

# **NAGALAND'S DEMOGRAPHIC SOMERSAULT**

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## Nagaland's Demographic Somersault\*

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### Abstract

After two decades of abnormally high growth, Nagaland's population declined during the 2001–2011 period. Nagaland's population has shrunk in the absence of war, famine, natural calamities, political disturbance, and any significant changes in the state's socio-economic characteristics. This is unprecedented in the history of independent India. In light of the above, this study examines the reliability of the Census of Nagaland between 1981 and 2011 by testing the internal consistency of Census population estimates. It also tries to validate the Census estimates using information from other sources like Sample Registration System and National Family Health Surveys. The analysis shows that the Census substantially overestimated the population of Nagaland in 1991 and 2001 and raises questions about the Indian state's institutional capacity to design empirically informed policies.

*Keywords:* Census, India, Migration, Naga, Over count

*JEL Classification Codes:* J11, J13, J15, J18

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## 1. Introduction

The unavailability of reliable information on smaller states of North-East India impedes social-scientific studies of these states. National level surveys either do not cover the smaller states of the region (various waves of *Rural Economic and Demographic Surveys*, for instance) or cover them irregularly (for instance, *District Level Household and Facility Survey* did not cover Nagaland in 2007–08). Even the surveys that cover the region regularly do not have sufficiently representative samples to generate reliable estimates for the smaller states (*National Sample Surveys* and, until recently, *Sample Registration System*, for instance). In fact, National Sample Surveys do not cover “villages of Nagaland situated beyond five kilometres of the bus route” (Govt of India 2012, p. 5). The decennial census is, therefore, the most important source of demographic and other related information on the smaller states of the North-East, and its reliability is of utmost importance to policy-makers and social scientists alike.

Unfortunately, doubts have emerged over the reliability of the Census with regard to the North-East region. The Census has recorded abnormal changes in the population of some states of the region.<sup>1</sup> For instance, Nagaland, the most fecund state in the country between 1981 and 2001, recorded a negative population growth in Census 2011 (Figure 1). During 1981-91 and 1991-2001, the state registered decadal population growth rates of 56.08 and 64.53 per cent, respectively. However, between 2001 and 2011 Nagaland’s population declined from 1,988,636 to 1,980,602. This is the first time in independent India<sup>2</sup> that a state has witnessed an absolute decline in population in the absence of war, famine, natural

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<sup>1</sup> Between 1901 and 1991, the annual population growth rate of the North-East region (2.24 per cent) was consistently higher than that of India (1.18 per cent) (Sharma and Kar 1997, pp. 74-76).

<sup>2</sup> The population of Punjab declined between 1941 and 1951 because of population transfer and unprecedented bloodshed following the partition of British India. Also, there was a decline in the population of two union territories, the Andaman and Nicobar Islands (during 1941–51) and Daman and Diu (during 1951–61), most likely due to out-migration (Govt of India 2011a).

calamities, political disturbance, and significant changes in the socio-economic correlates of fertility (Table 1).<sup>3</sup>

Figure 1 and Table 1 about here

While observers drew attention to Nagaland's high growth rate and its developmental consequences as early as the 1970s (Means 1971), the government seems to have taken note of this only recently when it rejected the 2001 Census (Govt of India 2011b, p. viii). However, despite the government's rejection of the 2001 Census, state and non-state organisations continue to use the flawed population statistics. For instance, the Economic Survey of 2010–11 (Govt of India 2011c, p. A125) used the wrong population series for Nagaland, which resulted in erroneous estimates of some human development indicators. Similarly, other surveys uncritically refer to the Census of Nagaland as a benchmark (for instance, Centre for the Study of Developing Societies 2008, p. 3).

Although the dramatic changes in Nagaland's population were discussed extensively in the North-East in the run-up to the 2011 Census (Nagaland Post 2009), social scientists largely ignored the issue. Three possible explanations have emerged from these discussions. First, migration has been invoked to explain the demographic changes. It has been argued that net out-migration from the state could have caused its population to decline between 2001 and 2011 (Chaurasia 2011, Jeermison 2011, also Kundu and Kundu 2011). On the other hand, others have argued that net in-migration was responsible for the high population growth rate between 1991 and 2001 (Rio 2010, Amarjeet Singh 2009). Second, prevalence of HIV/AIDS and drug addiction have been invoked to explain the decline in population between 2001 and 2011 (Jeermison 2011). Third, the struggle among tribes for political power and development funds was cited by the Chief Minister as the reason behind the abnormal growth between 1991 and 2001 (Hazarika 2005, Thohe Pou 2011). However, a

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<sup>3</sup> The key socio-economic correlates of fertility are income, literacy, level of urbanisation, female work participation and access to public health services (Anker 1978, Barro and Sala-i-Martin 2004 pp. 407–8, Dreze and Murthi 2001).

systematic empirical investigation of these and other plausible explanations has not been conducted so far, to our knowledge.

