The Story of India's Population



Technical Report on:

Levels, Trends, and Determinants of Fertility in India; Population Projections and Expected Levels of Achievement for Spacing and Limiting FP Methods to Strategise and Prioritise the Programme in India



October 2013

POLICY UNIT

आरोग्यम् सुखसम्पदा

NATIONAL HEALTH MISSION
राष्ट्रीय स्वास्थ्य मिशन

USAID
FROM THE AMERICAN PEOPLE

HEALTH POLICY PROJECT

© National Institute for Heath and Family Welfare. 2014.

For more information contact:
Policy Unit, National Institute of Health and Family Welfare
Baba Gang Nath Marg, Munirka, New Delhi-110067.
tel: 91 11 26165959/26166441/26188485 | fax: 91 11 2610 1623 | Web: www.nihfw.org

Health Policy Project, Futures Group
V Floor, Building No.10/B, DLF Cybercity Phase II, Gurgaon 122002, India.
tel: +91 124 4702009 l fax: +91 124 4702042 | Web: www.futuresgroup.com

CONTRIBUTORS

1. Dr Arvind Pandey, Director National Institute of Medical Statistics
2. Dr Jayachandran, Senior Technical Specialist, Research and M&E, Health Policy Project, Futures Group
3. Dr Sathyanarayana KM, National Program Officer, United Nations Fund For Population Activities
4. Prof Pushpanjali Swain, Department of Statistics and Demography, National Institute of Health and Family Welfare
5. Prof Arokiasamy, International Institute for Population Sciences, Mumbai
6. Dr Neeta Rao, Research and Evaluation Specialist, United State Agency for International Development
7. Dr Vishal Dev Shastri, Head of Research and Learning, BBC Media Action India
8. Dr Ashish Mishra, Technical Specialist, Health Policy Project, Futures Group
9. Mr Jay Prakash, Technical Expert, Policy Unit, National Institute of Health and Family Welfare
10. Ms Ayusmati Das, Data Analyst, Policy Unit, National Institute of Health and Family Welfare

FOREWORD

CONTENTS

		Page No.
	List of Tables …….....	8–9
	List of Figures …….....	10
	Acknowledgements …….....	11
	Executive Summary …….....	13–20
	Abbreviations …….....	21
	SECTION 1	
Chapter 1	**Introduction**	**23–25**
1.1	Background	
1.2	Objectives of the Study	
1.3	Data & Methods	
1.4	Organisation of the Report	
Chapter 2	**Trends in Fertility and Mortality Indicators in India and Selected States**	**26–35**
2.1	Population and Growth Rate in India and EAG States	
2.2	A Closer Look at the Levels and Trends in Fertility in India and EAG States	
2.2.1	Steady Decline in the Crude Birth Rate	
2.2.2	Age-specific Fertility Rates: Heterogeneity across the EAG States and in India	
2.2.3	Total Fertility Rate: Drop in fertility in big EAG states very recent and a long way to go before stabilisation is achieved	
2.2.4	Birth Order: Varying rates of decline	
2.3	Levels and Trends of Selected Proximate Determinants of Fertility among the EAG States	
2.3.1	Age at Marriage	
2.3.2	Couples Currently and Effectively Protected by Various Family Planning Methods	
2.3.3	Contraceptive Prevalence Rate: High unmet need despite increased use	
2.3.3.1	Method Mix: Nationally female sterilisation outstrips the use of other family planning methods	
2.3.3.2	Trends in acceptance of various family planning methods – Service Statistics	
2.3.3.3	Unmet Need for Contraception: Highest in Bihar, Uttar Pradesh and Jharkhand	
2.4	Points for Discussion	
Chapter 3	***Population Projections and Expected Levels of Achievement for***	**36–65**

India and EAG States

3.1 Introduction

3.2 Population Projections and ELAs: Input and Assumptions

3.2.1 DemProj: Inputs and Assumptions

3.2.2 FamPlan: Inputs and Assumptions

3.3 Child Survival

3.4 Method Attributes and Effectiveness

3.5 Outputs of Population Projection and ELAs

3.5.1 Population of India and Selected States

3.5.2 Population by Select Age Groups

3.5.3 Implied Total Fertility Rates

3.5.4 Implied Contraceptive Prevalence Rate

3.5.5 Mortality Indicators: Infant Mortality Rate and Under Five Child Mortality Rate

3.5.6 Projected Number of Married Women in Reproductive Age

3.6 Repositioning Family Planning in India

3.6.1 Number of Users of Spacing Methods

3.6.2 Users of Limiting Methods

3.6.3 Number of Acceptors of Spacing Method

3.6.4 Number of Acceptors of Limiting Methods

3.7 Conclusion

3.8 Limitations

ANNEXES

For Chapter 1 67–72

For Chapter 2 73–90

For Chapter 3 91–123

References: Section 1 124–126

SECTION 2

Chapter 4	***Determinants of Children Ever Born and Period Parity Progression Ratios in Eight EAG States of India***	**128–141**
4.1	Introduction	
4.2	Objective	
4.3	Data and Methodology	
4.4	Parity Progression Ratios in Eight EAG States and India	
4.5	Bivariate Distribution of Children Ever Born by Selected Characteristics in the EAG States of India	
4.6	Multinomial Logit Regression Results	
4.7	Adjusted Probabilities of Being in Different Categories of Children Ever Born or Parities by Selected Background Characteristics in EAG States	
4.8	Conclusion	
Chapter 5	***Analysing Proximate Determinants of Fertility***	**142–159**
5.1	Introduction	
5.2	Objectives	
5.3	Overview of the Intermediate Fertility Variables	
5.4	Data Sources	
5.5	Methods of Estimation	
5.6	Decomposition of a Change in Fertility between Two Points in Time	
5.7	The Recent Decline of Fertility in India	
5.8	Role of Proximate Determinants	
5.9	Results and Discussion	
5.10	Conclusion	
Chapter 6	***Recommendations***	**160-161**
	Technical Note	**163-165**
	ANNEXES	
	Chapter 4	166–169
	Glossary of Terms	170–173
	References: Section 2	174–175

TABLES

		Page No.
	SECTION 1	
3.1	*Age-specific fertility rate in proportion, India and selected states, for base year, 2011*	37
3.2	*Expectation of life at birth and the proposed annual increment by sex, India and selected states, 2011*	38
3.3	*Implied sex ratio at birth, India and selected states, 2011*	39
3.4	*Net migration rate by sex per 100 persons, 2001*	40
3.5	*Method mix scenarios considered for projection of ELAs*	42
3.6	*Method mix scenarios considered for population projection and ELAs*	47
3.7	*Proximate determinants of fertility, India and selected states*	49
3.8	*Indicators of child survival, India and selected states*	50
3.9	*Method attributes for India and selected states*	50
3.10	Effectiveness of contraceptive methods, India and states	51
3.11	Projected population under two different scenarios of method mix, India and selected states	53
3.12	Implied annual growth rate of population, India and states, 2012–2022	54
3.13	Population ages 0–14, 65+, and female population 15–49 (per cent), India and states, 2012–2022	55
3.14	Implied infant and under-5 mortality rates, India and states, 2012–2022	56
3.15	Projected number of married women in reproductive age	57
3.16	Number of users of spacing methods, India and states, 2011–2022	59
3.17	Number of sterilisation users, India and states, 2011–2022	61
3.18	Number of acceptors* of spacing methods, India and states, 2011–2022	62
3.19	Number of acceptors of limiting methods, India and states, 2011–2022	64

	SECTION 2	
4.1	Multinomial logit regression coefficients of the model with CEB1, CEB2, CEB3, CEB4, with CEB 0 as the reference category in the response variable, EAG states	133
4.2	Multinomial logit regression coefficients of the model with CEB 1, CEB2, CEB3, CEB4, with CEB 0 as the reference category in the response variable for women aged 40-49 in EAG states	135
4.3	Multiple Classification Analysis results of adjusted values of probabilities (pj) from the model of CEB1, CEB2, CEB3, CEB4 with CEB0 as Reference Category* for women 40-49 in the EAG States	137
4.4	Multinomial logit regression coefficients of the model with CEB 1, CEB2, CEB3, CEB4, with CEB 0 as the reference category in the response variable for sterilised women at any age and non-sterilised women aged 40-49 in EAG states	138
4.5	Multiple Classification Analysis Table of adjusted values of probabilities (pj) from the model of CEB1, CEB2, CEB3, CEB4 with CEB0 as Reference Category* for sterilised women at any age and non-sterilised women aged 40-49 in the EAG States	139
5.1	Change in total fertility rate, India and selected states, 1992–2005	148
5.2	Proportion of women married, India and selected states, 2005–06	150
5.3	Total fertility rate, total marital fertility rate, and index of marriage, India and selected states, 2005–06	150
5.4	Current use of modern contraception, India and selected states, 2005–06	151
5.5	Abortion rate, India and selected states, 2005–06	152
5.6	Index of postpartum amenorrhea, India and selected states, 2005–06	153
5.7	Value of intermediate fertility indices, India and selected states, 2005–06	154
5.8	Total fertility rate, total marital fertility rate, total natural marital fertility rate, and total fecundity rate, India and selected states, 2005–06	155
5.9	Decomposition of the change in TFR due to proximate determinants between 1992 and 2005	158

FIGURES

		Page No.
	SECTION 1	
2.1	India's population (in millions) and decadal growth rate, 1901–2011	27
2.2	Growth rates of India, EAG states and all non-EAG states, 1951–61 to 2001–11	28
2.3	Age-specific fertility pattern in India, SRS	28
2.4	Trend in higher-order births in India and selected EAG states with higher birth order since 2005	31
2.5	Percentage effective couple protection rate, India and selected states	32
2.6	Contraceptive prevalence rate (any modern method), EAG states	33
3.1	Trend in proportional share of population, eight EAG and non-EAG states of India	52
3.2	Comparison between UN population projections (2013) and Policy Unit's projections for India	52
3.3	Implied TFRs, EAG states and India	55
3.4	SCENARIO A: Projected users of spacing methods in selected states of India, 2011–2022	58
3.5	SCENARIO B: Projected users of spacing methods in selected states of India, 2011–2022	58
3.6	SCENARIO A: Number of sterilisation users in selected states, 2011–2022	60
3.7	SCENARIO B: Number of sterilisation users in selected states, 2011–2022	60
3.8	Acceptors of limiting methods, India	63
	SECTION 2	
4.1	Parity progression ratios of currently married women, India and selected states	130
4.2	Children ever born, by age of women, EAG states of India	132
4.3	Children ever born, by age at marriage, EAG states of India	132
4.4	Children ever born, by current contraception use, EAG states of India	132
4.5	Children ever born, by experience of any child died, EAG states of India	132
4.6	Children ever born, by women's educational label, EAG states of India	132
4.7	Children ever born, by wealth index, EAG states of India	132
5.1	Change in fertility levels (TFR), India and selected states, 2005–06	148
5.2	Contribution of proximate determinants in fertility decline, India and selected states, 2005–06	156
5.3	Contribution of proximate determinants in fertility decline, India and selected states, 1992–93	157

ACKNOWLEDGEMENTS

This Technical Report is the result of a concerted collaboration between the Health Policy Unit within the National Institute of Health and Family Welfare (NIHFW) and the Family Planning Division of the Ministry of Health and Family Welfare (MoHFW). The Technical Report presents the population trends and determinants of fertility in India and the expected level of achievements for spacing and limiting family planning methods to strategise and prioritise for the family planning programme in India in the near term. We are grateful to the family planning division for entrusting the assignment to the Policy Unit. We thank Dr S.K. Sikdar, Deputy Commissioner and Family Planning In-Charge, MoHFW, for his proactive engagement through review and several discussions to develop the report.

The Technical Report is developed under the able and technical guidance of the Expert Group constituted by the NIHFW and Chaired by Dr Arvind Pandey, Director, National Institute of Medical Statistics. We are hugely grateful to the Chairperson and members of the expert group, who provided leadership and technical guidance, and very capably vetted the data, projections, and the report. We acknowledge the contributions of the members, including Dr Sathyanarayana KM, National Program Officer, United Nations Population Fund; Professor Pushpanjali Swain, Department of Statistics and Demography, NIHFW; Professor Arokiasamy, Department of Development Studies, International Institute for Population Sciences, Mumbai; Dr Neeta Rao, Research and Evaluation Specialist, USAID; Dr Vishal Dev Shastri, Head of Research and Learning, BBC Media Action India; and Dr Jayachandran AA, Senior Technical Specialist Research and M&E, Health Policy Project, Futures Group.

Special thanks to the members of the Steering Committee—Prof A.K. Sood, Department of Education and Training, NIHFW; Prof Mathiyazhagan, Head of Department of Communication, NIHFW; Prof Thaneshwar Bir, Department of Social Science, NIHFW; Dr Renu Shaharawat, Asst. Prof, Department of Reproductive Biomedicine, NIHFW; and Dr K. S. Nair, Asst. Prof, Department of Planning and Evaluation, NIHFW, for their time to review the analysis.

We acknowledge the members of the Advisory Panel of the Policy Unit for review and feedback on the report. A special mention to Mr A. R. Nanda, Former Secretary, MoHFW and Chairman of the Advisory Panel; Ms Meenakshi Datta Ghosh, Former Principal Advisor (Health), Planning Commission; Dr Dinesh Agarwal, Ex. Chief Country Technical officer, UNFPA, India; Dr Suneeta Sharma, Managing Director, Futures Group; Dr Avina Sarna, Country Director, Population Council; Ms Poonam Muttreja, Executive Director, Population Foundation of India; Dr T. Sundaraman, Executive Director, National Health Systems Resource Centre; and Prof Suneeta Mittal, Director & Head, Obstetrics & Gynaecology, Fortis Memorial Research Institute.

We thank Dr (Prof) J.K. Das, Director, NIHFW, for his continued guidance and participation in Expert Group meetings. We warmly acknowledge the contributions of Dr (Prof) N. K. Sethi, Professor and Head, Department of Planning and Evaluation, who invested his time in providing necessary inputs and steering the discussions. We also give special thanks to Dr R.K. Srivastava, Senior Policy Analyst, who enthusiastically supported and capably facilitated several consultations.

We also thank the USAID and Health Policy Project for their valuable support and guidance. A special mention goes to Sheena Chhabra, Team Leader, Health Systems Division, USAID, and Himani Sethi, Team Leader Health Policy Project.

Finally, we acknowledge the sincere and hard work of the members of the working group, including Dr Ashish Mishra, Technical Specialist, Health Policy Project; Dr Rajna Mishra, Former Technical Specialist, Health Policy Project; Mr Jay Prakash, Technical Expert, Policy Unit, NIHFW; and Ms Ayusmati Das, Data Analyst, Policy Unit, who undertook the analysis and projections, and developed the report.



Photo: Jignesh Patel. © Futures Group

EXECUTIVE SUMMARY

Background: India has witnessed a steady decline in its population growth rate over the last four decades (1971–2011). The fertility rates have fallen by 2.7 per cent per annum (2.8 to 2.5) over the 2006–10 period—a faster decline than the decline of 1.6 per cent per annum (3.1 to 2.9) in the preceding five years. Despite this steady decline, India has missed and postponed its fertility goals time and again. The goal of achieving the replacement level of fertility has now been deferred to 2017. As per the latest Sample Registration System (SRS) 2012 estimates twenty-one states and union territories (UTs) have achieved the replacement level of fertility, though fertility remains high in several states, highlighting different stages of demographic transition among the states, leading to difference in their timelines to achieve population stabilisation.

Seven states with high fertility rates are Bihar (3.6), Uttar Pradesh (UP) (3.4), Madhya Pradesh (MP) (3.1), Rajasthan (3.0), Jharkhand (2.9), Chhattisgarh (2.7), and Assam (2.4), of which six belong to the empowered action group (EAG[1]) states. All of the EAG states and Assam also collectively account for the highest number of births, as well as infant, under-five, and maternal deaths in the country, bringing a focus on poor maternal and child health (MCH) indicators and their correlations with high fertility rates. Reducing maternal and child mortality are integral to the National Rural Health Mission (NRHM), and the government has made strategic investments to improve the MCH indicators in the country, with a specific focus on high-fertility states. More recently, acknowledging the need for a more focused approach to improve maternal and child healthcare, the Government of India (GoI) has undertaken a strategic approach to reproductive, maternal, newborn, child, and adolescent health (RMNCH+A) to strengthen efforts towards improving maternal health and child survival in India.

Purpose of the Technical Report: With renewed emphasis on family planning (FP), the FP Division at the Ministry of Health and Family Welfare (MoHFW) undertook the development of this Technical Report, which describes the changing fertility dynamics, especially among the EAG states and Assam, and develops population projections and expected levels of achievement (ELAs) to meet the unmet need for family planning. The population projections will chart the future course of population dynamics, estimate the resources required for family planning, and highlight the different states' contributions to the achievement of the country's replacement level of fertility.

Methodology: The Technical Report was commissioned by the FP Division, MoHFW to the Health Policy Unit at the National Institute of Health and Family Welfare (NIHFW). NIHFW constituted an expert group under the Chairmanship of Dr Arvind Pandey, Director, National Institute of Medical Statistics (NIMS), with experts from various technical organisations as part of the group. The expert group provided technical direction for estimating the population projections and ELAs and reviewed the Technical Report.

Geographic Coverage: The suggested states by the FP Division included the EAG states, Assam and India, along with two non-EAG states (Andhra Pradesh–AP, and Tamil Nadu–TN), which have already achieved replacement level of fertility. The two non-EAG states of AP and TN have been considered because of their recent demographic achievements despite socioeconomic conditions that have not improved.

Data Sources: Data collated from various sources have been used for the analysis, including Census publications, Sample Registration System (SRS) Bulletins, three rounds of National Family Health Surveys (NFHS), District Level Household and Facility Survey (DLHS), Annual Health Survey (AHS), and Family Welfare Statistics in India (of MoHFW), as well as other published materials.

[1] Eight states have been designated Empowered Action Group states by the Ministry of Health and Family Welfare, Government of India, on the basis of their high fertility and weak socio-demographic indicators. These include Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Odisha, Rajasthan, Uttar Pradesh and Uttarakhand. The Center is facilitating focused efforts to promote the Reproductive and Child Health Programme in these states.

Tools: The population projections in this Technical Report have been made using the *Spectrum Suite* of computer models. In particular, *DemProj* and *FamPlan* have been used to project the population and FP requirements needed to reach the state and national goals to address unmet FP need. Decomposition of fertility followed two steps: (1) analysis of proximate determinants of fertility, by applying Bongaarts' framework (later reformulated by Stover in 1998); and (2) analysis of effects of various socioeconomic variables on change in parity progression ratio (PPR), using multivariate analysis. Through these two analyses, a comprehensive picture has been presented of different factors that affect changes in fertility in the country and the states.

Key Highlights of the Technical Report

The findings of the analysis of the levels of and trends in population growth, fertility, mortality, and contraceptive prevalence rate (CPR) and method mix are presented below:

Population growth:

- In the period 2001–11, India, for the first time since 1921, added fewer people to its population compared to the previous decade.
- The EAG states have seen a significant fall in their growth rates in this decade (2001–11).
- UP's growth rate has declined by 5.7 percentage points, and Rajasthan has seen a bigger decline of 7 percentage points.

Fertility Indicators:

- Encouraging trends in fertility: There was an improvement in most of the indicators of fertility—crude birth rate (CBR), age-specific fertility rate (ASFR), total fertility rate (TFR), and birth order, along with proximate determinants of fertility—age at marriage, couple protection rate, contraceptive prevalence rate, and unmet need for contraception.
- Crude Birth Rate (CBR): Among the EAG states, UP and Bihar recorded much higher CBR, at 28 per 1,000 population in 2011, whereas Uttarakhand (18.9) and Odisha (20.1) were at the bottom of the table, having recorded less than the national average.
- Age-specific Fertility Rate (ASFR): The trend in ASFR across the EAG and non-EAG states reveals a decline across the age groups in the states, though at a different tempo, with the EAG states lagging behind.
- Total Fertility Rate (TFR): The second highest annual decline of 0.8 in TFR was recorded in phase one of NRHM, after the 0.9 decline observed in 1981–91.
- Higher Order Birth: The overall decline during the last two decades was more than 35 per cent for the country. A rapid decline of about 20 per cent was observed in the last five years (2006–11).

Proximate Determinants of Fertility:

- Age at Marriage: The mean age at marriage in India is 21.2, which has gone up moderately from 20.2 in 2005. Among the EAG states, Odisha has the highest mean age at marriage (21.4); it is the lowest in Chhattisgarh (20.2).
- The national-level modern CPR has steadily increased from 36 per cent in NFHS-1 (1992–93) to 47 per cent in DLHS-3 (2007–08).
- Uttarakhand, Rajasthan, and MP have shown creditable performances by achieving modern CPR of more than 55 per cent.
- Method Mix: Female sterilisation is the primary method of family planning in the all the EAG states, including India and other non-EAG states. Method mix has not changed over the period of time.
- Unmet Need for Contraception: As per all the surveys except NFHS-3, the unmet need for family planning is hovering around 19–21 per cent at the national level. As per NFHS-3, it was 12.8 per cent.
- Bihar recorded the highest unmet need of 39 per cent. Almost all the EAG states have shown higher levels of unmet need in the latest AHS survey. The lowest unmet need was recorded in Rajasthan.

With an overarching goal of meeting the unmet need for family planning in the near term, the population projections are estimated for the period 2012–22. The selected states (EAG states and Assam) and India were divided into two groups (*Group 1*–Bihar; Chhattisgarh; MP; Jharkhand and Rajasthan; and *Group 2*–Assam; Odisha; UP; Uttarakhand and India). Group 1 consists of a higher proportion of users of limiting methods and a relatively higher proportion of unmet need for spacing methods, currently; Group 2 consists of a higher proportion of spacing method users and a fairly equal proportion of unmet need for both spacing and limiting methods, currently.

The projections considered two scenarios: Scenario A, with the change in method mix proposed (based on the state's current level) for the projection period (2011–22); and Scenario B, in which the method mix will remain unchanged during the projection period (2011–22).

The tables below detail the method mix scenarios considered for population projections and ELAs.

	Scenario A : Method Mix											
State	**Method Mix 2011 (Current)**						**Method Mix 2022 (Assumed)**					
	Condom	**Female sterilisation**	**IUD**	**Male sterilisation**	**Pill**	**Total**	**Condom**	**Female sterilisation**	**IUD**	**Male sterilisation**	**Pill**	**Total**
Uttar Pradesh	32.1	54.9	3.0	0.6	9.4	100.0	14.0	68.6	8.6	1.2	7.6	100.0
Madhya Pradesh	10.2	83.8	0.9	1.8	3.3	100.0	15.0	71.7	6.2	1.8	5.3	100.0
Bihar	4.4	89	1.4	0.8	4.4	100.0	10.0	78.8	3.9	1.1	6.2	100.0
Rajasthan	15.9	76.9	1.7	0.7	4.8	100.0	19.9	66.0	5.7	1.6	6.8	100.0
Odisha	4.8	68.5	0.7	0.7	25.3	100.0	6.0	74.0	3.0	1.0	16.0	100.0
Jharkhand	8.7	76.8	2.1	1.3	11.1	100.0	12.0	67.9	5.1	2.0	13.0	100.0
Chhattisgarh	2.6	92.4	0.8	2.0	2.2	100.0	10.0	78.0	3.6	3.0	5.4	100.0
Uttarakhand	28.9	59.1	1.8	2.7	7.5	100.0	20.0	67.3	3.2	2.5	7.0	100.0
Assam	8.5	35.6	3.7	0.6	51.6	100.0	10.0	50.4	3.7	0.6	35.3	100.0
Andhra Pradesh**	0.7	93.9	0.7	4.3	0.4	100.0	1.6	92.7	0.3	4.5	0.9	100.0
Tamil Nadu**	3.8	91.7	3.5	0.7	0.3	100.0	5.7	87.7	5.1	1.0	0.5	100.0
India	13.0	72.1	1.7	1.3	11.9	100.0	11.7	70.1	5.4	4.9	7.9	100.0

State	Scenario B: Method Mix											
	2011 (Current)						2022 (Same proportion kept for projection period as 2011)					
	Condom	Female sterilisation	IUD	Male sterilisation	Pill	Total	Condom	Female sterilisation	IUD	Male sterilisation	Pill	Total
Uttar Pradesh	32.1	54.9	3	0.6	9.4	100.0	32.1	54.9	3	0.6	9.4	100.0
Madhya Pradesh	10.2	83.8	0.9	1.8	3.3	100.0	10.2	83.8	0.9	1.8	3.3	100.0
Bihar	4.4	89.0	1.4	0.8	4.4	100.0	4.4	89.0	1.4	0.8	4.4	100.0
Rajasthan	15.9	76.9	1.7	0.7	4.8	100.0	15.9	76.9	1.7	0.7	4.8	100.0
Odisha	4.8	68.5	0.7	0.7	25.3	100.0	4.8	68.5	0.7	0.7	25.3	100.0
Jharkhand	8.7	76.8	2.1	1.3	11.1	100.0	8.7	76.8	2.1	1.3	11.1	100.0
Chhattisgarh	2.6	92.4	0.8	2	2.2	100.0	2.6	92.4	0.8	2	2.2	100.0
Uttarakhand	28.9	59.1	1.8	2.7	7.5	100.0	28.9	59.1	1.8	2.7	7.5	100.0
Assam	8.5	35.6	3.7	0.6	51.6	100.0	8.5	35.6	3.7	0.6	51.6	100.0
Andhra Pradesh**	0.7	93.9	0.7	4.3	0.4	100.0	0.7	93.9	0.7	4.3	0.4	100.0
Tamil Nadu**	3.8	91.7	3.5	0.7	0.3	100.0	3.8	91.7	3.5	0.7	0.3	100.0
India	13.0	72.1	1.7	1.3	11.9	100.0	13.0	72.1	1.7	1.3	11.9	100.0

Outputs of Population Projections and Expected Levels of Achievement (ELAs):

Population trends:

- India's population is likely to exceed 1.306 billion by 2017 before reaching 1.381 billion in 2022. The country is likely to add 170 million persons during the next decade, which is about 10 million fewer people added compared to the last decadal increase.
- A rising trend in the contribution of EAG states' populations to the total population of the country (43.4% in 1991, 44.6% in 2001, and 46% in 2011) has been observed. The population share of eight EAG states and Assam is likely to increase from 46.05 per cent in 1991 to 49.70 per cent in 2022, and the population of the EAG states is likely to cross the combined population of all 26 non-EAG states/UTs between 2020 and 2022.
- As per the projections, the proportion of four EAG states—UP, MP, Bihar, and Rajasthan—to the country's population is likely to increase from 36.8 per cent in 2011 to 40 per cent in 2022.
- The projected per cent population in the 0–14 year age group shows a continuous decline over a period of time across all the states and India. The north Indian states have a window of opportunity to utilise the demographic dividend, as a large number of working people will enter into the job market. This group of people will also require access to FP services and products in order address the unmet need for family planning.

Implied Total Fertility Rates:

- India is likely to achieve the replacement level of fertility (2.1) before 2020. Fertility rates projections for 2022 for larger EAG states like Bihar and UP are 2.3 and 2.4, respectively. Major states like Bihar, UP, and Rajasthan are likely to achieve TFR of 2.1 by 2030.

Implied Contraceptive Prevalence Rates:

- Results indicate that modern CPR would reach a level of 57.7 by meeting 60 per cent of unmet need by 2022.

Method Mix:

- The contribution of spacing methods went up from 15.8 per cent (1998–99) to 20.9 per cent (2005–06) and, according to DLHS-3 (2007–08), the contribution by all spacing methods is 23.3 per cent—a definite break-away from the usual method-mix pattern, dominated by limiting methods, especially female sterilisation.
- The projections show an increasing trend for both spacing and limiting methods according to the projected figures for ELAs in India and EAG states.
- There is a significant increase in the projected figures in UP in the number of users of limiting methods from the current level to the end of the projected period (2022), though figures show only a marginal increase in the number of projected users of limiting methods in the other EAG states.

Infant Mortality Rate (IMR):

- Despite a declining infant mortality rate (IMR), India is likely to fall short of achieving its Millennium Development Goal (MDG) of bringing down its IMR to 28 per 1,000 live births by 2015. As per the projection results, the IMR and under-five mortality goal may not be achieved by any of the EAG states or AP.

Projected Number of Married Women of Reproductive Age (MWRA):

- UP has the largest number of married women in the reproductive age group, which is more than one-third of the total number of married women in EAG states. Combining UP and Bihar, the proportion of married women would constitute more than half of the married women in the reproductive age group (54.3%) in the EAG states and more than one-fourth (25.6%) of the country's married women in the reproductive age group by 2022.
- The number of married women in the reproductive age group will increase over the period of time. UP has the largest number of married women in the reproductive age group, which is more than one-third of the total number of married women in EAG states. Combining the UP and Bihar proportion of married women would constitute more than half of the married women in the reproductive age group (54.3%) in the EAG states and more than one-fourth (25.6%) of the country's MWRA by 2022.

