

## ON THE FUTURE OF HUMAN FERTILITY IN INDIA

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*The trouble with our times is that the future is not what it used to be.* (Paul Valery)

*Prophecy is a good line of business, but it is full of risks.* (Mark Twain)

This paper addresses the issue of the trend and level of fertility in India during the coming decades. It takes as its starting point (i) the requirement to produce population projections which are as accurate as possible, and (ii) the fact that countries with fertility around or below the replacement level currently hold over forty percent of the world's people. Since India contains one sixth of humanity, the future of its population is clearly of great interest. And the question of what will happen to the country's total fertility rate (TFR) is crucial - because it will doubtless be the most important variable determining by how much the population will grow.

The paper has six parts. First I provide an explanation for the phenomenon of below-replacement fertility. Second I comment briefly on the processes involved in framing assumptions for population projections. Third I review some past population projections for India - with particular reference to their fertility assumptions. This involves forwarding some fertility assumptions and rationalisations of my own. Fourth I make some additional comments about the nature of future fertility decline in India. Fifth I examine the subject of regional fertility variation - a discussion which *inter alia* touches upon how low future total fertility may fall. Here I suggest that there are deep-seated social-structural considerations which will probably influence regional fertility variation over the medium-term. The final section of this unreservedly speculative paper summarises and concludes.

### A. EXPLAINING BELOW -REPLACEMENT FERTILITY

Before considering the specific case of India some words are in order about two related, but distinct questions. Why is fertility declining in the developing world? And why do some countries now have below-replacement fertility?

The answer to the first question is mortality decline. The *remote* force which, operating at what I have elsewhere termed the 'super-macro' level, has *ultimately* caused all sustained fertility declines since the late eighteenth century is persistent and massive mortality decline (Dyson 2001a, pp. 69-72). Confronted with a major fall in the death rate no society can remain with a TFR of five or six live births for more than a few decades. Because sustained mortality decline leads to bigger and bigger cohorts entering the working ages it has a depressing effect upon relative wages. Cohorts of young people are eventually forced to choose between experiencing a fall (or significantly reduced rate of improvement) in their levels of living, or limiting fertility (Macunovich, 2000). When people restrict their fertility they usually rationalise the decision with proximate explanations (e.g. we can't afford many children). In other words, they don't appreciate that mortality decline is the ultimate cause of their behavioural change. Many factors - social, cultural, economic - influence the *timing* and *speed* of the fertility decline response in particular populations. But the remote causal force behind all fertility transitions is mortality decline. This is just as true for the developing world today as it was for historical Europe. But because they have

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benefited from what is sometimes termed a 'late development effect' changes in contemporary developing countries tend to be *faster* than was the case in Europe.

The answer to the second question is that because of mortality decline and - still more - fertility decline, *women have become more like men* (Dyson, 2001a, pp. 82-83). In all societies women not only give birth to the children, but they also do most of the childcare. Therefore circumstances of high fertility tend to lock them up within the domestic domain. In high fertility societies women's relatively short lives were - and in some places still are - dominated by the responsibilities of childbirth and childcare. But this is not true of places where fertility is low and life expectation at birth (LEB) is high.

As Davis and van den Oever (1982) argued in a seminal piece, a major social-structural adaptation to conditions of persistent low fertility is *a weakening of the institution of marriage*. For women especially, but also for men, marriage in the sense of a formal lifetime commitment for the having and rearing of children becomes much less important than it used to be. Given such conditions women have more time - and partly because they live longer, more reason - to pursue their lives away from the domestic domain. Consequently, especially in the most developed countries (e.g. of Europe, North America, Japan) levels of gender differentiation have tended to fall. And measures of gender equality tend to be greatest in societies with low fertility. In Europe and North America, for example, recent decades have seen women become more like men *vis-à-vis* their levels of education, employment patterns, appearance, and even their names (Dyson, 2001a, p. 73).

These reductions in gender differentiation have been *asymmetrical* i.e. it is the women who have become more like the men, rather than the reverse (e.g. see Lieberman, Dumais and Baumann, 2000, p. 1285). I stress that I am *not* saying that women have become *the same* as men (thankfully differences remain and, of course, a majority of women still marry and have children at some point). Nor have all gender inequalities gone. Nevertheless it is this basic fact - i.e. that women have become increasingly like men - which explains why for an increasing proportion of women in the demographically most advanced countries getting married and having children are simply not as important as they used to be. I see no reason why given conditions of low fertility (and mortality) and knowledge of what is occurring in places like Europe, women elsewhere in the world will not eventually follow the same broad path.

Certainly there are clear signs that these developments are already underway in India. Fertility decline has been occurring for several decades now. And it is this phenomenon, above all, which is opening up completely new employment and educational prospects for young women. Among the general population there has been a rise in women's share of agricultural employment, and an increase in the average wages they earn. There has also been a fall in male-female wage differentials. The truth is that in rural areas many young men simply do not want to work in agriculture. In contrast, however, young women are often more motivated. These processes are contributing to a reduction in the traditional preference for sons. Consequently Bhanwar Rishyasringa (2000, p. 441-2) has rightly stated that economic changes are occurring in the country in the direction of empowering women relative to men. In addition education, plus the mass media, are raising women's aspirations. It is increasingly apparent that young women can lead lives largely independent of men. Of course, these developments are most apparent among the better-off sections of urban Indian society - where many well educated young women see no particular reason to get married and where, with increasing individualism, the incidence of divorce is almost certainly on the rise. Among the growing urban elite many couples are content to have just one child - even if it is a daughter.

So below-replacement fertility results from the process of fertility decline itself. Women become more like men. Marriage and childbearing become less important. In the long run the only thing that is likely to reverse these trends in the world is some kind of fundamental renegotiation of gender roles - a renegotiation in which (to simplify) men may be required to become more like women (e.g. in terms of

childcare responsibilities). The implication of what I am saying is that unless there is such a renegotiation then below-replacement fertility will eventually be a fact almost everywhere, including India.