This paper examines the unexpected decline in Nagaland's population after two decades of abnormally high growth. Section 2 draws attention to the discrepancy between the actual and projected populations of Nagaland over the past three decades. Section 3 examines the plausibility of the Census population estimates. It tests the internal consistency of Census estimates and also externally validates the Census using information from the Sample Registration System (SRS) and National Family Health Surveys (NFHS). The final section offers concluding remarks.

## **2. Past Projections for Nagaland's Population**

During the last three decades Nagaland's population repeatedly defied different expert group projections (Table 2). To begin with, the Expert Committee (1974) underestimated the population of Nagaland in 1991 by about 20 per cent. The underestimation indicates that the dynamics of population growth between 1981 and 1991 were inconsistent with the fertility and mortality conditions prevailing in the 1960s and 1970s, which the Expert Committee used for their projection. Again, the Technical Group (1988), which based its projection on the 1991 Census and on the socio-economic and demographic conditions prevailing in the 1980s, underestimated the population in 2001 by about 14 per cent. Underestimation in 2001 despite the use of an inflated baseline means that the growth between 1991 and 2001 was very high.

Table 2 about here

While the forecasts for 1991 and 2001 happen to be underestimates vis-à-vis corresponding censuses, the forecast for 2011 is an over-estimate. The Technical Groups on Population Projections constituted in 1988 and 2001 overestimated the 2011 population of Nagaland

by about 10 and 14 per cent, respectively. The Population Reference Bureau and Population Foundation of India overestimated the 2011 population of Nagaland by about 23 per cent. In light of the discrepancy between the actual and projected populations of Nagaland over the past three decades, the present study makes an attempt to assess the reliability of the Census of Nagaland.

### **3. Feasibility of Census Population Estimates**

This section examines whether births and deaths and lawful migration can explain the abnormal changes in Nagaland's population. The analysis is restricted to the 1971–2011 period, as the pre- and post-1971 censuses cannot be compared directly—because of the steady expansion of the area of the Naga Hills prior to 1963 and also the increase in coverage of census operations.

#### **3.1 Birth and death rates**

Table 3 compiles estimates of crude birth rate from NFHS and SRS since 1971. SRS estimates of birth rate for Nagaland are lower than that for India. Although NFHS estimates of birth rate in Nagaland are higher than that for India, they do not vary enough to warrant an abnormally high growth rate of population in one period and negative in the subsequent one.

Table 3 about here

For each decade between 1971 and 2011, Table 3 also provides estimates of natural growth rate (NGR) corresponding to NFHS and SRS birth rates for two scenarios: one assuming zero death rates, NGR (0), and another assuming death rate equal to SRS death rates, NGR (SRS). Even if one assumes a crude death rate of zero, which is impossible, the estimates of birth rates support the observed population growth only if there was substantial in-migration

until 2001 and out-migration thereafter. Also, neither SRS nor NFHS reported substantial changes in the birth and death rates for 1991–2001 and 2001–2011 periods, which rules out the feasibility of explaining the decline in population in 2011 by transition to a low birth-and-death rates regime. So, the decline has to be explained almost entirely by either substantial out-migration during 2001–2011 and/or overestimation in population in earlier censuses. These possibilities are discussed in the following sub-sections. But before that, ruling out the HIV/AIDS epidemic-based explanation of the decline is imperative.

