International Journal for Multidisciplinary Research (IJFMR)

E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Understanding the Factors Determining District-Level Variation in Fertility in India

Malay Das

Assistant Professor, Department of Economics, Naba Barrackpore Prafulla Chandra Mahavidyalaya, New Barrackpore, Kolkata-700131, West Bengal, India,

Abstract

Using the district-level estimates of fertility from the published source, data from District Level Household Survey-3 (DLHS-3), 2007-08, and data from 61st round of National Sample Survey (NSS), 2004-05, this paper examined the factors responsible for district-level variation in total fertility rate (TFR) in India, considering the districts as the units of analysis. The distribution and mapping analyses of districts based on the levels of TFR were carried out to understand the district-level variation in fertility. The multivariate analysis has been carried out to understand the factors determining district-level variation in fertility in India. Results showed that a large variation in fertility continued to exist among the districts of India. The levels of fertility were likely to be higher in the districts of northern states, compared to that of other parts of India. The factors such as female literacy, modern contraceptive use, ante-natal care, female workforce participation rate, size of Muslim population, and size of combined Scheduled castes and Scheduled tribes population were found to be the most significant predictors of district-level variation in fertility in India. The regional location has a strong influence on fertility; likely to play significant role in shaping fertility.

Keywords: Total Fertility Rate, District-Level Variation, Factors, Districts, India

Introduction

Understanding the factors determining fertility change has been the major subject of enquiry for many demographers. Davis and Black (1956) identified a set of 11 variables known as “Intermediate variables” of fertility through which various socio-economic factors affect fertility. But it was difficult to measure these variables and link them with the intermediate variables and fertility. Bongaarts (1978) provided a comprehensive model suggesting four principal determinants namely; proportion married, use of contraception, induced abortion and lactational infecundability that explain large variation in fertility.

In India, fertility transition began in the late 1960s (Adlakha and Kirk, 1974) and was rapid in 1990s (Arokiasamy, 2009). There is body of literature which showed the clear evidence of different socio-economic, demographic and cultural factors contributing to fertility change at national and sub-national levels. Number of studies in India showed that factor such as increased age at marriage and contraception, increase in female literacy and age at marriage in association with increased use of contraception, and reduction in infant mortality played significant role in reducing fertility in India during 1970s (Jain and Adlakha, 1982; Jain,1985) The high fertility is also found to associate with high female child mortality (Kishore, 1991; Murthi *et al*., 1995). Bhat (1996) using 1991 census data for the districts in 15 major states of India showed that the factors such as joint family, female age at marriage, proportion of Muslims, proportion of scheduled tribes, female literacy, media exposure, population density, child mortality and unmet need for contraception play crucial role in explaining district level variation in fertility. Dreze and Murthi (2001) using district level data from 1981 and 1991 census showed that female education and child mortality are important factors explaining fertility differences across the country and overtime. The proportion of Muslims is found to have significant positive effect on fertility. The proportion of scheduled tribes has no effect on fertility, after controlling for other variables but shows significant negative effect on fertility when the variable of son-preference is dropped. This study also shows that regional location is an important factor explaining fertility differences. However, they found no relationship between fertility and general indicators of development such as male literacy, level of urbanization and poverty. Arokiasamy (1997) showed that factors such as faster economic growth, increase in female literacy and age at marriage, and reduction in infant mortality were the major causes of fertility decline in India. Available past evidences from India and other countries also showed that the fertility reduction is more rapid among educated and socio-economically advanced women (UN, 1973; Caldwell et.al 1982; Coal and Watkins, 1986). Women's education is significantly associated with small family norms and fertility decline across the country. In almost every setting, regardless of religion, culture and level of development, well educated women are found to have fewer children than uneducated women have (Vaidyanathan, 1989, Jejeebhoy 1995, UN 1995, Parasuraman *et al*., 1999, Dreze and Murthi, 2001). However, some other studies suggest that fertility reduction in recent years in India is largely due to increased use of contraception among uneducated and poor women (Bhat, 2002; McNay *et al*., 2003; Arokiasamy, 2009). Mohanty and Ram (2011) showed that the association of poverty reduction and fertility reduction in Indian states. Their study indicates that the reduction in poverty and reduction in fertility are not similar across states. The association of change in poverty and fertility is weak for many states. The major reduction in fertility in Indian states was caused mainly due to increased use of contraception and little by increased age at marriage. The variation in fertility reduction across states is attributable to the variation in contraceptive use among the states. All these evidences suggest that increase in female literacy and age at marriage, increased use of contraception, and reduction in infant and child mortality are the common factors contributing to fertility reduction across countries. However, the role of other factors such as poverty, economic growth, and other conditions in reducing fertility vary across countries and overtime.

