rate (TFR) was approximately 6.0 and would not begin a process of decline until the late 1960s (United Nations, 2009). In the very beginning, little was actually done to put the new population policy into effect. Relatively small amounts were included in the health budget for family planning services and supplies due to a lack of funds. In any event, Indian couples were likely to be slow to begin the use of something as novel as

contraception, partly due to deep-seated traditions that favored larger families combined with low levels of education that tended to reinforce such traditions.

Expenditures for family planning increased sharply in 1966 and the program was made the responsibility of the new Department of Health and Family Planning. In 1978, India became a signatory to the “Health for All” campaign at the WHO/UNICEF conference at Alma Ata leading to the introduction of health services to the very large rural population (Jain, 1998). This allowed a variety of maternal and child health services to be offered as well as contraceptive information and supplies. The family planning program’s most infamous era took place during the National Emergency declared by Indira Gandhi in 1975–1977. Under the enthusiastic administration of her son, Sanjay, a series of sterilization camps with a target approach were set up and millions of vasectomies were performed on often-unwitting patients. As a result, the reputation of the program was seriously compromised and the slow birth rate decline virtually stopped for a time. The name of the responsible ministry was also changed to the Ministry of Health and Family Welfare (MOHFW) from the Ministry of Health and Family Planning and remains so to this day. In 2000, MOHFW released National Population Policy 2000 (NPP2000), which incorporated a large number of demographic and health goals, among them the achievement of a TFR of 2.1 by 2010 (MOHFW, 2000). NPP2000 also set up a National Population Commission (NPC) with the Prime Minister as its head. In October 2009, the Supreme Court of India asked the NPC why many of the goals of NPP2000 had not been met (Times of India, 2009)

2. Fertility Trends

From the early 1950s, the 6.0 TFR declined to about 2.7 in 2007 (RGI, 2009; United Nations, 2009) Given the vast and often difficult-to-reach rural population, this has been a remarkable result. Still, TFR reduction has been quite slow, an average of about .06 per year. The national TFR decline also masks a wide disparity in TFR levels and trends among the country’s 35 states and Union Territories (UTs). These differentials serve to add a considerable element of doubt regarding the country’s future population size. In Viet Nam, by way of comparison, the TFR is comparatively uniform among regions, from 1.7 to 2.3 children per woman in 2008 (General Office for Population and Family Planning, 2009). In India, in 2007, the TFR varied from 1.7 in the southern state of Kerala to 3.9 in both Bihar and Uttar Pradesh (RGI, 2009).

Compounding the effect of widely varying fertility is the population size of the higher fertility states. Uttar Pradesh, a large state in north India, had an enumerated population of 166 million at the 2001 Census (Registrar General of India, 2004) and is currently approaching 200 million at a growth rate of about 2.0 per cent per year (Population Foundation of India (PFI) and Population Reference Bureau (PRB), 2007). Kerala’s population stood at 32 million in 2001, growing at 0.9 per cent per year. If Kerala’s current TFR of 1.7 were to remain constant, its population size is unlikely to exceed 38 million before going into decline. Uttar Pradesh, on the other hand, is quite likely to pass the 300 million mark (PFI, PRB, 2007). Other large northern states with large populations and an above national average TFRs are: Bihar (83 million population at the 2001 Census and a 2007 TFR of 3.9); Madhya Pradesh (60 million in 2001, 2007 TFR of 3.4); Rajasthan (57 million in 2001, 2007 TFR of 3.4). These four states, along with the higher-fertility states of Chhattisgarh and Jharkhand (separated from Madhya Pradesh and Bihar, respectively, in 2000) accounted for about 40 per cent of India’s population in 2001.

B. POPULATION GROWTH

1. National Growth

Since the 1950s, India’s percentage of population growth has been above 20 per cent (see Table 1.). In the last two censuses, the percentage growth has declined but the absolute number added continued to rise. Several projections of India’s population to the next census year, 2011, project that the number added between censuses will fall for the first time since the 1920s, in the range of 166³ (U.S. Census

Bureau, (International Database) to 171⁴ million (UN 2009), an increase over the 2001 Census of about 17 per cent.

2. Urban and Rural Growth

Of particular importance in India is the size and growth of the rural and urban population. Growth in the urban proportion of the has not been particularly rapid (see Table 2.). From 1991 to 2001 the proportion urban increased from 25.7 per cent to 27.8 per cent. In terms of absolute growth, the rural population continues to outweigh the urban, although the urban share of total growth has been increasing recently. When considering urban-rural growth, it is advisable to keep the definition in mind. In India, the urban population is defined as those living in villages, towns, and cities of 5,000 or more in which 75 per cent of the male labor force is not directly engaged in agriculture, and the population density is at least 400 people per square kilometer. Many such places are very rural in character and culture, if not by definition. Some of the growth in the urban population has not only been due to rural-urban migration but to natural population growth when villages pass the 5,000 population mark.

Of the urban population, 35 cities with one million or more population comprised 109 million, or 38 per cent of the urban population in 2001 (RGI, 2006). Of these, there are four cities often referred to as “major metros,” Mumbai (formerly Bombay), Kolkata (formerly Calcutta), Delhi, and Chennai (formerly Madras). Of India’s 593,616 inhabited villages identified in the 2001 Census, 574,856 had a population of less than 5,000 (RGI, 2006). Thus, it is not surprising that the Registrar General has stated that “India lives in its villages.” (RGI, 2005a) Such a dispersal of population, often with very poor transportation infrastructure makes the delivery of health and family planning services quite difficult.

3. State Population Growth

Finally, a brief look at population and population growth distribution by State would also be of value (see Table 3). Some of the more rapid growth from the 1991 to 2001 Census was in the northern states, frequently called the “Hindi Belt” states. These are among the least economically developed states, consisting of Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Rajasthan, and Uttar Pradesh, states with the highest TFRs. These states also had high net out-migration for the 1991-2001 period. Net out-migration for Uttar Pradesh was 2.7 million and 1.7 million for Bihar (RGI, 2006). Maharashtra and Delhi experienced the heaviest in-migration, 2.4 and 1.8 million, respectively (RGI, 2006). Both Gujarat, a state with considerable industrial development, and Haryana, which contains a number of very affluent Delhi suburbs, both had net in-migration of 0.7 million. It is evident from Table 3 that growth is shifting towards the higher fertility states and that these states are likely to continue to see out-migration as residents seek income and a better life elsewhere. By 2011, Uttar Pradesh will likely pass the 200 million mark and Bihar, even without Jharkhand, the 100 million mark⁵.

C. SOURCES OF DATA

1. Sample Registration System (SRS)

The SRS of the RGI office is a monthly canvass of vital events in 4,433 rural sample units and 3,162 urban covering 1.4 million households and 7.0 million population. A more complete description of the SRS from the October 2008 *SRS Bulletin* is given in the endnotes to this paper⁶. Virtually unique among large LDCs, the SRS provides annual estimates of vital rates for India and its subnational units. The SRS began in a few selected states in 1964-1965 and became national in 1969-1970. The sample is changed following each census, typically in years ending in 4. Normally, the sample replacement process is conducted over a 2-3 year period on a rotating basis. In 2004, it was decided to replace the entire sample then in use in a single year (RGI 2005a). This required a complete change in enumeration staff, placing the difficult burden of training 7,597 new staff in a single year. It was anticipated by some

observers that a higher level of under-registration due the complete change of field enumerators would result and, when the results for 2004 were published, that expectation appeared to have been justified (see Table 4.). The crude birth and death rates (CBR and CDR) for 2004 had a much sharper drop from 2003 to 2004 than before or after, although the infant mortality rate (IMR) did not exhibit the same pattern. Speculation that there might be a rise in vital rates in 2005, after enumerators had been completely trained, was not borne out. It is clear that, whatever the cause, that the new 2004 sample resulted in a one-time drop in the CBR and CDR and that the amount of annual decrease in the CBR and CDR resumed its pre-2004 pattern.

Given that the SRS is based on a sample, a review of the level of sampling error is in order. The 95 per cent confidence limit is published in the annual SRS *Bulletin* (see Table 5). As would be expected, the sampling error is smallest at the all-India level and increases among the states and UTs as the population size decreases. As can be seen in the table, annual change in the SRS CBR for India at the national level for the years shown does appear to be statistically significant. The selected states in Table 5 represent two large, moderately-high fertility states, Bihar and Uttar Pradesh; one modestly large low-fertility state, Kerala, with about 30 million population; and two smaller states, Himachal Pradesh and the Northeastern state of Manipur, states with about 5 and 2 million population, respectively. Data collection in the seven Northeastern states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, and Tripura has frequently been more difficult due to civil unrest. These seven states contain about 32 million population and irregularities in their SRS rates are, at times, observed. There are similar difficulties in Jammu and Kashmir, a state in which the 1991 Census could not be held. Advance, pre-release SRS vital rates for 2008 were obtained during the writing of this paper and are given in Table 5. With a CBR of 22.8 at the all-India level, the TFR in 2008 may have declined to about 2.64.

How accurate is the SRS? The RGI's office published evaluations of SRS coverage in 1988 (RGI, 1988) and in 1992 (RGI, 1992) 1992.⁷ In 1988, the RGI estimated that the national underenumeration was 1.82 per cent, with highest rate in West Bengal at 3.1 per cent. The 1992 report estimated that, nationwide, under-registration was two per cent in 1978, three per cent in 1980, and just under two per cent in 1985. By state, under-registration varied from about nine per cent in Assam to nearly zero per cent in Madhya Pradesh in 1980 and from about four per cent in Assam to zero per cent in Bihar and Maharashtra in 1985. Compared to the evaluation study described below, some the results of the 1988 and 1992 studies do seem at least questionable, particularly at the state level.

An evaluation of the SRS as well as the results of the two Demographic and Health Surveys held to that time was conducted by Retherford and Mishra as a part of the National Family Health Survey-2 (NFHS-2) program (Retherford and Mishra, 2001; see also Retherford, Mishra, and Prakasam, 2001). To summarize, their conclusion was that the under-registration of births was approximately 9.6 per cent in the 1978-1992 period and that it had declined to 6.8 per cent in the 1984-1998 period (see Table 9 in the Retherford and Mishra report). By state, Gujarat and Himachal Pradesh were estimated to have had little or no under-registration, while Assam, Bihar, Kerala, Madhya Pradesh, Maharashtra, Tamil Nadu, and Uttar Pradesh are estimated to have under-registered births by 8 to 11 per cent in 1984-1998. The authors also noted that their estimates of under-registration are likely to be underestimates, particularly in some states.

It is advisable to use three-year moving averages for SRS rates, even at the national level, a practice frequently followed by the RGI office. Still, in contrast to rates obtained from periodic surveys, the SRS allows annual tracking of vital rate trends with reasonable reliability and accuracy, although levels are somewhat in doubt.

SRS vital rates, CBR, CDR, and IMR for the previous year, are normally published in the *Bulletin* in October. A final bound report with the TFR and considerable state-level detail is usually published in the following Spring. *Bulletins* are posted on the Registrar General's website.⁸ The large annual reports are, at present, only available in hard copy and must be purchased.

2. Demographic and Health Surveys (DHS)

Three DHS surveys, entitled the National Family Health Surveys (NFHS), have been conducted in India in 1992-1993, 1997-1998, and 2005-2006. TFRs collected in the NFHS surveys have typically been below those of the SRS. Retherford and Mishra had noted that displacement of births in NFHS resulted in a shift of births out of the three period for which the TFR is reported with a resultant underestimate of the TFR for the three-year period before the survey (Retherford and Mishra, 2001). They also noted, however, that the pattern of age-specific fertility rates in the NFHS were more realistic than the SRS, primarily for the age group 15-19 (see Figures 1 and 2). The NFHS-2 TFR was, however, nearly 0.5 lower than the SRS for the comparable year of 1997. The same pattern of age-specific reporting in NFHS-3 and the 2004 SRS was observed, although the gap between the two TFRs had narrowed (see Table 6). In NFHS-3, the three-year period was retained in the interest of an estimate for a comparatively recent period. The various NFHS surveys are, of course, indispensable for the measurement of a very wide variety of socioeconomic and reproductive health variables, including nationally-representative testing for HIV infection.

3. District Level Household and Facility Survey (DLHS)

The District Level Household and Facility Surveys, are one of the largest surveys of their type ever taken in India. Conducted by the International Institute of Population Sciences (IIPS), Mumbai, the first such survey was taken in 1998-1999 as a part of the Reproductive and Child Health (RCH) program of MOHFW. The DLHS surveys also provide information related to MOHFW's National Rural Health Mission, which will be discussed later in this paper. The surveys are taken in two rounds, each round covering half of the country's 600-some districts so that coverage is national in scope. Among variables useful for considering assumptions for population projections are contraceptive use by method, women with two children wanting no more, mean age at marriage and married before age 18 (the minimum legal age is 18 for women, 21 for men), and per cent of births to women 15-19. For the most recent 2007-2008 round, state-level reports are released as completed and a final national report sometime later⁹. The DLHS also collects information on health facilities such as Sub Centres, Primary Health Centres, and District Hospitals to ascertain the degree to which they are properly staffed and equipped.

D. FERTILITY TRENDS

1. India

When projecting fertility rates, there are several fundamental issues to be considered. First, in countries where there has been no apparent decline, when will decline begin? This is not a concern in India as all states and UTs have experienced TFR decline for many years. In India, two questions are foremost. One, since it is apparent that TFRs can reasonably be expected to continue to decline, what will the pattern of decline be in states where fertility is still moderately high? And, two, what will be the *ultimate* number of children in a particular state - assuming that fertility declines to a given value for the long term and remains there. In that connection, what are the prospects for states which have declined to well below the replacement level? Will their fertility remain low or will it ultimately rise to a higher value? At present, there appears to be no reason to expect a rise in fertility for below replacement states. It could be surmised that, as income rises, couples who would prefer additional children may decide to have another birth but there is little experience in India in this regard.