Though Nagaland is among the six worst HIV/AIDS affected states in India (Govt of Nagaland 2010, p. 121), the resultant deaths are too few to explain the dramatic changes in Nagaland's population (Nagaland State AIDS Control Society 2011). Three additional reasons rule out prevalence of HIV/AIDS as the driving force behind population decline during the 2001–2011 period. First, with comparable HIV/AIDS prevalence rates, the populations of Manipur and Andhra Pradesh did not shrink. Second, Nagaland registered spectacular population growth during the 1990s despite a comparable prevalence of HIV/AIDS. Third, population growth was positive in districts with high HIV/AIDS prevalence (Dimapur and Tuensang, for instance) and negative in districts with low HIV/AIDS prevalence (Mon, for instance) (Bachani, Sogarwal and Rao 2011 and Govt of India 2011b).

### **3.2 Migration**

Migrants constituted around 5 per cent of Nagaland's population in both 1991 and 2001; only 40 per cent of these migrants were from outside the state (Table 4).<sup>4</sup> Therefore, migrants from outside Nagaland constituted nearly two per cent of its population in both years. Moreover, the share of in-migrants from other states and countries in Nagaland's population has been falling over time, making in-migration an unlikely cause of high population growth during 1981–2001 (Table 4).

Table 4 about here

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<sup>4</sup> The migration figures correspond to 'migration by place of last residence'. The reference period is 0–9 years. Therefore, the figures are for individuals who have changed residence only between Censuses.

In any case, if in-migration was the dominant cause of population growth between 1981 and 2001, then the subsequent absolute decline in population will require that we assume net out-migration from the state. While the migration data of Census 2011 are not yet available, any account of the absolute decline in Nagaland's population after abnormal growth that is based on out-migration would be implausible for two reasons. One, the number of out-migrants during 2001–2011 is unlikely to out-number the out-migrants from the state during 1971–2001, who add up to only 82,305. Two, in-migration should have increased during 2001–2011 because of the ceasefire between the underground movement and the government, which created an unprecedentedly peaceful environment in the state (South Asia Terrorism Portal nd).

### 3.3 Births, deaths and migration

The information on birth, death and migration is now combined to check if together these factors can explain census population estimates. The population change between two years, say, ' $t - \tau$ ' and ' $t$ ', is given by the following fundamental equation (Preston *et al.* 2001, p. 2):

$$\Delta N(t - \tau, t) = B(t - \tau, t) - D(t - \tau, t) + NI(t - \tau, t) = NG(t - \tau, t) + NI(t - \tau, t) \quad (1)$$

where  $\Delta N(t - \tau, t)$ ,  $B(t - \tau, t)$ ,  $D(t - \tau, t)$ ,  $NG(t - \tau, t)$ , and  $NI(t - \tau, t)$ , respectively denote population change, number of births and deaths, natural growth, and net in-migrants between the years  $t - \tau$  and  $t$ . Natural growth and net in-migration in Eq (1) can be decomposed as follows into two components corresponding to '0–9' and '10+' years age groups:

$$\Delta N(t - \tau, t) = NG_{0-9}(t - \tau, t) + NG_{10+}(t - \tau, t) + NI_{0-9}(t - \tau, t) + NI_{10+}(t - \tau, t) \quad (2)$$

Between the years  $t - \tau$  and  $t$ , the sum of natural growth and net in-migration for the age group '0–9' years equals this group's population at time ' $t$ ' (let it be denoted by  $N_{0-9}(t)$ ).

Also, note that there are no births in the age group '10+' years. So, Eq (2) simplifies to the following, where  $D_{10+}(t - \tau, t)$  denotes the number of deaths within '10+' years age group:

$$\Delta N(t - \tau, t) = N_{0-9}(t) + 0 - D_{10+}(t - \tau, t) + NI_{10+}(t - \tau, t) \quad (3)$$

Eq (3) can be reorganized as follows:

$$D_{10+}(t - \tau, t) = N_{0-9}(t) + NI_{10+}(t - \tau, t) - \Delta N(t - \tau, t) \quad (4)$$

Table 5 compiles the information on changes in population, net in-migrants and the population of the '0–9' years age group. The number of deaths in Table 5 is the number of individuals required to balance the fundamental equation under the assumption of zero deaths among those aged 10 years and above. Therefore, it provides a lower bound of the population overestimate for each census decade. If the population figures reported by the Census since 1971 are reliable, then the number of deaths during the past three census decades must have been negative! The discrepancy, defined as the ratio of people not accounted for to the population at the decade's end, increases from 4 per cent in 1971–81 to 17 per cent during the 1991–2001 period.

