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Profiles of Fertility in Districts of India

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Abstract

This chapter presents estimates of total fertility rate (TFR) for 707 districts of the country based on the data available from the National Family Health Survey, 2019-2021 and classifies them into possible profiles of fertility depending upon the total marital fertility rate (TMFR) and proportion of reproductive age women who are married in the district relative to the TMFR and the proportion of reproductive age women who are married in the country. The chapter highlights the variation in TFR across the districts of the country. In 326 of the 707 districts of the country, the TFR is estimated to have reached below the replacement level, although there are 67 districts in which TFR is estimated to be very high, at least 3 births per woman of reproductive age. The profiling of fertility suggests that 707 districts of the country can be classified into six categories depending upon the level of TMFR and the proportion of the reproductive age women who are married.

Introduction

Direct estimates of fertility are not available for the districts of India. The registration of births in India is mandatory under the Registration of Births and Deaths Act of 1969 (Government of India, 1969). However, according to the latest round of the National Family Health Survey (2019-2021), birth of only around 89 per cent of children below 5 years of age in India was found to be registered under the official civil registration system and this proportion varies widely across the districts of the country (Government of India, 2022). Under the Registration of Births and Deaths Act, 1969, births are registered on *de-facto* rather than *de-jure* basis. It is, therefore, not possible to estimate fertility from the births registered under the civil registration system. The estimation of fertility also requires estimates of population by age and sex which are not available through the civil registration system. The only source of information about the population of the district by age and sex is the decennial population census. The last decennial population census in India was conducted way back in 2011 so that recent estimates of population of the district by age and sex are not available. Direct estimation of fertility in the districts of the country is also not reliable from the data available from the National Family Health Survey because the sample of households surveyed in the district is small.

In the absence of direct estimates of fertility, attempts have been made to estimate district fertility through the application of indirect methods of fertility estimation. Different indirect methods of fertility estimation have been proposed. The most common of these methods is the P/F ratio method first proposed by Brass and its many refinements (Brass, 1968; 1975; Hobcraft et al, 1982; Moultrie et al, 2013). Cho and others (1986), on the other hand, have proposed the own children method based on the reverse survival technique while Rele (1967) has used the stable population method which has been modified by Swamy and others (1992). Regression-based methods have also been proposed (Mauldin and Ross, 1991; Jain, 1997, Singh et al, 2012). The mean duration of the interval between successive live births has also been used to estimate fertility (Srinivasan, 1980; Yadav and Kumar, 2002). Yadava and others (2009) have proposed a method based on the weighted average of the proportionate distribution of live births by birth order whereas Yadava and others (2009) have used the proportion of women having a live birth during the five years preceding the survey. Tiwari and others (2020) have used the proportion of childless women of reproductive age to explain the variation in TFR.

United Nations (1967) has suggested a simple approach to estimate total marital fertility rate (TMFR) from the average parity of currently married women of the younger age group. This method is based on the hypothesis that in populations that employ little birth control the ratio of the average parity of currently married women at the end of the child-bearing period to the average parity of currently married women of a younger age group is closely related to the relative average parity of currently married women early and late in their twenties. If the average number of children ever born (average parity) to women aged l5-19 years is P_1; average parity of currently married women aged 20-24 years is P_2, and so on so that the average parity of currently married women aged 45-50 years is P_7, then this hypothesis implies that

$$\frac{TMFR}{P_3} \approx \frac{P_3}{P_2} \tag{1}$$

or

$$TMFR \approx \frac{P_3^2}{P_2} \tag{2}$$

If equation (1) holds empirically, then TMFR can be approximated as

$$TMFR = \alpha + \beta * (P_3^2/P_2) \tag{3}$$

where α and β are constants to be determined.

Yadava and Tiwari (2007) have modified the approach suggested by the United Nations (1967) by considering the prevalence of contraception as a predictor of TFR whereas Gupta, and others (2014), have argued that with the increase in the age at marriage, there is a shift in fertility towards higher ages. They have, therefore, suggested that

$$\frac{TFR}{Q_4} \approx \frac{Q_4}{Q_3} \tag{4}$$

where, Q denotes the average parity of all women in a given age group not the average parity of currently married women. The TFR may now be calculated as

$$TFR = \gamma + \delta * (Q_4^2/Q_3) \tag{5}$$

where γ and δ are constants to be determined. Singh and others (2022), on the other hand, have observed on the basis of the data from the National Family Health Survey 2015-2016 that

$$\frac{TMFR}{P_5} \approx \frac{P_5}{P_4} \tag{6}$$

which means that TMFR may be estimated as

$$TMFR = \mu + \rho * \left(P_5^2/P_4\right) \tag{7}$$

Singh and others (2022) have also tested the stability or the robustness of the regression model (7) by estimating the shrinkage or the decrease in the coefficient of determination which results when the the regression model is applied to a new data set. It is well known in the regression analysis that a fitted relationship performs less well on a new data set than the data set which is used for fitting the model (Everitt, 2002). The robustness of the regression model implies that the model can be applied to data sets other than the one that is used to establish the relationship between the dependent and the independent variables and there is no loss of information.

Using different indirect methods of fertility estimation, there have been attempts in the past to estimate fertility in the districts of India. The Registrar General and Census Commissioner of India has produced estimates of different indicators of fertility for the districts of the country based on the children ever born data collected during 1981 and 1991 decennial population censuses through the application

of Brass PF Ratio method (Government of India, 1988; 1997). Similar exercise has, however, not been carried out by the Registrar General and Census Commissioner of India based on the data collected at 2001 and 2011 decennial population censuses. District level estimates of fertility using data from decennial population censuses have also been prepared by Mishra and others (1994), Guilmoto and Rajan (2002; 2013) and Kumar and Sathyanarayana (2012) using different indirect methods of fertility estimation. There has, however, been no decennial population census in India after 2011 so that census-based estimates of fertility for the districts of the country are not available after 2011.

The Government of India had also instituted the Annual Health Survey Programme in 2010 to generate estimates of key demographic indicators for the districts annually (Government of India, 2011). This survey, however, did not cover all districts of the country and was discontinued after 2013. The fourth round of the National Family Health Survey (2015-2016) provided, for the first time, district level data which have been used by many authors to estimate fertility in the districts of the country (Singh et al, 2022; Mohanty et al, 2016; Chatterjee and Mohanty, 2021; Jayachandran and Ram, 2019). There has, however, been little attempt to estimate fertility at the district level from the data available from the fifth round of the National Family Health Survey (2015-2016).

This chapter presents estimates of total fertility rate (TFR) for the 707 districts of the country based on the data available from the fifth round of the National Family Health Survey (2019-2021). The method proposed by Singh and others (2022) has been used to estimate the TFR at the district level. The estimate of TFR for the country based on the method proposed by Singh and others (2022) is found to be very close to the estimate of TFR based on the full birth history data collected during the survey. The chapter also classifies districts into fertility profiles which are characterised by the level of the fertility of married women of reproductive age and the proportion of women of reproductive age who were married at the time of the survey in the district relative to the national average. The analysis reveals that 707 districts can be classified into only six fertility profiles depending upon the difference in marital fertility and proportion of married among between the district and the national average.

Methods

Using the data from the official sample registration system of India for the period 1986 through 2015, Singh and others (2022) have established the following relationship

$$TMFR = 0.9409 * P_5^2/P_4 + 0.1738 \quad (8)$$

where TMFR is the total marital fertility rate, P_5 is the average number of children ever born to women aged 35-39 years and P_4 is the average number of children ever born to women aged 30-34 years. The coefficient of determination (R^2) was 99.74 per cent while the cross-validity prediction power (CVPP) was 0.99. The CVPP reflects the robustness of the model or model stability over different populations (Herzberg, 1969). Once TMFR is estimated using equation (8), total fertility rate (TFR) can be estimated by multiplying TMFR with the proportion of women in the reproductive age group who are married.

Application of the model (8) to the data on children ever born to married women available from the fifth round of the National Family Health Survey (2019-2021) suggests a TMFR of ____ births per married woman of reproductive age for the country. The data available from the National Family Health Survey also suggest that more than 71 per cent women of reproductive age in India were married at the time of the survey. This means that TFR in the country was around 2.17 births per woman of reproductive age. This estimate of TFR is very close to the estimate of around 2.1 births per women of reproductive age estimated from the full birth history data collected during the survey. This proximity of the two estimates of TFR at the country level provides credence and justifies estimating TFR in the districts of the country using the regression model (8).

If f denotes the total fertility rate (TFR), g denotes the total marital fertility rate (TMFR) and m denotes the proportion of married women, then

$$f = g \times m \tag{9}$$

Let f_d denotes the TFR in district d while f_c denotes the TFR in the country. Then the difference between the TFR of the district and the TFR of the country can be decomposed as

$$\nabla f_d = f_d - f_c = (g_d \times m_d) - (g_c \times m_c) \tag{10}$$

Now

$$\nabla f_d = \frac{f_d - f_c}{\ln\left(\frac{f_d}{f_c}\right)} \times \ln\left(\frac{f_d}{f_c}\right) = L_{dc} \times \ln\left(\frac{f_d}{f_c}\right) \tag{11}$$

Where

$$L_{dc} = \frac{f_d - f_c}{\ln\left(\frac{f_d}{f_c}\right)}$$

is the logarithmic mean of f_d and f_c. Now

$$\ln\left(\frac{f_d}{f_c}\right) = \ln\left(\frac{g_d}{g_c}\right) + \ln\left(\frac{m_d}{m_c}\right) \tag{12}$$

so that

$$\nabla f_d = \left(L_{dc} \times \ln\left(\frac{g_d}{g_c}\right)\right) + \left(L_{dc} \times \ln\left(\frac{m_d}{m_c}\right)\right) = \partial g_d + \partial m_d \tag{13}$$

Where

$$\partial g_d = \left(L_{dc} \times \ln\left(\frac{g_d}{g_c}\right)\right) \tag{14}$$

and

$$\partial m_d = \left(L_{dc} \times \ln\left(\frac{m_d}{m_c}\right)\right) \tag{15}$$

Equation (13) shows that the difference between TFR in a district and TFR in the country can be decomposed in terms of the difference between the TMFR and the proportion of reproductive age women who are married.