Users and Acceptors of Spacing Methods:

- The outputs of 'Scenario A' show a faster increase in the number of users of spacing methods for MP, Bihar, and Rajasthan and a marginal increase in users of spacing methods for other states. As per 'Scenario B,' the users of spacing methods in India and the states will increase at a slower pace than 'Scenario A'—an increase from 33.7 million in 2013 to 42.68 million in 2022 among users of spacing methods. In comparison to 'Scenario B,' the number of acceptors of spacing methods will increase faster in the case of 'Scenario A.' UP, MP, Bihar, and Rajasthan will have the largest number of acceptors of spacing methods due to their huge base population. Further, the rest of the states will have relatively fewer numbers of acceptors of spacing methods, due either to a smaller base or the states' high sterilisation focuses.

Acceptors of Limiting Methods:

- As per the projection results while meeting the unmet need, an increase will be seen in the number of sterilisation acceptors over a period of time. 'Scenario A' shows that sterilisation acceptors are likely to increase from 5.17 million in 2011 to 6.07 million by 2022. 'Scenario B' shows that the number of sterilisation acceptors in India will increase from 5.14 million to 5.63 million by 2022.

The multivariate analysis on high parity progression presents the analysis of measuring the impact of selected demographic and socioeconomic factors on fertility decline. The results highlight the following:

- There is a higher probability of higher parities, especially three and four plus, among women who marry early, do not use modern contraceptive methods, and experience infant or child death during their family-building career.

- EAG states are more likely to move from lower to higher parity compared to their counterparts from non-EAG states.
- Among EAG states, progression to third and higher parities in Odisha is lower compared to the other seven EAG states, and the slope is on par with the India's PPR.
- The slowest decline in PPR progression has been experienced in the states of Bihar and UP. The analysis emphasises the significant impact of child mortality among women in all parity categories.
- More educated women tend to have a lower number of children ever born compared to less educated or uneducated women, though it is interesting to note that women's education does not seem to play much of a role unless women cross parity two.
- Women who experience physical violence, characterising lower status in the house, depict higher fertility or children ever born.

Last, the Technical Report throws light on the proximate determinants of fertility. The findings include the following:

- Increased use of contraception (51%) has been the major cause for fertility decline in India, followed by a pattern of delayed marriage (45%). As per the analysis, abortions show no impact, and a very low decline (3%) has been caused by postpartum infecundability.
- Among the EAG states, delayed marriage has contributed to fertility decline the most in UP (42%) and the least in Rajasthan (23%).
- Variations in two major factors—marriage and contraception—are the primary proximate causes of fertility differences among EAG states. The decomposition analysis conducted to assess the magnitude of change caused due to the proximate determinants shows the use of contraception and delay in age at marriage as major contributing factors in fertility decline.
- Among the EAG states, the use of contraception has led to the decline in fertility levels most in the states of MP and Uttarakhand, while Bihar and UP have shown the lowest effect of contraception in explaining fertility decline.
- As per data from NFHS-2, abortion has not impacted fertility control, though there has been evidence that fertility in TN has been impacted by abortion.
- The estimated duration of postpartum insusceptibility ranged between 11 months in Rajasthan to about 14 months in Bihar and Jharkhand among the EAG states. The contribution of postpartum insusceptibility varies between states as per the length of breastfeeding and sexual abstinence. The mean duration of breastfeeding ranges from 7.4 months in TN and 13.3 months in Bihar and Jharkhand.
- Mean length of sexual abstinence for India is estimated at 5 months, varying between 3.9 months in Rajasthan and 8.9 months in Odisha. AP, TN, and Odisha show the maximum impact of postpartum insusceptibility among all the states under study, implying that these states will show an increase in fertility if breastfeeding practices are changed.

Recommendations: Though there is a perceptible improvement in the levels of and trends in fertility among the EAG states, these gains need to be accelerated. An emphasis needs to be placed on providing impetus to the efforts being made in these states to achieve replacement level of fertility and place them in the final stage of demographic transition.

The analysis points to the biggest reduction in fertility with increased contraceptive utilisation, among all the proximate determinants of fertility. There is a need to put an increased emphasis on increasing the availability and utilisation of contraception (Bihar and UP), especially among women in greater need. States that have shown the lowest effect of contraception on fertility decline should place additional emphasis of their FP programmes, especially terminal methods.
Janani Suraksha Yojana (JSY) provides an opportunity for integration of MCH and FP services, which can be utilised to increase uptake of contraceptive services, especially postpartum contraception. Measures also need to be taken towards raising the age at marriage and encouraging breastfeeding practices.

Women's education plays a clear and vital role in curtailing fertility. Exposure to electronic media is also a factor for lower parity progression ratios. Motivating women to get married later, use modern contraceptives widely and use their adolescent period to achieve higher standards of education will facilitate faster reductions in fertility and improve women's health.

Some state-specific policy prescriptions for the study states are as follows:

- **MP** has enough room for effecting delayed marriages to help fertility decline. The state should take necessary steps in reaping full advantage of increasing age at marriage and, thereby, anticipate much faster fertility decline.
- **Odisha:** fertility decline in this state was attributed to two proximate determinants—change in contraceptive use and delayed age at marriage. Thus, the state has to take necessary steps to improve both age at marriage and access to contraceptive methods;
- **Rajasthan:** among the states considered for this proximate determinant analysis, Rajasthan has shown least progress in delaying age at marriage. Thus, the state should concentrate on improving the age at marriage as this would help in achieving quick changes in fertility decline.
- **UP:** change in use of contraception has had the lowest impact in fertility decline in UP. This prompts the state functionaries to focus on expanding access to FP services.
- **AP:** the state reaped the maximum benefit in fertility decline through the changes in use of contraception. The state has largely underutilised both delayed age at marriage proposition and postpartum infecundability. State planners should focus on these two aspects to improve and consolidate the situation.
- **Tamil Nadu:** fertility decline in the state was largely governed by delayed age at marriage and widespread use of contraception. More than five per cent of fertility decline has been attributed to changes in induced abortion, with a minimal attribution to postpartum infecundability. These findings point to the fact Tamil Nadu should focus more on provision of quality abortion services and take necessary steps to increase the postpartum infecundability period.

Some state-specific policy prescriptions for the study states are as follows:

- **MP:** The state is doing fairly well in meeting its ELAs, but Madhya Pradesh has enough room to affect delayed marriages to help fertility decline. The state should take necessary steps in reaping full advantage of increasing age at marriage and thereby anticipate much faster fertility decline.
- **Odisha:** Fertility decline in Odisha was attributed to two proximate determinants—change in contraceptive use and delayed age at marriage. In addition the state should work towards improving its infant and child mortality indicators to achieve the overall development goals.
- **Rajasthan:** Among the states considered for the analysis of the proximate determinants, Rajasthan has reaped lowest possible advantage of delayed age at marriage in fertility decline, though it has progresses well in terms of contraceptive use. Thus, the state should place renewed focus on improving age at marriage to accelerate fertility decline.
- **Uttar Pradesh:** Change in use of contraception seems to have the lowest impact in fertility decline in Uttar Pradesh. This prompts the state functionaries to focus on expanding access to family planning services and address the unmet need for family planning.
- **Bihar:** The state has to work hard to meet its ELAs in the coming years to achieve its fertility goals. Bihar would need to focus on delayed age at marriage and improving women's education.
- **Jharkhand:** The state has the prospect of achieving replacement level of fertility by 2021–22. Jharkhand should put in more efforts towards addressing the spacing requirements and improving the age at marriage.
- **Andhra Pradesh:** The state has reaped maximum benefit in fertility decline through changes in use of contraception. Andhra Pradesh has largely underutilised both delayed age at marriage proposition and

postpartum infecundability. Planners should focus on these two aspects to improve the skewed sterilisation programmes and consolidate the gains made by the state.

- **Tamil Nadu:** Fertility decline in the state was largely governed by delayed age at marriage and widespread use of contraception. These findings point to the that fact the state should focus more on provision of quality abortion services and take necessary steps to increase the postpartum infecundability period and finally, the skewed method mix..

Giving due consideration to these state-specific interventions would help states accelerate the achievement of the fertility goals by the states.

ABBREVIATIONS

AHS	Annual Health Survey
AP	Andhra Pradesh
ASFR	Age-specific Fertility Rate
CBR	Crude Birth Rate
CEB	Children Ever Born
CPR	Contraceptive Prevalence Rate
CYP	Couple-years of Protection
DLHS	District Level Household and Facility Survey
EAG	Empowered Action Group
ELA	Expected Level of Achievement
FP	Family Planning
GoI	Government of India
GRR	Gross Reproduction Rate
ICPD	International Conference on Population and Development
IMR	Infant Mortality Rate
IUCD	Intrauterine Contraceptive Device
JSY	Janani Suraksha Yojana
MCA	Multiple Classification Analysis
MCH	Maternal and Child Health
MDG	Millennium Development Goal
MoHFW	Ministry of Health and Family Welfare
MP	Madhya Pradesh
MWRA	Married Women of Reproductive Age
NFHS	National Family Health Survey
NHP	National Health Policy
NIHFW	National Institute of Health and Family Welfare
NIMS	National Institute of Medical Statistics
NPP	National Population Policy
NRHM	National Rural Health Mission
NRR	Net Reproduction Rate
PCPNDT Act	Pre-conception and Pre-natal Diagnostics Techniques Act
PPPR	Period Parity Progression Ratio
PPR	Parity Progression Ratio
RCH	Reproductive and Child Health
SRS	Sample Registration System
TF	Total Fecundity
TFR	Total Fertility Rate
TMFR	Total Marital Fertility Rate
TN	Tamil Nadu
UP	Uttar Pradesh
UT	Union Territory

Section 1

Chapter 1. Introduction

Chapter 2. Trends in Fertility and Mortality Indicators in India and Selected States

Chapter 3. Population Projections and Expected Levels of Achievement for India and EAG States

Annexes

For Chapter 1

For Chapter 2

For Chapter 3

References: Section 1

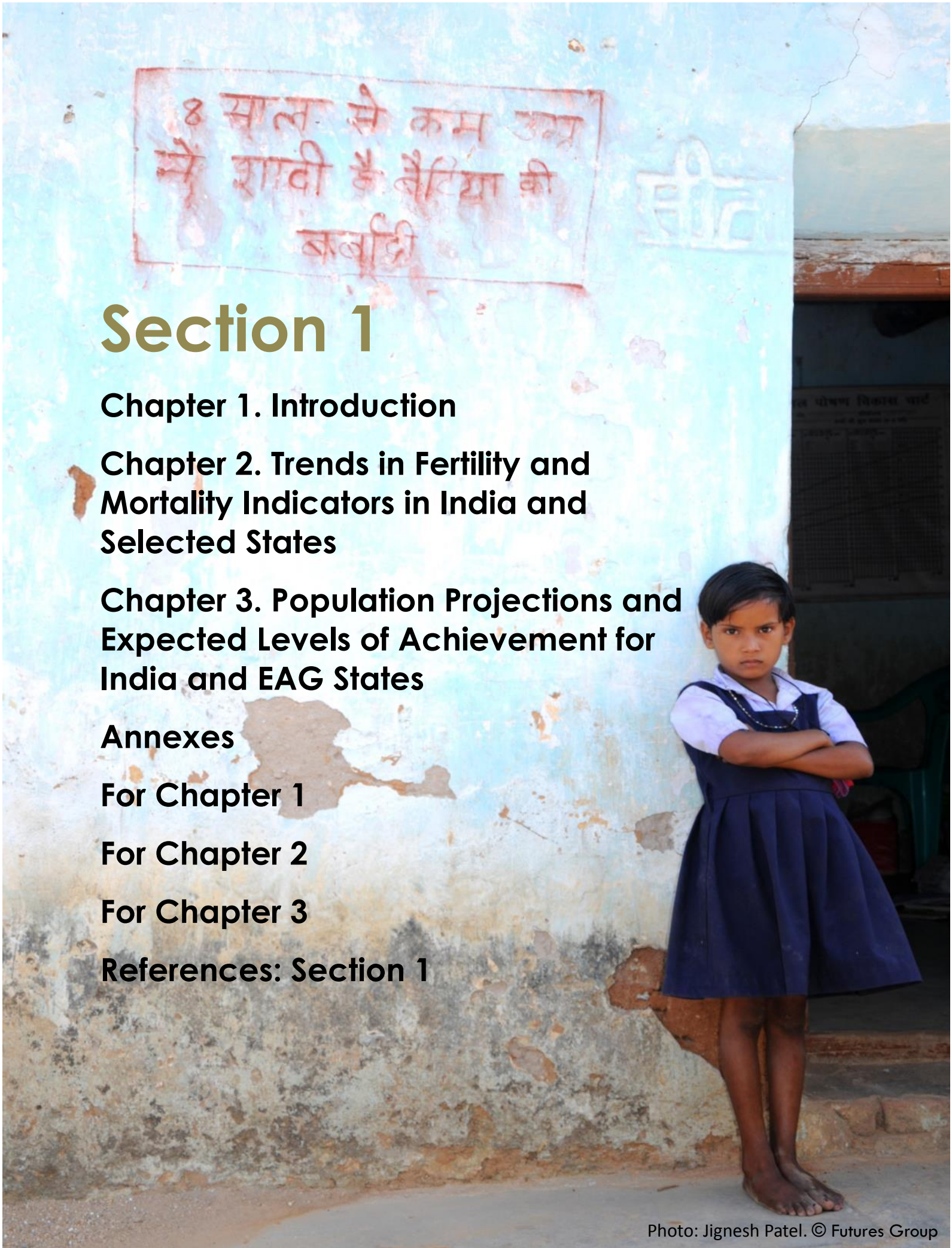


Photo: Jignesh Patel. © Futures Group

CHAPTER 1: INTRODUCTION

1.1. Background

Over the last four decades (1981 to 2011), India's population growth rate has declined consistently (Office of the Registrar General and Census Commissioner, 2011d), but for the first time, the Census 2011 has in addition reported a decrease of absolute numbers. An optimal decline in the Total Fertility Rate (TFR) from 5.2 in 1971 to 2.4 in 2011 (Office of the Registrar General, 2012) has been witnessed. According to Sample Registration System (SRS) 2012, while the replacement level of fertility has been achieved by 21 states/union territories (UTs), fertility levels remain high for seven states, including Bihar (3.6), Uttar Pradesh (UP) (3.4), Madhya Pradesh (MP) (3.1), Rajasthan (3.0), Jharkhand (2.9), Chhattisgarh (2.7), and Assam (2.4), of which six belong to the empowered action group (EAG) states.[2] Despite these demographic achievements, India is likely to become the world's most populous country in about 15 years (United Nations, 2013 Revision[3]). According to Census 2011, India's population stands at 1.21 billion—almost equivalent to the combined population of six of the 10 most populous countries in the world.

In India, each state is at a different stage of demographic transition and thus there is a vast difference in their timelines to achieve population stabilisation. States with high fertility are dealing with the challenge of tremendous pressure on their limited resources, whereas states like Kerala, which achieved replacement-level TFR (TFR=2.1) in 1987, continue to grow at a much slower pace[4] but face problems very different from those faced by high-fertility states, such as an increasing ageing population. The experience of states that have achieved replacement-level fertility can be useful for policy-level measures in those states not so demographically advanced.

The Indian health and family planning (FP) programme works within a sound policy framework. In 1952, India was the first country to launch a national programme, emphasising the need for family planning to the extent necessary for reducing birth rates "to stabilise the population at a level consistent with the requirement of national economy."[5] The successive five-year plans provided the framework within which the states could develop and strengthen their health infrastructure, though a need for a comprehensive and integrated approach to healthcare was felt in response to the needs and priorities of the country. This provided the basis for the National Health Policy (NHP, 1983), which accepted health as central to development and pegged it to the goal of population stabilisation (MoHFW, 1983). The NHP, 1983 stated that replacement levels of TFR should be achieved by the year 2000. Taking this commitment forward, the National Population Policy (NPP, 2000) re-emphasised population stabilisation and underscored the government's commitment towards voluntary and informed choice by the citizens while availing reproductive healthcare services and continuation of the target-free approach in administering FP services. The NPP, 2000 provided a policy framework for advancing goals and prioritising strategies during the next decade to meet the reproductive and child health (RCH) needs of the people of India, and to achieve net replacement levels (TFR) by 2010 (MoHFW, 2000).

The National Rural Health Mission (NRHM, 2005–12) of the 11th five-year plan was conceptualised in response to what were perceived as systemic flaws in the health system: namely, the lack of a holistic approach, absence of linkages with collateral health determinants, gross shortage of infrastructure and human resources, lack of community ownership and accountability, non-integration of vertical disease control programmes, inadequate

[2] Eight states have been designated Empowered Action Group states by the Ministry of Health and Family Welfare, Government of India, on the basis of their high fertility and weak sociodemographic indicators. These include Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Odisha, Rajasthan, Uttar Pradesh, and Uttarakhand. The Center is facilitating focused efforts to promote the Reproductive and Child Health Programme in these states.
[3] Retrieved from http://esa.un.org/wpp/ .
[4] Once a population has achieved a replacement level of fertility, it continues to grow for the next 30–40 years before stabilisation, due to the "population momentum" phenomenon.
[5] Retrieved from http://mohfw.nic.in/NRHM/FP.htm.

responsiveness to community needs, and lack of financial resources. It recognised the importance of health for socioeconomic development and improving quality of life. Above all, the 11th five-year plan aligned its time-bound goals with the NRHM goals and expects achievement of replacement level of fertility by the end of the plan period.

A review of the achievements of fertility goals through these plan and mission documents suggests that fertility rates have fallen by 2.8 per cent per annum (2.8 to 2.5) over the 2006–10 period—a faster decline compared to the decline of 2.0 per cent per annum in the preceding five years. However, this relatively faster decline in the fertility rate was not enough to achieve the 11th five-year plan TFR goal of 2.1 by 2012. Invariably, the country has missed or deferred its fertility and other demographic goals from time to time (Srinivasan, 1998; Bhat, 2009). Now the replacement level of fertility goal has been deferred by the 12th five-year plan and is proposed to be achieved by 2017.

The Family Planning Division at the Ministry of Health and Family Welfare (MoHFW) intends to develop a Technical Report to learn more about the story of country's population in terms of fertility dynamics, levels and trends in TFR, and other fertility indicators in India and the states, the proximate determinants and socioeconomic variables that impact fertility, and the contributions of states to the future course of population dynamics and expected levels of achievement (ELAs) for spacing and limiting. The Technical Report aims to inform the roll out of the FP component of the Reproductive, Maternal, Neonatal, Child, and Adolescent Health Strategy of the Government of India (GoI), which articulates family planning beyond population stabilisation to overall well-being of women and children through a lifecycle approach.

1.2. Objectives of the Study

The main objective of this study is to analyse fertility dynamics, especially among the EAG states, to elicit the major contributing factors that affect fertility decline in India and among the EAG states.

This includes an analysis of the following components:

- Levels and trends in TFR, contraceptive prevalence rate (CPR), other fertility indicators, and select mortality indicators in India and selected states;
- Population projections:
  a) Contribution of EAG states to the future course of population dynamics;
  b) Projection of future levels of contraceptive use required to achieve fertility goals, given expected changes in the other proximate determinants;
  c) Contribution of different states to achieve the country's replacement-level fertility; and
  d) Projection of ELAs for limiting and spacing methods of family planning for India and EAG states by analysing the unmet FP need.
- Contribution of each proximate determinant to realisation of current levels of the total fertility through the Decomposition Method:[6]
  a) Contribution of changes in the proximate determinants to changes in the TFR over time and across different states; and
  b) Contribution of various socioeconomic indicators on fertility by using a multivariate analysis of parity progression.

Finally, the technical report recommends strategies for FP prioritisation.

[6] "Decomposition method" is a generic term for solutions of various problems and design of algorithms, in which the basic idea is to decompose the problem into sub-problems. Changes in age, sex, race-ethnicity, marital status, and many other characteristics contribute to changes in demographic indicators. Over time, compositional changes and behavioural changes interact, determining the dynamics of summary measures. To accurately explain population phenomena, demographers usually separate the variables into smaller parts. These parts are then studied separately. This allows for analysis of the specific effects that each component has on the whole dynamic. Decomposition methods can be used to analyse the problems of confounding compositional effects.

1.3. Data and Methods

The data used to analyse the levels and trends of different demographic and contraceptive indicators have been collated mainly from various Census publications, SRS Bulletins, three rounds of the National Family Health Survey (NFHS) and the District Level Household and Facility Survey (DLHS), the Annual Health Survey (AHS), Family Welfare Statistics in India of the MoHFW, and other published materials. The list of states considered for the analysis comprises eight EAG states and Assam, and two non-EAG states (Andhra Pradesh [AP] and Tamil Nadu [TN]) in addition to India. Specifically, the two non-EAG states (AP and TN) are included because of their recent demographic achievements, through which socioeconomic conditions were not improved.

Population projections have been made using the *Spectrum Suite*[7] of computer models, which is one of the widely used tools for population projections. In particular, two models, *DemProj* and *FamPlan*, have been used to project the population FP requirements needed to reach the national goals to address unmet need. *DemProj* projects the population for an entire country or region by age and sex, based on assumptions about fertility, mortality, and migration. The *FamPlan* programme uses assumptions about the proximate determinants of fertility and characteristics of the FP programme (method mix, source mix, discontinuation rates) to calculate the number of users and acceptors of different methods in a population (see Annex 1).

Decomposition of fertility is carried out in two steps. In the first step, proximate determinants of fertility are analysed by applying the Bongaarts framework (Bongaarts, 1978; Bongaarts and Stover, 1986), later reformulated by Stover in 1998 on proximate determinants of fertility. The effects of various socioeconomic variables on change in the parity progression ratio (PPR) are analysed in the second step, using multivariate analysis. These two analyses are expected to provide a comprehensive picture of different factors that affect the changes in fertility in the country and the states selected for this study.

To ensure multi-stakeholder participation and high-level technical guidance, NIHFW constituted an expert group under the Chairmanship of Dr Arvind Pandey, Director, National Institute of Medical Statistics (NIMS) and experts from various national institutions to provide technical guidance and oversight to the work undertaken. A working group was constituted comprising demographers, data analysts, and modellers from the Policy Unit and Health Policy Unit to undertake the work. The working group worked in close coordination with the expert group to develop the analysis and finalise the report.

1.4. Organisation of the Report

This report is divided into two sections. Section 1 introduces the purpose and methodology for the report; presents an analysis of the levels of and trends in TFR, CPR, and other fertility indicators in India and selected states; and presents the population projections and expected levels of achievement for India and the EAG states. Section 2 presents a multivariate analysis to measure the impact of select demographic and socioeconomic factors on fertility decline, and analyses the proximate determinants of fertility.

[7] For more information on *Spectrum Suite* and models, please visit http://futuresgroup.com/resources/software_models/spectrum.

CHAPTER 2: TRENDS IN FERTILITY INDICATORS IN INDIA AND SELECTED STATES

Population growth of a country or state is affected only by natural increase and net (overseas) migration. Natural increase is the easiest to define. It is simply the population growth that arises from the difference between the number of live births and deaths over a specified period. An important influence on the number of births and deaths in a period is the age structure of the population.

This chapter presents analyses of the levels and trends in population, growth, fertility, and selected mortality indicators in India, the EAG states, and two non-EAG states. It aims to assess the progress made by the EAG states against these indicators and analyse the state-level differentials among the EAG states and the two non-EAG states with respect to these indicators.

2.1. Population and Growth Rate in India and EAG States

While looking at the trends in population growth in India and the EAG states, it is important to understand the different stages in "demographic transition." Demographic transition is a descriptive interpretation of the change that populations undergo from high to low birth and death rates. Typically, demographic transition witnesses four stages or phases. The first stage is characterised by high birth and death rates, resulting in little or no population growth; in the second stage, the birth rate is high, with a decline in the death rate, resulting in high population growth; the third stage shows slower population growth due to a declining birth rate and a relatively low death rate; and the fourth stage is typified by very low population growth due to low birth and death rates. Beyond these four stages of demographic transition, there is also a fifth stage, in which fertility declines to very low levels and stays there for a prolonged period. A slow population growth can also turn into a negative growth rate.

- *Between 2001–11, India, for the first time since 1921, added less population compared to the previous decade.*
- *A dramatic increase in population size during the 1960s through 1990s can be attributed to the "population momentum."*
- *Eight EAG states are at different levels of decadal growth rate, as Uttarakhand and Odisha are ahead of the other six states, with much lower decadal growth rates. The growth rate in the other EAG states is higher than that of India overall.*
- *The EAG states have seen a significant fall in their growth rates in this decade.*
- *UP's growth rate has declined by 5.7 percentage points, and Rajasthan has seen a bigger decline of 7 percentage points.*

Population growth has started declining throughout the country, though the pace and magnitude of decline varies considerably across the states. The precise assessment of India's demographic transition is hampered by systematic data deficiencies on birth, death, and growth rates, especially for the period before the 1970s, since regular data collection by SRS became fully operational only in 1969–70.

As per the 2011 Census, the total population of the country was enumerated at 1,210,726,932 (1.21 billion). There was an increase of 181.96 million persons during 2001–11 in the country. Population size has increased five-fold, from 238 million in 1901, and the increase was quite dramatic after the 1960s (Figure 2.1). The decadal growth rate for the country during 2001–11 was 17.6 per cent. The trend in decadal growth rate shows an upward swing for six to seven decades from the 1900s, barring a brief downward swing during 1911–21. Growth rate plateaued during 1971 through 1991, and from1991 onward, a clear downward trend can be observed, which is likely to continue in the future.

Among all the states, UP continues to be the most populous state in the country, with a population of 199.8 million. The other EAG states that figure in the 10 most populous states of the country are Bihar (103.8 million),

MP (72.6 million), and Rajasthan (68.5 million) (Annex 2, Table A 2.1). The population of eight EAG states comprised nearly half (45.9%) of the country's population in 2011. It has consistently increased from 44.7 per cent in 2001 and 43.4 per cent in 1991.

Figure 2.2 plots the trend in combined growth rates post-independence for the EAG states, all of the non-EAG states, and India. Growth rates of all non-EAG states started off from a higher level, at 23 per cent during 1951−61 compared to 19.9 per cent for the EAG states in the same period. Growth rates continued to be on the higher side for non-EAG states for the subsequent decade; since then, they have started declining. While the trend in growth rates of EAG states took an upward trajectory until 1971–81, it plateaued at about 25 per cent during the subsequent two decades before declining to 20.9 per cent in the last decade.

In the decade 2001–11, all of the EAG states except Odisha (13.9%) have registered a higher growth rate than India's growth rate. Uttarakhand is the second best among the EAG states, with a population growth rate of 19.2 per cent. Among the EAG states, the highest growth rates were recorded in Bihar and Chhattisgarh (25.1% and 22.6% respectively), followed by Jharkhand (22.3%), Rajasthan (21.2%), MP (20.3%), and UP (20.1%). The selected non-EAG states have a considerably lower population growth rate, with AP at 11.1 per cent and TN at 15.6 per cent (see Annex 2, Table A 2.2).

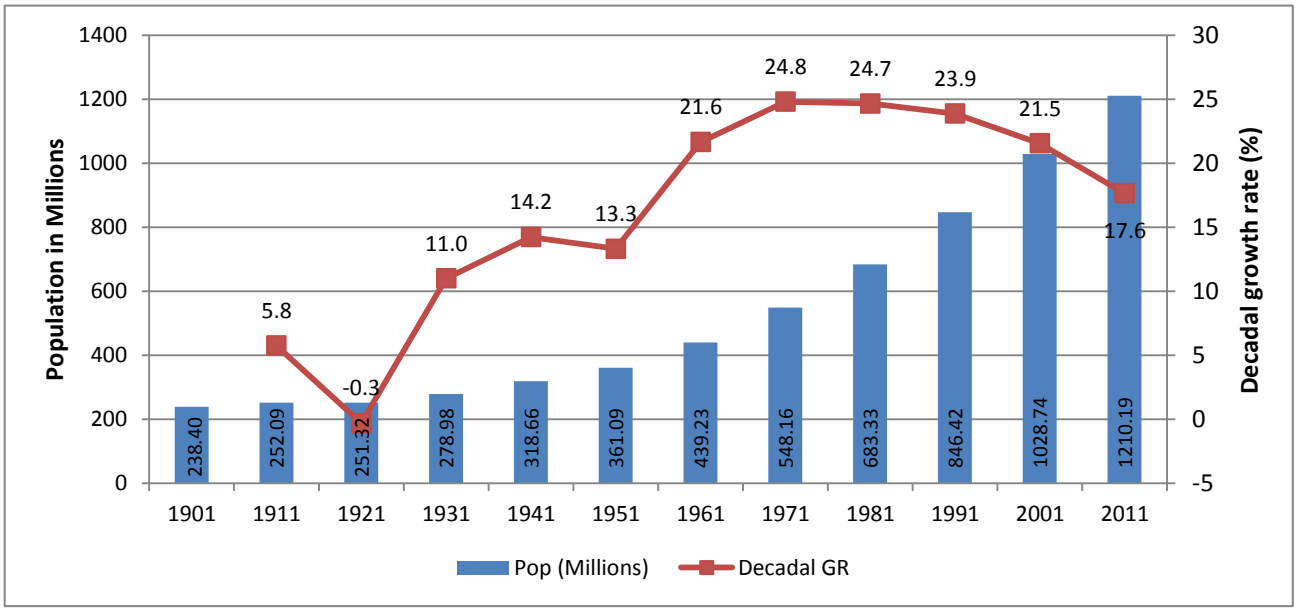


Figure 2.1: India's population (in millions) and decadal growth rate, 1901–2011
Source: Office of the Registrar General and Census Commissioner, 2011c.