In India, the districts are considered as the basis for the implementation of any developmental plan and programme. The fertility estimates are often required for effective planning and program implementation. It may be mentioned that most studies on fertility analysis in India mainly focused on the national and state level. Though, in the recent past, few studies have been carried out to provide the district level estimates of fertility in India, most of them were based on census data (Registrar General of India, 1989; 1997; Bhat, 1996; Prakasam et al., 2000; Guilmoto and Irudaya Rajan, 2002; Prakasam et al., 2000; Ram *et al*., 2005; Das and Mohanty, 2012; Mohanty et al., 2012). In this context, the present paper assessed the district-level variations as well as factors determining district-level variations in fertility among the districts of India using population-based survey data.

Data and Methods

The purpose of this paper was to examine the variation and as well as factors determining variation in fertility at the district level in India for which the district-level estimates of total fertility rate (TFR) for the period 2006 were considered. These estimates of TFR were borrowed from Das (2013). In the past, there was a growing interest among many researchers to provide the estimates of fertility for districts of India using data from Indian censuses applying indirect methods (Registrar General of India, 1989; 1997; Bhat, 1996; Prakasam *et al*., 2000; Guilmoto and Irudaya Rajan, 2002). Later, some researchers attempted to provide district-level estimates of fertility in India using birth order statistics from District Level Household and Facility Survey (DLHS) of India applying direct methods i.e. regression method (Ram *et al*., 2005; Das, 2013). Ram *et al*., (2005) using regression method estimated TFR for districts of India based on the combined percentage of first and second order births from DLHS-2 (2002-04). They have used the combined percentage of first and second order births as independent variable and TFR as dependent variable from census in order to compute the regression coefficients. Following the similar procedure, Das (2013) provided the estimates of TFR for districts of India. However, he estimated the TFR for districts of India using the percentage of births of order 3 and above ((BOD3+) derived from DLHS-3 (2007-08). He referred these estimates to the period of 2006 as these estimates were based on the percentage of BOD3+ that were derived from the births that took place in 3 years preceding the survey (Das, 2013). The district-level estimates of TFR as provided by Das (2013) have been used in the analysis of this paper.

In order to understand the factors determining district-level variation in fertility in India, the ordinary least square (OLS) regression analysis was carried out where the TFR was the dependent variable. The estimates relating to 581 districts of the 33 states (except Jammu and Kashmir, and Nagaland) of India are used in the regression analysis. A set of eleven independent variables, namely, female literacy rate, proportion of girls marrying below 18 years of age, proportion of women using any modern contraception, proportion of women having at least 3 ante-natal care (ANC) visits, proportion of Muslim population, proportion of combined Scheduled caste and Scheduled tribe (SC/ST) population, proportion of poor (i.e. level of poverty), proportion of urban population (i.e. level of urbanization), infant mortality rate (IMR), female workforce participation rate and monthly per capita consumption expenditure (MPCE) (in rupees) is included in the analysis. These were used based on literature and availability of data. Additionally, four regional dummy variables, namely, North dummy (1 for the districts of Chhattisgarh, Madhya Pradesh and Rajasthan), South dummy (1 for the districts of Andhra Pradesh, Karnataka, Kerala and Tamil Nadu), Uttar Pradesh dummy (1 for the districts of Uttar Pradesh) and Bihar dummy (1 for the districts of Bihar) are used to understand the regional pattern in TFR. The TFR is transformed into logarithmic form (Bhat, 1996). The MPCE is transformed into logarithmic form to normalize its distribution and linearize its relationship with TFR. Before applying OLS regressions for TFR, a correlation analysis were carried out to understand the degree and pattern of association between all included variables.