Based on equation (13), a district can be characterised into one of the following mutually exclusive yet exhaustive profiles:

$$\begin{aligned}
&Profile\ 1: \partial g_d > 0, \partial m_d > 0, \nabla f_d > 0\\
&Profile\ 2: \partial g_d > 0, \partial m_d < 0, \nabla f_d > 0\\
&Profile\ 3: \partial g_d > 0, \partial m_d < 0, \nabla f_d < 0\\
&Profile\ 4: \partial g_d < 0, \partial m_d < 0, \nabla f_d < 0\\
&Profile\ 5: \partial g_d < 0, \partial m_d > 0, \nabla f_d < 0\\
&Profile\ 6: \partial g_d < 0, \partial m_d > 0, \nabla f_d > 0\\
&Profile\ 7: \partial g_d = 0, \partial m_d = 0, \nabla f_d = 0\\
&Profile\ 8: \partial g_d = 0, \partial m_d > 0, \nabla f_d > 0\\
&Profile\ 9: \partial g_d = 0, \partial m_d < 0, \nabla f_d < 0\\
&Profile\ 10: \partial g_d > 0, \partial m_d = 0, \nabla f_d > 0\\
&Profile\ 11: \partial g_d < 0, \partial m_d = 0, \nabla f_d < 0
\end{aligned} \tag{16}$$

Inter-district Variation in TFR

Estimates of TFR for 707 districts of the country for which data are available from the National Family Health Survey, 2019-2021, are given in the appendix table along with estimates of TMFR and proportion of married women in the reproductive age group. The inter-district variation in TFR is depicted in figure 1 while the distribution of districts by the level of TFR in different states and Union Territories of the country are presented in table 1. There are 326 (46.1 per cent) districts where TFR is estimated to be below the replacement level but in 63 districts, TFR is at least 3 births per woman of reproductive age and in 16 districts where TFR is at least 3.5 births per woman of reproductive age. In 199 (28.1 per cent) districts, TFR ranges between 2.1-2.5 births per woman of reproductive age whereas it ranges between 2.5-3.0 births per woman of reproductive age in 119 (16.8 per cent) districts.

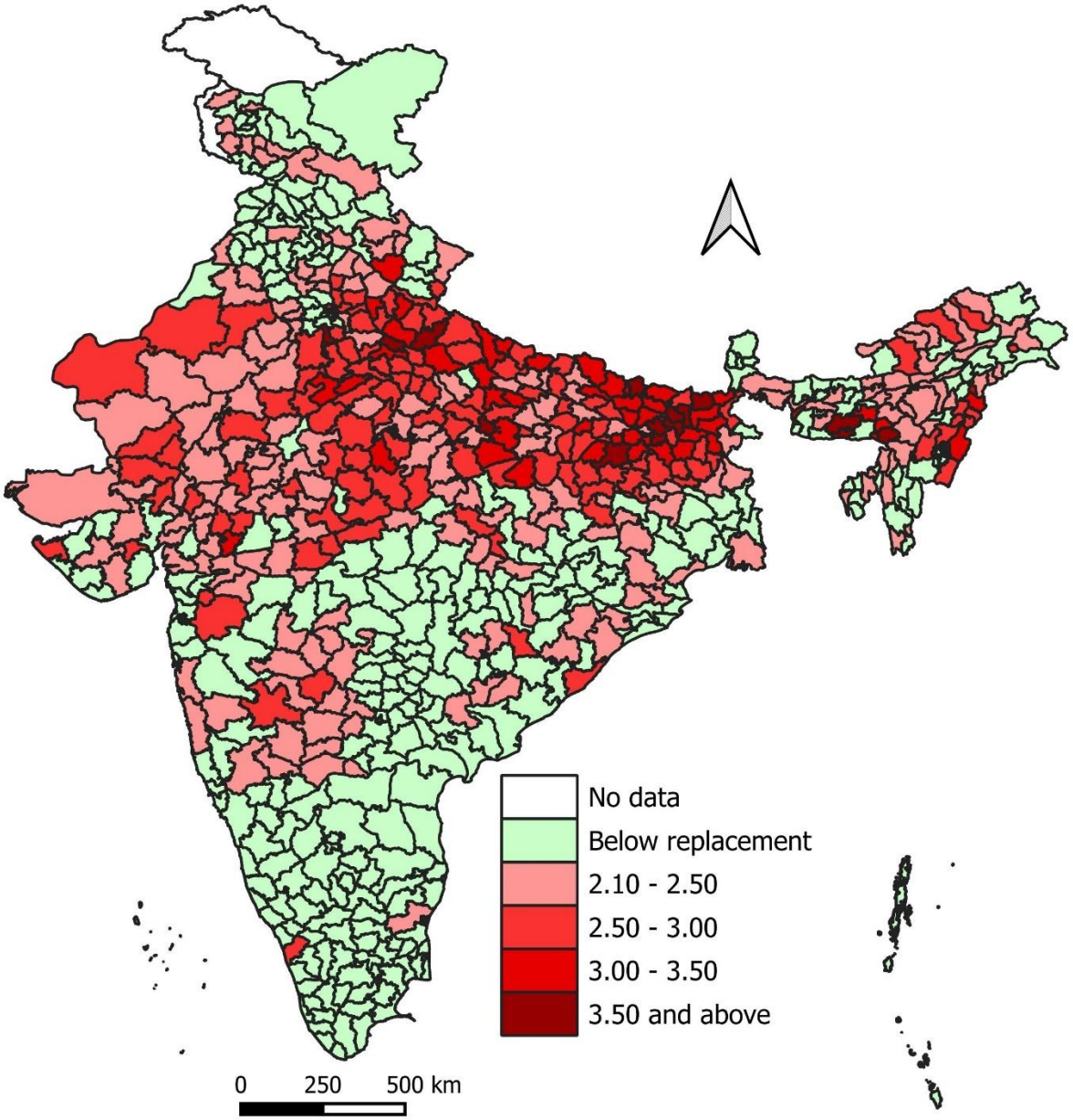

Figure 1: Inter-district variation in total fertility rate (TFR) in India, 2019-2021.
Source: Author

Table 1: Variation in district TFR across states and Union Territories of India, 2019-2021.

Country/State/Union Territory	Total fertility rate					Total
	< 2.1	2.1-2.5	2.5-3.0	3.0-3.5	≥3.5	
Andaman & Nicobar Islands	3	0	0	0	0	3
Andhra Pradesh	13	0	0	0	0	13
Arunachal Pradesh	6	10	4	0	0	20
Assam	13	18	1	1	0	33
Bihar	0	1	8	21	8	38
Chandigarh	1	0	0	0	0	1
Chhattisgarh	15	11	1	0	0	27
Dadra & Nagar Haveli and Damand & Diu	3	0	0	0	0	3
Delhi	6	4	1	0	0	11
Goa	2	0	0	0	0	2
Gujarat	12	14	7	0	0	33
Haryana	11	9	1	0	1	22
Himachal Pradesh	9	3	0	0	0	12
Jammu & Kashmir	12	8	0	0	0	20
Jharkhand	3	6	14	1	0	24
Karnataka	23	7	0	0	0	30
Kerala	13	0	1	0	0	14
Ladakh	2	0	0	0	0	2
Lakshadweep	0	1	0	0	0	1
Madhya Pradesh	9	18	20	3	1	51
Maharashtra	21	12	3	0	0	36
Manipur	5	0	3	1	0	9
Meghalaya	5	1	0	2	3	11
Mizoram	6	2	0	0	0	8
Nagaland	3	3	3	2	0	11
Odisha	19	10	1	0	0	30
Puducherry	4	0	0	0	0	4
Punjab	20	2	0	0	0	22
Rajasthan	2	17	12	2	0	33
Sikkim	4	0	0	0	0	4
Tamil Nadu	31	1	0	0	0	32
Telangana	27	4	0	0	0	31
Tripura	5	3	0	0	0	8
Uttar Pradesh	1	22	36	13	3	75
Uttarakhand	5	5	2	1	0	13
West Bengal	12	7	1	0	0	20
India	326	199	119	47	16	707

Source: Author.

Among the 707 districts, TFR is estimated to be the lowest (1.21 births per woman of reproductive age) in district South Goa of Goa but the highest (4.7 births per woman of reproductive age) in district West Khasi Hills of Meghalaya. Among the 63 districts where TFR is estimated to be very high, 29 are in Bihar while 13 are in Uttar Pradesh. Among the 16 districts with exceptionally high TFR, 8 are in Bihar, 3 each in Meghalaya and Uttar Pradesh, and 1 each in Haryana and Madhya Pradesh. In 7 states/Union Territories, TFR is estimated to be below the replacement level in all districts in the state/Union Territory whereas there is no district in Bihar and Lakshadweep where TFR is estimated to be below the replacement level.

Profiles of Fertility

The TFR in any population is determined by two factors: 1) fertility of married women in the reproductive age (TMFR), and 2) proportion of reproductive age women who are married. The difference between the TFR of a district from the TFR of the country, therefore, is determined by the difference in TMFR and the proportion of reproductive age women who are married between the district and the country. The relative contribution of the difference in TMFR and the difference in the proportion reproductive age women wo are married to the difference in TFR between the district and the country can be obtained through equations (14) and (15) respectively. Based on the magnitude and the direction of these contributions, the district may be classified into one of the possible 11 mutually exclusive and exhaustive profiles as defined by equation (16). This exercise suggests that 707 districts of the country can be classified into 6 of the 11 fertility profiles. The distribution of districts according to the fertility profile of the district and the level of fertility in the district is presented in table 2. There are 326 districts where the TFR is below the replacement level, but the fertility profile of these districts is different. In 144 of these districts, both TMFR and the proportion of married women in the district is less than the TFR and the proportion married at the national level (Profile 4). In addition, in 151 of these districts, TMFR is below the national level while the proportion of married women is higher than the proportion at the national level (Profile 5). Finally, there are 31 districts having below replacement fertility where TMFR is higher than the national TMFR, but the proportion of married women is lower than the proportion of married women at the national level (Profile 3).