#### B. FERTILITY ASSUMPTIONS FOR POPULATION PROJECTIONS AND THE INFLUENCE OF 'HERD INSTINCT'

As noted above, the context for this paper includes the need to make accurate population projections. And when considering the future of fertility in India the matter of what the numerical level of the TFR will be at given times has to be confronted. In other words the discussion cannot be conducted solely in abstract terms; the 'numbers' must be addressed at some point. Moreover because the preceding brief theoretical discussion ended with the sweeping suggestion that below-replacement fertility may one day be a universal feature of human society, a few words of caution are probably appropriate.

It is especially important to bear in mind that most social scientists are 'herd animals' to some degree. And there tends to be a *prevailing view* in the demographic community about what is generally happening *vis-à-vis* fertility trends. Thus 25 years ago many demographers were concerned with understanding why fertility levels in developing countries were so *high*. Therefore there was sometimes a corresponding predisposition to be doubtful about evidence of falling fertility. As late as 1979 a leading demographic journal led with an article (Cavanaugh, 1979) the title of which asked in sceptical vein: '[i]s fertility, declining in the less developed countries?' Accordingly in my view there was truth in Nicholas Eberstadt's allegation, made around that time, that in many developing countries fertility declines were occurring while demographers were still debating whether even incipient declines were still 15 or 25 years away (Eberstadt, 1981).

Today we should at least be aware that the pendulum may have swung too far in the opposite direction. For nowadays the prevailing view is that fertility is falling appreciably *faster* than was expected just 10 to 15 years ago. This view is conditioned by the fact of below-replacement fertility in many economically advanced countries and - albeit in a very different socio-political context - China too. One result of this fairly widespread view that future fertility may fall faster than expected is that analysts sometimes favour the United Nations *low* variant population projection or, 'in a spirit of compromise' they use the average of the United Nations *low* and *medium* projections (e.g. see Seckler and Amarasinghe, 2001, p. 4; also Seckler and Rock, 1997).

It is equally important to be open about the *iterative* nature of making projections. It must be rare for the assumptions of a population projection to be made, the projection run, and then the results written-up. What usually happens in practice is that the initial projection results are considered, the assumptions are revised, and the projection is then run again. Indeed, several iterations may be involved before the 'final' projection is made. Of course a major reason for making such preliminary projections is to ensure a plausible and acceptable final result. Among other things the projected population totals must not be *too* different from the results of other projections. To illustrate: the latest United Nations *high* variant projection for India's population in 2025 is 1,442 million (United Nations, 2001, p. 265). It would be difficult for anyone making a single projection for the country to defend fertility assumptions which led, say, to a population of 1500 million. Again, this reflects the influence of the 'herd instinct' - and we are all influenced by it to some extent.

#### C. REVIEW OF SOME PAST FERTILITY ASSUMPTIONS USED FOR INDIA

The assumptions of past population projections for India merit consideration in part because they represent attempts to forecast the country's future TFR trajectory in specific numerical terms. Probably the most important distinction which can be made about past projections is between those which project the country's population at the *national* level (i.e. for all-India) and those that project at the *state* level. In

the first category are the population projections of the United Nations (and the US Census Bureau and World Bank). In the second category are those of the Registrar General of India, the Population Foundation of India (PFI), and some of my own. More detailed comparisons of the assumptions and results of these projections can be found elsewhere (Dyson and Hanchate, 2000; Dyson, 2002). Here I summarise some of the most germane points *vis-à-vis* fertility.

The United Nations *medium* variant projection assumes that India's TFR will fall to the approximate replacement level - i.e. 2.1 births - by 2015-20 and that it will then remain there over the longer run. This '2.1' assumption has been described by Demeny (1997, p. 95) as the 'received wisdom' on the course of future fertility, although 'convenience' might be a better word than 'wisdom'. The United Nations *high* and *low* variant projections also reach their lower limits in 2015-20, but their corresponding TFRs are 2.6 and 1.6 (United Nations, 2001, pp. 264-65). For the period 20-25 the US Census Bureau and World Bank projections envisage that total fertility will be around 2.3 and 2.2 births respectively (Dyson, 2002, table 1).

Discussion of the state-level projections immediately raises a crucial question. *How valid and sensible is it to formulate fertility assumptions for India as a whole?* Of course international organisations are often obliged to make population projections for individual nation states. So country-level assumptions must be made. Otherwise, however, several associated considerations favour a state-level approach for India. First, there is the sheer size of the population. Second, because of different rates of demographic growth in different states, the *composition* of the country's population is changing over time. Third, and relatedly, there is considerable fertility variation within the country. Finally, there is the practical fact that for many reasons Indian planners and policy makers require results from state-level projections.

Table 1 shows the provisional population totals for the country's fifteen major states from the 2001 census. For reasons elaborated below the states have been grouped into three broad regions - the south, north and east - with an element of subdivision. Note that India's states vary in size from about 21 million in the case of Haryana to almost 175 million in the case of the (former) state of Uttar Pradesh (UP). Ten states have populations of fifty million or more.

To generate assumptions about future fertility the most recent population projections made by the Registrar General of India (1997) employed regression equations fitted to estimates of annual state-level TFRs from the early 1980s to 1993. As with all such projections, the TFRs used to formulate the assumptions were taken from India's Sample Registration System (SRS) - a demographic registration system which, while not perfect, is thought to be comparatively reliable (Mari Bhat, 1998). Table 1 gives the state TFRs assumed by the Registrar General for the first and last projection periods (i.e. 1996-01 and 2011-16) and the years when the assumed trends in total fertility imply that a TFR of 2.1 will be reached. The statistics illustrate the considerable variation of fertility within India. In particular, fertility levels are substantially higher in what I will term the 'core' northern states of Rajasthan, UP, Madhya Pradesh (MP) and Bihar. Elsewhere fertility is lower - especially in the south. Notice too that were the TFR trajectories assumed by the Registrar General to extend into the future then it would take roughly four decades for a TFR of 2.1 to be reached in Bihar and Rajasthan, around six decades in MP, and more than a century in the case of UP! Yet in 2001 these four core states contained 41.1 percent of India's population. Were their TFRs to decline as slowly as is suggested in table 1 then this would act as a significant 'drag' on the rate of *national* fertility decline.