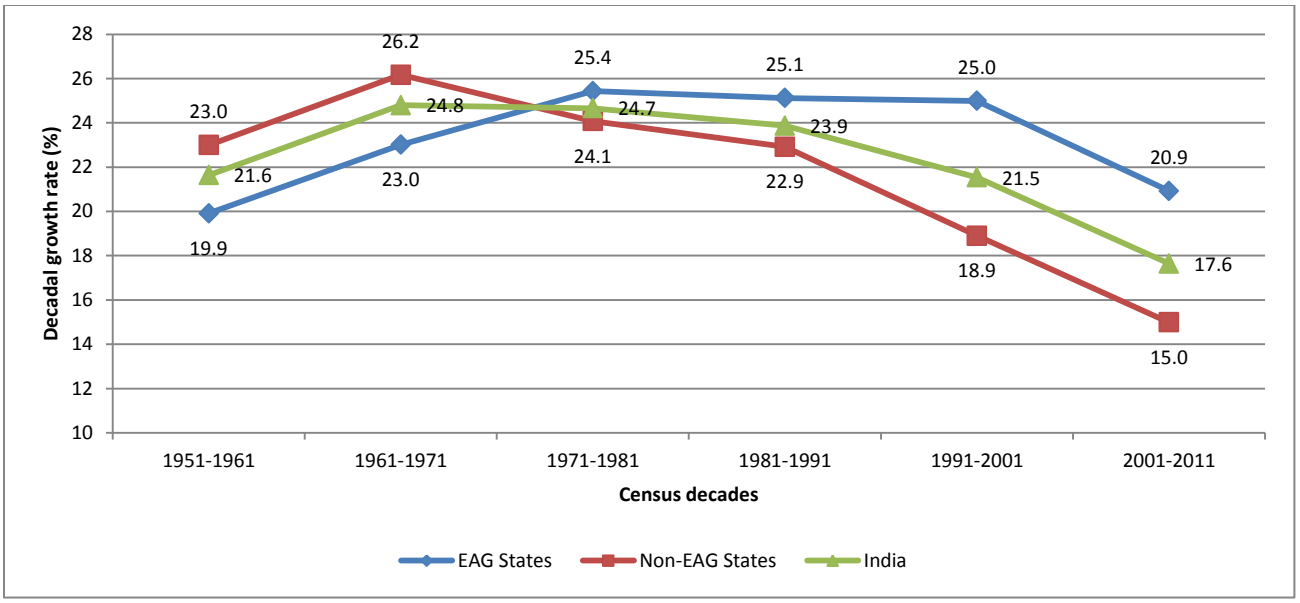


Figure 2.2: Growth rates of India, EAG states, and all non-EAG states, 1951–61 to 2001–11

Results from the levels and trends in population size and growth have clearly shown that population growth has declined uniformly across all of the states and the country in the last couple of decades. The country as a whole is entering the final stages of demographic transition, with a considerable heterogeneity in demographic transition levels among different states. The worrying fact is that six of the eight EAG states registered a decadal growth rate of more than 20 per cent in the last decade.

There are two unique aspects to these growth rates: the growth rate in Chhattisgarh has seen an increase and a decrease in every decade without exception; and the growth rate in TN was significantly higher in 2001–11 than in 1991–2001. Further in-depth analysis of migration data would be required to explain the phenomenon of varying population growth rate in Chhattisgarh, which is not within the scope of this report. Further analysis of the increase in the growth rate in TN shows that there was an additional population of 4.44 million enumerated in the 2011 census than was expected from natural increase (i.e., births to deaths) in the state. During the last decade, both birth and death rates have not changed significantly in TN.

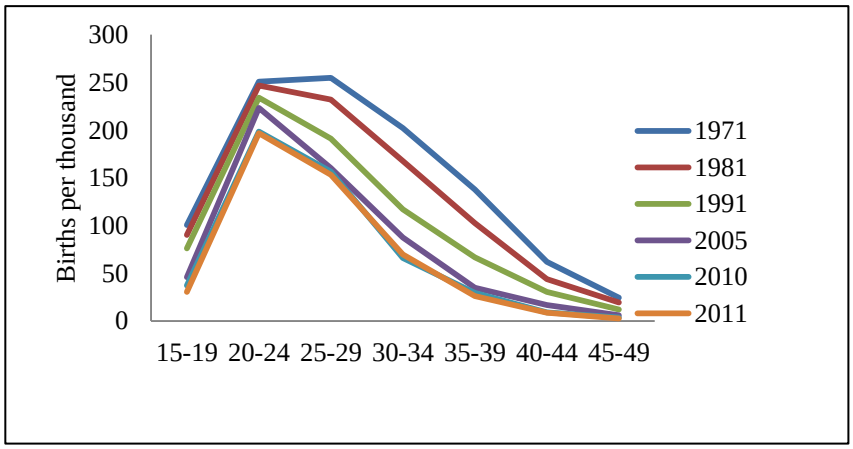


Figure 2.3: Age-specific fertility pattern in India
Source: SRS

Thus, this increase in population growth rate in the last decade can be attributed to migration into the state.

2.2. A Closer Look at the Levels and Trends in Fertility in India and the EAG States

While studying the fertility trends in India, the EAG states, and two non-EAG states, four indicators of fertility were considered—crude birth rate (CBR), age-specific fertility rate (ASFR), TFR, and birth order. Among the various measures of fertility, CBR is seen as the crudest measure, indicating the number of live births per 1,000 population in a given year. ASFR[8] helps analysts to understand the comparisons in fertility and fertility behaviors at different ages and over time. TFR[9] is an important and the most widely used measure of fertility for studying patterns and trends. Birth order was also analysed for this study, since distribution of births by birth order is an important determinant of maternal health. An analysis of third and higher-order births merits attention, as these account for about 28 per cent of the total births that occur in India.

2.2.1 Steady Decline in the Crude Birth Rate

SRS estimates are the main and the most regular source of information on vital rates in India.[10] They show that the CBR at the national level was estimated at 21.8 births per 1,000 population in 2011. CBR at the national level has declined uniformly, from 36.9 in 1971 to 21.8 in 2011, a decline of 41 per cent in four decades. Among the EAG states, UP and Bihar recorded much higher CBRs, at 28 per 1,000 population in 2011, whereas Uttarakhand (18.9) and Odisha (20.1) were at the bottom of the table, having recorded less than the national average. While looking at the CBR trend over three to four decades, a relatively much faster decline (41.9%) has been observed in Odisha.

The select non-EAG states of AP and TN had a birth rate of more than 30 per 1,000 population in 1971—almost at par with the EAG states. However, during a span of 40 years (1971–2011), CBR in AP and TN has declined by almost half. The CBR in AP and TN stands at 17.5 and 15.9 respectively (see Annex 2, Table A 2.7).

2.2.2 Age-specific Fertility Rates: Heterogeneity across the EAG States and in India

A review of the figures in Annex 2, Table A 2.8, which provides the fertility patterns by age groups across India, the EAG states, and two non- EAG states, reveals that the highest fertility has been attained in the age group 20–24, accounting for more than 40 per cent. ASFR in the younger age group (15–19 years) is about 6 per cent.

- *In the last four decades (1971–2011), TFR declined by 53.8 per cent, and the maximum decadal decline (more than 22%) was observed in the last decade (2001–11). However, the highest decline in TFR in absolute terms (0.9) was observed during the 1981–91 period.*

- *During Phase I of NRHM (2006–11), the second highest annual decline in TFR was recorded at 0.8, after the 0.9 decline observed in 1981–91.*

- *Historically, fertility in UP has been observed to be the highest, which continued until 2007; since then, Bihar's fertility has been found to be the highest in the country.*

- *Fertility in Uttarakhand and Odisha (historically as well currently) continues to be lower than the national average.*

[8] ASFR is an aggregate of the number of children born to women of a specific age group.
[9] The TFR is the average number of children that would be born to a woman by the time she has ended childbearing if she were to pass through all of her childbearing years in conformance to the age-specific fertility rates of a given year.
[10] Retrieved from http://www.un.org/esa/population/publications/completingfertility/RevisedBHATpaper.PDF.

Fertility, however, shows a decline after age 30, and the fertility of the four age groups past 30 (30–34, 35–39, 40–44, 45–49) together constituted only 22 per cent in 2011 for the country. Trends in ASFR for India show a consistent decline in fertility across all the age groups since 1971. The decline is more significant in the higher age groups, i.e., after 35–39, in which a more than 80 per cent decline in fertility has been recorded from the 1971 levels. The fertility of the younger age group, 15–19, has declined more than 69 per cent during the same period.

The trend in ASFR among the EAG states and two non-EAG states reveals that fertility has declined across age groups and states at a different pace. As expected, decline is much faster among the two non-EAG states, and the larger share of decline in fertility has been observed in the higher age groups (above 30). However, only a moderate fall in fertility in the higher age groups has been observed among EAG states during the four decades since 1971.

2.2.3 Total Fertility Rate: Drop in fertility in big EAG states very recent, and a long way to go before stabilisation is achieved

TFR, the most widely used measure of fertility, was 2.4 for India in 2011 (Office of the Registrar General, 2012). Fertility has declined more than 53 per cent, from 5.2 in 1971. Decline in the first two decades (1971–91) was slightly lower, at 30 per cent, compared to a 33 per cent decline registered during later decades (1991–2011). Similarly, the second half of the last decade (2006–11) recorded a steeper fertility decline of 14 per cent, compared to a 6 per cent decline in 2001–05.

Among the EAG states, Bihar was positioned at the top of the table, with a TFR of 3.6; UP, with a TFR of 3.4, placed second in 2011. Bihar and UP have had the highest TFRs throughout the historical period. A declining trend is discernible in all of the EAG states and the two non-EAG states, with different trajectories. The slowest decline was recorded in Bihar (only 36.8 per cent) during three decades, and other EAG states registered a moderately healthier decline of more than 40 per cent during the referenced period.

An analysis of the trends among the EAG states in the last decade shows a much hoped-for result. In the second half of the last decade (2006–11), three EAG states—UP, Bihar, and Rajasthan—showed an impressive drop of more than 14 per cent in fertility, similar to India's fertility decline in the same period. Incidentally, UP recorded the maximum drop of more than 19 per cent.

Two non-EAG states, AP and TN, recorded 60.9 and 56.4 per cent declines, respectively, in the last four decades, and the major portion of this decline occurred well before 2000. During the last decade, fertility in both of these states has plateaued in the range of 1.7 to 1.8. (Annex 2, Table A 2.9)

Two important conclusions can be drawn from the analysis of levels and trends in fertility: (1) the country's more recent fertility decline may be attributed to the drop in fertility in the EAG states; and (2) future fertility decline must depend on the decline in the EAG states, not the non-EAG states, as the fertility decline in these two states has almost plateaued.

2.2.4 Birth Order: Varying rates of decline

In 1991, higher-order births accounted for about 43 per cent of all births in India, dropping to 39 per cent in 2001 and further, to 27.6 per cent, in 2011. The overall decline during the last two decades was more than 35 per cent for the country. A rapid decline of about 20 per cent has been observed in the last five years (2006−11). Among the EAG states, both Odisha and MP recorded a more than 40 per cent decline in higher-order births during 1991–2011. The slowest decline was observed in Bihar (only 19.8 per cent), from 53.6 per cent in 1991 to 43 per cent in 2011.

Both AP and TN registered a much steeper drop in the proportion of higher-order births, from the level of 33.3 per cent in 1991 to 10.5 per cent in 2011 for AP, and from 26.8 per cent in 1991 to 9.8 per cent in 2011 for TN.

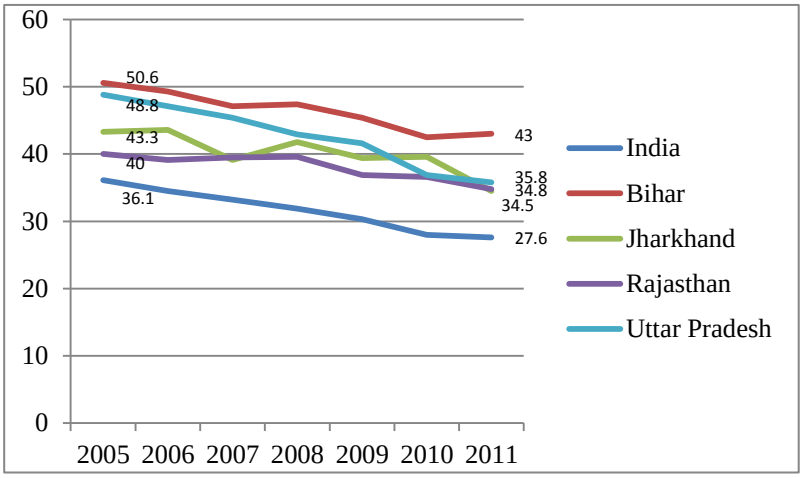


Figure 2.4: Trend in higher-order births in India and selected EAG states with higher birth order since 2005
Source: Computed from Registrar General of India, SRS, various issues.

2.3. Levels and Trends of Selected Proximate Determinants of Fertility among the EAG States

Among the indicators analysed in this section are the proximate determinants of fertility, including age at effective marriage, couple protection rate, and contraceptive prevalence rate (CPR). This section also looks at the trends in method mix, the patterns in usage of permanent versus non-permanent methods of family planning, and the unmet need for contraception.

2.3.1. Age at Marriage

Age at marriage (or entry into sexual union) is one of the proximate determinants of fertility, since it determines the number of women exposed to the risk of pregnancy, thus having a bearing on birth rates, the fertility of a woman, and her health profile. Additionally, women in India are expected to begin childbearing as soon as they are married, which results in high fertility.

As per the SRS, 2012 estimates, the mean age at marriage in India is 21.2, which has risen moderately from 20.2 in 2005. Among the EAG states, Odisha has the highest mean age at marriage (21.4), whereas it is lowest in Chhattisgarh (20.2). In Rajasthan, the mean age at marriage is 20.5, and three states—MP, Jharkhand, and Bihar—stand at 20.7. UP has a slightly higher mean age at marriage, at 20.8. The mean age at effective marriage in TN (22.4) and AP (21.6) is higher than the national average as per the 2011 estimates (Office of the Registrar General, 2012).

The percentage of women married before the age of 18 years is high in India (about 22%) and varies across states (DLHS-3, 2007–08). It is as high as 46 per cent in Bihar, 40 per cent in Rajasthan, 36 per cent in Jharkhand, and 33 per cent in UP. In TN, the percentage stood at a low 9 per cent, though at a much higher 29 per cent in AP. An analysis of the data since 2005 shows the largest increase in the mean age at effective marriage from 2005 to 2011 was in Bihar—1.7 years in six years. The increase in the mean age at effective marriage in Jharkhand during the same period was 1.5 years, in UP it is 1 year. The states of MP, Chhattisgarh, and Rajasthan have

lagged behind, with a much slower increase in the mean age at marriage. During the same period, the mean age of effective marriage increased by one year for India (20.2 to 21.2).

AP has shown a marked improvement since 2005, with an increase of 2.9 years in the mean age of effective marriage among females. Though the mean age at effective marriage in AP during 2005–2010 was lower than the national average, the figures in 2011 show an improvement over the national figures. TN had the highest mean age at effective marriage among the states selected for analysis—21.8 years in 2005—which improved further to 22.4 years in 2011 (see Annex 2, Table A 2.6).

- *The national-level modern CPR has steadily increased, from 36 per cent in NFHS-1 (1992–93) to 47 per cent in DLHS-3 (2007–08).*
- *Uttarakhand, Rajasthan, and MP have shown creditable performances by achieving a modern CPR of more than 55 per cent.*

2.3.2. Couples currently and effectively protected by various family planning methods

Data on couple protection rate, which represents the proportion of couples currently, and effectively, protected by various FP methods, available from the MoHFW,[11] the Government of India (GoI; 2011) show that couple protection rate in India has increased, from a low of 22 per cent in 1980 to almost double, at 40 per cent, in 2011. The trend shows an erratic pattern, as the couple protection rate increased from 22 per cent in 1980 to 47 per cent in 2004 and since then has dipped continuously, to 40 per cent in 2011.

All of the EAG states have shown a similar pattern of continuous increase up to 2004–05, then dropping to the current level in 2011. AP, one of the two non-EAG states, shows a different pattern, as the couple protection rate has consistently increased in the state, from a low of 25.6 in 1980 to more than 60 per cent for the last seven years. However, the trend in TN shows a surprising "up and down" pattern (see Table A 2.11, Annex 2).

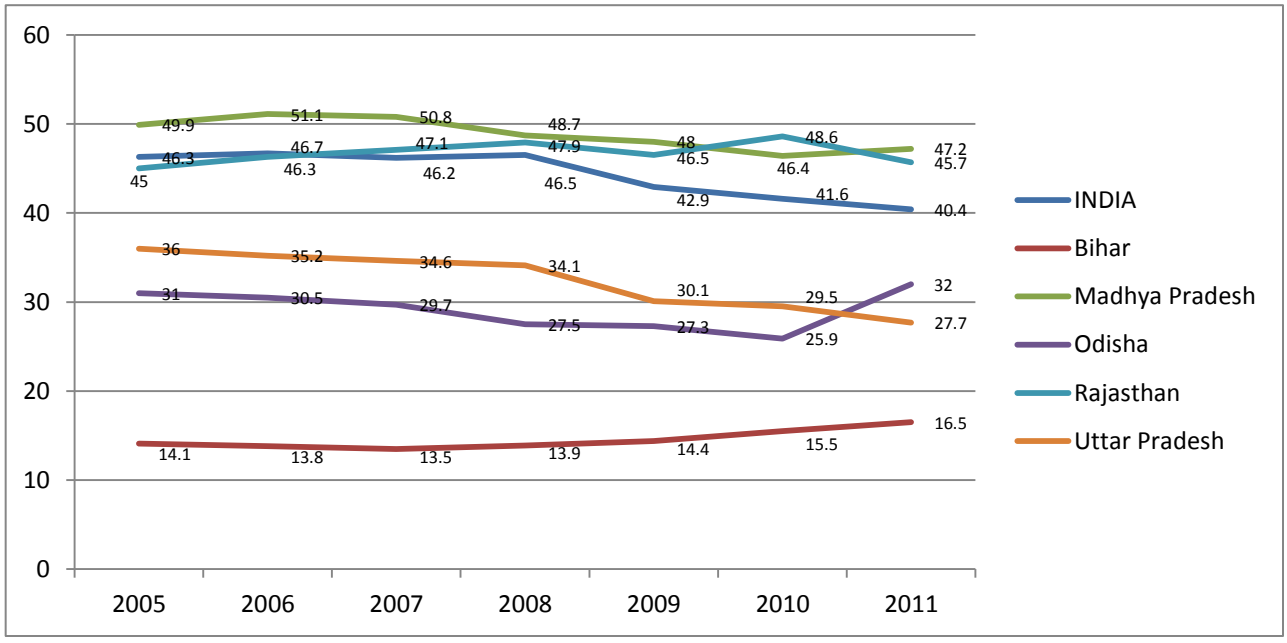


Figure 2.5: Percentage of effective couple protection rate, India and selected states
Source: Family Welfare Statistics (MoHFW, 2011).

[11] Data are not available for Jharkhand, Uttarakhand, and Chhattisgarh.

2.3.3. Contraceptive Prevalence Rate: High unmet need despite increased use

The latest AHS (2010–11) estimates of contraceptive use (popularly known as CPR) for EAG states reveal that modern contraceptive use is highest in Rajasthan (59%), followed by MP (57%), Uttarakhand (55%), and Chhattisgarh (50%), and lowest in UP (32%). Contraceptive use in Bihar and Jharkhand was at a moderate 38 per cent in 2010–11. In different surveys, all of the major EAG states have shown an increase in the use of contraceptives.

The CPR, as per NHFS surveys, showed that the overall contraceptive use in India for any modern method increased from 36.5 per cent in 1992–93 (NFHS-1) to 42.8 per cent in 1997–98 (NFHS-2) to 48.5 per cent in 2005–06 (NFHS-3), representing a 0.9 per cent average annual increase. Data from DLHS on contraceptive use also showed similar results, with an increase in CPR from 42.5 per cent in 1998–99 (DLHS-1) to 45.7 in 2002–04 (DLHS-2) to 47.1 in 2007–08 (DLHS-3), an average annual increase of about 0.5 per cent over a period of nine years.

Analysis of the data from DLHS-2 and 3 and AHS for all of the EAG states shows that Bihar, Chhattisgarh, MP, Rajasthan, and UP showed an upward trend in the CPR (see Figure 2.6).

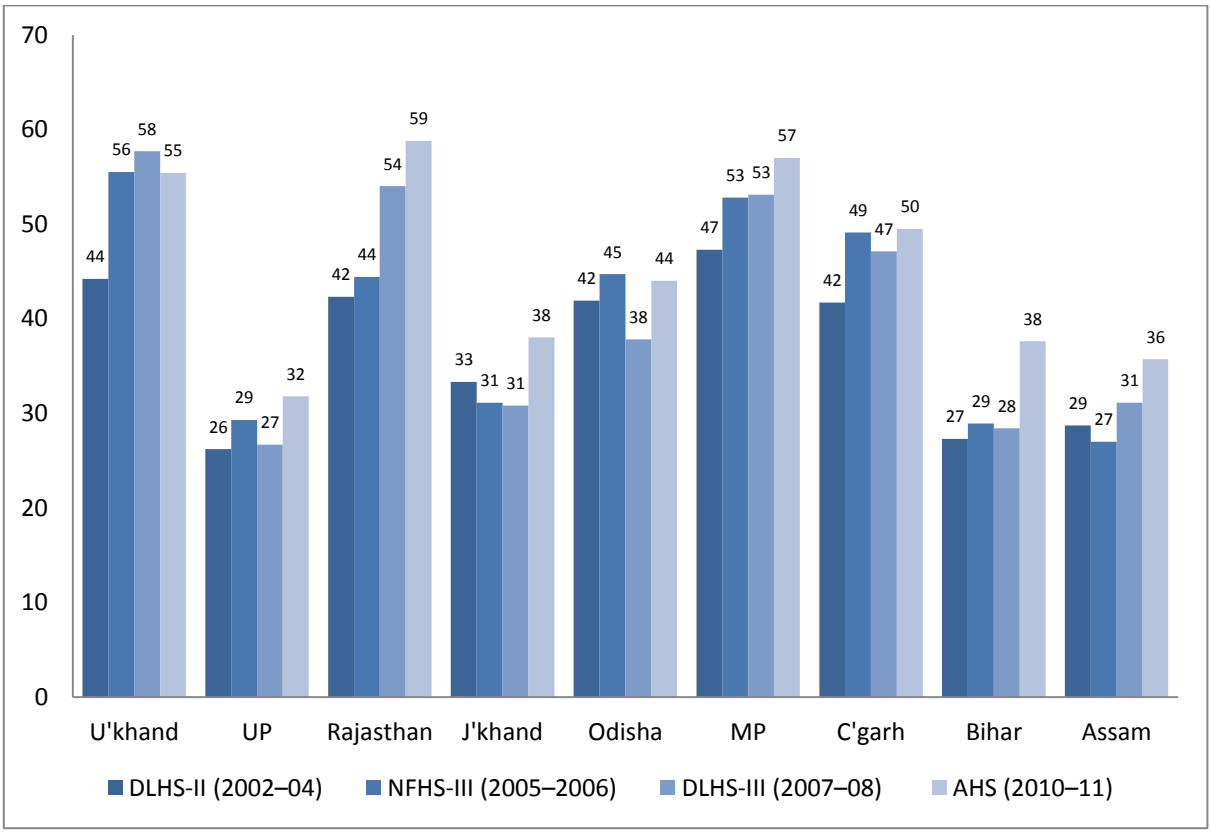


Figure 2.6: Contraceptive prevalence rate (any modern method), EAG states
Sources: DLHS-2, 3 (IIPS 2006, IIPS 2007), NFHS-3 (IIPS and Macro International, 2007), and AHS 2010–11 (Office of the Registrar General and Census Commissioner, 2011a).

Use of modern contraception showed a 1.3 per cent per year increase in AP between 1992–93 (NFHS-1) and 2005–06 (NFHS -3), and a 0.7 per cent annual increase from 1998–99 (DLHS-1) to 2007–08 (DLHS-3)—much higher than the national average. In TN, a 1.1 per cent increase per year was seen between the first and third rounds of NFHS, and 0.9 per cent per year between the first and third rounds of DLHS (Annex 2, Table A 2.12).

2.3.3.1 Method Mix: Nationally, female sterilisation outstrips the use of other family planning methods

Three-fourths of the users of modern contraceptives in India have adopted female sterilisation, with a little more than 2 per cent using male sterilisation (DLHS-3, 2007–08). The proportion of limiting methods users has hardly changed over different survey periods, from NFHS-1 in 1992−93 to DLHS-3 in 2008–09 for the country. In most of the EAG states, female sterilisation accounted for 80 per cent of modern method use, with the exception of UP and Uttarakhand. In UP, however, female sterilisation accounted for about 56 per cent of modern method use, while spacing methods accounted for 44 per cent. In Uttarakhand, spacing methods contributed more than 38 per cent (AHS, 2010–11). Spacing methods contributed to about 10–15 per cent of modern method use in the other EAG states. Over the last 18 years, a declining trend in the prevalence of male sterilisation and Intrauterine Contraceptive Devices (IUCDs) has been noted in most of the EAG states (NFHS-1, 1992–93 and AHS, 2010–11).

In the two non-EAG states, TN and AP, female sterilisation use accounted for about 93 per cent of the modern method use, as per DLHS-3. Seven per cent was attributed to spacing methods in TN, compared to just 2 per cent in AP. As in the case of the EAG states, the use of male sterilisation and IUCD remained low in the non–EAG states (see Annex 2, Table A 2.13).

- *According to all of the surveys except NFHS-3, the unmet need for family planning is hovering around 19−21 per cent at the national level. As per NFHS-3, it was 12.8 per cent.*
- *Bihar recorded the highest unmet need—39 per cent. Almost all of the EAG states showed higher levels of unmet need in the latest AHS survey. The lowest unmet need was recorded in Rajasthan.*

2.3.3.2 Trends in acceptance of various family planning methods – Service statistics

The acceptance of female sterilisation has increased nationally, in the EAG states, and in the other states. Use of IUCDs has remained stagnant, while male sterilisation has declined.

Sterilisation: Service statistics data show that MP and Jharkhand have made a substantial improvement in sterilisation performance since 2006–07. Bihar has also shown improvement in performance; UP, on the other hand, despite having a high unmet need for limiting methods, has shown no improvement in performance (Annex 2, Tables A 2.15 and A 2.16).

IUCD: Nationally, the acceptance level for the IUCD showed a drastic improvement in the 1990s, maintaining momentum until 2001–02, after which it declined in the latter part of the last decade. This declining trend was observed in the non-EAG states as well. In 2006, the government strategised to reposition the IUCD, resulting in a positive shift in the acceptance of IUCDs in the EAG states, especially Bihar and Jharkhand. In AP, IUCD use declined after 2009, whereas in the case of TN, a mixed trend can be observed (Annex 2, Table A 2.17).

Oral Pills and Condoms: There has been a drop in the acceptance of oral pills and condoms in the country, especially after 2007–08. A similar trend has been observed in the EAG states of UP, MP, and Rajasthan. However, Bihar has been an outlier, showing an increase in the acceptance of these two methods. In the non-EAG states too, the acceptance of these two methods has declined, especially after 2008 (Annex 2, Tables A 2.18 and A 2.19).

- *Female sterilisation is the primary method of FP in the all the EAG states, including India and other non-EAG states.*
- *Method mix has not changed over the period of time.*

2.3.3.3 Unmet Need for Contraception: Highest in Bihar, Uttar Pradesh, and Jharkhand

The data on unmet need for contraception reveal that 13 per cent of currently married women in India have an unmet need for family planning (NFHS-3, 2005–06),[12] a marginal decline from 15.8 per cent in 1997–98. The unmet need for limiting (6.6%) is slightly higher than the unmet need for spacing (6.2%). The decline in the unmet need for spacing (8.3% per cent to 6.2%) was higher than the decline in limiting methods (7.5% to 6.6%) between NFHS-2 (1997–98) and NFHS-3 (2005–06). However, the unmet need increased, reaching 21.3 per cent as estimated by DLHS-3 (2007–08) for India. Higher levels of unmet need have been recorded in all three rounds of DLHS compared to the three rounds of NFHS.

As per NFHS-3, differentials persisted within the EAG states, with states such as Bihar (23%), Jharkhand (24%), and UP (22%) having a very high unmet need—higher than the national average—while Uttarakhand and Chhattisgarh showed an unmet need of 11 per cent—below the national average. The recent AHS estimates for the EAG states show that the unmet need for contraception is highest in Bihar (39%), followed by Jharkhand and UP (30%). Almost all of the EAG states have shown a higher level of unmet need in the AHS in comparison to the NFHS-3. The lowest unmet need as per the AHS was in Rajasthan (19%). Unmet need in the selected non-EAG states was less than 10 per cent (below the national average), as per NFHS-3 estimates, and contraceptive need was lower in AP compared to TN. Overall, there is an inverse relationship between the unmet need for FP and contraceptive prevalence. The higher the contraceptive prevalence, the lower the unmet need is likely to be (Annex 2, Table A 2.14).

