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Fertility at District Level in India: Lessons from the 2011 Census

Christophe Z Guilmoto[*] *and Irudaya Rajan*[**]

Abtsract

This paper describes the methodology for estimating recent fertility levels at the district level in India based on the 2011 census figures. Due to the absence of reliable vital statistics for Indian districts, we rely on a set of indirect methods to assess fertility levels. To do this, we use mortality estimates and the child population aged 0-6 years to estimate the number of births during the 7 years preceding the census and derive from these figures both crude birth rates and fertility rates for all Indian districts. The results are compared with similar results derived from the 2001 census. Our analysis points in particular to the significant population overcount in Jammu and Kashmir during the 2011 census and to the continuous, but extremely slow process of fertility decline in India.

Keywords

Fertility, Indian, Estimation, Census

The provisional results of India's 2011 population census have highlighted several of the main contours of its current demographic regime (Census of India 2011a; Navaneetham and Dharmalingam, 2011). It stressed in particular the recent reduction in the intercensal growth rate, which has come down from 21.5 per cent in 1991-2001 to 17.6 per cent in 2001-2011. Regional and subregional variations remain important, with population growth during the last decade ranging from apparent stagnation in Nagaland to a record 50 per cent growth in Dadra and Nagar Haveli. Variations in demographic growth rates are even wider at the district level and migration accounts for the highest rates observed in areas such as in Gurgaon and Ghaziabad districts around Delhi, or in Hyderabad and Bengaluru. Yet, fertility variations remain the prime factor behind the disparities in regional population growth observed across districts and States and are responsible for most of regional growth differentials observed over the last thirty years.

Estimates of the average number of children per woman exist only at the State level. The main source is in particular the Sample Registration System (SRS), which provides annual (or three-year average) vital rates for all States and Union Territories. But even if differences between States are considerable – ranging for instance from 1.7 children per woman in Kerala in 2009 to 3.8 in Bihar – previous research has also shown that variations across districts within a single State can also be important (Guilmoto and Rajan 2001; 2002; 2005). The districts are themselves large administrative units, with 231 of them having more than two million inhabitants. District-level fertility may be expected to vary considerably within the most populated States such as Uttar Pradesh, Madhya Pradesh or Andhra Pradesh. It is

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therefore of primary importance to get an exhaustive picture of fertility levels across Indian districts to understand the pace of fertility transition across the country and its regions.

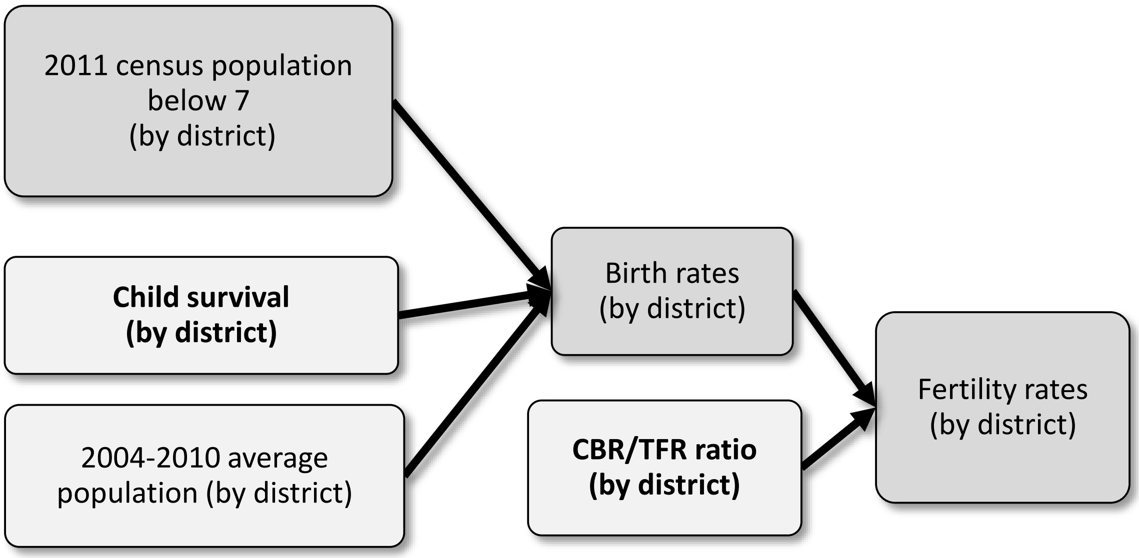
Demographic sources at the district level remain, unfortunately, limited. Sixty years after Independence, the quality of the civil registration system in India is still appalling. In fact, not only does a significant proportion of the population fail to register births, but many local authorities do not compile, tabulate or publish birth registration statistics on an annual basis. Even the Office of Register General of India has ceased to publish a regular series of vital statistics as it used to in the past. As a result, existing demographic estimates are based only on sample surveys or a sample registration. The most famous population sources for estimating fertility in India – the SRS (Sample Registration System) and the NFHS (National family and Health Survey) – do not go beneath the State level. In the recent past, there have been several district-level demographic surveys such as the District Level Household and Facility Survey (with the last round in 2007-08) and more recently, the annual Health Survey launched in 2010. But these sources do not cover India entirely or do not provide adequate fertility measurements. The Census of India remains therefore the only source for both simultaneous and exhaustive figures on fertility differentials at the district level.

This paper will start with a presentation of our methodology. We hope that by describing our estimation technique in detail, we will encourage other scholars to review and improve on this procedure. In the second part, we discuss the quality of our results and stress the difficulties encountered in collecting data in some parts of India, where census figures may be overstated. As a conclusion, we review the distribution of fertility on the eve of the 2011 Census and its regional distribution.

From census children to recent births per woman

As mentioned in our introduction, the Census of India is the only source that provides an exhaustive picture of India’s population in the absence of reliable birth registration data. Two types of information can be used for estimating fertility from the census. The first type relates to the information canvassed by the census on the births during the last 12 months preceding the census. In theory, this should provide a rather reliable estimate of birth rates during the previous year provided that births are properly reported. A more serious limitation of this source is that the so-called “fertility tables” are published rather late by the census, with direct estimates based on recent births not available before several years. The second type of census variable available for indirect estimation purposes is the child population distribution. Provisional figures have already been published at the district level in 2011. Here, we use the distribution of the population aged 0-6 years, following an estimation method inaugurated by the late P. N. Mari Bhat back in 1996 (Bhat, 1996), using 1991 census data.

Figure 1.



The method is summarized in Figure 1. In a nutshell, the procedure consists in using the available child population by district for estimating the corresponding number of births during the seven years preceding the census. This requires converting the child population into births after correction for infant and child mortality. The district-level crude birth rates (CBR) are then derived by computing the ratio of births to the average district population during 2004-11. In order to convert birth rates into total fertility rates (TFR), a district-level ratio of birth to fertility rates is used. This ratio depends mainly on the local age distribution and the fertility schedule. Two crucial aspects of this procedure – mortality estimation and natality/fertility conversion – are reviewed in more detail in the next two sections.

Estimating local birth rates from child population figures

The pivotal hypothesis of this methodology refers to our capacity to back-project the child populations measured in 2011 and estimate the number of births during the previous seven years. The child population below the age of seven in 2011 is, in theory, composed of the surviving population born since 2004.[1] Yet, this hypothesis is concerned with three aspects – the potential impact of migration, age misstatement, and mortality. We can easily rule out the effect of migration since there is little to support the hypothesis that international migration would significantly affect the distribution of the children below the age of seven, either by excess departures or arrivals among the child population compared to other age groups. But we need to examine in greater detail the potential effects of age quality and mortality on our estimation procedure.

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[1] The concerned period extends from April 1 2004 till March 30 2011. We will simply refer to it as 2004-2010 and use 2007 as the mid-year.

Age reporting in India

Identifying the distribution of the population under age 7 with the number of births during 2004-10 assumes that ages are properly reported in the census. This is a rather dubious assumption in the Indian context where many people have no exact knowledge of their biological age or of their year of birth. Moreover, systematic attempts by census takers to properly assess age for all individuals would greatly extend the duration of the enumeration. The figures given below indicate that only few enumerators have taken the trouble to estimate the exact age of the respondents using traditional calendars. They often prefer to round off the age based on guesswork. Take for instance the case of preferred rounding of ages ending with 0 or 5. Using the 2001 Census tables published by single year of age, we can compute the ratio of the population of any single year to the average population returning the lower and higher adjacent ages. This ratio should be 100 per cent in the absence of age attraction, but in 2001 it was above 200 per cent for all ages ending 0 or 5 above 20 years, reaching, for instance, 750 per cent for age 50 – meaning that there are 7.5 more people aged 50 than people aged 49 or 51 years.

In the case of children, the situation is however far less dramatic than among adults in terms of quality of age reporting. The population aged exactly 5 years in 2001 represents 105.6 per cent of the average population aged 4 or 6 years. This demonstrates that the attraction of age 5 is almost negligible. In fact, 2001 data suggest that no major attraction or repulsion effect is visible before age 7. Since we do not yet have the population distribution by single age for 2011, we are forced to presume a similar pattern for 2011, with relatively reasonable good quality in age reporting before age 7.[2]

A different way of assessing the quality of the age data is using other age estimates. One such source relates to the figures computed by the Population Division of United Nations in their latest 2010 revision of the World Population Prospects (United Nations Population Division 2011). From this series, we can, for instance, compute the proportion aged 0-6 years by interpolating the five-year age distribution estimated in 2000 and 2005 by the Population Division. We obtain a proportion of 16.4 per cent in 2001 according to the Population Division estimates, as against a lower figure of 15.9 per cent according to the 2001 census tabulations by single year of age. The relative difference between these estimates and the census figures was therefore less than 3 per cent in 2001. In 2011, the same exercise leads to a greater difference of 9 per cent between the provisional census figure and the Population Division estimate for India. Yet, the latter figure is likely to be biased since the Population Division estimate was prepared before the 2011 provisional results were published.[3] We also observe that the age distribution of population below 7 during both the NFHS-3 survey (in 2005-06) and the DLHS (in 2002-2004) was slightly higher at 15.7 per cent and 15.0 per cent respectively, than the average 2001 and 2011 proportion at 14.5 per cent. These comparisons with United Nations estimates and survey data suggest an underestimation of the child population by the census that could be of order of up to 5 per cent.

[2] The pattern of age attraction among children was almost identical in 2001 compared to the 1991 results. This indicates that the progress in quality of age reporting during the 2001 census was very slow.

[3] The United Nations figures are based on a total population estimate of 1.31 billion in 2010 –100 million inhabitants more than the provisional results from the census taken a year later.

Mortality correction

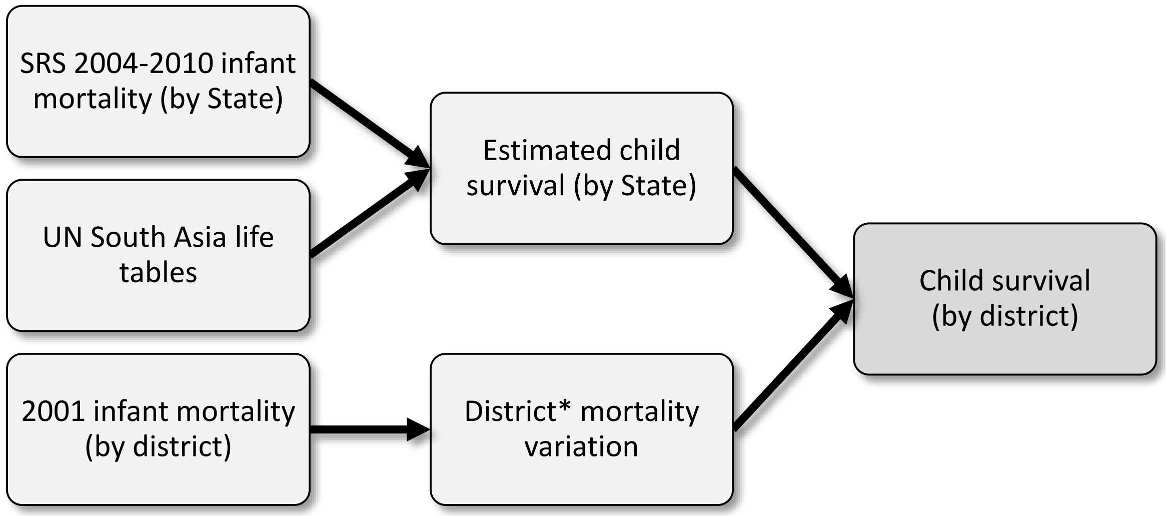
The child population recorded in 2011 by the census is composed of survivors of births that took place from 2004 to 2010. It is therefore necessary to form proper estimates of the intensity of infant and child mortality during that period to compute births by back projection. Assuming that the child population is correctly estimated by the census, the volume of births during 2004-2010 is equal to the 2011 child population divided by the survival rate from birth to age 0-6 years.