To address the pattern of decline first, Figure 3 shows the trend in the Indian TFR as measured in the SRS since the early 1970s. Despite several periods of "plateauing" in the decline, the general pattern has been downward. The exceptions are the post-Emergency period, in which the TFR remained relatively static into the mid-1980s. It is possible that the brief flattening of the curve in the early 1990s has more to do with the new sample drawn after the 1991 Census than with an actual TFR "stall." Since

1999, the annual decline in the SRS TFR has averaged -0.06 per year, with the largest decrease occurring in the most recent period available, from 2006 to 2007, when it declined by -0.10 . From 1999 to 2000, there was no decrease and, from 2003 to 2004, the decrease was but -0.01 .

When projecting the values of demographic parameters, it is often assumed that, as rates approach some terminal value, the increments of increase or decrease diminish. This pattern is often referred to as the logistic, or Pearl-Reed curve, in which decline slows near the end of the process. An analysis of TFR projections of the United Nations Population Division and the International Programs Center of the U.S. Census Bureau typically exhibit this pattern, even in cases of very rapid TFR decline such as occurred in the Islamic Republic of Iran. In terms of the TFR, this is not surprising as one might expect annual decrease to diminish as the value of the measure itself diminishes. While reasons for this effect will naturally vary by country, one can visualize a scenario where, at the onset of fertility decline from high levels, women with a pent-up need for family limitation will quickly adopt family planning but, as the TFR decreases, women or couples with more deeply-rooted traditions of large families or those in harder-to-reach rural areas will be less likely to practice family size limitation as readily or will have less access to reproductive health services. Does India exhibit this pattern?

In Figure 4, the three-year moving average of TFR change increments in India are shown. In a general way, the amount of decline does appear to lessen as the TFR declines (to 2.7 in 2007). But what of the states, particularly those whose TFR has descended well below replacement level? These could serve as a suggestion for the manner in which fertility will decline in other higher-fertility states.

2. States

Figures 5 and 6 illustrate the same two trends for Kerala, whose TFR fell below replacement in the late 1980s. Here, the pattern of TFR slowdown as a final value is reached seems quite clear. As the TFR declined below 3.0 in the early 1980s, the annual increment of decline did show a downward trend, suggesting the use of some type of logistic curve for fertility assumptions.

The pattern in Tamil Nadu, another state with fertility well below replacement, is similar (see Figures 7 and 8). At least one word of caution should be given when using SRS rates, even three-year average rates. The writer has been advised on numerous occasions by those directly involved with the SRS for many years that the SRS did suffer from some logistical problems in the early 1980s but there is no known public documentation of those difficulties.

Figures 9 and 10 show the same trends for Uttar Pradesh. The state, of course is in the midst of its transition to lower fertility, with a TFR just under four children per woman. For that reason, it is interesting to observe that, in some ways, it appears to resemble the patterns shown in Kerala and Tamil Nadu in that annual TFR declines are fairly large at this midpoint in its TFR decline. Should it follow patterns observed in other states, it may be anticipated that Uttar Pradesh's annual TFR decline will become less and less.

3. Ultimate TFR Levels

Since, as previously noted, projections typically select an ultimate future TFR value, one at which TFR decline will cease, an evaluation of the states in which fertility is above, or well above the replacement, is in order. Figure 11 summarizes the current statewise status of the TFR for 2007, the latest year for which SRS TFRs are available. TFRs are published for what the RGI refers to as the "major," or "bigger" states in population, twenty in all. The number of states in this group has grown over the years, along with the addition of the Delhi National Capital Territory, i.e. the city of Delhi.

Keeping in mind the population size of the states with the highest TFRs, it becomes evident that the bulk of India's future population will lie in the aforementioned larger states, which contain 40 per cent of the country's population (the first six states in Figure 11, reading from left to right). TFRs from 2000 to 2007, along with the annual decrease, are given in Table 7. Recently, in some states, there appears to have

been an acceleration of sorts in the annual SRS TFR decrease in the higher-fertility states following little decrease from 2003 to 2004, when the new sample was incorporated.

Other states with relatively high fertility, should also be considered. The Northeastern State of Assam, with a 2007 SRS TFR of 2.67 and a population of about 30 million currently, has seen its TFR fall by 0.27 since 2004. Haryana (population about 24 million at present), once a part of Punjab, surrounds Delhi on the north, west, and south and is one of India's highest income states, although that is partly due to its high income information technology and manufacturing suburbs of Delhi such as Gurgaon and Faridabad. Its SRS TFR of 3.02 in 2004 declined to 2.62 in 2007, a decline of 0.4. Gujarat, on India's western coast with a population of about 57 million, has been developing industrially rather quickly, particularly around the city of Surat. Its TFR declined from 2.84 in 2004 to 2.62 in 2007, a decline of 0.22. Finally, Orissa¹⁰, an impoverished State of the eastern coast with a population of about 40 million, saw its TFR decline from 2.69 in 2004 to 2.39 in 2007, a drop of 0.3. In each of these states, the TFR had risen slightly from 2003 to 2004 (the new sample). Each of these states had seen a slight increase in the TFR from 2003 to 2004. These are, however, substantial fertility declines for a three-year period.

In Figure 12, both the variation and the rise in the desire to limit childbearing at two living children across states is readily apparent. This measure is lower in the higher fertility states at the right side of the graph. While that is not surprising, change is also clearly underway. Nonetheless, the question of whether or not those states will adopt a two-child norm and when that might occur remains unanswered. An insight can be gained from another fertility preference variable, the "wanted" fertility rate, derived from the planning status of pregnancies, whether wanted at the time, unwanted, or mistimed and the desire for additional children. As can be seen in Figure 13, there has been a significant shift downwards in every State, even at or approaching replacement level in the higher-fertility states.

Some mention should be made on fertility differentials by religion. At the 2001 Census, India's population was 80.5 per cent Hindu, 13.4 per cent Muslim, 2.3 per cent Christian, 1.9 per cent Sikh, 0.8 per cent Buddhist, and 1.0 per cent others, such as Jain and Parsi (RGI 2004a). In NFHS-3, the TFR of Hindus was 2.7, 3.1 for Muslims, 2.4 for Christians, and 2.0 for Sikhs. When considering the wanted TFR, however, those differentials narrow considerably. The wanted TFR for Hindus was 1.9, 2.0 for Muslims, 1.9 for Christians, and 1.5 for Sikhs (IIPS 2007). Wanted TFRs for the other smaller religious groups were all below two children. In terms of numbers, Hindus predominate in all states save for a few small Northeastern states, Jammu and Kashmir, and Punjab. Muslims comprised 67.0 per cent in Jammu and Kashmir, 30.9 per cent in Assam, 25.2 per cent in West Bengal, 24.7 in Kerala, 18.5 per cent in Uttar Pradesh, and 16.5 per cent in Bihar. Sikhs comprise 59.9 per cent of their native State, Punjab, where the vast majority of Sikhs are found. Of the major, states, Kerala has the highest per cent Christian at 19.0 per cent, with the much of the balance of Christians residing in the Northeastern states and in the former Portuguese colony of Goa.

E. CONTRACEPTION

1. India

Overall, contraceptive use has risen in India from 40.7 per cent of currently married women in the 1992-1993 NFHS (36.5 per cent modern methods) to 56.3 per cent all methods and 48.5 per cent modern methods in the 2005-2006 NFHS (IIPS, 199X and 2007). This represents an increase of 1.2 per cent per year for reported use of all methods over the period and 0.9 per cent annually for modern. Contraceptive use data are also collected in the DLHS and are included in Figure 14 for comparison. NFHS and DLHS results are quite similar, although contraceptive use rates (CPRs) collected in the DLHS suggest slightly lower levels of use (IIPS and MOHFW 2006). (National CPRs are not yet available from the 2007-2008 DLHS, for which State-by state results are released first.)

Female sterilization has also predominated in family planning in India, although there has been a small rise in supply methods over the years. The increase in condom use is likely to have resulted from

publicity given to HIV prevention which has intensified in recent years, along with free distribution, an important element of any HIV prevention program. There has also been a noticeable rise in the use of traditional methods, particularly in some states.

Modern CPR rise has been slower in both Bihar and Uttar Pradesh than nationally (see Figures 15 and 16), with use of all modern methods increasing by 0.6 per cent per year from NFHS-1 to NFHS-3. In Uttar Pradesh, the rise in the use of traditional methods, such as withdrawal and rhythm has been rather dramatic and appears in both the NFHS and DLHS surveys. The reasons for this increase appear not yet to have an explanation but one could not help but surmise that the increase suggests a desire to limit family size when family planning services are lacking, a condition known to exist in the State.

In Rajasthan, the increase in the use of modern contraception appears to have been comparatively spectacular (see Figure 17). The modern CPR rose by an average of 1.0 per cent per year from NFHS-1 to NFHS-3, to 44.4 per cent and then to 54.0 in the 2007-2008 DLHS barely two years later, assuming the results of the surveys are comparable. Rajasthan instituted a detailed population policy in 1999 and it appears to have had results. The policy set a goal of replacement fertility by 2016. Andhra Pradesh is included as an example given the different nature of its family program. Despite the declaration of a “target-free” approach following the International Conference on Population and Development (ICPD) in Cairo in 1994, many State programs continued to use administrative targets as they knew no other way of operating. This has certainly been true in Andhra Pradesh (see Figure 18) where sterilization was vigorously promoted with incentives offered such payments of 500 rupees (about \$US10), transistor radios, and the like. As a result, Andhra Pradesh, had the youngest median age at sterilization in India in NFHS-3 at 23.3 years among currently married women. Among women 25-29, 69.1 per cent were sterilized. The national average age at sterilization was also quite young, however, at 25.5 years. In Andhra Pradesh, 95 per cent of sterilized women had not used any other method prior to sterilization, well above the 77.2 rate for all-India. Sterilization regret was not published in the NFHS-2 and NFHS-3 reports, but was in the NFHS-1 report. Despite the data being rather old, it is instructive to observe that 5.5 per cent of couples reported regretting sterilization, with about half of those giving side effects as the reason at that time. Reported male sterilization rates have declined since NFHS-1, when it was 3.4 per cent, to 1.0 per cent in NFHS-3. The majority of sterilized men were sterilized during the 1970s Emergency and have been aging out of the NFHS sample.

F. CONTRACEPTIVE USE AND FERTILITY

Given that sterilization is the primary form of contraception in India, the proportion of family planning due to sterilization could be expected to play a large role in TFR reduction. In Figure 19, it is generally clear that a high proportion of sterilization results in a low TFR. This may have considerable implications for the higher-fertility states, such as Bihar and Uttar Pradesh with approximately 300 million population, one-fourth of the national total. The effectiveness of contraceptive use can also be gauged by examining discontinuation rates. In NFHS-3, 42.3 per cent of women had discontinued a modern spacing method within the first year of use, 10.4 per cent to have child and 10.6 per cent for fear of side effects. In Bihar and Uttar Pradesh, discontinuation of all spacing methods was 44.1 and 42.3 per cent, respectively. Discontinuation rates of spacing methods were generally quite low in the low fertility states, such as 9.9 per cent in Karnataka and 14.1 per cent in Tamil Nadu. West Bengal is a noticeable exception to the more usual pattern of contraceptive use in India, with a proportion of couples using traditional methods. This has been said to be due to the fact that the West Bengal State government never strongly advocated family planning and that many couples appear to have practiced family limitation on their own initiative. One might speculate if the lack of land may have played a role as West Bengal is rather small geographically at about 89,000 sq. kilometers in size (slightly smaller than Portugal and the U.S. State of Indiana) but holds a population of over 80 million. There has been increasing resistance in the State to the usurping of agricultural land by industrial enterprises.

Overall, the relationship between the TFR and contraceptive use is reasonably strong, but there is considerable variation by State. Figure 20 presents a scatterplot of the total CPR and TFR. Overall, the

correlation coefficient is $-.083$ with an r^2 of 0.68 . The relationship between the CPR and TFR is weaker in some states, such as Haryana, whose TFR is relatively high compared its TFR. A similar situation exists in Gujarat and Madhya Pradesh. Finally, given the frequently-observed relationship between female education and fertility, Figure 21 presents educational levels for females by State for those completing the 12th Standard. While the 12th Standard actually represents rather high educational achievement in India, it also provides evidence of the proportion of females whose education is being taken seriously. The quality of education also varies very widely, with private schools providing the best education and government schools the least quality education, frequently lacking equipment and books, qualified teachers, and even toilet facilities. Attendance in private schools tends to be more common in states of the South and in very large cities.

G. SON PREFERENCE

1. As Measured in Surveys

A distinguishing feature of Indian demography is the skewed sex ratio at birth, particularly in the wealthier, lower fertility states. The abortion of female fetuses has grown to what is seen as a major national human rights problem. In 1994, the central government passed the Prenatal Diagnostic Techniques and Regulations and Prevention of Misuse Act (PNDT), following similar measures in several states (Retherford and Roy 2003). Son preference is a well-known facet of Indian life. The possible effect of son preference on the TFR has been estimated at about 1.08, i.e., an eight per cent increase in the TFR as couples strive to have at least one son (Mutharayappa, et al. 1997). The birth of a boy is often greeted with celebration in a village, while that of a girl is barely taken note of or, when it is, with sorrow. There is a traditional Indian saying that having a girl child is “like watering your neighbor’s garden.” The unfortunate truth is that this saying simply recognizes several economic realities and traditional practices, despite the country’s attempts to resist them for many years. At marriage, a daughter leaves the family home to live in her husband’s parents’ house with the result that she is seen as no further use by her parents and will not be a source of support in their old age. In addition, her parents must pay a substantial dowry upon her marriage. The Dowry Prohibition Act was passed in 1961 and, in 1986, sections were to the Indian Penal Code specifying the definition of a dowry death, whereby a bride may even be killed when her in-laws later become dissatisfied with the dowry amount they had received. While the practice is slowly dying out among educated urbanites, very little progress has been made in reality in the large majority of the population. An additional motivation for a son is the necessity, seen by many Hindus, for a son, and not a daughter, to light a parent’s funeral pyre at cremation.

