Data Reduction Techniques for Estimating TFR in Indian States

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Context:

Fertility is an important factor for population growth and crucial issue for the developing country like India. Fertility situations in the countries around the world have changed greatly during the recent decades. India is a vast country and has cultural, social, demographic and behavioral diversities. This variability complicates the problem of estimation of fertility for country as a whole. In general, the tempo of fertility is explained by so many indicators like Crude Birth Rate, General Fertility Rate, Age Specific Fertility Rate (ASFR) and Total Fertility Rate (TFR). TFR gives the precise and most widely used indicator of fertility. This can also be used for knowing the tempo of fertility in comparative manner. Many demographers suggested different types of direct and indirect methods of estimation of TFR. In the present study, data reduction technique has been applied on ASFR to estimate the TFR for the different major states of India. This data reduction technique has been further providing some other proxy variables to estimate TFR. Some indirect techniques have been suggested and the reliable estimates for TFR have been obtained for the different major states of India.

Data and Method:

The reliable data has been obtained from the most recent round of Indian Demographic Health Survey called as National Family and Health Survey (NFHS-III). The data on ASFR has been extracted from the NFHS-III report. This data has been further utilized for data reduction. Principal component analysis has been carried out to reduce the data. Further regression technique has been used to estimate TFR for different major states of India.

Results:

The estimated values of TFRs have been obtained by the two components obtained from PC analysis. First factor explain the early fertility group and second factor explain late fertility group. Percentage change in the observed values of TFR for different major states lies within the range (-6.5 percent to +10.7 percent). Higher departure (more than 5 percent) in estimated value from observed value of TFR has been shown by state Jammu and Kashmir, Gujarat and

Jharkhand and lower departure in TFR (less than one percent) shown by state Delhi, Himachal, Punjab, Madhya Pradesh, and Orissa.

Conclusions:

The analysis has brought out that the first two principal components explained 86 percent of the total variance in the ASFRs of the 20 major states of India for the years around 2005 for which the basic data were available in the NFHS-III Report (2005-06). Based on this result PC model for representing an ASFR schedule, is presented in current situation. This will be useful for estimating and projecting ASFR values for different group of population. The TFR are also estimating with the help of this PC model. These estimates are quite reliable and the procedure can be further utilized for demographers and policy makers.

Table 1: The observed and estimated value of TFR for different major states of India

STATS	OBS_TFR	PRE_TFR	% Change	95% C.I. for PRE_TFR	
				Lower	Upper
Delhi	2.13	2.1296	-0.0199	1.8934	2.3658
Haryana	2.69	2.7377	1.7720	2.5096	2.9657
Himachal	1.94	1.9375	-0.1267	1.7022	2.1729
Jammu and Kashmir	2.38	2.6352	10.7216	2.3929	2.8775
Punjab	1.99	1.9756	-0.7232	1.7423	2.2089
Rajasthan	3.21	3.0993	-3.4478	2.8683	3.3304
Uttaranchal	2.55	2.4304	-4.6890	2.1955	2.6654
Chhattisgarh	2.62	2.6883	2.6081	2.4604	2.9162
Madhya Pradesh	3.12	3.1039	-0.5167	2.8712	3.3366
Uttar Pradesh	3.82	3.7361	-2.1951	3.4848	3.9875
Bihar	4.00	3.9386	-1.5342	3.6860	4.1913
Jharkhand	3.31	3.4947	5.5799	3.2481	3.7413
Orissa	2.37	2.3847	0.6190	2.1578	2.6115
West Bengal	2.27	2.2349	-1.5468	1.9908	2.4790
Gujarat	2.42	2.2625	-6.5083	2.0350	2.4900
Maharashtra	2.11	2.0261	-3.9750	1.7912	2.2611
Andhra Pradesh	1.79	1.8644	4.1570	1.6151	2.1137
Karnataka	2.07	2.0368	-1.6043	1.8040	2.2696
Kerala	1.93	1.9615	1.6340	1.7232	2.1999
Tamil Nadu	1.80	1.8421	2.3374	1.6092	2.0750

Fig.1: The graphical representation of observed and estimated TFR for different major states of India
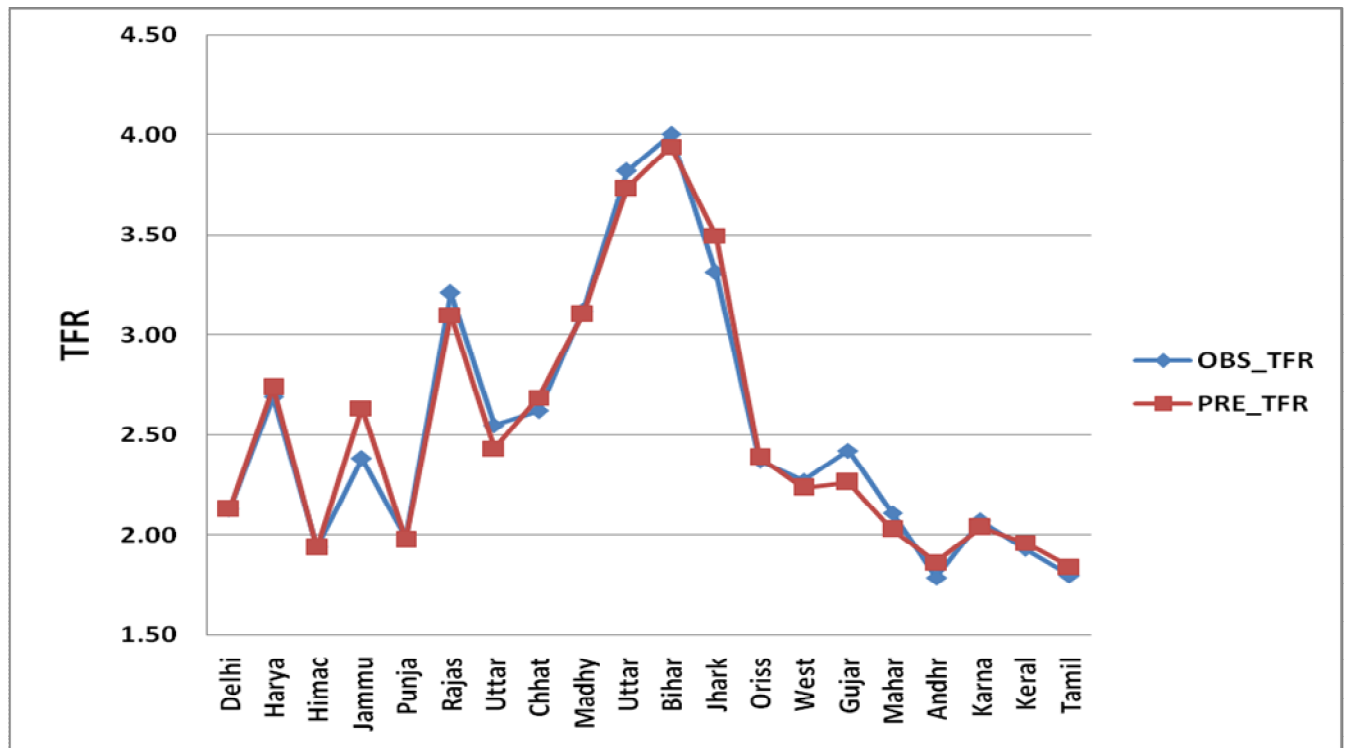
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