The estimates on all independent variables except IMR, female workforce participation rate and MPCE were derived from DLHS-3 only. The estimates on female literacy rate, proportion of girls marrying below 18 years of age, proportion of Muslim population, proportion of SC/ST population and level of urbanization were estimated from the member file of DLHS-3. The estimates on ANC and modern contraceptive use are estimated from the women file of DLHS-3. The level of poverty at the district level has been estimated based on a set of household economic proxies (household assets and amenities) from household file of DLHS-3 by applying principal component analysis (PCA). The PCA was used to derive the wealth index separately for rural and urban areas. The state-specific rural and urban poverty ratios provided by Planning Commission, Government of India (Planning Commission, 2012) was applied to the wealth index to derive the combined poverty ratio at the district level. The district-level estimates of IMR and MPCE have been borrowed from Das (2013). Das (2013) also provided the district-level estimates of IMR (using birth history data from DLHS-3) and MPCE (using household consumption expenditure data from 61st round of NSS). The female workforce participation rate have been estimated using the information on usual principle activity of household members aged 5 years and above for a reference period of 365 days available from 61st round of NSS, 2004-05 (Schedule 10, Block 4 of Level 3 and Block 5.1 of Level 4). This particular analysis was carried out based on the estimates of 581 districts of India as the number of districts covered under 61st round of NSS differed from that of DLHS-3. Therefore, for the sake of similarity and simplicity, this analysis was confined to 581 districts.

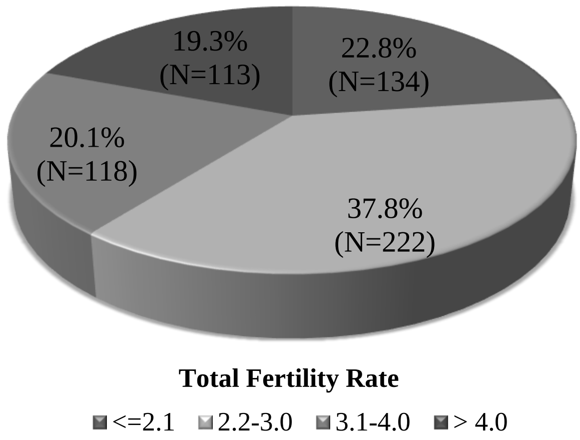
Results

Distribution of districts by levels of TFR in India and states

In order to see the distribution of districts by levels of TFR in India and states, the districts were classified into four categories- districts with TFR of less than or equal to 2.1, with TFR of 2.2-3.0, with TFR of 3.1-4.0, and with TFR of more than 4.0. It was observed that out of 587 districts of the 33 states and union territories of India, 37.8 percent (222 districts) had TFR in the range of 2.2-3.0, 20 percent (118 districts) had TFR in the range of 3.1-4.0 and 19.3 percent (113 districts) had TFR above 4.0 (Figure 1). However, only 22.8 percent districts (134 out of 587) had replacement level or below replacement level fertility (TFR of ≤2.1). Near about 40 percent districts (231 out of 587) had TFR of more than 3.

The pattern of distribution of the districts by levels of TFR was not similar across the states. For example, in Andhra Pradesh, 21 out of 23 districts had TFR at replacement level or below replacement level and the remaining 2 districts had TFR in the range of 2.2-3.0. Similarly, in Tamil Nadu, 26 out of 30 districts had TFR at replacement level or below replacement level and the remaining 4 districts had TFR in the range of 2.2-3.0. On the contrary, majority of the districts in Uttar Pradesh and Bihar (57 out of 70 districts in Uttar Pradesh and 33 out of 37 districts in Bihar) had TFR of more than 4 and none of the districts of these states had reached replacement level of fertility.

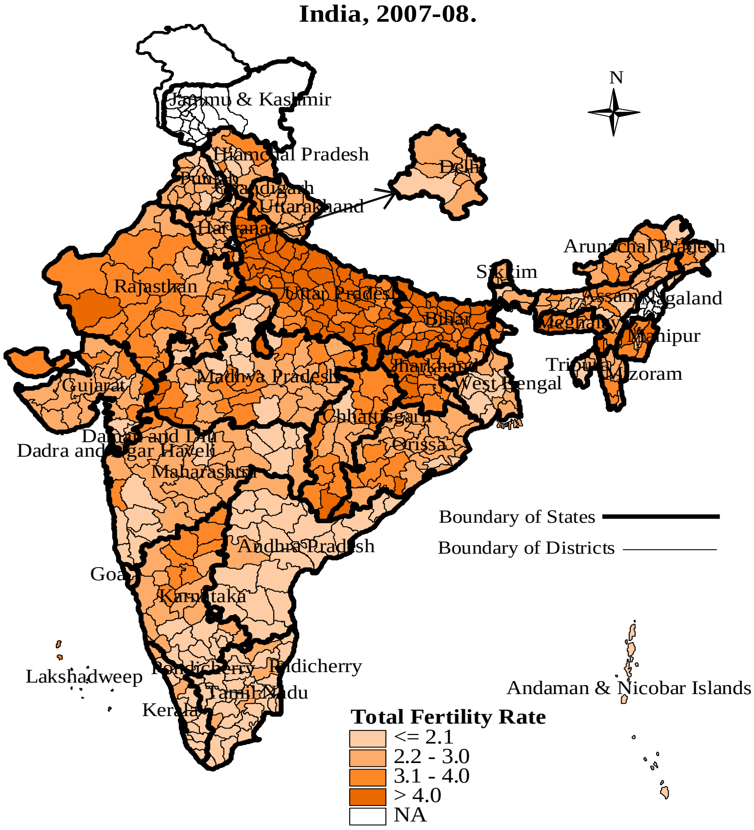
Figure 1: Percent distribution of districts by levels of total fertility rate, India.



