

Progress in Reproductive Health in India, 1992-2021: Evidence from National Family Health Survey

Brijesh P Singh
Ayushi Chourasiya
Hricha Rai

Abstract

This paper highlights the progress in reproductive health in India during 1992-2021 based on selected indicators of reproductive health available from different rounds of the National Family Health Survey. The paper also analyses the disparity in reproductive health by wealth index quintiles groups. The progress in reproductive health has been discussed in the context of government policies and programmes that have been implemented from time to time to meet the reproductive health needs, especially of women, in the country. The paper also highlights the challenges by way of advancement in reproductive health in India. The analysis has been carried out for the country and for its constituent states and Union Territories.

Background

India has made considerable progress in reproductive health during the last three decades because of the focused attention of the government to meet the reproductive health needs, especially of women of the country. Concern about the health of women and children has always been a priority health agenda in India right since independence. During the first five-year plan (1951–1956), India launched a nationwide family planning program to reduce the birth rate and stabilize population growth and to promote maternal and child health. During this period, primary health centres were established in rural areas, and auxiliary nurse midwives (ANM) were trained in delivering maternal and child health (MCH) services (Government of India, 1951). In 1992, Government of India launched the Child Survival and Safe Motherhood (CSSM) with the objectives of enhancing child survival, preventing maternal mortality and morbidity, and increasing the effectiveness of service delivery (Government of India, 1992). In 1997, the CSSM Programme was expanded into the Reproductive and Child Health (RCH) Programme (Government of India, 1997). In 2005, Government of India launched the National Rural Health Mission with the RCH Programme as the lead programme of the Mission (Government of India, 2005). In 2013, the National Health Mission was launched in the country, and the RCH Programme remained the lead programme of the Mission (Government of India, 2013). The Government of India, now, follows the Reproductive, Maternal, Newborn, Child, and Adolescent Health (RMNCH+A) strategy to meet the reproductive health needs, especially of women (Government of India,

2013). These initiatives taken by the Government of India have resulted in marked improvement in the reproductive health situation in the country. For example, the maternal mortality ratio in the country has decreased from 212 maternal deaths for every 100 thousand live births during 2007-2009 (Government of India, 2011) to 97 maternal deaths for every 100 thousand live births in 2018-2020 (Government of India, 2021). However, despite significant gains in reproductive health in the country since 1990, challenges in meeting the reproductive health needs of the people of the country remain, particularly in rural areas and among marginalized communities. It is in this context that understanding the progress in reproductive health in India after 1990 becomes important. The present paper is an attempt in this direction. It analyses the progress in reproductive health in the country during the last three decades in terms of the trend in selected indicators of reproductive health for which estimates are available from different rounds of the National Family Health Survey. The paper also highlights the inequality in progress in selected reproductive health indicators within the country across states/Union Territories.

There are five sections in this study. The next section describes the data source used in the analysis and the methods adopted to analyse the progress in reproductive health. An outline of the data gathered, and the methodology applied in this investigation may be found in the next section. The third section of the paper analyses the advancement made in selected reproductive health indicators in India and in its constituent states/Union Territories. The income inequality of the progress in reproductive health has been analysed in the fourth section of the paper. The last section of the paper summarises the findings of the analysis and highlights their policy and programme implications.

Data and Methods

This paper is based on the estimates of selected indicators of reproductive health estimated from the data available through different rounds of the National Family Health Survey (NFHS). The NFHS programme was instituted by the Government of India in 1992. It is a multi-round household survey programme. The first round of the survey was conducted in 1992-93 (Government of India, 1995), followed by second round in 1998-1999 (Government of India, 2000), third round in 2005-2006 (Government of India, 2007), fourth round in 2015-2016 (Government of India, 2017), and fifth round in 2019-2021 (Government of India, 2022). Currently, the sixth round of NFHS is in progress. Details of the NFHS including the method of sample selection are given elsewhere (Government of India, 2022). The NFHS is based on a statistically representative sample of households which provides estimates of key reproductive health indicators right up to the district level. Prior to its fourth round (2015-2016), the NFHS provided estimates of key reproductive health indicators for the country and for its states/Union Territories only, but NFHS has provided estimates of reproductive health indicators for the districts also in its fourth and fifth rounds. The present paper, however, is limited to the analysis of the progress in reproductive health in the country and in its constituent states and Union Territories only. Analysis of the progress in reproductive health at the district level is difficult as the number of districts at the fourth round of the NFHS were different from the number of districts in the fifth round of NFHS.

We have used a set of the 24 indicators of reproductive health, grouped into four categories – fertility, timing of marriage and first birth, family planning, and care during pregnancy, at the time of the delivery, and after delivery during the postnatal period. The selection of the indicators was based on the relevance of the indicator to the reproductive health of women. The reproductive health indicators that have been selected for the present analysis are as follows:

1. Fertility
 - 1.1 Fertility of women aged 15-19 years.
 - 1.2 Fertility of women aged 20-24 years.
 - 1.3 Fertility of women aged 25-29 years.
 - 1.4 Fertility of women aged 30-34 years.
 - 1.5 Fertility of women aged 35-39 years.
 - 1.6 Fertility of women aged 40-44 years.
 - 1.7 Total fertility rate
 - 1.8 Total wanted fertility rate.
2. Timing of marriage and first birth
 - 2.1 Proportion of women 20-24 years married by 15 years of age.
 - 2.2 Proportion of women 20-24 years married by 18 years of age.
 - 2.3 Proportion of women 20-24 years married by 20 years of age.
 - 2.4 Proportion of women 20-24 years gave first birth by 15 years of age.
 - 2.5 Proportion of women 20-24 years gave first birth by 18 years of age.
 - 2.6 Proportion of women 20-24 years gave first birth by 20 years of age.
3. Family Planning
 - 3.1 Proportion of currently married women using a contraceptive method
 - 3.2 Proportion of currently married women using a modern contraceptive method
 - 3.3 Proportion of currently married women using a permanent contraceptive method
 - 3.4 Proportion of currently married women using a modern spacing method of contraception
 - 3.5 Unmet need of spacing
 - 3.6 Unmet need of limiting
 - 3.7 Total unmet need
 - 3.8 Total demand of family planning
4. Antenatal and postnatal care
 - 4.1 Proportion of women received antenatal care from skilled service provider.
 - 4.2 Proportion of women with at least 4 ANC visits
 - 4.3 Proportion of women received assistance from skilled health person at the time of delivery.
 - 4.4 Proportion of women who were checked up within two days of delivery.