In Figure 22, one measure of the extent of son preference and its trend from NFHS-1 to NFHS-3 is shown. It is both clear that son preference remains quite strong in India but also that it has weakened since the early 1990s. In NFHS-1, 37 per cent of women with two living children and no sons stated that they wished to have no more children. By the time NFHS-3 was taken 61 per cent of such women said they wished to have no more children. Figure 23 gives a similar observation, but for the number of living daughters from NFHS-2. (Measure not available in NFHS-3 reports.) Once again, the preference for sons is quite strong. Still, son preference does appear to be on the decline with additional evidence given in Figure 24. We can speculate that this change is due to several factors: first the desire in India for fewer children in general with the resultant willingness to abandon the attempt to have a son once a desired number of children has been achieved. A second contributing factor may be the awareness that there has been a far higher probability of child survival as well as the awareness that medical services are more available than in the past for a sick child. In addition, the government has been conducting a nationwide campaign using full page newspaper advertisements, billboards, and television spots during universally-watched programs, such as cricket matches and game shows, promoting the value of the girl child.

2. Actual Trends in the SRS Sex Ratio at Birth

While changes in the reported attitudes on the issue of son preference, as measured in surveys, are useful indicators of changes in attitudes, the actual performance of States, as measured in the SRS, is even more informative. In India, the sex ratio at birth (SRB) is shown as the number of female births per 1,000 male births, the reverse of more typical international practice.

Sex ratio at birth was first reported in the 1999 SRS (RGI 2001), five years after the NPDT Act was passed outlawing abortion for the purpose of sex selection. Some of the lowest sex ratios at birth were reported for the States of Haryana and Punjab, both among the country's wealthiest States and with the some of the lowest TFRs. Sex ratios at birth are reported in the annual reports of the SRS for three year averages, beginning with 1999-2001. The worst performing State on this measure was Punjab, with 775 female births per 1,000 male births in 1999-2001, or a sex ratio at birth of 129 male births per 1,000 female births, the highest known sex ratio at birth in the world. Using the Indian method, 950 female births per 1,000 female births would be considered a normal sex ratio. The trend for Kerala in Figure 28 seems odd given that it has not been seen as a state with high son preference.

SRS data indicate that there has been a gradual improvement in the SRB, even in the lowest-performing States, but most of these States are still well below a normal SRB (Figures 25 through 27). Recent news reports from Punjab state have indicated that the number of court cases prosecuting doctors under the NPDT Act had declined since 2006 when a new government was installed in the state (The Tribune, 2009). Nonetheless, the SRS SRB has trended upwards.

H. ADDITIONAL CONSIDERATIONS

The second phase of the National Rural Health Mission (NRHM), 2005-2012 (MOHFW, no date) has, among many other goals, the closing of disparities in reproductive and child health measures between the more impoverished EAG states (Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Orissa, Rajasthan, Uttar Pradesh, Uttaranchal) and the rest of the country, with particular emphasis on rural districts. While NRHM will operate nationally, the EAG states are its focus states. One important difference between the current NRHM is that Prime Minister Singh announced in September 2009 that an Annual Health Survey will be taken to monitor NRHM results by the Centre government¹¹. This can be seen as a major step to ensure results which, in the past, have not always been satisfactory, in part due to decentralization of efforts.

Many other programs to improve living standards and socioeconomic conditions, particularly in rural areas are underway, some quickly initiated by the current government following its impressive success in the 2009 elections. These include the Right to Education Bill, which provides free education up to age 14¹². This program alone will cost about \$US35 billion between now and 2016¹³. Another program to extend a national identity card¹⁴ has begun. This will augment an existing system whereby the below poverty line population (BPL) receive cards to enable them to receive food supplies at greatly reduced prices. There is also a proposed system where "smart cards" will be issued so that it can be assured that benefits under the BPL program reach the intended recipients¹⁵. In that connection, a commission has recommended that the criterion for those living below poverty be extended so that over 50 per cent would be considered as living below the official national poverty line would rise considerably over the current 28 percent. Additional programs target some form of guaranteed employment for the rural population to raise incomes.

These steps being taken by the government are significant since they represent genuine attempts to abandon business as usual and institute reforms and to monitor their progress. This will be a huge task, to be sure, and it will not succeed everywhere at the same pace, but the current government is quite dedicated to the programs' success and that cannot be emphasized too highly.

I. CONCLUSION AND RECOMMENDATIONS

Given that India more resembles a group of countries than a single, homogenous entity, consideration must be paid to fertility prospects among its 35 states and Union Territories.

The low fertility states, such as Kerala and Tamil Nadu, have had TFRs below two children per woman for many years, 1988 in the case of Kerala and 1998 in the case of Tamil Nadu. There is no indication that either of these states will see a significant rise in fertility, given their history. As has been stated in this paper, India's population growth will largely be determined by fertility trends in the large northern states of the Hindi Belt, as the fertility states will have little growth and will ultimately decline in size. At present, these states show steady fertility decline in the SRS, although in the middle of their fertility transition. Fertility will continue to decline in these states for some time, that is a near certainty. But it is very difficult to project where the TFR will cease decline in those states and arrive at a final value, assuming that it does so.

The writer's experience in India and working in many of its states, including speaking with persons in national and local governments, local NGOs, and national and state population organizations have led to the opinion that below replacement fertility in the Hindi Belt states is doubtful, at least in any near time frame. Given that these states comprise 40 percent of the country's population, this is no small matter.

It would be worth investigating the effect of differential growth of larger states on the national rates, such as the TFR. In Table 8, the results of recent projections of India's population are presented. The first column shows the most recent projections of the RGI (RGI, 2006b). The RGI's office produces projections for India and states once a decade following each decennial census, projections which are then used by the national Planning Commission. The RGI first projects a national total for India, then for the major states for which they publish TFRs. TFRs are projected using a Gompertz curve. After projecting the major states and subtracting those results from the national total, the remainder is divided among the smaller states. The RGI projections reach a TFR in 2021. The UN Medium variant projections (UN, 2009) project India at the national level, reaching a TFR of 1.85 in 2020-2025. The UN also produces a number of other variants. The U.S. Census Bureau projections, released in 2009, project the population at the national level and reach a TFR of 2.1 in 2034 (U.S. Census Bureau, 2009). The PFI/PRB projections, released in 2007, were performed for all 35 states and Union Territories. Two variants of these projections, Scenario A, with a "target" TFR of 2.1 for states and Scenario B, with a target TFR of 1.85 were produced. When these projections were run, the most recent SRS crude vital rates were for 2005 and TFRs for major states for 2004. The projections produce a higher result than the other series in Table 8. The difference is most likely accounted for the use of state level projections. Finally, projections run by Dyson (based on the 1991 Census) produce the lowest results by 2051 (Dyson, et al., 2004).

Given the uncertainty of future fertility in the higher-fertility states, a final recommendation might be made. A relatively simple exercise which examines the effect of weighting different sizes of possible future state populations and TFRs on the national TFR would be useful when projecting the country at the national level.

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Table 1. Population Growth in India, 1901-2001

Census year	Population	Decadal growth		1901=100
		Absolute	Per cent	
1901	238,396,327	---	---	100
1911	252,093,390	13,697,063	5.8	106
1921	251,321,213	-772,177	-0.3	105
1931	278,977,238	27,656,025	11.0	117
1941	318,660,580	39,683,342	14.2	134
1951	361,088,090	42,427,510	13.3	151
1961	439,234,771	78,146,681	21.5	184
1971	548,159,652	108,924,881	24.8	230
1981	683,329,097	138,169,445	24.7	287
1991	846,421,039	163,091,942	23.9	355
2001	1,028,737,436	182,316,397	21.5	432

Source: RGI (2004) and electronic files obtained from the RGI office

Table 2. Urban and Rural Population, India, 1901-2001

Census year	Total population	Urban population	Rural population	Intercensal growth of urban population	Intercensal growth of rural population	Per cent urban
1911	252,093,390	25,948,431	226,144,959	93,464	13,603,599	10.3
1921	251,321,213	28,091,299	223,229,914	2,142,868	-2,915,045	11.2
1931	278,977,238	33,462,539	245,514,699	5,371,240	22,284,785	12.0
1941	318,660,580	44,162,191	274,498,389	10,699,652	28,983,690	13.9
1951	361,088,090	62,443,709	298,644,381	18,281,518	24,145,992	17.3
1961	439,234,771	78,936,603	360,298,168	16,492,894	61,653,787	18.0
1971	548,159,652	109,113,977	439,045,675	30,177,374	78,747,507	19.9
1981	683,329,097	159,462,547	523,866,550	50,348,570	84,820,875	23.3
1991	846,302,688	217,611,012	628,691,676	58,148,465	104,825,126	25.7
2001	1,028,737,436	286,119,689	742,617,747	68,508,677	113,926,071	27.8

Source: RGI (2004) and electronic files obtained from the RGI office

Table 3. Population and Decadal Growth Rate, State and Union Territories, India, 1991-2001

Rank in 2001	India/State/Union Territory	Total population		Per cent Growth 1991- 2001	Per cent of India's population		Rank in 1991
		1991	2001		1991	2001	
	INDIA	846,421,039	1,028,737,436	21.5	100.0	100.0	
1	Uttar Pradesh	132,061,653	166,197,921	25.9	15.6	16.2	1
2	Maharashtra	78,937,187	96,878,627	22.7	9.3	9.4	2
3	Bihar	64,530,554	82,998,509	27.9	7.7	8.1	5
4	West Bengal	68,077,965	80,176,197	17.8	8.0	7.8	3
5	Andhra Pradesh	66,508,008	76,210,007	14.6	7.9	7.4	4
6	Tamil Nadu	55,858,946	62,405,679	11.7	6.6	6.1	6
7	Madhya Pradesh	48,566,242	60,348,023	24.3	5.7	5.9	7
8	Rajasthan	44,005,990	56,507,188	28.4	5.2	5.5	9
9	Karnataka	44,977,201	52,850,562	17.5	5.3	5.1	8
10	Gujarat	41,309,582	50,671,017	22.7	4.9	4.9	10
11	Orissa	31,659,736	36,804,660	16.3	3.7	3.6	11
12	Kerala	29,098,518	31,841,374	9.4	3.4	3.1	12
13	Jharkhand*	21,843,911	26,945,829	25.4	2.5	2.6	14
14	Assam	22,414,322	26,655,528	18.9	2.7	2.6	13
15	Punjab	20,281,969	24,358,999	20.1	2.4	2.4	15
16	Haryana	16,463,648	21,144,564	28.4	2.0	2.1	17
17	Chhattisgarh*	17,614,928	20,833,803	18.3	2.1	2.0	16
18	Delhi**	9,420,644	13,850,507	47.0	1.1	1.4	18
19	Jammu & Kashmir	7,837,051	10,143,700	29.4	0.9	1.0	19
20	Uttarakhand*	7,050,634	8,489,349	20.4	0.8	0.8	20
21	Himachal Pradesh	5,170,877	6,077,900	17.5	0.6	0.6	21
22	Tripura	2,757,205	3,199,203	16.0	0.3	0.3	22
23	Meghalaya	1,774,778	2,318,822	30.7	0.2	0.2	24
24	Manipur***	1,837,149	2,293,896	17.9	0.2	0.2	23
25	Nagaland	1,209,546	1,990,036	64.5	0.1	0.2	25
26	Goa	1,169,793	1,347,668	15.2	0.1	0.1	26
27	Arunachal Pradesh	864,558	1,097,968	27.0	0.1	0.1	27
28	Pondicherry**	807,785	974,345	20.6	0.1	0.1	28
29	Chandigarh*	642,015	900,635	40.3	0.1	0.1	30
30	Mizoram	689,756	888,573	28.8	0.1	0.1	29
31	Sikkim	406,457	540,851	33.1	0.1	0.1	31
32	Andaman & Nicobar Islands**	280,661	356,152	26.9	0.03	0.03	32
33	Dadra & Nagar Haveli**	138,477	220,490	59.2	0.02	0.02	33
34	Daman & Diu**	101,586	158,204	55.7	0.01	0.02	34
35	Lakshadweep**	51,707	60,650	17.3	0.01	0.01	35

* Jharkhand was formerly part of Bihar, Chhattisgarh of Madhya Pradesh, and Uttarakhand of Uttar Pradesh.

** Union Territory

*** The 2001 census population of India and Manipur state include estimated population of Mao Maram, Paomara and Purul sub-divisions of Senapati district.

Source: RGI (2004) and electronic files obtained from the RGI office

Table 4. SRS Vital Rates, India, 2000 - 2008

	Births per 1,000 Population	Change	Deaths per 1,000 Population	Change	Infant Deaths per 1,000 Births	Change
2000	25.8	-	8.5	-	68	-
2001	25.4	-0.40	8.4	-0.10	66	-2.0
2002	25.0	-0.40	8.1	-0.30	64	-2.0
2003	24.8	-0.20	8.0	-0.10	60	-4.0
2004	24.1	-0.70	7.5	-0.50	58	-2.0
2005	23.8	-0.30	7.6	0.10	58	0.0
2006	23.5	-0.30	7.5	-0.10	57	-1.0
2007	23.1	-0.40	7.4	-0.10	55	-2.0
2008	22.8	-0.30	7.4	-0.00	53	-2.0

Source: RGI, SRS Bulletins, annual issues

Table 5. SRS Reported Values and 95 Per cent Confidence Limits,
Crude Birth Rate, India and Selected states, 2003 - 2007

		Births Lower Limit	per 1,000 Reported Value	Population Upper Limit	Upper Limit - Lower Limit
India	2003	24.5	24.8	25.1	0.6
	2004	23.8	24.1	24.3	0.5
	2005	23.6	23.8	24.1	0.5
	2006	23.2	23.5	23.7	0.5
	2007	22.9	23.1	23.3	0.4
	2008	22.6	22.8	23.0	0.4
Uttar Pradesh	2003	29.8	31.3	32.8	3.0
	2004	29.9	30.8	31.7	1.8
	2005	29.5	30.4	31.2	1.7
	2006	29.2	30.1	30.9	1.7
	2007	28.8	29.5	30.2	1.4
	2008	28.3	29.1	29.8	1.5
Bihar	2003	30.0	30.7	31.3	1.3
	2004	29.3	30.2	31.0	1.7
	2005	29.8	30.4	31.1	1.3
	2006	29.2	29.9	30.7	1.5
	2007	28.6	29.4	30.2	1.6
	2008	28.0	28.9	29.9	1.9
Kerala	2003	16.1	16.7	17.3	1.2
	2004	14.6	15.2	15.8	1.2
	2005	14.4	15.0	15.7	1.3
	2006	14.2	14.9	15.6	1.4
	2007	14.1	14.7	15.3	1.2
	2008	14.0	14.6	15.2	1.2
Himachal Pradesh	2003	19.4	20.9	21.8	2.4
	2004	17.8	19.2	20.6	2.8
	2005	18.7	20.0	21.2	2.5
	2006	17.4	18.8	20.3	2.9
	2007	16.2	17.9	18.7	2.5
	2008	16.4	17.7	18.9	2.5
Manipur	2003	14.6	15.5	16.5	1.9
	2004	12.8	13.9	15.0	2.2
	2005	13.7	14.7	15.8	2.1
	2006	12.4	13.4	14.5	2.1
	2007	13.6	14.6	15.6	2.0
	2008	14.8	15.8	16.9	2.1