It is an unfortunate fact that - despite the inevitable arbitrariness and associated imposition of a false future constancy - population projections for countries like India really have to incorporate assumptions about how low total fertility will fall. The TFR 'floor' assumed in the Registrar General's projections is 1.6 births. No justification is given for this figure. But notice from table 1 that only Kerala

achieves it by 2011-16, although Tamil Nadu - another southern state - comes close. In fact there must be a suspicion that a figure as low as 1.6 was chosen partly to *offset* the extremely slow fertility trajectories which arose from the regressions for the core northern states. Note that if a lower boundary of 2.1 had been used by the Registrar General then no less than six states would have had *higher* levels of assumed fertility in 2011-16. And, of course, the country's projected population would have been appreciably larger as a result - perhaps 'unacceptably' so over the longer run.

Another key point is that the all-India TFR of 2.52 births shown in table 1 for the period 2011-16 is a 'pooled' figure i.e. it arises from weighting the assumed state-level TFRs by the corresponding proportions of the country's females projected to be aged 15-44. However the Registrar General's report makes clear that were the regression approach to be applied to the available SRS TFRs for *all-India* then this would produce a TFR of only 2.33 by 2011-16. Thus, other things equal, a state-level approach tends to produce a significantly *slower* rate of national fertility decline. It is a fact, however, that states with relatively high TFRs are constituting an increasing fraction of India's population over time. Thus in 1971 the four core northern states contained only 38.7 percent of the country's population. So changes in the regional composition of the population will affect the future course of all-India total fertility.

The state-level projections of the PFI also use a TFR floor of 1.6. Again, there is no discussion of this choice. And, again, a plausible explanation is that it helps to facilitate an acceptable rate of national fertility decline. Thus in the PFI projections no fewer than seven major states achieve a TFR of 1.6 by 2016, and this reaches twelve by 2026. However the assumed TFR for UP in 2016 remains as high as 4.0 births, and in 2026 it is still as high as 3.5. The PFI projections too illustrate that a state-level approach implies a slower rate of national fertility decline. Thus the authors state that '[w]hile extrapolation of India's TFR during 1971-96 would have resulted in a TFR of 2.1 in the [year] 2016, when the regional variations are taken into account it appears that replacement fertility corresponding to a TFR of 2.1 [will] be achieved by the year 2026 i.e., ten years later. This [latter] assumption has been used to project India's population.' (Natarajan and Jayachandran, 2001, p. 40).

Finally in this section table 1 summarises the fertility assumptions of my own state-level projections (Dyson, 2002). I am sceptical that total fertility will fall to an *average* level of 1.6 births in many states in the period to 2026. Therefore, to be candid, what I aimed to achieve in framing these assumptions was some form of 'middle way' - i.e. an approach which simultaneously produces a reasonably fast rate of fertility decline in all states, but which also avoids the use of an extremely low floor. Several approaches were tried to achieve this compromise. But the one eventually used involved fitting linear regressions to the available state-level SRS TFRs for 1986-98. These were then employed to extrapolate into the future until the TFR reached a floor of 1.8 births, at which point it was held constant. Essentially the figure of 1.8 is a compromise between 1.6 and 2.1. For Assam (where the SRS has been affected by political disturbances) suspect TFRs for 1994 and 1995 were omitted from the regressions. And for Rajasthan the period used to fit the regression was 1984-98 (because the inclusion of TFRs for 1984 and 1985 produced a somewhat faster fertility decline). Clearly, these modifications are arbitrary. But they can be defended on the grounds that they are modest and that they produce fertility trajectories which seem more plausible. Also for Kerala the TFR was assumed constant at 1.8 births throughout the projection; this was because the SRS suggests that below-replacement fertility has already been reached (but see below).

However in the case of Uttar Pradesh (a mere 175 million people) fitting a linear regression to the TFRs for 1986-98 still produced a *very* slow pace of fertility decline - in which fertility would still be about 3.2 births by 2021-26, while in *all* the other major states it would be around or below 2.1. Yet if linear extrapolation produces a TFR of 2.1 for the neighbouring core northern state of Bihar in 2021-26 it seems unlikely that the TFR will be over one birth greater at that time in UP. Accordingly, I made the subjective - although arbitrary - assumption that the TFR in UP during 2021-26 will be about 10 percent

higher than that in Bihar (as applied during the baseline period, 1996-2001 (see table 1)). This means that UP's assumed TFR falls to around 2.3 in 2021-26, and that the state is not left as the sole significant outlier. This is an instance where our knowledge that fertility has fallen faster than expected in many populations over-rides any simple extrapolation of the numbers. I believe that the TFR in UP will fall faster than is assumed in either the Registrar General's or the PFI projections. Indeed the state's TFR could be less than 2.3 by 2021-26.

Table 2 summarises the implications of these state-level assumptions for the all-India path of total fertility (the state-level TFRs being weighted on the corresponding projected female populations aged 15-49). Of course the resulting all-India fertility trajectory is non-linear. Notice that the country's TFR falls from around 3.2 during 1996-2001 to just above replacement (2.13 births) by 2016-21 - a trajectory which is similar to that assumed by the United Nations *medium* projection. However unlike the United Nations projection total fertility continues to fall until it reaches an assumed floor of 1.8 (in 2031-36). For interest table 2 also gives the assumed all-India TFR trajectories which arise when state-level floors of 2.1 and 1.5 births are used instead. These latter trajectories represent an attempt to generate 'high' and 'low' variant national projections working, so to speak, from the state-level up. Note that by 2021-26 India's TFR may be between 2.14 and 1.78 births; the central value being 1.94. Over fifty years these different assumptions imply all-India populations varying greatly in size - the corresponding projected populations in 2051 being 1731, 1579 and 1458 million. The latter figure, based on a TFR floor as low as 1.5 seems highly unlikely.

