Below-Replacement Fertility in India: An Analysis of the Proximate Determinants of Low Fertility

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Introduction

Several studies have documented the low to moderate decline in India's fertility since the 1950s until the 1990s (Rele 1987; Guilmoto and Rajan 2001). Total fertility rate remained stable at around 6 during the 1950s and in the early 1960s. Starting in the latter half of the 1960s, total fertility rate slowly started to decline reaching 4.7 in 1976-81 (Jain and Adlakha 1982; Guilmoto and Rajan 2001). Data from the latest National Family Health Survey (NFHS3) shows that fertility has fallen to 2.7 for the three year period ending 2005-06. A recent article by Alkema et al. (2011) predicts that fertility in India will continue to decline steadily to below-replacement levels towards the end of the century, and then recover early next century. Averages aggregated at the national level however, mask the considerable economic, cultural and spatial heterogeneity at the regional level, which in turn, have a profound influence on the level and pace of fertility decline. Recent data from the NFHS3 shows that state fertility levels range from a high of 4.01 births per woman in Bihar to a low of 1.79 in Andhra Pradesh (NFHS).

This article seeks to document recent trends in fertility levels in India and to update our knowledge on the mechanisms behind state variation. We use the conceptual framework proposed by Bongaarts for studying the proximate determinants of low fertility (Bongaarts 2001; Bongaarts 2002; Morgan 2003) to explain variations across time in state-level fertility. Conventional fertility theories highlight the influence of modernization, social and economic development and diffusion of changing ideas and individualistic values on the desired number of children. A key assumption of these theories is that individuals are able to realize their preferences. However, empirical evidence from many low-fertility countries demonstrates that actual fertility differs considerably from desired number of children.

The low fertility proximate determinants framework has at its core the incongruence between stated preferences and actual observed fertility (Bongaarts 2001). Holding stated preferences as a "baseline", the framework allows analysis of aggregate fertility by examining factors that either enhance or depress observed fertility relative to desired family size (Bongaarts 2001; Morgan et al. 2009). At the individual level, actual fertility does not match desired fertility as a result of factors and circumstances that are not or cannot be incorporated into childbearing intentions (Bongaarts 2001; Morgan et al. 2009). Notably, the proximate determinants that influence low fertility regimes include: unwanted fertility, child mortality, gender preference, which can increase fertility relative to intentions; and the tempo effect, sub-fecundity and competition for children which can reduce fertility relative to intentions (Bongaarts 2001).

The framework is described as:

$$TFR = IP * (U * R * SP * T * I * C)$$

Table 1 summarizes what we hope to accomplish in this paper. The overarching goal of our paper is to fill in the remaining columns in the table. This will help us evaluate the proximate determinants model and the implications of the model and its empirical estimates.

Data and Methods

We use three waves of data from the Demographic and Health Surveys (DHS), also referred to as the National Family Health Surveys (NFHS) in India, collected in 1992-93, 1998-99 and 2005-06. The NFHS were initiated in the early 1990s and are nationally representative surveys providing important demographic and health information at the national and state-level in India. A multi-stage stratified random sampling procedure was employed to obtain reliable samples within each state. Since a basic aim of the survey was to obtain reliable estimates at various geographic levels (states, urban/ rural, metropolitan cities), national sample sizes for each survey

were unusually large (IIPS 1995). Our measure of fertility and its proximate determinants come from the retrospective fertility histories provided by 89,777 ever-married women age 13-49 in 25 states in 1992-93, 90,303 ever-married women age 15-49 in 26 states in 1998-99, and 124,385 women age 15-49 in 29 states in 2005-06. We pooled the data from the three surveys and transformed them into a person-year format. We then estimated age-specific fertility rates by year to obtain period and cohort fertility.

Measures

Intended Parity (IP): Desired fertility for women with living children is measured in response to the question: If you could go back to the time you did not have any children and could choose exactly the number of children to have in your whole life, how many would that be?[1]

Unwanted Fertility (U): Even in countries where contraceptives are widely available, a substantial proportion of women report bearing more children than they want. This is higher in developing countries where women still lack complete control over reproductive preferences. Unwanted fertility is estimated by first calculating the wanted component of the TFR. Wanted total fertility rate (WTFR) is computed using a method proposed in the DHS, in which a birth is considered wanted if the number of living children at the time of conception of the birth is less than the ideal number of children as reported by the respondent[2]. Empirical evidence from other countries show that unwanted fertility contributes significantly to the excess of TFR over desired family size. We expect it to play a major role in the variation in fertility across states.

[1] Desired fertility for women without any living children was measured using the question: If you could choose exactly the number of children to have in your whole life, how many would that be?

[2] Retrospective reports of wanted fertility are available for waves 1 and 3, which were also used to compute another measure of WTFRs. The correlation between rates from the two different methods rates was quite high. However, since the retrospective reports are available only for waves 1 and 3, WTFR using the DHS method were used.

Replacement Effect (R): According to the World Bank, infant mortality rate was 50.3 per 1000 and under-five mortality rate was 65.6 per 1000 in 2009 in India (World Development Indicators 2009). Although these rates are substantially high, the replacement effect on fertility has been shown to be quite low in India, in the range of 0.02 and 0.10 (Bhat 1998). We will use data on mortality of children and birth intervals to estimate the replacement effect.