We need to first assess not only the mortality levels for India, but also for its States and districts, keeping in mind that child mortality risks may be, for instance, six times higher in Uttar Pradesh than in Kerala and that inter-district differentials are bound to be as sizeable.[4] In view of the fact that no district-level mortality estimates exist for this period, we have two tasks before us: computing State-level survival rates during 2004-2010 and estimating the extent of district differentials. Mortality analysis in India is hardly equipped with better data than fertility estimation in the absence of vital registration statistics. Note in comparison that the completeness of birth and death registration has been close to 100 per cent in neighbouring Sri Lanka for the last 20 years, allowing, for instance, child mortality to be monitored at the district level (Chaudhuri et al., 2006).

We start our analysis from estimates available at the State level. The SRS is probably a better source than the NFHS-3 for our purpose since it provides annual infant and child mortality figures for the major States. We therefore use the average mortality below 5 years for the period 2004-2010 for assessing mortality levels for the larger States. For smaller units without annual mortality estimates, we use the 2005-07 average. We then convert mortality rates under five into person-years from birth to age 7. This can be done using model life tables that are most appropriate for the Indian mortality regime, i.e., the South Asia life tables derived by the United Nations (United Nations, 1982). Mortality rates are thus converted into State-level survival rates from birth to age 0-6 years, using which we can transform populations under 7 into births during 2004-2010.

[4] This differential refers to the State-level variation in under-five mortality estimated during the NFHS-3 survey round. The pronounced spatial clustering of infant and child mortality below the State level) has been documented by Singh et al. (2011).

Figure 2. Estimation of district-level child survival estimation



Whenever necessary, ratios for new 2011 administrative units have been estimated by averaging original 2001 districts. It may be noted that most new 2011 districts stem from 2001 districts that have been bifurcated.[5] In such cases, the parameters from the original 2001 districts are simply imputed to the new 2011 districts. As noted further below, this strategy is far from perfect when 2001 districts have been precisely bifurcated because of the internal heterogeneity of their constituents (rural/urban, developed/backward) – since mortality and other rates are very likely to vary within these heterogeneous districts. When new 2011 districts have been carved from two or more 2001 districts, we use a ratio obtained by averaging the values of the original districts.

The estimation of district-level survival rates is more demanding, since we have no data at this level for this period. The DHLS surveys do not provide usable mortality estimates at the district level and the ongoing Annual Health Survey has covered less than half of India's districts. We are therefore compelled to use the estimates of infant mortality derived from the 2001 Census by Irudaya Rajan et al. (2008). The idea consists in using this source to calculate the relative intensity of infant mortality by comparing State and district level estimates and then applying similar ratios to the 2004-2010 rates. In other words, a ratio of relative mortality based on estimated infant mortality in 2001 is computed for each district (see Figure 2). These differentials are by no means negligible since district-level ratios vary from 43 per cent to 178 per cent of the respective 2001 State-level mortality estimates.[6]

This procedure yields finally a series of estimated 2004-2010 births for all districts. Birth rates are then computed by estimating the average 2004-2010 population in each district.

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[5] See Census of India (2011b) for details on administrative changes between 2001 and 2011.

[6] For instance, in Madhya Pradesh, infant mortality was estimated to be 36 per cent lower in Gwalior than in the State as a whole, but 25 per cent higher in some districts of the nearby Bundelkhand region. Similarly, Mangalore registered a mortality level less than half of Karnataka's value as against districts such as Bellary or Koppal in the Deccan where mortality rates are 40per cent above the State average.

From birth to fertility

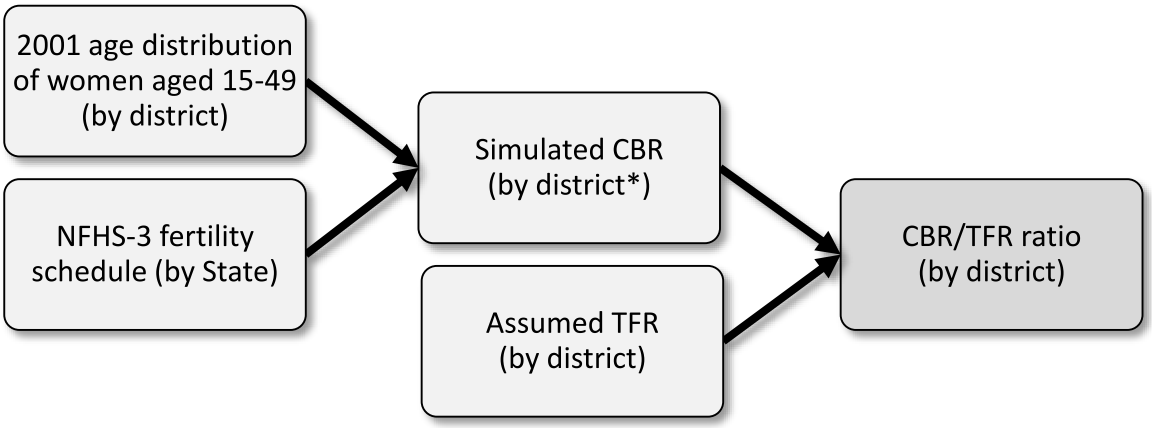
Crude birth rates (CBRs) are important dimensions of population dynamics since they are the major determinants of variations in population growth across Indian districts. The other two components of the local demographic growth equation – viz., death and net migration rates – are not available at this scale of analysis. Moreover, the volume of births is also affected by several structural features of regional populations. Populations with distorted sex ratios or with a large proportion of youth will be characterized, *ceteris paribus*, by a deficit of women of childbearing age and consequently by lower birth rates. Demographic structures therefore play a significant role in areas characterized by heavy in- or out-migration, by skewed sex ratios or by young populations. The average number of children per woman (or total fertility rates, TFR) is therefore a much better estimate of reproductive behaviour than CBRs.

The TFRs are computed from age specific fertility rates, which census data does not provide yet. We will therefore use available age and fertility data to model the impact of population structures on the fertility-natality ratio in each State and district. The procedure (see Figure 3) is as follows: we first select from a fixed fertility schedule for each State and apply it to the specific age and sex structure of each district to compute a theoretical number of births and the corresponding birth rates. We use these two parameters (fixed fertility and resulting birth rates) to compute a fertility/birth rates ratio at the district level. This ratio will allow us to finally convert CBRs into TFRs.

The parameters used here stem from different sources. The age schedule of fertility comes from the age specific fertility rates at the State level based on the SRS series for 2005-09. For smaller units, we can use only the 2005-07 period. These age-specific fertility rates are then applied to the age and sex distributions to estimate the number of births and the birth rates.[7] Here, we use the age and sex structure available at the district level from the 2001 census after correction for district changes. Borrowing age and sex structures from the 2001 census may be questionable in view of the potential changes in terms of population composition during the previous decade. This is especially true in districts that have experienced rapid population growth fuelled by migration or for new 2011 administrative units that may have population compositions quite distinct from that in 2001. However, significant population recomposition or redistribution corresponds probably to less than 20 districts and we can therefore assume that the fertility/birth rates ratios as computed here are the best available instruments to convert CBRs into TFR levels.

[7] The NFHS-3 offers another set of age-specific fertility rates, but we have opted for the SRS rates as they are more recent and cover more States and Union Territories. However, using different fertility schedules results only in very moderate variations.

Figure 3. Estimation of the ratio of birth rates to fertility rates



Consistency checks

Before commenting on the results shown in the Appendix, we first need to check the consistency of these estimates and compare them to other available sources on fertility in India. Here we use both State- and district-level fertility estimates. But this systematic verification has compelled us to conduct a more methodical review of data for one particular region, namely the State of Jammu and Kashmir where the quality of the 2011 census figures is a source of serious concern. [8]

What is the matter with Jammu and Kashmir?

As shown further below, our census-based estimates fall in line with other fertility estimates available in India since 2005. Yet, we encountered several difficulties regarding district-level estimates from Jammu and Kashmir and this has led us to re-examine the consistency of the 2011 census results in this State.

The perplexing census data from Jammu and Kashmir

Provisional census data were published within a month following the 2011 census. So far, the quality of these data has not been subjected to a thorough statistical review and no result from the post-enumeration survey has been published. We are therefore encouraged to take census results at face value. Yet, the provisional census results in Jammu and Kashmir were fairly intriguing for at least three reasons and this could have alerted demographers of the possibility of serious data issues:

1. The census-based population growth rate of 21.5 per cent during 2001-11 was significantly higher in Jammu and Kashmir than the SRS-based rates of natural increase (birth rates minus death rates) of 14.0 per cent

[8] We have benefited notably from exchanges with Bashir Ahmad, Kamala Visweswaram and PM Kulkarni on this issue.

2. The proportion of population below 7 increased from 14.6per cent to 16.0per cent in Jammu and Kashmir, whereas it decreased significantly everywhere else in India during 2001-11.
3. The child sex ratio decreased considerably from 941 to 859 girls per 1000 boys under 7, by far the largest decline observed among the States between 2001 and 2011.

The first anomaly was hardly acknowledged by any observer even if the difference between the census-based decadal population growth and the corresponding SRS estimate was more than 7 per cent. Census figures tend to inspire more trust than vital rates derived from regional SRS samples. For instance, the observed population growth in 2001-2011 was also unexpectedly high in Tamil Nadu compared to SRS-based estimates of the natural increase, but the gap between demographic growth and natural increase was simply ascribed to immigration to Tamil Nadu.[9] A similar logic would imply massive immigration in Jammu and Kashmir during 2001-2011, but that seems quite implausible in a period otherwise characterized by prolonged political disturbances. A sudden rise in fertility would be another hypothesis, which will be explored below. But if we trust SRS trends, an equally logical explanation for this elevated intercensal growth would be a 2001 census underestimation or a 2011 census overcount.

The second anomaly relates to the unexpected rise in the proportion of the child population in Jammu and Kashmir, which became the third largest among the States and Union territories in 2011. This was noted by the Census of India (2011.a), but no comment was offered. Such a rise in the proportion of young population can only stem for a rebound of fertility rates in Jammu and Kashmir. Yet, no other fertility estimate confirms any downturn in fertility decline in the State (discussed below in more detail). Another possible explanation for this discrepancy could be an inflated child population during the 2011 census, or on the contrary, a serious understatement of the population aged 7 years or more in 2001.

The third anomaly is the sudden plunge in child sex ratios. Many in the State opined at once that prenatal sex selection had suddenly shot up in Jammu and Kashmir and this hypothesis received a large echo in the regional, national and international press, encouraging activists to focus on the "new evil of gender discrimination". Yet, this decrease in sex ratio is contradictory to that obtained from other sources. While rather low in the mid-2000s, SRB levels did increase in Jammu and Kashmir from 838 in 2004-06 to 873 in 2008-10 according to the SRS estimates. The neighbouring States of Punjab or Haryana had also recorded higher birth masculinity during the same period. Birth registration data from Jammu and Kashmir also pointed to SRB levels of around 900 in 2007, significantly higher than the census-based sex ratio of the 0-6 year population (859). The SRS estimates for the population aged less than 5 years are also higher, since they averaged 889 in 2004-2010 without any discernible declining trend. However, there is no obvious technical explanation for this significant decline in child sex ratio except a sudden change in sex-selective underenumeration.