District-level variation in fertility in India

The district level estimates of TFR showed that there were large variations in the level of TFR among districts of India. The level of TFR, as of 2006, ranges from a highest of 6.1 in the district of Shahjahanpur of Uttar Pradesh followed by Mewat of Haryana (5.9), and Bahraich (5.8) and Balrampur (5.7) of Uttar Pradesh to a lowest of 1.3 in the district of Mahe of Pondicherry preceded by Guntur of Andhra Pradesh, three districts of Kerala namely, Pathanamthitta, Kollam, Idukki and three districts of Tamil Nadu namely, Erode, Kanniyakumari and Coimbatore (1.4 in each). About 75% of the districts (174 out of 231) with higher fertility (TFR of more than 3) are mainly from six northern states of India, namely, Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Rajasthan and Uttar Pradesh. On the contrary, majority of the districts with replacement level or below replacement of fertility (60%) are mainly from four southern states, Andhra Pradesh, Karnataka, Kerala and Tamil Nadu and one western state, namely, Maharashtra. The district-level variation in fertility is also evident from the mapping of districts developed based on district-level estimates of TFR (see Figure 2). From Figure 2 it is evident that the districts of northern and north-eastern India had very high fertility (TFR of more than 3) compared to the districts of other parts of India.

Figure 2: Mapping of districts based on total fertility rate, India, 2007-08.



Even, a large variation in TFR was noticed among the districts within different states of India. For e.g., in Haryana, the level of TFR ranges from a highest of 5.9 in the district of Mewat, followed by Panipat and Bhiwani (3.0 in each), and Jind (2.9) to a lowest of 2.1 in the district of Ambala, preceded by Sonipat and Kurukshetra (2.0 in each). Similarly, in Odisha, the level of TFR ranges from a highest of 4.6 in the district of Gajapati, followed by Malkangiri (4.5) and Kalahandi (4.0) to a lowest of 1.7 in the district of Khorda, preceded by Jagatsinghapur (1.9), and Puri, Nayagarh, Jajapur and Cuttack (2.0 in each).

Factors determining district-level variation in fertility

The results of regression analysis are presented in Table 1. The OLS regression analysis has been carried out to examine the factors determining district-level differentials in fertility in India. Data relating to 581 Indian districts were used in the analysis, where the district level TFR borrowed from Das (2013) is the dependent variable. Under regression analysis, four alternative regression models with alternative set of independent variables are developed to understand the interaction effect, if any, between the independent variables. In Model1, only MPCE is included. It is found that the MPCE is significant ($p< 0.01$) in Model1 and it alone accounts for 22% of the explained variation (R^2=0.22) in TFR. The coefficient for MPCE is found to be negative (-0.48), indicating that the MPCE is negatively associated with TFR. In Model2, poverty, level of urbanization, female workforce participation rate, proportion of Muslim population, proportion of SC/ST population, and four regional dummy variables (north, south, Uttar Pradesh and Bihar dummies) in addition to MPCE are included. In this model, all variables except MPCE and female workforce participation rate are significant. The coefficients for poverty, female workforce participation rate, proportion of Muslim population and proportion of SC/ST population are found to be positive, though the coefficient is not significant for female workforce participation rate, indicating that these variables are positively associated with TFR. The coefficient for level of urbanization is negative, indicating that this variable is negatively associated with TFR. Interestingly, the coefficients for north, Uttar Pradesh and Bihar dummies are found to be positive while the coefficient for south dummy is found to be negative, indicating that the level of fertility is likely to be high in northern region as well as Uttar Pradesh and Bihar and low in southern region, compared to other regions (regions corresponding to 0 (zero) values) of India. In Model3, infant mortality rate, ANC visits, modern contraceptive use, and proportion of girls marrying below 18 years of age are included along with all ten variables used in Model 2. In Model 3, MPCE, level of urbanization and north dummy variable are not significant. The infant mortality and proportion girls marrying below 18 years of age are found to have significant and positive effect while the ANC visits and modern contraceptive use have significant and negative effect on TFR. The coefficients for all regional variables, though the coefficient for north dummy is not significant, remain in the same direction as in Model 2. In Model 4, female literacy rate is included in addition to the variables used in Model3.