Sex Preferences (SP): Son preference has been abnormally high in India (Arnold et al. 2002), but varies widely among states. Estimates from the 2001 census show unusually high sex ratios among young children under age seven due to excess female mortality in Punjab and Haryana in the north and Gujarat in the west (Arnold et al. 2002). We will use data on the sex composition of a respondent's current family to infer her sex preferences. Specifically, we will construct a measure of son preference for respondents with more than two children to estimate the likelihood of having an additional child given the sex composition of the first two children. Additionally, we will also use information on the respondent's use of technologies known to be available for sex determination of the fetus.

Tempo Effect (T): The method proposed by Bongaarts and Feeney (1998) will be used to compute the tempo effects of the changing mean age at childbearing on fertility at each parity. Preliminary calculations show that mean ages at first, second, third and fourth and higher-order births increased linearly from 1972 to 2006 (see Figure 1). For instance, the mean age at first birth increased from 18.9 to 21.9 years, the mean age at second birth increased from 20.6 to 24.1 years, the mean age at third birth increased from 22.3 to 25.8 years and the mean age at fourth birth increased from 23.7 to 26.8 year. Given that the mean age at childbearing is considerably different across the states, we expect this to be an important factor that contributes to the state-level variation in fertility.

Infecundity (I): Although sub-fecundity is a concern in many low-fertility countries, it is likely to have a minor effect in India because of universal marriage, low age at marriage, and subsequent low age at childbearing. We will use self-reports of fecundity, sterilization and contraceptive use in the last five years to construct a measure of infecundity.

Competing Preferences (C): In many Asian countries experiencing low fertility, delayed marriage is often cited as a key factor influencing fertility, as both men and women pursue higher education and explore career opportunities (Jones 2007). In India, however, marriage continues to be universal, the age at marriage has been rising gradually (see NFHS reports), and marital fertility is still the norm. Thus, competing preferences for children is likely to play a small role in India's declining fertility.

Figure 1. Mean Age at First, Second, Third, Fourth and Higher Order Births

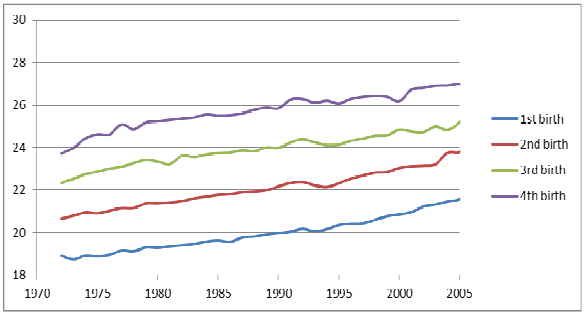

Table 1. Proximate Determinants of Low Fertility for States of India

	State	TFR	IP	U	R	SP	T	I	C
1	Andhra Pradesh	1.787	2.141	1.203					
2	Gujarat	1.793	2.139	1.163					
3	Tamil Nadu	1.801	1.949	1.262					
4	Kerala	1.926	2.322	1.079					
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22	Nagaland	3.737	3.152	1.37					
23	Meghalaya	3.799	3.245	1.23					
24	Uttar Pradesh	3.820	2.447	1.566					
25	Bihar	4.005	2.558	1.632					
	All-India	2.678	2.300	1.391					

Source: NFHS3

References

Alkema Leontine, Adrian E. Raftery, Patrick Gerland, Samuel J. Clark, Francois Pelletier, Thomas Buettner, Gerhard K. Heilig. (2011). " Probabilistic Projections of the Total Fertility Rate for All Countries" Demography **48**(3): 815-839.

Arnold, F., S. Kishor, et al. (2002). "Sex-Selective Abortions in India." Population and Development Review **28**(4): 759-785.

Bhat, M. (1998). The Effects of Child Mortality on Fertility: The Indian Case Study. Washington, D.C., National Research Council.

Bongaarts, J. (2001). "Fertility and Reproductive Preferences in Post-Transitional Societies." Population and Development Review **27**(ArticleType: research-article / Issue Title: Supplement: Global Fertility Transition / Full publication date: 2001 / Copyright © 2001 Population Council): 260-281.

Bongaarts, J. (2002). "The End of the Fertility Transition in the Developed World." Population and Development Review **28**(3): 419-443.

Bongaarts, J. and G. Feeney (1998). "On the Quantum and Tempo of Fertility." Population and Development Review **24**(2): 271-291.

Guilmoto, C. Z. and S. I. Rajan (2001). "Spatial Patterns of Fertility Transition in Indian Districts." Population and Development Review **27**(4): 713-738.

IIPS (1995). National Family Health Survey: MCH and Family Planning : India, 1992-93. Bombay, International Institute for Population Sciences.

Jain, A. K. and A. L. Adlakha (1982). "Preliminary Estimates of Fertility Decline in India During the 1970s." Population and Development Review **8**(3): 589-606.

Jones, G. W. (2007). "Fertility Decline in Asia: The Role of Marriage Change." Asia-Pacific Population Journal **22**(2): 13-32.

Morgan, S. P. (2003). "Is Low Fertility a Twenty-First-Century Demographic Crisis?" Demography **40**(4): 589-603.

Morgan, S. P., G. Zhigang, et al. (2009). "China's Below-Replacement Fertility: Recent Trends and Future Prospects." Population and Development Review **35**(3): 605-629.

Rele, J. R. (1987). "Fertility Levels and Trends in India, 1951-81." Population and Development Review **13**(3): 513-530.