Table 5 about here

### 3.4 Discussion

It can be concluded that demographic factors alone are insufficient to explain the changes in Nagaland's population. Hence, other factors like political-geographic and political-economic factors need to be examined in future work. Our preliminary analysis suggests that the political geographic hypothesis—people migrate to cope with arbitrary post-colonial boundaries leading to otherwise unexpected shifts in population dynamics—cannot explain the changes in Nagaland's population if only intra-national boundaries are considered. While there is no reliable data on the international aspect of this problem, available evidence does not fully support the political-geographic hypothesis. It can at best partly

explain abnormal growth between 1981 and 2001 without being able to explain the subsequent steep decline in growth.

However, evidence partly supports a political-economic explanation—competing sub-groups of population inflated their numbers to seek greater political representation and, by implication, a greater share in state’s resources—of the changes in Nagaland’s population between 1991 and 2011. Different Naga tribes seem to have inflated their numbers in the Census of 2001 to avoid loss of political representation to competing tribes and non-tribal plainsmen due to the impending delimitation of constituencies in 2002. Ultimately, inter-tribal conflict and litigation forced deferment of delimitation in Nagaland to until after 2031 (Govt of India 2008b). So, there was no incentive in the 2011 Census to inflate population. Our preliminary analysis suggests that the inflation of population across Kohima, Mokokchung and Tuensang—the three broad geographic and ethnic divisions of Nagaland—in the 2001 Census was related to the expected loss of political representation due to impending delimitation, whereas deflation of population in the Census of 2011 is related to the inflation in the preceding decade. But a definitive conclusion in this regard can be arrived at only after an analysis of abnormalities in the census at the level of assembly constituencies and circles.

#### **4. Concluding Remarks**

Developmental states like India need information on the socio-economic division of their populations to design redistributive policies. And, given their obsession with global rankings, they also need information to compare themselves with other countries. But the official statistics of India are not free of errors. The Census of Nagaland is a case in point.<sup>5</sup> We

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<sup>5</sup> In fact, the Census is not the only case where India’s official statistics have been questioned. Several questions have been raised about official statistics in other fields in the past year. In July 2011, the Governor of the Reserve Bank of India expressed concern over the quality of statistics collected by government agencies (Subbarao 2011). A few months later, the commerce secretary admitted that India’s export figures for the April–October period were inflated by US\$9.4 billion due to a misclassification of certain items and data

examined a largely ignored surprise thrown up by Census 2011, one of the biggest data collection exercises in the world, which shows that after two decades of abnormally high growth Nagaland's population declined in absolute terms during 2001–2011. Our analysis suggests that the Census substantially overestimated the population of Nagaland both in 1991 and 2001. The inconsistencies in successive censuses—the most important source of information about smaller states of India like Nagaland—and the uncritical use of questionable statistics by government agencies raise questions about the Indian state's institutional capacity to design empirically-informed policies.

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entry errors (Business Line 2011). Not long afterward, the chief statistician conceded that the accuracy of the Index of Industrial Production is questionable (Financial Express 2011). More recently, the Planning Commission's Deputy Chairman argued that National Sample Surveys systematically underestimate household consumption (Economic Times 2012).

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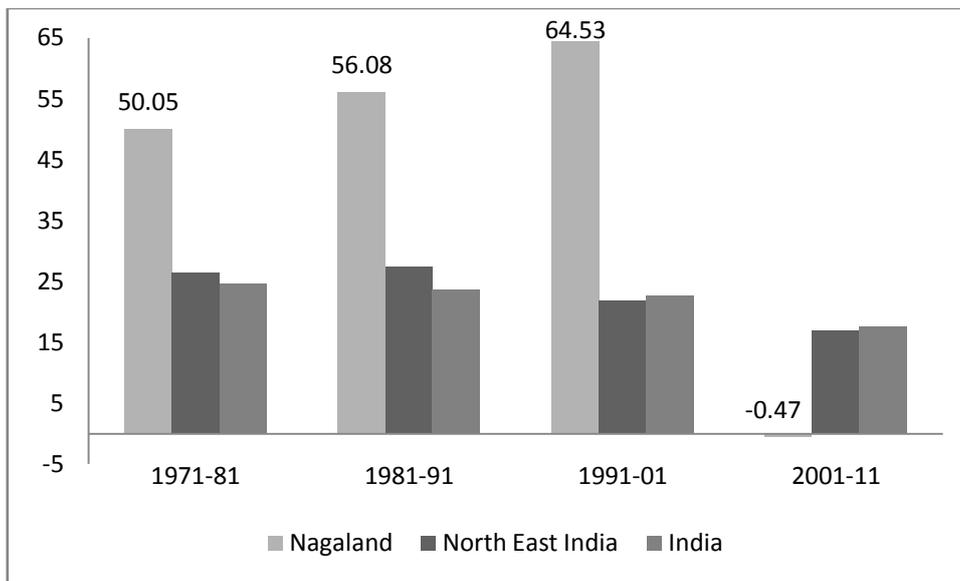
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Figure 1: Decadal Population Growth Rates (in per cent), 1981–2011