The data for analysis have been retrieved from the Demographic and Health Surveys data repository using the STATcompiler tool (ICF, 2015) for the country and for its constituent states/Union Territories to analyse the within country disparity or inequality in progress in reproductive health.

The estimates of the reproductive indicators available from the NFHS refer to discrete points in time. We have assumed that the change in an indicator between any two rounds of NFHS is linear. We have measured this change in terms of annual per cent change (APC) to characterise the change in the indicator within the interval. The APC in the reproductive health indicator, a , between two points in time t_1 and t_2 ($t_2 > t_1$) is defined as

$$APC = \frac{1}{t_2 - t_1} \times \left(\frac{a_2 - a_1}{a_1} \right) \times 100$$

The APC in different time-segments of the trend period may not be the same. As such, we have calculated the average annual percentage change (AAPC) to characterise the trend during the entire trend period. The AAPC is the weighted average of APC in different time-segments with weights equal to the proportionate length of the time-segment. If w_i is the proportionate weight for the time-segment i , then AAPC is calculated as

$$AAPC = \sum_i w_i \times APC_i$$

The AAPC reflects the progress in reproductive health in a more appropriate manner than the conventional way of calculating the change by considering only the level of the reproductive health indicator at the beginning and at the end of the trend period (Clegg et al, 2009). AAPC takes into consideration different pace of change in different time-segments of the trend period.

When the annual per cent change (APC) in different time-segments of the trend period is not the same, the inequality in progress across different time-segments in the reproductive health indicator j can be calculated through the index of progress inequality, PI , which is defined as

$$PI_j = \frac{1}{AAPC} \times \frac{\sqrt{\sum (APC_{jk} - AAPC)^2}}{k}$$

where k is the number of time-segments in the trend period. It is clear that when the APC in all time-segments is the same, the index of progress inequality 0 and the larger the deviation of the index of progress inequality, PI , from its limiting value of 0, the larger the inequality in progress across different time-segments of the trend period. Higher value of the index of progress inequality, PI , reflects higher degree of inconsistency in progress across different time segments and vice versa. The index of progress inequality has been calculated for each of the 24 reproductive health indicators separately.

We have also analysed the income inequality in different reproductive health indicators. For this purpose, all women were categorised into five income groups – poorest, poor, average, rich, and richest – on the basis of the household wealth index of the women and reproductive health indicators in different income groups have been compared with the corresponding indicator in the richest income group which has been taken as the reference. The difference in the value of the reproductive health indicator in different income groups from the value of the indicator in the richest income group has been summarised in terms of the index of income inequality. Let the value of the reproductive health indicator j in the income group i is a_{ji} , and a_{jr} is the value of the reproductive health

indicator in the richest income group. Then index of income inequality in the reproductive health indicator j is defined as

$$I_j = \frac{\sqrt{\sum \left(\frac{a_{ji}}{a_{jr}} - 1 \right)^2}}{n - 1}$$

where n is the number of wealth index quintiles groups. The limiting value of index I_j is 0 which signifies that the value of the indicator is the same in all income groups and is equal to the value of the indicator in the richest income group so that there is no income inequality in the reproductive health indicator j . On the other hand, the higher the value of the index I_j the higher the income inequality in the reproductive health indicator j . The index of income inequality has been calculated for each indicator separately for each round of NFHS to examine whether the income inequality in the indicator has decreased or not during the trend period.

Progress in Reproductive Health in India

Table 1 depicts the progress in selected reproductive health indicators in India during the period 1992-2021. It may be seen from the table that the decrease in the total fertility rate has been more rapid than the decrease in the total wanted fertility rate. Among women of different age groups, fertility decreased most rapidly in women aged 40-44 years, but the decrease has been very slow in the age group 25-29 years and 20-24 years. The decrease in the fertility of women aged 15-19 years has been faster than the decrease in fertility of women aged 20-29 years but slower than women aged 30 years and above. On the other hand, the decrease in the proportion of women aged 20-24 years who got married has been the most rapid compared to the decrease in the proportion of women aged 20-24 years who got married before 18 years and before 20 years. It may be pointed out that marriage of females before 18 years of age is an offence under the Child Marriage Prevention Act of the Government of India (Government of India, 1978). However, at least 22 per cent married women aged 20-24 years were found to be married before reaching 18 years of age according to the latest round of the NFHS (2019-2021). Similarly, the decrease in the proportion of women aged 20-24 years who gave first birth before 15 years of age has been the highest as compared to the decrease in the proportion of women aged 20-24 years who gave first birth before 18 years or before 20 years of age.

Table 1 also shows that the increase in the proportion of married women using any contraceptive method has been faster than the number of married women using a modern contraceptive method. This implies that the proportion of married women using traditional contraceptive methods has been more rapid than the proportion of married women using modern contraceptive methods during the period under reference. Similarly, the increase in the proportion of married women using modern spacing methods has been found to be more rapid than the increase in the proportion of married women using permanent methods of family planning. As the result, the decrease in the unmet need for spacing has been more rapid than the decrease in the unmet need of limiting.

Table 1: Progress in selected indicators of reproductive health in India, 1992-2021.