Source: Registrar General of India
SRS *Bulletins*, annual issues,
and personal communication

Table 6. Total Fertility Rates, SRS and NFHS-3, India

	2004 SRS	2005-2006 NFHS-3*	NFHS-3 minus SRS	NFHS-3 Difference as % of SRS
India	2.95	2.68	-0.27	-9.2
Uttar Pradesh	4.39	3.82	-0.57	-13.0
Bihar	4.31	4.00	-0.31	-7.2
Rajasthan	3.74	3.21	-0.53	-14.2
Madhya Pradesh	3.74	3.12	-0.62	-16.6
Jharkhand	3.54	3.31	-0.23	-6.5
Chhattisgarh	3.35	2.62	-0.73	-21.8
Haryana	3.03	2.69	-0.34	-11.2
Assam	2.94	2.42	-0.52	-17.7
Gujarat	2.84	2.42	-0.42	-14.8
Orissa	2.69	2.37	-0.32	-11.9
Jammu and Kashmir	2.39	2.38	-0.01	-0.4
Karnataka	2.28	2.07	-0.21	-9.2
West Bengal	2.22	2.27	0.05	2.3
Maharashtra	2.21	2.11	-0.10	-4.5
Punjab	2.21	1.99	-0.22	-10.0
Delhi	2.15	2.13	-0.02	-0.9
Himachal Pradesh	2.10	1.94	-0.16	-7.6
Andhra Pradesh	2.07	1.79	-0.28	-13.5
Tamil Nadu	1.82	1.80	-0.02	-1.1
Kerala	1.74	1.93	0.19	10.9

*NFHS-3 rates are for the three year period before the survey

Source: RGI, 2005b and IIPS 2008

Table 7. Total Fertility Rate and Annual Change, EAG States, India, 2000-2007

	Uttar Pradesh	Decrease	Bihar	Decrease	Jharkhand	Decrease
2000	4.736	-	4.545	-		-
2001	4.537	-0.20	4.433	-0.11		0.00
2002	4.445	-0.09	4.327	-0.11		0.00
2003	4.388	-0.06	4.216	-0.11		0.00
2004	4.390	0.00	4.305	0.09		0.00
2005	4.232	-0.16	4.309	0.00	3.541	3.54
2006	4.164	-0.07	4.167	-0.14	3.390	-0.15
2007	3.946	-0.22	3.932	-0.24	3.218	-0.17

	Madhya Pradesh	Decrease	Chhattisgarh	Decrease	Rajasthan	Decrease
2000	4.027	-		-	4.126	-
2001	3.930	-0.10		0.00	4.024	-0.10
2002	3.825	-0.11		0.00	3.883	-0.14
2003	3.753	-0.07		0.00	3.773	-0.11
2004	3.735	-0.02		0.00	3.740	-0.03
2005	3.637	-0.10	3.413	3.41	3.660	-0.08
2006	3.546	-0.09	3.302	-0.11	3.510	-0.15
2007	3.400	-0.15	3.140	-0.16	3.440	-0.07

Source: Registrar
General of India,
SRS Annual Reports

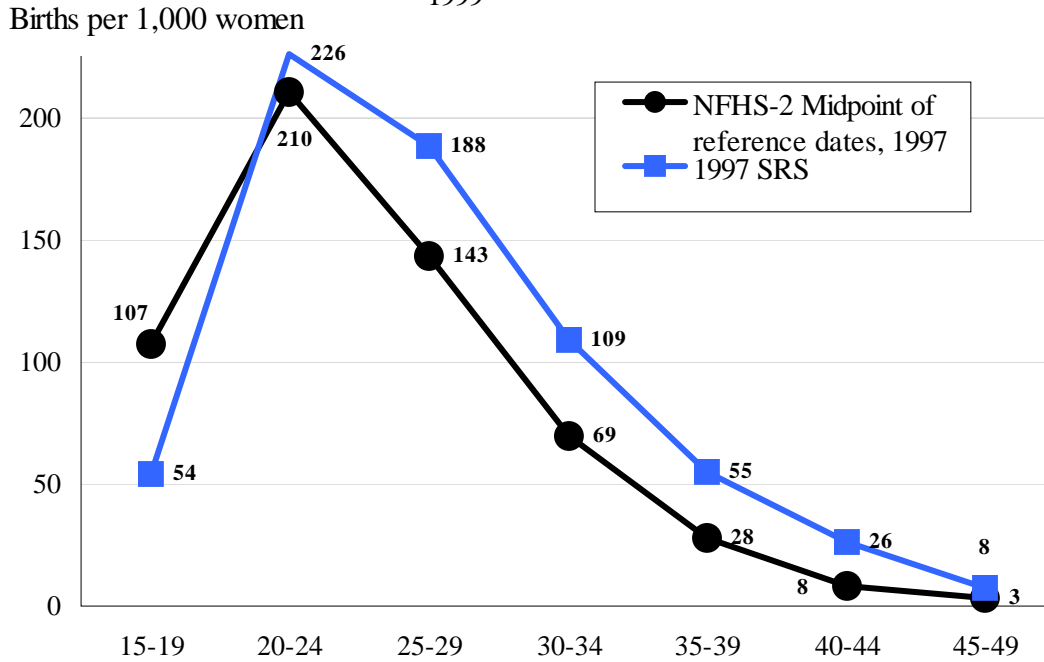
Table 8. Recent Projections by Different Organizations, India (population in millions)

	RGI 2007	United Nations Population Division 2008	U.S. Census Bureau 2009	PFI/PRB PFI/PRB Scenario A	PFI/PRB PFI/PRB Scenario B	Dyson, et al. Dyson, et al. 2000
2001	1,029	1,060	1,023	1,029	1,029	1,027
2026	1,400	1,443	1,409	1,464	1,449	1,419
2051	-	1,617	1,664	1,825	1,751	1,579
2076	-	-	-	2,055	1,876	-
2101	-	-	-	2,181	1,853	-
TFR = 2.1	2021	2020-2025	2034	2056-2061	2036-2041	2016-2021
TFR in 2050	-	1.85	2.1	2.14	2.02	1.8

Note: UN2008 Medium Variant and U.S. Census Bureau 2051 values extrapolated from 2049 and 2050.

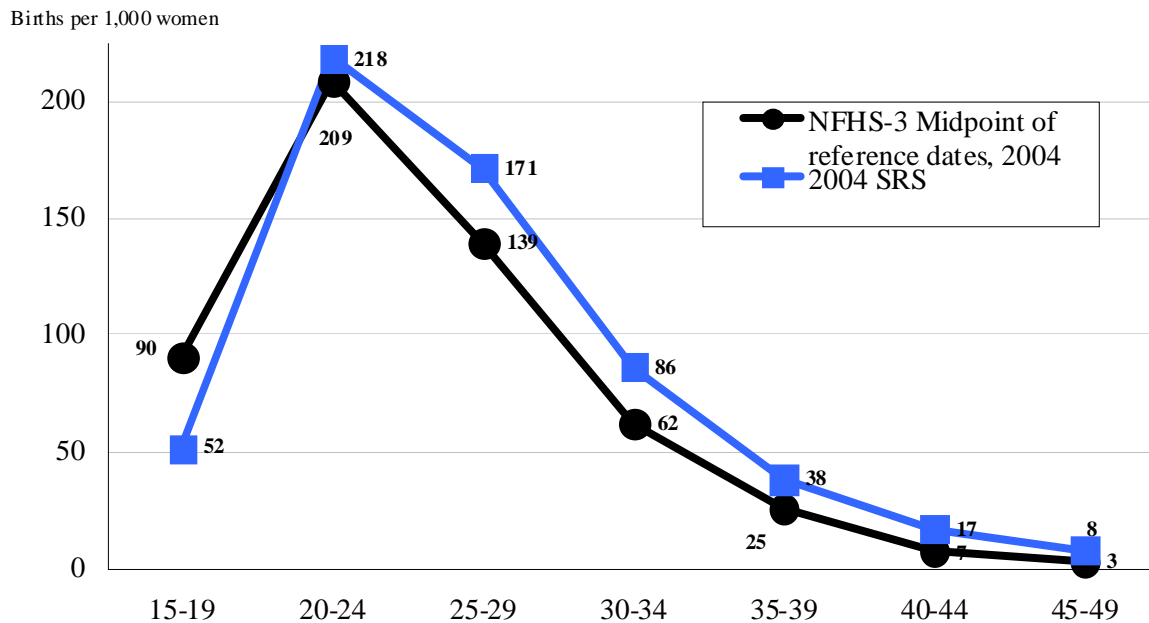
Source: RGI, 2006b, UN 2009, U.S. Census Bureau 2009, PFI/PRB 2007, and Dyson, et al. 2004.

Figure 1. Age-specific Fertility Rates, India, SRS 1997 and NFHS-2, 1998-1999



Source: IIPS 2000 and RGI 1998 Note: 1997 SRS TFR was 3.32; NFHS-2 TFR was 2.85

Figure 2. Age-specific Fertility Rates, India, SRS 2004 and NFHS-3, 2005-2006

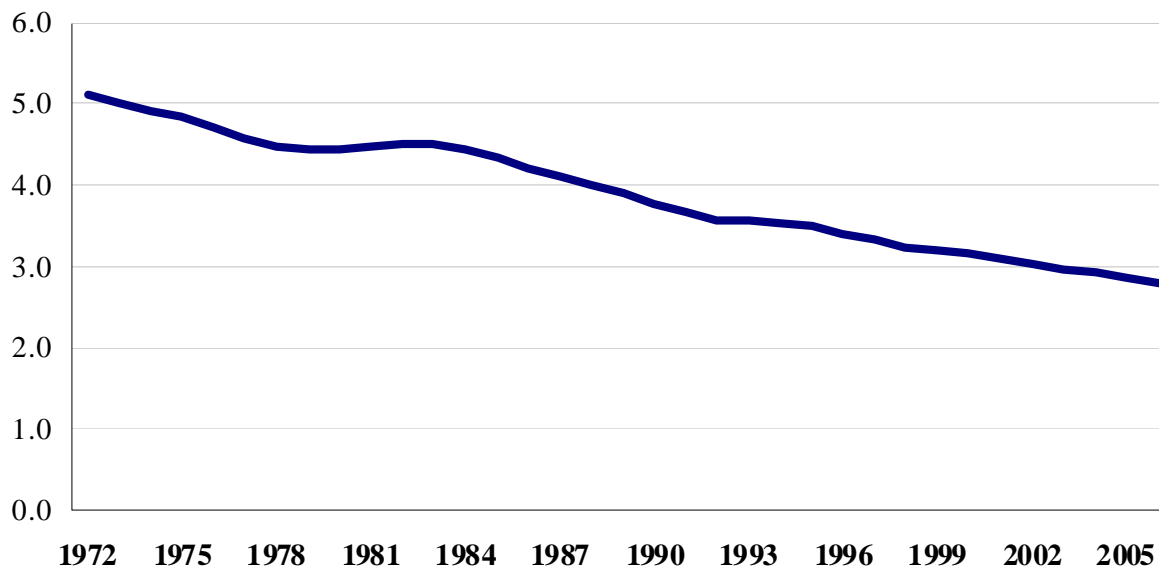


Source: IIPS 2007 and RGI 2006

Note: 2004 SRS TFR was 2.95 NFHS-3 TFR was 2.68

Figure 3. Total Fertility Rate, India, 1972 - 2006 SRS Three Year Moving Averages

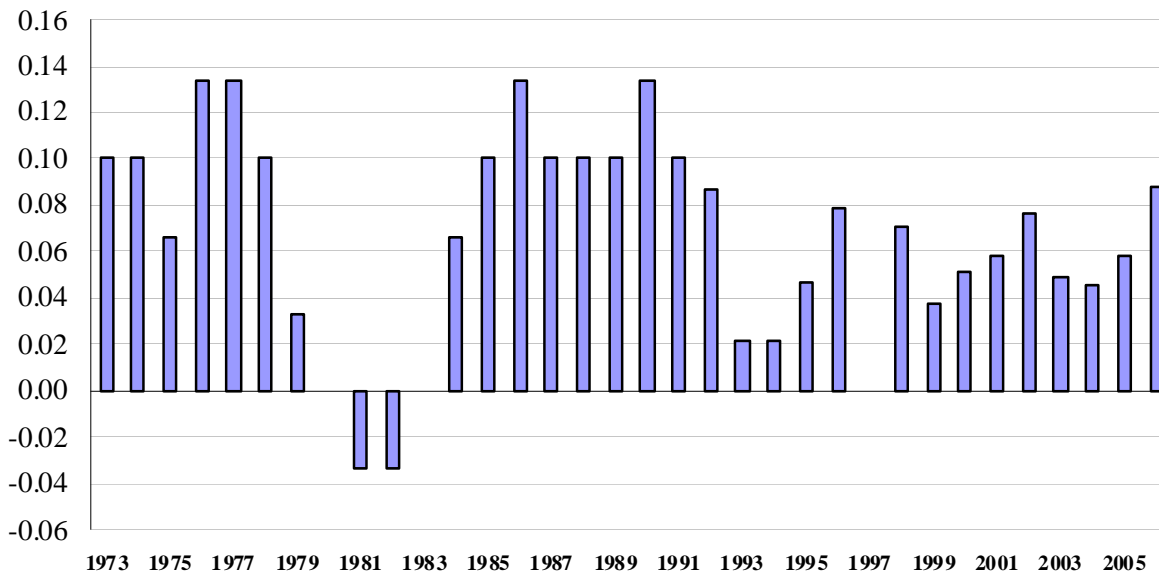
Children per woman



Source: SRS Bulletins and annual reports

Figure 4. TFR Decrease, India, Based on SRS Three Year Moving Averages, 1971-1973 to 2005-2007