2.4. Points for Discussion

Analysis of the mortality and fertility trends in the EAG states confirms an improvement in most of the indicators considered for the analysis, though the pace and pattern need to be steadied, accelerated, and uniformly aligned for these states to achieve demographic transition. Focused attention on EAG states from the government, nongovernmental organisations, and donor agencies to improve overall population and health indicators is expected to yield positive results in the near future.

Analysis of various fertility indicators suggests that fertility is definitely dropping, and India is on the verge of the final stages of demographic transition (also see James, 2011). Another important finding is that bigger EAG states have started contributing significantly to India's fertility decline. However, the EAG states have a long way to go before getting to the final stages of demographic transition, and the fertility levels of non-EAG states have plateaued. Hence, the future decline in India's fertility largely depends on the contribution of the EAG states. This corroborates an earlier finding that the recent fertility decline in India is primarily because of a decline among illiterate women (more than half of the recent fertility decline) (Bhat, 2009). This is due largely to the normative change in their behaviours that emphasises having fewer children and investing more in their futures.

This can be restated by saying that the slow pace of increase in CPR in states like UP will hamper timely achievement of fertility objectives, which have been deferred in the past quite frequently.

The introduction of the Janani Suraksha Yojana (JSY) scheme under NRHM has led to a tremendous increase in institutional deliveries, both nationally and in the EAG and selected non-EAG states (Annex 2, Table A 2.20). This provides an opportunity for integration between maternal and child health (MCH) and FP services, which could help increase the uptake of contraceptive services, especially postpartum contraception.

[12] The decline in the unmet need for spacing was higher than the decline in limiting methods between the two surveys. Evidence from the DLHS surveys also shows a similar trend. However, estimates provided by the DLHS are slightly higher, which is attributable to the survey methodology and definition adopted, especially between the first and second phases and the third phase. Hence, for comparative purposes, NFHS estimates have been used.

CHAPTER 3: POPULATION PROJECTIONS AND EXPECTED LEVELS OF ACHIEVEMENT FOR INDIA AND EAG STATES

3.1. Introduction

This chapter provides an analysis and the results of population projection estimates and ELAs for family planning, computed from the projections for India, the EAG states, and two non-EAG states (AP and TN).

In the recent past, India has made considerable progress in slowing down its population growth. Even though India as a country has shown a sharp decline in population growth, the high fertility and population growth rates in EAG states remain a challenge for policymakers and planners. In 1991, the EAG states comprised 43.4 per cent of the country's population; this increased to 45.9 per cent in 2011. Also, these states, in comparison to the southern states of India, have relatively unfavourable demographic, socioeconomic, and FP indicators. It is important to note that these states, in comparison with southern states, also have a relatively higher unmet need for contraception and lower use of contraceptives.

This chapter provides the results of population projections and the ELA exercise carried out by the working group under the guidance of eminent experts. This analysis will facilitate understanding of the future population scenario among the EAG states and in India as a whole.

3.2. Population Projections and ELAs: Inputs and Assumptions

For the purpose of computing the population projections, the universally accepted "Component Method" has been used.[13] According to this method, the population growth of a given geographic location is determined by three components: fertility, mortality, and migration.

As stated earlier, the population projections and ELAs have been computed for the eight EAG states and Assam, two non-EAG states, and India. The sources of data used for projection purposes include Census 2001 and 2011 (for data on age and sex for the all of the states and India), SRS (for vital rates), NFHS (for other indicators), and AHS, 2010–2011. NIMS calculated and provided age-sex "smoothened[14] and matched"[15] data for all EAG states and India. In addition, DLHS, 2007–08 and AHS, 2010–11 were also considered in developing assumptions that would be close to accurate.

SPECTRUM Suite,[16] a software package developed by Futures Group, was used to compute population projections and ELAs. Several models are available as part of this package. For the purposes of this report, *DemProj* and *FamPlan* were used. *DemProj* provides population projections by age and sex, based on assumptions on fertility, mortality, and migration. *FamPlan* projects expected levels of FP indicators (CPR, use of FP products, unmet need, etc.) required to reach the national goals for addressing unmet need for FP or achieving desired fertility. Results from this model can be used to set realistic FP goals, plan for service expansion, and suggest method-mix alternatives to achieve desired FP programme goals. The model uses assumptions about the proximate determinants of fertility and characteristics of the FP programme (method mix, source mix, discontinuation rates) to calculate the number of users and acceptors of different methods by source.

In view of the two subsequent plan periods (12th and 13th five-year plans), the projection period has been determined to be 2011–22.

[13] For details, please see: http://www.un.org/esa/population/techcoop/PopProj/manual3/chapter1.pdf.
[14] Smoothened age-sex distribution data takes care of the issues of under-reporting, age misreporting, undefined ages, and sex distribution.
[15] The smoothened data (Census, 2001) was matched with the total population for 2011.
[16] Retrieved from http://www.healthpolicyproject.com/index.cfm?id=software&get=Spectrum.

3.2.1 DemProj: Inputs and Assumptions

Input variables for *DemProj* include the following:

a) Age-sex distribution for base year (2011)
b) ASFR in proportion
c) Life expectancy at birth
d) Sex ratio at birth
e) Model life table
f) Migration

a) Age–sex Distribution for the Base Year (2011)

For the current population projections, 2011 is considered the base year. Smoothened age-sex distribution data (matched with Census, 2011 data) provided by NIMS[17]for India, the EAG states, Assam, and the two non-EAG states have been used for the population projections and ELAs.

b) Age–specific Fertility Rate (Proportion)

In *DemProj*, the ASFR as a proportion is entered as the percentage of lifetime fertility that occurs in the following five-year age groups: 15−19, 20−24, 25−29, 30−34, 35−39, 40–44, and 45−49. For the projection period (2011–22), SRS distributions for 2005 and 2010 have been used to calculate the annual rate of change and further extrapolated until the year 2022. ASFRs have been converted to percentage distribution by dividing each ASFR by the sum of all of the ASFRs. Table 3.1 provides the details of ASFRs in percentage distribution (base year 2011) for selected states and India.

Table 3.1: Age–specific fertility rate in proportion (India and selected states), for base year (2011)

State	15–19	20–24	25–29	30–34	35–39	40–44	45–49	Total
Uttar Pradesh	4.5	32.0	34.4	15.3	9.7	2.8	1.4	100.0
Madhya Pradesh	6.8	42.5	32.1	11.3	4.9	1.7	0.7	100.0
Bihar	5.1	32.8	32.5	15.7	9.1	3.1	1.8	100.0
Rajasthan	6.5	38.7	28.5	14.8	6.9	3.5	1.2	100.0
Odisha	8.2	33.3	32.8	16.9	5.9	2.1	0.8	100.0
Jharkhand	8.3	33.3	31.2	15.9	7.2	3.3	0.8	100.0
Chhattisgarh	7.4	39.6	31.3	13.2	5.9	1.9	0.8	100.0
Uttarakhand	8.0	44.3	32.3	11.1	2.0	2.4	0.0	100.0
Assam	10.0	30.6	29.9	16.9	8.8	2.7	1.1	100.0
Andhra Pradesh	12.6	54.5	24.9	6.2	1.2	0.5	0.1	100.0
Tamil Nadu	5.7	44.4	35.5	11.3	2.8	0.3	0.1	100.0
India	7.4	39.6	31.3	13.2	5.9	1.9	0.8	100.0

Source: SRS, 2011 (Office of the Registrar General, 2011b).

c) Life Expectancy at Birth

Data on life expectancy at birth for India and its states have been made available through SRS for the past three decades. For projection purposes, abridged life table data have been used for the period 2006–2010. According to the trends witnessed in the past (annual rate of increment), it has been assumed that life expectancy at birth for the projected period will continue to increase. For the projected years, the life expectancy at birth has been extrapolated by assuming the same annual rate of increment. For Jharkhand, Chhattisgarh, and Uttarakhand,

[17] When the analysis was undertaken, the latest data from Census 2011 were not available; hence, the projected data from NIMS have been used.

similar values from their parent states have been assumed, due to unavailability of data for these states (Table 3.2).

Table 3.2: Expectation of life at birth and the proposed annual increment, by sex, India and selected states, 2011

State	Life Expectancy		Annual Increase	
	Male	**Female**	**Male**	**Female**
Uttar Pradesh	61.8	63.7	0.46	0.64
Madhya Pradesh	61.1	63.8	0.38	0.49
Bihar	65.5	66.2	0.44	0.57
Rajasthan	64.7	68.3	0.43	0.58
Odisha	62.2	63.9	0.45	0.52
Jharkhand	65.5	66.2	0.44	0.57
Chhattisgarh	61.1	63.8	0.38	0.49
Uttarakhand	61.8	63.7	0.46	0.64
Assam	61.0	63.2	0.41	0.51
Andhra Pradesh	63.5	68.2	0.42	0.53
Tamil Nadu	67.1	70.9	0.49	0.59
India	64.6	67.7	0.39	0.52

Source: SRS Based Abridged Life Tables, 2006–2010 (Office of the Registrar General, 2011c).

d) Sex Ratio at Birth

Under the *DemProj* module, sex ratio at birth is defined as the number of male births per 100 female births. For our purposes, input data on the implied sex ratios at birth for the base year (2011) have been accessed from a report "District Level Estimates of Fertility and Implied Sex Ratio at Birth in India," published in the *Economic and Political Weekly* (Kumar, 2012). It has been assumed that the sex ratios at birth of the selected states and India will remain unchanged for the projection period. Table 3.3 provides the details of the implied sex ratios at birth for the selected states and India for the year 2011. As presented in the table, the sex ratio at birth for some states is skewed towards male births (the globally accepted sex ratio at birth is considered to be 105 male babies per 100 female babies[18]); this can have serious policy implications for the states and India. In certain states across India, high sex ratio at birth can be attributed to strong son preference amongst communities, coupled with weak implementation of the Pre-conception and Pre-natal Diagnostics Techniques (PC&PNDT) Act at the policy level.

[18] Retrieved from http://www.prb.org/Articles/2008/indiasexratio.aspx.

Table 3.3: Implied sex ratio at birth, India and selected states, 2011

State	Sex Ratio at Birth
Uttar Pradesh	110
Madhya Pradesh	109
Bihar	106
Rajasthan	112
Odisha	107
Jharkhand	105
Chhattisgarh	104
Uttarakhand	112
Assam	105
Andhra Pradesh	106
Tamil Nadu	106
India	109

Source: Kumar, S., and K.M. Sathyanarayana. 2012. "District-level Estimates of Fertility and Implied Sex Ratio at Birth in India." Economic and Political Weekly 47(33): 66–72.

e) Model Life Table

Life expectancy at birth, indicating the overall mortality in a population, is one of the mortality inputs for the *DemProj* module. The *DemProj* module also requires another input, i.e., an age-specific mortality pattern, to produce mortality rates by age group. Specifically, the mortality rates required by *DemProj* refer to the survival ratios for each age group, which indicate the proportion of survivors from one age group to the next (five-year group). Two sets of model life tables are employed by *DemProj*: the Coale-Demeny (Coale et al., 1983) model life tables and the United Nations life tables for developing countries (United Nations, 1982). The Coale-Demeny family of life tables are known as North, East, South, and West models. Looking at the age-specific mortality patterns of India, the most suitable life table is the Coale-Demeny West model. For the current projection purposes, this model has been applied to India and the states.

f) Migration

Another input for population projections in the DemProj module is migration, which refers to the number of migrants moving into or out of a particular geographic area. Migration is specified through two inputs, i.e., net migration by sex and percentage distribution of migration by age and sex for the projection period. Data on net migration by sex have been sourced from the *Report of the Technical Group on Population Projections Constituted by the National Commission on Population* (Office of the Registrar General, India, 2006b). For country projections, international migration has not been considered, since it is negligible. For state projections, the net migration inputs have been presented in Table 3.4 and are assumed to remain constant for the projection period.

Table 3.4: Net migration rate by sex, per 100 persons, 2001

State	Net Migration Rate per 100	
	Male	**Female**
Uttar Pradesh	-0.25	-0.16
Madhya Pradesh	-0.01	0.00
Bihar	-0.39	-0.17
Rajasthan	-0.08	-0.05
Odisha	-0.1	-0.04
Jharkhand	-0.08	-0.02
Chhattisgarh	-0.06	-0.07
Uttarakhand	-0.03	-0.06
Assam	-.06	-.09
Andhra Pradesh	-0.03	-0.03
Tamil Nadu	-0.08	-0.07
India	0.00	0.00

Source: Population Projections for India and States, 2001–2026 (Office of the Registrar General, 2006a)

3.2.2 FamPlan: Inputs and Assumptions

As stated in the previous section, *FamPlan* is commonly used to project the expected levels of FP indicators required to reach national goals. The goals may be expressed in demand (i.e., meeting unmet need, achieving the desired TFR) or supply (i.e., achieving CPR and TFR goals). Results from this model will aid planners in choosing attainable and useful goals. Additionally, the model will also be able to provide estimates of service and resource requirements to programme planners/implementers for achieving the chosen goals. The input data for the *FamPlan* module have largely been sourced from NFHS-3. Data from DLHS-3 and AHS 2010–11 also have been used to understand the trends in contraceptive use and unmet need. It is important to note that, for the purpose of IUCD duration of use, 1.5 years have been assumed—relatively lower than the international standard of 3.5 years—to accommodate the lower retention rates and wastage (Stover et al., 1997).

Input variables for *FamPlan* include the following:

a) Goal
b) Method mix
c) Source mix
d) Child survival
e) Method attributes and effectiveness
f) Proximate determinants

a) Goal

To make a projection of FP requirements, it is necessary to set the goal/s for the FP programme. For current projection purposes, reducing the unmet need for contraception has been identified as the goal, based on the recommendations from the 1994 International Conference on Population and Development (ICPD), of which India is one of the signatories. This approach allows the use of inputs of the current use of, and unmet need for, contraception. Since this approach is in line with the ICPD recommendations and provides for the use of these critical inputs, it has been chosen for our projection. By choosing this approach, the current unmet need will be converted into new contraceptive users in the future.

Further, it has been assumed that the unmet need for contraception will not fall beyond 4.7 per cent (AP level, NFHS-3, 2005–06), which has been observed to be the lowest in the country.
Two scenarios have been created for projection and ELAs:

Scenario A: Change in method mix proposed (based on the state's current level) for the projection period (2011−22).
Scenario B: The method mix will remain unchanged during the projection period (2011–2022).

b) Method Mix

Method mix is the percentage distribution of all current users for different methods. For current projection, AHS 2010–2011 survey data have been used to calculate the method mix, which provides the basis for estimating future method mix patterns.

Two method mix scenarios were considered for the calculation of ELAs regarding users of FP methods in different years. In one of the scenarios, designated Scenario B, the method mix would be been kept unchanged, starting from the base year (AHS, 2010–11) until the end of the projection period. The second scenario (Scenario A) would use a varying method mix based on certain assumptions.

Thus, the *uniform* method mix under Scenario B is the same one obtained in the base year 2011 and kept for the entire projection period. However, the construction of the method mix under Scenario A would require a series of assumptions and calculations based on available data, expert opinions or, in some cases, a combination of all of these. This scenario was generated for each state by analysis on a case-by-case basis.

There are three general guiding principles available to fix the future course of the method mix pattern for a population. These three ways are explained in the *FamPlan* module of the *Spectrum Suite*.[19] The first method is to examine the distribution of those who intend to use family planning in the future. They often are asked which methods they prefer to use, and surveys provide this information. The second approach is to study the method mix currently being used by the urban population or educated women. These women are assumed to have good knowledge of methods and access to services. The method mix of this group may indicate likely future directions, if family planning is able to increase knowledge and access. The third approach is to examine the current mix of contraceptive users who are deemed "knowledgeable" about contraception. A "knowledgeable" user is often defined as a user who knows about at least four modern methods. The usual time lag between the urban and rural population in achieving fertility and FP goals is about 15 years.

However, in the current exercise, the principles mentioned above were not found to be satisfactory in the context of most of the states. Thus, alternate ways were chosen to fix the future method mix pattern. In a nutshell, this pattern has been worked out by using two broad principles, i.e., the proportion of users of limiting method to total users and the pattern of unmet need for family planning. The states have been divided into two groups according to these two principles. The following matrix provides the details of these two broad groupings and the principles applied to them.

[19] Retrieved from http://www.policyproject.com/policycircle/documents/famplan.pdf.

Table 3.5: Method mix scenarios considered for projection of ELAs

Groups	States	Future trend in method mix
Group 1	Bihar, Chhattisgarh, Madhya Pradesh, Jharkhand, and Rajasthan	• Currently, a higher proportion of users of limiting methods and a relatively higher proportion of unmet need for spacing methods. • Thus, the future method mix patterns are fixed by lowering the allocation of limiting methods and ensuring a more balanced method mix.
Group 2	Assam, Odisha, Uttar Pradesh, Uttarakhand, and India	• Currently, a higher proportion of spacing method users and a fairly equal proportion of unmet need for both spacing and limiting methods. • To ensure a more balanced method mix, the future method mix pattern has been altered by increasing the allocation of limiting methods in these states.

Goal Fixing to Reach the Unmet Need for Contraception: Altogether, 50 to 60 per cent reductions in unmet need of contraception were fixed during the projection period 2011–2022 on a case-by-case basis. The goal of reaching unmet need for contraception has been fixed while keeping in mind the estimates of reaching the TFR of 2.1 provided by the Expert Committee on Projections, 2005−2006 (Office of the Registrar General of India, 2006b).

1. Bihar

The overall Goal is to "meet 60% of current unmet need (39.2%, AHS, 2010–11) for family planning." This will result in increasing the modern CPR from 33.3 per cent in 2010−11 to 56 per cent in 2022.

Method mix

- *The unchanged or uniform* method mix Scenario B, by keeping 89.2 per cent (at the AHS, 2010−11 level) for limiting methods against 21.2 per cent for spacing methods through the projection period, i.e., from 2012–2022, would result in increasing the number of acceptors of limiting methods from 5.2 lakhs in 2012 to nearly three times that—14.4 lakhs—in 2022. In looking at the human resources and health facilities available to the state government, achieving this number from the 2012 level will be an enormous task. Thus, it has been decided to create another scenario that propagates a balanced method mix.

- The proportion of limiting methods changed from 89.2 per cent in 2011 to 79.2 per cent in 2022. Scenario A (the *changed* method mix) was constructed by looking at various datasets (NFHS, DLHS, and AHS). While looking at these datasets, no clear trend has emerged for the method mix for Bihar, except that both limiting and spacing methods have similar proportions, at about 80 per cent to 20 per cent, respectively. Unmet need for family planning in the state is more tilted towards spacing methods, at more than 54 per cent, per AHS, 2010−11. This provides an opportunity to create a second scenario by assuming 1 per cent per year reduction in the proportion of limiting methods, contributing to a 1 per cent per year increment in the proportion of spacing methods, resulting in an approximate reduction of 10 per cent in the proportion of limiting methods by the year 2022, pegged at 78.8 per cent. A much slower increase in the number of acceptors of limiting methods was noticed while calculating the number of

acceptors for the projection period using this assumption. The number of acceptors of limiting methods increased from 5.2 lakhs in 2012 to 11.3 lakhs in 2022, almost twice the current estimate.

2. Assam

The overall goal is to achieve "meeting 60% of current unmet need (24.0%, AHS, 2010−11) for family planning." This will result in increasing the modern CPR from 35.4 per cent in 2010–11 to 49.8 per cent in 2022.

Method mix

- *The unchanged or uniform* method mix Scenario B, by keeping 36.2 per cent (on a par with the AHS, 2010−11 level) for limiting methods against 63.8 per cent for spacing methods through the projection period, i.e., from 2012 through 2022, resulted in decreasing the number of acceptors of limiting methods from 0.8 lakhs in 2012 to 0.6 lakhs in 2022.

- The proportion of limiting methods changed from 36.2 per cent in 2011 to 51.0 per cent in 2022.
  The *changed* method mix (Scenario A) has been constructed by looking at the various datasets at different time periods. The proportion of limiting methods increased from 45.4 per cent in 1998–99 (NFHS-2) to 48.7 per cent in 2005–06 (NFHS-3), and then decreased to 36.2 per cent in the 2010–11 (AHS) period. Apparently, these data do not depict any clear trend for future assumptions on method mix. As per NFHS-3 (2005–06), among women with four or more children, only 20.5 per cent adopted sterilisation, 8.4 per cent used pills, more than 26 per cent used traditional methods, and more than 42 per cent did not use any method. A similar trend was observed in contraceptive use among women who had three children. After studying the trend in this method mix, some space appeared available for expanding the limiting methods. In this context, in Scenario A, the proportion of limiting methods has been increased to 50 per cent by 2022 to make up a more balanced method mix pattern. By creating such a scenario, the number of acceptors of limiting methods increased from 0.10 lakhs in 2012 to 1.4 lakhs in 10 years. *[This figure (1.4 lakhs) basically corroborates the number of limiting methods recorded by HMIS for the years 2010 and 2011 for Jharkhand (1.3 lakhs) and Odisha (1.4 lakhs), with a population size similar to Assam (3.1 Cr).]*

3. Chhattisgarh

The overall goal is to achieve "meeting 50% of current unmet need (26.4%, AHS, 2010−11) for family planning." This will result in increasing the modern CPR from 49.4 per cent in 2010–11 to 64.2 per cent in 2022.

Method mix

- *The unchanged or uniform* method mix Scenario B, by keeping 94 per cent (on a par with the AHS, 2010–11 level) for limiting methods against 6 per cent for spacing methods through the projection period, i.e., from 2012 through 2022, resulted in increasing the number of acceptors of limiting methods from 1.4 lakhs in 2012 to 2.0 lakhs in 2022.

- Proportion of limiting methods changed from 94 per cent in 2011 to 81 per cent in 2022.
  The method mix used in the state was always highly skewed towards limiting methods—the proportion of users of limiting methods was always pegged at 90 per cent. As per the AHS, 2010–11, unmet need for family planning shows that a majority (58.7%) were in need of spacing methods. Scenario A was created through providing a greater opportunity for spacing methods. Compared to Bihar, where 10 per

cent shifting was provided for spacing methods, in Chhattisgarh, 13 per cent shifting was provided for spacing methods because a higher proportion of unmet need for spacing has been recorded in the state. This scenario calculates that the number of acceptors of limiting methods was in a range from 1.4 lakhs in 2012 to 1.2 lakhs in 2022.

4. Madhya Pradesh

The overall Goal is to "meet 60% of current unmet need (22.4%, the AHS, 2010–11) for family planning." This will result in increasing the modern CPR from 57.0 per cent in 2010–11 to 69.9 per cent in 2022.

Method mix

- *The unchanged or uniform* method mix Scenario B, by keeping 85.6 per cent for limiting methods against 14.4% for spacing methods (on a par with the AHS, 2010–11 level) through the projection period (2012–2022), resulted in a nearly 2 lakhs increase in the number of acceptors of limiting methods in 10 years, i.e., from 4.2 lakhs in 2012 to 6.1 lakhs in 2022.

- Proportion of limiting methods changed from 85.6 per cent in 2011 to 73.5 per cent in 2022.
  Over the years, the proportion of limiting methods accepted in the state has been decreasing at a slower pace—from 88.8 per cent in 1998–99 to 86.4 per cent in 2005–06, and further, to 85.6 per cent, in 2010–11. In the coming years, it is assumed that this decrease will be intensified; so, to sustain the current number of acceptors of limiting methods (4.2 lakhs in 2011), it is proposed under Scenario A to alter the proportion to 73.5 per cent from 85.6 per cent by providing a greater proportion of spacing methods. This would bring the projected number of acceptors of limiting methods from 4.2 lakhs in 2012 to 3.7 lakhs by 2022.

5. Odisha

The overall goal is to "meet 50% of current unmet need (23.2%, AHS, 2010–11) for family planning." This will result in increasing the modern CPR from 40.0 per cent in 2010–11 to 55.6 per cent in 2022.

Method mix

- *The unchanged or uniform* method mix Scenario B, by keeping 69.2 per cent for limiting methods against 30.8 per cent for spacing methods (on a par with the AHS, 2010–11 level) through the projection period (2012–2022), resulted in an increase of nearly 0.2 lakh in the number of acceptors of limiting methods in 10 years, i.e., from 1.5 lakhs in 2012 to 1.6 lakhs in 2022. The situation in Odisha seems to be fairly under control, as under Scenario B, the number of acceptors of limiting methods has not increased substantially.

- A decreasing trend in the proportion of limiting methods has been observed for the state over time—the proportion of limiting methods decreased from 88 per cent in 1998–99 to 76 per cent in 2005–06 and was further reduced to 69 per cent in 2010–11. Ironically, more than 53 per cent of unmet need (12.4% of 23.2%, AHS, 2010–11) was accounted for by limiting methods. Thus, an altered method mix in Scenario A, by increasing the proportion of limiting methods to 75.0 per cent by 2022 from 69.2 per cent in 2010–11 to cater to the more than 53 per cent of unmet need, will generate 1.7 lakh acceptors of limiting methods in 2012, increased to 2.0 lakhs by 2022.

6. Jharkhand

The overall goal is to "meet 50% of current unmet need (23.2%, AHS, 2010–11) for family planning." This will result in increasing the modern CPR from 37.8 per cent in 2010–11 to 53.1 per cent in 2022.

Method mix

- *The unchanged or uniform* method mix Scenario B, by keeping 78.0 per cent for limiting methods against 22.0 per cent for spacing methods (on a par with the AHS, 2010–11 level) through the projection period (2012–2022), resulted in a nearly 1.0 lakh increase in the number of acceptors of limiting methods over 10 years, i.e., from 1.4 lakhs in 2012 to 2.3 lakhs in 2022.

- In the state, the proportion of limiting methods was decreased from 88 per cent in 1998–99 to 77 per cent in 2005–06 and marginally increased to 78 per cent in 2010–11. The unmet need scenario in the state typically is characterised by allotting more than 53 per cent (16.2% of 30.5%, AHS, 2010–11) to spacing. Thus, to accommodate this larger proportion of spacing requirements, Scenario A was generated by reducing proportion of limiting methods from 78 per cent in 2010–11 to 70 per cent by 2022. The projected number of acceptors of limiting methods under this scenario varies between 1.2 lakhs in 2012 to 1.6 lakhs in 2022, creating a reasonable level for the state to achieve; at the same time, however, more efforts would be required to meet the spacing requirements.

7. Rajasthan

The overall goal is to achieve "meeting 60% of current unmet need (19.6%, AHS, 2010–11) for family planning." This will result in reaching modern CPR from 58.8 per cent in 2010–11 to 70.2 per cent in 2022.

Method mix

- *The unchanged or uniform* method mix Scenario B, by keeping 77.6 per cent for limiting methods against 22.4 per cent for spacing methods (on a par with the AHS, 2010–11 level) through the projection period (2012–2022), resulted in a nearly 1.1 lakhs increase in the number of acceptors of limiting methods over 10 years, i.e., from 4.3 lakhs in 2012 to 5.4 lakhs in 2022.

- The state has observed a decline in the proportion of limiting methods, from 85 per cent in 1998–99 to 79 per cent in 2005–06, and further to 77 per cent in 2010–11. Additionally, unmet need for family planning in the state is skewed towards spacing methods, as more than 60 per cent of unmet need (11.9% of 19.6%, AHS, 2010–11) has been directed towards spacing methods. This provides an opportunity to change the method mix in Scenario A to reduce the proportion of limiting methods from 77 per cent in 2010–11 to 67 per cent by 2022—a 10 per cent decline over 10 years. The projected number of acceptors of limiting methods under this scenario range between 3.4 lakhs in 2012 to 3.5 lakhs in 2022.

8. Uttar Pradesh

The overall goal is to achieve "meeting 60% of current unmet need (29.7%, AHS, 2010–11) for family planning." This will result in increasing the modern CPR from 31.4 per cent in 2010–11 to 48.6 per cent in 2022.

Method mix

- *The unchanged or uniform* method mix Scenario B, by keeping 56.4 per cent for limiting methods against 43.6 per cent for spacing methods (on a par with the AHS, 2010–11 level) through the projection period (2012–2022), resulted in a nearly 2.6 times increase in the number of acceptors of limiting methods over 10 years i.e., from 5.0 lakhs in 2012 (4.1 lakhs in 2011) to 12.8 lakhs in 2022.
- The proportion of limiting methods in the state has consistently declined, from more than 70 per cent in 1998–99 to 60 per cent in 2005–06, and further, to 56 per cent in 2010–11. The data on unmet need reveal that more than 57 per cent (17.1% of 29.7%, AHS, 2010–11) were in need of spacing methods. To provide an upper limit scenario for the number of acceptors of the limiting methods, an alternate, Scenario A has been created by increasing the contribution of limiting methods to the overall method mix to 70 per cent (NFHS-2, 1998–99 level) by 2022, an increase of more than 1 per cent per annum. This resulted in an increase in the projected number of acceptors of limiting methods, from 6.7 lakhs in 2012 (4.1 lakhs in 2011) to 19.5 lakhs by 2022, a nearly threefold increase in 10 years.

9. Uttarakhand

The overall goal is to achieve "meeting 60% of current unmet need (23.2%, AHS, 2010–11) for family planning." This will result in increasing the modern CPR from 55.4 per cent in 2010–11 to 67.0 per cent in 2022.