Child population and fertility estimates

The second abnormality noted earlier – the apparent rise in the proportion of the child population between 2001 and 2011 – has a direct bearing on our estimates for Jammu and Kashmir. Any rise in the child population translates mechanically into a parallel rise in CBR and TFR estimates at both the district and State levels. Our estimated TFR level of 3.7 children per woman derived from the census age distribution in Jammu and Kashmir is one of the highest in the country and represents a

[9] See Navaneetham and Dharmalingam (2011). For Tamil Nadu, this corresponds to a net migration influx of about 3-4 million people during 2001-11 (Kulkarni 2011).

significant increase from the 3.0 estimate of ten years earlier. The recent estimates of fertility in Jammu and Kashmir point, on the contrary, to a gradual decline in TFR levels in Jammu and Kashmir, reaching respectively 2.4 children per woman in the NFHS-3 survey and an average of 2.25 for the six annual SRS estimates from 2004 to 2009. As a matter of fact, the latest SRS estimate for Jammu and Kashmir puts fertility at 2.0 children per woman in 2010, signalling a continual decline in fertility rates in the State.

The gap between our census-based fertility estimate and other figures for the State amounts therefore to at least 1.4 children per woman (more than 60 per cent in relative terms). Our district-level estimates for Jammu and Kashmir further show that fertility level is supposed to have increased during 2001-2011 in almost all districts. This again conflicts with what we know of regional trends, characterized by a regular decline in fertility levels in Jammu and Kashmir according to the SRS annual series. However, we also observe that the three districts in which fertility had in fact decreased at almost the same pace as elsewhere in India were Kathua, Jammu and Samba. These are three adjacent districts are located in the extreme south of the Jammu region and notably characterized by the lowest proportion of Muslim population in the State (below 10 per cent in all the districts).[10]

We should add here that the most spectacular decline in child sex ratios from 2001 to 2011 have been also recorded in the districts of the Kashmir Valley such as Pulwama (-210 girls per 1000 boys), Budgam (-172), Kupwara (-167), or Ganderbal (-151). On the contrary, the child sex ratio has remained almost stable between 2001 and 2011 in the three districts of Kathua, Jammu and Samba which are distinguished by normal fertility trends,

At this point, we should depart from statistics and come back to the real world. Wild rumours started to circulate long before the final operations of the 2011 census were held in Jammu and Kashmir. It was held that there was a plan to exaggerate the share of the Jammu region within the State by inflating census results in Jammu by, for instance, counting migrants and non-residents. At a time coinciding with the start of the house listing operations in May 2010, Syed Ali Shah Geelani spoke about "a planned conspiracy to change the Muslim majority of the state" through the census. [11] This obviously did not happen since the population growth was lowest in Jammu. But this rumour may also have, on the contrary, encouraged people in the rest of the State to react.

Child population overcount

We already mentioned several hypotheses accounting for these census anomalies. One of them would be a severe underestimation of the population in 2001, in part due to the census boycott supported by Kashmiri separatists.[12] But any such undercount does not explain the rise in child population, unless all fertility levels and trends from 2001 to 2010 given by the SRS are equally wrong. The other hypothesis of a real rise in fertility during the last decade is also contradicted by all available fertility measurement available from the SRS and from the NFHS. We are left with a third scenario,

[10] Figures are taken from the 2001 census. The overall Muslim population in the State was 67per cent.

[11] A few days earlier, he had stressed that the "Although the census is no alternative to self-determination, the local government employees must discharge their duties honestly to defeat the RSS-BJP designs to change the demography of Jammu and Kashmir". See "J&K skeptical about Census, senses 'conspiracy'", *The Asian Age*, 18 May 2010; *IANS* 13 May 2010.

[12] See Peerzada Arshad Hamid, "Counting Kashmiris" in *Himal*, April 2011.

corresponding to an unusual population overestimation in 2011.[13] Let us now examine this hypothesis in greater detail.

According to the scenario emerging from our observations, the apparent surplus in demographic growth and fertility rates could have proceeded instead from a deliberate over-reporting of children in Jammu and Kashmir. The fear of a census conspiracy to inflate Jammu's population could have induced people in the rest of the State, especially in the Kashmir Valley, to overstate their own household population by adding non-existent children. In this hypothesis, many people in the Kashmir region would have resorted to a systematic exaggeration of their household population in order to boost the overall share of this region within Jammu and Kashmir. Adding non-existent children to one's family is probably the easiest procedure to inflate a population total during the census, since there are far less columns to fill up in the questionnaire. Most variables for children such as mother tongue, occupation, education, or migration status can be quickly entered in the census schedule as 0, or duplicated from the mother's response. Incidentally, sex ratio levels suggest that in trying to inflate their child population, many households seem to have invented boys rather than girls – as if reporting non-existent boys was easier or more spontaneous.

Additional effort and data would be needed to confirm this wide over-reporting and to understand its demographic impact and exact motives. While the regional Government has already challenged the veracity of the census figures[14], its only concern relates to the child sex ratio rather than the entire child population in Kashmir. We have moreover no guarantee that this systematic overcount has not affected older age groups as well. Yet, the scale of this exaggeration brings with it an uncomfortable implication, namely that the active cooperation or initiative of local enumerators in the process of census manipulation cannot be ruled out. The proportion of non-existent children entered in the census may be as much as 60 per cent of the expected number of children if we follow SRS fertility estimates. It is difficult to believe that census personnel could have failed entirely to detect these systematic misstatements, especially for preschool age children who are usually at home during the visit of the census enumerators.

Demographers will be able confirm the true level of population overstatement during the 2011 census only after the publication of data on the detailed age and sex structure. However, a few preliminary conclusions may be drawn from our finding. Since it is most likely that the published figures reflect a severe exaggeration of the real child population, fertility rates derived from the child population in Jammu and Kashmir are gross over-estimates. There is little to be done with such inconsistent and unreliable figures. In addition, the dramatic decline in child sex ratio in Jammu and Kashmir is most probably an additional casualty of these manipulations. The efforts to track prenatal sex selection in Jammu and Kashmir may be simply misplaced and should be redirected to States where the situation is more likely to have significantly deteriorated – like Maharashtra or Rajasthan. A further implication concerns the impact on the decennial population growth rate. After correction for the fertility overstatement, an alternative 2011 population total would in fact be in the range of 11.75 million – as against the published provisional total of 12.55.[15] The decennial population growth rate would be reduced from the published figure of 23.7 per cent to an estimated growth rate of 16.2 per cent – a

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[13] Dr. Bashir Ahmad Bhat (Population Research Centre, Srinagar) is the first scholar to raise the possibility of a census over-count in May 2011. See his "Where have they gone? Searching Missing Girls in Jammu and Kashmir", *Greater Kashmir*, 12 May 2011.

[14] See Muddasir Ali "Govt 'challenges' Census figures. Orders Fresh Survey Of Births During Past 5 Years", *Greater Kashmir*, 3 May 2011.

[15] This alternative population figure is obtained by reducing the child population below 7 years according an assumed fertility level of 2.3 children per woman.

value significantly closer to the SRS-estimated natural rate of increase of 14.0 per cent from 2001 to 2010.[16] Since the inflation in population numbers during the census has apparently been concentrated among the Muslim population as seems to have been the case, we may also expect a jump in the proportion of the Muslims in the State according to the official census returns. This increase may artificially raise the proportion of Muslims from 67 per cent in 2001 to about 70 per cent of the State population in 2011, a bogus trend likely to launch another futile round of controversies about religious demographic differentials in Jammu and Kashmir and in India.[17] We finally add that the countrywide fertility estimate is only marginally affected by the removal of Jammu and Kashmir districts from our estimate since the State accounts only for 1 per cent of India's total population and its presumed TFR level, according to the SRS or NFHS figures, is very close to the national average.

In view of the aforementioned difficulties and the doubt over the quality of census data, we have decided to exclude Jammu and Kashmir from the purview of our estimation exercise. We do not want to circulate any potentially misleading fertility estimates related to Jammu and Kashmir in view of the data issues exposed here. Neither do we wish to feed pointless discussion about an alleged fertility rise in Jammu and Kashmir. Biased estimates of child sex ratio levels from the 2011 census in Jammu and Kashmir have already polluted the debate on prenatal sex selection and we want to warn census data users against any unqualified use of the population figures for the State. We have, however, retained in our results the three districts in which fertility appear to be reasonably well estimated, namely, Jammu, Kathua and Samba.

Census-based and other fertility estimates

The previous discussion focused on issues related to 2011 census data for Jammu and Kashmir. We have also checked the reliability of our fertility estimates for the rest of India. The first validity check consists in comparing them with the annual TFR estimates from the SRS. Figure 4 plots our census-based estimates against SRS estimates for large States, for which annual SRS estimates are based on larger samples. This comparison demonstrates the very high consistency level at the State level between our TFR estimates and the SRS measurements in these "large States". The correlation coefficient (r^2) is as high as 0.95 for these 19 States. There significant variations for some States – such as Bihar – but the agreement between the two series is obviously very strong.

Including all the 34 regional units for which SRS provides TFR estimates leads to a weaker, but still highly significant correlation (r^2=0.76). For smaller States and Union Territories, the correspondence between both sources appears far less convincing although it is difficult to identify the origin of the gap between the two series. The largest variation between both sets of TFR estimates correspond to the North-eastern States from Meghalaya to Tripura where census-based estimates are consistently higher than SRS values. The limited sample size for some smaller regional units tends to affect the quality of SRS figures, but the quality of our own census-based estimates may also be more fragile in smaller States.[18] We applied the same comparison procedure to the earlier fertility estimates from the

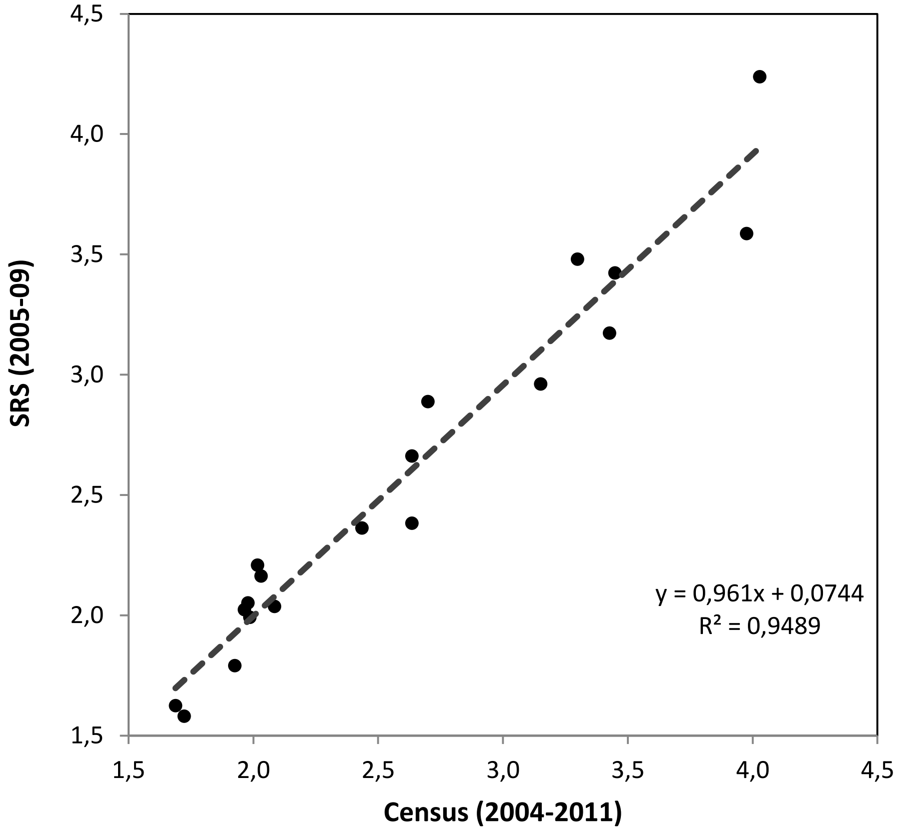
[16] The overall impact of this demographic overcount of India's population total remains modest since Jammu and Kashmir accounts for 1 per cent of India's population.