Table 1: Results of linear regression analysis for TFR as a dependent variable based on the data of 581 districts of India.

Independent variables	Model1	Model2	Model3	Model4
MPCE@	-0.482*** (12.93)	-0.028 (0.65)	0.021 (0.54)	0.028 (0.75)
Proportion of poor	--	0.286*** (5.36)	0.100** (1.97)	0.048 (0.95)
Proportion of urban population	--	-0.140*** (2.60)	0.015 (0.30)	0.053 (1.11)
Female workforce participation	--	0.053 (0.76)	0.243*** (3.89)	0.153** (2.44)

rate				
Proportion of Muslim population	--	0.566*** (8.23)	0.371*** (5.67)	0.374*** (5.90)
Proportion of SC/ST population	--	0.344*** (7.89)	0.203*** (5.07)	0.228*** (5.83)
Infant mortality rate#	--	--	0.115*** (2.99)	0.036 (0.90)
ANC visits (at least 3 ANC visits)	--	--	-0.425*** (7.86)	-0.361*** (6.75)
Modern contraceptive use	--	--	-0.505*** (7.14)	-0.562*** (8.12)
Proportion girls marrying below 18 years of age	--	--	0.110* (1.78)	-0.091 (1.33)
Female literacy rate	--	--	--	-0.570*** (5.98)
North dummy	--	0.069*** (2.77)	0.006 (0.22)	-0.010 (0.42)
South dummy	--	-0.204*** (7.74)	-0.057** (2.13)	-0.068*** (2.59)
UP dummy	--	0.489*** (16.50)	0.256*** (8.12)	0.250*** (8.16)
Bihar dummy	--	0.436*** (11.13)	0.279*** (7.61)	0.261*** (7.33)
Constant	4.156	0.885	1.253	1.516
R^2	0.22	0.69	0.77	0.78
Number of districts	**581**	**581**	**581**	**581**

@Used in logarithmic form. #Used in logit scale. ***Significant at 1% level (p<0.01). **Significant at 5% level (p<0.05). *Significant at 10% level (p<0.10). Note: The dependent variable is in logarithmic form. Figures in the parentheses are the absolute t-ratios.

All variables in Model 4 account for 78% of the explained variation (R^2=0.78) in TFR. In this model, the MPCE, poverty, level of urbanization, infant mortality, proportion girls marrying below 18 years of age, and north dummy variable remain insignificant. The female literacy rate is found to have significant and negative effect on TFR. The effects of other significant variables remain in the same direction as in Model 3. The female workforce participation rate, proportion of Muslim population and proportion of SC/ST population are found to have significant and positive effect on TFR. The ANC visits and modern contraceptive use are found to have significant and negative effect on TFR. The magnitude of the coefficients for female literacy rate, modern contraceptive use and ANC visits indicates that the level of TFR would decline by 6%, 6% and 4% for every 10% increase in female literacy rate, modern contraceptive use and ANC visits, respectively. The coefficients for all regional dummy variables except the north dummy remain statistically significant and in the same direction as in the previous two models.

However, the coefficient for north dummy variable remains insignificant and in the opposite direction (negative), controlling for all variables.
From this analysis it is found that the factors such as female literacy, ANC, use of any modern contraception, female workforce participation rate, and size of Muslim population and SC/ST population were most significant predictors of district-level variation in fertility in India. The MPCE has significant negative association with fertility and it alone explains 22% variation in fertility. However, it remains insignificant while controlling for all variables. The other factors such as level of poverty, level of urbanization, infant mortality rate and age at marriage for girls have no significant association with fertility, controlling for all variables. Regional location plays significant role in shaping fertility. The levels of fertility were likely to be higher in Uttar Pradesh and Bihar and lower in southern region of India.