Table 2: District cross-classified by the level of TFR and the fertility profile, 2019-2021.

Fertility profile	Total fertility rate					Total
	<2.1	2.1-2.5	2.5-3.0	3.0.3.5	≥3.5	
Profile 1: $\partial g_d > 0, \partial m_d > 0, \nabla f_d > 0$	0	43	53	26	10	132
Profile 2: $\partial g_d > 0, \partial m_d < 0, \nabla f_d > 0$	0	89	66	21	6	182
Profile 3: $\partial g_d > 0, \partial m_d < 0, \nabla f_d < 0$	31	16	0	0	0	47
Profile 4: $\partial g_d < 0, \partial m_d < 0, \nabla f_d < 0$	144	4	0	0	0	148
Profile 5: $\partial g_d < 0, \partial m_d > 0, \nabla f_d < 0$	151	21	0	0	0	172
Profile 6: $\partial g_d < 0, \partial m_d > 0, \nabla f_d > 0$	0	26	0	0	0	26
Total	326	199	119	47	16	707

Source: Author

On the other hand, there are 132 districts where both TMFR and the proportion of married women are higher than those at the national level and in none of these districts, TFR is below the replacement level (Profile 1). In addition, there are 182 districts where TFR is higher than the replacement level fertility. In these districts, TMFR is higher than the national TMFR, but the proportion of married women is less than the national proportion of married women (Profile 2). The TFR in these 314 districts, however, varies widely. Lastly, there are 26 districts where the TMFR is lower than the national average, but the proportion of married women is higher than the national average (Profile 6) and the TFR in all these districts is above the replacement level, although less than 2.5.

The regional distribution of districts by their fertility profile is apparent from table 3 and figure 2. In Bihar 30 of the 38 districts, the fertility profile is 1 while in the remaining 8 districts, the fertility profile is 2. In Jharkhand, 13 of the 24 districts, the fertility profile is 1 while in 8 districts, the fertility profile is 2. In Madhya Pradesh, the fertility profile of 23 of the 51 districts is 1 while the fertility profile of 14 districts is 2. Similarly, the fertility profile of 18 of the 33 districts of Rajasthan is 1 while that of 11 districts is 2. In Uttar Pradesh, the fertility profile is 1 in only 6 of the 75 districts but profile is 2 in 67 districts. On the other hand, the fertility profile in 12 of the 13 districts of Andhra Pradesh and 25 of the 31 districts of Telangana is 5. Similarly, in majority of the districts in Karnataka, Kerala, Maharashtra, Tamil Nadu and West Bengal, the fertility profile is 5.

Table 3: Distribution of districts by states/Union Territories and fertility profiles.

India/State/Union Territory	Fertility profile						Total
	1	2	3	4	5	6	
	$\partial g_d>0$	$\partial g_d>0$	$\partial g_d>0$	$\partial g_d>0$	$\partial g_d<0$	$\partial g_d<0$	
	$\partial g_d>0$	$\partial g_d<0$	$\partial g_d<0$	$\partial g_d<0$	$\partial g_d>0$	$\partial g_d>0$	
	$\nabla f_d > 0$	$\nabla f_d > 0$	$\nabla f_d < 0$	$\nabla f_d < 0$	$\nabla f_d < 0$	$\nabla f_d > 0$	
Andaman & Nicobar Islands	0	0	0	2	1	0	3
Andhra Pradesh	0	0	0	1	12	0	13
Arunachal Pradesh	2	9	4	4	0	1	20
Assam	9	6	1	5	9	3	33
Bihar	30	8	0	0	0	0	38
Chandigarh	0	0	0	1	0	0	1
Chhattisgarh	0	10	5	12	0	0	27
Dadra & Nagar Haveli and Damand & Diu	0	0	1	0	2	0	3
Delhi	0	2	4	5	0	0	11
Goa	0	0	0	2	0	0	2
Gujarat	8	4	1	6	9	5	33
Haryana	4	4	1	6	5	2	22
Himachal Pradesh	0	1	0	3	8	0	12
Jammu & Kashmir	0	6	8	6	0	0	20
Jharkhand	13	8	1	1	1	0	24
Karnataka	3	1	1	7	17	1	30
Kerala	1	0	0	2	11	0	14
Ladakh	0	0	2	0	0	0	2
Lakshadweep	0	1	0	0	0	0	1
Madhya Pradesh	23	14	0	8	3	3	51
Maharashtra	5	1	0	7	16	7	36
Manipur	0	4	4	1	0	0	9
Meghalaya	0	6	5	0	0	0	11
Mizoram	0	1	2	5	0	0	8
Nagaland	1	7	3	0	0	0	11
Odisha	2	4	1	12	11	0	30
Puducherry	0	0	0	4	0	0	4
Punjab	0	1	0	16	5	0	22
Rajasthan	18	11	0	3	1	0	33
Sikkim	0	0	0	4	0	0	4
Tamil Nadu	0	0	0	16	16	0	32
Telangana	2	0	0	4	25	0	31
Tripura	1	0	0	0	5	2	8
Uttar Pradesh	6	67	2	0	0	0	75
Uttarakhand	1	5	1	3	3	0	13
West Bengal	3	1	0	2	12	2	20
India	132	182	47	148	172	26	707

Source: Author

There are 26 districts in the country where TFR of the district is higher than the TFR of the country not because the TMFR of the district is higher than the TMFR of the country but because the proportion of married women among women of reproductive age in the district is higher than the proportion of married women among women of reproductive age in the country (fertility profile 6).

Among these 26 districts, 7 are in Maharashtra, 5 in Gujarat, 3 each in Madhya Pradesh and Assam, 2 each in Haryana, Triputra and West Bengal, and 1 each in Assam and Karnataka. The fertility profile in these districts is different from the fertility profile of other districts of the country which needs further examination.

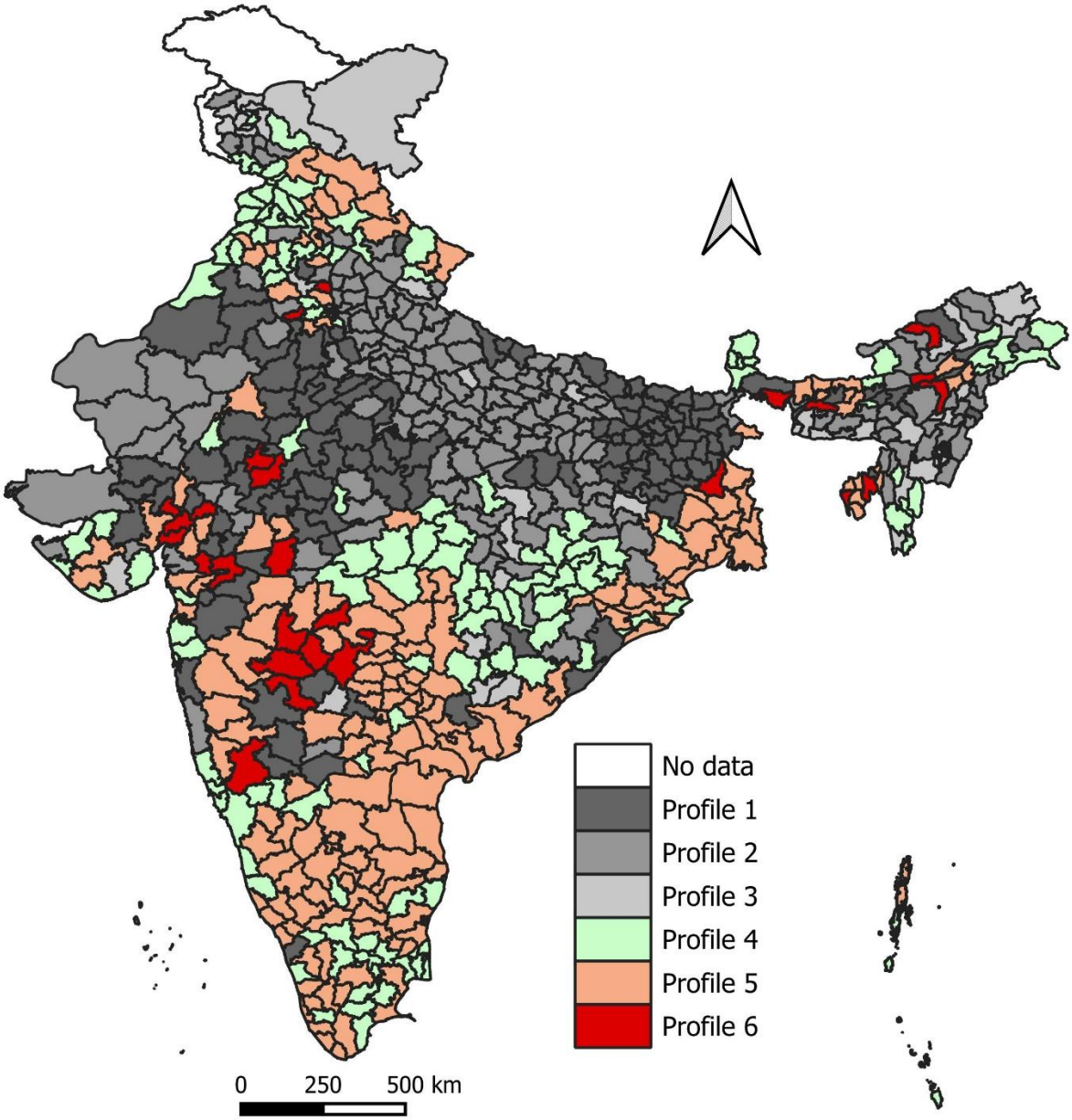

Figure 2: Profiles of fertility in India, 2019-2021.
Remarks:

Profile 1: $\partial g_d > 0, \partial m_d > 0, \nabla f_d > 0$
Profile 2: $\partial g_d > 0, \partial m_d < 0, \nabla f_d > 0$
Profile 3: $\partial g_d > 0, \partial m_d < 0, \nabla f_d < 0$
Profile 4: $\partial g_d < 0, \partial m_d < 0, \nabla f_d < 0$
Profile 5: $\partial g_d < 0, \partial m_d > 0, \nabla f_d < 0$
Profile 6: $\partial g_d < 0, \partial m_d > 0, \nabla f_d > 0$

Source: Author

Conclusions

This chapter highlights the variation in fertility, as measured through TFR, across the districts of the country based on the latest available data. Fertility appears to have decreased to below the replacement level in 326 or in less than half of the districts of the country for which data are available from the latest round of the National Family Health Survey, 2019-2021. In majority of the districts of the country, fertility appears to remain above the replacement level. Nearly all but a few districts of the country where fertility reamins above the replacement level are located in the central region of the country comprising of the states of Gujarat, Rajasthan, Madhya Pradesh, Uttar Pradesh and Bihar. Fertility also appears to remain above the replacement level in many districts in the north-eastern region of the country. In the southern region of the country, comprising of the states of Maharashtra, Andhra Pradesh, Karnataka, Kerala, Tamil Nadu and Telangana, on the other hand, fertility appears to have deceased to below the replacement level in most of the districts, although there are districts in this part of the country also where fertility remains above the replacement level. The marked variation in TFR across districts suggests that there are district-specific factors that play a dominating role in deciding the level of fertility in the district.

Fertility in India is confined entirely within the institution of marriage. This means that the TFR in a district is determined by the fertility of married women and the proportion of reproductive age women who are married. This implies that the difference between the TFR of a district and the TFR of the country can be decomposed into two factors, one attributed to the difference between the district and the country in the fertility of married women and the other attributed to the difference in the proportion of reproductive age women who are married. This decomposition leads to 11 mutually exclusive yet exhaustive fertility profiles depending upon the difference between the district and the country in the fertility of married women of reproductive age and in the proportion of women of reproductive age who are married. The decomposition reveals that 707 districts of the country can be classified into six fertility profiles. There are districts where fertility of married women of reproductive age is lower than the fertility of married women of reproductive age in the country but the total fertility rate in these districts is still higher than the total fertility rate in the country because the proportion of reproductive age women who are married is higher in the district relative to the proportion in the country. Similarly, there are districts where fertility of married women of reproductive age is higher than that in the country but TFR in the district is lower than TFR of the country because the proportion of reproductive age women who are married is lower in the district relative to the proportion in the country.

The profiling or characterising district fertility has implications for efforts directed towards fertility reduction in those districts where TFR still remains above the replacement level. TFR may be above average becuase TMFR is above average or because the proportion of reproductive age women who are married is above average or both. Since the interventions that contribute to a decrease in TFR are different from the interventions that contribute to the decrease in the proportion of reproductive age women who are married, understanding the fertility profile of a district is important for planning and programming fertility transition efforts in the district. For example, a reduction in maternal mortality or the risk of death due to complications of pregnancy and child birth may lead to an increase in the proportion of reproductive age women who are married but may not have any impact on the fertility of married women or reproductive age. Similarly, an increase in the prevalence of breastfeeding may contribute to a decrease in the fertility of married women of reproductive age but may have little impact on the proportion of reproductive age women who are married. The very fact that different districts of the country have different fertility profile, there is a need to adopt a decentralised district-specific approach of fertility transition efforts in these districts where fertility still remains above the replacement level. The relative contribution of fertility of married reproductive age women and proportion of reproductive age women who are married to the TFR that prevails in the district presented in this chapter provides in emprical evidence for such an approach.

References

Brass W (1968) Methods of analysis and estimation, In W Brass, (Eds) *The Demography of Tropical Africa*. Princeton, Princeton University Press.

Brass W (1975). Methods for Estimating Fertility and Mortality from Limited and Defective Data. Chapel Hill, NC, University of North Carolina, Laboratories for Population Statistics.

Chatterjee S, Mohanty SK (2021) Fertility transition and socioeconomic development in districts of India, 2001–2016. *Journal of Biosocial Science* : 1-19.

Cho L-J, Retherford RD, Choe MK (1986) *The Own-Children Method of Fertility Estimation*. Honolulu, University of Hawaii Press.

Everitt BS (2002) *Cambridge Dictionary of Statistics*. Oxford, Oxford University.

Government of India (1988) Fertility in India. An Analysis of 1981 Census Data. New Delhi, Ministry of Home Affairs. Office of the Registrar General, India. Demography Division. Occasional Paper No. 13 of 1988.

Press.Government of India (1997) *District Level Estimates of Fertility and Child Mortality for 1991 and their Inter Relations with Other Variables.* New Delhi, Registrar General and Census Commissioner of India. Occasional Paper No. 1 of 1997.

Government of India (1969) *Registration of Births and Deaths Act 1969*. New Delhi, Government of India.

Government of India (2011) Annual Health Survey

Government of India (2022) *National Family Health Survey (NFHS-5)*

Guilmoto CZ, Rajan SI (2002) District level estimates of fertility from India's 2001 Census. *Economic and Political Weekly* XXXVII(7): 665-672.

Guilmoto CZ, Rajan SI (2013) Fertility at the district level in India. *Economic and Political Weekly* 48(23).

Gupta K, Singh BP, Singh KK (2014) Estimation of total fertility rates in India using indirect techniques. *Journal of National Academy of Mathematics* 28: 21-28.

Hobcraft JN, Goldman N, Chidambaram VC (1982) Advances in the P/F ratio method for the analysis of birth histories. *Population Studies* 36(2): 291-316.

Herzberg PA (1969) The parameters of cross validation. *Psychometrika Monograph Supplement* 16. 34(2): 1-70.

Jain A (1997) Consistency between contraceptive use and fertility in India. *Demography India* 26(1): 19-36.

Jayachandran AA, Ram F (2019) Estimation of District Level TFR of Eight EAG States and Assam from NFHS-4, 2015-16. *Demography India* 48(1): 63-73.

Kumar S, Sathyanarayana KM (2012) District-Level estimates of fertility and implies sex ratio at birth in India. *Economic and Political Weekly* 47(33):

Mauldin WP, Ross JA (1991) Family planning programmes: Efforts and results, 1982-1989. *Studies in Family Planning* 22(6): 350-367.

Maultrie T, Dorrington R, Hill A, Hill K, Timæmus I, Zaba B (2013) *Tools for Demographic Estimation*. Paris, International Union for the Scientific Study of Population.

Mishra VK, Palmore JA, Sinha SK (1994) Indirect estimates of fertility and mortality at the district level, 1981. New Delhi, Office of the Registrar General India. Occasional Paper No. 4 of 1994.

Rele JR (1967) Fertility analysis through extension of stable population concepts. PhD Dissertation. Berkeley, University of California.

Singh KK, Singh BP, Gupta K (2012) Estimation of total fertility rate and birth averted due to contraception: regression approach. *International Journal of Statistics and Applications* 2(5): 47-55.

Singh BP, Chaurasia AR, Tiwari AK (2022) A simple approach to estimate fertility at the district level. In AR Chaurasia (Ed) *India 2021: Population Health*. Bhopal, Madhya Pradesh, India, MLC Foundation and 'Shyam' Institute.

Srinivasan K (1980) Birth interval analysis in fertility surveys. The Hague, International Statistical Institute.

Swamy VS, Saxena AK, Palmore JA, Mishra V, Rele JR, Luther NY (1992) Evaluating the sample registration system using indirect estimates of fertility and mortality, New Delhi, Registrar General of India. Occasional Paper.

Tiwari AK, Singh BP, Patel V (2020) Retrospective study of investigation of possible predictors for total fertility rate in India. *Journal of Scientific Research & Reports*, 26(9): 111-119.

United Nations (1967) *Manuals on Methods of Estimating Population. Manual 4. Methods of Estimating Basic Demographic Measures from Incomplete Data*. New York, United Nations, Department of Economics and Social Affairs.

Yadava RC, Kumar A (2002) On an indirect estimation of total fertility rate from open birth interval. *Demography India* 31(2): 211-222.

Yadava RC, Tiwari AK (2007) A modified procedure to estimate total fertility rate. *Journal of Empirical Research in Social Science* 2(1): 82-87.

Yadava RC, Tiwari AK, Sharma SS (2009) Indirect measurements of total fertility rate. *The Journal of Family Welfare* 55(2): 70-73.

Appendix Table: Total fertility rate (TFR), total marital fertility rate (TMFR), proportion of reproductive age women who are married and the profile of fertility in districts of India, 2019-2021.