Method mix

- *The unchanged or uniform* method mix Scenario B, by keeping 61.8 per cent for limiting methods against 38.2 per cent for spacing methods (on a par with the AHS, 2010–11 level) through the projection period (2012−2022), resulted in more than a 1.5 times increase in the number of acceptors of limiting methods over 10 years, i.e., from 0.3 lakhs in 2012 to 0.5 lakhs in 2022.

- The proportion of users of limiting methods to overall users declined from 77 per cent in 1998–99 to 61 per cent in 2005–06 and nearly stabilised at 62 per cent in 2010–11. The overall unmet need scenario in the state is pegged at 23.2 per cent (AHS, 2010–11) and more than 48 per cent (11.2% of 23.2%) reported a need for limiting methods. To create an alternate Scenario A, the method mix was modified by slightly increasing the proportion of users of limiting methods from 62 per cent in 2010–11 to 70 per cent by 2022. The projected number of acceptors of limiting methods under this scenario will increase from 0.4 lakhs in 2012 to 0.7 lakhs in 2022.

10. India

The overall goal is to achieve "meeting 60% of current unmet need (12.8%, NFHS, 2005–06) for family planning." This will result in increasing the modern CPR from 48.3 per cent in 2005–06 to 57.7 per cent in 2022.

Method mix

- *The unchanged or uniform* method mix Scenario B would keep 73.4 per cent for limiting methods to 26.7 per cent for spacing methods. In the absence of India-level estimates for the recent years, average values of the method mix were calculated by assuming that India would follow the average of the AHS states' pattern of method mix through the projection period (2012−2022), resulting in an increase in the

number of acceptors of limiting methods over 10 years, i.e., from 48.5 lakhs in 2012 to 56.3 lakhs by 2022.

- While analysing the method mix pattern, a decline was observed in the proportion of acceptors of limiting methods, from 84 per cent in 1998–99 to 79 per cent in 2005–06 (DLHS-3 also reported 77%). The unmet need scenario in India shows a marginally higher proportion, as more than 51 per cent (NFHS-3) reported a need for limiting methods, while DLHS-3 shows a larger proportion of more than 64 per cent of unmet need for limiting methods. Keeping these percentages in view, the alternate Scenario A was created by nominally increasing the proportion of limiting methods, from 73.4 per cent in 2011 to 75 per cent by 2022 to cater to the relatively higher proportion of unmet need for limiting methods. By changing the method mix, the projected number of acceptors of limiting methods increased from 50.5 lakhs in 2012 to 60.7 lakhs by 2022.

11. Tamil Nadu and Andhra Pradesh

The overall goal is to achieve "meeting 40% of current unmet need (8.5%, NFHS-3, 2005–06) for family planning" for Tamil Nadu. This will result in increasing the modern CPR from 60.0 per cent in 2011 to 62.7 per cent in 2022.

For Andhra Pradesh, the state recorded the lowest unmet need, at 4.7 per cent (NFHS-3, 2005–06), and this was unchanged throughout the projection period. Thus, no goal for meeting unmet need has been fixed, and there has been no change in the level of contraceptive prevalence rate for the state.

Table 3.6 provides the details of the two scenarios for method mix considered for the EAG states and India, which are considered to be one of the important inputs for the projection of ELAs.

Table 3.6: Method mix scenarios considered for population projection and ELAs

State	Scenario A: Method Mix											
	Method Mix 2011 (Current)						Method Mix 2022 (Assumed)					
	Condom	Female sterilisation	IUD	Male sterilisation	Pill	Total	Condom	Female sterilisation	IUD	Male sterilisation	Pill	Total
Uttar Pradesh	32.1	54.9	3.0	0.6	9.4	100.0	14.0	68.6	8.6	1.2	7.6	100.0
Madhya Pradesh	10.2	83.8	0.9	1.8	3.3	100.0	15.0	71.7	6.2	1.8	5.3	100.0
Bihar	4.4	89	1.4	0.8	4.4	100.0	10.0	78.8	3.9	1.1	6.2	100.0
Rajasthan	15.9	76.9	1.7	0.7	4.8	100.0	19.9	66.0	5.7	1.6	6.8	100.0
Odisha	4.8	68.5	0.7	0.7	25.3	100.0	6.0	74.0	3.0	1.0	16.0	100.0
Jharkhand	8.7	76.8	2.1	1.3	11.1	100.0	12.0	67.9	5.1	2.0	13.0	100.0
Chhattisgarh	2.6	92.4	0.8	2.0	2.2	100.0	10.0	78.0	3.6	3.0	5.4	100.0
Uttarakhand	28.9	59.1	1.8	2.7	7.5	100.0	20.0	67.3	3.2	2.5	7.0	100.0
Assam	8.5	35.6	3.7	0.6	51.6	100.0	10.0	50.4	3.7	0.6	35.3	100.0
Andhra Pradesh**	0.7	93.9	0.7	4.3	0.4	100.0	1.6	92.7	0.3	4.5	0.9	100.0
Tamil Nadu**	3.8	91.7	3.5	0.7	0.3	100.0	5.7	87.7	5.1	1.0	0.5	100.0
India	13.0	72.1	1.7	1.3	11.9	100.0	11.7	70.1	5.4	4.9	7.9	100.0

State	Scenario B: Method Mix											
	2011 (Current)						2022 (Same proportion kept for projection period as in 2011)					
	Condom	Female sterilisation	IUD	Male sterilisation	Pill	Total	Condom	Female sterilisation	IUD	Male sterilisation	Pill	Total
Uttar Pradesh	32.1	54.9	3	0.6	9.4	100.0	32.1	54.9	3	0.6	9.4	100.0
Madhya Pradesh	10.2	83.8	0.9	1.8	3.3	100.0	10.2	83.8	0.9	1.8	3.3	100.0
Bihar	4.4	89.0	1.4	0.8	4.4	100.0	4.4	89.0	1.4	0.8	4.4	100.0
Rajasthan	15.9	76.9	1.7	0.7	4.8	100.0	15.9	76.9	1.7	0.7	4.8	100.0
Odisha	4.8	68.5	0.7	0.7	25.3	100.0	4.8	68.5	0.7	0.7	25.3	100.0
Jharkhand	8.7	76.8	2.1	1.3	11.1	100.0	8.7	76.8	2.1	1.3	11.1	100.0
Chhattisgarh	2.6	92.4	0.8	2	2.2	100.0	2.6	92.4	0.8	2	2.2	100.0
Uttarakhand	28.9	59.1	1.8	2.7	7.5	100.0	28.9	59.1	1.8	2.7	7.5	100.0
Assam	8.5	35.6	3.7	0.6	51.6	100.0	8.5	35.6	3.7	0.6	51.6	100.0
Andhra Pradesh**	0.7	93.9	0.7	4.3	0.4	100.0	0.7	93.9	0.7	4.3	0.4	100.0
Tamil Nadu**	3.8	91.7	3.5	0.7	0.3	100.0	3.8	91.7	3.5	0.7	0.3	100.0
India	13.0	72.1	1.7	1.3	11.9	100.0	13.0	72.1	1.7	1.3	11.9	100.0

c) Source Mix

Source mix, the next input for FamPlan, is the percentage of all users of a particular method who obtain services from both public and private sources. The NFHS-3 source mix was considered for the current projection purposes, while regarding sources, segregated information was not provided for the projection exercise because the source mix is affected by several factors, including the regulations on FP products, extent of government involvement in FP service provision, and the strength of the private sector.

d) Proximate Determinants

The module *FamPlan* determines the family planning requirements to meet specific fertility goals. It can be used to determine the number of family planning users, new acceptors, and commodities required by method and source to achieve a TFR goal, given estimates of changes in the other proximate determinants of fertility. One of the six key steps in making population-based projections within *FamPlan* is input on proximate determinants of fertility, which includes a set of variables listed below. (For more details, see *FamPlan – A Computer Program for Projecting Family Planning Requirements*. Manual prepared by John Stover, Laura Heaton, and John Ross for the POLICY Project).

The proximate determinants that affect fertility directly include the proportion of women in a sexual union, the period for regaining fertility following child birth (postpartum insusceptibility), levels and quality of contraceptive practice, and, to a lesser degree, the underlying capability to conceive, levels of induced abortion, and prevalence of pathological infertility. For these indicators, data from NFHS-3 were considered. The assumption is that the values of the proximate determinants of fertility will remain unchanged during the projection period (2011–22).

1. Percentage in a Sexual Union

To determine the number of women in reproductive age who are in a sexual union, *FamPlan* requires an estimate of the percentage of women 15−49 years who are in such a union.

2. Duration of Postpartum Insusceptibility

Postpartum insusceptibility is the period after a birth during which a woman is not exposed to the risk of pregnancy, either because of postpartum amenorrhea or postpartum abstinence. *FamPlan* requires an estimate of the average duration of postpartum insusceptibility, expressed in months.

3. Total Abortion Rate

The total abortion rate is the average number of induced abortions a woman would have if she survived to age 49 and had abortions at the prevailing age-specific rates. Thus, in concept, it is similar to the TFR. Due to the unavailability of recent data from other sources, NFHS-2 has been used for estimates on the total abortion rate.

4. Infertility

The infertility variable measures both natural and pathological infertility. Since natural fertility is not likely to change, the major effects of changes in fertility will result from pathological fertility. In practice, this variable is likely to be significant only in societies with high levels of pathological sterility that result in significant infertility and sub-fecundity. The extent of sterility is gauged by the percentage of women who are childless at the end of the reproductive period. The proportion of women who remain childless in the age group of 45–49 years has been considered as an input to indicate this variable (sourced from NFHS-3). Table 3.7 provides the details of these proximate determinants for India, the EAG states, and two non-EAG states.

Table 3.7 Proximate determinants of fertility, India and selected states

State	Proximate Determinants			
	Percentage of women 15−49 in sexual union	Postpartum insusceptibility (months)	Total abortion rate*	Infertility (%)
Uttar Pradesh	75.0	12.0	0.06	2.4
Madhya Pradesh	79.0	10.0	0.03	1.7
Bihar	81.1	14.3	0.01	2.4
Rajasthan	83.4	10.3	0.02	1.9
Odisha	72.5	13.6	0.03	1.5
Jharkhand	78.3	14.0	0.01	2.3
Chhattisgarh	73.0	10.0	0.03	2.9
Uttarakhand	70.4	10.0	0.06	1.8
Andhra Pradesh	76.7	12.8	0.03	3.7
Tamil Nadu	72.6	9.6	0.14	4.0
India	74.8	10.3	0.04	3.3

Source: NFHS-3 (IIPS and Macro International, 2007); *NFHS-2 (IIPS and ORC Macro, 2000).

3.3. Child Survival

FamPlan includes a module for child survival. This module can be used to estimate the effects of contraceptive use upon infant and child mortality through the intermediate influence of high-risk births. Higher contraceptive use means fewer high-risk births, and fewer high-risk births mean lower infant and child mortality rates. (For more details, see *FamPlan – A Computer Program for Projecting Family Planning Requirements*. Manual prepared by John Stover, Laura Heaton, and John Ross for the POLICY Project).

Thus, contraceptive use has an indirect influence on infant and child mortality. For projection purposes, information on high-risk births and infant and child mortality for the base year is required. A birth is classified as high risk if it has one or more of the following characteristics: mother's age is less than 18 years or above 34 years, previous birth interval is less than two years, and the births order is more than three. Details of child survival indicators are presented in Table 3.8.

Table 3.8 Indicators of child survival, India and selected states

State	Child Survival Indicators		
	Per cent of births with any risk in base year*	IMR in base year**	Under-5 mortality rate in base year**
Uttar Pradesh	75.0	57.0	78.0
Madhya Pradesh	62.0	59.0	82.0
Bihar	75.4	44.0	62.0
Rajasthan	72.5	52.0	59.0
Odisha	57.0	57.0	78.0
Jharkhand	72.7	39.0	59.0
Chhattisgarh	67.3	48.0	82.0
Uttarakhand	68.5	36.0	78.0
Assam	68.4	55.0	81.0
Andhra Pradesh	65.1	43.0	45.0
Tamil Nadu	36.6	22.0	27.0
India	70.0	44.0	58.0

*Sources: *NFHS-3 (IIPS and Macro International, 2007); ** SRS, 2012 (Office of the Registrar General, 2012).*

3.4 Method Attributes and Effectiveness

"Method protection attributes"[20] refer to the characteristics of method practice required to calculate the number of users, acceptors, and commodities essential to meet the chosen goals. For the temporary methods (condoms and pills), the key attribute is couple-years of protection (CYPs). The link between the method used and the goal sought is the protection given to couples to avert unwanted pregnancies. For the long-term methods (IUD), the key attribute is the average duration of use. For the permanent methods (female and male sterilisation), the duration of use is determined from the average age at the time of sterilisation.

The average age at sterilisation for both males and females has been sourced from NFHS-3. For other indicators, GoI estimates of 72 pieces of condoms and 13 cycles of oral pills have been used, and Table 3.9 provides details on method attributes among the EAG states, the two non-EAG states, and India.

Table 3.9 Method attributes for India and selected states

State	Method Attributes				
	Condoms/CYP	**Female ster. average age**	**IUD duration of use (yrs)**	**Male ster. average age**	**Pill cycles/CYP**
Uttar Pradesh	72.0	27.4	1.5	28.9	13.0
Madhya Pradesh	72.0	27.1	1.5	28.3	13.0
Bihar	72.0	27.9	1.5	28.7	13.0
Rajasthan	72.0	27.3	1.5	28.9	13.0
Odisha	72.0	26.5	1.5	28.3	13.0
Jharkhand	72.0	27.3	1.5	27.7	13.0

[20] *FamPlan*: A Computer Programme for Projecting Family Planning Requirements.

State	Method Attributes				
	Condoms/CYP	**Female ster. average age**	**IUD duration of use (yrs)**	**Male ster. average age**	**Pill cycles/CYP**
Chhattisgarh	72.0	27.1	1.5	26.6	13.0
Uttarakhand	72.0	27.7	1.5	30.0	13.0
Assam	72.0	27.7	1.5	30.0	13.0
Andhra Pradesh	72.0	23.7	1.5	27.2	13.0
Tamil Nadu	72.0	25.4	1.5	26.0	13.0
India	72.0	26.8	1.5	27.1	13.0

"Method effectiveness" is the proportion of users who do not become pregnant during a year of method use among the particular method users. For each method, *FamPlan* requires a specific average effectiveness rate, or the extent by which the practice of a method of contraception lowers fecundability. It is determined by both a population's ability to conceive and the extent of contraceptive method failure. Globally accepted values calculated by John Stover et al. (2000) have been used, as presented in Table 3.10.

Table 3.10 Effectiveness of contraceptive methods, India and states

Methods	Effectiveness, in Percentage
Pill	92.0
IUD	96.0
Condom	81.0
Sterilisation	100.0

3.5 OUTPUTS OF POPULATION PROJECTION AND ELAs

3.5.1 Population of India and Selected States

Table 3.11 presents the projected population under two different scenarios. India's population is likely to exceed 1.306 billion by 2017 before reaching 1.381 billion in 2022. The country is likely to add 170 million persons during the next decade—about 10 million fewer people added in the last decade.

Figure 3.1 plots the graph for the proportion of EAG states' and Assam populations to the overall population. The graph clearly shows a continuous increase in the proportion of EAG states' populations to the total population during the projection period. The population share of the eight EAG states and Assam is likely to increase from 46.05 per cent in 1991 to 49.70 per cent in 2022 .The population of the eight EAG states is likely to cross the combined population of all 26 non-EAG states/UTs in the period 2020–2022.

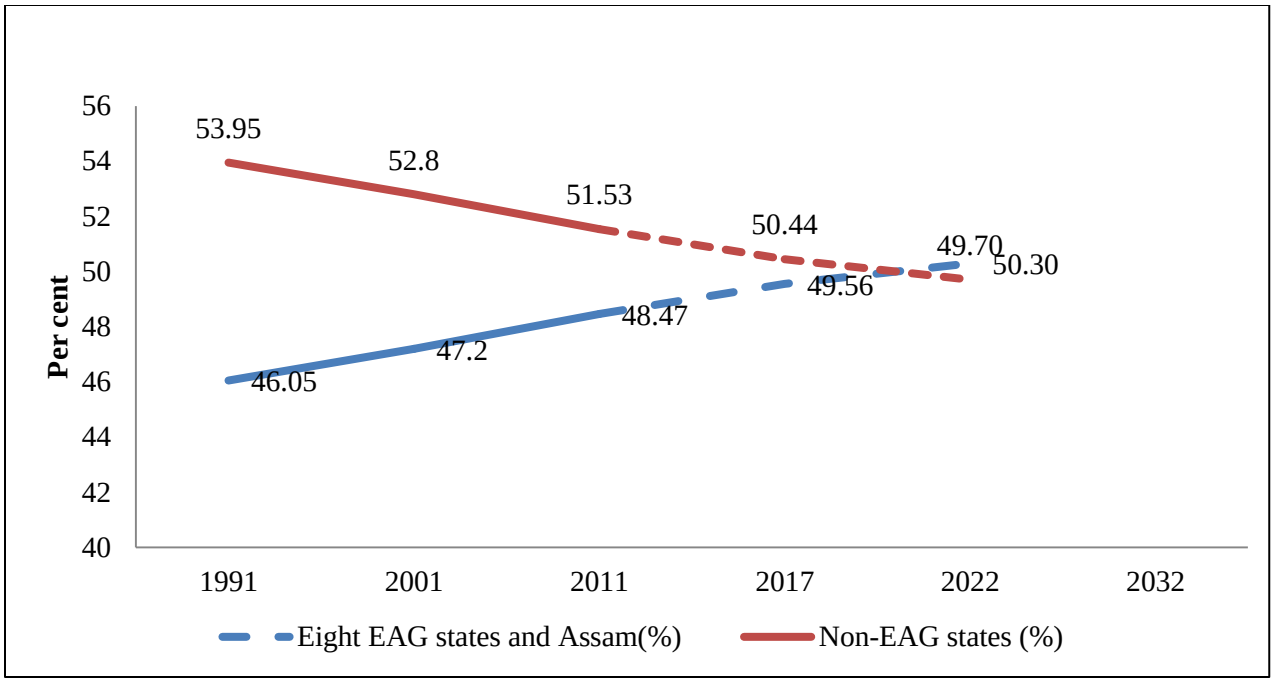


Figure 3.1: Trend in proportional share of population, eight EAG and Non-EAG States of India

The projection indicates that the four main north Indian states (i.e., UP, MP, Bihar, and Rajasthan) will become a challenge for India in the near future, as the proportion of their populations to the country's population is likely to increase from 36.8 per cent in 2011 to 40 per cent in 2022.

Figure 3.2 provides a comparison of projected populations between UN estimates and the Policy Unit's projections. This comparison helps in testing the robustness of the projection models. The projected UN estimate (1.38 billion, medium variant) for 2022 matches the result obtained from the current projection (1.38 billion). This signifies that the projection model developed under this activity provides reliable estimates for ancillary projections.

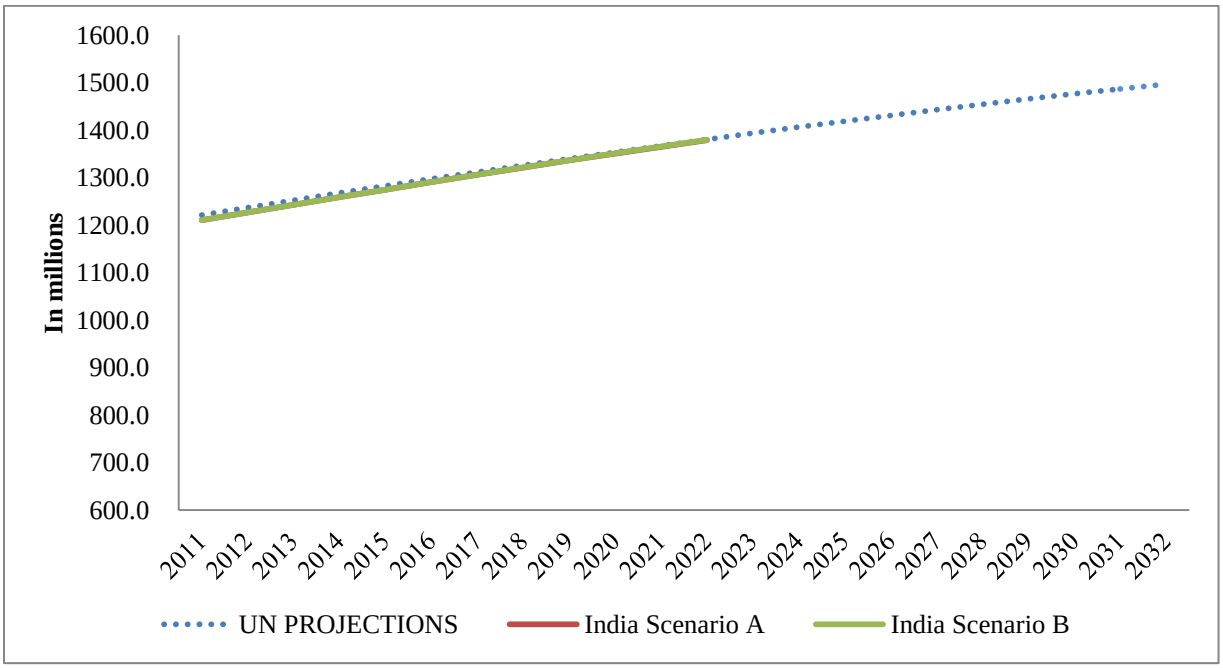


Figure 3.2: Comparison between UN population projections (2013) and Policy Unit's projections for India

Table 3.11: Projected population under two different scenarios of method mix, India and selected states

State	SCENARIO A								
	Projected Population (Millions)								
	2011			2017			2022		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Uttar Pradesh	104.6	95.0	199.6	116.2	105.4	221.6	125.7	113.6	239.3
Madhya Pradesh	37.6	35.0	72.6	41.3	38.5	79.8	43.8	41.0	84.8
Bihar	54.3	49.8	104.1	61.0	56.4	117.3	66.3	61.5	127.8
Rajasthan	35.6	33.0	68.6	39.5	36.6	76.1	42.4	39.7	82.0
Odisha	21.2	20.8	42.0	22.3	21.9	44.2	23.0	22.5	45.6
Jharkhand	16.9	16.1	33.0	18.7	17.8	36.4	20.0	19.2	39.2
Chhattisgarh	12.8	12.7	25.5	13.8	13.9	27.7	14.5	14.6	29.2
Uttarakhand	5.1	4.9	10.1	5.5	5.3	10.7	5.7	5.5	11.2
Assam	15.9	15.3	31.2	17.0	16.3	33.3	17.7	17.1	34.9
Andhra Pradesh	42.8	42.5	85.3	44.4	44.4	88.8	45.8	45.9	91.8
Tamil Nadu	36.1	36.0	72.1	37.1	37.1	74.2	37.7	37.8	75.5
India	623.1	587.4	1210.6	671.5	634.3	1305.9	708.7	669.8	1378.5
EAG states + Assam	304.2	267.3	555.5	318.3	295.7	614.0	341.4	294.8	636.1
Non-EAG states	319.0	320.1	655.0	353.2	338.7	691.9	367.3	375.1	742.3
EAG states (%)	48.8	48.1	48.5	49.9	49.2	49.6	50.7	46.6	48.7
Non-EAG states (%)	51.2	51.9	51.5	50.1	50.8	50.4	49.3	53.4	51.3
	SCENARIO B								
	Projected Population (Millions)								
State	2011			2017			2022		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Uttar Pradesh	104.6	95.0	199.6	116.3	105.4	221.7	126.1	114.0	240.0
Madhya Pradesh	37.6	35.0	72.6	41.3	38.5	79.8	43.9	41.0	84.9
Bihar	54.3	49.8	104.1	60.9	56.3	117.2	66.0	61.3	127.3
Rajasthan	35.6	33.0	68.6	39.5	36.6	76.0	42.2	39.2	81.4
Odisha	21.2	20.8	42.0	22.3	21.8	44.2	23.1	22.5	45.6
Jharkhand	16.9	16.1	33.0	18.7	17.8	36.4	19.1	19.1	38.2
Chhattisgarh	12.8	12.7	25.5	13.8	13.9	27.7	14.5	14.6	29.1
Uttarakhand	5.1	4.9	10.1	5.5	5.5	11.0	5.8	5.7	11.5
Assam	15.9	15.3	31.2	17.0	16.4	33.3	17.7	17.2	34.9
Andhra Pradesh	42.8	42.5	85.3	44.4	44.3	88.7	45.8	45.9	91.8
Tamil Nadu	36.1	36.0	72.1	37.1	37.1	74.2	37.7	37.8	75.4
India	623.1	587.4	1210.6	671.6	634.4	1306.1	709.1	670.2	1379.3
EAG states (%)	48.8	48.1	48.5	49.9	49.2	49.6	50.5	49.9	50.2
Non-EAG states (%)	51.2	51.9	51.5	50.1	50.8	50.4	49.5	50.1	49.8

Table 3.12 presents the implied annual rate of growth of population in India and selected states. All EAG states except Odisha and Uttarakhand show a higher annual growth rate of population compared to India (1.3 in 2012 and 1.0 in 2022) through the projection period. The implied annual growth rate of population for the non-EAG states (TN and AP) is lower than the India average, wherein the growth rate for Tamil Nadu (which ranges between 0.5 in 2012 and 0.3 in 2022) is significantly lower than the rest of the states across India.

The pace of population decline in major north Indian states will be relatively slower than the rest of India. UP, MP, Bihar, Rajasthan, Jharkhand, and Chhattisgarh will have a higher annual growth rate.

Table 3.12: Implied annual growth rate of population, India and states, 2012–2022

	SCENARIO A			SCENARIO B		
State	**2012**	**2017**	**2022**	**2012**	**2017**	**2022**
Uttar Pradesh	1.5	1.5	1.15	1.5	1.5	1.2
Madhya Pradesh	1.6	1.5	1.01	1.6	1.43	.96
Bihar	1.9	1.9	1.43	1.9	1.9	1.3
Rajasthan	1.7	1.5	1.2	1.7	1.5	1.4
Odisha	0.8	0.7	0.4	0.8	0.7	0.5
Jharkhand	1.6	1.5	1.2	1.6	1.5	1.2
Chhattisgarh	1.3	1.2	0.9	1.3	1.4	0.8
Uttarakhand	1.1	0.9	0.5	1.1	0.9	0.6
Assam	1.1	0.9	0.8	1.1	0.9	0.8
Andhra Pradesh	0.8	0.7	0.6	0.8	0.7	0.6
Tamil Nadu	0.5	0.4	0.3	0.5	0.4	0.3
India	1.3	1.2	1.0	1.3	1.2	1.0

3.5.2. Population by Selected Age Groups

Table 3.13 presents population distribution by selected age groups for the years 2012, 2017, and 2022 under Scenario A. The projected percentage population in the 0−14 age group shows a continuous decline over time across all of the states and India. Conversely, due to an increase in life expectancy and better health services, the proportion of the older-age population (65 and above) has been on the increase. This could be a real challenge for policymakers and planners, who now will have to invest more in palliative healthcare for this population. Both Tamil Nadu and Andhra Pradesh will have a larger proportion of ageing population (6.1 in 2012 to 7.6 in 2022 for AP; 7.6 in 2012 to 9.9 in 2022 for TN), and thus will require a different set of strategies to deal with this population. It is interesting to note that most of the north Indian states have a window of opportunity to utilise the demographic dividend, as a large number of working populations will be entering the job market. This group of people also will require access to FP services and products to address the unmet need for family planning.

North Indian states have a window of opportunity to reap the demographic dividend. Southern states have to be ready for investing in elderly aspects.

Table 3.13: Population ages 0–14, 65+, and female population 15−49 (per cent), India and states, 2012–2022

SCENARIOS A and B									
	2012	2017	2022	2012	2017	2022	2012	2017	2022
State	0–14 (%)			65 and over (%)			Females 15–49 (%)		
Uttar Pradesh	34.6	33.1	31.4	4.8	4.8	5.0	51.5	52.3	52.7
Madhya Pradesh	32.4	31.0	29.1	4.8	4.8	5.2	53.0	53.3	53.4
Bihar	33.4	31.8	31.1	4.8	4.9	5.4	52.2	52.8	52.0
Rajasthan	32.3	30.5	28.9	4.9	5.1	5.5	53.1	53.8	54.2
Odisha	26.1	24.4	22.9	6.1	6.3	7.0	56.2	56.1	55.1
Jharkhand	30.6	28.9	28.2	4.5	5.1	5.8	54.3	54.6	53.6
Chhattisgarh	30.8	28.7	26.6	5.2	5.6	6.2	52.8	53.3	53.5
Uttarakhand	29.9	27.9	24.9	5.8	5.9	6.4	54.0	54.7	55.9
Assam	31.7	28.1	24.9	3.5	4.0	4.9	55.2	56.5	57.0
Andhra Pradesh	24.6	22.9	21.8	6.1	6.6	7.6	56.8	56.2	54.7
Tamil Nadu	22.3	20.6	18.7	7.6	8.5	9.9	55.9	54.7	53.2
India	30.0	27.7	25.7	5.1	5.7	6.5	54.4	55.3	55.3

3.5.3. Implied Total Fertility Rates

FamPlan provides another important output in implied TFRs. Figure 3.3 presents a plotted graph of the implied TFR values for the EAG states, two non-EAG states, and India. The TFR for India is projected to decline from 2.4 in 2011 to 2.0 in 2022. India is likely to achieve the replacement level of fertility (2.1) before 2020. Fertility rates of the larger EAG states, such as Bihar and UP, are estimated at 2.3 and 2.4 in 2022, respectively. All of the major states, such as Bihar, UP, and Rajasthan, would be likely to achieve a TFR of 2.1 by 2030. Odisha and Uttarakhand are likely to witness a fall in their fertility rates to below 2.0 by 2022.