Summary and Conclusion

The purpose of this paper was to assess the extent of district-level variation and factors determining district-level variation in fertility in India. The key findings showed that there were large variations in TFR among the districts of India. About 40% of the selected districts (231 out of 587) had TFR of more than 3, of which about 75% districts (174 out of 231) are mainly from the six of the eight Empowered Action Group states of India, namely, Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Rajasthan and Uttar Pradesh. On the contrary, only 23% districts (134 districts) had reached replacement level or below replacement level fertility, of which more than 50% districts (72 out of 134) are mainly from the states of Andhra Pradesh, Kerala, Maharashtra and Tamil Nadu. The TFR was highest in the district of Shahjahanpur of Uttar Pradesh (6.1), followed by Mewat of Haryana (5.9), and Bahraich (5.8) and Balrampur (5.7) of Uttar Pradesh to a lowest of 1.3 in the district of Mahe of Pondicherry, preceded by Guntur of Andhra Pradesh, three districts of Kerala namely, Pathanamthitta, Kollam, Idukki and three districts of Tamil Nadu namely, Erode, Kanniyakumari and Coimbatore (1.4 in each). The levels of fertility were found to be higher in the districts of northern states of Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Orissa, Rajasthan and Uttar Pradesh, indicating that the districts in these states were lagged behind in demographic progress. These results are also similar to the findings of some previous studies (Guilmoto and Irudaya Rajan, 2002; Mohanty *et al*, 2012; Registrar General of India, 2009b). One of the possible reasons of higher fertility of the districts in northern states of India was because these districts were socio-economically backward (Das, 2013). Moreover, the incidence of higher infant mortality (Das, 2017) and lower utilization of reproductive and child health care services (Das, 2015) might be responsible for higher fertility in the districts of northern states of India.
The results from regression analyses showed that the factors such as female literacy, modern contraceptive use, ANC visits, female workforce participation rate, and size of Muslim population and size of SC/ST population were the most significant factors determining district level variation in fertility in India. Among the significant factors of fertility, the female literacy, modern contraceptive use and ANC have significant and negative effects while the female workforce participation rate and size of Muslim population and SC/ST population have significant and positive effects on fertility. The level of TFR would decline by 6%, 6% and 4% for every 10% increase in female literacy rate, modern contraceptive use and ANC visits, respectively. The regional location has a strong influence on fertility. The levels of fertility are likely to be higher in the states of Uttar Pradesh and Bihar, compared to other parts of India. Moreover, this analysis also suggested that among the significant determinants of fertility,

female literacy, modern contraceptive use and ANC visits are negatively associated with fertility, indicating that the districts with higher levels of female literacy, modern contraceptive use and ANC visits were likely to have lower fertility. Other determinants such as female workforce participation rate and size of Muslim population and SC/ST population are positively associated with fertility, indicating that the districts with higher proportion of Muslim population or SC/ST population are likely to have higher fertility. These findings are also consistent with some previous studies in India (Bhat, 1996; Dreze and Murthi, 2001; Das and Mohanty, 2012).