State/Union Territory	District	TMFR	Proportion of reproductive age women who are married (Per cent)	TFR	Fertility profile
Andaman & Nicobar Islands					
	Nicobars	2.145	64.205	1.377	4
	North & Middle Andaman	2.408	74.074	1.784	5
	South Andaman	1.882	70.522	1.327	4
Andhra Pradesh					
	Anantapur	2.223	79.780	1.774	5
	Chittoor	2.137	76.331	1.631	5
	East Godavari	2.513	75.533	1.898	5
	Guntur	2.123	77.804	1.652	5
	Krishna	2.273	72.592	1.650	5
	Kurnool	2.540	76.205	1.936	5
	Prakasam	2.150	79.255	1.704	5
	Sri Potti Sriramulu Nellore	2.086	73.554	1.534	5
	Srikakulam	2.175	71.957	1.565	4
	Visakhapatnam	2.100	73.311	1.540	5
	Vizianagaram	2.466	75.110	1.852	5
	West Godavari	2.331	76.923	1.793	5
	Y.S.R.	2.567	77.308	1.985	5
Arunachal Pradesh					
	Anjaw	2.581	70.525	1.820	4
	Changlang	2.988	69.282	2.070	4
	Dibang Valley	3.027	66.514	2.013	3
	East Kameng	3.533	71.528	2.527	2
	East Siang	2.818	64.105	1.807	4
	Kra Daadi	2.950	77.757	2.294	6
	Kurung Kumey	3.553	66.052	2.347	2
	Lohit	3.418	64.736	2.213	2
	Longding	3.515	65.781	2.312	2
	Lower Dibang Valley	3.249	65.055	2.114	3
	Lower Subansiri	3.150	65.634	2.067	3
	Namsai	3.851	72.968	2.810	1
	Papum Pare	3.576	63.855	2.283	2
	Siang	3.930	63.750	2.506	2
	Tawang	3.506	66.943	2.347	2
	Tirap	3.491	70.958	2.477	2
	Upper Siang	3.154	70.865	2.235	2
	Upper Subansiri	3.643	75.045	2.734	1
	West Kameng	2.565	66.401	1.703	4
	West Siang	3.030	70.947	2.150	3
Assam					
	Baksa	2.455	75.334	1.850	5
	Barpeta	3.293	75.146	2.475	1

State/Union Territory	District	TMFR	Proportion of reproductive age women who are married (Per cent)	TFR	Fertility profile
	Biswanath	2.952	74.575	2.201	6
	Bongaigaon	2.704	76.174	2.060	5
	Cachar	3.381	71.578	2.420	2
	Charaideo	2.885	67.711	1.954	4
	Chirang	2.701	75.273	2.033	5
	Darrang	3.190	77.022	2.457	1
	Dhemaji	3.049	77.809	2.372	1
	Dhubri	3.428	80.611	2.763	1
	Dibrugarh	3.015	69.476	2.095	4
	Dima Hasao	3.244	66.017	2.142	3
	Goalpara	3.012	73.015	2.199	6
	Golaghat	2.911	75.326	2.193	6
	Hailakandi	3.420	70.990	2.428	2
	Hojai	3.279	72.560	2.379	1
	Jorhat	2.581	72.940	1.882	5
	Kamrup	2.671	73.675	1.968	5
	Kamrup Metropolitan	2.049	68.884	1.411	4
	Karbi Anglong	3.441	68.869	2.370	2
	Karimganj	3.521	70.270	2.474	2
	Kokrajhar	2.572	75.945	1.953	5
	Lakhimpur	2.495	75.730	1.889	5
	Majuli	3.322	73.604	2.445	1
	Morigaon	3.168	76.744	2.431	1
	Nagaon	3.355	74.077	2.486	1
	Nalbari	2.371	74.774	1.773	5
	Sivasagar	2.571	73.925	1.901	5
	Sonitpur	3.453	71.650	2.474	2
	South Salmara Mancachar	3.979	77.076	3.067	1
	Tinsukia	2.480	69.149	1.715	4
	Udalguri	3.012	71.696	2.159	4
	West Karbi Anglong	3.135	70.710	2.217	2
Bihar					
	Araria	4.688	79.011	3.704	1
	Arwal	3.985	73.105	2.913	1
	Aurangabad	4.622	71.791	3.318	2
	Banka	4.107	79.912	3.282	1
	Begusarai	4.921	76.106	3.745	1
	Bhagalpur	4.243	75.385	3.198	1
	Bhojpur	3.940	74.068	2.919	1
	Buxar	4.713	70.337	3.315	2
	Darbhanga	4.287	73.578	3.154	1
	Gaya	4.837	72.971	3.529	1
	Gopalganj	4.355	69.447	3.025	2
	Jamui	3.967	80.735	3.202	1

State/Union Territory	District	TMFR	Proportion of reproductive age women who are married (Per cent)	TFR	Fertility profile
	Jehanabad	4.029	75.044	3.024	1
	Kaimur (Bhabua)	3.777	71.500	2.701	2
	Katihar	4.311	77.101	3.324	1
	Khagaria	4.785	79.774	3.817	1
	Kishanganj	5.153	67.797	3.493	2
	Lakhisarai	4.927	76.531	3.771	1
	Madhepura	4.325	81.651	3.532	1
	Madhubani	4.460	75.399	3.363	1
	Munger	3.737	75.044	2.804	1
	Muzaffarpur	4.205	75.042	3.155	1
	Nalanda	4.401	73.942	3.254	1
	Nawada	4.671	72.490	3.386	1
	Pashchim Champaran	4.306	75.620	3.256	1
	Patna	3.381	73.454	2.483	1
	Purba Champaran	4.138	76.632	3.171	1
	Purnia	4.419	79.015	3.491	1
	Rohtas	4.255	69.474	2.956	2
	Saharsa	4.260	83.080	3.539	1
	Samastipur	4.207	79.530	3.345	1
	Saran	4.065	71.910	2.923	2
	Sheikhpura	4.643	74.732	3.470	1
	Sheohar	4.396	73.998	3.253	1
	Sitamarhi	4.986	74.497	3.715	1
	Siwan	4.164	65.108	2.711	2
	Supaul	3.671	80.602	2.959	1
	Vaishali	4.375	77.025	3.370	1
Chandigarh					
	Chandigarh	2.586	64.744	1.675	4
Chhattisgarh					
	Balod	2.356	66.216	1.560	4
	Baloda Bazar	3.368	66.807	2.250	2
	Balrampur	3.521	70.037	2.466	2
	Bastar	3.347	69.196	2.316	2
	Bemetara	3.418	68.790	2.351	2
	Bijapur	2.842	65.439	1.860	4
	Bilaspur	3.030	65.181	1.975	3
	Dantewada	3.020	65.753	1.985	4
	Dhamtari	2.638	66.442	1.753	4
	Durg	2.693	67.196	1.810	4
	Gariyaband	2.675	69.338	1.855	4
	Janjgir - Champa	2.797	66.937	1.872	4
	Jashpur	2.921	70.866	2.070	4
	Kabeerdham	3.214	67.989	2.185	2
	Kodagaon	3.628	61.172	2.219	2

State/Union Territory	District	TMFR	Proportion of reproductive age women who are married (Per cent)	TFR	Fertility profile
	Korba	3.418	63.789	2.180	2
	Koriya	3.025	68.969	2.086	3
	Mahasamund	2.601	67.385	1.753	4
	Mungeli	4.301	65.825	2.831	2
	Narayanpur	3.533	60.804	2.148	3
	Raigarh	2.947	64.251	1.893	4
	Raipur	3.045	66.860	2.036	3
	Rajnandgaon	2.718	66.228	1.800	4
	Sukma	3.335	64.839	2.163	3
	Surajpur	3.145	70.626	2.221	2
	Surguja	3.318	68.047	2.258	2
	Uttar Bastar Kanker	2.985	62.585	1.868	4
Dadra & Nagar Haveli and Daman and Diu					
	Dadra & Nagar Haveli	2.687	72.031	1.935	5
	Daman	2.761	73.724	2.036	5
	Diu	3.601	55.300	1.991	3
Delhi					
	Central	2.468	64.167	1.584	4
	East	2.734	66.966	1.831	4
	New Delhi	3.192	71.785	2.291	2
	North	3.714	69.661	2.587	2
	North East	3.194	66.007	2.108	3
	North West	2.898	69.077	2.002	4
	Shahdara	3.158	62.766	1.982	3
	South	3.171	67.081	2.127	3
	South East	2.868	63.278	1.815	4
	South West	2.185	71.353	1.559	4
	West	3.158	66.517	2.101	3
Goa					
	North Goa	1.871	66.239	1.239	4
	South Goa	2.006	60.094	1.206	4
Gujarat					
	Ahmadabad	2.723	72.824	1.983	5
	Amreli	3.088	69.495	2.146	3
	Anand	2.815	79.206	2.229	6
	Aravali	3.519	74.248	2.613	1
	Banas Kantha	3.689	74.712	2.756	1
	Bharuch	3.057	71.992	2.201	2
	Bhavnagar	2.980	69.192	2.062	4
	Botad	3.603	70.761	2.549	2
	Chhota Udaipur	3.154	74.651	2.355	1
	Devbhumi Dwarka	3.559	71.324	2.538	2
	Dohad	3.993	73.409	2.931	1
	Gandhinagar	2.882	78.248	2.255	6

State/Union Territory	District	TMFR	Proportion of reproductive age women who are married (Per cent)	TFR	Fertility profile
	Gir Somnath	2.995	67.221	2.013	4
	Jamnagar	2.660	67.901	1.806	4
	Junagadh	2.727	73.394	2.002	5
	Kachchh	3.390	68.904	2.336	2
	Kheda	2.852	76.964	2.195	6
	Mahesana	3.643	75.186	2.739	1
	Mahisagar	3.005	79.301	2.383	6
	Morbi	2.538	71.354	1.811	4
	Narmada	2.935	75.813	2.225	6
	Navsari	2.425	69.238	1.679	4
	Panch Mahals	2.911	74.394	2.165	5
	Patan	3.271	72.420	2.369	1
	Porbandar	2.742	70.242	1.926	4
	Rajkot	2.975	72.647	2.161	5
	Sabar Kantha	2.915	74.419	2.170	5
	Surat	2.826	72.169	2.039	5
	Surendranagar	3.234	73.077	2.363	1
	Tapi	2.521	72.163	1.820	5
	The Dangs	3.312	77.155	2.555	1
	Vadodara	2.502	75.026	1.877	5
	Valsad	2.116	73.229	1.550	5
Haryana					
	Ambala	2.557	68.622	1.755	4
	Bhiwani	3.250	71.635	2.328	2
	Charkhi Dadri	3.011	74.579	2.245	6
	Faridabad	2.980	69.686	2.077	4
	Fatehabad	2.588	70.151	1.815	4
	Gurgaon	2.686	74.708	2.007	5
	Hisar	2.809	72.203	2.028	5
	Jhajjar	2.688	71.923	1.933	4
	Jind	3.074	69.363	2.132	3
	Kaithal	3.117	73.431	2.289	1
	Karnal	3.394	70.458	2.391	2
	Kurukshetra	2.639	74.210	1.958	5
	Mahendragarh	3.055	77.075	2.355	1
	Mewat	5.027	72.027	3.621	1
	Palwal	4.133	72.313	2.989	1
	Panchkula	3.180	68.862	2.190	2
	Panipat	2.946	74.304	2.189	6
	Rewari	2.692	75.402	2.030	5
	Rohtak	2.858	69.267	1.980	4
	Sirsa	3.122	69.894	2.182	2
	Sonipat	2.641	73.917	1.953	5
	Yamunanagar	2.686	71.878	1.930	4