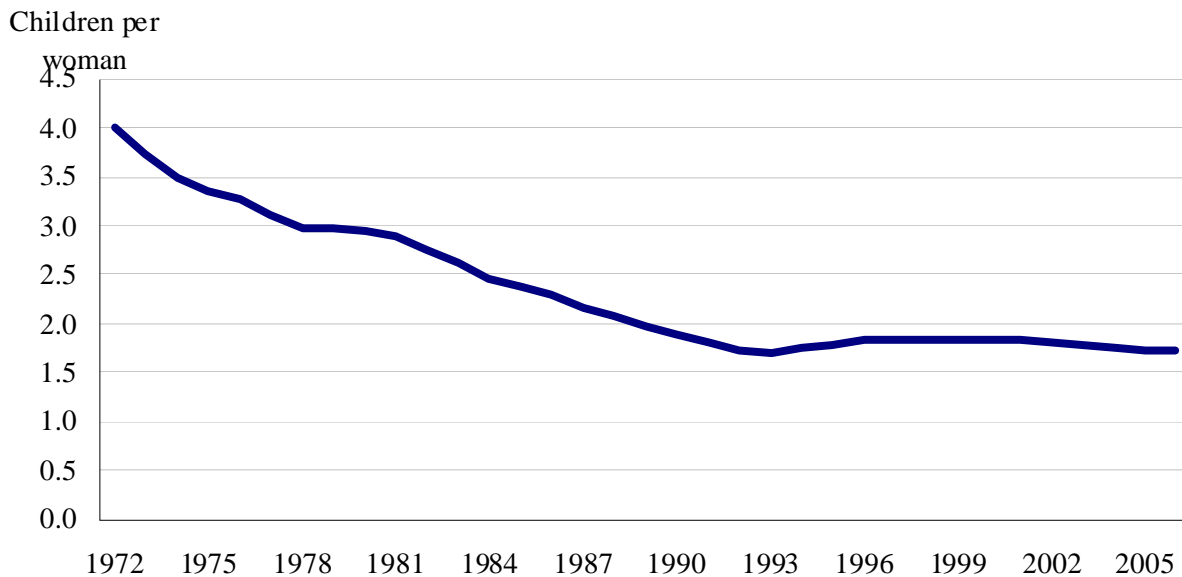
Decrease*



Source: SRS Bulletins and annual reports

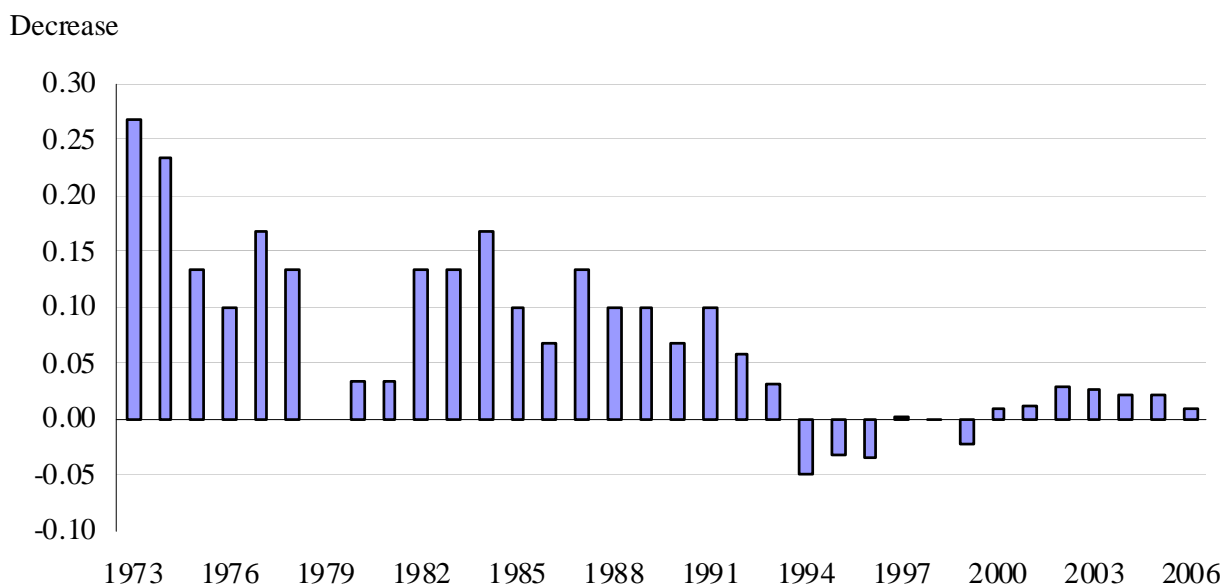
* Negative values indicate a TFR increase

Figure 5. Total Fertility Rate, Kerala, 1972 - 2006 Three Year Moving Averages



Source: SRS Bulletins and annual reports

Figure 6. TFR Decrease, Kerala, Based on SRS Three Year Moving Averages, 1971-1973 to 2005-2007



Source: SRS Bulletins and annual reports

Note: Negative values indicate a TFR increase

Figure 7. Total Fertility Rate, Tamil Nadu, 1972 - 2006 Three Year Moving Averages

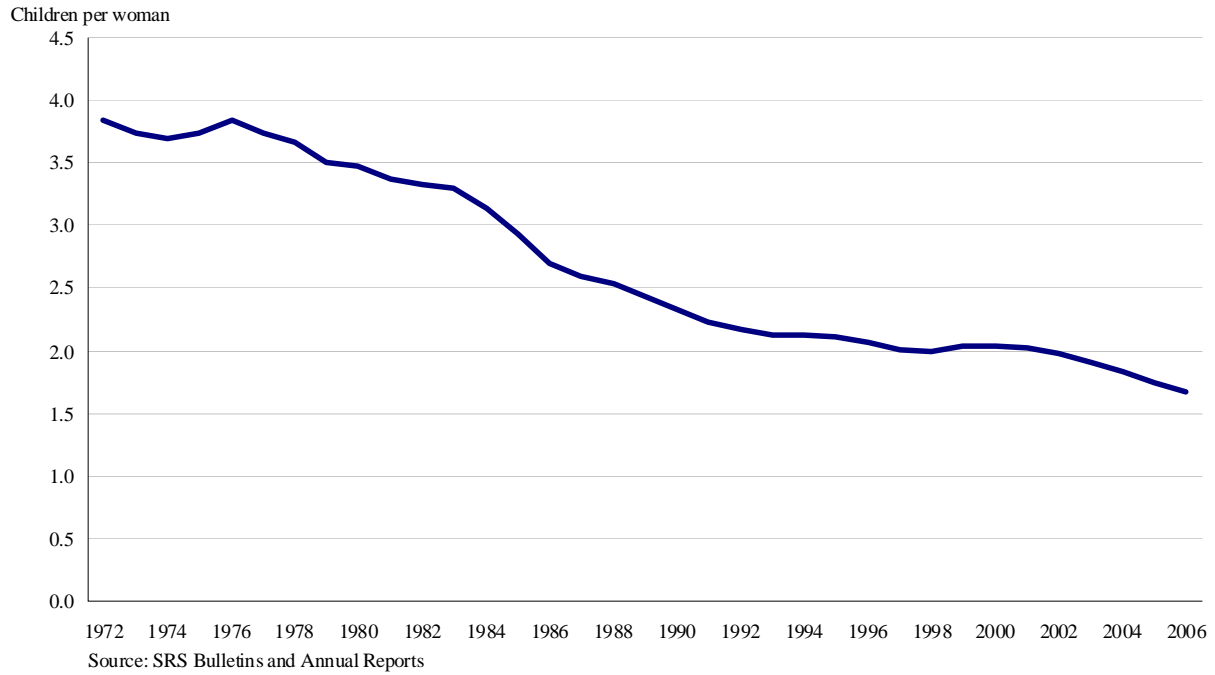


Figure 8. Annual Total Fertility Rate Decrease, Tamil Nadu, Based on Three Year Moving Averages

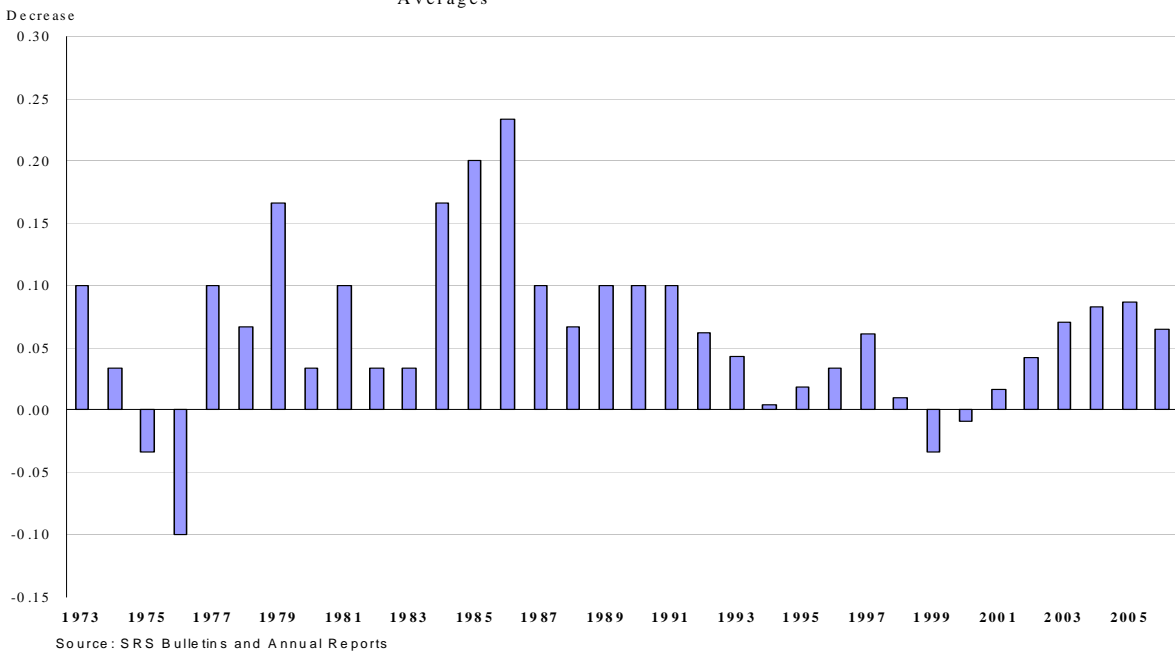
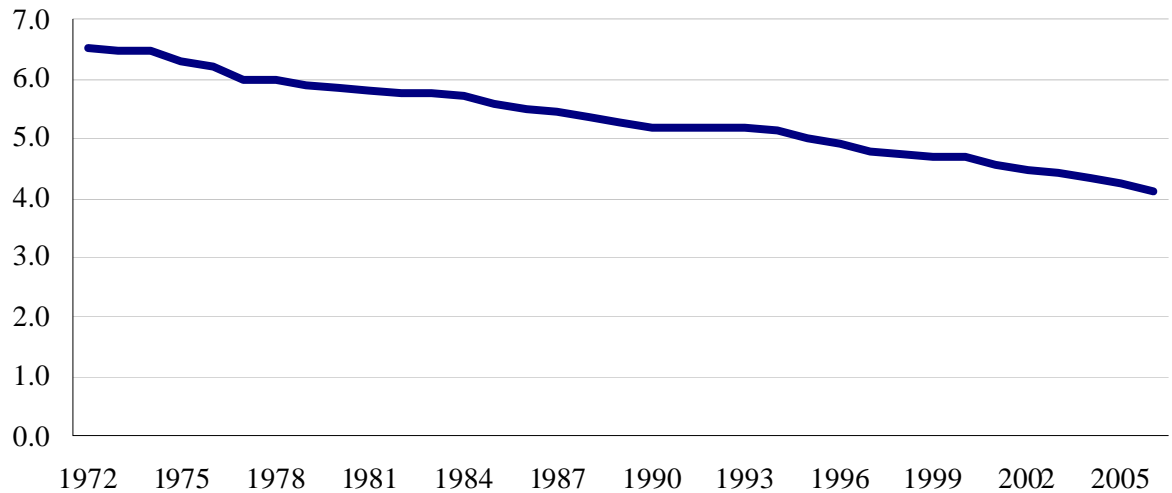
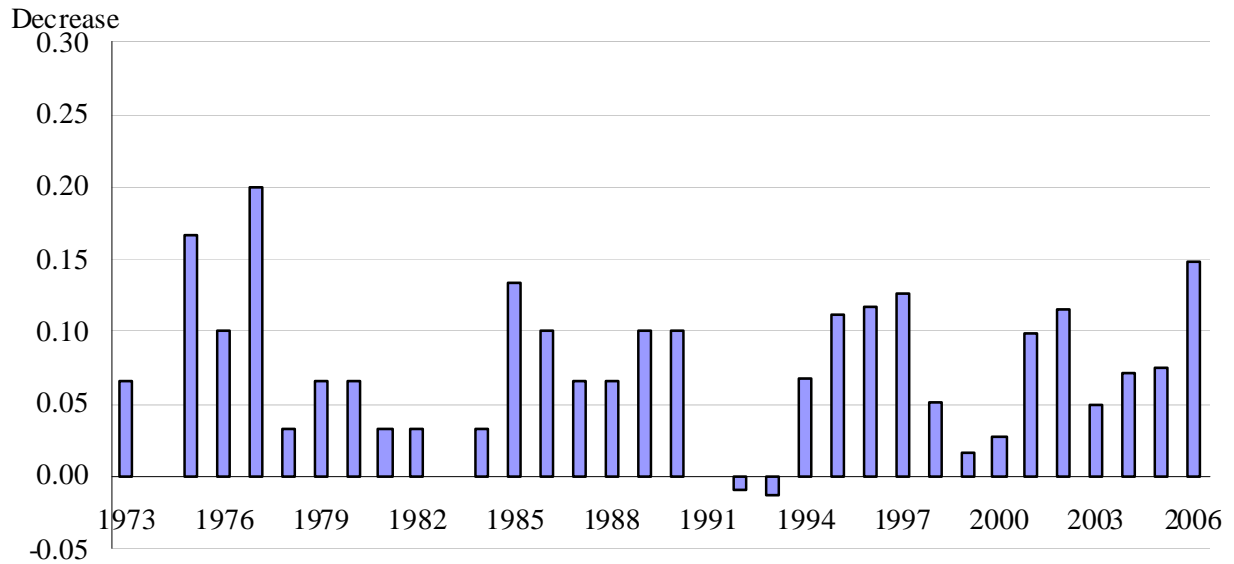