In concluding this section I stress three points. First, the value - and difficulties - of adopting a state-level approach. Second, that iterations and compromises are inescapable, particularly when making state-level projections. Third, we are all encumbered to some degree by pre-conceptions about what assumptions and outcomes are acceptable.

#### D. FURTHER COMMENTS ON THE NATURE OF FUTURE FERTILITY DECLINE

Several additional points of substantiation and qualification must be made apropos the preceding discussion. It is worth emphasising, for example, that fertility *is* falling in virtually all of India's states, including the core northern ones. Perhaps the only exceptions to this statement are Kerala and Tamil Nadu - where according to the SRS total fertility is already below 2.1. That fertility is falling everywhere is established by both the SRS and analysis of own-child data from the two rounds of the National Family Health Survey (NFHS) which were conducted during 1992-93 and 1998-99 (see Retherford and Mishra, 2001a). The SRS suggests that total fertility has been falling in most states since the 1970s - in some cases the early 1970s, or perhaps even earlier (Dyson, 2001b).

That said, it is likely that most of the SRS estimates used in the population projections discussed above *understate* slightly the true level of total fertility. Thus for Uttar Pradesh Retherford and Mishra undertook a comparative study of NFHS and SRS data which also benefited from the conduct of a post-NFHS evaluation check survey. They suggest that in 1997 the true TFR in UP may have been about 5.2 births as opposed to the figure of 4.8 indicated by the SRS (Retherford and Mishra, 2001b). Table 1 gives correction factors (CF) for the SRS TFRs derived from own-child analysis of NFHS data, also by Retherford and Mishra (2001a, p.39). Note that for the country as a whole the level of the SRS TFR in the 1990s may have to be adjusted upwards by perhaps 2 percent. However, it is somewhat moot whether these CF values are sufficiently large, or sufficiently firm (alternative values are given) to merit their use when formulating fertility assumptions at the state-level.

The CFs in table 1 can be used to make another pertinent point. Inasmuch as there is any *empirical* justification for assuming a below-replacement 'floor' for state-level total fertility it rests with the SRS estimates for Kerala and Tamil Nadu. According to the SRS the TFR in Kerala first fell below

2.1 births in 1988; during the years 1992-94 inclusive it fell further to just 1.7; and in subsequent years it has risen slightly to 1.8. For Tamil Nadu the SRS suggests that total fertility fell below 2.1 in 1997, and in 1998 it was still at 2.0 births (Registrar General, India, 1999). Note, however, that the CFs for Kerala and Tamil Nadu are sizeable - being respectively 15.7 and 9.5 percent. These values are sufficiently great to cast doubt on the suggestion that *any* Indian state has yet experienced a total fertility rate much below 2.1.

Another point worth making is that the available SRS time series provide little support for the idea that total fertility in any state will 'plateau' for long at what might be termed an 'intermediate' level (say, anything as high as 2.6 births). This is particularly so if when interpreting the data one takes account of past changes in the system's level of birth coverage and rotations in its sample. It is true that SRS data do occasionally reveal genuine rises in fertility - e.g. in Maharashtra during 1975, following the severe drought which depressed the TFR there in 1973-74. And there is some suggestion that total fertility may not have declined much during the years following the Emergency - called by Mrs Gandhi during 1975-77 - which instigated a period of setback for family planning activities. However, such events were comparatively short-lived. Clearly, there may well be short-term plateaus and even rises in total fertility in the future (e.g. following drought). But such events are impossible to predict and in the long run fairly inconsequential. So in general the SRS suggests that once the TFR starts to fall in any state, by and large the fall persists.

In my view the ongoing state-level fertility declines will continue during the medium term future largely independently of trends in conventional socio-economic variables like per capita incomes and urbanisation. In other words, to a considerable extent these TFR declines now have a 'life of their own'. This is not to deny that at most levels of analysis such socio-economic factors tend to be associated positively with each other, and negatively with fertility. Nor is it to deny that such variables may have some effect in *facilitating* - speeding up very slightly - state-level fertility falls. Moreover, most forward-looking analysts concur that in the next few decades average levels of per capita income and urbanisation will continue to rise in most states (albeit at different rates, expected progress generally being faster in India's south). That said, as discussed below, there may be more *deep-seated* regional dimensions of South Asian society which have helped to determine the timing and extent of *both* socio-economic and demographic progress. Accordingly, when one looks at current fertility variation - e.g. across the country's major states - what one observes to a considerable extent is differences in the *timing* of fertility decline, more than differences in the impact of these socio-economic variables. As aforementioned, I regard fertility decline as an unconscious, lagged adjustment to the effects of sustained and massive mortality improvement. In India mortality decline - which at first was very slow - dates from around the 1920s. By Independence in 1947 life expectation had improved slightly to about 33 years. Today it is probably around 62 and still rising. While, of course, there is mortality variation between states, such inter-state variation is of minor significance compared to the fact of sustained and major mortality improvement which has been occurring across the whole country for perhaps seventy years.