State/Union Territory	District	TMFR	Proportion of reproductive age women who are married (Per cent)	TFR	Fertility profile
Himachal Pradesh					
	Bilaspur	2.619	76.291	1.998	5
	Chamba	2.936	73.750	2.166	5
	Hamirpur	2.633	76.222	2.007	5
	Kangra	2.521	69.472	1.751	4
	Kinnaur	2.718	75.620	2.055	5
	Kullu	2.542	74.351	1.890	5
	Lahul & Spiti	2.648	79.708	2.111	5
	Mandi	2.509	78.603	1.972	5
	Shimla	2.502	71.032	1.777	4
	Sirmaur	3.461	71.956	2.490	2
	Solan	2.649	73.077	1.936	5
	Una	2.928	71.704	2.099	4
Jammu $ Kashmir					
	Anantnag	3.296	55.862	1.841	3
	Badgam	3.387	57.210	1.938	3
	Bandipore	3.538	53.187	1.882	3
	Baramula	3.486	56.003	1.952	3
	Doda	3.347	67.218	2.250	2
	Ganderbal	3.499	60.092	2.102	3
	Jammu	2.287	65.330	1.494	4
	Kathua	2.672	62.602	1.673	4
	Kishtwar	2.970	62.915	1.868	4
	Kulgam	3.320	59.164	1.964	3
	Kupwara	3.922	57.870	2.270	2
	Pulwama	3.015	58.109	1.752	4
	Punch	3.477	61.482	2.137	3
	Rajouri	3.374	65.094	2.196	2
	Ramban	3.577	63.525	2.272	2
	Reasi	3.197	68.007	2.174	2
	Samba	2.801	67.607	1.894	4
	Shupiyan	3.499	59.522	2.083	3
	Srinagar	2.544	58.124	1.479	4
	Udhampur	3.361	66.303	2.228	2
Jharkhand					
	Bokaro	3.043	75.431	2.296	1
	Chatra	3.730	75.226	2.806	1
	Deoghar	3.510	82.184	2.885	1
	Dhanbad	3.169	72.593	2.300	1
	Dumka	3.353	79.568	2.668	1
	Garhwa	3.993	73.156	2.921	1
	Giridih	3.282	79.587	2.612	1
	Godda	3.445	79.123	2.726	1
	Gumla	3.831	67.828	2.599	2

State/Union Territory	District	TMFR	Proportion of reproductive age women who are married (Per cent)	TFR	Fertility profile
	Hazaribagh	3.364	76.190	2.563	1
	Jamtara	3.118	80.538	2.511	1
	Khunti	3.305	67.081	2.217	2
	Kodarma	3.533	74.866	2.645	1
	Latehar	4.052	70.364	2.851	2
	Lohardaga	3.523	66.016	2.326	2
	Pakur	3.435	75.407	2.590	1
	Palamu	3.784	70.796	2.679	2
	Pashchimi Singhbhum	3.303	69.132	2.284	2
	Purbi Singhbhum	2.828	70.367	1.990	4
	Ramgarh	4.131	71.623	2.959	2
	Ranchi	3.128	64.784	2.027	3
	Sahibganj	4.068	77.902	3.169	1
	Saraikela-Kharsawan	2.726	72.095	1.965	5
	Simdega	3.554	64.384	2.288	2
Karnataka					
	Bagalkot	3.043	72.185	2.197	1
	Bangalore	1.998	73.807	1.475	5
	Bangalore Rural	2.266	75.126	1.703	5
	Belgaum	3.019	72.638	2.193	6
	Bellary	2.646	68.527	1.813	4
	Bidar	3.105	69.687	2.164	3
	Bijapur	3.297	74.638	2.461	1
	Chamarajanagar	2.423	73.790	1.788	5
	Chikkaballapura	2.362	76.612	1.810	5
	Chikmagalur	2.176	73.744	1.605	5
	Chitradurga	2.207	76.694	1.693	5
	Dakshina Kannada	2.605	67.867	1.768	4
	Davanagere	2.347	72.579	1.703	5
	Dharwad	2.135	69.746	1.489	4
	Gadag	2.875	70.664	2.032	4
	Gulbarga	2.904	72.613	2.109	5
	Hassan	2.122	72.052	1.529	5
	Haveri	2.438	73.431	1.790	5
	Kodagu	2.251	73.434	1.653	5
	Kolar	2.403	75.000	1.802	5
	Koppal	2.602	73.255	1.906	5
	Mandya	2.231	72.500	1.618	5
	Mysore	2.497	72.682	1.815	5
	Raichur	3.246	72.340	2.348	1
	Ramanagara	2.292	71.604	1.641	4
	Shimoga	2.036	72.460	1.476	5
	Tumkur	2.245	77.014	1.729	5
	Udupi	2.187	68.750	1.503	4

State/Union Territory	District	TMFR	Proportion of reproductive age women who are married (Per cent)	TFR	Fertility profile
	Uttara Kannada	2.353	68.358	1.608	4
	Yadgir	3.074	71.418	2.196	2
Kerala					
	Alappuzha	1.967	74.017	1.456	5
	Ernakulam	2.067	72.449	1.498	5
	Idukki	2.238	73.270	1.640	5
	Kannur	2.241	77.333	1.733	5
	Kasaragod	2.669	75.129	2.006	5
	Kollam	2.039	73.507	1.499	5
	Kottayam	2.195	72.110	1.583	5
	Kozhikode	2.440	74.736	1.823	5
	Malappuram	3.253	77.800	2.531	1
	Palakkad	2.413	75.111	1.812	5
	Pathanamthitta	2.009	69.423	1.395	4
	Thiruvananthapuram	1.974	74.425	1.469	5
	Wayanad	2.726	73.174	1.995	5
Ladakh					
	Kargil	3.642	57.603	2.098	3
	Leh(Ladakh)	3.239	59.715	1.934	3
Lakshadweep					
	Lakshadweep	3.186	68.492	2.182	2
Madhya Pradesh					
	Agar Malwa	3.219	79.491	2.558	1
	Alirajpur	4.357	73.675	3.210	1
	Anuppur	3.257	70.734	2.303	2
	Ashoknagar	3.714	76.680	2.848	1
	Balaghat	2.521	68.433	1.725	4
	Barwani	3.315	74.537	2.471	1
	Betul	2.881	67.753	1.952	4
	Bhind	3.702	74.032	2.741	1
	Bhopal	2.713	66.017	1.791	4
	Burhanpur	3.218	70.370	2.265	2
	Chhatarpur	3.236	72.432	2.344	1
	Chhindwara	2.749	65.969	1.813	4
	Damoh	3.678	75.201	2.766	1
	Datia	3.648	72.594	2.648	1
	Dewas	3.053	75.676	2.310	1
	Dhar	2.658	76.406	2.031	5
	Dindori	3.596	71.012	2.554	2
	Guna	3.768	74.249	2.797	1
	Gwalior	3.384	70.971	2.402	2
	Harda	3.799	73.680	2.799	1
	Hoshangabad	3.799	70.535	2.680	2
	Indore	2.680	75.450	2.022	5

State/Union Territory	District	TMFR	Proportion of reproductive age women who are married (Per cent)	TFR	Fertility profile
	Jabalpur	2.519	68.880	1.735	4
	Jhabua	4.644	76.000	3.529	1
	Katni	3.254	71.311	2.321	2
	Khandwa (East Nimar)	3.607	71.611	2.583	2
	Khargone (West Nimar)	2.949	74.579	2.199	6
	Mandla	3.004	70.071	2.105	4
	Mandsaur	2.973	76.460	2.273	6
	Morena	3.936	75.680	2.979	1
	Narsimhapur	2.931	73.795	2.163	5
	Neemuch	3.019	74.531	2.250	6
	Panna	3.499	70.561	2.469	2
	Raisen	4.090	68.354	2.796	2
	Rajgarh	3.067	76.930	2.359	1
	Ratlam	3.048	78.335	2.388	1
	Rewa	4.438	69.254	3.073	2
	Sagar	3.910	74.808	2.925	1
	Satna	3.828	70.933	2.716	2
	Sehore	3.927	74.179	2.913	1
	Seoni	2.915	69.856	2.036	4
	Shahdol	2.742	70.460	1.932	4
	Shajapur	3.282	75.982	2.493	1
	Sheopur	3.327	75.185	2.502	1
	Shivpuri	3.684	75.164	2.769	1
	Sidhi	4.059	70.426	2.859	2
	Singrauli	4.612	72.418	3.340	1
	Tikamgarh	3.331	76.204	2.538	1
	Ujjain	3.148	76.361	2.404	1
	Umaria	3.529	69.417	2.450	2
	Vidisha	3.943	71.064	2.802	2
Maharashtra					
	Ahmadnagar	2.462	75.626	1.862	5
	Akola	2.732	74.176	2.026	5
	Amravati	2.384	71.442	1.703	4
	Aurangabad	2.668	78.508	2.095	5
	Bhandara	2.441	73.147	1.785	5
	Bid	2.795	78.361	2.190	6
	Buldana	2.492	75.468	1.881	5
	Chandrapur	2.522	72.987	1.841	5
	Dhule	3.064	78.535	2.406	1
	Gadchiroli	2.284	73.197	1.672	5
	Gondiya	2.449	72.899	1.786	5
	Hingoli	2.772	76.603	2.123	5
	Jalgaon	2.675	77.193	2.065	5
	Jalna	2.930	79.943	2.342	6