Sources: Sharma and Kar (1997) and Govt of India (2011a).

Table 1: Correlates of Fertility, 1981–2011

Growth rate/ socio-economic correlate	Nagaland				India			
	1981	1991	2001	2011	1981	1991	2001	2011
Population growth rate	50.05	56.08	64.53	-0.47	24.66	23.86	21.54	17.64
Income per capita	10560	14103	16582	17898	8793	11579	16684	24304
Human Development Index	0.328 (20)	0.468 (11)	NA	NA	0.302	0.381	NA	NA
Female literacy	40.39	54.75	61.46	76.49	29.76	39.29	53.67	65.46
Female work participation rate	33.2	38	38.1	NA	19.7	22.3	25.7	NA
Infant Mortality Rate	NA	42	38	NA	NA	68	57	NA
Urbanisation	15.52	17.21	17.23	28.97	23.31	25.71	26.33	31.16

*Notes:* (i) 'Population growth rate' includes the estimated populations of Assam for 1981 and Jammu and Kashmir for 1991 where census could not be conducted. (ii) 'Income per capita' is at constant 1999–2000 prices. The values for 1981, 1991 and 2001 are three year averages (central) of the financial years and the value for 2011 corresponds to that for 2007–08. (iii) The numerals in parentheses below Nagaland's HDI indicate rank (out of 32 states). (iv) 'Female literacy' corresponds to those aged 'seven years and above' and the figures for India exclude Assam in 1981 and Jammu and Kashmir in 1991. (v) 'Female Work Participation Rate' for India excludes Assam, Jammu and Kashmir, and Paomata, Mao Maram, and Purul sub-divisions of Senapati district in all the years. (vi) 'NA' indicates that comparable data is not available. (vii) The data for 'Infant Mortality Rate' for 1991 and 2001 correspond to the periods 1996–98 and 2003–05, respectively.

*Sources:* (i) Population growth rate and female literacy: Govt of India (2011a and 2011b), (ii) Income per capita: Reserve Bank of India (2005 and 2011) and Govt of India (2011c), (iii) Human Development Index: Govt of India (2002), (iv) Female Work Participation Rate: Govt of India (1999a and 2008a), (v) IMR: International Institute for Population Sciences and Macro International (2007 and 2009), and (vi) Urbanisation: Govt of India (1985a, 1992, and 2011a and 2011b).

Table 2: Actual and Projected Populations of Nagaland, 1981–2011

Year	Source	Population (in '000)		Error (per cent)*
		Projected	Actual	
1981	Expert Committee (1974)	714.5	774.9	-7.80
1991	Expert Committee (1974)	957.9	1209.55	-20.80
2001	Technical Group (1988)	1721	1990.0	-13.52
2011	Technical Group (1988)	2185	1980.6	10.32
2011	Technical Group (2001)	2249	1980.6	13.55
2011	PFI-PRB (2006)	2426-2439**	1980.6	22.49-23.14**

*Notes:* \* 'Error (%)' is the excess of projected over actual population as a share of actual population.

\*\* PFI-PRB (2006) provides two projections, corresponding to low and high fertility scenarios.

*Sources:* (i) Expert Committee (1974): Govt of India (1978, pp. 158-59), (ii) Technical Group (1988): Govt of India (1996, p. 64), (iii) Technical Group (2001): Govt of India (2006, p. 35), and (iv) PFI-PRB (2006): Population Foundation of India-Population Research Bureau (2006, p 7 and p 11).