This is not to reject the power of the media, family planning activities and educational improvements to hasten slightly the fertility decline response. The pace at which various forms of communication (e.g. bus travel, public telephones, movies, even internet cafes) are spreading in India - especially the south - is remarkable. The 1998-99 NFHS found that 48 percent of all households had a bicycle, 11 percent owned a moped, scooter or motorcycle, 38 percent owned radios, 25 percent had black and white TVs, and 10 percent had colour TVs (International Institute for Population Sciences and ORC Macro, 2000, p. 40). Such developments will surely continue in the coming decades and give me confidence in my fairly rapid fertility decline assumptions summarised in tables 1 and 2. It should be noted too that control over family planning activities has increasingly become the province of individual state governments, rather than of the central government in Delhi. This may not make much difference to the overall tempo of family planning activities in the country. But in some states - perhaps most noticeably Andhra Pradesh - it has meant that politicians have recently instigated fairly aggressive 'target'

and 'incentive' driven strategies to promote sterilisation - irrespective of what post-Cairo mainstream opinion may hold. Again, it is hard to gauge how such developments will turn out, but they may play an accelerating role. Particularly important would be improvements in the availability of family planning methods in states like UP and Bihar - because there is little doubt that these states face significant 'supply-side' problems. Of course female education is viewed as a particularly powerful way of increasing fertility control. Between 1991 and 2001 the national literacy rate of females aged seven and above increased from 39 to 54 percent (the figures for males are 64 and 76 percent (Registrar General, India, 2001)). There are many signs that Indian parents are attaching much greater value to the education of their children. This trend too provides support for the idea that fertility in most states will decline at a fairly brisk pace. That said, it should not obscure the fact that especially in the south there are now tens of millions of poor women, with two children, sterilised, and with no education at all (McNay, Arokiasamy and Cassen, 2000). More educated women may reduce their fertility earlier and faster, but after some time less educated women do almost as well. Again, education affects the *timing* of the fertility reduction, but its direct impact upon the *eventual* level of fertility may be negligible.

Finally in this section a word is in order regarding how the *age pattern* of fertility has been transformed as levels of fertility have fallen. Here the NFHS data may be better than those of the SRS - although both sources reveal a similar picture. In short, especially in those states with relatively low levels of fertility there is an *unusually* young and *extremely* concentrated age pattern of fertility. Analysis shows that between the first and second rounds of the NFHS the age location of fertility declined still further and it became even more highly concentrated in almost all the major states (Dyson, 2002). For example, data from the 1998-99 NFHS indicate that in Andhra Pradesh and Maharashtra about 70 percent of the age specific fertility schedule is located at ages below 25 years. And if recent trends continue this will soon apply to Gujarat, Haryana, Tamil Nadu and West Bengal too.

Female sterilisation is the main form of contraception in India. The 1998-99 NFHS found that 34 percent of currently married women in the country were sterilised, and this method accounted for 71 percent of total contraceptive prevalence (International Institute for Population Sciences and ORC Macro, 2000, p. 133). The median age of female sterilisation was found to be 25.7 years. So - to simply massively - what is suggested is a trend towards a fertility regime in which Indian women continue to start to cohabit at a relatively young age (an age which, admittedly, has probably risen), have two children in fairly quick succession (almost certainly including at least one son), and then get sterilised. Female sterilisation is popular. Past analysts who - quite reasonably - considered that reversible forms of contraception would be required in order to get young Indian women to contracept essentially got the matter wrong (e.g. see Nortman, 1978).

#### E. THE REGIONAL DIMENSION

I hope to have shown that - while they are not without problems - consideration of the available 'numbers' can produce insights about how fertility will decline in different parts of India. That said, as has been implied repeatedly, the 'numbers' must be interpreted in their wider context. In particular, it seems sensible to ask whether there are deep-seated features of Indian society which may persist to influence fertility behaviour post the fertility transition.

Recall that I argued above that the occurrence of below-replacement fertility arises from the implications for women's lives of fertility decline itself. Especially in the later stages of the fertility transition young women increasingly have other avenues for advancement than marriage, having children, and a life spent largely within the domestic family domain. The importance of getting married and having children declines, although of course most women continue to get married and have children. However, given the basic fact of fertility (and to a lesser extent mortality) decline there seems to be no reason why this rationale for below-replacement fertility should not apply in all populations. But there may be



variation in certain key social-structural factors - e.g. in the social centrality of marriage - which may affect how readily and quickly below-replacement fertility levels are reached.

No contemplation of India's future fertility can ignore the underlying regional dimension with its attendant social-structural correlates. The basic contrast between the groups of states in tables 1 and 3 is between the 'north' and the 'south' - with the 'east' occupying an intermediate position. In the 'north' the more economically advanced states of Punjab and Haryana have been separated-out a little, as has Gujarat which borders Maharashtra (which here has been put in the south). Kerala deserves some separation in the south; indeed, from a demographic perspective it is very similar to Sri Lanka which lies just a few kilometres across the sea (Dyson, 2001b).

Although massive generalisations are involved, the main point - which table 3 illustrates with recent statistics - is that northern and southern parts of the Indian subcontinent appear to have long been governed by rather different *demographic regimes*. The north always seems to have experienced somewhat higher levels of fertility and mortality, an earlier age at marriage for women and greater excess female mortality. These regimes and their social-structural basis have been detailed elsewhere using data for different periods in the twentieth century (see Dyson and Moore, 1983). Table 3 shows that with some alterations the basic *relative* features persist. Fertility is highest in the four core northern states. And census child woman ratios (CWRs) suggest that until about the last third of the twentieth century fertility in Punjab, Haryana and Gujarat was also comparatively high. Fertility always seems to have been comparatively low in the south; and the southern states experienced fertility declines earlier than the core northern states. Interestingly analysis using district-level CWRs for the period 1951-91 shows fertility decline spreading gradually throughout southern India from an initial 'bridgehead' in the extreme south; this is followed a little later by a second slower emanation of fertility decline from a bridgehead in Punjab/Haryana in the north (Guilmoto and Rajan, 2001). As previously intimated, differences in the timing of fertility declines have probably accentuated the current size of the former north/south differential. But the key point is that this differential probably existed prior to the onset of the fertility transition. Table 3 shows that a broadly similar relative picture of north/south variation relates to mortality, with Kerala having an exceptionally high life expectation at birth (LEB). Again, the north/south contrast is reflected in data from the middle of the twentieth century, and it may well have existed before. Notice that women in the core northern states tend to marry at younger ages - a feature which has clear resonances in census data from the late nineteenth century.