Reproductive health indicator	Annual per cent change (APC) during				AAPC	Progress inequality
	1992-1999	1999-2006	2006-2016	2016-2021	1992-2021	
Fertility						
Fertility of women aged 15- 19 years	-1.108	-2.270	-4.333	-3.137	-2.851	-0.417
Fertility of women aged 20- 24 years	-1.299	-0.068	-1.196	-2.065	-1.098	-0.651
Fertility of women aged 25-29 years	-2.269	-0.400	-0.791	-0.938	-1.079	-0.652
Fertility of women aged 30-34 years	-4.124	-1.449	-1.774	-0.392	-2.025	-0.675
Fertility of women aged 35-39 years	-5.195	-1.531	-3.200	-3.529	-3.335	-0.390
Fertility of women aged 40-44 years	-6.667	-1.786	-4.286	-5.000	-4.380	-0.401
Total fertility rate	-2.521	-0.510	-1.852	-1.818	-1.684	-0.433
Total Wanted Fertility rate	-2.747	-1.360	-0.526	-2.222	-1.556	-0.553
Time of marriage and time of first birth						
Women 20-24 years married by 15 years of age	4.708	-6.288	-5.877	-5.185	-3.302	-0.530
Women 20-24 years married by 18 years of age	-0.057	-1.571	-4.315	-2.372	-2.290	-0.621
Women 20-24 years married by 20 years of age	-0.552	-0.809	-2.607	-1.838	-1.544	-0.552
Women 20-24 years gave first birth by 15 years of age	-0.560	-4.373	-7.058	-6.000	-4.659	-1.381
Women 20-24 years gave first birth by 18 years of age	-0.353	-3.053	-5.714	-2.151	-3.164	-0.677
Women 20-24 years gave first birth by 20 years of age	-0.440	-1.668	-3.726	-2.069	-2.151	-0.536
Family Planning						
Married women using any contraceptive method	2.633	2.401	-0.497	4.935	1.894	1.048
Married women using modern contraceptive method	2.466	1.903	-0.144	3.598	1.625	0.860
Unmet need of spacing	-4.567	-3.787	-0.820	-5.714	-3.284	-0.567
Unmet need of limiting	-0.529	0.000	-0.769	-5.000	-1.255	-1.612
Unmet need of family planning	-2.956	-1.952	-0.719	-5.426	-2.368	-0.749
Total demand of family planning	0.773	1.311	-0.541	2.922	0.820	1.556
Antenatal, natal, and postnatal care						
Antenatal care from skilled provider	2.834	3.098	0.830	1.382	1.957	0.490
Antenatal care (4+ visits)	1.587	2.762	4.078	2.976	2.969	0.300
Assistance during delivery from skilled health person	3.184	1.702	7.516	1.645	4.055	0.605
First Postnatal checkup within 2 days after delivery	NA	NA	9.320	4.962	7.867	0.292

Source: Authors' calculations based on the data available from different rounds of NFHS.

Table 2: Income inequality in selected indicators of reproductive health in India.

Indicator	Period				
	1992-1993	1998-1999	2005-2006	2015-2016	2019-2021
Fertility					
Fertility of women aged 15- 19 years	NA	NA	1.653	1.569	1.442
Fertility of women aged 20- 24 years	NA	NA	0.811	0.893	0.867
Fertility of women aged 25-29 years	NA	NA	0.598	0.592	0.521
Fertility of women aged 30-34 years	NA	NA	0.787	0.619	0.441
Fertility of women aged 35-39 years	NA	NA	1.633	0.966	0.576
Fertility of women aged 40-44 years	NA	NA	6.344	3.758	0.992
Total fertility rate	NA	NA	0.845	0.819	0.657
Total Wanted Fertility rate	NA	NA	0.673	0.676	0.611
Time of marriage and time of first birth					
Women 20-24 years married by 15 years of age	1.286	1.751	6.554	3.504	2.456
Women 20-24 years married by 18 years of age	0.751	1.055	2.682	2.034	2.690
Women 20-24 years married by 20 years of age	5.325	6.328	1.573	1.503	1.517
Women 20-24 years gave first birth by 15 years of age	1.264	1.994	3.819	2.816	3.882
Women 20-24 years gave first birth by 18 years of age	0.669	0.763	1.817	1.758	1.922
Women 20-24 years gave first birth by 20 years of age	0.979	0.753	1.135	1.187	1.178
Family Planning					
Married women using any contraceptive method	0.625	0.633	0.398	0.440	0.475
Married women using modern contraceptive method	0.708	0.667	0.400	0.437	0.476
Unmet need of spacing	0.773	0.592	0.865	0.571	0.558
Unmet need of limiting	0.407	0.473	0.762	0.587	0.587
Unmet need of family planning	0.440	0.440	0.799	0.579	0.566
Total demand of family planning	1.209	0.938	0.443	0.460	0.485
Antenatal, natal, and postnatal care					
Antenatal care from skilled provider	1.752	2.071	0.374	0.421	0.453
Antenatal care (4+ visits)	0.710	0.602	0.224	0.343	0.399
Assistance during delivery from skilled health person	0.040	0.047	0.261	0.435	0.465
First Postnatal checkup within 2 days after delivery	NA	NA	0.217	0.403	0.444

Source: Authors' calculations based on the data available from different rounds of NFHS.

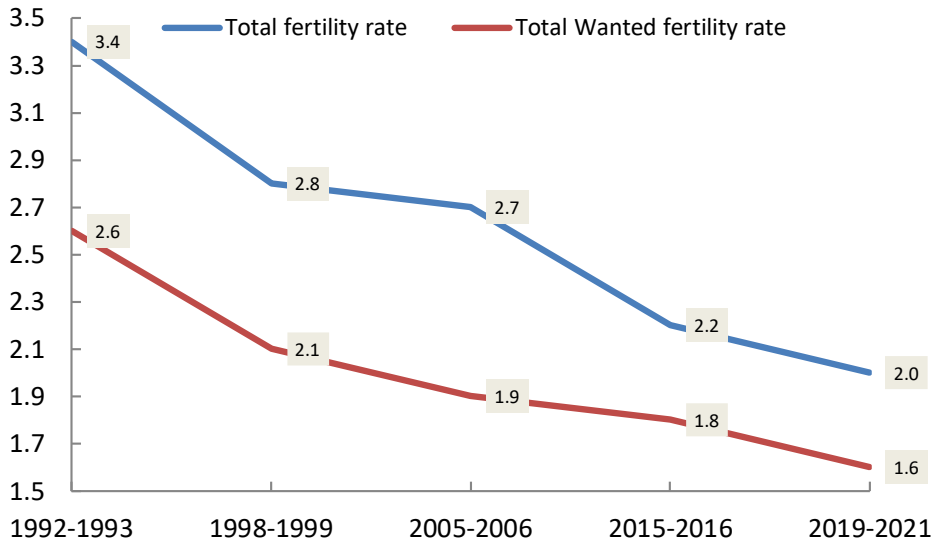


Figure 1: Trend in total fertility rate and total wanted fertility rate in India, 1992-2021
Source: Authors