[17] Incidentally, a previous controversy had engulfed the Census of India in 2004 when unadjusted religious figures exaggerated the Muslim population growth in India… because they forgot to control for the absence of the census in Jammu and Kashmir in 1991. See Bhagat (2004).

[18] In 2007, the SRS sample covered populations smaller than 40,000 people in States such as Arunachal Pradesh, Meghalaya or Mizoram. Comparatively, the sample ranged in bigger States from one to six lakhs.

NFHS-3 round, which are available for 28 States. The correlation coefficient is again very significant (r^2=.86), but even higher when the analysis is restricted to the larger States.

Figure 4. Fertility estimates for larger States, Census (2004-10) vs. SRS (2005-09)



Our 2011 TFR estimates can also be juxtaposed with the estimates derived from the 2001 census at the district level, after the necessary correction for changes in the administrative geography. Here, we use our own district-level fertility estimates published ten years ago (Guilmoto and Rajan 2002). Since fertility decline is not uniform across the country, we use a logarithmic regression rather than a linear model.[19] The correlation analysis demonstrates a very strong relationship between the 2001 and 2011 estimates at the district level, with r^2=.91. There are still 25 districts where fertility appears to have increased during the last ten years, a rather unexpected result in a country that has recorded a sustained fertility decline in 2001-2011. We cannot examine all such odd cases, but the two extreme examples described below may reflect the kind of issues encountered in our estimation procedure. In the district of Mewat (Haryana) formed in 2005, fertility has seemingly risen by more than one child per women during the period 2001-2011. However, the 2001 estimate relates to the district's original components in 2001 (viz., Gurgaon and Faridabad). There is nothing surprising in this case since the new district was precisely carved out of two highly urbanized districts of Haryana adjacent to Delhi to isolate the far less developed rural areas of Mewat, mainly populated by the underprivileged Muslim Meo community –among whom we can indeed expect fertility to be far higher than among the middle

[19] Low-fertility areas in South India have, for instance, recorded slower fertility decline during 2001-2011 than other districts. The linear regression used here is based on the logarithm of fertility estimates rather than on original fertility estimates.

classes living in Gurgaon or Faridabad.[20] Kurung Kumey (Arunachal Pradesh) is the only other district in the country where fertility appears to have increased by one child per woman during 2001-2011 and is again a new district unit. It is composed of the least developed circles in the northwestern part of the original Lower Subansiri district – from which it was carved out in 2001. In addition, the size of the district's population makes our procedure less reliable since Kurung Kumey has one of the lowest district population (and density) found in India.[21] These two examples probably summarize some of the comparison issues we may face when assessing the recent change in fertility levels. This should encourage us to take due account of intercensal redistricting and of the overall population size of districts in many parts of India when discussing the quality of census-based estimates and decennial trends.

A final test is conducted using the recently published district-level data from the Annual Health Survey (AHS). The first AHS round was conducted in 284 districts of 9 States in 2010-11 and it provides, for the first time, a set of detailed demographic indicators at the district level. From this source, we now have district-level crude birth rates, though TFR estimates are not available. After adjusting for district changes, we have once again regressed these CBR estimates against our census-based CBR estimates. Results are unfortunately rather disappointing since the correlation coefficient (r^2) between the two series of CBR estimates is only 0.49 for the 281 comparable districts. A closer look at these two series indicates that discrepancies are modest at the State level. But when crude birth rates are compared at the district level, the relative variations in the estimated CBR values between these two sources are often sizeable, ranging from -32 per cent to +36 per cent. All this reflects serious discrepancies between census- and AHS-based estimates. Since we have previously observed a relatively high level of correspondence between our census-based estimates and others sources, the source of the observed discrepancy may therefore point to potential quality issues for the AHS figures at the district level. In this regard, a similar regression between census-based child sex ratios from both sources (2011 census estimates and AHS) yield similarly mediocre results, with a coefficient correlation (r^2) of 0.53. A proper assessment of the quality of the AHS statistics would however require a more in-depth analysis based on detailed results from the Annual Health Survey.

Fertility differentials and trends

Fertility according to our estimates had reached 2.66 children during the seven years preceding the 2011 census. This figure is very close to the corresponding SRS TFR average of 2.72 for 2005-2009. It is also almost similar to the projected value of 2.65 for 2006-10 in 2002 by Mari Bhat (Bhat 2009). However, regional differentials are still extremely important. Fertility does vary today from 1 to 3 within India. India's fertility trend is the composite product of distinct regional fertility trajectories, ranging from early decliners like South Kerala and West Tamil Nadu to latecomers like North Bihar and West Rajasthan. We offer here a brief analysis of our results, stressing the regional diversity and the overall slow rate of fertility decline as seen from an Asian perspective.

[20] On Mewat's disadvantaged socioeconomic situation, see IHD (2008). Conversely, Gurgaon district has now the highest Internet penetration in the country according to 2011 figures.

[21] The population below 7 years recorded in Kurung Kumey was 15,540 children in 2011. On Kurung Kumey's sociodemographic characteristics, see also IIPS (2010).

A complex map of fertility variations in India

On the one hand, fertility has gone below the replacement level of 2.1 children per woman in no less than 12 States and Union Territories in the country (see Table 1). In terms of districts, 174 out of 621 have today fertility levels below 2.1, accounting for 28 per cent of all Indian districts. The vast majority of them are located in the five Southern States and Union Territories and in the North-western States of Punjab and Himachal Pradesh. East India is represented by West Bengal, where almost half of districts in West Bengal fall into the below-replacement category, as well as Odisha and Tripura. West India consists mostly of Maharashtra and Goa, with less than 10 per cent of districts in Gujarat reporting TFR level below 2.1.

But as State-level results indicate, a few regions such as Kerala, Tamil Nadu or Goa have even recorded fertility levels close to 1.5 children per woman. A closer look indicates that there are indeed a small number of districts (24) where fertility averages below 1.5 children per woman according to the 2011 census. The lowest fertility level in India is estimated in Kolkata (1.2), but several other districts of Kerala, Tamil Nadu and other States also report unusually low fertility levels. Several of them are big cities like Kolkata, New Delhi, Chennai, Kollam, Mumbai, Thiruvananthapuram, and Coimbatore. But this list also includes typically rural districts such as Pathanamthitta, Idukki, Alappuzha and Kottayam in Kerala, Chikmagalur and Hassan in Karnataka, and Kaniyakumari and Namakkal in Tamil Nadu. This category comes close to the "lowest-low fertility", a notion referring to cases of fertility dropping below 1.3 children per woman. This situation has been observed in some highly developed countries in East Asia (parts of China, South Korea, Japan, Taiwan, etc.) and in Europe (Germany, Poland, Russia, Italy, Spain, etc.). It may be noted that in these districts, the pace of fertility decline has slowed down to 0.3 child per woman during 2001-2011 – as against -0.5 in India as a whole. It is difficult to predict future fertility trends in these areas, but lowest-low fertility is a distinct possibility in more than a dozen Indian districts by 2020.[22]

[22] For a detailed discussion of TFR trends, see also Haub (2011). See also the analysis of fertility trends in South Asia by Basu (2009).

Table 1. State level estimates of crude birth rates and total fertility rates, 2011 and 2011

State	CBR	TFR		Change		CBR	TFR		Change
	2011	2011	2001			2011	2011	2001	
Andaman & Nicobar	15.7	1.68	2.32	-0.6	Lakshadweep	16.6	2.06	2.69	-0.6
Andhra Pradesh	16.2	1.79	2.31	-0.5	Madhya Pradesh	24.3	3.17	3.86	-0.7
Arunachal Pradesh	23.7	3.29	3.92	-0.6	Maharashtra	17.9	2.16	2.56	-0.4
Assam	23.7	2.89	3.19	-0.3	Manipur	20.0	2.48	2.59	-0.1
Bihar	29.7	4.24	4.54	-0.3	Meghalaya	31.3	4.34	4.45	-0.1
Chandigarh	17.4	1.99	2.25	-0.3	Mizoram	24.1	2.90	3.36	-0.5
Chhatisgarh	23.2	2.96	3.60	-0.6	Nagaland	21.1	2.82	3.16	-0.3
Dadra & Nagar Haveli	25.1	3.07	3.61	-0.5	Odisha	19.7	2.36	2.82	-0.5
Daman & Diu	18.3	2.14	2.48	-0.3	Puducherry	16.4	1.66	1.82	-0.2
Delhi	18.7	2.21	2.62	-0.4	Punjab	16.7	2.05	2.42	-0.4
Goa	14.3	1.54	1.79	-0.2	Rajasthan	25.4	3.42	4.22	-0.8
Gujarat	20.1	2.38	2.57	-0.2	Sikkim	15.5	1.87	3.03	-1.2
Haryana	21.2	2.66	3.22	-0.6	Tamil Nadu	14.9	1.62	1.85	-0.2
Himachal Pradesh	17.6	1.99	2.39	-0.4	Tripura	18.9	2.21	2.48	-0.3
Jammu & Kashmir			2.98		Uttar Pradesh	24.8	3.59	4.36	-0.8
Jharkhand	25.8	3.48	4.07	-0.6	Uttarakhand	21.0	2.58	3.63	-1.0
Karnataka	17.8	2.04	2.40	-0.4	West Bengal	17.3	2.02	2.62	-0.6
Kerala	14.7	1.58	1.70	-0.1	**INDIA**	**21.2**	**2.66**	**3.16**	**-0.5**

TFR= total fertility rates in children per woman

CBR= Crude birth rates in per 1000 population

2001 figures derived from Guilmoto and Rajan (2012)

On the other hand, Bihar and Meghalaya are the only States where average fertility still stands at above four children per women. In four isolated districts of the latter State, estimated fertility levels are even higher than five children per women. These are States where fertility decline appears to have been rather modest during the previous decade. But as usual, these State-level means tend to conceal the large amount of intra-regional heterogeneity. The number of districts with fertility estimates above 4 is more numerous (72), and are scattered across many other regions in the country. Apart from Bihar and the Northeastern States, several of these high-fertility districts are located in West Rajasthan, Madhya Pradesh, Uttar Pradesh and Jharkhand. We recognize here the contours of the high-fertility area of North-Central India, extending from the Indo-Gangetic plains to drier areas of the Deccan Plateau. Unsurprisingly, fertility decline has been slightly slower than average over the past ten years in these 72 districts.

The largest number of States and districts lie between these two extremes, with fertility ranging from replacement level to four children per woman. These are also the areas where fertility decline has proceeded at a faster pace during the intercensal period (-0.6 child in ten years). Unlike Bihar, several "Empowered Action Group" States such as Rajasthan, Uttar Pradesh and Madhya Pradesh emerge as States with the fastest speed of fertility decline during the previous decade. But this intermediary category is a mixed combination of districts. On one side, it includes districts where women will very soon have, or already have in 2012, less than 2.1 children on average in view of the speed of their recent fertility decline. Among these are several advanced districts in the otherwise lagging States such as Assam, Uttar Pradesh, Madhya Pradesh or Chhatisgarh. In particular, we notice distinct urban effects at work in areas such as Durg, Bhopal, Indore, Lucknow or Kanpur where the fertility level was below 2.5 on the eve of the 2011 census. On the other side, we also find a large number of districts with higher than average fertility levels and where below-replacement levels are unlikely to be attained within the next ten years in spite of the real progress achieved during the last decade.

Is there a "Hindu rate of fertility decline"?

A more general observation relates to the moderate momentum of fertility decline across Indian districts. According to our estimates, only 6 per cent of all districts have recorded a reduction of more than one child per woman within the intercensal period. While it is auspicious to see that most of these 37 districts are in States with high fertility average levels such as Madhya Pradesh, Rajasthan, and especially Uttar Pradesh, it is surprising to find that there has been no acceleration in fertility decline in India. This does not square with the appreciable rate of social and economic change that has otherwise characterized India since the end of the 20th century.