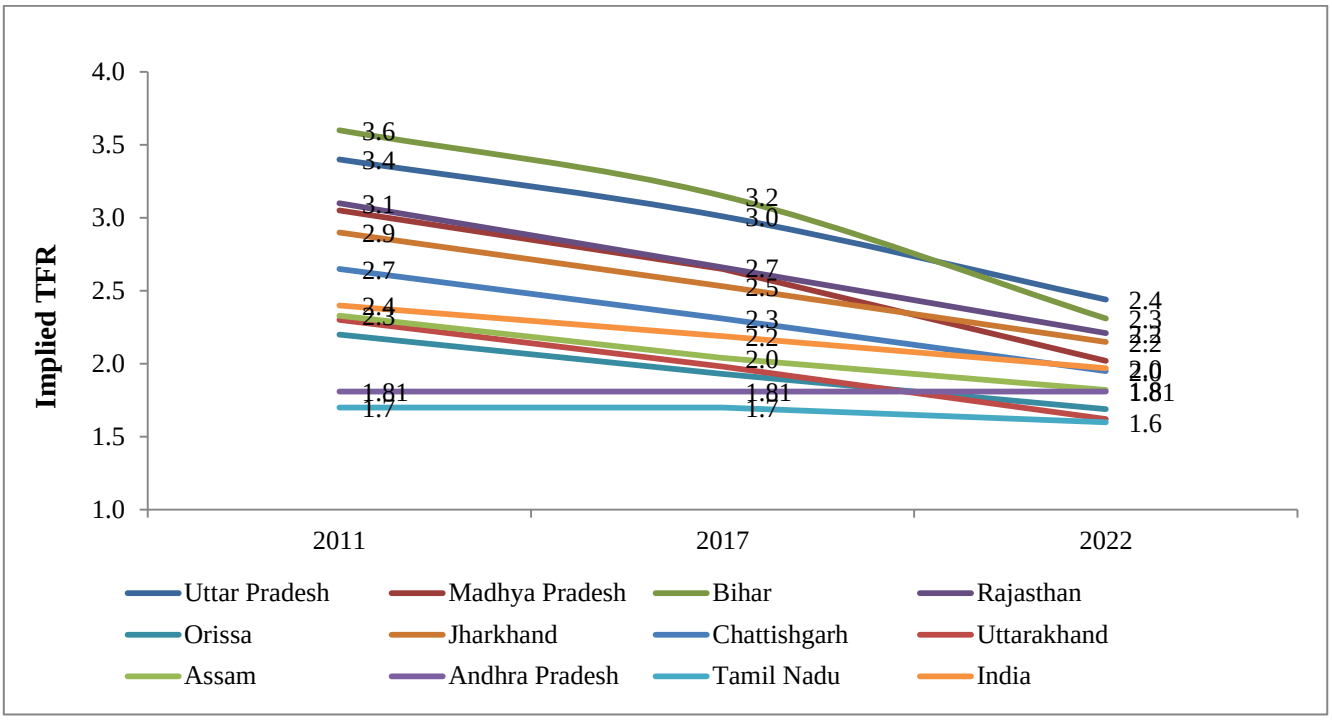


Figure 3.3: Implied TFRs, EAG states and India

Interestingly, fertility in both non-EAG states plateaus at about 1.6 or 1.7. This has significant implications for the Indian fertility transition, as the lowest level of fertility probably will not fall below 1.7 or 1.6. Some of the East European and South East Asian countries have shown a decline in the fertility levels to as low as 1.2, although such a situation is unlikely to take place in India or the Indian states.

3.5.4. Implied Contraceptive Prevalence Rate

One of the key assumptions in the *FamPlan* modelling was meeting unmet need. The goal specified under this assumption was to convert 60 per cent of the base level of unmet need for India by 2022. The level of satisfaction for meeting the unmet need of contraception was decided on the basis of prospective TFR in India and the states. The state-specific goals were adjusted by considering the current and future level of TFR. Such a meeting of unmet need resulted in an increase in the CPR; the results are shown in Table A 3.17 (see Annex 3). The results indicate that the modern CPR would reach a level of 57.7 by meeting 60 per cent of unmet need by 2022.

3.5.5. Mortality Indicators: Infant Mortality Rate and Under-Five Child Mortality Rate

Outputs from *DemoProj* also pertain to infant mortality rates (IMRs) and under-5 mortality rates. Table 3.14 shows these two outputs as generated by the projection exercise. Mortality has declined in the recent past in India, but the pace of decline is not very encouraging. It seems that India will fall short of achieving its Millennium Development Goal (MDG) for IMR of 28 per 1,000 live births by 2015. The projection results suggest that the IMR goal of 28 may not be achieved by any of the EAG states or Andhra Pradesh. Among the selected states, only TN is likely to achieve the MDG. All of the EAG states are required to put forth more concerted efforts on this issue. The situation regarding under-5 mortality is similar.

North Indian states have to make strong efforts to achieve 4th MDG goal

Table 3.14: Implied infant and under-5 mortality rates, India and states, 2012–2022

State	IMR			UNDER-5 MORTALITY		
	2012	2017	2022	2012	2017	2022
Uttar Pradesh	55.5	45.8	36.8	73.9	59.0	46.1
Madhya Pradesh	58.7	52.3	46.1	78.8	69.0	59.5
Bihar	44.2	36.7	29.6	56.8	46.1	36.1
Rajasthan	41.5	34.7	28.5	52.3	42.8	34.7
Odisha	55.7	48.5	41.7	74.3	63.2	52.9
Jharkhand	44.3	36.6	29.6	57.6	45.9	36.1
Chhattisgarh	50.0	43.8	38.3	65.3	56.0	48.2
Uttarakhand	55.5	45.8	36.8	73.9	59.6	46.1
Assam	60.0	53.3	46.7	81.0	70.4	60.4
Andhra Pradesh	44.5	38.0	32.4	57.0	47.1	39.8
Tamil Nadu	33.1	26.2	20.1	40.7	31.6	23.7
India	41.3	34.1	27.3	52.1	42.0	33.1

3.5.6. Projected Number of Married Women of Reproductive Age

In India, marriage is a universal phenomenon. In *FamPlan*, the contraceptive requirements are calculated on the basis of the number of married women in the reproductive age group. The following table (Table 3.15) provides the projected number of Married Women of Reproductive Age (MWRA) for the projection period. It is important to note that the number of married women in the reproductive age group will increase over time. UP has the largest number of married women in this group—more than one-third of the total number of married women in the EAG states. It is interesting to note that combining the UP and Bihar proportion of married women would constitute more than half of the married women in the reproductive age group (54.3%) in the EAG states, and more than one-fourth (25.6%) of the country's MWRA by 2022.

Reaching all married women in reproductive age in UP and Bihar will cover more than half of the married women in eight EAG states in India.

Table 3.15: Projected number of married women of reproductive age

SCENARIOS A and B MWRA												
Numbers (Millions)												
State	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Uttar Pradesh	36.4	37.3	38.2	39	39.8	40.6	41.3	42.1	42.8	43.5	44.2	45
Madhya Pradesh	14.6	14.9	15.2	15.5	15.7	16.0	16.2	16.5	16.7	16.9	17.1	17.3
Bihar	21	21.6	22.1	22.7	23.2	23.7	24.1	24.5	24.9	25.2	25.5	25.8
Rajasthan	14.5	14.9	15.2	15.5	15.9	16.1	16.4	16.6	16.9	17.1	17.3	17.5
Odisha	8.4	8.5	8.6	8.7	8.8	8.8	8.9	8.9	8.9	9	9	9
Jharkhand	6.8	6.9	7.1	7.2	7.4	7.5	7.6	7.7	7.8	7.9	7.9	8
Chhattisgarh	4.9	5	5.1	5.1	5.2	5.3	5.4	5.4	5.5	5.6	5.6	5.7
Uttarakhand	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1
Assam	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5	6.5	6.6	6.7	6.8
Andhra Pradesh	18.3	18.5	18.7	18.8	18.9	19.0	19.1	19.1	19.2	19.2	19.3	19.3
Tamil Nadu	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.6	14.6
India	237.7	242.2	246.6	250.8	254.8	258.6	262.1	265.5	268.6	271.5	274.3	277

3.6. Repositioning Family Planning in India

To reduce maternal mortality, the MoHFW has repositioned its approach towards family planning. Thus, family planning is considered as one of the major strategies for reducing maternal mortality. To stagger the population momentum, GOI has changed its strategies for family planning by promoting the use of spacing methods of contraception as opposed to the limiting methods. GoI supplies contraceptives (IUCDs, OCPs, ECPs, and condoms) to states as a part of free supply and social marketing schemes. The utilisation of spacing methods by communities is reported to be low, due to variety of reasons. The unmet need for spacing is quite a bit higher in the EAG states of India. To promote spacing methods and reduce the unmet need for them among the general population, GOI has initiated (2012) the doorstep delivery of contraceptives (condoms, OCPs, and ECPs) in all districts of the country.[21]

GOI introduced doorstep delivery of contraceptives (OCP, ECP, and condoms) through ASHAs in all the districts of the country in 2012.

[21] Retrieved August 2013, from http://mohfw.nic.in/WriteReadData/l892s/4310032100Revise%20Guidelines%20on%20Home%20Delivery%20of%20Contraceptives%20by%20ASHA.pdf.

3.6.1. Number of Users of Spacing Methods

Number of spacing method users will substantially increase in UP, MP, BIHAR, and Rajasthan in changed method mix scenario.

Another output generated by *FamPlan* is the expected number of users of different FP methods for the projection period. Table 3.16 presents the number of users of spacing methods in India and selected states. To estimate the number of users required, the two scenarios of method mix were calculated. The resulting outputs indicate an increasing number of contraceptive users under both the scenarios from 2011 to 2022. The contraceptive users of spacing methods in India will increase to 33.4 million in 2013 and further to 40 million in 2022 under the changing method mix of Scenario A. Among these users, 13.7 million and 22.2 million users would be from the EAG states and Assam in 2013 and 2022, respectively. The outputs of Scenario A shows a faster increase in the number of users of spacing methods for states such as MP, Bihar, and Rajasthan, and a marginal increase in users of spacing methods for the other states. The results of Scenario B show the users of spacing methods in India and the states will increase at a slower pace than in Scenario A. It shows that users of spacing methods in India will increase to 33.7 million in 2013 and 42.6.8 million in 2022 (see the method-specific breakdown in Annex 3, Tables A 3.13 to A 3.16).

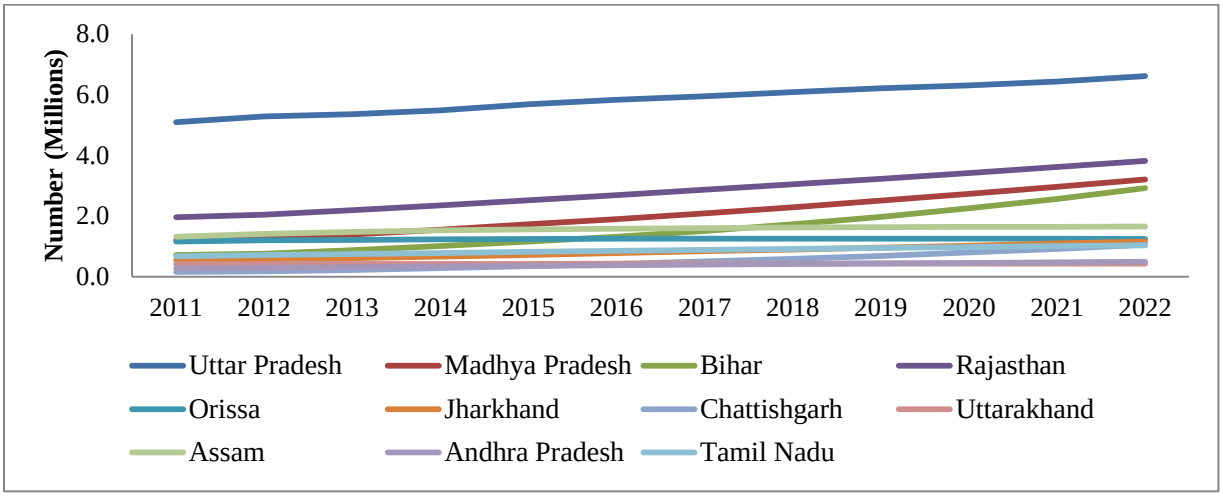


Figure 3.4: SCENARIO A: Projected users of spacing methods in selected states of India, 2011–2022

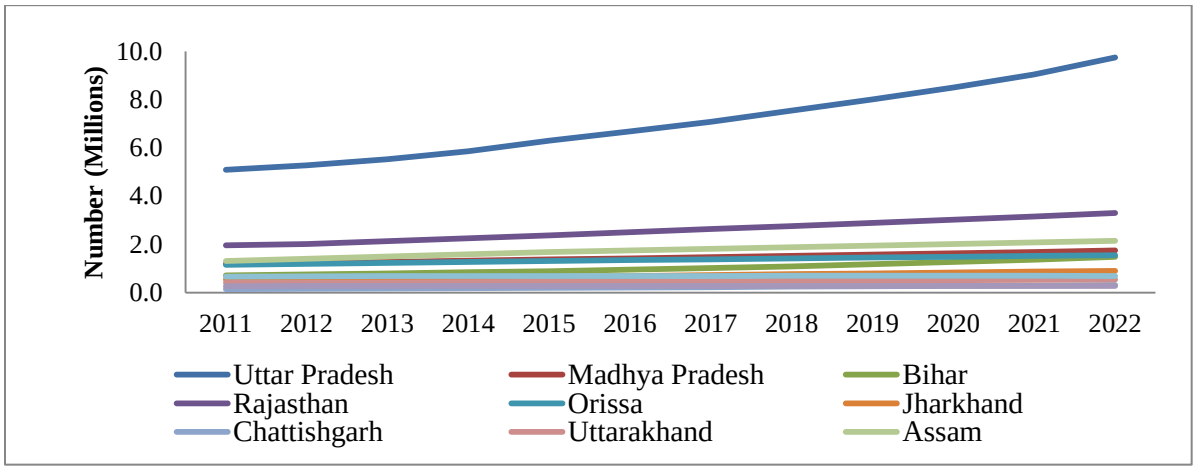


Figure 3.5: SCENARIO B: Projected users of spacing methods in selected states of India, 2011–2022
*Spacing methods include condoms, pills, and IUCDs.

Table 3.16: Expected number of users of spacing methods, India and states, 2011–2022

SCENARIO A												
Numbers (Millions)												
State	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Uttar Pradesh	5.1	5.3	5.4	5.5	5.7	5.8	5.9	6.1	6.2	6.3	6.4	6.6
Madhya Pradesh	1.2	1.2	1.4	1.6	1.7	1.9	2.1	2.3	2.5	2.7	3	3.2
Bihar	0.7	0.8	0.9	1	1.2	1.3	1.5	1.7	2	2.3	2.6	2.9
Rajasthan	2	2	2.2	2.3	2.5	2.7	2.9	3	3.2	3.4	3.6	3.8
Odisha	1.2	1.2	1.2	1.2	1.2	1.2	1.3	1.3	1.3	1.3	1.2	1.2
Jharkhand	0.5	0.6	0.6	0.7	0.7	0.8	0.8	0.9	1	1	1.1	1.2
Chhattisgarh	0.2	0.2	0.2	0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
Uttarakhand	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Assam	1.3	1.4	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.7
Andhra Pradesh	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5
Tamil Nadu	0.7	0.7	0.7	0.8	0.8	0.8	0.9	0.9	0.9	1	1	1
India	31.6	32.7	33.4	34.2	35	35.7	36.4	37.2	37.9	38.6	39.3	39.9
SCENARIO B												
Numbers (Millions)												
State	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Uttar Pradesh	5.1	5.3	5.5	5.9	6.3	6.7	7.1	7.5	8	8.5	9	9.7
Madhya Pradesh	1.2	1.2	1.3	1.3	1.4	1.4	1.5	1.5	1.6	1.6	1.7	1.7
Bihar	0.7	0.8	0.8	0.8	0.9	1	1	1.1	1.2	1.3	1.4	1.5
Rajasthan	2	2	2.1	2.2	2.4	2.5	2.6	2.8	2.9	3	3.2	3.3
Odisha	1.2	1.2	1.2	1.3	1.3	1.3	1.4	1.4	1.5	1.5	1.5	1.6
Jharkhand	0.5	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.8	0.9	0.9
Chhattisgarh	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3
Uttarakhand	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6
Assam	1.3	1.4	1.5	1.6	1.7	1.7	1.8	1.9	1.9	2	2.1	2.2
Andhra Pradesh	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Tamil Nadu	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
India	31.6	32.7	33.7	34.7	35.7	36.6	37.6	38.6	39.6	40.6	41.6	42.5

3.6.2. Users of Limiting Methods

Since its inception in 1951, the National Family Planning Programme has been dominated by demographic goals. The government introduced method-specific FP targets in the mid-1960s, wherein state targets were set by the central government and then pursued at the local level. The programme focused primarily on sterilisation, largely obviating client choice and limiting availability to a narrow range of services. Two years after the ICPD Cairo conference (1994), in April 1996, GoI announced that the national FP programme would become target free. An examination of various survey results indicates that the overall modern CPR increased from 36.4 per cent in 1992–93 (NFHS-1) to 42.9 in 1998–99, and further to 48.4 per cent in 2005–06. Examining the method mix shows that the proportion of limiting methods declined from 84.9 per cent in 1992–93 to 84.1 per cent in 1998–99; a further decline was observed after the target-free approach was initiated in 1996, reaching 79.1 per cent in 2005–06. Female sterilisation continued to contribute more than 77 per cent in 2005–06, even after the implementation of "no method-specific targets"; however, this proportion has decreased from 79.7 per cent in 1998–99, which is encouraging. The contribution of spacing methods has started to pick up since 1998–99, from 15.8 per cent to 20.9 per cent in 2005–06. The more recent DLHS-3 (2007−08) data show a 23.3 per cent contribution by all spacing methods, a definite break from the usual method-mix pattern, which normally was dominated by limiting methods, especially female sterilisation. Moreover, the use of female sterilisation varies widely across the states. For example, in UP, one of the high-priority states in India, only 17 per cent of women were sterilisation users in 2005–06, compared with 63 per cent in AP, which is a relatively more demographically developed and urbanised state. The following figures show that the estimated users of sterilisation in India and selected states are likely to increase in the coming years under both scenarios.

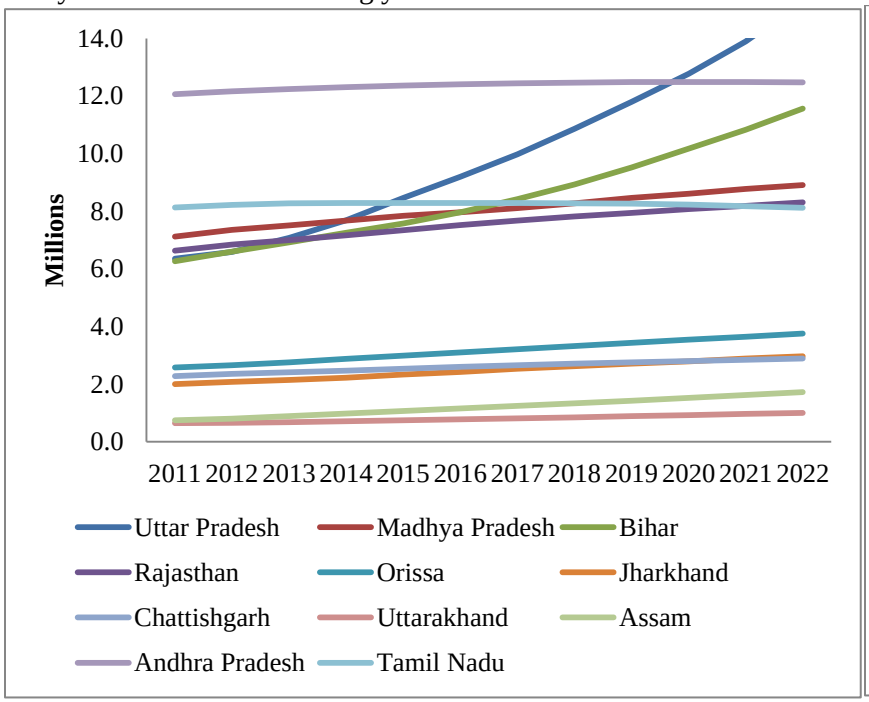


Figure 3.6: SCENARIO A: Number of sterilisation users in selected states, 2011–2022

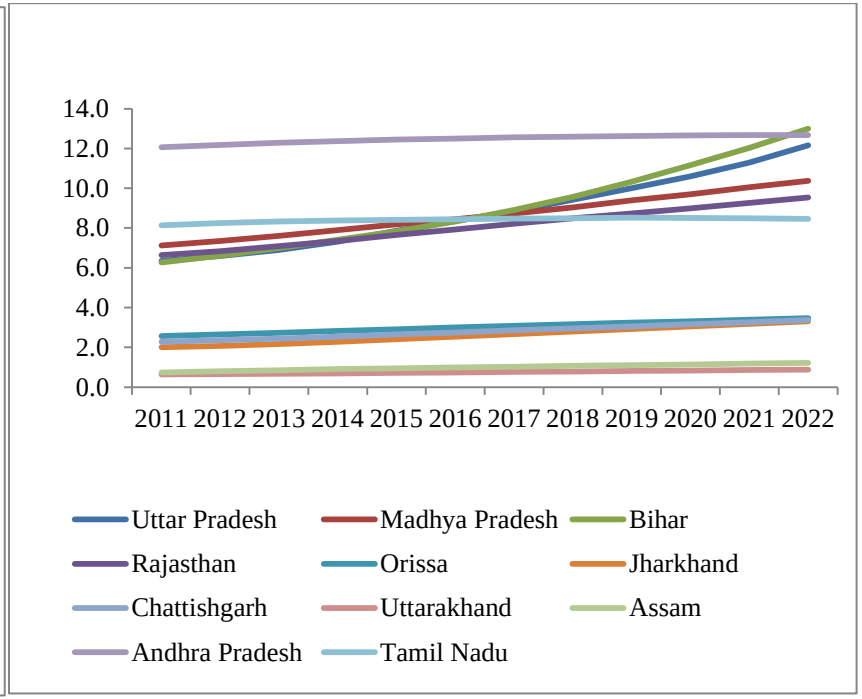


Figure 3.7: SCENARIO B: Number of sterilisation users in selected states of India, 2011–2022

Table 3.17: Number of sterilisation users, India and states, 2011–2022

SCENARIOA												
Numbers												
State	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Uttar Pradesh	6.3	6.6	7.1	7.7	8.5	9.2	10	10.9	11.8	12.8	13.9	15.3
Madhya Pradesh	7.1	7.4	7.5	7.7	7.8	8	8.1	8.3	8.5	8.6	8.8	8.9
Bihar	6.3	6.6	6.9	7.3	7.6	8	8.4	8.9	9.5	10.2	10.8	11.6
Rajasthan	6.6	6.8	7	7.2	7.3	7.5	7.7	7.8	7.9	8.1	8.2	8.3
Odisha	2.6	2.6	2.8	2.9	3	3.1	3.2	3.3	3.4	3.5	3.6	3.8
Jharkhand	2	2.1	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3
Chhattisgarh	2.3	2.4	2.4	2.5	2.5	2.6	2.7	2.7	2.7	2.8	2.8	2.9
Uttarakhand	0.6	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.9	0.9	1	1
Assam	0.7	0.8	0.9	1	1.1	1.2	1.2	1.3	1.4	1.5	1.6	1.7
Andhra Pradesh	12.1	12.2	12.2	12.3	12.4	12.4	12.4	12.5	12.5	12.5	12.5	12.5
Tamil Nadu	8.1	8.2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.2	8.2	8.1
India	87.2	90.2	93	96	98.9	101.9	104.7	107.8	110.8	113.8	116.8	119.8
SCENARIO B												
Numbers												
State	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Uttar Pradesh	6.4	6.6	6.9	7.3	7.9	8.3	8.8	9.4	10	10.6	11.3	12.2
Madhya Pradesh	7.1	7.4	7.6	7.9	8.2	8.4	8.7	9	9.4	9.7	10.1	10.4
Bihar	6.3	6.6	7	7.4	7.8	8.3	8.9	9.6	10.3	11.2	12	13
Rajasthan	6.6	6.8	7.1	7.4	7.6	7.9	8.2	8.5	8.7	9	9.3	9.5
Odisha	2.6	2.7	2.7	2.8	2.9	3	3.1	3.2	3.2	3.3	3.4	3.5
Jharkhand	2	2.1	2.2	2.3	2.4	2.5	2.7	2.8	2.9	3.1	3.2	3.3
Chhattisgarh	2.3	2.4	2.4	2.5	2.6	2.8	2.9	3	3.1	3.2	3.3	3.4
Uttarakhand	0.6	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.9	0.9
Assam	0.7	0.8	0.9	0.9	1	1	1	1.1	1.1	1.1	1.2	1.2
Andhra Pradesh	12.1	12.2	12.3	12.4	12.4	12.5	12.6	12.6	12.6	12.7	12.7	12.7
Tamil Nadu	8.1	8.3	8.3	8.4	8.4	8.4	8.5	8.5	8.5	8.5	8.5	8.5
India	87.2	90.2	92.8	95.5	98.3	100.9	103.6	106.4	109.1	111.8	114.6	117.2

3.6.3. Number of Acceptors of Spacing Methods

FamPlan provides the number of acceptors of a particular method for the projection's duration, signifying the number of new users of a particular method in a particular year. A person is classified as an acceptor if s/he starts using a method during the year and was not using it at the beginning of the year. Previously, s/he may have been using either nothing or a different method. For the short-term methods (pills and condoms) a new acceptor is difficult to identify, and there is little difference in service requirements between an acceptor and a continuing user. The following table (Table 3.18) provides the number of acceptors of spacing methods, (IUDs, condoms, and pills). It shows the number of acceptors of spacing methods under the two method-mix scenarios. Compared to Scenario B, the number of acceptors of spacing methods would increase faster under Scenario A. UP, MP, Bihar, and Rajasthan would have the largest number of acceptors of spacing methods due to their huge base population. Further, the rest of the states would have a relatively smaller number of acceptors of spacing methods, due either to a smaller base or a high sterilisation focus.

Table 3.18: Number of acceptors* of spacing methods, India and states, 2011–2022

SCENARIO A												
Number (Millions)												
State	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Uttar Pradesh	4.99	5.25	5.31	5.42	5.59	5.7	5.79	5.9	5.98	6.04	6.13	6.27
Madhya Pradesh	1.18	1.26	1.4	1.55	1.7	1.86	2.03	2.22	2.41	2.62	2.83	3.06
Bihar	0.69	0.75	0.86	0.99	1.13	1.28	1.47	1.68	1.91	2.18	2.48	2.82
Rajasthan	1.87	1.96	2.12	2.28	2.46	2.64	2.82	3.01	3.2	3.4	3.6	3.82
Odisha	1.14	1.18	1.19	1.21	1.22	1.22	1.23	1.23	1.23	1.23	1.22	1.22
Jharkhand	0.55	0.57	0.62	0.67	0.73	0.8	0.87	0.93	1	1.07	1.15	1.23
Chhattisgarh	0.13	0.15	0.2	0.25	0.31	0.39	0.47	0.55	0.65	0.76	0.88	1.01
Uttarakhand	0.39	0.4	0.4	0.4	0.41	0.41	0.42	0.42	0.42	0.42	0.43	0.43
Assam	1.29	1.38	1.45	1.5	1.53	1.55	1.57	1.59	1.6	1.61	1.61	1.61
Andhra Pradesh	0.25	0.27	0.29	0.3	0.32	0.34	0.36	0.38	0.39	0.41	0.43	0.44
Tamil Nadu	0.58	0.62	0.65	0.68	0.71	0.73	0.76	0.79	0.82	0.85	0.87	0.89
India	31.04	32.52	33.12	33.74	34.34	34.89	35.42	35.97	36.49	36.98	37.44	37.92

SCENARIO B												
Number (Millions)												
State	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Uttar Pradesh	4.99	5.18	5.43	5.76	6.18	6.56	6.96	7.41	7.86	8.34	8.89	9.57
Madhya Pradesh	1.18	1.21	1.26	1.3	1.35	1.39	1.44	1.49	1.55	1.6	1.66	1.71
Bihar	0.69	0.73	0.77	0.82	0.86	0.92	0.98	1.05	1.14	1.23	1.33	1.43
Rajasthan	1.87	1.93	2.03	2.15	2.27	2.4	2.52	2.65	2.78	2.91	3.04	3.18
Odisha	1.14	1.17	1.21	1.25	1.29	1.32	1.36	1.4	1.43	1.46	1.5	1.53
Jharkhand	0.55	0.57	0.59	0.62	0.66	0.69	0.73	0.76	0.8	0.83	0.87	0.91
Chhattisgarh	0.13	0.14	0.15	0.16	0.18	0.19	0.21	0.22	0.23	0.25	0.27	0.28
Uttarakhand	0.39	0.4	0.41	0.42	0.43	0.45	0.46	0.47	0.49	0.5	0.52	0.53
Assam	1.29	1.39	1.48	1.57	1.65	1.72	1.78	1.85	1.91	1.98	2.05	2.11
Andhra Pradesh	0.24	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Tamil Nadu	0.57	0.58	0.58	0.58	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59
India	31.04	32.08	33.01	33.99	34.96	35.91	36.85	37.84	38.82	39.79	40.75	41.7

**The number of acceptors includes users of condom and pills, and acceptors of IUDs.*

3.6.4. Number of Acceptors of Limiting Methods

In India, limiting methods, especially female sterilisation, has played a crucial role in the FP programme in the past. The growth of sterilisation use continues to rise, as more and more couples who have completed their family size are more likely to adopt any of the limiting methods. It is pertinent to note that four major EAG states (UP, MP, Bihar, and Rajasthan) still continue to have high TFRs. Thus, the promotion of both limiting and spacing methods in an appropriate mix are essential in these states. Table 3.19 shows the number of new acceptors of any of the limiting methods for the EAG states, two non-EAG states, and India for the projection period 2011–22. The projection results show that while meeting unmet need, there is an increase in the number of sterilisation acceptors over a period of time. Scenario A shows that sterilisation acceptors are likely to increase, from 5.17 million in 2011 to 6.07 million by 2022. Scenario B shows that the number of sterilisation acceptors in India will increase from 5.14 million to 5.63 million by 2022.