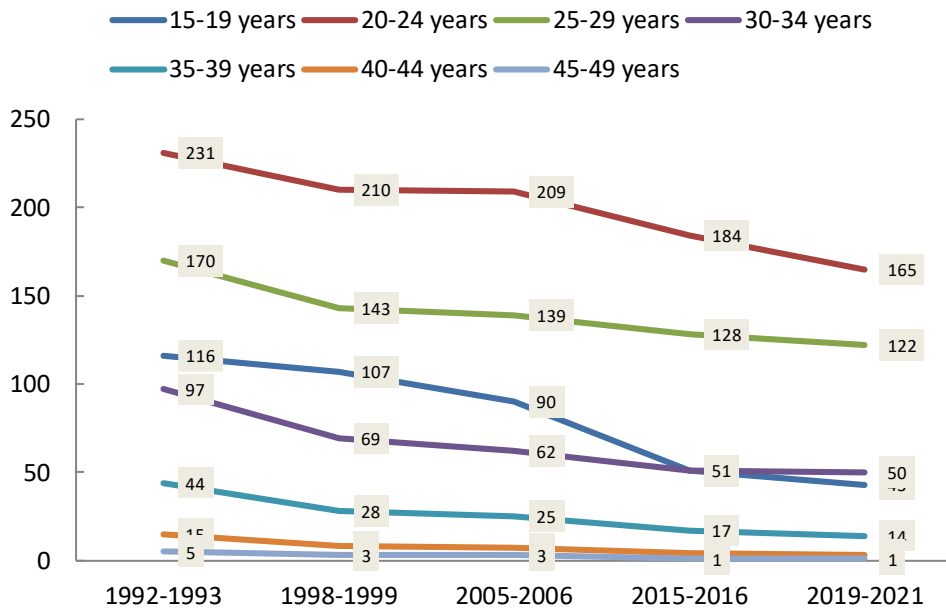


Figure 2: Trend in age-specific fertility rates (per 1000) in India, 1992-2021.
Source: Authors

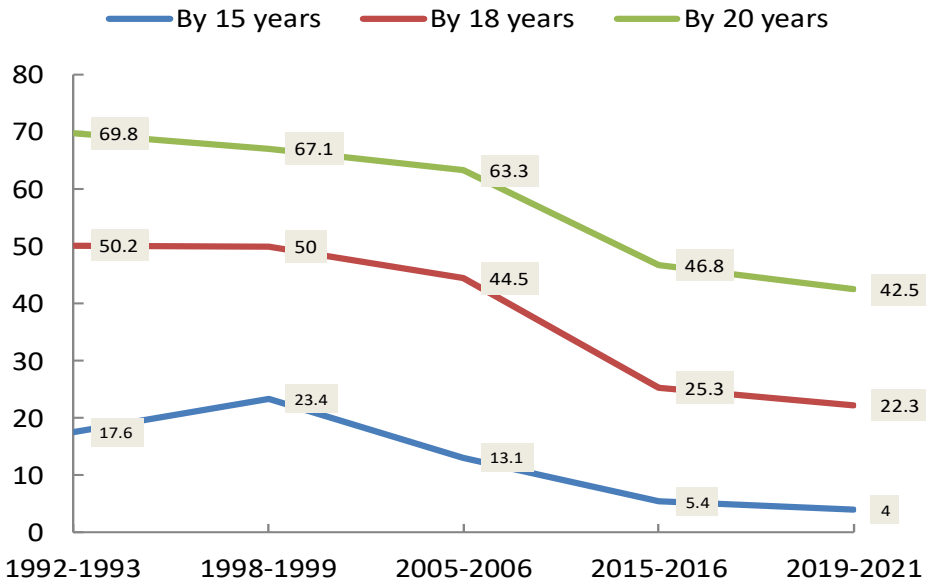


Figure 3: Trend in the proportion (per cent) of women 20-24 years married by 15 years, 18 years, and 20 years of age.

Source: Authors

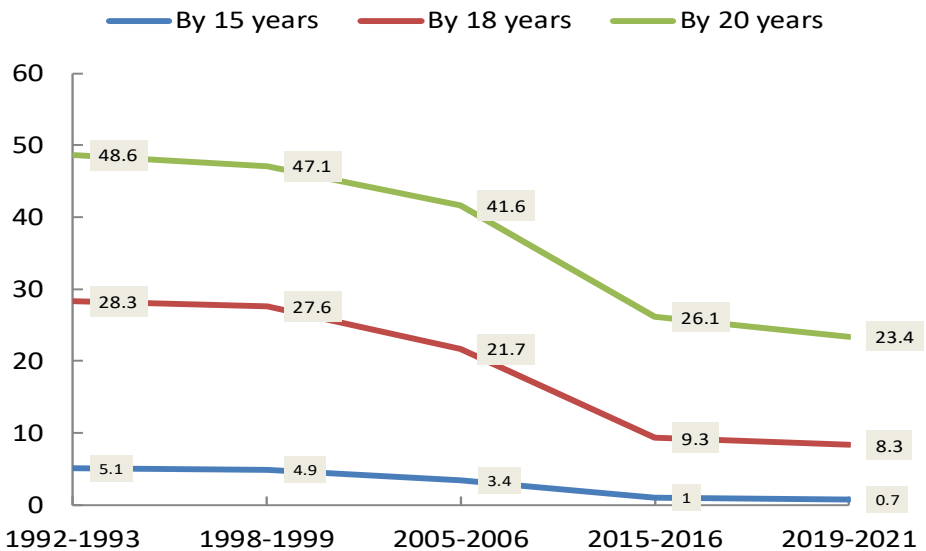


Figure 4: Trend in the proportion (per cent) of women 20-24 years gave first birth by 15 years, 18 years, and 20 years of age.

Source: Authors

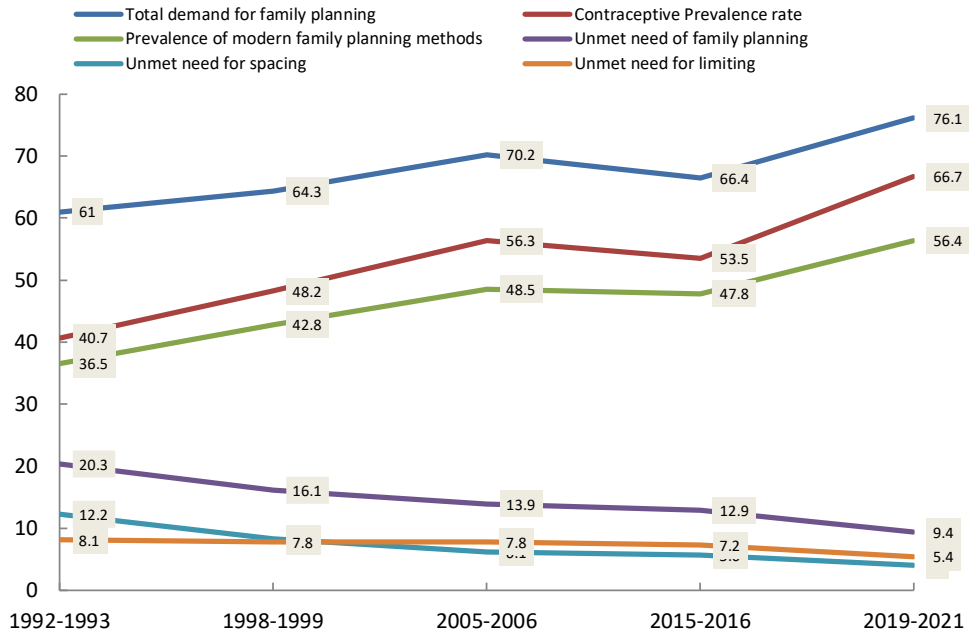


Figure 5: Trend in indicators of family planning in India, 1992-2021.