Figure 9. Total Fertility Rate, Uttar Pradesh, 1972 - 2006 Three Year Moving Averages
Children per woman



Source: SRS Bulletins and annual reports

Figure 10. Annual Total Fertility Rate Decrease, Uttar Pradesh, Based on Three Year Moving Averages



Source: SRS Bulletins and annual reports

Note: Negative values indicate a TFR increase

Figure 11. Total Fertility Rate, Major States of India, 2007

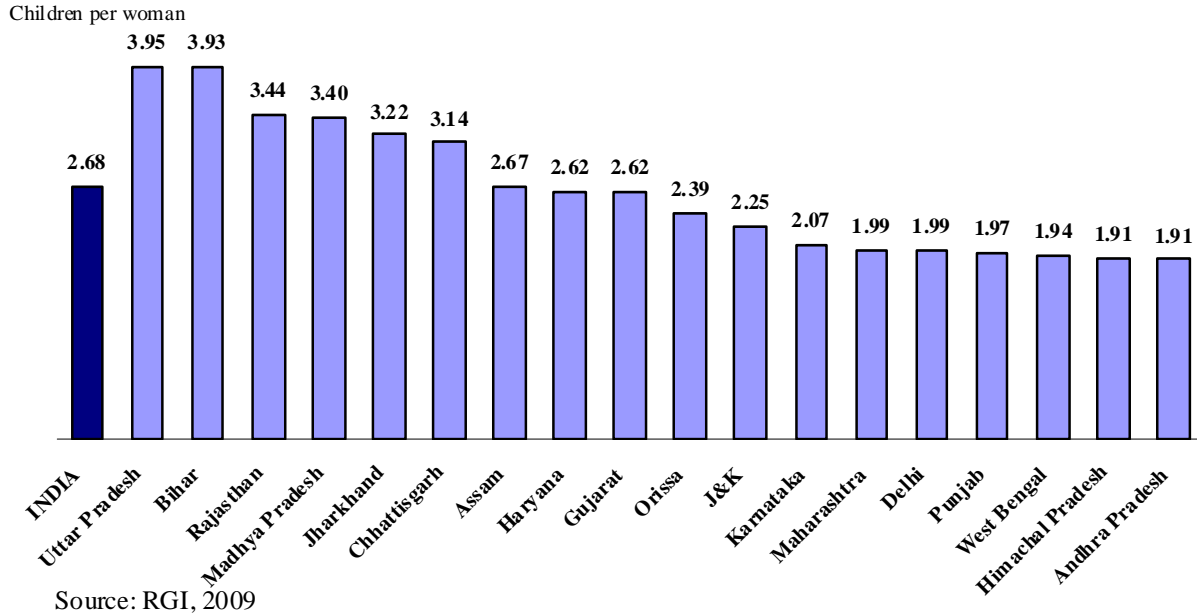


Figure 12. Currently Married Women, Ages 15-49, with Two Living Children Who Want No More, Selected States of India

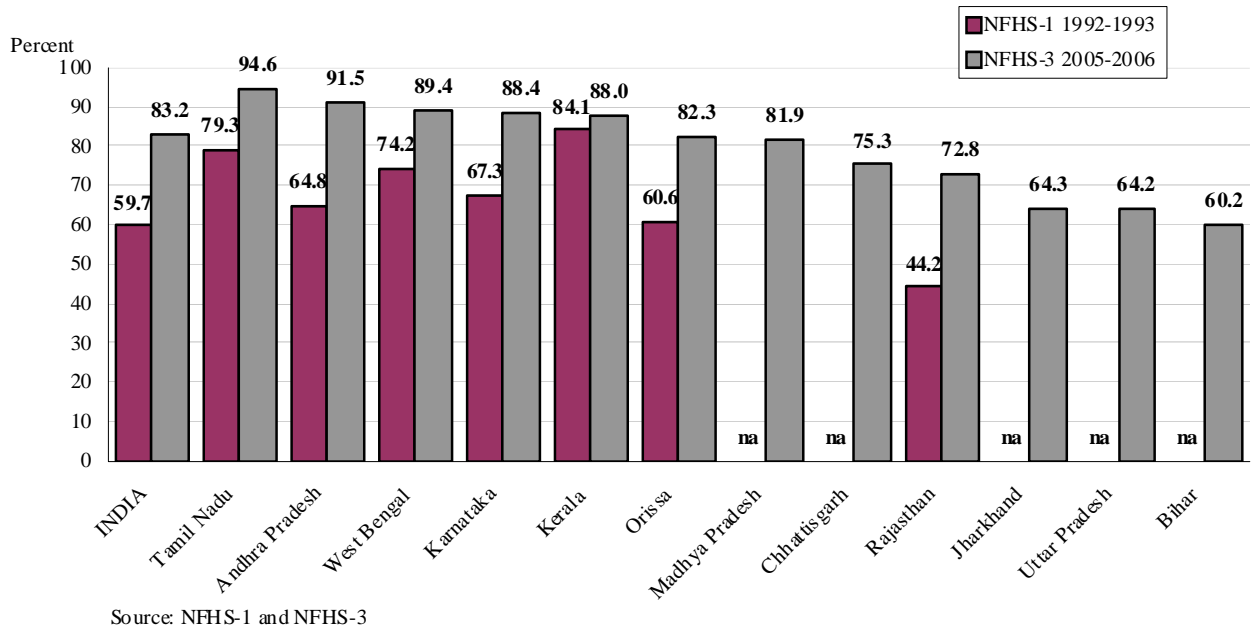
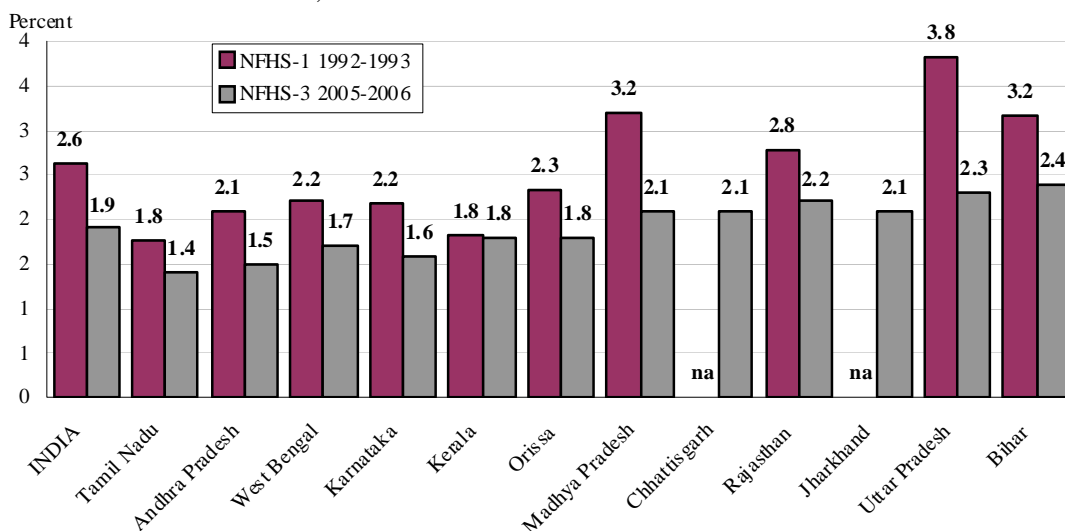


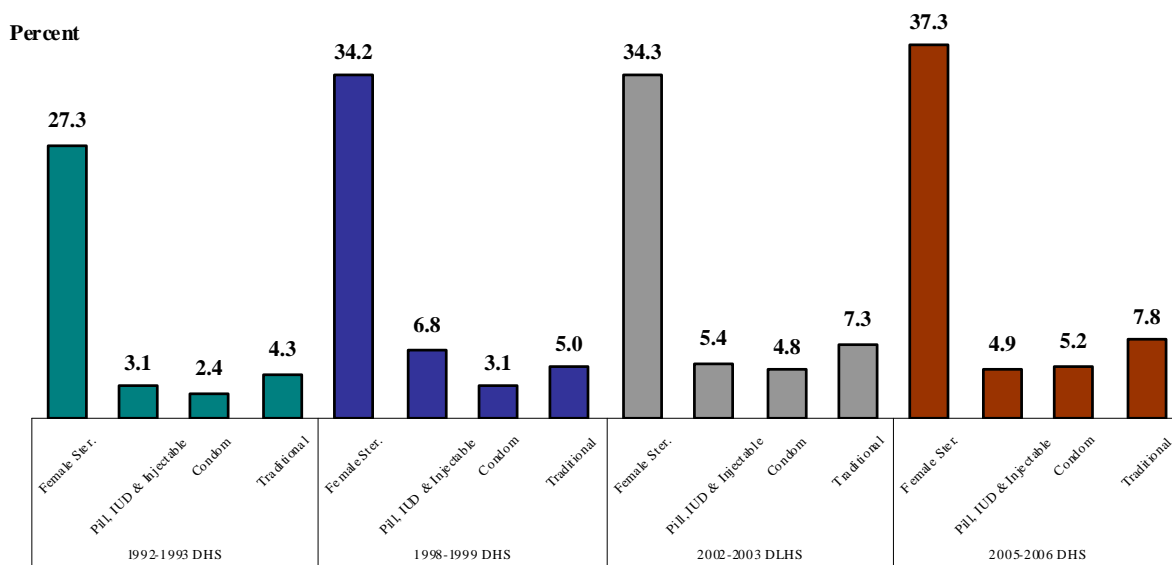
Figure 13. "Wanted" Total Fertility Rate among Currently Married Women, Ages 15-49, India and Selected States, NFHS-1 and NFHS-3



Source: NFHS-1 and 3

Note: In NFHS-1, Madhya Pradesh includes Chhattisgarh, Uttar Pradesh includes Uttarakhnad, and Bihar includes Jharkhand

Figure 14. Contraceptive Use by Currently Married Women, Ages 15-49, Modern and Traditional Methods, India



Source: DHS, DLHS

Figure 15. Contraceptive Use by Currently Married Women, Ages 15-49, Modern and Traditional Methods, Uttar Pradesh

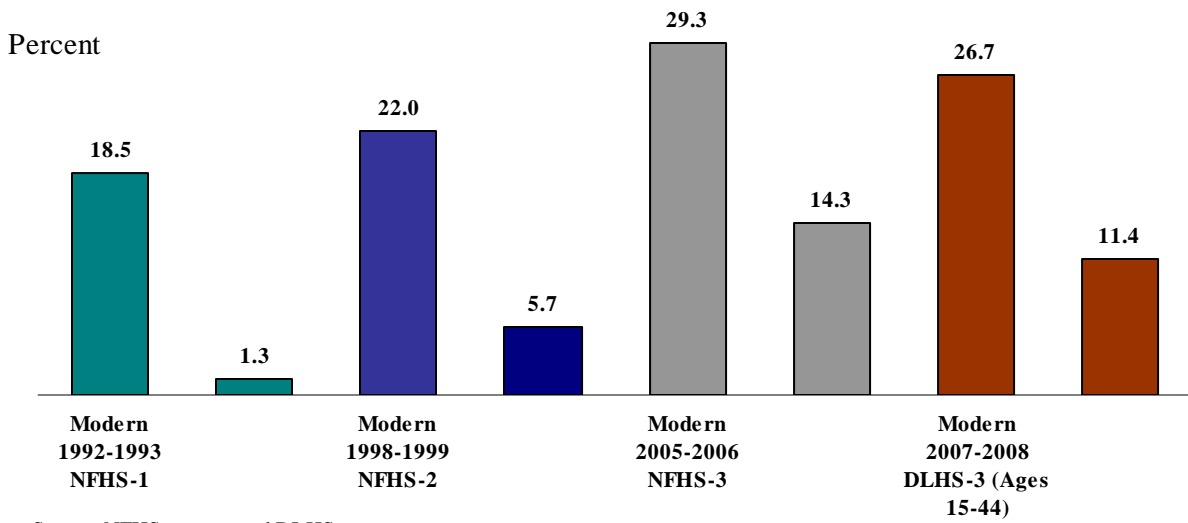


Figure 16. Contraceptive Use by Currently Married Women, Ages 15-49, Modern and Traditional Methods, Bihar