Table 3 shows that the exceptional masculinity of India's population is largely a northern feature. This differential too is deeply ingrained and of longstanding. Sex ratios from the census have always been unusually masculine in the north - especially in Punjab/Haryana and neighbouring areas of western UP. As well as differential child neglect, in the past this phenomenon also reflected female infanticide among some higher castes. Using district-level data from the 2001 census figure 1 shows the same basic pattern of north/south variation in child sex ratios. In much of northern India there is neglect of female infants and children, especially second or higher order girls. Indeed such biases may be heightened by fertility decline (Das Gupta and Mari Bhat, 1998). Interestingly, and probably facilitated by the increasing recent availability of sex-selective abortion, in 2001 the child populations of Punjab, Haryana, Maharashtra and Gujarat became much more masculine compared to 1991 (Dyson, 2001c). Note too that in the south certain districts of western Tamil Nadu now have exceptionally masculine child populations. This is a relatively new development. The essential north/south contrast persists, but we should be aware of modifications.

The explanation for this demographic contrast is complex (Dyson and Moore, 1983). But for present purposes it will suffice to say that northern society tends to place greater stress upon the *male* line. The main social units are patrilineally related groups of males (i.e. fathers and sons). Marriages rules are exogamic; 'wife-giving' groups are socially inferior to 'wife-taking' groups; and dowry (i.e. resources

which go from the bride's family to that of the groom) is the main marriage transaction. Therefore in the northern kinship system as well as being a fundamental arrangement for the having and rearing of children (especially male heirs) marriage represents a statement of the relationship between different groups. It is central to the structure of the wider society. When women marry they often move over long distances into households where they are strangers. Their levels of personal autonomy are extremely low and son preference is very strong (table 3). A daughter will usually require the provision of a dowry. Producing a son is the chief route for a bride to raise her status. It is often said that son preference in India reflects the Hindu requirement for a son to light the funeral pyre. But this rite can be performed by others than a son, and the highest level of religious merit also requires that a daughter be given in marriage. So the real basis for strong son preference - and daughter neglect - lies in the fundamental arrangements of kinship, inheritance and marriage.

Although some of the more invidious features of the northern kinship system - especially dowry - have increasingly affected parts of south India, the traditional southern system still prevails in places and has strong ramifications. Customary marriage rules in the south tended to be endogenous and women often married men to whom they were related (e.g. cousins or uncles). So the grooms frequently came from familiar households, perhaps in the same village. In this system approximate social equality existed between kin who were related by marriage. And for most of the twentieth century dowry was not very important in most of the south. Accordingly, son preference tends to be significantly weaker, and the birth of a daughter was and is more acceptable (table 3). Moreover, because southern women often marry men who they know, spousal relationships tend to be more balanced. After marriage women continue to interact with their parents more frequently than generally applies in the north, and there is less need to re-socialise young brides in their marital homes. In short, to quote Irawati Karve (1953, p. 229) 'the south represents ... greater freedom for women in ... society'.

In my view there are several reasons why the basic north/south contrast will mean that during the foreseeable future, say the next twenty-five years, below-replacement fertility is much more likely to prevail in southern than in northern India. First, there is the basic fact that fertility seems always to have been a little lower in the south. Of course, because something is of longstanding does not mean that it will necessarily persist, but at the same time this consideration cannot be entirely discounted. Second, other things equal, the particularly strong level of son preference found in the north should tend to promote somewhat higher levels of fertility there. Third, as argued above, in the north the institution of marriage is pivotal to the construction of the wider society. This is relevant chiefly because it implies that it will take northern women longer to explore avenues of life apart from the domestic domain. Indeed, southern women have long had a significant advantage in terms of their levels of 'freedom', 'autonomy', 'personal decision-making', call it what you will (see table 3).

It is also important to note that, in general, south Indian society and economy are appreciably more *dynamic* than those of the north. This is not to deny the existence of 'bright spots' in the north, such as Delhi, Punjab and Haryana (although these places all have relatively small populations). Gujarat too is as socially and economically dynamic as is Maharashtra immediately to its south. But, that said, travelling around India there is certainly a lack of 'buzz' about the northern, inland, Gangetic core. In contrast, south India, both its urban and its rural parts, has a very different feel. Thus, compared to the core northern states, rates of per capita income growth have generally been much faster in the south. The southern states also tend to be more urban. In addition, most of the more vibrant, big urban centres - e.g. Mumbai, Pune, Bangalore, Hyderabad, Chennai - are located in the south. It is these cities, especially, which have benefited from the liberalisation of the economy since the early 1990s, and where many new investment opportunities have been created. These are the main locations for the growing numbers of high-tech jobs, places where the newly installed high-capacity telephone lines have led to the establishment of large call-centres (often employing young women) which service overseas markets. These are the locations where much of the recent urban employment growth - e.g. in the service sector

and light industry - has increasingly favoured women. And it is in the south where, one strongly suspects, in the future increasing levels of education and economic growth will augment the frequency of migration for employment, business and educational purposes for men, but also for women (Dyson and Visaria 2002). Finally one should reaffirm the roles of migration and the media in changing how Indian women will increasingly see themselves. In particular, past international migration (including, it must be said, significant outflows from Punjab and Gujarat) has, through mechanisms like the return visits of Indians resident overseas - and their children - had an inordinate effect by helping to spread elements of a so-called western lifestyle. The consequences are very evident among better-off young men and women living in cities like those mentioned above. Increasingly these lifestyle influences have been reflected in the wider media - something which will happen even more in the years ahead.

So south Indian society, in particular, holds out the firm prospect that increasing numbers of young women will carve out independent lives of their own - lives in which marriage and childbearing are less significant. The majority of them will marry, but they and their husbands will be happy with two children or one, even if it is a girl. But irrespective of the child's sex much greater attention will be given to its education. Frequently in occupations like nursing, teaching and service, young women from Kerala can be seen as having been pioneers for some time. And if this state's level of total fertility is not already below replacement, there is nevertheless evidence that the TFR is well below replacement at least for some poor social groups (Pallikadavath and Wilson, 2000). Moreover the nature of south Indian society is such that in twenty or so years time one can well envisage significant numbers of women in urban areas following their counterparts in South Korea, Thailand and Malaysia where young women are 'staying away from marriage in droves' (Jones, 1997, p. 74).