Source: Authors

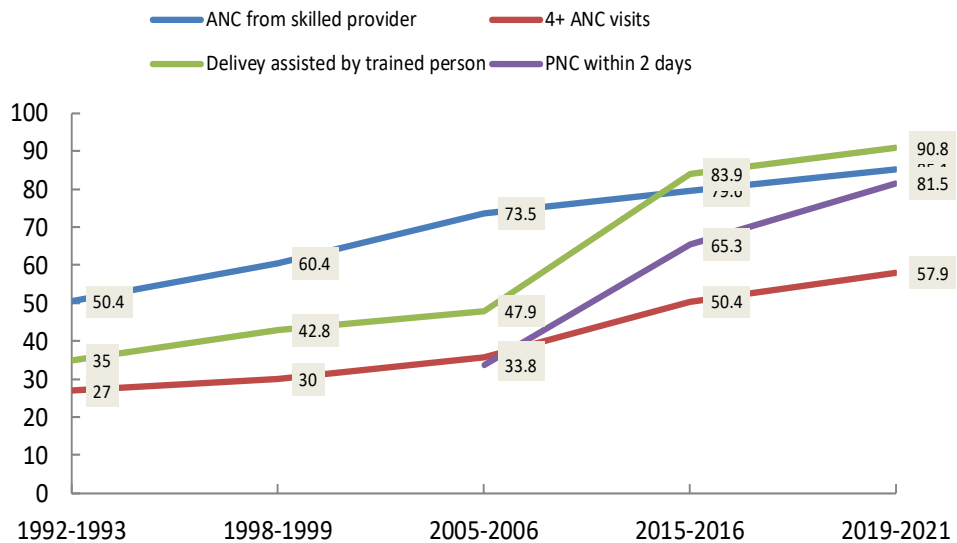


Figure 6: Trend in indicators of antenatal, natal and postnatal care in India, 1992-2021.

Source: Authors

In case of antenatal, natal, and postnatal care, table 1 reveals that the progress has been the most rapid in the proportion of deliveries assisted by a skilled health person but the slowest in antenatal care. The proportion of institutional deliveries has increased from 35 per cent during 1992-1993 to 90.8 per cent during 2019-2021. On the other hand, the increase in the proportion of women who received first postnatal checkup with 2 days of delivery slowed down during the period 2015-2021 relative to the period 2005-2016.

It is also evident from table 1 that the progress in all the reproductive health indicators has varied considerably across different time-segments of the period 1992-2021 as reflected through the variation in the annual per cent change (APC) in different time-segments. The index of inequality in progress across different time-segments has been found to be the highest in the unmet need of limiting followed by the total demand for family planning and the proportion of women aged 20-24 years who were married before reaching 15 years of age. This means that progress in these indicators has been highly inconsistent in different time-segments of the period 1992-1993 through 2019-2021. In contrast, the index of inequality in progress has been found to be the lowest in the proportion of women who received at least 4 ANC visits during their last pregnancy and in the fertility of women aged 35-39 years which reflects that the progress in reproductive health in terms of these indicators has been relatively more consistent across different time-segments of the period 1992-1993 through 2019-2021.

Reproductive Health Inequality

The index of income inequality in different reproductive health indicators in India is presented in table 2. The table shows that the trend in the income inequality in different reproductive health indicators used in the analysis has been different and no common trend emerges. The income inequality in the total fertility rate, as measured by the index of income inequality, has always been higher than the index of income inequality in the total wanted fertility rate during the period under reference. However, the decrease in income inequality has been more rapid in total fertility rate as compared to that in total wanted fertility rate if the change in the index of income inequality is any indication. On the other hand, the index of income inequality has been the lowest in the fertility of women aged 25-29 years but the highest in the fertility of women aged 40-44 years. However, the decrease in the income inequality in fertility of women aged 40-44 years has been very rapid whereas the decrease in the income inequality of fertility of women as 25-29 years has, at best, been marginal. The index of income inequality in the fertility of women aged 15-19 years has also been quite high and the decrease in this inequality has been marginal.

The trend in the index of income inequality in different indicators related to the time of marriage and time of first birth of women aged 20-24 years has been different. In case of the proportion of women aged 20-24 years who got married by 15 years of age, the index of income inequality first increased and then decreased. However, in case of the proportion of women aged 20-24 years who got married by 18 years and 20 years of age, the index of income inequality appears to have increased in recent years. On the other hand, the income inequality in the proportion of women aged 20-24 years who gave first birth by

18 years of age increased consistently during the period under reference. This has, however, not been the case in the proportion of women aged 20-24 years who gave first birth by 15 years of age or by 20 years of age. The income inequality in the proportion of women aged 20-24 years who gave first birth by 15 years of age appears to have increased in recent years while that in the proportion of women who gave first birth by 20 years of age has decreased, albeit marginally.

The income inequality in different indicators of family planning also reveal different trend during the period under reference. The income inequality in both proportion of married women using any contraceptive method and proportion of married women using a modern contraceptive method has increased since 2005-2006. However, the income inequality in the unmet need of family planning has decreased consistently since 2005-2006. The income inequality in the indicators related to the unmet need of family planning was very high during the period 2005-2006. On the other hand, the income inequality in the total demand for family planning decreased very rapidly during the period 1992-1993 through 2005-2006 but has increased after 2005-2006.

The income inequality in all the four indicators related to the care during antenatal, natal, and postnatal period has increased during the period 2019-2021 as compared to the period 2015-2016. Moreover, the income inequality in the proportion of women who had at least 4 ANC visits during their last pregnancy decreased quite rapidly during 1992-1993 through 2005-2006 but increased thereafter. On the other hand, the income inequality in the proportion of women who were assisted by a professionally trained person at the time of their last delivery has increased quite rapidly since 1992-1993. The income inequality in the proportion of women who were checked up within two days of their last delivery has also increased over time.