Sustained urbanization, rapid progress in education, economic development, and poverty reduction are distinct features of India's last decade. Consider, for instance, the tripling of India's GDP from 2000 to 2010, the decline in female illiteracy from 61 per cent in 1991 to 46 per cent in 2001 and 35 per cent in 2011, the surprising increase in the proportion of households possessing mobile phones in 2011 (60 per cent), or the regular reduction in the share of the population below the poverty line since the 1990s. These obvious achievements seem to have no parallel with the fertility trends. In fact, when seen from a historical perspective, fertility reduction seems to be more determined by its date of inception than by the rate of its decline as noted earlier (Guilmoto and Rajan 2001; Bhat 2009). States where fertility started to decrease earlier, as in South India, are still those in which fertility level is the lowest. The geography of fertility has remained roughly the same, and little seems to have taken place by way of regional convergence.

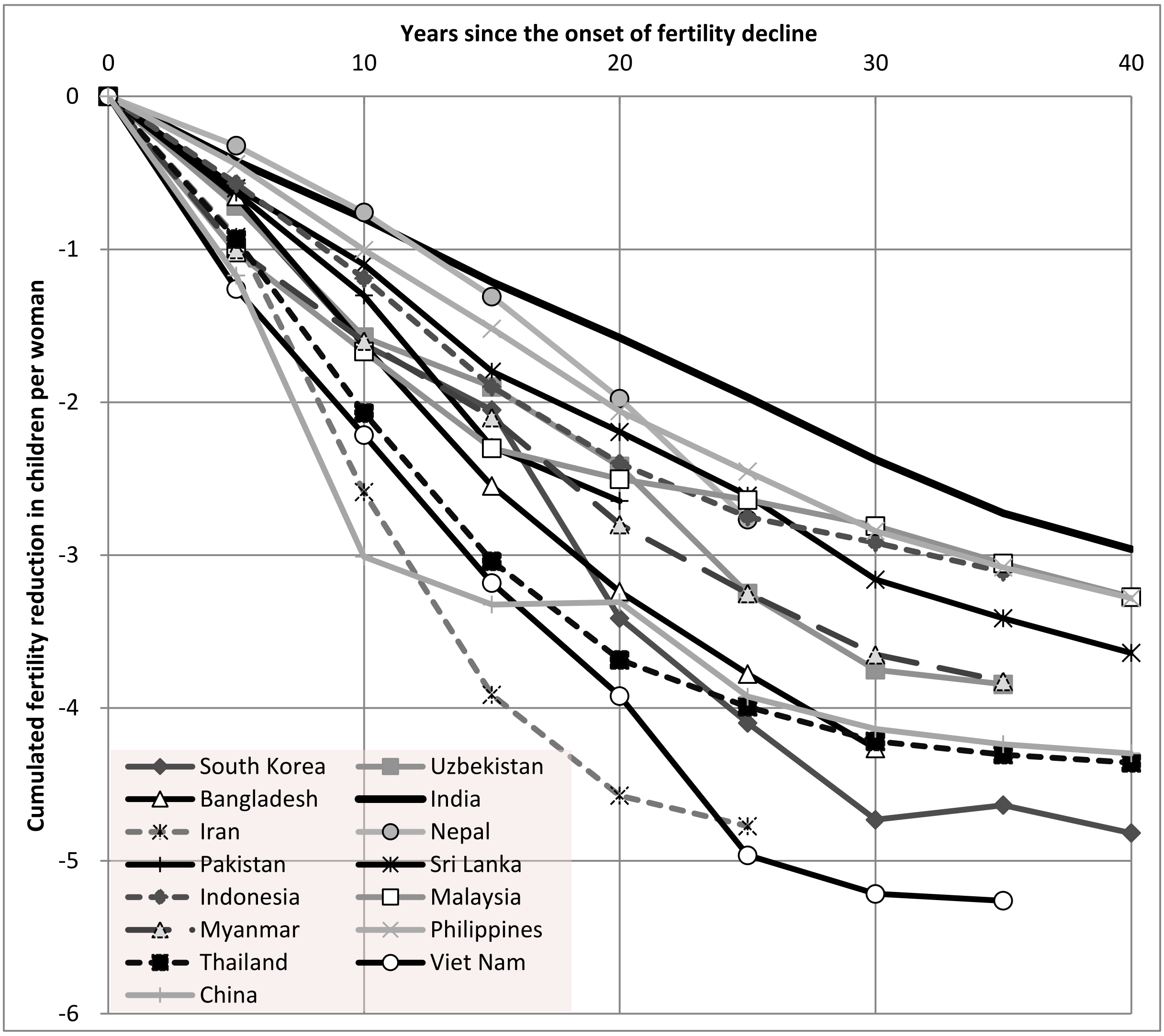
To view Indian fertility trends from a larger perspective, we compare them with trends observed elsewhere in Asia. We use the fertility estimates brought out by the Population Division of the United Nations to compare the fertility levels since 1960 with selected countries in South, Southeast and East Asia.[23] Trends are difficult to compare because of variations across countries in terms of 1) date of inception of fertility decline, and 2) fertility level at this date. For instance, the inception of fertility decline can be dated to 1960 in Sri Lanka and South Korea, 1965 in Malaysia, 1970 in India, China and Thailand, 1975 in Indonesia, Myanmar (Burma, Uzbekistan and Indonesia, 1980 in Bangladesh, 1985 in Iran and Nepal, and 1990 in Pakistan. [24] Similarly, pretransitionnal fertility levels ranged from 5.3 to 7.1 children per woman.[25] To standardize the series, we have therefore plotted the trends in terms of 1) years since the start of sustained fertility decline, and 2) overall fertility reduction since the start of the decline.

[23] We retained only countries of more than 10 million inhabitants and without early fertility decline.

[24] The start of a sustained fertility decline is defined as the five-year period in 1950-2010 during which fertility levels decreased by at least 5 per cent during two successive five-year periods We have removed Cambodia (for its erratic trends during the 1970s) and Afghanistan (for its very recent TFR decline) from the list.

[25] In fact, there is no discernible relation between the pace of fertility decline and any other characteristic such as the subregion in Asia, the date of inception of fertility decline, or the fertility level at that period, the political regime, or the religious composition of the population.

Figure 5. Fertility reduction since the onset of fertility decline in selected Asian countries, computed from United Nations estimates for 1960-2010



The chart in Figure 5 represents the reduction in TFR since the five-year period preceding fertility decline. It is seen, for instance, that fertility decreased by three children in China during the first ten years following the onset of fertility decline, but this decline took forty years to happen in India. Figure 5 confirms the rather slow profile of India's fertility trajectory over the last 40 years. [26] We first note that the Indian fertility curve is almost a perfect straight line, corresponding to a TFR decline of 0.74 children per women every ten years since 1970. There is only a slight deceleration during the last decade, which corresponds to the low-fertility plateau in South India and elsewhere. In most countries where fertility has declined for more than 30 years such as China, South Korea or Vietnam, fertility has already stopped decreasing. Yet, the most obvious feature of fertility decline in India illustrated by this comparative analysis is that fertility has diminished faster everywhere else in Asia than in India. India's fertility trajectory stands clearly apart from trends observed, for instance, in South Korea, Vietnam, Iran, Thailand, Bangladesh, or China. Over the first three decades following the inception of fertility transition, TFR levels in the latter countries is seen to have decreased by at least 1.5 children

[26] James stresses that the *relative* rate of fertility decline in India has recently quickened (2011: 577). We use, on the contrary, a measure of *absolute* decline measured in births per woman rather than in percentages.

more than India. The comparison with other countries also shows India's fertility decline to be significantly slower than its neighbours such as Burma, Nepal, Sri Lanka and even Pakistan where the outset of fertility decline came especially late.

The reduction of fertility in almost all countries except India has proceeded at a pace equal or greater than one child per decade during the period examined here. In this respect, the only two countries closest to India in terms of slow fertility decline are Malaysia and the Philippines, and it is interesting to examine their situation. For one thing, Malaysia is hardly comparable with India, since it became a pronatalist country during the 1980s (Jones and Leete 2002). Its government started then to de-emphasize the family planning programme introduced earlier. This explains why the pace of fertility decline among the ethnic Malay majority has decelerated. As for the Philippines, where fertility started its decline after 1970 like India, it is one country where fertility decline has consistently fallen short of expectations (Costello and Casterline 2009). Many factors have been put forward to explain the rather slow reduction in family size in the Philippines: sluggish economic progresses, opposition of the Catholic Church to modern contraception, weak family planning campaigns and lukewarm support to it by political leaders, prohibition of abortion, and insularity and spatial fragmentation. These are real obstacles to sustained fertility decline in this country, but as readers may easily notice, none of these conditions applies to India. On the contrary, India's governments have long supported family planning efforts. Economic growth in India has been sustained, no organized or political religious force has opposed modern contraception or family planning campaigns, and abortion has been legalized for more than 30 years.

These are, of course, superficial comments on far more complex issues that have plagued India's demographic modernization since the 1960s when the country first launched its birth planning campaigns. A complementary analysis of regional trends in India (not reproduced here) suggests that the pace of fertility decline has not been more rapid even in "success States" such as Kerala, Andhra Pradesh, Punjab or Odisha where replacement-level is already or almost attained. The examination of State-level trends always point to rates of fertility decline ranging from -0.5 to -0.8 child per decade, i.e. rates that are significantly slower that was has been observed in other Asian countries. At both the national and regional level, trends have therefore been moderate and correspond to what could be dubbed a typical "Hindu rate of fertility decline".[27]

If India's fertility level still appears moderate compared to levels observed in other developing countries, it is more due to the early date of inception in the 1960s (its family policy programme was one of the first in the world) than to the pace of this decline ever since that period. As the international comparison demonstrates, many countries such as Bangladesh, Vietnam, Uzbekistan, Burma or Iran, which started their fertility decline at higher TFR levels and later than India, now have lower fertility rates. The fertility rates of Cambodia and Nepal are also likely to catch up with India's.

There are many structural checks accounting for the slow diffusion of the small-family norm in the country. When examined in parallel with the case of the Philippines, several factors can be easily ruled out. The growth in GDP between 5 and 10 per cent per year observed in India since the mid-1990s belies, for instance, a strictly economic explanation for the slow reduction of fertility levels. The recent spurt in economic growth seems to have had no singular influence of fertility trajectories in States such as Gujarat or Maharashtra. Inversely, local studies can also document the presence of fast fertility decline without corresponding economic development, as Säävälä (2010) shows for Andhra Pradesh. Similarly, governments in India have supported family planning more strongly than in the

[27] We borrow here from the expression of the "Hindu rate of growth" popularized by the late Raj Krishna.

Philippines. Yet, the impact of the excesses committed during the Emergency may, in fact, be blamed for a brief stalling of fertility decline around 1980 and perhaps, also for long-term political misgivings from politicians about overt support of family planning. Finally, when compared with the Archipelago of the Philippines, geography may not be a decisive factor in a country like India with high population density and where, in spite of inadequate communication infrastructures, most inhabitants live not far from a town with many modern health facilities.

Family planning campaigns and economic development have therefore had only a limited influence on fertility reduction. This leaves us with explanations revolving more around the slow change in the demand for small families than around supply factors related to costs and availability of birth control methods. Furthermore, this slow fertility decline may not be readily associated with economic indicators such as poverty rates or average income, but are rather linked to traditional lifestyles and values cantered on family building and women's subordination. Alaka Basu (2009) has rightly pointed out that "South Asian patterns of patriarchy and gender inequality and cultural prescriptions about the need for women to become wives and mothers" may account for a slower pace of fertility decline and that sub-replacement fertility in India may not resemble the experience of industrialized countries. The process of "social modernization" has probably less affected social structures in India than elsewhere. The rapid transformations affecting its urban middle classes are more representative of their political strength and media visibility than of their demographic and sociological weight.