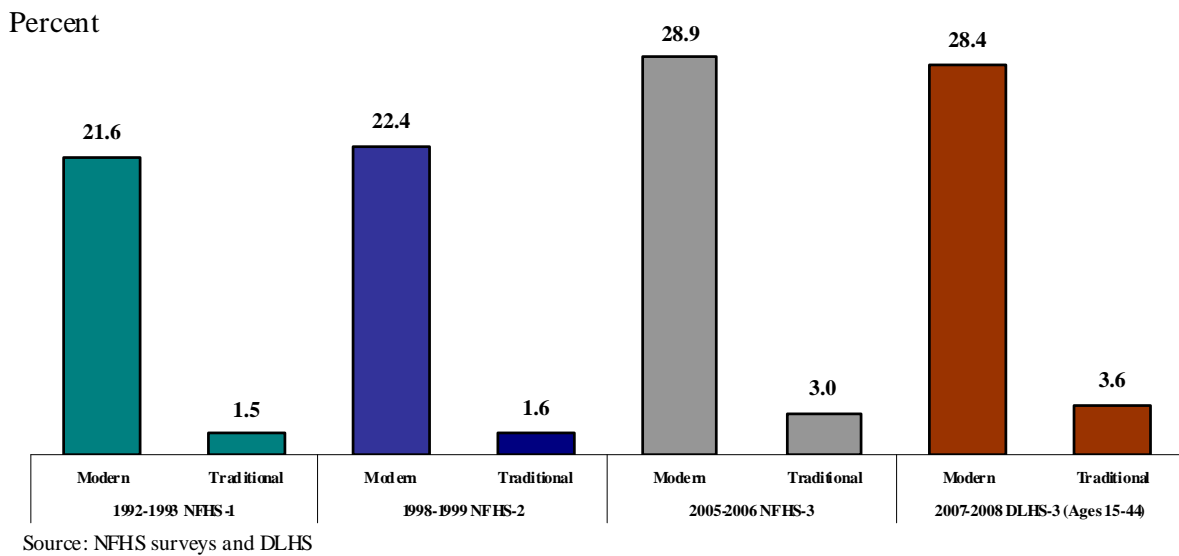
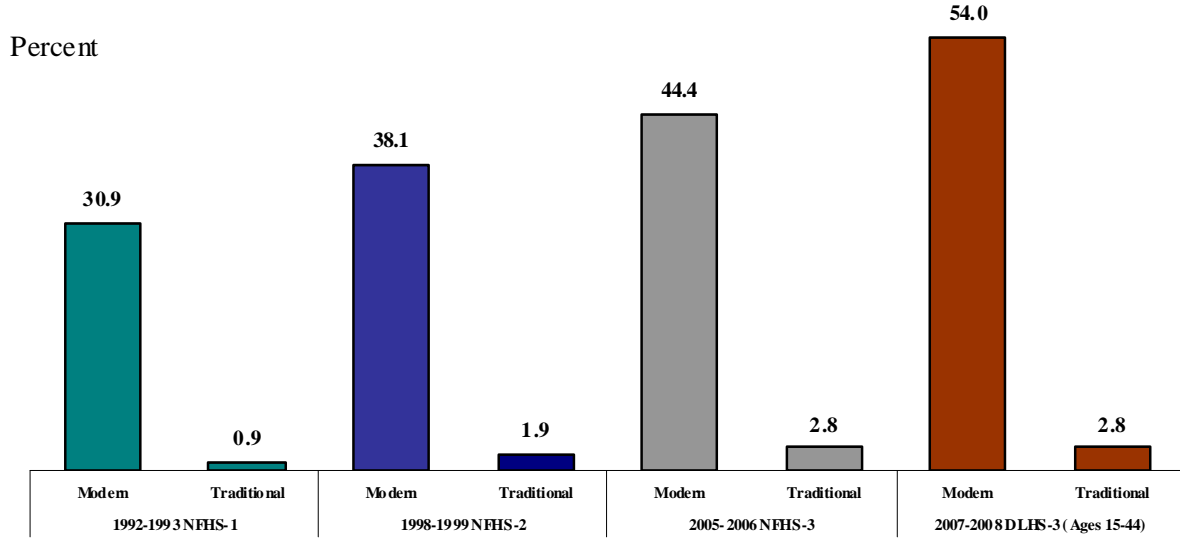
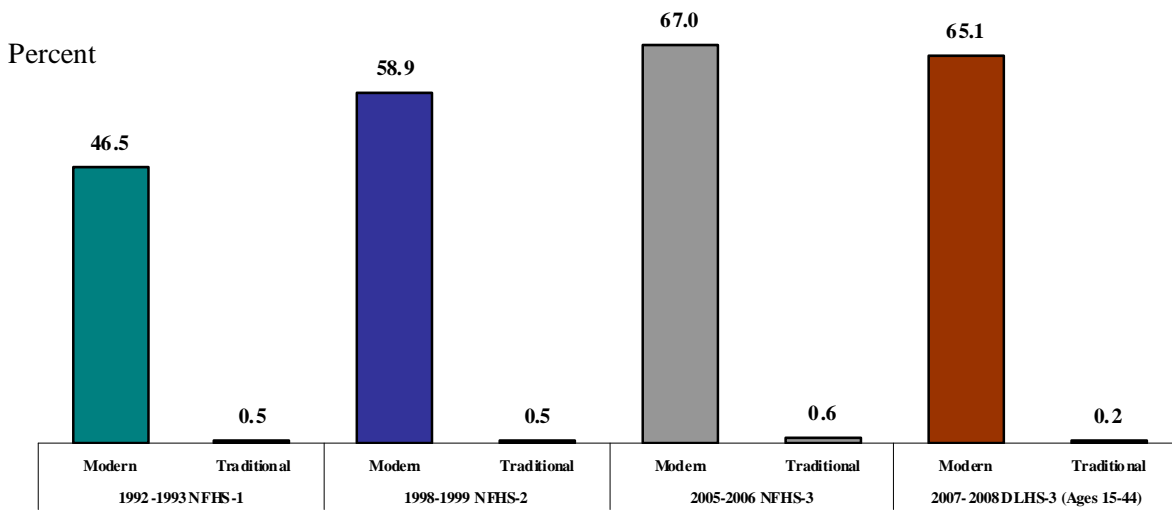


Figure 17. Contraceptive Use by Currently Married Women, Ages 15-49, Modern and Traditional Methods, Rajasthan



Source: NFHS surveys and DLHS

Figure 18. Contraceptive Use by Currently Married Women, Ages 15-49, Modern and Traditional Methods, Andhra Pradesh



Source: NFHS surveys and DLHS

Figure 19. Contraceptive Use, Percent of Currently Married Women, Ages 15-44 Using Female Sterilization and Using Other Methods, Selected States of India, 2007-2008

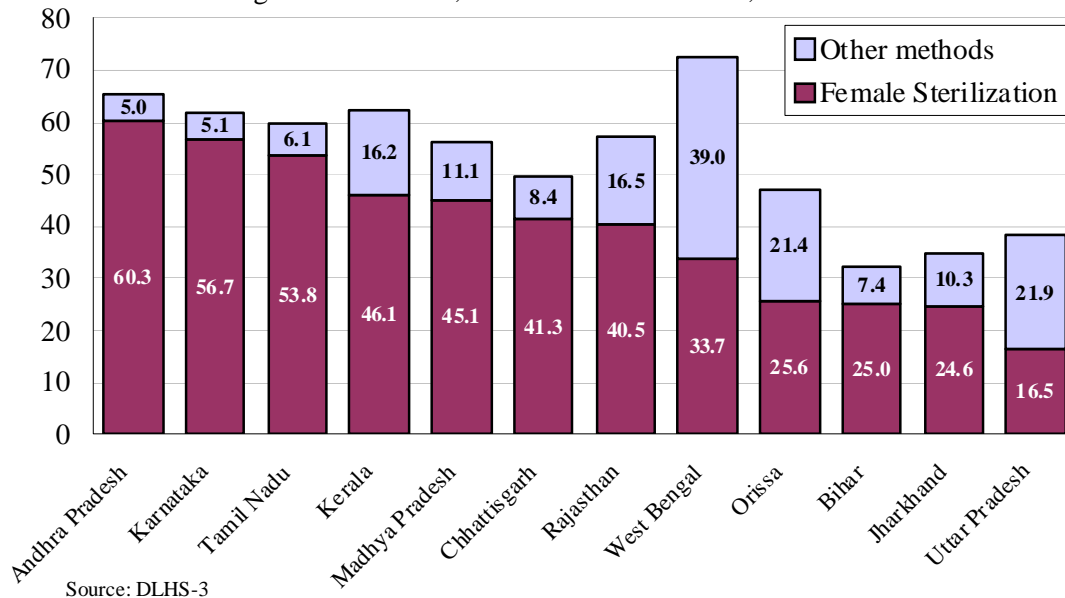


Figure 20. Contraceptive Use, All Methods, 2005-2006 and 2005 Total Fertility Rate, India and Larger States

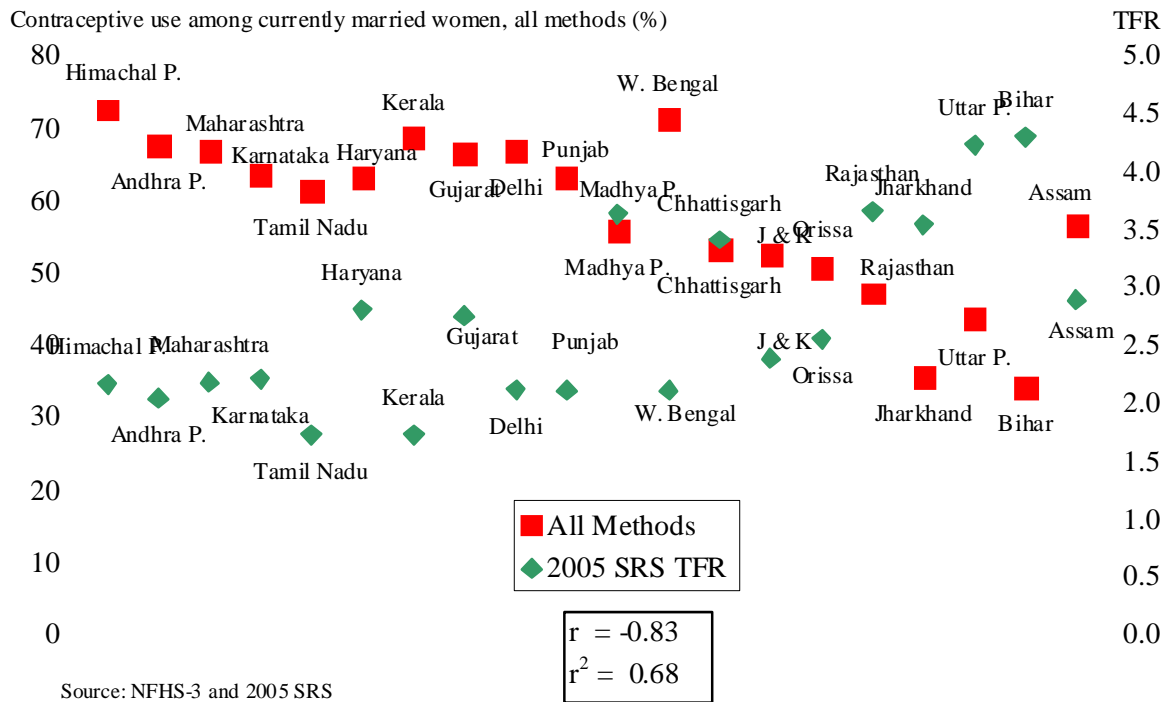
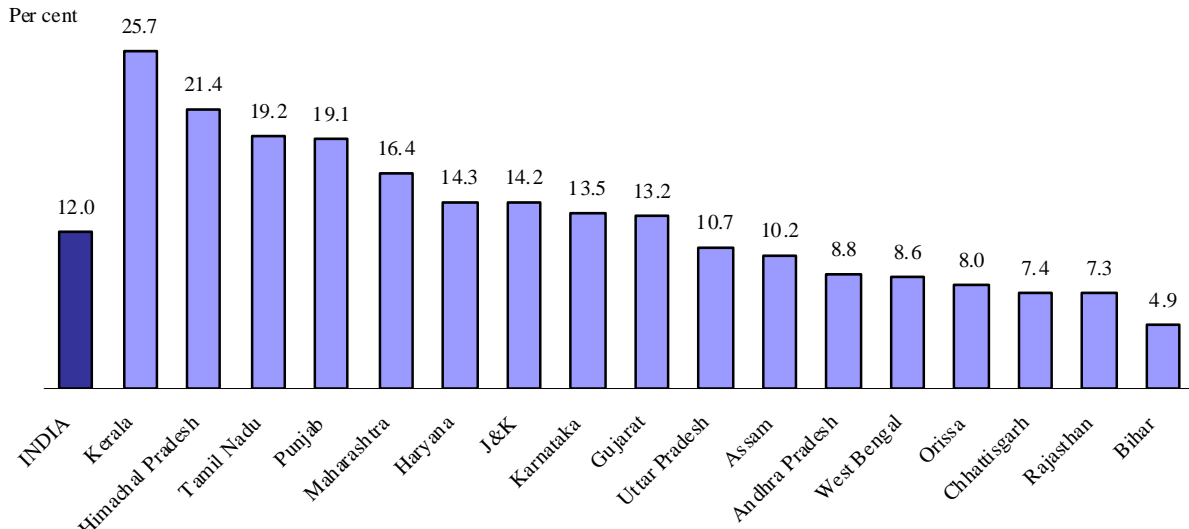
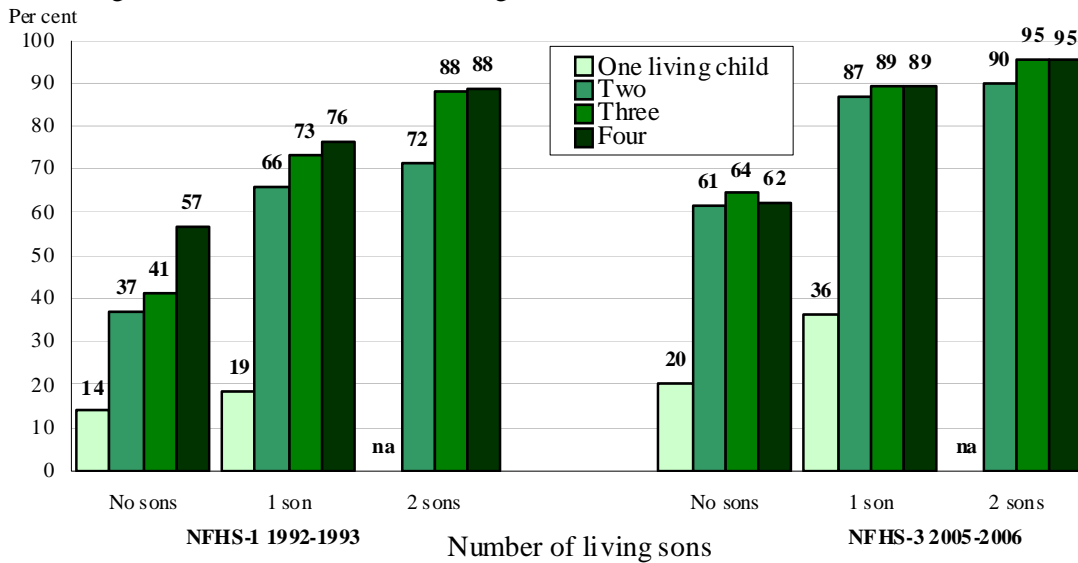


Figure 21. Women 15-49 with 12 or More Years Education, Major States, 2005-2006



Source: NFHS-3

Figure 22. Currently Married Women, Ages 15-49, Who Want No More Children by Number of Living Children and Number of Living Sons, NFHS-1 and NFHS-3