State Level Analysis

The progress in reproductive health, revealed through the average annual per cent change (AAPC) in different reproductive health indicators, varies widely across the constituent states and Union Territories of the country as shown in the appendix table. The AAPC in different states/Union Territories is based on different time-segments as data from all the five rounds of NFHS are available for only 20 states so that AAPC during the period 1992-1993 through 2019-2021 could be calculated for these 20 states only. Summary measures of the variation in AAPC across 20 states in different indicators of reproductive health are presented in table 3. The median AAPC during 1992-2021 in the total fertility rate across the 20 states has been 1.772 per cent. The AAPC in the total fertility rate has been the fastest in Arunachal Pradesh but the slowest in Kerala. On the other hand, the median AAPC across 20 states in the total wanted fertility rate has been -1.432. The AAPC in the total wanted fertility rate has been the most rapid in Arunachal Pradesh but the slowest in Kerala. In case of fertility in women aged 15-19 years, the median AAPC is estimated to be -2.841. The decrease in fertility of women aged 15-19 years was the most rapid in Haryana whereas in Goa, Manipur and Tripura, fertility of women aged 15-19 years increased, instead decreased as the AAPC in these states has been positive, not negative. The median AAPC in fertility of women aged 20-24 years has been -1.321. The decrease in

fertility of women aged 20-24 years has been the most rapid in Arunachal Pradesh but the least rapid in Meghalaya. The median AAPC in fertility of women aged 25-29 years has been -1.176. The AAPC has been the most rapid in West Bengal whereas fertility in this group of women increased instead decreased during the period under reference. The median AAPC in fertility of women aged 30-34 years has been -0.871. The AAPC has been the most rapid in West Bengal but fertility in this group of women increased in five states during the period under reference. Similarly, fertility in women aged 35-39 years increased in five states. The median AAPC in the fertility of these groups of women, however, is estimated to be -1.581 and -1.866, respectively.

Tables 3 also shows that the median AAPC in all the four indicators related to the time of marriage and the time of first birth among women aged 20-24 years has been negative during the period under reference. However, the AAPC in the proportion of women who were married by 15 years of age is found to be positive in five states. However, the proportion of women 20-24 years of age who were married by 18 years or by 20 years of age decreased all states but the pace of the decrease in these proportions during the period under reference varied widely across the 20 states of the country. A similar situation may also be observed in case of the proportion of women aged 20-24 years who gave first birth by 15 years, 18 years, and 20 years of age. In five states, the proportion of women aged 20-24 years who gave first birth by 15 years of age increased, instead decreased, during the period under reference. Similarly, the median AAPC in the proportion of currently married women using a contraceptive method or a modern contraceptive method has been positive suggesting increase in the use of contraceptive methods during the period under reference, there are states where the AAPC has been negative which indicates that the proportion of currently married women using a contraceptive method or using a modern contraceptive method has decreased in these states during the 27 years period between 1992-1993 and 2019-2021. Similarly, the AAPC in all the three indicators of the unmet need of family planning has been negative but there are states where the unmet need of family planning has increased, instead decreased during the period under reference as the AAPC has been positive in these states. The unmet need for spacing increased in two states but the unmet need for limiting increased in 7 of the 20 states so that total unmet need for family planning increased in 7 states. On the other hand, the demand for family planning increased in all but two of the 20 states during the period under reference. Finally, three of the 4 indicators related to antenatal, natal, and postnatal care increased in all states during the period under reference but the proportion of married women who received at least 4 ANC visits decreased, instead increased, in Kerala. The progress in the proportion of married women who received postnatal care within two days of delivery is measured during the period 2005-2006 through 2019-2021 as estimates of the indicator are not available from the first two rounds of NFHS.

Table 4 also presents the index of variation in AAPC in each of the 24 indicators across the 20 states. The index of variation in AAPC has been measured as the positive root mean square deviation from the median. The index of variation is similar to the coefficient of variation with arithmetic mean replaced by the median. Among the 24 reproductive health indicators included in the present analysis, the index of variation in AAPC across states is found to be the highest in the proportion of women aged 20-24 years who had first birth by 15 years of age followed by the proportion of women aged 20-24 years who

were married by 15 years of age. On the other hand, the index of variation in AAPC across states has been found to be the lowest in fertility of women aged 25-29 years followed by fertility of women aged 20-24 years. Inter-state variation in AAPC in the proportion of women who had first check-up within two days of the delivery has also been to be very high, but the AAPC in this indicator is based on the change in the period 2005-2021 and not in the period 1992-2021.

Table 4: Variation in AAPC in different reproductive health indicators across 20 states of India during 1992-2021.

Indicator	Minimum	Maximum	Median	Index of variation
Fertility				
Fertility of women aged 15- 19 years	-4.895	0.719	-2.841	1.531
Fertility of women aged 20- 24 years	-2.486	-0.697	-1.321	0.598
Fertility of women aged 25-29 years	-2.041	0.209	-1.176	0.572
Fertility of women aged 30-34 years	-2.948	1.308	-0.871	1.135
Fertility of women aged 35-39 years	-4.119	2.327	-1.581	1.757
Fertility of women aged 40-44 years	-4.848	4.632	-1.866	2.710
Total fertility rate	-2.405	-0.301	-1.722	0.624
Total Wanted Fertility rate	-2.060	-0.121	-1.432	0.624
Time of marriage and time of first birth				
Women 20-24 years married by 15 years of age	-6.168	6.615	-2.662	3.237
Women 20-24 years married by 18 years of age	-4.513	-0.602	-2.676	1.155
Women 20-24 years married by 20 years of age	-4.103	-0.162	-2.039	0.967
Women 20-24 years gave first birth by 15 years of age	-8.622	4.965	-3.588	3.762
Women 20-24 years gave first birth by 18 years of age	-5.508	-1.127	-3.404	1.293
Women 20-24 years gave first birth by 20 years of age	-4.028	-0.569	-2.702	0.949
Family Planning				
Married women using any contraceptive method	-1.514	8.615	1.419	2.276
Married women using modern contraceptive method	-1.495	6.801	1.434	1.883
Unmet need of spacing	-5.127	1.511	-1.989	1.615
Unmet need of limiting	-2.284	6.917	-0.793	2.526
Unmet need of family planning	-3.470	1.740	-1.636	1.579
Total demand of family planning	-0.764	2.137	0.577	0.696
Antenatal, natal, and postnatal care				
Antenatal care from skilled provider	0.015	5.932	1.092	1.438
Antenatal care (4+ visits)	-0.239	7.841	3.279	2.425
Assistance at delivery from skilled health person	0.329	8.224	3.484	2.239
First checkup within 2 days after delivery	0.525	24.573	5.821	6.008