In retrospect, the resilience of India's traditional institutions – a huge resource in times of social, political and economic upheavals – has indeed offered a formidable resistance to the joint onslaught of government and market forces. Many government initiatives and other transformations fuelled by economic growth have in fact contributed to the promotion of the Malthusian norms, directly or indirectly. But fertility, like other crucial dimensions of social development such as female employment and literacy levels, has moved very slowly over the last 50 years in spite of the many economic and social incentives for smaller families. While in many countries, age-old family systems have given way to new social arrangements centred on nuclear households and supported by the development of new economic opportunities, the process has taken more time in India. The drive towards lower fertility has been undoubtedly slowed down by the strength of local social institutions protecting traditional family systems.

Conclusion

The need for subregional monitoring of fertility trends has not changed since our previous analysis in 2002. Neither has the situation of civil registration in India improved during the interval. This is a disappointing observation in view of the need for birth certificates for school registration and of recent efforts made to establish a population register and to provide identity cards. To estimate fertility differentials, we have therefore been obliged to use census data and indirect techniques. The results of this exercise (see Appendix) appear to be, on the whole, quite reliable as the very strong correspondence of State-level TFR levels with other sources of fertility estimates suggest. Its major outcome is an in-depth picture of fertility trends at the district-level.

If sustained, the current rate of fertility decline in India should bring the national TFR average down to replacement-level before the end of the decade. This corresponds to the TFR projected by Bhat (2009), but it points to a faster rate of decline than foreseen by the Population Division of the United Nations. Our estimates also confirm the overall slow decline of fertility across India, where many districts witnessed, during the intercensal period, a decrease in TFR levels greater than one child per woman. This slow decline stands in opposition with historical trends observed elsewhere in Asia since the 1960s, where TFRs have usually diminished at a significantly faster rhythm. Neighbouring countries with higher fertility rates such as Pakistan, Nepal or even Afghanistan have reported during the last ten years a fertility decline faster than India's.[28] Fertility rates in Bangladesh, Sri Lanka, Bhutan and the Maldives are already below India's. This Indian specificity may be partly a consequence of India's diversity, since the decline in one region may not coincide with the decline in other regions. Yet, even when fertility trajectories are examined at the State level, swift TFR decreases have remained uncommon. It may also be emphasized that while the impact of demographic change on economic growth is regularly stressed (James 2011, Bloom 2011), the experience of the last twenty years suggests that the reverse influence of economic development on fertility decline – a central tenet of the original theory of demographic transition – appears minimal in India.

Along the way, fertility estimation has also allowed us to spot us a major unanticipated discrepancy in 2001 census figures, namely, the most probable over-enumeration of the child population in Jammu and Kashmir. This is not a common feature of censuses since quality issues usually relate to underenumeration of specific groups (male migrants, minorities, homeless in cities, etc.) or to well-known response biases such as age misstatement. Population over-enumeration is a less common phenomenon and quite difficult to confirm in countries with no reliable civil registration system. Many observers could wrongly infer from the rising proportions of the child population that fertility has indeed increased in Jammu and Kashmir over the last ten years. But thanks to the SRS statistics, the various inconsistencies of the census results in this State could be detected. For want of disaggregated age and sex series, we have been unable to probe the adult population. But it is perfectly possible that population above age 7 may also have been affected by over-reporting. This is unlikely to be as severe as for the child population since the gap in Jammu and Kashmir between the corrected population growth rate in 2001-11 (16.2 per cent) and the corresponding SRS-based rates of natural increase (14.0 per cent) appears comparable to what could be observed in other States. Even if this persisting difference between corrected census rates and SRS figures could be entirely ascribed to exaggeration of the population above age 7, this would lead to an over-enumeration of about two lakhs in this population. This represents an over-enumeration rate of 2 per cent for the population age 7 or more, a level far less catastrophic for demographic estimation than the possible exaggeration of the child population mentioned here.

Another lesson drawn from this exercise is that statisticians and demographers should remain vigilant and always question data before using them. A thorough review of the quality and consistency of the data they manipulate remains the best insurance against sociological inanities. Surveys and censuses are not machine-based operations beyond human agency. A survey remains a volatile confrontation between State-sponsored categories and etic concepts, between enumerators equipped with tools that are presumed all-terrain and context-free and myriads of agents actively promoting their local social and political agenda through this encounter. Many social issues are at stake during demographic data collection. The current caste census will, in fact, soon offer its own mishmash of exaggerations, misstatements and statistical ambiguities. Ever since the so-called Stamp's law of statistics was put forward,[29] the Indian census has become far more democratic and manipulation is often now more a

[28] More evidence on these fertility declines can be found in Demographic and Health Surveys conducted in Afghanistan in 2010, in Nepal in 2011, and in Pakistan in 2007.

[29] The following quotation attributed to Harold Cox refers to India in the 1880s: "when you are a bit older, you will not quote Indian statistics with that assurance. The Government are very keen on amassing statistics - they collect them, add them, raise them to the n^{th} power, take the cube root and prepare wonderful diagrams. But what you must never forget is that every one of these figures comes in the first place from the chowkidar, who just puts down what he damn pleases" (Stamp, 1929: 258–259).

political statement than the outcome of statistical incomprehension. In case of discrepancies, it is often found easier to dismiss statistical data than engage them, leading researchers to either credulously accept statistics or indiscriminately ignore them. But in spite of a large level of "statistical noise" typical of Indian data, demographers can still detect trends or irregularities. Data from the 2011 census and other large-scale surveys will no doubt provide some more illustrations of these anomalies and this should encourage demographers to practice their skills before other social scientists and data users attempt to put the data to contribution.

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Appendix

Crude birth rates (CBR) and total fertility rates (TFR), Indian districts and States, 2001 and 2011 censuses

Name	CBR 2011	TFR 2011	TFR 2001
INDIA	**21.2**	**2.7**	**3.2**
Jammu & Kashmir			**3.0**
Kathua	20.9	2.8	3.1
Jammu	16.4	2.1	2.7
Samba	18.9	2.5	2.9
Himachal Pradesh	**17.6**	**2.0**	**2.4**
Chamba	21.1	2.6	2.9
Kangra	16.4	1.8	2.2
Lahul & Spiti	13.9	1.7	2.0
Kullu	18.4	2.1	2.6
Mandi	17.3	1.9	2.4
Hamirpur	16.2	1.8	2.2
Una	17.7	2.0	2.5
Bilaspur	17.1	1.9	2.3
Solan	18.4	2.1	2.5
Sirmaur	20.7	2.6	3.1
Shimla	15.9	1.8	2.2
Kinnaur	14.9	1.9	
Punjab	**16.7**	**2.1**	**2.4**
Gurdaspur	16.1	2.0	2.4
Kapurthala	15.5	1.9	2.2
Jalandhar	15.1	1.8	2.1
Hoshiarpur	15.8	1.9	2.3
Shahid Bhagat Singh Nagar	14.9	1.9	2.2
Fatehgarh Sahib	15.8	1.9	2.3
Ludhiana	16.4	2.0	2.3
Moga	16.1	2.0	2.4
Firozpur	18.9	2.4	2.8
Muktsar	18.0	2.2	2.6
Faridkot	16.9	2.1	2.4
Bathinda	16.9	2.1	2.4
Mansa	16.8	2.1	2.7
Patiala	17.3	2.1	2.3
Amritsar	16.8	2.1	2.7
Tarn Taran	18.4	2.3	2.7
Rupnagar	15.5	1.9	2.4
Sahibzada Ajit Singh Nagar	18.2	2.2	2.4
Sangrur	16.8	2.1	2.5
Barnala	16.9	2.1	2.5
Chandigarh	**17.4**	**2.0**	**2.2**
Chandigarh	17.4	2.0	2.2
Uttaranchal	**21.0**	**2.6**	**3.6**
Uttarkashi	21.7	2.7	3.6
Chamoli	19.9	2.4	3.0
Rudraprayag	19.4	2.2	3.2
Tehri Garhwal	20.2	2.4	3.2
Dehradun	19.1	2.2	2.6
Garhwal	17.7	2.0	2.8
Pithoragarh	19.7	2.4	3.1
Bageshwar	20.3	2.5	3.3
Almora	18.5	2.3	3.0
Champawat	22.5	2.7	3.8
Nainital	20.9	2.5	3.3
Udham Singh Nagar	22.7	3.0	3.9
Hardwar	24.7	3.3	4.1
Haryana	**21.2**	**2.7**	**3.2**
Panchkula	18.8	2.2	2.8
Ambala	17.0	2.0	2.4
Yamunanagar	18.8	2.3	2.8
Kurukshetra	19.4	2.3	2.7
Kaithal	20.4	2.6	3.1
Karnal	20.9	2.6	3.0
Panipat	22.8	2.9	3.5
Sonipat	20.2	2.7	3.1
Jind	19.9	2.6	3.3
Fatehabad	20.6	2.5	3.2
Sirsa	19.1	2.3	2.9
Hisar	19.4	2.4	3.1
Bhiwani	20.4	2.5	3.3
Rohtak	18.8	2.4	3.0
Jhajjar	19.2	2.4	3.1

Mahendragarh	19.2	2.4	3.3
Rewari	20.3	2.5	3.1
Gurgaon	24.5	3.2	4.5
Mewat	38.0	4.9	3.7
Faridabad	22.1	2.8	3.7
Palwal	27.2	3.5	3.7
Delhi	**18.7**	**2.2**	**2.6**
North West	19.7	2.4	2.8
North	17.7	2.1	2.1
North East	21.4	2.6	3.2
East	17.4	2.0	2.5
New Delhi	11.6	1.4	1.9
Central	14.8	1.7	1.9
West	17.7	2.1	2.4
South West	18.7	2.2	2.7
South	18.9	2.2	2.7
Rajasthan	**25.4**	**3.4**	**4.2**
Ganganagar	20.0	2.5	3.4
Hanumangarh	21.0	2.7	3.4
Bikaner	27.2	3.6	4.4
Churu	25.0	3.3	4.2
Jhunjhunun	20.9	2.8	3.8
Alwar	26.1	3.6	4.5
Bharatpur	27.9	4.1	4.9
Dhaulpur	29.9	4.5	5.7
Karauli	27.3	4.1	4.9
Sawai Madhopur	24.6	3.5	4.4
Dausa	26.3	3.7	4.6
Jaipur	22.8	2.9	3.8
Sikar	22.5	3.0	3.9
Nagaur	24.6	3.3	4.2
Jodhpur	26.9	3.7	4.4
Jaisalmer	32.8	4.8	5.8
Barmer	32.7	4.9	5.7
Jalor	29.1	4.1	5.2
Sirohi	27.7	3.8	4.7
Pali	23.7	3.4	4.4
Ajmer	23.9	3.2	3.7
Tonk	23.5	3.2	4.2
Bundi	23.2	3.1	4.0
Bhilwara	24.7	3.3	4.0
Rajsamand	25.2	3.3	3.9

Dungarpur	29.5	3.9	4.5
Banswara	30.9	4.2	4.8
Chittaurgarh	22.6	2.8	3.8
Kota	21.1	2.6	3.5
Baran	24.4	3.3	4.0
Jhalawar	23.9	3.2	4.0
Udaipur	27.6	3.5	4.1
Pratapgarh	29.1	3.8	4.2
Uttar Pradesh	**24.8**	**3.6**	**4.4**
Saharanpur	24.0	3.5	4.0
Muzaffarnagar	24.9	3.7	4.4
Bijnor	24.4	3.6	4.6
Moradabad	26.7	4.0	5.0
Rampur	26.9	4.1	5.1
Jyotiba Phule Nagar	26.4	3.9	4.9
Meerut	22.8	3.3	3.9
Baghpat	23.0	3.5	3.9
Ghaziabad	24.3	3.3	3.9
Gautam Buddha Nagar	26.0	3.6	4.4
Bulandshahr	24.9	3.8	4.4
Aligarh	25.5	3.9	4.5
Mahamaya Nagar	25.7	3.9	4.4
Mathura	25.8	3.9	4.6
Agra	23.9	3.5	3.8
Firozabad	24.8	3.7	4.8
Mainpuri	24.4	3.7	4.4
Budaun	30.1	4.7	5.5
Bareilly	25.2	3.7	4.9
Pilibhit	24.5	3.6	4.9
Shahjahanpur	27.8	4.1	4.8
Kheri	26.9	3.9	4.7
Sitapur	28.0	4.1	4.7
Hardoi	27.8	4.2	4.8
Unnao	22.2	3.3	4.1
Lucknow	18.9	2.5	3.1
Rae Bareli	22.7	3.2	4.3
Farrukhabad	26.0	3.9	4.3
Kannauj	25.2	3.8	4.4
Etawah	23.0	3.4	4.0
Auraiya	23.2	3.5	4.1
Kanpur Dehat	22.2	3.4	4.2
Kanpur Nagar	16.3	2.2	2.6