State/Union Territory	District	TMFR	Proportion of reproductive age women who are married (Per cent)	TFR	Fertility profile
	Kolhapur	2.355	76.205	1.795	5
	Latur	3.240	77.519	2.512	1
	Mumbai	2.179	67.742	1.476	4
	Mumbai Suburban	1.966	67.459	1.326	4
	Nagpur	2.379	68.785	1.636	4
	Nanded	2.956	75.489	2.232	6
	Nandurbar	2.949	73.784	2.176	6
	Nashik	3.392	76.742	2.603	1
	Osmanabad	2.867	80.704	2.314	6
	Palghar	2.685	69.371	1.863	4
	Parbhani	2.809	80.536	2.262	6
	Pune	2.232	73.749	1.646	5
	Raigarh	3.025	72.785	2.202	1
	Ratnagiri	3.153	69.378	2.187	2
	Sangli	1.769	77.387	1.369	5
	Satara	2.845	75.716	2.154	5
	Sindhudurg	1.927	68.997	1.330	4
	Solapur	3.580	76.644	2.744	1
	Thane	2.736	68.506	1.874	4
	Wardha	2.180	74.411	1.622	5
	Washim	2.970	78.537	2.333	6
	Yavatmal	2.371	73.849	1.751	5
Manipur					
	Bishnupur	3.052	65.319	1.993	3
	Chandel	4.185	66.248	2.772	2
	Churachandpur	3.256	61.806	2.012	3
	Imphal East	2.937	64.689	1.900	4
	Imphal West	3.136	64.540	2.024	3
	Senapati	4.258	64.883	2.762	2
	Tamenglong	3.690	69.899	2.579	2
	Thoubal	3.140	63.816	2.004	3
	Ukhrul	4.734	63.624	3.012	2
Meghalaya					
	East Garo Hills	3.670	63.060	2.314	2
	East Jantia Hills	6.333	61.224	3.877	2
	East Khasi Hills	3.852	54.474	2.098	3
	North Garo Hills	3.142	59.420	1.867	3
	Ribhoi	5.219	58.941	3.076	2
	South Garo Hills	3.059	67.701	2.071	3
	South West Garo Hills	3.130	63.248	1.980	3
	South West Khasi Hills	5.537	65.566	3.630	2
	West Garo Hills	3.112	67.336	2.095	3
	West Jaintia Hills	5.764	60.269	3.474	2
	West Khasi Hills	6.754	69.601	4.701	2

State/Union Territory	District	TMFR	Proportion of reproductive age women who are married (Per cent)	TFR	Fertility profile
Mizoram					
	Aizawl	3.436	48.818	1.677	3
	Champhai	2.833	60.073	1.702	4
	Kolasib	2.896	61.033	1.767	4
	Lawngtlai	3.406	62.743	2.137	3
	Lunglei	2.601	53.049	1.380	4
	Mamit	3.488	63.747	2.224	2
	Saiha	2.645	62.636	1.657	4
	Serchhip	2.758	55.724	1.537	4
Nagaland					
	Dimapur	3.190	57.372	1.830	3
	Kiphire	3.564	72.896	2.598	1
	Kohima	4.035	48.778	1.968	3
	Longleng	4.294	69.989	3.006	2
	Mokokchung	3.400	55.395	1.884	3
	Mon	3.644	60.958	2.222	2
	Peren	3.929	62.540	2.457	2
	Phek	4.624	55.032	2.545	2
	Tuensang	4.973	60.628	3.015	2
	Wokha	3.716	59.824	2.223	2
	Zunheboto	4.659	58.259	2.714	2
Odisha					
	Anugul	2.680	73.353	1.966	5
	Balangir	2.929	68.020	1.993	4
	Baleshwar	2.710	78.863	2.137	5
	Bargarh	2.332	70.833	1.652	4
	Baudh	2.351	73.154	1.720	5
	Bhadrak	2.813	72.250	2.032	5
	Cuttack	2.046	72.598	1.485	5
	Debagarh	2.560	70.692	1.810	4
	Dhenkanal	2.939	73.333	2.155	5
	Gajapati	2.978	66.596	1.983	4
	Ganjam	3.111	73.001	2.271	1
	Jagatsinghapur	2.396	72.642	1.740	5
	Jajapur	2.904	73.812	2.143	5
	Jharsuguda	2.720	65.164	1.773	4
	Kalahandi	2.858	70.526	2.016	4
	Kandhamal	3.487	69.628	2.428	2
	Kendrapara	2.892	71.228	2.060	4
	Kendujhar	3.326	71.167	2.367	2
	Khordha	2.049	71.696	1.469	4
	Koraput	2.757	66.182	1.825	4
	Malkangiri	3.045	70.599	2.150	3
	Mayurbhanj	2.603	75.485	1.965	5

State/Union Territory	District	TMFR	Proportion of reproductive age women who are married (Per cent)	TFR	Fertility profile
	Nabarangapur	3.750	72.857	2.732	1
	Nayagarh	2.761	78.712	2.174	5
	Nuapada	3.216	69.990	2.251	2
	Puri	2.346	73.327	1.720	5
	Rayagada	3.168	71.901	2.278	2
	Sambalpur	2.408	64.769	1.559	4
	Subarnapur	2.586	70.389	1.820	4
	Sundargarh	2.551	65.329	1.666	4
Puducherry					
	Karaikal	2.260	65.279	1.475	4
	Mahe	2.399	70.344	1.688	4
	Puducherry	2.422	66.667	1.615	4
	Yanam	2.390	69.940	1.671	4
Punjab					
	Amritsar	2.693	71.233	1.918	4
	Barnala	2.383	72.753	1.734	5
	Bathinda	2.695	72.885	1.964	5
	Faridkot	2.696	73.033	1.969	5
	Fatehgarh Sahib	2.510	72.128	1.811	5
	Fazilka	3.010	70.416	2.120	4
	Firozpur	2.719	71.951	1.956	4
	Gurdaspur	2.474	71.884	1.778	4
	Hoshiarpur	2.768	66.917	1.852	4
	Jalandhar	2.915	67.517	1.968	4
	Kapurthala	2.784	66.865	1.862	4
	Ludhiana	3.234	69.141	2.236	2
	Mansa	2.943	69.409	2.043	4
	Moga	2.604	70.084	1.825	4
	Muktsar	2.773	71.795	1.991	4
	Pathankot	2.633	71.113	1.872	4
	Patiala	2.750	71.702	1.972	4
	Rupnagar	2.906	67.751	1.969	4
	Sahibzada Ajit Singh Nagar	2.343	75.426	1.767	5
	Sangrur	2.765	69.956	1.934	4
	Shahid Bhagat Singh Nagar	2.512	65.755	1.652	4
	Tarn Taran	2.957	69.265	2.048	4
Rajasthan					
	Ajmer	2.900	73.131	2.121	5
	Alwar	3.723	74.693	2.781	1
	Banswara	3.198	70.840	2.266	2
	Baran	3.132	72.288	2.264	1
	Barmer	3.568	68.761	2.454	2
	Bharatpur	4.217	70.136	2.958	2
	Bhilwara	3.602	75.198	2.709	1

State/Union Territory	District	TMFR	Proportion of reproductive age women who are married (Per cent)	TFR	Fertility profile
	Bikaner	3.323	75.826	2.520	1
	Bundi	3.401	72.534	2.467	1
	Chittaurgarh	3.038	77.628	2.358	1
	Churu	3.441	73.177	2.518	1
	Dausa	3.812	72.117	2.749	1
	Dhaulpur	4.107	73.660	3.025	1
	Dungarpur	3.299	70.940	2.340	2
	Ganganagar	2.794	71.975	2.011	4
	Hanumangarh	3.360	72.586	2.439	1
	Jaipur	3.111	73.213	2.278	1
	Jaisalmer	3.675	71.228	2.618	2
	Jalor	3.597	71.479	2.571	2
	Jhalawar	3.086	75.000	2.314	1
	Jhunjhunun	3.191	68.300	2.180	2
	Jodhpur	3.141	71.941	2.260	2
	Karauli	4.492	72.586	3.260	1
	Kota	2.953	68.604	2.026	4
	Nagaur	3.298	70.110	2.312	2
	Pali	3.465	67.705	2.346	2
	Pratapgarh	3.548	74.166	2.631	1
	Rajsamand	3.002	71.189	2.137	4
	Sawai Madhopur	4.007	74.295	2.977	1
	Sikar	3.324	72.273	2.402	1
	Sirohi	4.225	69.292	2.927	2
	Tonk	3.512	72.836	2.558	1
	Udaipur	3.361	72.319	2.430	1
Sikkim					
	East District	2.268	62.544	1.418	4
	North District	2.359	67.995	1.604	4
	South District	1.972	70.604	1.392	4
	West District	2.326	63.384	1.474	4
Tamil Nadu					
	Ariyalur	2.524	75.669	1.910	5
	Chennai	2.072	67.564	1.400	4
	Coimbatore	1.927	72.914	1.405	5
	Cuddalore	2.135	72.109	1.540	5
	Dharmapuri	2.316	73.950	1.712	5
	Dindigul	2.291	76.715	1.758	5
	Erode	2.264	71.574	1.621	4
	Kancheepuram	2.454	70.034	1.719	4
	Kanniyakumari	2.019	75.446	1.523	5
	Karur	2.127	71.567	1.523	4
	Krishnagiri	2.657	76.696	2.038	5
	Madurai	2.159	70.104	1.513	4