Source: Authors

Discussion and Conclusions

India has undergone significant social and economic transformation during the last several decades including substantial gains in the fields of health and education. From being considered a lower-income country, it became a lower-middle-income country in 2009 and is on way to achieving the goal of becoming an upper-middle-income country (World Bank,

2022). The Human Development Index (HDI) of the country increased by 1.5 times between 1990 and 2021 as the result of different policies and reforms undertaken by the government. The present analysis suggests that the country has achieved remarkable gains in the reproductive health of women also. At the national level, all the 24 indicators of reproductive health considered in the present analysis have shown improvement during the last three decades, although the progress, as measured in terms of the average annual per cent change (AAPC), has been different in different indicators. This improvement in the reproductive health status of women during the last three decades is a reflection of the success of government efforts towards meeting the reproductive health needs of women. The analysis, however, reveals that the progress in reproductive health has not been consistent throughout the period under reference. Similarly, there exists significant income inequality in the reproductive health of women in the country as there are notable differences in all indicators of reproductive health by the level of income. The efforts and interventions directed towards improving the reproductive health of women needs to be focused more on the poorest and the most vulnerable section of the population to reduce the income inequality in the reproductive health status of women. The analysis also shows that, within the country, the progress in reproductive health of women has varied widely across the constituent states and Union Territories and there are states/Union Territories in which progress in some of the reproductive health indicators included in the present analysis has been negative. This may be a cause of concern to health policy makers and programme managers. Some of the variation in the progress in different indicators of reproductive health may be due to the fact that the reproductive health status of women is different states/Union Territories of the country. In any case, the reasons for the negative progress in some reproductive health indicators in some states/Union Territories of the country, as revealed through the present analysis needs to be looked into from the policy and programme perspective. There may be factors endogenous to the health care delivery system and factors exogenous to the health care delivery system that may be responsible for the negative progress in some indicators related to the reproductive health of women. These factors need to be addressed at both policy and programme levels as there is still considerable scope for improvement in the reproductive health of the women of the country. There is noticeable variation in the reproductive health of women within the country, across states and Union Territories. A reduction in the within country disparity in the reproductive health of women may go a long way towards an accelerated improvement in the reproductive health of women of the country.

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Appendix Table: Average annual per cent change (AAPC) in different reproductive health indicators during 1992-2021 in states/Union Territories.