Jalaun	21.6	3.1	3.7
Jhansi	20.4	2.7	3.4
Lalitpur	29.1	4.1	4.9
Hamirpur	21.7	3.3	4.2
Mahoba	23.5	3.4	4.5
Banda	26.9	4.0	4.6
Chitrakoot	29.5	4.4	5.2
Fatehpur	23.6	3.6	4.5
Pratapgarh	22.2	3.1	4.2
Kaushambi	28.1	4.3	4.8
Allahabad	23.8	3.4	4.2
Bara Banki	26.1	3.8	4.7
Faizabad	23.0	3.3	4.0
Ambedkar Nagar	22.2	3.1	4.2
Sultanpur	23.8	3.3	4.4
Bahraich	31.8	4.6	5.2
Shrawasti	31.6	4.5	4.8
Balrampur	31.4	4.7	4.9
Gonda	27.1	3.9	4.7
Siddharthnagar	31.2	4.6	5.1
Basti	24.9	3.6	4.7
Sant Kabir Nagar	26.5	3.9	4.9
Mahrajganj	25.8	3.7	5.0
Gorakhpur	21.6	3.0	4.3
Kushinagar	25.6	3.6	4.7
Deoria	23.3	3.3	4.4
Azamgarh	24.3	3.4	4.5
Mau	24.0	3.4	4.6
Ballia	21.8	3.1	3.8
Jaunpur	23.4	3.3	4.3
Ghazipur	24.1	3.5	4.3
Chandauli	25.6	3.6	4.5
Varanasi	21.3	3.0	4.1
Sant Ravidas Nagar (Bhadohi)	26.1	3.6	4.4
Mirzapur	26.2	3.8	4.7
Sonbhadra	27.9	3.9	4.8
Etah	26.5	4.1	4.9
Kanshiram Nagar	28.8	4.4	4.9
Bihar	**29.7**	**4.2**	**4.5**
Pashchim Champaran	32.2	4.6	5.0
Purba Champaran	32.7	4.7	4.9
Sheohar	32.0	4.7	5.1
Sitamarhi	32.1	4.6	5.1
Madhubani	28.9	4.0	4.3
Supaul	31.8	4.4	4.7
Araria	34.2	4.9	4.9
Kishanganj	34.9	5.2	5.3
Purnia	33.2	4.8	5.0
Katihar	33.3	4.9	5.3
Madhepura	33.6	4.7	4.8
Saharsa	33.0	4.6	4.6
Darbhanga	29.2	4.2	4.5
Muzaffarpur	28.8	4.1	4.6
Gopalganj	27.4	3.9	4.4
Siwan	26.1	3.7	4.6
Saran	27.3	4.0	4.7
Vaishali	28.0	4.1	4.6
Samastipur	30.4	4.4	4.9
Begusarai	29.9	4.3	4.8
Khagaria	34.9	5.1	5.1
Bhagalpur	28.9	4.3	4.5
Banka	29.6	4.2	4.8
Munger	26.4	3.9	4.0
Lakhisarai	30.2	4.3	4.7
Sheikhpura	30.6	4.4	4.7
Nalanda	28.7	4.0	4.2
Patna	25.6	3.5	3.9
Bhojpur	26.5	3.8	4.2
Buxar	27.4	4.0	4.4
Kaimur (Bhabua)	30.3	4.5	4.8
Rohtas	27.1	3.8	4.5
Aurangabad	29.1	4.0	4.3
Gaya	29.0	4.0	4.4
Nawada	27.3	3.8	4.3
Jamui	29.6	4.1	4.5
Jehanabad	28.4	3.9	4.1
Arwal	28.9	3.9	4.1
Sikkim	**15.5**	**1.9**	**3.0**
North District	15.6	2.2	3.4
West District	17.0	2.1	3.5
South District	15.8	1.9	3.4
East District	14.6	1.7	2.5
Arunachal Pradesh	23.7	3.3	3.9

Tawang	18.4	2.8	3.8
West Kameng	20.6	2.9	3.4
East Kameng	30.7	4.4	4.4
Papum Pare	22.5	2.7	3.5
Upper Subansiri	23.7	3.5	4.1
West Siang	18.7	2.7	3.8
East Siang	18.7	2.5	3.7
Upper Siang	19.8	3.1	4.0
Changlang	27.0	3.6	4.4
Tirap	26.7	3.9	4.4
Lower Subansiri	21.1	2.9	3.4
Kurung Kumey	34.3	4.7	3.4
Dibang Valley	21.2	3.0	3.9
Lower Dibang Valley	21.7	3.1	3.9
Lohit	25.2	3.5	4.2
Anjaw	24.8	3.5	4.2
Nagaland	**21.1**	**2.8**	**3.2**
Mon	22.7	3.4	3.4
Mokokchung	14.2	1.7	2.0
Zunheboto	20.3	2.8	3.5
Wokha	17.5	2.3	3.2
Dimapur	20.6	2.6	3.3
Phek	25.5	3.4	3.8
Tuensang	26.7	3.7	3.4
Longleng	18.9	2.7	3.4
Kiphire	25.1	3.5	3.4
Kohima	21.0	2.7	3.0
Peren	23.8	3.1	3.0
Manipur	**20.0**	**2.5**	**2.6**
Senapati	20.2	2.6	2.2
Tamenglong	20.4	2.7	2.8
Churachandpur	19.6	2.5	2.5
Bishnupur	18.9	2.4	2.5
Thoubal	24.2	3.1	3.3
Imphal West	17.2	2.0	2.2
Imphal East	20.4	2.5	2.6
Ukhrul	20.0	2.8	3.1
Chandel	17.8	2.1	2.8
Mizoram	**24.1**	**2.9**	**3.4**
Mamit	28.6	3.7	3.3
Kolasib	24.5	3.0	3.4
Aizawl	20.5	2.3	3.0

Champhai	27.2	3.4	3.5
Serchhip	21.9	2.8	3.3
Lunglei	23.6	2.9	3.5
Lawngtlai	30.8	4.0	4.2
Saiha	25.3	3.3	4.0
Tripura	**18.9**	**2.2**	**2.5**
West Tripura	16.5	1.9	2.3
South Tripura	19.3	2.3	2.6
Dhalai	23.0	2.8	2.8
North Tripura	21.9	2.6	2.8
Meghalaya	**31.3**	**4.3**	**4.5**
West Garo Hills	28.5	3.9	4.1
East Garo Hills	30.3	4.1	4.4
South Garo Hills	31.7	4.6	4.6
West Khasi Hills	37.7	5.8	5.5
Ribhoi	33.5	4.8	5.4
East Khasi Hills	27.3	3.5	3.6
Jaintia Hills	37.7	5.6	5.4
Assam	**23.7**	**2.9**	**3.2**
Kokrajhar	23.4	2.9	3.3
Dhubri	31.8	4.1	4.3
Goalpara	27.6	3.5	3.9
Barpeta	27.8	3.6	3.8
Morigaon	28.3	3.6	3.9
Nagaon	26.4	3.3	3.6
Sonitpur	22.5	2.7	3.0
Lakhimpur	23.9	2.8	3.3
Dhemaji	24.1	2.9	3.5
Tinsukia	21.0	2.5	2.9
Dibrugarh	18.2	2.1	2.4
Sivasagar	18.5	2.1	2.4
Jorhat	16.7	1.9	2.2
Golaghat	19.2	2.3	2.7
Karbi Anglong	31.4	3.9	3.7
Dima Hasao	23.8	2.9	3.1
Cachar	23.6	2.9	3.1
Karimganj	28.2	3.7	3.6
Hailakandi	27.9	3.7	3.8
Bongaigaon	26.2	3.3	3.5
Chirang	23.4	2.8	3.2
Kamrup	20.7	2.4	2.6
Kamrup Metropolitan	15.6	1.8	2.6

Nalbari	18.9	2.2	2.7
Baksa	19.8	2.4	3.0
Darrang	27.8	3.4	3.4
Udalguri	21.2	2.6	3.2
West Bengal	**17.3**	**2.0**	**2.6**
Darjiling	15.2	1.6	2.1
Jalpaiguri	18.1	2.1	2.8
Koch Bihar	18.6	2.3	3.0
Uttar Dinajpur	24.6	3.2	4.3
Dakshin Dinajpur	17.2	2.1	3.3
Maldah	23.0	2.9	4.0
Murshidabad	22.2	2.7	3.5
Birbhum	19.8	2.3	3.0
Barddhaman	16.0	1.8	2.3
Nadia	15.2	1.7	2.4
North Twenty Four Parganas	13.9	1.6	2.1
Hugli	14.0	1.6	2.0
Bankura	17.4	2.1	2.6
Puruliya	21.0	2.7	3.1
Haora	15.8	1.8	2.1
Kolkata	9.9	1.2	1.4
South Twenty Four Parganas	19.0	2.2	3.0
Paschim Medinipur	17.4	2.0	2.6
Purba Medinipur	17.3	2.0	2.6
Jharkhand	**25.8**	**3.5**	**4.1**
Garhwa	29.5	4.2	5.3
Chatra	30.2	4.3	4.6
Kodarma	29.7	4.0	4.5
Giridih	30.5	4.2	4.7
Deoghar	29.2	4.1	4.5
Godda	29.3	4.0	4.2
Sahibganj	31.3	4.2	4.5
Pakur	32.3	4.3	4.4
Dhanbad	20.9	2.9	3.4
Bokaro	21.6	2.9	3.5
Lohardaga	27.1	3.9	4.6
Purbi Singhbhum	19.5	2.4	2.7
Palamu	27.5	3.9	4.9
Latehar	31.1	4.4	4.9
Hazaribagh	25.7	3.5	4.1
Ramgarh	21.6	3.0	4.1
Dumka	25.8	3.4	3.6
Jamtara	26.1	3.4	3.6
Ranchi	21.5	2.8	3.5
Khunti	25.3	3.3	3.5
Gumla	26.9	3.8	4.0
Simdega	24.5	3.5	4.0
Pashchimi Singhbhum	27.5	3.6	3.5
Saraikela-Kharsawan	23.7	3.1	3.5
Odisha	**19.7**	**2.4**	**2.8**
Bargarh	16.8	2.1	2.5
Jharsuguda	16.9	2.1	2.6
Sambalpur	17.7	2.1	2.6
Debagarh	20.5	2.5	3.1
Sundargarh	19.3	2.3	2.7
Kendujhar	23.1	2.8	3.0
Mayurbhanj	21.4	2.7	3.0
Baleshwar	19.1	2.3	2.9
Bhadrak	18.9	2.3	2.9
Kendrapara	17.0	2.0	2.6
Jagatsinghapur	14.3	1.7	2.3
Cuttack	15.4	1.8	2.4
Jajapur	18.1	2.2	2.6
Dhenkanal	18.1	2.1	2.7
Anugul	18.5	2.2	2.9
Nayagarh	17.2	2.1	2.5
Khordha	16.2	1.9	2.4
Puri	15.8	1.8	2.4
Ganjam	18.4	2.2	2.9
Gajapati	24.1	2.9	3.3
Kandhamal	24.7	3.0	3.6
Baudh	22.6	2.8	3.2
Subarnapur	19.2	2.5	2.8
Balangir	21.2	2.7	2.8
Nuapada	23.1	2.9	3.0
Kalahandi	23.0	2.8	3.2
Rayagada	25.1	2.9	3.3
Nabarangapur	28.6	3.5	3.4
Koraput	26.2	3.0	3.1
Malkangiri	30.0	3.5	3.3
Chhatisgarh	**23.2**	**3.0**	**3.6**
Koriya	22.7	3.0	3.4
Surguja	25.6	3.4	3.9