State/Union Territory	District	TMFR	Proportion of reproductive age women who are married (Per cent)	TFR	Fertility profile
	Nagapattinam	2.397	68.010	1.630	4
	Namakkal	2.058	71.031	1.462	4
	Perambalur	2.722	74.459	2.027	5
	Pudukkottai	2.774	72.277	2.005	5
	Ramanathapuram	2.291	75.216	1.723	5
	Salem	2.581	73.429	1.895	5
	Sivaganga	2.172	71.778	1.559	4
	Thanjavur	2.211	71.545	1.582	4
	The Nilgiris	2.261	69.803	1.578	4
	Theni	2.463	75.915	1.870	5
	Thiruvallur	2.269	74.235	1.685	5
	Thiruvannamalai	2.335	70.537	1.647	4
	Thiruvarur	2.493	69.212	1.725	4
	Thoothukkudi	2.769	68.608	1.900	4
	Thrissur	1.988	70.929	1.410	4
	Tiruchirappalli	2.343	71.226	1.669	4
	Tirunelveli	2.142	73.737	1.580	5
	Tiruppur	2.256	71.409	1.611	4
	Vellore	2.725	73.467	2.002	5
	Viluppuram	2.906	72.368	2.103	5
	Virudhunagar	2.244	69.381	1.557	4
Telangana					
	Adilabad	3.286	74.030	2.433	1
	Bhadradri Kothagudem	2.196	72.439	1.591	5
	Hyderabad	2.678	66.549	1.782	4
	Jagitial	2.337	75.163	1.757	5
	Jangoan	2.378	76.556	1.821	5
	Jayashankar Bhupalapally	2.275	76.637	1.743	5
	Jogulamba Gadwal	2.773	77.527	2.150	5
	Kamareddy	2.320	76.101	1.766	5
	Karimnagar	1.959	74.946	1.469	5
	Khammam	2.228	73.774	1.643	5
	Komaram Bheem Asifabad	2.408	73.140	1.761	5
	Mahabubabad	2.194	74.362	1.631	5
	Mahabubnagar	2.801	74.904	2.098	5
	Mancherial	2.089	71.544	1.495	4
	Medak	2.636	75.255	1.984	5
	Medchal-Malkajgiri	2.570	72.626	1.866	5
	Nagarkurnool	2.483	72.860	1.809	5
	Nalgonda	2.344	76.138	1.784	5
	Nirmal	2.147	74.497	1.600	5
	Nizamabad	2.200	74.684	1.643	5
	Peddapalli	2.136	73.168	1.563	5
	Rajanna Sircilla	2.594	75.940	1.970	5

State/Union Territory	District	TMFR	Proportion of reproductive age women who are married (Per cent)	TFR	Fertility profile
	Ranga Reddy	2.720	73.503	1.999	5
	Sangareddy	3.107	73.970	2.298	1
	Siddipet	2.369	77.111	1.827	5
	Suryapet	2.392	77.614	1.857	5
	Vikarabad	2.849	74.395	2.120	5
	Wanaparthy	2.733	70.629	1.930	4
	Warangal Rural	2.300	78.596	1.808	5
	Warangal Urban	2.395	74.252	1.778	5
	Yadadri Bhuvanagiri	2.503	71.821	1.798	4
Tripura					
	Dhalai	2.907	78.322	2.277	6
	Gomati	2.207	81.709	1.803	5
	Khowai	2.084	80.068	1.669	5
	North Tripura	2.642	72.643	1.919	5
	Sepahijala	2.724	81.481	2.220	6
	South Tripura	2.199	81.525	1.793	5
	Unakoti	3.249	75.879	2.465	1
	West Tripura	2.096	81.159	1.701	5
Uttar Pradesh					
	Agra	4.237	69.447	2.942	2
	Aligarh	3.494	70.858	2.476	2
	Allahabad	4.736	67.259	3.186	2
	Ambedkar Nagar	4.816	60.455	2.911	2
	Amethi	4.828	65.598	3.167	2
	Auraiya	4.156	70.893	2.946	2
	Azamgarh	3.628	63.290	2.296	2
	Baghpat	3.766	67.960	2.559	2
	Bahraich	4.175	74.494	3.110	1
	Ballia	3.615	65.321	2.361	2
	Balrampur	4.030	72.253	2.912	1
	Banda	4.257	69.089	2.941	2
	Bara Banki	4.694	64.434	3.025	2
	Bareilly	4.596	63.870	2.935	2
	Basti	3.532	65.621	2.318	2
	Bijnor	4.097	60.707	2.487	2
	Budaun	4.981	67.980	3.386	2
	Bulandshahr	3.642	71.715	2.612	2
	Chandauli	3.473	70.456	2.447	2
	Chitrakoot	3.591	69.376	2.491	2
	Deoria	3.159	67.243	2.124	3
	Etah	5.068	67.882	3.440	2
	Etawah	3.757	69.315	2.604	2
	Faizabad	3.506	66.552	2.333	2
	Farrukhabad	4.460	66.565	2.969	2

State/Union Territory	District	TMFR	Proportion of reproductive age women who are married (Per cent)	TFR	Fertility profile
	Fatehpur	4.261	66.125	2.817	2
	Firozabad	4.145	71.234	2.953	2
	Gautam Buddha Nagar	3.178	69.263	2.201	2
	Ghaziabad	3.695	68.449	2.529	2
	Ghazipur	3.926	67.941	2.667	2
	Gonda	4.130	67.826	2.801	2
	Gorakhpur	3.943	66.251	2.612	2
	Hamirpur	3.697	67.661	2.501	2
	Hapur	3.713	69.842	2.593	2
	Hardoi	4.586	67.442	3.093	2
	Jalaun	3.424	71.967	2.464	2
	Jaunpur	3.398	66.585	2.263	2
	Jhansi	3.236	71.501	2.314	2
	Jyotiba Phule Nagar	4.835	62.953	3.044	2
	Kannauj	4.448	66.568	2.961	2
	Kanpur Dehat	3.615	69.165	2.500	2
	Kanpur Nagar	3.392	67.283	2.282	2
	Kanshiram Nagar	5.331	70.742	3.771	2
	Kaushambi	5.585	67.451	3.767	2
	Kheri	3.985	68.704	2.738	2
	Kushinagar	3.448	68.553	2.364	2
	Lalitpur	4.149	76.420	3.171	1
	Lucknow	3.136	65.742	2.062	3
	Mahamaya Nagar	3.680	68.818	2.532	2
	Mahoba	4.171	66.714	2.783	2
	Mahrajganj	3.426	71.018	2.433	2
	Mainpuri	4.446	66.463	2.955	2
	Mathura	4.151	72.252	2.999	1
	Mau	4.054	62.055	2.516	2
	Meerut	4.430	66.191	2.932	2
	Mirzapur	3.430	71.887	2.466	2
	Moradabad	4.042	63.008	2.547	2
	Muzaffarnagar	3.688	67.213	2.479	2
	Pilibhit	3.806	68.855	2.621	2
	Pratapgarh	4.257	66.145	2.816	2
	Rae Bareli	4.362	64.752	2.824	2
	Rampur	5.714	61.224	3.499	2
	Saharanpur	3.377	65.444	2.210	2
	Sambhal	4.182	67.299	2.814	2
	Sant Kabir Nagar	3.530	66.025	2.330	2
	Sant Ravidas Nagar (Bhadohi)	3.573	71.768	2.564	2
	Shahjahanpur	5.185	70.774	3.670	2
	Shamli	3.978	64.919	2.582	2
	Shrawasti	4.348	79.389	3.452	1

State/Union Territory	District	TMFR	Proportion of reproductive age women who are married (Per cent)	TFR	Fertility profile
	Siddharthnagar	4.495	69.862	3.140	2
	Sitapur	3.760	69.842	2.626	2
	Sonbhadra	3.534	72.699	2.569	1
	Sultanpur	4.679	65.476	3.064	2
	Unnao	3.624	66.125	2.396	2
	Varanasi	3.389	67.819	2.298	2
Uttarakhand					
	Almora	2.488	67.213	1.672	4
	Bageshwar	2.766	73.044	2.020	5
	Chamoli	2.716	71.190	1.934	4
	Champawat	3.744	69.880	2.616	2
	Dehradun	2.900	66.488	1.928	4
	Garhwal	3.102	65.160	2.021	3
	Hardwar	4.705	68.366	3.217	2
	Nainital	3.231	68.921	2.227	2
	Pithoragarh	2.925	72.000	2.106	5
	Rudraprayag	3.218	72.014	2.317	1
	Tehri Garhwal	3.194	70.231	2.243	2
	Udham Singh Nagar	3.634	69.921	2.541	2
	Uttarkashi	2.894	73.429	2.125	5
West Bengal					
	Bankura	2.565	79.539	2.040	5
	Birbhum	2.741	80.202	2.198	6
	Dakshin Dinajpur	2.512	77.787	1.954	5
	Darjiling	2.379	70.686	1.681	4
	Haora	2.021	74.608	1.507	5
	Hugli	1.838	78.585	1.444	5
	Jalpaiguri	3.165	72.297	2.288	1
	Koch Bihar	2.922	79.893	2.334	6
	Kolkata	1.877	68.483	1.285	4
	Maldah	3.051	77.257	2.357	1
	Murshidabad	2.696	79.304	2.138	5
	Nadia	2.352	80.805	1.901	5
	North Twenty Four Parganas	2.279	77.736	1.772	5
	Paschim Barddhaman	2.519	74.125	1.867	5
	Paschim Medinipur	2.431	82.673	2.010	5
	Purba Barddhaman	2.471	80.927	2.000	5
	Purba Medinipur	1.969	83.219	1.639	5
	Puruliya	3.279	75.135	2.464	1
	South Twenty Four Parganas	2.592	81.341	2.108	5
	Uttar Dinajpur	3.539	71.690	2.537	2

Remarks: The fertility profile of a district is based on the difference in the fertility of married women of reproductive age between the district and the country and the difference in the proportion of reproductive age women who are married between the district and the country. The 707 districts of the

country have been classified in the six categories depending upon the six profiles of fertility defined as follows:

Profile 1: $\partial g_d > 0, \partial m_d > 0, \nabla f_d > 0$
Profile 2: $\partial g_d > 0, \partial m_d < 0, \nabla f_d > 0$
Profile 3: $\partial g_d > 0, \partial m_d < 0, \nabla f_d < 0$
Profile 4: $\partial g_d < 0, \partial m_d < 0, \nabla f_d < 0$
Profile 5: $\partial g_d < 0, \partial m_d > 0, \nabla f_d < 0$
Profile 6: $\partial g_d < 0, \partial m_d > 0, \nabla f_d > 0$

For further details, see text.
Source: Author