Table 3: Birth, Death and Natural Growth Rates, 1971–2011

Period	Data Source	Nagaland				India			
		Birth rate	Death rate	NGR (0)	NGR (SRS)	Birth rate	Death rate	NGR (0)	NGR (SRS)
<b>1971-1981 (Decadal growth in Nagaland: 50.05)</b>									
1976–1981 (average)	SRS	21.88	6.87	24.16	16.07	33.67	13.67	39.26	21.90
<b>1981-1991 (Decadal growth in Nagaland: 56.08)</b>									
1983–1991 (average)	SRS	21.41	5.02	23.60	17.65	28.82	10	32.86	20.50
<b>1991-2001 (Decadal growth in Nagaland: 64.53)</b>									
1991–94 (average)	SRS	19.45	4.02	21.24	16.54	24.65	8.95	27.57	16.86
1990–92	NFHS-1	31.3	NA	36.10	30.88	28.7	NA	32.71	21.60
1996–98	NFHS-2	30.4	NA	34.91	29.74	24.8	NA	27.76	17.03
<b>2001-2011 (Decadal growth in Nagaland: -0.47)</b>									
2004–09 (average)	SRS	16.61	4.25	17.91	13.07	23.3	7.45	25.90	17.03
2003–05	NFHS-3	28.5	NA	32.45	27.07	23.6	NA	26.27	17.38

Notes: (i) The birth rate is the number of live births per 1000 population and the death rate is the number of deaths per 1000 population. (ii) The natural growth rate NGR (0) denotes the decadal NGR of 'closed' (no migration) population (assuming zero death rate) and NGR (SRS) (assuming the death rate is the same as the SRS death rate (for the corresponding decade). NGR (0)/ NGR (SRS) has been arrived at by calculating compound growth rate using birth rate/ birth and death rates. (iii) The figures for 1976–81 for Nagaland are based on the rural sample only; however, the share of rural population in the state's population was 90 and 85 per cent, respectively, in 1971 and 1981. (iv) 'NA' indicates non-availability of data.

Sources: (i) Srivastava (1987), (ii) Govt of India (1999b), (iii) International Institute for Population Sciences and Macro International (2007, p. 78 and 2009, p. 36), and (iv) SRS birth and death rates for 2004–09 (average) have been compiled from SRS Bulletins for the respective year.

Table 4: Share of Migrants in Nagaland's Population (in per cent), 1971–2001

<b>Type of migration</b>	<b>1971</b>	<b>1981</b>	<b>1991</b>	<b>2001</b>
All in-migrants*	12.64	15.33	5.74	4.36
<i>Intra-state**</i>	48.29	62.38	61.96	59.24
<i>Inter-state**</i>	42.16	34.00	35.31	38.74
<i>International**</i>	9.56	3.62	2.73	2.02
In-migrants from outside the state*	6.54	5.77	2.20	1.78

Notes: \* as proportion of state's total population

\*\* as proportion of in-migrants

Sources: Computations based on (i) Govt of India (1976, p. 28, 24), (ii) Govt of India (1977, p. 84-85), (iii) Govt of India (1985b, p. 34, 48, 50), (iv) Govt of India (1988, p. 318-19), (v) Govt of India (1997a, p. 52-53), (vi) Govt of India (1997b, p. 6, 40, 52), and (vii) Govt of India (nd1, nd2).

Table 5: Population Dynamics in Nagaland, 1971–2001

Population/Change	Census decade		
	1971–81	1981–91	1991–2001
End of decade population	774930	1209546	1990036
Total population change, all ages	258481	434616	780490
Net in-migrants, all ages	38227	13797	-16511
Net in-migrants, 0-9 years	0	3092	-6738
Net in-migrants, aged 10 years and above	38227	10705	-9773
0-9 years population (end of the decade)	189739	295162	445190
Deaths (among those aged more than 10 years)	-30515	-128749	-345073
Discrepancy (per cent)	3.94	10.64	17.34

*Note:* The estimate of discrepancy for 1971–81 is not accurate because we could not find information on out-migrants in the 0–9 year age group and, therefore, assumed zero net in-migration in that age group. However, if we replace ‘Net in-migrants, 0–9 years’ (0 in the above table) with ‘In-migrants, 0–12/0–7 years’ (6700/3443), the discrepancy becomes 4.80/4.38 per cent.

*Sources:* Please see the sources to Table 4.

## Recent Working Papers

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