Jashpur	22.7	3.1	3.3
Raigarh	20.9	2.7	3.2
Korba	22.7	2.9	3.5
Janjgir - Champa	21.9	3.1	3.5
Bilaspur	25.5	3.3	3.6
Kabeerdham	30.1	3.9	3.8
Rajnandgaon	22.3	2.8	3.3
Durg	20.5	2.5	2.9
Raipur	24.1	3.0	3.4
Mahasamund	20.7	2.7	3.1
Dhamtari	20.0	2.5	3.3
Uttar Bastar Kanker	20.9	2.6	3.2
Bastar	24.6	3.1	3.5
Narayanpur	26.7	3.3	3.5
Dakshin Bastar Dantewada	23.1	2.8	3.6
Bijapur	25.0	3.0	3.6
Madhya Pradesh	**24.3**	**3.2**	**3.9**
Sheopur	28.1	3.8	4.6
Morena	25.5	3.6	4.2
Bhind	23.6	3.3	4.0
Gwalior	20.5	2.6	3.3
Datia	23.1	3.1	4.0
Shivpuri	28.0	3.8	5.1
Tikamgarh	26.2	3.4	4.5
Chhatarpur	26.7	3.8	5.0
Panna	26.9	3.6	4.7
Sagar	24.8	3.3	4.2
Damoh	25.1	3.3	4.0
Satna	24.8	3.3	4.3
Rewa	24.3	3.2	4.4
Umaria	26.2	3.4	4.0
Neemuch	20.8	2.5	3.3
Mandsaur	21.1	2.6	3.5
Ratlam	24.3	3.1	3.7
Ujjain	22.0	2.8	3.5
Shajapur	23.0	3.0	4.1
Dewas	23.5	3.0	3.8
Dhar	26.9	3.5	4.1
Indore	20.8	2.4	2.9
West Nimar	26.3	3.5	4.3
Barwani	32.8	4.4	5.1

Rajgarh	24.7	3.3	4.2
Vidisha	27.0	3.7	4.5
Bhopal	20.7	2.4	3.0
Sehore	24.9	3.4	4.6
Raisen	25.5	3.5	4.5
Betul	21.5	2.9	3.9
Harda	24.0	3.3	4.2
Hoshangabad	21.4	2.9	3.7
Katni	24.7	3.1	3.6
Jabalpur	19.2	2.3	2.9
Narsimhapur	21.1	2.7	3.5
Dindori	25.5	3.2	3.2
Mandla	22.7	2.9	3.4
Chhindwara	20.9	2.8	3.5
Seoni	21.1	2.7	3.4
Balaghat	20.0	2.5	3.1
Guna	28.0	3.8	4.6
Ashoknagar	27.6	3.7	4.6
Shahdol	24.2	3.1	3.6
Anuppur	22.7	2.9	3.6
Sidhi	28.3	3.9	4.7
Singrauli	29.6	4.0	4.7
Jhabua	35.4	5.0	5.4
Alirajpur	33.4	4.7	5.4
East Nimar	26.2	3.5	3.9
Burhanpur	25.5	2.9	2.9
Gujarat	**20.1**	**2.4**	**2.6**
Kachchh	24.9	3.1	
Banas Kantha	26.5	3.3	3.9
Patan	21.8	2.6	3.1
Mahesana	17.7	2.0	2.5
Sabar Kantha	22.6	2.7	2.9
Gandhinagar	18.4	2.0	2.4
Ahmadabad	17.9	2.0	2.3
Surendranagar	21.4	2.7	3.4
Rajkot	17.9	2.1	1.9
Jamnagar	18.4	2.2	2.4
Porbandar	16.8	2.0	2.5
Junagadh	17.2	2.1	2.6
Amreli	17.1	2.2	2.5
Bhavnagar	20.4	2.6	3.0
Anand	18.8	2.2	2.4

Kheda	19.5	2.3	2.6
Panch Mahals	23.9	3.1	3.5
Dohad	32.4	4.2	4.3
Vadodara	18.3	2.1	2.4
Narmada	20.7	2.6	2.8
Bharuch	17.5	2.1	2.5
The Dangs	28.5	3.6	3.8
Navsari	15.1	1.8	2.0
Valsad	19.3	2.2	2.5
Surat	19.8	2.2	2.5
Tapi	16.3	1.8	2.5
Daman & Diu	**18.3**	**2.1**	**2.5**
Diu	19.1	2.1	2.9
Daman	18.0	2.2	2.3
Dadra & Nagar Haveli	**25.1**	**3.1**	**3.6**
Dadra & Nagar Haveli	25.1	3.1	3.6
Maharashtra	**17.9**	**2.2**	**2.6**
Nandurbar	22.9	2.9	3.3
Dhule	20.3	2.6	2.7
Jalgaon	19.0	2.4	2.7
Buldana	19.7	2.6	3.0
Akola	17.5	2.2	2.7
Washim	19.4	2.5	3.0
Amravati	16.2	2.0	2.5
Wardha	14.6	1.7	2.3
Nagpur	16.1	1.8	2.2
Bhandara	15.7	1.9	2.4
Gondiya	16.1	1.9	2.5
Gadchiroli	17.0	2.0	2.9
Chandrapur	15.7	1.8	2.4
Yavatmal	18.0	2.2	2.9
Nanded	20.9	2.8	3.3
Hingoli	21.7	2.9	3.4
Parbhani	21.8	3.0	3.3
Jalna	23.1	3.2	3.2
Aurangabad	22.7	2.8	3.1
Nashik	21.1	2.6	3.1
Thane	18.7	2.1	2.6
Mumbai Suburban	14.2	1.6	2.0
Mumbai	12.0	1.4	1.6
Raigarh	17.3	2.0	2.3
Pune	18.2	2.0	2.3

Ahmadnagar	18.2	2.3	2.7
Bid	21.0	3.0	3.2
Latur	19.7	2.6	3.1
Osmanabad	18.5	2.6	3.0
Solapur	18.6	2.4	2.7
Satara	15.4	1.9	2.3
Ratnagiri	13.4	1.6	2.1
Sindhudurg	11.8	1.4	1.8
Kolhapur	15.5	1.8	2.3
Sangli	15.8	1.9	2.3
Andhra Pradesh	**16.2**	**1.8**	**2.3**
Adilabad	17.1	2.0	2.7
Nizamabad	16.5	1.8	2.5
Karimnagar	13.1	1.5	2.2
Medak	18.3	2.2	2.9
Hyderabad	16.0	1.6	1.9
Rangareddy	19.6	2.0	2.6
Mahbubnagar	20.4	2.4	3.1
Nalgonda	16.1	1.8	2.6
Warangal	14.4	1.6	2.5
Khammam	15.0	1.6	2.3
Srikakulam	15.6	1.8	2.4
Vizianagaram	15.9	1.8	2.5
Visakhapatnam	16.1	1.7	2.2
East Godavari	14.7	1.6	2.1
West Godavari	14.2	1.6	2.0
Krishna	13.8	1.5	1.9
Guntur	14.7	1.6	1.9
Prakasam	16.8	1.9	2.3
Sri Potti Sriramulu Nellore	15.3	1.7	2.0
Y.S.R.	17.1	1.9	2.3
Kurnool	19.0	2.2	3.0
Anantapur	16.9	1.9	2.4
Chittoor	16.0	1.8	2.2
Karnataka	**17.8**	**2.0**	**2.4**
Belgaum	19.9	2.4	2.7
Bagalkot	22.4	2.7	3.1
Bijapur	22.6	3.0	3.0
Bidar	20.0	2.7	3.4
Raichur	22.5	2.9	3.3
Koppal	22.8	2.9	3.4

Gadag	18.8	2.3	2.6
Dharwad	18.0	2.1	2.5
Uttara Kannada	15.5	1.7	2.2
Haveri	18.6	2.2	2.6
Bellary	22.6	2.7	3.1
Chitradurga	17.0	2.0	2.3
Davanagere	16.6	1.9	2.4
Shimoga	15.4	1.7	2.0
Udupi	12.8	1.2	1.5
Chikmagalur	13.4	1.4	1.9
Tumkur	14.6	1.7	2.2
Bangalore	17.5	1.7	1.9
Mandya	13.7	1.5	1.9
Hassan	13.2	1.5	1.9
Dakshina Kannada	14.8	1.5	1.7
Kodagu	14.1	1.5	2.0
Mysore	15.2	1.7	2.1
Chamarajanagar	14.5	1.6	2.0
Gulbarga	22.1	3.0	3.5
Yadgir	25.9	3.5	3.5
Kolar	16.5	1.9	2.5
Chikkaballapura	15.5	1.8	2.5
Bangalore Rural	16.3	1.9	2.2
Ramanagara	14.3	1.6	2.2
Goa	**14.3**	**1.5**	**1.8**
North Goa	13.7	1.5	1.7
South Goa	15.0	1.6	1.8
Lakshadweep	**16.6**	**2.1**	**2.7**
Lakshadweep	16.6	2.1	2.7
Kerala	**14.7**	**1.6**	**1.7**
Kasaragod	17.1	1.8	1.9
Kannur	15.4	1.6	1.7
Wayanad	16.3	1.7	2.0
Kozhikode	15.6	1.6	1.7
Malappuram	20.4	2.2	2.4
Palakkad	15.3	1.6	1.8
Thrissur	13.7	1.5	1.6
Ernakulam	13.0	1.5	1.5
Idukki	13.0	1.4	1.6
Kottayam	12.4	1.4	1.6
Alappuzha	12.7	1.4	1.5
Pathanamthitta	11.0	1.3	1.5

Kollam	13.2	1.4	1.6
Thiruvananthapuram	12.9	1.4	1.6
Tamil Nadu	**14.9**	**1.6**	**1.8**
Thiruvallur	16.4	1.7	1.9
Chennai	13.6	1.4	1.3
Kancheepuram	16.5	1.7	1.9
Vellore	16.1	1.8	1.9
Tiruvannamalai	16.2	1.9	2.1
Viluppuram	17.2	2.0	2.1
Salem	14.6	1.6	1.9
Namakkal	12.9	1.5	1.7
Erode	12.4	1.4	1.6
The Nilgiris	12.3	1.3	1.6
Dindigul	14.4	1.6	1.8
Karur	14.3	1.6	1.8
Tiruchirappalli	14.4	1.6	1.8
Perambalur	15.5	1.8	2.0
Ariyalur	15.6	1.8	2.1
Cuddalore	15.6	1.7	2.1
Nagapattinam	14.6	1.6	1.9
Thiruvarur	13.7	1.5	1.8
Thanjavur	14.1	1.5	1.8
Pudukkottai	16.0	1.7	2.0
Sivaganga	14.9	1.6	1.9
Madurai	15.0	1.6	1.8
Theni	14.1	1.6	1.8
Virudhunagar	14.6	1.6	1.9
Ramanathapuram	14.7	1.6	2.1
Thoothukkudi	15.0	1.6	1.8
Tirunelveli	15.1	1.7	1.9
Kanniyakumari	13.2	1.4	1.6
Dharmapuri	17.0	1.9	2.6
Krishnagiri	17.3	2.0	2.6
Coimbatore	13.5	1.4	1.7
Tiruppur	14.6	1.6	1.6
Puducherry	**16.4**	**1.7**	**1.8**
Yanam	19.7	2.0	2.5
Puducherry	16.2	1.6	1.8
Mahe	16.7	1.6	1.5
Karaikal	16.7	1.7	1.9
Andaman & Nicobar Islands	**15.7**	**1.7**	**2.3**

Nicobars	16.2	1.8	2.2
North & Middle Andaman	16.3	1.7	2.3
South Andaman	15.4	1.6	2.3