Finally a brief word is required about the core northern states - because, albeit over a significantly longer time horizon, one can foresee the same fundamental processes eventually unfolding there too. One possible indication of this is that even for northern states there is now evidence from the NFHS to indicate that the unusually high levels of son preference, for example as evidenced in Gujarat and Punjab, are finally beginning to decline (Lahiri and Dutta, 2002). It seems likely that, in time, fertility decline in the north will bring about a more balanced view of the desirability of having daughters, perhaps partly because they will represent a more reliable source of support and security over the longer run than will sons. And a reduced level of sex preference will itself tend to facilitate a lower level of fertility. The populations of Gujarat, Punjab and Haryana should see replacement fertility within the next ten years or so. But in general this will take at least twenty years in the core northern states.

## F. SUMMARY AND CONCLUSIONS

Forecasting the future is certainly risky! There is always the danger that one will be swept along by the herd. The thrust of this piece has been that a consideration of future fertility trends in India should really be conducted at the *state-level*. And I have shown that, other things equal, a state-level approach to the formulation of fertility assumptions for population projections leads to a significantly *slower* rate of fertility decline than does an all-India approach. Total fertility is falling in virtually all of India's states. It is unlikely that in any state the TFR will stagnate for long at a level that is well above replacement. The fertility declines which are occurring are ultimately a response to massive and sustained mortality decline. And while it is conceivable that in some states specific interventions - e.g. the instigation of a forceful approach to sterilisation - may accelerate developments, on balance the fertility declines currently underway are probably better considered as having a momentum of their own. That said, India seems set to experience continued social and economic progress, and this should do future fertility decline no harm. I predict that the TFR in the massive northern state of Uttar Pradesh will fall appreciably *faster* than is envisaged by other population projections. Consequently my state-level fertility assumptions produce an all-India TFR trajectory which in the period to 2016-21 is similar to that assumed by the United Nations medium variant projection. Thereafter, however, I envisage that all-India total fertility will fall below

replacement - unlike the United Nations projection which assumes that the TFR will remain at 2.1. So although recent research suggests that no Indian state - not even Kerala or Tamil Nadu - has yet experienced fertility levels that are significantly below replacement, I *do* envisage this happening in some states fairly soon. In this context it is extremely important to consider the *regional* dimension. In general fertility fell earlier and is appreciably lower in the country's south. Moreover, it is the southern states which show most clearly a situation developing in which women - irrespective of their household incomes or their levels of education - *marry young, have two children and then get sterilised*. South Indian society seems always to have allowed women a little more autonomy in their lives. And southern India - which often seems almost a different country from the north - tends to be socio-economically more advanced and progressive.

If, as I have argued here, below-replacement fertility occurs because with fertility decline an increasing proportion of young women begin to develop lifestyles in which marriage and children are less important, lifestyles which are sometimes independent of men, then circumstances are quite favourable to such a scenario developing in much of south India. In fact this scenario is already underway. That said I am rather doubtful whether, looking at the next decade or so, average levels of total fertility will be as low as 1.6 throughout the main southern states, although in a few of them it may be. The core northern states, however, are a very different matter. To reiterate, it may take twenty years for these states to have TFRs that are around replacement. And in these states marriage is so central to grass-roots social structure that it will take longer still for an appreciable proportion of women to be able to reduce their lifetime commitment to the domestic domain and conjure with the possibility of a leading life that revolves less around marriage and children. So for core northern states like Bihar and UP sustained levels of below-replacement fertility are probably several decades off. And even then total fertility may well remain somewhat higher in the north than in the south. Overall, however, India is heading for a future of below-replacement fertility, probably a little below 2.1, and the late development effect will mean that it gets there comparatively rapidly.

#### G. ACKNOWLEDGEMENTS

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TABLE 1. SELECTED POPULATION PROJECTION FERTILITY ASSUMPTIONS AND DEMOGRAPHIC MEASURES FOR INDIA AND ITS MAJOR STATES, GROUPED BY REGION

Region/state	Population 2001 (millions)	Registrar General's projections			Dyson's projections		CF for SRS TFR
		Assumed TFR		TFR = 2.1 (year)	TFR 1996-01	TFR=1.8 (period) or TFR in 2021-26	
		1996-01	2011-16				
South							
Kerala	31.8	1.62	1.60	1988	1.80	1996-01	1.157
Tamil Nadu	62.1	1.87	1.65	1993	1.96	2001-06	1.095
Andhra Pradesh	75.7	2.27	1.78	2002	2.34	2001-06	1.006
Karnataka	52.7	2.54	2.01	2009	2.41	2006-11	1.021
Maharashtra	96.8	2.51	1.97	2008	2.63	2011-16	0.992
North							
Gujarat	50.6	2.73	2.11	2014	2.93	2016-21	0.975
Rajasthan	56.5	3.91	3.06	2048	4.13	2021-26	1.030
Uttar Pradesh	174.5	4.75	4.05	>2100	4.73	2.32	1.024
Madhya Pradesh	81.2	3.99	3.27	>2060	3.93	1.88	1.041
Bihar	109.8	3.92	2.93	2039	4.28	2.11	1.031
Punjab	24.3	2.65	2.11	2019	2.64	2011-16	1.027
Haryana	21.1	3.25	2.47	2025	3.31	2016-21	1.011
East							
West Bengal	80.2	2.56	1.99	2009	2.44	2006-11	1.021
Orissa	36.7	2.64	2.01	2010	2.89	2011-16	1.017
Assam	26.6	2.82	2.17	2015	3.16	2016-21	1.066
All India	1027.0	3.64	2.52	2026	3.21	2016-21	1.020

Sources: Registrar General, India (1997, 2001); Dyson (2002); Retherford and Mishra (2001a).