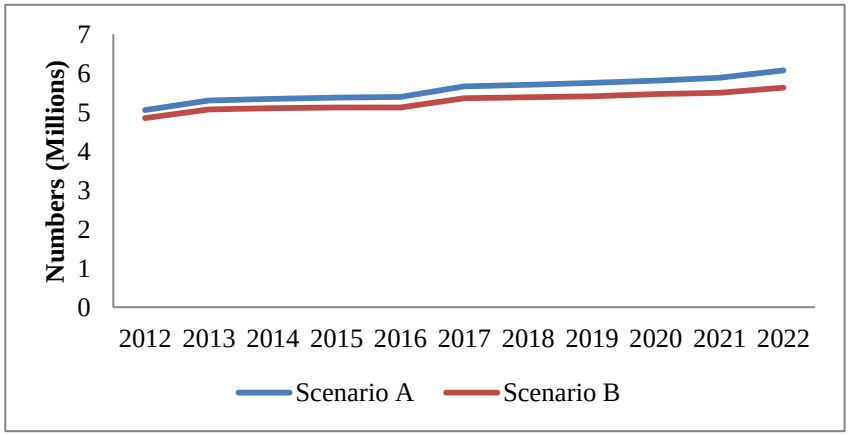


Figure 3.8: Acceptors of limiting methods, India

Table 3.19: Number of acceptors of limiting methods, states and India, 2011–2022

SCENARIO A												
Numbers (millions)												
State	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Uttar Pradesh	0.41	0.67	0.8	0.99	0.97	1.03	1.16	1.23	1.3	1.47	1.77	1.95
Madhya Pradesh	0.42	0.35	0.37	0.37	0.33	0.35	0.38	0.4	0.37	0.4	0.37	0.37
Bihar	0.52	0.52	0.54	0.54	0.61	0.69	0.77	0.85	0.94	0.95	1.05	1.13
Rajasthan	0.38	0.34	0.36	0.38	0.37	0.36	0.35	0.34	0.34	0.34	0.34	0.35
Odisha	0.14	0.17	0.18	0.18	0.18	0.19	0.19	0.19	0.19	0.19	0.19	0.2
Jharkhand	0.13	0.12	0.15	0.16	0.16	0.18	0.16	0.16	0.16	0.17	0.16	0.16
Chhattisgarh	0.14	0.12	0.12	0.13	0.13	0.13	0.12	0.11	0.12	0.12	0.12	0.12
Uttarakhand	0.03	0.04	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.07	0.07	0.07
Assam	0.08	0.1	0.1	0.1	0.1	0.1	0.11	0.11	0.12	0.12	0.13	0.14
Andhra Pradesh	0.29	0.28	0.26	0.25	0.24	0.23	0.22	0.21	0.2	0.19	0.18	0.18
Tamil Nadu	0.26	0.22	0.17	0.17	0.17	0.16	0.16	0.16	0.12	0.11	0.1	0.1
India	5.17	5.05	5.3	5.34	5.37	5.39	5.66	5.7	5.75	5.81	5.88	6.07
SCENARIO B												
Numbers												
State	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Uttar Pradesh	0.41	0.5	0.6	0.75	0.7	0.73	0.82	0.84	0.87	0.98	1.18	1.28
Madhya Pradesh	0.42	0.45	0.49	0.5	0.47	0.51	0.54	0.58	0.56	0.61	0.59	0.61
Bihar	0.52	0.6	0.62	0.64	0.73	0.82	0.92	1.03	1.15	1.19	1.33	1.44
Rajasthan	0.38	0.43	0.46	0.49	0.49	0.49	0.49	0.47	0.5	0.51	0.53	0.54
Odisha	0.14	0.15	0.16	0.16	0.16	0.15	0.15	0.15	0.15	0.15	0.15	0.16
Jharkhand	0.13	0.14	0.17	0.19	0.2	0.2	0.2	0.2	0.21	0.21	0.22	0.23
Chhattisgarh	0.14	0.15	0.16	0.17	0.17	0.18	0.18	0.17	0.18	0.19	0.19	0.2
Uttarakhand	0.03	0.03	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Assam	0.08	0.07	0.06	0.06	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06
Andhra Pradesh	0.31	0.29	0.28	0.27	0.26	0.25	0.24	0.23	0.22	0.21	0.21	0.21
Tamil Nadu	0.29	0.25	0.21	0.2	0.19	0.2	0.2	0.2	0.16	0.15	0.14	0.14
India	5.14	4.85	5.07	5.1	5.12	5.12	5.36	5.38	5.41	5.46	5.5	5.63

3.7. Conclusion

Underlying assumptions used in the current projection exercise have been checked for their reliability and robustness by comparing them with UN population projection estimates (medium variant, 2012 revision). Estimated population figures from both of the projections are quite close to these estimates, as the UN estimate for 2022 is 1,380.2 million, compared to the Policy Unit's figure of 1,378.5 million under Scenario A and 1,379.3 million under Scenario B. According to these projections:

- Current population projections are being carried out based on the goal of "meeting unmet need."
- The trend in the contribution of the EAG states' population to the total population of the country was found to be consistently rising. In 1991, their share was 43.4 per cent, which increased to 44.6 per cent in 2001 and further to 46.0 per cent in 2011. The projection results suggest that this increasing trend will continue in the future as well, if no specific interventions occur. By 2017, the share of EAG states' population would reach more than 48 per cent, and the population of EAG states would be likely to overtake the non-EAG states' population by 2017.
- Projected figures for ELAs in India and the EAG states show an increasing trend for both spacing and limiting methods.
- The projected figures in UP show a significant increase in the number of users of limiting methods from the current level to the end of the projected period, whereas for the other EAG states, only a marginal increase in the number of projected users of limiting methods would occur.

3.8. Limitations

All population projections have built-in uncertainties, especially for those years further in the future, because they are based on assumptions about future behaviour. In addition, these uncertainties can multiply because key aspects of population change often are interrelated. None of the projections should be treated as predictions. The country's policies may change, as may the factors that influence birth, death, and immigration rates. Even given these caveats, however, population projections are an important analytical tool for planners.

More specifically:

1. The forecasting in *DemProj* and *FamPlan* relies on certain assumptions based on past trends; any programmatic changes would affect the forecasting of numbers in the long run. In such cases, projections usually are done based on a shorter duration and thus can provide more reliable estimates.

2. One of the major challenges in doing these projections was to match the service statistics data with the projected data. The projection was based on community-based standard survey data; thus, there is always the possibility of not matching some of the baseline figures with the service statistics figures.

3. The current forecast of condoms considered only family planning acceptors; thus, the projected estimates of condom acceptors may be underestimated, since it does not account for condom distribution via the HIV prevention programme.

4. Since the latest (2011 Census) age-sex distribution data were not available at the time of the analysis, there might be some deviations in the estimated number of the MWRA group.

5. The accuracy of this exercise depends on the implementation of a successful FP programme. If the government is likely to promote spacing methods, then Scenario A should be considered. If there are no major programmatic changes, then the results from Scenario B would be more useful.

Annexes

For Chapter 1

For Chapter 2

For Chapter 3

References: Section 1

ANNEX 1: FOR CHAPTER 1

Scenarios considered for determining the method mix

Two method mix scenarios were considered for the calculation of Expected Levels of Achievement (ELAs) for FP methods in different years. One of the scenarios (Scenario B) kept the method mix unchanged, starting from the base year (AHS, 2010–11) all through the projection period. The second scenario (Scenario A) used a varying method mix under certain assumptions. Thus, the *uniform* method mix under Scenario B used the same method mix obtained in the base year 2011 and was kept for the entire projection period. However, the construction of the method mix under Scenario A required a series of assumptions, calculations based on available data, expert opinions and, in some cases, a combination of all these. This scenario was generated for each state through analysis on a case-by-case basis.

There are three general guiding principles available to determine the future course of a method mix pattern for a population. These three ways are explained in the *FamPlan* module of the *Spectrum Suite*.[22] The first method is to examine the distribution of those who intend to use family planning in the future, who often are asked which methods they prefer to use; surveys provide this information. The second approach is to study the method mix currently being used by the urban population or educated women. These women are assumed to have a good knowledge of methods and access to services. The method mix of this group may indicate likely future directions for family planning in increasing knowledge and access. The third approach is to examine the current mix of contraceptive users who are deemed "knowledgeable" about contraception. A "knowledgeable" user often is defined as one who knows about at least four modern methods. The usual time lag between the urban and rural populations in achieving fertility and family planning goals is about 15 years.

However, in the current exercise, the above-mentioned principles were not found to be satisfactory in most of the states, compelling the use of alternate ways of determining the future method-mix pattern. In a nutshell, the future method-mix pattern has been developed by using two broad principles, i.e., the proportion of users of limiting methods to total users, and the pattern of unmet need for family planning. The states were divided into two groups based on these two principles. The following matrix provides the details of these two broad groupings and the principles applied to each.

Groups	States	Future trend in method mix
Group 1	Bihar, Chhattisgarh, Madhya Pradesh, Jharkhand, and Rajasthan	• Currently, there is a higher proportion of users of limiting methods and a relatively higher proportion of unmet need for spacing methods. • Thus, the future method-mix patterns were determined by lowering the allocation of limiting methods to ensure a more balanced method mix.
Group 2	Assam, Odisha, Uttar Pradesh, Uttarakhand, and India	• Currently, there is a higher proportion of spacing method users and a fairly equal proportion of unmet need for both spacing and limiting methods. • To ensure a more balanced method mix, the future method mix pattern was altered by increasing the allocation of limiting methods in these states.

Goal Fixing for Reaching the Unmet Need of Contraception: Altogether, 50 to 60 per cent reductions in the unmet need of contraception were determined during the projection period 2011−2022 on a case-by-case basis. The goal of reaching the unmet need of contraception has been determined by keeping in mind the estimates of reaching the TFR of 2.1 provided by the Expert Committee on Projections 2005−2006, Office of the Registrar General of India.[23]

[22] Retrieved from http://www.policyproject.com/policycircle/documents/famplan.pdf.

[23] RGI (2006): *Report of the Technical Group on Population Projections Constituted by the National Commission on Population*. Office of the Registrar General, India, 2006b.

1. Bihar

The overall goal is to achieve "meeting 60% of current unmet need (39.2%, AHS, 2010−11) for family planning." This will result in increasing the modern CPR, from 33.3 per cent in 2010–11 to 56 per cent in 2022.

Method mix

a. *The unchanged or uniform* method mix scenario B, by keeping 89.2 per cent (at AHS, 2010−11 level) for limiting methods as opposed to 21.2 per cent for spacing methods through the projection period, i.e., from 2012 through 2022, resulted in an increase in the number of acceptors of limiting methods, from 5.2 lakhs in 2012 to nearly three times that amount, at 14.4 lakhs, by 2022. By looking at the human resources and health facilities available through the state government, achieving this number from the current level of 5.2 lakhs will be an enormous task. Thus, it was decided to create another scenario, which produces a balanced method mix.

b. In Scenario A, the proportion of limiting methods changed from 89.2 per cent in 2011 to 79.2 per cent in 2022.

Scenario A was constructed by looking at various datasets (NFHS, DLHS, and AHS). While looking at these datasets, no clear trend emerged in the method mix for Bihar, except that both limiting and spacing methods were in the similar proportions, at about 80 per cent and 20 per cent, respectively. Unmet need for family planning in the state was tilted towards spacing methods, at more than 54 per cent as per the AHS, 2010−11. This provided an opportunity to create the second scenario by assuming a 1 per cent per year reduction in the proportion of limiting methods, contributing a 1 per cent per year increment in the proportion of spacing methods, resulting in an approximate reduction of 10 per cent in the proportion of limiting methods by the year 2022, pegged at 78.8 per cent. A much slower increase in the number of acceptors of limiting methods was noticed while calculating the number of acceptors for the projection period based on this assumption. The number of acceptors of limiting methods increased from 5.2 lakhs in 2012 to 11.3 lakhs in 2022, almost twice the current estimate.

2. Assam

The overall goal is to achieve "meeting 60% of current unmet need (24.0%, AHS, 2010–11) for family planning." This will result in increasing the modern CPR from 35.4 per cent in 2010−11 to 49.8 per cent in 2022.

Method mix

a. The *unchanged* or *uniform* method mix scenario B kept 36.2 per cent (on a par with the AHS, 2010−11 level) for limiting methods as opposed to 63.8 per cent for spacing methods through the projection period, i.e., from 2012 through 2022; this resulted in decreasing the number of acceptors of limiting methods from 0.8 lakhs in 2012 to 0.6 lakhs in 2022.

b. The proportion of limiting methods under Scenario A changed from 36.2 per cent in 2011 to 51.0 per cent in 2022.
The *changed* method mix was constructed by looking at the various datasets at different time periods. The proportion of limiting methods increased from 45.4 per cent in 1998−99 (NFHS-2) to 48.7 per cent in 2005–06 (NFHS-3) and then decreased to 36.2 per cent in 2010–11 (AHS) period. Apparently these data do not depict any clear trend for developing future assumptions on the method mix. As per NFHS-3 (2005−06), among women with four or more children, only 20.5 per cent adopted sterilisation, 8.4 per cent used pills, more than 26 per

cent used traditional methods, and more than 42 per cent were not using any method. A similar trend was observed in contraceptive use among women who had three children. After studying the trend in the method mix, it was felt that there was some latitude for expanding the limiting method. In this context, the proportion of limiting methods was increased to 50 per cent by the year 2022 to make up a more balanced method-mix pattern. In such a scenario, the number of acceptors of limiting methods increased from 0.10 lakhs in 2012 to 1.4 lakhs in 10 years. *[This figure (1.4 lakhs) nearly corroborates the number of limiting methods recorded by HMIS for the years 2010 and 2011 for Jharkhand (1.3 lakhs) and Odisha (1.4 lakhs), with a population size similar to that of Assam (3.1 Cr).]*

3. Chhattisgarh

The overall goal is to achieve "meeting 50% of current unmet need (26.4 per cent, AHS, 2010−11) for family planning." This will result in increasing the modern CPR from 49.4 per cent in 2010−11 to 64.2 per cent in 2022.

Method mix

a. *The unchanged or uniform* method mix in Scenario B, by keeping 94 per cent (on a par with the AHS, 2010−11 level) for limiting methods as opposed to 6 per cent for spacing methods through the projection period, i.e., from 2012 through 2022, resulted in increasing the number of acceptors of limiting methods from 1.4 lakhs in 2012 to 2.0 lakhs in 2022.

b. In Scenario A, the proportion of limiting methods changed from 94 per cent in 2011 to 81 per cent in 2022.
The method mix in the state was highly skewed towards limiting methods, as the proportion of users of limiting methods was always pegged at 90 per cent. As per AHS, 2010−11, the unmet need for family planning showed that a majority (58.7%) were in need of spacing methods. Scenario A was created to provide a greater opportunity for spacing methods. Compared to Bihar, where 10 per cent shifting was provided for spacing methods, in Chhattisgarh, 13 per cent shifting was provided for spacing methods because of the higher proportion of unmet need for spacing in the state. This scenario calculated the number of acceptors of limiting methods in a range between 1.4 lakhs in 2012 and1.2 lakhs in 2022.

4. Madhya Pradesh

The overall goal is to achieve "meeting 60% of current unmet need (22.4%, AHS, 2010–11) for family planning." This will result in an increase of the modern CPR from 57.0 per cent in 2010–11 to 69.9 per cent in 2022.

a. *The unchanged* or *uniform* method mix scenario B, by keeping 85.6 per cent for limiting methods as opposed to 14.4 per cent for spacing methods (on a par with the AHS, 2010−11 level) through the projection period (2012−2022), resulted in a nearly 2 lakhs increase in the number of acceptors of limiting methods in 10 years, i.e., from 4.2 lakhs in 2012 to 6.1 lakhs in 2022.

b. In Scenario A, the proportion of limiting methods changed from 85.6 per cent in 2011 to 73.5 per cent in 2022.
Over the years, the proportion of limiting methods accepted in the state has experienced a decreasing trend at a slower pace—a decrease from 88.8 per cent in 1998−99 to 86.4 per cent in 2005−06, and further to 85.6 per cent in 2010−11. In the coming years, the assumption is that this decrease will intensify; to sustain the current number of acceptors of limiting methods (4.2 lakhs in 2011), the scenario altered the proportion to 73.5 per cent from 85.6 per cent by providing a greater proportion for spacing methods. This brought up the projected number of acceptors of limiting methods from 4.2 lakhs in 2012 to 3.7 lakhs by 2022.

5. Odisha

The overall goal is to achieve "meeting 50% of current unmet need (23.2%, AHS, 2010–11) for family planning." This will result in increasing the modern CPR from 40.0 per cent in 2010−11 to 55.6 per cent in 2022.

a. *The unchanged* or *uniform* method mix scenario B, by keeping 69.2 per cent for limiting methods as opposed to 30.8 per cent for spacing methods (on a par with the AHS, 2010–11 level) through the projection period (2012−2022), resulted in a nearly 0.2 lakhs increase in the number of acceptors of limiting methods in 10 years, i.e., from 1.5 lakhs in 2012 to 1.6 lakhs in 2022. The situation in Odisha seems to be fairly under control, as under Scenario B, the number of acceptors of limiting methods did not increase substantially.

b. A decreasing trend in the proportion of limiting methods for the state has been observed over time—the proportion of limiting methods has decreased from 88 per cent in 1998−99 to 76 per cent in 2005−06, and further dropped to 69 per cent in 2010−11. Ironically, more than 53 per cent of the unmet need (12.4% of 23.2%, AHS, 2010−11) has been accounted for by limiting methods. Thus, Scenario A, by increasing the proportion of limiting methods to 75.0 per cent by 2022 from 69.2 per cent in 2010−11 to address the more than 53 per cent of unmet need will generate 1.7 lakhs of acceptors of limiting methods in 2012, increasing to 2.0 lakhs by 2022.

6. Jharkhand

The overall goal is to achieve "meeting 50% of current unmet need (23.2%, AHS, 2010–11) for family planning." This will result in increasing the modern CPR from 37.8 per cent in 2010−11 to 53.1 per cent in 2022.

a. The *unchanged* or *uniform* method mix Scenario B, by keeping 78.0 per cent for limiting methods as opposed to 22.0 per cent for spacing methods (on a par with the AHS, 2010−11 level) through the projection period (2012−2022), resulted in a nearly 1.0 lakhs increase in the number of acceptors of limiting methods over 10 years, i.e., from 1.4 lakhs in 2012 to 2.3 lakhs in 2022.

b. In the state, the proportion of limiting methods has decreased from 88 per cent in 1998−99 to 77 per cent in 2005−06, and marginally increased to 78 per cent in 2010−11. The unmet need scenario in the state typically is characterised by allotting more than 53 per cent (16.2 per cent of 30.5 per cent, AHS, 2010–11) to spacing. Thus, to accommodate this larger proportion of spacing, Scenario A was generated by reducing the proportion of limiting methods from 78 per cent in 2010−11 to 70 per cent by 2022. The projected number of acceptors of limiting methods under this scenario varies between 1.2 lakhs in 2012 to 1.6 lakhs in 2022, which sets a reasonable goal for the state to achieve while at the same time requiring additional efforts to meet the spacing requirements.

7. Rajasthan

The overall goal is to achieve "meeting 60% of current unmet need (19.6%, AHS, 2010–11) for family planning." This will result in increasing the modern CPR from 58.8 per cent in 2010−11 to 70.2 per cent in 2022.

a. *The unchanged* or *uniform* method mix Scenario B, by keeping 77.6 per cent for limiting methods as opposed to 22.4 per cent for spacing methods (on a par with the AHS, 2010−11 level) through the projection period (2012−2022), resulted in a nearly 1.1 lakhs increase in the number of acceptors of limiting methods over 10 years, i.e., from 4.3 lakhs in 2012 to 5.4 lakhs in 2022.

b. The state has observed a decline in the proportion of limiting methods, from 85 per cent in 1998–99 to 79 per cent in 2005–06 and further to 77 per cent in 2010–11. Additionally, unmet need for family planning in the state is found to be skewed towards spacing methods, as more than 60 per cent of unmet need (11.9% of 19.6%, AHS, 2010–11) has been directed towards spacing methods. This provides an opportunity to change the method-mix scenario to reduce the proportion of limiting methods from 77 per cent in 2010–11 to 67 per cent by 2022—a 10 per cent decline over 10 years. The projected number of acceptors of limiting methods under this scenario ranges from 3.4 lakhs in 2012 to 3.5 lakhs in 2022.

8. Uttar Pradesh

The overall goal is to achieve "meeting 60% of current unmet need (29.7%, AHS, 2010–11) for family planning." This will result in reaching the modern CPR from 31.4 per cent in 2010–11 to 48.6 per cent in 2022.

a. *The unchanged or uniform* method mix Scenario B, by keeping 56.4 per cent for limiting methods as opposed to 43.6 per cent for spacing methods (on a par with AHS, 2010–11 level) through the projection period (2012–2022), resulted in nearly 2.6 times increase in the number of acceptors of limiting methods over 10 years; i.e., from 5.0 lakhs in 2012 (4.1 lakhs in 2011) to 12.8 lakhs in the year 2022.

b. The proportion of limiting methods in the state has declined consistently from over 70 per cent in 1998–99 to 60 per cent in 2005–06 and further to 56 per cent in 2010–11. The data on unmet need reveal that more than 57 per cent (17.1% of 29.7%, AHS, 2010–11) were in need of spacing methods. In order to provide an upper limit scenario for the number of acceptors of limiting methods, an alternate scenario has been created by increasing the contribution of limiting methods to overall method mix to 70 per cent (which is the NFHS-2, 1998–99 level) by 2022, an increase of more than 1 per cent per annum. This resulted in an increase in the projected number of acceptors of limiting methods from 6.7 lakhs in 2012 (4.1 lakhs in 2011) to 19.5 lakhs by 2022, a nearly threefold increase in 10 years.

9. Uttarakhand

The overall goal is to achieve "meeting 60% of current unmet need (23.2%, AHS, 2010–11) for family planning." This will result in reaching the modern CPR from 55.4 per cent in 2010–11 to 67.0 per cent in 2022.

a. *The unchanged or uniform* method mix Scenario B, by keeping limiting methods at 61.8 per cent as opposed to 38.2 per cent for spacing methods (on a par with AHS, 2010–11 level) through the projection period (2012–2022), resulted in an increase of more than 1.5 times in the number of acceptors of limiting methods over 10 years; i.e., from 0.3 lakhs in 2012 to 0.5 lakhs in 2022.

b. The proportion of users of limiting methods to overall users has declined, from 77 per cent in 1998–99 to 61 per cent in 2005–06, and nearly stabilised at 62 per cent in 2010–11. The overall unmet need scenario in the state is pegged at 23.2 per cent (AHS, 2010–11), with more than 48 per cent (11.2% of 23.2%) reporting a need for limiting methods. To create an alternate scenario, the method mix has been modified by slightly increasing the proportion of users of limiting methods from 62 per cent in 2010–11 to 70 per cent by 2022. The projected number of acceptors of limiting methods under this scenario is going to increase from 0.4 lakhs in 2012 to 0.7 lakhs in 2022.

10. India

The overall goal is to achieve "meeting 60% of current unmet need (12.8%, NFHS-3, 2005–06) for family planning." This will result in reaching the modern CPR, from 48.3 per cent in 2005–06 to 57.7 per cent in 2022.

a. *The unchanged or uniform* method mix Scenario B keeps 73.4 per cent with limiting methods as opposed to 26.7 per cent for spacing methods. In the absence of India-level estimates for the recent years, average values of method mix were considered by assuming that India would follow the average of AHS states patterns of method mix through the projection period (2012–2022); this resulted in an increase in the number of acceptors of limiting methods over 10 years; i.e., from 48.5 lakhs in 2012 to 56.3 lakhs by 2022.

b. While analysing the method mix pattern, it has been observed that there is a decline in the proportion of acceptors of limiting methods from 84 per cent in 1998–99 to 79 per cent in 2005–06 *(DLHS-3 also reported 77%)*. The unmet need scenario in India shows a marginally higher proportion, as more than 51 per cent (NFHS-3) reported a need for limiting methods, while DLHS-3 shows a larger proportion (more than 64 per cent) of unmet need accounted for limiting methods. Keeping these numbers in mind, the alternate scenario has been created by nominally increasing the proportion of limiting methods from 73.4 per cent in 2011 to 75.0 by 2022 to cater to the relatively higher proportion of unmet need for limiting methods. By changing method mix, the projected number of acceptors of limiting methods increased from 50.5 lakhs in 2012 to 60.7 lakhs by 2022.

11. Tamil Nadu and Andhra Pradesh

The overall goal is to achieve "meeting 40% of current unmet need (8.5%, NFHS-3, 2005–06) for family planning" for Tamil Nadu. This will result in reaching a modern CPR, going from 60.0 per cent in 2011 to 62.7 per cent in 2022.

For Andhra Pradesh, the state has recorded the lowest unmet need at 4.7 per cent (NFHS-3, 2005–06), which has been kept unchanged throughout the projection period. Thus, no goal of meeting unmet need has been fixed and there is no change in the level of contraceptive prevalence rate for the state.

ANNEX 2: FOR CHAPTER 2

Table A 2.1: Population of India and selected states, 1951–2011 (in thousands)

Country/State	1951	1961	1971	1981	1991	2001	2011*
INDIA	3,61,088	4,39,235	5,48,160	6,83,329	8,46,421	10,28,737	12,10,569
EAG States							
Bihar	29,085	34,841	42,126	52,303	64,531	82,999	1,04,099
Chhattisgarh	7,457	9,154	11,637	14,010	17,615	20,834	25,545
Jharkhand	9,697	11,606	14,227	17,612	21,844	26,946	32,988
Madhya Pradesh	18,615	23,218	30,017	38,169	48,566	60,348	72,627
Odisha	14,646	17,549	21,945	26,370	31,660	36,805	41,974
Rajasthan	15,971	20,156	25,766	34,262	44,006	56,507	68,548
Uttar Pradesh	60,274	70,144	83,849	1,05,137	1,32,062	1,66,198	1,99,812
Uttarakhand	2,946	3,611	4,493	5,726	7,051	8,489	10,086
Assam	8,029	10,837	14,625	18,041	22,414	26,656	31,206
Selected Non-EAG States							
Andhra Pradesh	31115	35983	43503	53551	66508	76210	84,581
Tamil Nadu	30119	33687	41199	48408	55859	62406	72,147

Sources: Registrar General of India Various Issues & Economic Survey, 2011–12.
* Final Population Totals, (PCA), Census, 2011

Table A 2.2: Population decadal growth rate, India and selected states

Country/State	1941–51	1951–61	1961–71	1971–81	1981–91	1991–2001	2001–11
INDIA	13.31	21.64	24.8	24.66	23.86	21.54	17.64
EAG States							
Bihar		19.79	20.91	24.16	23.38	28.62	25.07
Chhattisgarh	9.42	22.77	27.12	20.39	25.73	18.27	22.59
Jharkhand	9.35	19.69	22.58	23.79	24.03	23.36	22.34
Madhya Pradesh		24.73	29.28	27.16	27.24	24.26	20.3
Odisha		19.82	24.8	20.17	20.06	16.25	13.97
Rajasthan		26.20	27.83	32.97	28.44	28.41	21.44
Uttar Pradesh	11.78	16.38	19.54	25.39	25.61	25.85	20.09
Uttarakhand		22.57	24.42	27.45	23.13	20.41	19.17
Assam		34.98	34.95	23.36	24.24	18.92	16.93
Select Non-EAG States							
Andhra Pradesh	14.0	15.7	20.9	23.1	24.2	14.6	11.1
Tamil Nadu	14.7	11.8	22.3	17.5	15.4	11.7	15.6

Source: Office of the Registrar General of India, Provisional Population Totals, 2011.
For AP: 1941–51, retrieved from http://www.ap.gov.in/Other%20Docs/Population.pdf.