State/ Union Territory	Reproductive health indicator																							
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.3	3.3	3.4	3.5	4.1	4.2	4.3	4.4
AN Islands	-4.76	-6.63	-0.52	6.73	-2.61	NA	-1.59	-6.67	-0.52	-2.25	18.52	4.44	-2.61	-3.42	6.56	4.32	-5.49	0.00	-2.87	4.40	-2.06	-1.67	-0.18	2.86
Andhra Pradesh	-4.28	-2.29	-0.59	5.85	11.11	NA	-1.23	-5.78	-2.11	-2.66	-9.15	0.99	-2.85	-1.39	0.51	0.45	-3.58	7.41	0.48	0.48	-0.46	-1.78	1.04	3.18
Arunachal Pradesh	-3.23	-2.49	-1.72	-0.77	-2.64	-1.55	-2.41	2.14	-2.56	-2.22	-1.41	-3.06	-2.76	-2.06	4.79	4.80	-1.18	-0.18	-1.56	2.01	2.05	3.05	6.44	8.96
Assam	-2.12	-1.26	-1.93	-2.39	-2.54	-3.98	-1.89	-3.28	-1.86	-1.02	-4.89	-3.27	-1.82	-1.42	1.45	3.44	-2.09	-1.59	-2.19	0.38	2.31	7.09	8.22	24.57
Bihar	-2.75	-0.38	-1.20	-3.10	-6.13	-5.17	-1.85	-4.91	-2.49	-1.43	-6.16	-3.19	-1.84	-0.54	7.05	4.91	-3.08	-3.40	-3.26	2.16	6.13	7.14	12.33	18.49
Chandigarh	-12.22	0.00	-6.59	6.57	-0.82	NA	-2.78	8.33	-4.11	0.00	NA	4.27	-5.02	0.00	1.02	-0.99	8.64	-0.49	2.12	1.11	-1.11	0.49	-0.30	-1.28
Chhattisgarh	-6.50	-1.62	-0.51	-1.90	-3.08	-5.86	-2.31	-7.85	-7.07	-4.67	-8.40	-8.03	-6.27	-1.75	1.79	1.67	-2.60	-0.81	-1.61	1.24	1.08	7.12	7.25	19.00
Goa	0.07	-1.83	-1.88	-0.85	1.07	1.14	-1.25	-5.28	-3.14	-3.14	-8.62	-3.34	-3.25	-0.99	4.13	3.90	-2.21	-0.87	-1.70	1.50	0.11	0.43	0.33	1.83
Gujarat	-2.80	-1.70	-0.80	-1.43	-1.85	-2.18	-1.56	0.35	-1.14	-1.42	-3.99	-2.34	-2.13	-1.44	1.53	0.74	-0.83	2.92	0.94	0.81	2.06	2.99	3.06	4.25
Haryana	-4.89	-2.08	-1.29	-1.85	-3.13	-4.08	-2.41	-3.62	-3.85	-2.49	-7.27	-5.20	-3.54	-2.00	1.54	1.21	-1.89	-1.35	-1.80	0.74	1.02	4.88	4.86	7.57
Himachal Pradesh	-3.19	-2.38	-1.19	0.79	-3.03	4.63	-1.82	-2.75	-4.51	-3.48	1.21	-4.91	-4.03	-1.15	1.16	0.86	-1.10	1.73	0.03	0.48	0.52	5.77	5.31	9.07
Jammu& Kashmir	-5.25	-3.90	-2.19	-0.40	-1.51	-2.85	-2.57	-3.28	-4.16	-4.47	-3.48	-4.14	-4.25	-1.67	0.71	1.06	-2.67	-1.74	-2.44	0.02	0.69	3.51	4.45	5.20
Jharkhand	-3.71	-0.99	-2.05	-2.73	-3.98	-4.84	-2.22	-6.01	-3.73	-2.08	-7.96	-5.15	-3.10	-0.66	4.54	3.63	-4.57	-4.00	-4.30	1.53	2.74	6.02	11.56	19.28
Karnataka	-3.59	-1.09	-0.78	-1.47	-2.14	-4.85	-1.63	-4.85	-3.01	-1.83	-5.81	-4.54	-2.85	-1.45	1.50	1.61	-3.50	-1.95	-3.15	0.48	1.46	0.77	2.43	3.50
Kerala	-2.25	-0.77	0.21	1.31	1.42	3.03	-0.30	-6.17	-4.44	-2.24	1.82	-5.51	-2.87	-0.12	0.00	-0.07	-0.22	1.56	0.42	-0.04	0.02	-0.24	0.34	0.52
Lakshadweep	-16.67	0.34	-8.68	0.80	-10.02	6.67	-4.94	NA	-7.02	1.29	NA	NA	-4.17	-5.56	17.13	20.38	-8.22	-0.52	-6.05	8.73	0.00	2.48	0.00	-0.59
Madhya Pradesh	-5.17	-1.78	-1.64	-3.66	-5.62	-5.17	-2.68	-8.06	-4.88	-2.95	-9.48	-6.52	-4.21	-1.75	2.17	1.79	-1.92	-3.21	-2.51	1.27	0.63	9.44	9.22	12.77
Maharashtra	-3.40	-1.49	-0.95	-0.65	0.00	0.00	-1.81	-4.97	-2.84	-1.86	-6.27	-3.90	-2.64	-1.40	0.78	0.73	-2.67	-0.09	-1.43	0.36	0.95	2.38	2.28	3.25
Manipur	0.58	-1.01	-1.14	-0.76	-0.10	2.38	-0.80	-1.03	-1.19	-1.77	0.13	-1.23	-1.78	-0.45	5.27	-0.16	1.51	0.78	0.37	1.22	1.47	6.16	3.19	4.03
Meghalaya	-1.36	-0.70	-0.60	0.93	-1.33	-0.36	-0.63	-2.19	-1.41	-1.45	-1.36	-2.05	-1.18	-0.72	1.11	1.57	-0.56	6.92	0.58	0.67	1.97	3.45	3.78	9.45
Mizoram	-1.32	-0.93	-1.00	0.34	2.33	1.28	-0.44	1.59	-2.43	-3.14	-2.77	-3.18	-3.43	-0.30	-1.51	-1.50	1.04	4.40	1.74	-0.76	0.55	0.51	1.32	2.49
Nagaland	-2.89	-2.02	-1.92	-1.37	-0.44	1.22	-1.87	2.18	-2.87	-4.10	-4.61	-3.47	-3.83	-2.01	8.62	6.80	-2.86	-2.05	-3.06	2.14	2.86	6.07	4.47	17.00
New Delhi	-3.32	-2.26	-1.56	-0.98	-1.50	-3.27	-2.11	-4.13	-3.46	-3.07	4.97	-4.39	-3.65	-1.75	1.16	0.30	-2.99	-0.71	-1.77	0.37	0.19	1.30	2.43	4.83
Odisha	-2.39	-1.27	-1.16	-1.71	-2.68	-3.52	-1.62	-4.73	-2.76	-1.78	-6.51	-3.63	-2.47	-1.45	2.89	1.31	-5.13	-1.65	-3.47	1.12	3.51	6.36	7.21	10.70
Puducherry	1.93	-8.15	0.78	5.82	3.70	-22.22	-2.61	7.41	-9.97	-11.11	-22.22	-17.09	-10.34	-4.17	1.47	0.33	-7.41	24.76	5.89	1.96	-0.25	1.01	-0.07	1.56
Punjab	-3.20	-2.38	-1.43	-0.06	0.22	-2.67	-1.94	6.61	-1.14	-2.33	4.00	-1.24	-2.62	-1.72	0.59	0.13	-0.57	1.04	0.23	0.26	0.17	3.12	2.70	4.46
Rajasthan	-3.47	-1.10	-1.15	-2.52	-4.06	-2.99	-1.89	-2.16	-2.59	-1.61	-5.03	-3.73	-2.37	-1.88	3.33	2.76	-3.80	-2.28	-3.19	1.57	5.93	7.84	6.74	12.31
Sikkim	-3.35	-4.22	-2.86	-2.36	-4.18	1.92	-3.84	-4.57	-3.71	-3.22	-0.31	-5.53	-4.57	-2.53	1.68	1.46	-1.56	-2.30	-2.40	0.34	1.01	5.79	6.49	4.94
Tamil Nadu	-2.92	-1.22	-0.24	0.08	-0.90	-3.33	-1.09	-5.25	-3.60	-2.51	-5.79	-4.28	-2.85	-0.34	1.38	1.55	-2.93	-1.19	-2.20	0.69	0.76	1.16	1.20	0.59
Telangana	-6.30	-0.63	2.00	13.07	0.00	0.00	-1.23	-8.62	-1.58	-0.80	-6.17	-4.64	-2.85	0.00	4.23	3.78	-5.85	0.00	-3.00	3.41	0.78	-0.54	0.56	0.90
Tripura	0.72	-0.99	-1.56	-0.89	-1.66	-2.61	-1.33	-0.93	-0.60	-0.16	-1.08	-1.13	-0.57	-0.80	0.92	2.34	-1.89	-1.04	-1.57	0.43	1.16	3.44	4.85	12.06

State/ Union Territory	Reproductive health indicator																							
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.3	3.3	3.4	3.5	4.1	4.2	4.3	4.4
Uttar Pradesh	-6.36	-2.50	-1.74	-2.49	-4.32	-5.93	-3.02	-7.38	-5.89	-4.09	-6.15	-6.68	-5.50	-1.58	2.86	3.35	-3.71	-3.33	-3.51	0.95	1.46	13.21	11.86	30.09
Uttarakhand	-4.57	-2.52	-1.06	-1.34	-1.26	-5.06	-2.09	-6.86	-4.79	-2.98	-9.95	-4.76	-3.61	-1.20	1.56	0.42	-1.40	-1.31	-1.39	0.77	2.49	6.05	6.28	10.96
West Bengal	-1.29	-1.37	-2.04	-2.95	-4.12	-1.06	-1.95	-2.57	-0.84	-0.43	-3.19	-1.88	-0.83	-1.53	0.98	1.89	-3.48	-2.17	-2.90	0.30	0.84	5.29	4.91	6.81

Source: Computed by authors from data available from different rounds of the National Family Health Survey.

NA Not available