NOTES: The 2001 census populations are provisional. Here and in table 3 the figures shown for Uttar Pradesh (UP), Madhya Pradesh (MP) and Bihar relate to the former jurisdictions of these states (i.e. including the recently established states of Uttaranchal, Chhatisgarh and Jharkhand, which had populations in 2001 of 8.5, 20.8 and 26.9 million respectively). The all-India TFR shown for 2011-16 is the 'pooled' figure. For UP, MP and Bihar the penultimate column gives the values of the corresponding TFRs in 2021-26 since these states do not attain a TFR of 1.8 until later periods. The CFs shown are fifteen-year aggregated ratios derived by Retherford and Mishra from analysis of NFHS-2 data.

TABLE 2. FUTURE ALL-INDIA TFR TRAJECTORIES DERIVED FROM ASSUMED STATE-LEVEL TRAJECTORIES, BUT INCORPORATING DIFFERENT LOWER TFR 'FLOORS'

Period	High floor (TFR=2.1)	Middle floor (TFR=1.8)	Low floor (TFR=1.5)
2001-06	2.92	2.84	2.81
2006-11	2.68	2.55	2.46
2011-16	2.48	2.33	2.20
2016-21	2.30	2.13	1.98
2021-26	2.14	1.94	1.78
2026-31	2.10	1.81	1.59
2031-36	2.10	1.80	1.50
2036-41	2.10	1.80	1.50

Source: Dyson (2002).

TABLE 3. THE REGIONAL CONTEXT OF INDIAN FERTILITY - SELECTED MEASURES ILLUSTRATING THE CONTINUING INFLUENCE OF THE COUNTRY'S NORTHERN AND SOUTHERN DEMOGRAPHIC REGIMES

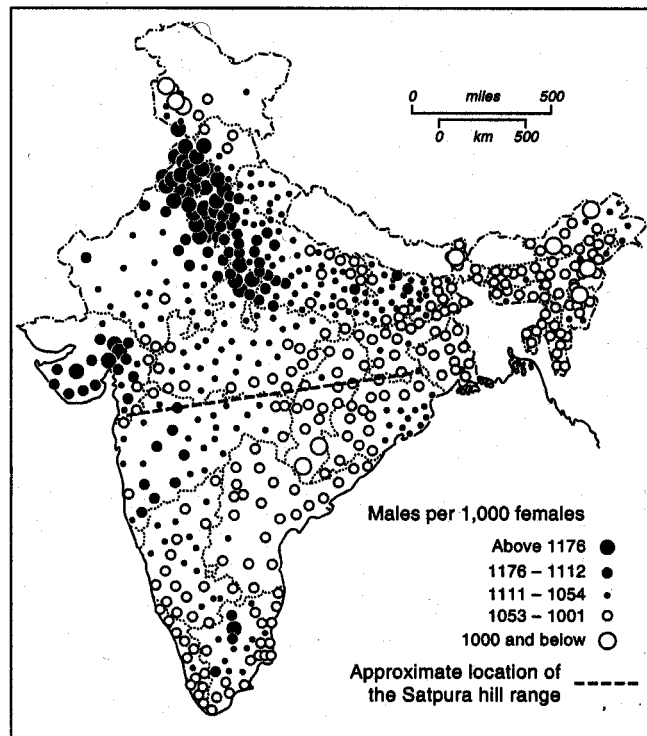
Region/state	TFR (births) 1996-98	LEB (years) 1992-96	0-4 death rate (per 000) 1992-96	Sex ratio (m/f) 2001	SMAM (years)		Percent wanting more sons than daughters	Percent not involved in any decision- making
					Male	Female		
South								
Kerala	1.8	73.1	3.2	0.945	27.9	21.5	14.6	7.2
Tamil Nadu	2.0	63.7	13.4	1.014	26.6	20.9	9.6	2.4
Andhra Pradesh	2.5	62.0	16.8	1.023	23.9	18.3	19.8	7.4
Karnataka	2.5	62.9	16.4	1.038	26.7	20.1	13.0	8.1
Maharashtra	2.7	65.2	12.2	1.084	25.3	19.8	27.1	7.2
North								
Gujarat	3.0	61.4	20.8	1.086	24.4	20.2	33.2	4.1
Rajasthan	4.2	59.5	29.5	1.085	22.3	18.3	47.5	13.3
Uttar Pradesh	4.8	57.2	31.1	1.109	23.3	19.0	53.3	16.4
Madhya Pradesh	4.0	55.2	32.3	1.067	23.5	18.9	42.5	12.5
Bihar	4.4	59.4	25.9	1.080	23.8	18.8	47.9	13.5
Punjab	2.7	67.4	14.9	1.145	25.7	22.1	29.1	1.0
Haryana	3.4	63.8	22.2	1.161	24.6	19.8	37.5	3.4
East								
West Bengal	2.5	62.4	16.8	1.071	26.2	19.6	20.7	8.0
Orissa	3.0	56.9	28.1	1.029	26.6	21.2	37.6	10.6
Assam	3.2	56.2	26.9	1.073	27.8	21.7	38.2	4.6
All India	3.3	60.7	25.2	1.072	24.9	19.7	33.2	9.4

Sources: Registrar General, India (1997; 1999; 2000; 2001); International Institute for Population Sciences and ORC Macro (2000).

NOTES: TFR = total fertility rate; LEB = life expectation at birth; SMAM = singulate mean age at marriage. The sex ratios shown are the ratios of the number of males enumerated by the 2001 census divided by the number of females enumerated. The all-India 0-4 death rate given above is the average of the rates for 1991 and 1996. All fertility and mortality measures are from the SRS. The SMAMs and remaining measures are all from the 1998-99 NFHS. The percentages relating to son preference and decision-making are based on the responses of ever-married women interviewed in the NFHS surveys. Women classed as 'not involved in any decision-making' made no decisions, for example, about when they might visit their natal kin, their own health care, or what foods might be cooked at home.



Figure 1. Sex ratio by district, for children aged 0-6, 2001



Source: Registrar General, India (2001).