Source: NFHS-1 and 3

Figure 23. Currently Married Women, Ages 15-49, Who Want No More Children by Number of Living Children and Number of Living Daughters, NFHS-2

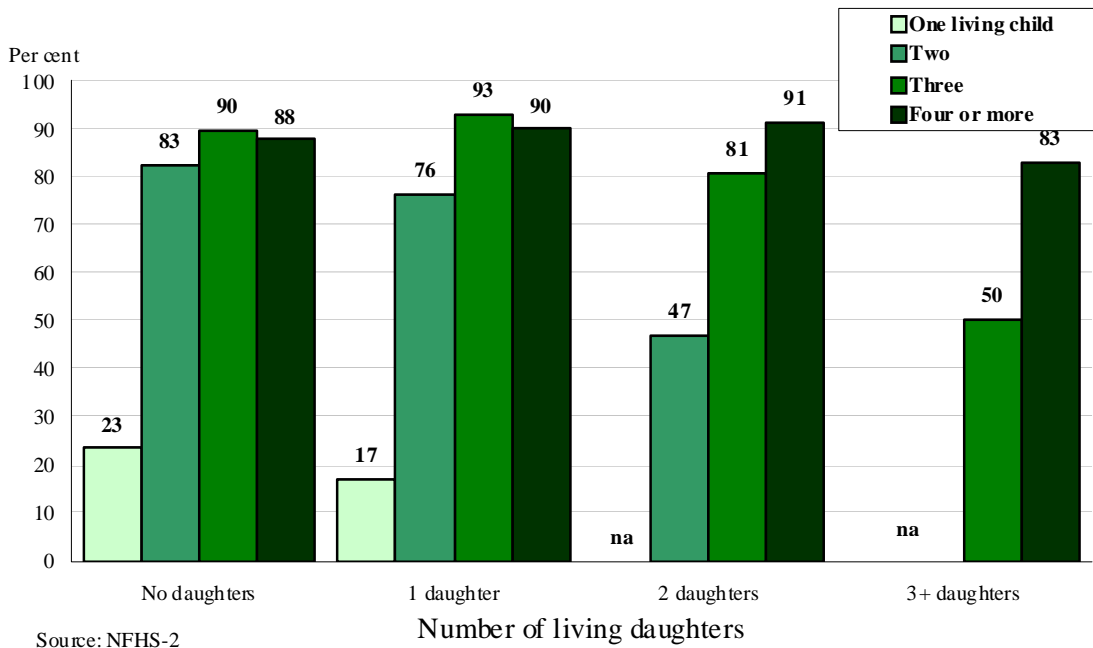


Figure 24. Currently Married Women, Ages 15-49, by Ideal Number of Children, by Sex, India, NFHS-1, NFHS-2, and NFHS-3

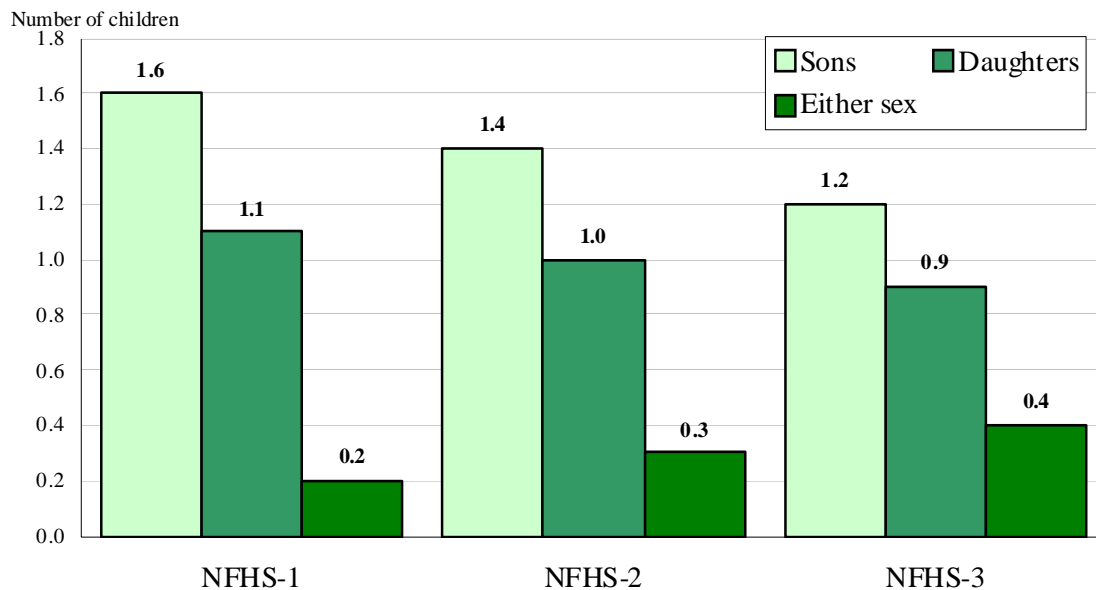


Figure 25. Sex Ratio at Birth, India, Worst Performing States, 1999-2001 to 2005-2007

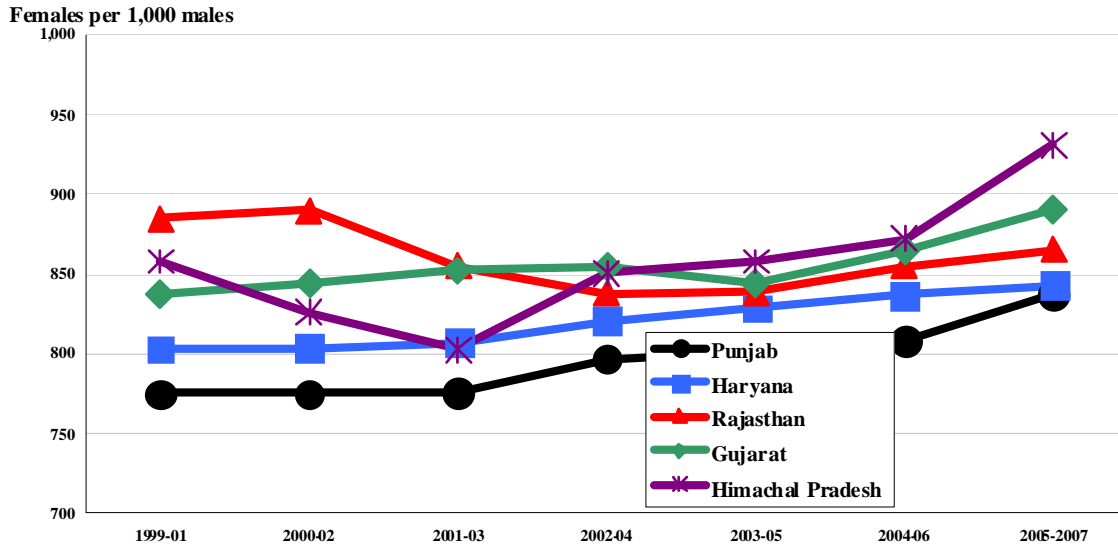


Figure 26. Sex Ratio at Birth, India, Middle Performing States, 1999-2001 to 2005-2007

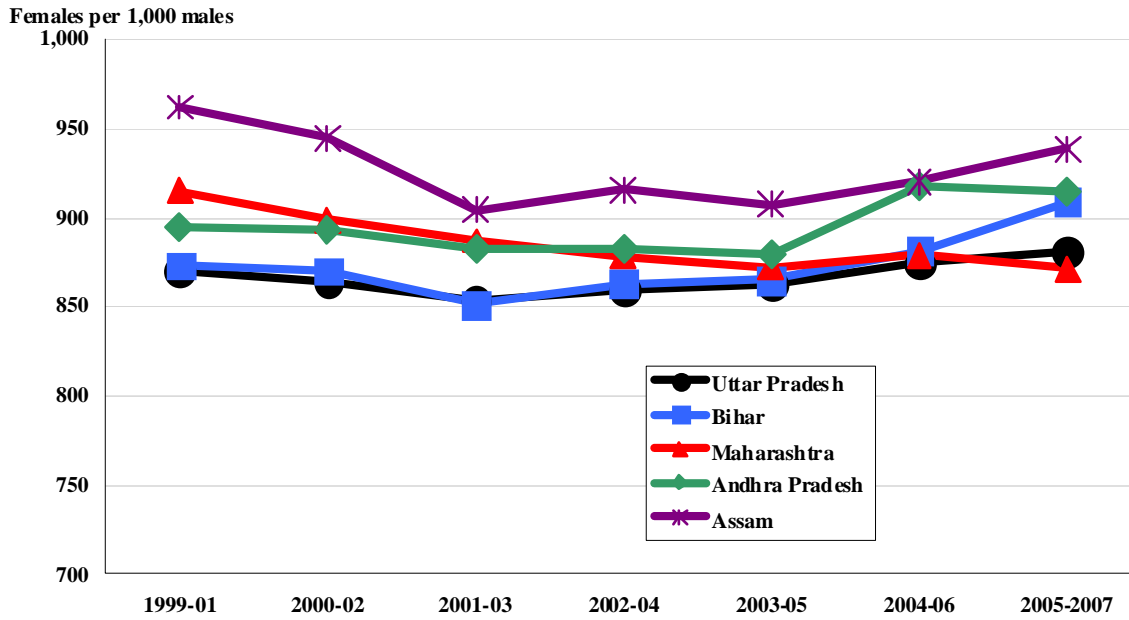
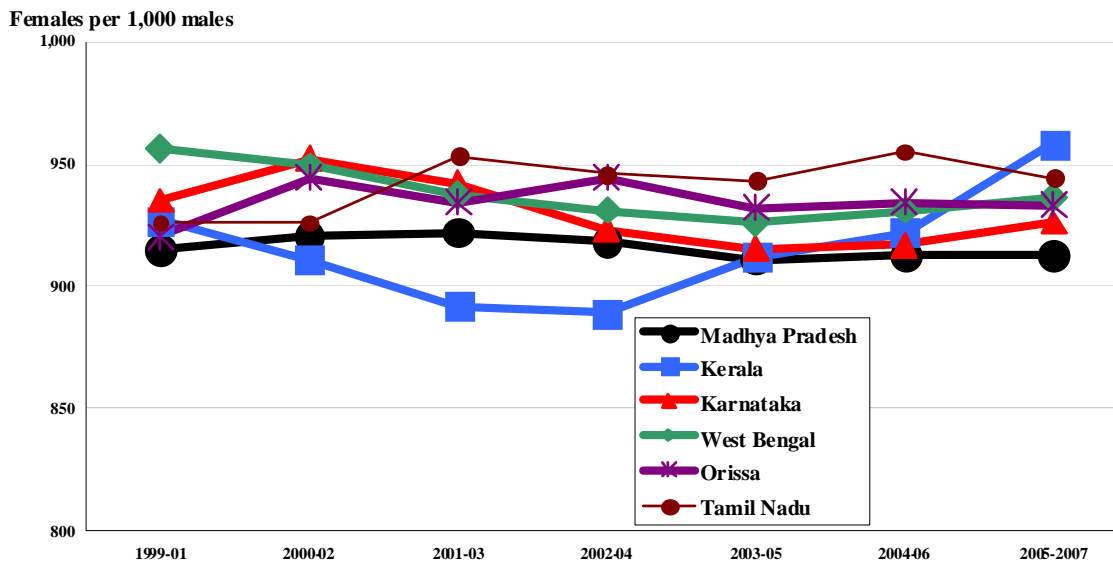


Figure 27. Sex Ratio at Birth, India, Best Performing States, 1999-2001 to 2005-2007



ENDNOTES

¹ The full name of the RGI office is the Office of the Registrar General and Census Commissioner, India since the office is responsible for both vital event registration and the decennial census. Typically, the acronym “RGI” is used.

² On the map below, Uttarakhand is shown as Uttaranchal. The name was changed to Uttarakhand in 2007.

³ <http://www.census.gov/ipc/www/idb/country.php>

⁴ <http://esa.un.org/unpp/p2k0data.asp>

⁵ PRB projections

⁶ The Sample Registration System (SRS) is a large-scale demographic survey for providing reliable annual estimates of birth rate, death rate and other fertility & mortality indicators at the national and sub-national levels. Initiated on a pilot basis by the OFFICE OF THE REGISTRAR GENERAL, INDIA in a few selected states in 1964-65, it became fully operational during 1969-70 with about 3700 sample units. The field investigation consists of continuous enumeration of births and deaths in selected sample units by resident part time enumerators, generally anganwadi workers & teachers, and an independent survey every six months by SRS supervisors. The data obtained by these two independent functionaries are matched. The unmatched and partially matched events are re-verified in the field and thereafter an unduplicated count of births and deaths is obtained. The sample unit in rural areas is a village or a segment of it, if the village population is 2000 or more. In urban areas, the sampling unit is a census enumeration block with population ranging from 750 to 1000. The SRS sample is replaced every ten years based on the latest census frame. It had been a practice to stagger the replacement process over 2-3 years. However, the latest replacement has been carried out in one go. Effective from January 2004, this sample is based on the 2001 Census frame. At present, SRS is operational in 7,597 sample units (4,433 rural and 3,164 urban) spread across all states and UTs and covers about 1.4 million households and 7.01 million population. (Registrar General of India, *SRS Bulletin*, October 2008)

⁷ RGI report, 1992

⁸ www.censusindia.gov.in

⁹ www.iipsindia.org

¹⁰ Orissa is likely to change its name to Odisha in the near future

¹¹ See <http://www.hindu.com/2008/10/03/stories/2008100360220300.htm>

¹² <http://timesofindia.indiatimes.com/india/Parliament-passes-landmark-Right-to-Education-Bill/articleshow/4857243.cms>

¹³ <http://timesofindia.indiatimes.com/india/Right-to-education-Will-schools-get-a-lifeline/articleshow/5181530.cms>

¹⁴ <http://timesofindia.indiatimes.com/news/india/Nilekani-takes-charge-says-first-set-of-IDs-in-12-18-months/articleshow/4812763.cms>

¹⁵ <http://timesofindia.indiatimes.com/city/ranchi/Smart-cards-for-BPL-families-in-the-offing/articleshow/5051905.cms>