References

1. Adlakha, A and D. Kirk. (1974). Vital Rates in India, 1961-1971. *Population Studies* 28(3): 381-400.
2. Arokisamy, P. (2009). “Fertility Decline in India: Contributions by Uneducated Women Using Contraception”, *Economic & Political Weekly,* XLIV (30), 55-64.
3. Arokiasamy P. (1997). “Determinants of Demographic Changes in India: An Analysis Using New Transformation of Variables”, *Demography India*, 26 (1), 45-62.
4. Bhat, M. (1996). Contours of fertility decline in India, In K Srinivasan (eds), Population Policy and Reprduction Health. Hisdustan Publishing Corporation (India), New Delhi.
5. Bongaarts, J. (1978). “A Framework for Analyzing the Proximate Determinants of Fertility”, *Population and Development Review*, 4(1), 105-132.
6. Caldwell, J. C., P. H. Reddy and P. Caldwell. (1982). The causes of demographic change in south India: A micro approach. *Population and Development Review* 8(4): 689-729.
7. Coale, A. J. and S. C. Watkins. (1986). The decline of fertility in Europe. Princeton University Press. Princeton.
8. DAS, M. (2013). “Economic Disparity and Demographic Differentials in Districts of India, Thesis of Doctor of Philosophy, International Institute for Population Sciences, Deonar, Mumbai.
9. Das, M. (2017). “Inter-district wealth-based differentials and inequality in infant mortality in India”, *IAHRW International Journal of Social Sciences Review*, 5(3): 442-449.
10. Das, M. (2015). “Investigating inter-district disparity in RCH care utilization status in India, 2002-2007”, *International Journal of Development Research*, 5(8): 5359-5365.
11. Das, M and S.K. Mohanty. (2012). “Spatial pattern of fertility transition in Uttar Pradesh and Bihar: a district level analysis”, Genus, LXVIII (2): 81-106.
12. Davis K and J. Black. (1956). “Social structure and fertility: An analytic framework” *Economic Development and Cultural Change*, 4(4), 211-235.
13. Dreze J. and M. Murthi. (2001). “Fertility, Education and Development: Evidence from India”, *Population and Development Review*, 27(1), 33-63.
14. Guilmoto, C.Z and S Irudaya Rajan. (2002). District Level Estimates of Fertility from India’s 2001 Census. *Economic and Political Weekly* February 16: 665-676.
15. Jain A. K. (1985). “The Impact of Development and Population Policies on Fertility in India”, *Studies in Family Planning*, 16(4), 181-198.
16. 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.
17. Jejeebhoy S.J. (1995), Women’s Education, Autonomy, and Reproductive Behaviour: Experience from Developing Countries, Clarendon Press, Oxford.

18. Kishore, S. (1991). May God Give Sons to All: Gender and Child Mortality in India. *American Sociological Review* 58(2): 247-265.
19. McNay K., P Arokiasamy and R. H. Cassen. (2003). "Why are uneducated women in India using contraception? A multilevel analysis", *Population Studies*, 57(1), 21-40.
20. Mohanty, S. K. and F. Ram. (2011). Pattern of Poverty Reduction and Fertility Transition in India. IIPS Working Paper 5. International Institute for Population Sciences, Mumbai.
21. Mohanty, S. K., T.K. Roy, M. Das and N.S. Devi. (2012). Fertility Transition in Districts of India, 1991-2011, Paper presented in the Second Asian Population Association Conference, 26-29 August, Bangkok, Thailand.
22. Murthi M., A.C. Guio and J. Dreze. (1995). "Mortality, Fertility and Gender Bias in India: A District-Level Analysis", *Population and Development Review*, 21(4), 745-782.
23. Parasuraman S., T.K Roy, D. Radha Devi, B. Paswan, P. Arokiasamy and S. Unisa.(1999). Role of Women's Education in Shaping Fertility in India: Evidence from NFHS, IIPS, Mumbai.
24. Planning Commission. (2012). Press Notes on Poverty Estimates, 2009-10. Government of India, Planning Commission, available at: http://planningcommission.nic.in/news/press pov1903.pdf.
25. Prakasam, C.P, P.K Murthy and S. Krishnaiah. (2000). Evaluation and Adjustment of 1991 Census Data and Estimates of Demographic Indicators: District Wise Analysis. IIPS, Mumbai.
26. Ram, F., C. Shekhar and S.K. Mohanty. (2005). Human Development: Strengthening District Level Vital Statistics in India. IIPS, Mumbai.
27. Registrar General of India. (2009). Compendium of India's Fertility and Mortality Indicators 1971-2007 based on the Sample Registration System. Ministry of Home Affairs, Government of India, New Delhi.
28. Registrar General of India. (1997). District Level Estimates of Fertility and Child Mortality for 1991 and their Interrelations with Other Variables. Occasional Paper No.1 of 1997. Registrar General, India, New Delhi.
29. Registrar General of India. (1989). Fertility in India: An Analysis of 1981 Census Data. Occasional Paper No.13 of 1988. Registrar General, India, New Delhi.
30. United Nations (UN). (1973). Determinants and Consequences of Population Trends: Department of Economics and Social Affairs. Population Studies 2(50). New York: United Nations.
31. United Nations (UN). (1995). Women's Education and Fertility Behaviour: Evidence from the Demographic and Health Surveys, United Nations, New York.
32. Vaidyanathan K. E. (1989). "Status of Women and Family Planning: The Indian Case" *Asia–Pacific Population Journal*, 4(2), 3-18.