Table A 2.3: Sex ratio at birth, India and selected states

Country/State	2004–06	2005–07	2006–08	2007–09	2008–10	2009–11
INDIA	892	901	904	906	905	906
EAG States						
Bihar	881	909	914	917	912	910
Chhattisgarh	961	969	975	980	985	991
Jharkhand	888	927	922	921	919	915
Madhya Pradesh	913	913	919	926	921	920
Odisha	934	933	937	941	938	946
Rajasthan	855	865	870	875	877	878
Uttar Pradesh	874	881	877	874	870	875
Uttarakhand	NA	NA	NA	NA	NA	NA
Assam	920	939	933	931	928	926
Select Non-EAG States						
Andhra Pradesh	917	915	917	919	920	915
Tamil Nadu	955	944	936	929	927	926

Source: SRS Statistical Report, 2010 and 11 (Office of the Registrar General, 2011a and 2012).

Table: A 2.4: Life expectancy at birth, India and selected states

Country/State	**2003–07**			**2004–08**			**2005–09**			**2006–10**		
	Total	Males	Females	Total	Males	Females	Total	Males	Females	Total	Males	Females
INDIA	65.1	63.7	66.5	65.4	64.0	66.9	65.7	64.3	67.2	66.1	64.6	67.7
EAG States												
Bihar	64.4	64.4	64.4	64.4	64.2	64.7	65.1	64.9	65.3	65.8	65.5	66.2
Chhattisgarh	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Jharkhand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Madhya Pradesh	60.7	59.7	61.8	61.5	60.3	62.7	61.9	60.8	63.1	62.4	61.1	63.8
Odisha	61.7	60.7	62.8	62.5	62.1	63.0	62.5	61.7	63.4	63	62.2	63.9
Rajasthan	65.2	63.5	67.0	65.8	64.3	67.4	66.2	64.7	67.8	66.5	64.7	68.3
Uttar Pradesh	61.6	61.0	62.2	62	61.4	62.6	62.3	61.6	63.1	62.7	61.8	63.7
Uttarakhand		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Assam	60.6	60.1	61.3	61.0	60.0	62.3	61.6	60.5	62.9	61.9	61.0	63.2
Select Non-EAG States												
Andhra Pradesh	65.6	63.2	68.0	65.8	63.5	68.1	65.6	63.4	67.9	65.8	63.5	68.2
Tamil Nadu	67.9	66.2	69.6	68.3	66.6	70.1	68.7	66.9	70.6	69	67.1	70.9

Source: SRS Based Abridged Life Tables, 2003–07 to 2006–10 (Office of the Registrar General, 2011c).

Table: A 2.5: Infant mortality rate, India and selected states

Country/State	1971	1981	1991	2001	2005	2006	2007	2008	2009	2010	2011
INDIA	129	110	80	66	58	57	55	53	50	47	44
EAG States											
Bihar	NA	118	69	62	61	60	58	56	52	48	44
Chhattisgarh	-	-	-	-	63	61	59	57	54	51	48
Jharkhand	-	-	-	-	50	49	48	46	44	42	39
Madhya Pradesh	135	142	117	86	76	74	72	70	67	62	59
Odisha	127	135	124	91	75	73	71	69	65	61	57
Rajasthan	NA	108	79	80	68	67	65	63	59	55	52
Uttar Pradesh	167	150	97	83	73	71	69	67	63	61	57
Uttarakhand	-	-	-	48	42	43	43	44	41	38	36
Assam	139	106	81	74	68	67	66	64	61	58	55
Select Non-EAG States											
Andhra Pradesh	106	86	73	66	57	56	54	52	49	46	43
Tamil Nadu	113	91	57	49	37	37	35	31	28	24	22

Source: SRS Bulletins, Various Issues (Office of the Registrar General) For 2011: SRS Bulletin (Office of the Registrar General, 2012).

Table A 2.6: Mean age at effective marriage (females), India and selected states (2005–11)

Country/State	2005	2006	2007	2008	2009	2010	2011
INDIA	20.2	20.5	20.6	20.7	20.7	21.0	21.2
EAG States							
Bihar	19.0	20.0	19.5	19.9	20.1	20.6	20.7
Chhattisgarh	19.9	19.7	20.2	20.3	20.9	21.5	20.2
Jharkhand	19.2	19.5	20.5	20.3	20.0	20.2	20.7
Madhya Pradesh	20.5	20.0	21.4	20.7	21.0	20.6	20.7
Odisha	20.5	20.5	20.5	20.7	21.4	21.1	21.4
Rajasthan	19.9	20.4	19.8	19.9	19.8	20.1	20.5
Uttar Pradesh	19.8	20.3	20.2	20.6	20.2	21.0	20.8
Assam	21.7	22.1	20.7	21.2	21.1	21.6	21.5
Select Non-EAG States							
Andhra Pradesh	18.7	19.6	19.6	20.1	19.9	20.6	21.6
Tamil Nadu	21.8	22.1	21.9	22.3	22.4	22.3	22.4

Sources: Family Welfare Statistics (MoHFW, 2011); SRS 2011 (Office of the Registrar General, 2012) & SRS 2010 (Office of the Registrar General, 2011b).

Table A 2.7: Crude birth rate, India and selected states

Country/State	1971	1981	1991	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
INDIA	36.9	33.9	29.5	25.8	25.4	25	24.8	24.1	23.8	23.5	23.1	22.8	22.5	22.1	21.8
EAG States															
Bihar	NA	37.8	30.7	31.9	31.2	30.9	30.7	30.2	30.4	29.9	29.4	28.9	28.5	28.1	27.7
Chhattisgarh				26.7	26.5	25.8	25.2	27.4	27.2	26.9	26.5	26.1	25.7	25.3	24.9
Jharkhand				26.5	26.2	26.2	26.3	26.2	26.8	26.2	26.1	25.8	25.6	25.3	25
Madhya Pradesh	39.1	37.6	35.8	31.2	31	31	30.2	29.8	29.4	29.1	28.5	28	27.7	27.3	26.9
Odisha	34.6	33.1	28.8	24.3	23.5	23.2	23	22.7	22.3	21.9	21.5	21.4	21	20.5	20.1
Rajasthan	NA	37.1	35	31.4	31.1	30.6	30.3	29.0	28.6	28.3	27.9	27.5	27.2	26.7	26.2
Uttar Pradesh	44.9	39.6	35.7	32.8	32.1	31.6	31.3	30.8	30.4	30.1	29.5	29.1	28.7	28.3	27.8
Uttarakhand	NA	NA	NA	NA	18.5	20.2	17.2	20.5	20.9	21.0	20.4	20.1	19.7	19.3	18.9
Assam	38.5	33	30.9	26.9	27	26.6	26.3	25.1	25	24.6	24.3	23.9	23.6	23.2	22.8
Select Non-EAG States															
Andhra Pradesh	34.8	31.7	26.0	21.3	20.9	20.7	20.4	19.0	19.1	18.9	18.7	18.4	18.3	17.9	17.5
Tamil Nadu	31.4	28	20.8	19.3	19.1	18.5	18.3	17.1	16.5	16.2	15.8	16	16.3	15.9	15.9

Source: SRS Bulletins. Various Issues. (Office of the Registrar General of India)

Table A 2.8: Age-specific fertility rates, India and selected states

Country/State	1971	1981	1991	2001	2005	2006	2007	2008	2009	2010	2011
INDIA											
15–19	100.8	90.4	76.1	48.9	45.9	45.2	41.1	41.6	38.5	37.2	30.7
20–24	250.8	246.9	234.0	215.8	223.4	208.1	213.9	200.1	206.5	198.6	196.7
25–29	254.8	232.1	191.3	177.3	160.4	168.0	158.3	158.3	156.8	156.8	153.4
30–34	202.2	167.7	117.0	98.5	87.6	79.1	75.2	73.3	75.1	66.0	69.8
35–39	137.8	102.5	66.8	49.9	35.0	35.7	31.7	32.7	29.9	29.7	26.4
40–44	62.2	44.0	30.6	21.2	16.7	15.0	12.3	12.3	11.5	9.3	8.7
45–49	24.4	19.6	12.1	7.3	6.2	6.0	4.1	4.9	4.8	3.9	2.8
EAG States											
Bihar											
15–19	NA	114.0	78.5	53.5	56.4	55.0	49.1	47.3	41.8	37.6	33.0
20–24	NA	275.5	230.8	244.6	274.5	246.8	265.7	231.0	249.1	242.8	247.5
25–29	NA	277.4	203.9	233.3	225.1	247.5	227.8	226.5	229.6	240.4	221.4
30–24	NA	214.0	165.1	180.9	165.5	140.5	134.1	138.9	141.8	116.2	128.8
35–39	NA	145.0	116.1	104.3	71.2	85.7	64.8	77.5	68.7	67.3	58.4
40–44	NA	73.1	59.9	54.6	51.0	36.6	32.6	35.6	29.0	23.3	26.3
45–49	NA	33.2	26.5	15.3	18.0	21.3	12.2	15.0	15.7	13.0	6.3
Chhattisgarh											
15–19	NA	NA	NA	NA	NA	53.9	49.9	47.9	34.3	38.2	39.8
20–24	NA	NA	NA	NA	NA	233.0	245.2	242.1	246.6	242.3	230.4
25–29	NA	NA	NA	NA	NA	202.9	183.5	176.1	185.6	177.6	168.0
30–24	NA	NA	NA	NA	NA	96.2	93.9	86.5	78.4	72.9	67.1
35–39	NA	NA	NA	NA	NA	47.7	35.9	26.3	22.9	24.4	29.8
40–44	NA	NA	NA	NA	NA	20.6	10.5	12.5	20.3	4.2	5.3
45–49	NA	NA	NA	NA	NA	6.1	8.3	0.3	2.4	1.8	0.7
Jharkhand											
15–19	NA	NA	NA	NA	NA	66.7	58.7	53.3	50.4	49.6	37.8
20–24	NA	NA	NA	NA	NA	201.6	233.3	212.2	220.0	198.4	193.4
25–29	NA	NA	NA	NA	NA	205.6	179.6	178.4	180.6	185.7	189.1
30–24	NA	NA	NA	NA	NA	99.0	95.1	105.0	108.8	94.5	100.3
35–39	NA	NA	NA	NA	NA	60.6	44.6	51.8	38.6	43.0	44.1

Country/State	1971	1981	1991	2001	2005	2006	2007	2008	2009	2010	2011
40–44	NA	NA	NA	NA	NA	31.3	24.6	22.2	21.5	19.4	14.7
45–49	NA	NA	NA	NA	NA	12.3	7.7	14.8	12.7	4.8	6.7
Madhya Pradesh											
15–19	166.8	124.7	124.6	79.0	61.6	51.9	49.2	48.1	45.5	43.4	32.5
20–24	295.4	287.9	287.6	278.5	286.1	276.6	279.6	261.8	282.5	268.8	273.1
25–29	250.3	265.8	233.5	231.8	202.0	216.1	200.9	201.5	194.6	203.0	185.8
30–24	212.6	188.7	143.8	108.7	108.1	92.4	90.1	83.6	90.8	71.8	77.2
35–39	154.8	114.0	76.6	56.7	43.9	41.1	39.6	38.5	29.5	31.2	28.3
40–44	73.7	44.3	32.6	23.5	18.5	22.0	15.4	16.4	9.1	10.8	9.3
45–49	16.5	23.0	13.2	7.8	7.1	9.1	4.7	3.7	6.1	4.6	4.0
Odisha											
15–19	118.4	71.5	62.0	38.3	30.7	40.7	35.7	40.6	39.0	39.3	29.8
20–24	222.7	259.9	207.5	172.7	183.9	165.0	172.9	164.5	165.6	166.2	165.5
25–29	242.4	234.8	204.0	171.1	161.9	162.5	151.7	148.9	153.9	148.5	143.0
30–24	171.4	161.5	109.2	93.7	85.1	84.0	77.9	77.9	75.6	66.4	68.9
35–39	107.2	82.0	49.3	40.6	31.4	29.3	26.2	26.9	32.5	21.7	24.5
40–44	46.6	33.3	21.4	9.7	14.2	10.4	10.4	10.0	8.3	5.7	5.9
45–49	39.2	11.0	7.7	3.0	3.5	3.9	3.3	3.6	3.9	3.2	2.3
Rajasthan											
15–19	NA	88.6	86.3	56.7	58.8	49.1	41.9	48.4	43.4	36.6	32.7
20–24	NA	271.5	283.5	288.0	285.8	267.7	274.3	260.4	268.6	259.4	240.0
25–29	NA	253.2	246.7	221.4	198.9	209.7	201.9	198.6	190.4	183.6	192.8
30–24	NA	197.6	157.2	127.0	104.5	94.1	102.3	87.6	90.8	84.4	88.4
35–39	NA	143.2	89.7	65.2	45.1	47.5	42.6	45.3	39.3	35.2	33.8
40–44	NA	68.5	42.9	33.7	27.6	22.2	17.7	17.8	18.9	16.5	11.9
45–49	NA	27.7	21.2	12.5	11.3	12.4	7.3	9.1	7.0	5.1	4.4
Uttar Pradesh											
15–19	98.8	91.5	72.2	37.1	39.7	40.2	33.4	32.6	31.9	32.0	26.1
20–24	280.1	277.6	270.9	242.9	282.6	251.3	269.7	233.6	239.0	226.4	220.3
25–29	289.6	281.9	255.0	244.8	231.0	261.5	234.1	243.2	231.1	233.9	223.1
30–24	246.6	230.7	196.9	188.8	161.6	144.8	137.3	131.7	138.0	111.7	128.4
35–39	187.9	159.7	126.9	117.0	77.3	82.8	72.2	75.0	63.9	67.3	51.9
40–44	93.9	74.4	66.9	54.6	39.3	36.8	32.4	30.3	29.9	22.1	22.4

Country/State	1971	1981	1991	2001	2005	2006	2007	2008	2009	2010	2011
45–49	43.4	40.5	25.0	21.6	14.9	15.3	10.1	15.3	12.9	10.7	7.2
Uttarakhand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Assam											
15–19	126.5	81.6	60.1	56.3	48.2	49.8	55.1	54.4	45.2	50.0	45.8
20–24	273.6	198.9	198.5	186.7	179.1	174.9	169.8	157.8	167.8	152.8	163.2
25–29	292.1	225.8	195.2	171.1	159.4	164.3	158.2	150.1	141.0	149.6	146.0
30–24	235.5	164.9	128.9	110.4	115.8	93.8	86.0	87.3	95.1	84.2	82.7
35–39	146.0	96.3	76.3	59.0	45.8	44.2	46.0	43.7	46.9	43.9	27.6
40–44	49.8	36.0	33.5	19.9	23.1	13.6	15.7	19.1	20.4	13.7	17.3
45–49	14.2	8.1	5.5	2.9	6.0	7.4	4.0	3.2	7.0	5.6	2.9
Select Non-EAG States											
Andhra Pradesh											
15–19	140.1	122.3	121.5	95.7	68.6	67.6	55.8	60.7	49.5	45.9	38.8
20–24	244.8	234.7	217.9	229.6	213.8	191.1	207.5	195.2	203.9	197.8	199.1
25–29	215.8	195.9	140.0	95.7	89.8	98.4	88.6	86.1	89.1	90.3	95.5
30–24	162.4	124.6	67.1	25.6	26.2	28.0	21.5	20.9	24.7	22.3	25.9
35–39	100.3	73.7	28.6	10.7	6.4	6.5	5.8	4.6	6.2	4.5	6.0
40–44	43.8	28.9	12.3	2.3	2.7	2.1	1.5	1.2	1.2	1.8	0.8
45–49	14.7	9.7	4.3	0.8	0.4	0.0	0.3	0.1	0.2	0.2	0.0
Tamil Nadu											
15–19	70.7	71.0	45.3	32.6	21.2	51.9	49.2	48.1	45.5	43.4	32.5
20–24	217.5	207.7	186.7	181.9	154.3	276.6	279.6	261.8	282.5	268.8	273.1
25–29	222.4	193.8	130.7	129.2	113.9	216.1	200.9	201.5	194.6	203.0	185.8
30–24	160.0	124.6	54.6	46.1	42.7	92.4	90.1	83.6	90.8	71.8	77.2
35–39	87.9	55.1	20.8	12.4	11.0	41.1	39.6	38.5	29.5	31.2	28.3
40–44	25.0	19.5	4.2	3.2	2.3	22.0	15.4	16.4	9.1	10.8	9.3
45–49	6.7	5.3	1.5	0.8	0.5	9.1	4.7	3.7	6.1	4.6	4.0

Source: SRS. Various Issues. (Office of the Registrar General of India)

Table A 2.9: Total fertility rate, India and selected states

Country/State	1971	1981	1991	1996	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
INDIA	5.2	4.5	3.6	3.4	3.2	3.1	3.0	3.0	2.9	2.9	2.8	2.7	2.6	2.6	2.5	2.4
EAG States																
Bihar	NA	5.7	4.4	4.5	4.5	4.4	4.3	4.2	4.3	4.3	4.2	3.9	3.9	3.9	3.7	3.6
Chhattisgarh				2.8*						3.4	3.3	3.1	3	3	2.8	2.7
Jharkhand				2.8*						3.5	3.4	3.2	3.2	3.2	3.0	2.9
Madhya Pradesh	5.6	5.2	4.6	4.1	4	3.9	3.8	3.8	3.7	3.6	3.5	3.4	3.3	3.3	3.2	3.1
Odisha	4.7	4.3	3.3	3.1	2.7	2.6	2.6	2.6	2.7	2.6	2.5	2.4	2.4	2.4	2.3	2.2
Rajasthan	NA	5.2	4.6	4.2	4.1	4	3.9	3.8	3.7	3.7	3.5	3.4	3.3	3.3	3.1	3.0
Uttar Pradesh	6.6	5.8	5.1	4.9	4.7	4.5	4.4	4.3	4.3	4.2	4.2	3.9	3.8	3.7	3.5	3.4
Uttarakhand				2.14						2.21**					2.3***	
Assam	5.7	4.1	3.5	3.2	3.1	3.0	3.0	2.9	2.9	2.9	2.7	2.7	2.6	2.6	2.5	2.4
Select Non-EAG States																
Andhra Pradesh	4.6	4.0	3.0	2.5	2.3	2.3	2.2	2.2	2.1	2.0	2.0	1.9	1.8	1.9	1.8	1.8
Tamil Nadu	3.9	3.4	2.2	2.1	2.1	2	1.9	1.9	1.8	1.7	1.7	1.6	1.7	1.7	1.7	1.7

Sources: Office of the Registrar General of India, Sample Registration System, Various Issues & NFHS-3 (IIPS and Macro International, 2007);

* NFHS-1 (IIPS, 1995) ** NFHS-3 *** AHS 2010-11 (Office of the Registrar General, 2011a)

Table A 2.10: Higher-order births (3 and above), India and selected states

Country/State	**1991**	**2001**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
INDIA	42.7	39.2	36.1	34.5	33.2	31.9	30.3	28.0	27.6
EAG States									
Bihar	53.6	51.8	50.6	49.3	47.1	47.4	45.4	42.5	43.0
Chhattisgarh			39.6	37.8	37.5	32.9	29.4	28.7	28.9
Jharkhand			43.3	43.6	39.1	41.8	39.4	39.6	34.5
Madhya Pradesh	48.7	43.4	39	36.7	35.9	33	32.5	29.2	28.9
Odisha	42.7	39.0	34.2	33.1	31.2	30.9	29.1	26.4	24.6
Rajasthan	48.8	44.2	40	39.1	39.5	39.6	36.9	36.6	34.8
Uttar Pradesh	51.4	53.1	48.8	47.1	45.4	42.9	41.6	36.9	35.8
Uttarakhand	-	-	-	-	-	-	-	31.4*	-
Assam	45.0	39.5	38.2	36.1	36.5	34.4	31.3	29.8	28.4
Select Non-EAG States									
Andhra Pradesh	33.3	16.9	12.6	14.6	12.1	11.1	10.5	8.7	10.5
Tamil Nadu	26.8	19.8	15.7	14	14	12.7	11.5	10.3	9.8

Source: Computed from the Office of the Registrar General of India, SRS, Various Issues.
For Uttarakhand: Annual Health Survey, 2010–11.
***** AHS 2010–11.

Table A 2.11: Percentage effective couple protection rate due to all methods (modern), India and selected states

Country/State	**1980**	**1991**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
INDIA	22.3	44.1	46.2	45.6	45.7	47.1	47.2	46.3	46.7	46.2	46.5	42.9	41.6	40.4
EAG States														
Bihar	26	23.1	17.4	17.3	17.3	15.2	15.2	14.1	13.8	13.5	13.9	14.4	15.5	16.5
Chhattisgarh	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Jharkhand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Madhya Pradesh	21.7	40.3	45.9	46.9	47.3	48.6	47.2	49.9	51.1	50.8	48.7	48	46.4	47.2
Odisha	26.9	41	37.6	36.7	35	33.2	32	31	30.5	29.7	27.5	27.3	25.9	32
Rajasthan	13.3	29	36.1	37.9	38.1	40.5	42.9	45	46.3	47.1	47.9	46.5	48.6	45.7
Uttar Pradesh	11.5	40.7	37.9	37.4	37.4	37.1	36.8	36	35.2	34.6	34.1	30.1	29.5	27.7
Uttarakhand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Assam	22.6	28.2	15.2	14.1	12.9	12.6	12.4	12.1	11.6	10.7	9.6	10.1	11.8	13.1
Select Non-EAG States														
Andhra Pradesh	25.6	44.3	52.8	55.5	56.9	59.3	61.0	62.4	63.3	63.9	66.3	64.6	63.9	61.5
Tamil Nadu	28.2	57.3	50.4	50.3	49.6	49.1	49.6	49	48.4	47.3	46.6	45.6	44.7	41.5

Source: Family Welfare Statistics in India, 2011 (MoHFW, 2011)

Table A 2.12: Contraceptive prevalence rate (any modern method), India and selected states

Country/State	NFHS-1 1992–93	NFHS-2 1998–99	NFHS-3 2005–06	DLHS-1 1998–99	DLHS-2 2002–04	DLHS-3 2007–08	AHS 2010–11
INDIA	36.5	42.8	48.5	42.5	45.7	47.1	-
EAG States							
Bihar	21.6	22.4	28.9	23.3	27.3	28.4	37.6
Chhattisgarh	-	42.3	49.1	-	41.7	47.1	49.5
Jharkhand	-	24.9	31.1	-	33.3	30.8	38.0
Madhya Pradesh	33.5	42.8	52.8	43.4	47.3	53.1	57.0
Odisha	34.7	40.3	44.7	39.5	41.9	37.8	44.0
Rajasthan	31.0	38.1	44.4	39.0	42.3	54.0	58.8
Uttar Pradesh	18.5	20.8	29.3	21.6	26.2	26.7	31.8
Uttarakhand	-	40.4	55.5	-	44.2	57.7	55.4
Assam	19.9	26.6	27.0	28.4	28.7	31.2	35.7
Select Non-EAG States							
Andhra Pradesh	47.0	58.9	67.0	58.7	62.4	65.1	-
Tamil Nadu	45.2	50.3	60.0	49.9	55.0	57.8	-

Sources: NFHS-3 (IIPS and Macro International, 2007), DLHS-1 (IIPS, 1998–99), DLHS-2 (IIPS, 2006) & DLHS-3 (IIPS, 2007–08), AHS 2010–11 ((Office of the Registrar General, 2011a).

Table A 2.13: Method mix, India and selected states, NFHS, DLHS, & AHS surveys

Country/State	NFHS-1 1992–93	NFHS-2 1998–99	NFHS-3 2005–06	DLHS-1 1998–99	DLHS-2 2002–04	DLHS-3, 2007–08	AHS 2010–11
INDIA							
Female sterilisation users	27.4	34.2	37.3	33.5	34.3	35.8	-
Male sterilisation users	3.5	1.9	1.0	1.5	0.9	1.1	
IUCD users	1.9	1.6	1.7	1.9	1.9	1.8	
Oral pill users	1.2	2.1	3.1	2.4	3.5	3.6	
Condom users	2.4	3.1	5.2	3.1	4.8	5.5	
EAG States							
Bihar							
Female sterilisation users	17.3	18.5	23.8	20.5	21.9	25.0	29.4
Male sterilisation users	1.3	1.0	0.6	0.7	0.4	0.3	0.3
IUCD users	0.5	0.6	0.6	0.5	0.8	0.3	0.5
Oral pill users	1.1	0.8	1.3	1.1	1.9	1.1	1.5
Condom users	1.3	0.6	2.3	0.6	2.0	1.0	1.6
Chhattisgarh							
Female sterilisation users	NA	35.1	40.7		34.8	41.3	45.6
Male sterilisation users		3.3	3.3		1.6	1.8	1.0

IUCD users		1.0	0.8		0.7	0.6	0.4
Oral pill users		0.8	1.4		1.9	1.7	1.1
Condom users		2.1	2.9		2.6	1.6	1.3
Jharkhand							
Female sterilisation users	NA	21.1	23.4		25.3	24.6	29.0
Male sterilisation users		0.9	0.4		0.4	0.4	0.5
IUCD users		0.3	0.6		0.9	0.5	0.8
Oral pill users		1.5	3.8		3.5	3.3	4.2
Condom users		1.1	2.7		2.9	2	3.3
Madhya Pradesh							
Female sterilisation users	26.4	36.0	44.3	36.3	37.5	45.1	47.6
Male sterilisation users	5.1	1.9	1.3	1.6	0.8	0.8	1.0
IUCD users	1.1	0.7	0.7	0.0	1.1	0.5	0.5
Oral pill users	0.7	1.0	1.7	1.4	2.5	2.9	1.9
Condom users	2.2	3.1	4.8	3.0	5.2	4.6	5.8
Odisha							
Female sterilisation users	28.3	33.9	33.1	32.5	28.9	25.6	30.1
Male sterilisation users	3.4	1.7	1.0	1.4	0.5	1.0	0.3
IUCD users	1.5	0.8	0.5	0.7	0.9	0.3	0.3
Oral pill users	0.9	3.0	7.0	3.6	8.4	9.0	11.1
Condom users	0.6	0.9	3.0	1.1	2.7	2.8	2.1
Rajasthan							
Female sterilisation users	25.4	30.8	34.2	31.5	31.2	40.5	45.1
Male sterilisation users	2.4	1.5	0.8	0.9	0.6	0.5	0.4
IUCD users	1.2	1.2	1.6	1.6	1.5	1.4	1.0
Oral pill users	0.5	1.5	2.0	1.5	2.8	3.2	2.8
Condom users	1.5	3.1	5.7	3.4	6.2	8.3	9.3
Uttar Pradesh							
Female sterilisation users	11.7	14.1	17.3	13.6	14.4	16.5	17.5
Male sterilisation users	1.4	0.5	0.2	0.4	0.2	0.1	0.2
IUCD users	1.1	0.9	1.4	1.3	1.6	1.0	1.0
Oral pill users	1.0	1.2	1.7	1.8	2.5	1.7	2.7
Condom users	3.2	4.0	8.6	4.2	7.3	7.1	10.0
Uttarakhand							
Female sterilisation users	-	27.3	32.1	-	25.1	39.5	32.5
Male sterilisation users		3.8	1.8	-	1.7	2.0	1.5
IUCD users		1.6	1.5		1.9	1.0	1.0
Oral pill users		1.4	4.2		4.1	4.1	4.1
Condom users		6.2	15.7		11.1	10.9	15.9
Assam							
Female sterilisation users	12.2	15.7	13.0	12.4	12.8	10.7	12.6
Male sterilisation users	2.4	1.0	0.2	1.0	0.1	0.2	0.2
IUCD users	0.9	1.9	1.3	2.1	1.2	1.5	1.3

Oral pill users	2.8	6.3	10.3	8.9	12.2	16.5	18.3
Condom users	1.7	1.8	2.3	3.9	2.3	2.3	3.0
Select Non-EAG States							
Andhra Pradesh							
Female sterilisation users	38.5	52.7	62.9	54.0	58.1	60.3	
Male sterilisation users	6.7	4.3	3.0	3.7	3.2	3.9	
IUCD users	0.6	0.6	0.5	0.4	0.4	0.4	
Oral pill users	0.5	0.5	0.3	0.4	0.3	0.3	
Condom users	0.7	0.7	0.5	0.2	0.4	0.4	
Tamil Nadu							
Female sterilisation users	37.6	42.5	55.0	45.0	49.5	53.8	
Male sterilisation users	2.0	0.8	0.4	0.4	0.2	0.2	
IUCD users	3.6	2.5	2.1	3.0	5.2	2.0	
Oral pill users	0.6	0.3	0.2	0.3	0.3	0.2	
Condom users	1.6	1.5	2.3	1.2	2.1	1.6	

Sources: NFHS-3 (IIPS and Macro International, 2007), DLHS-1 (IIPS, 1998–99), DLHS-2 (IIPS, 2006) & DLHS-3 (IIPS, 2007–08).

Table A 2.14: Unmet need for family planning, India and selected states

Country/State	**NFHS-1 1992–93**	**NFHS-2 1998–99**	**NFHS-3 2005–06**	**DLHS-1 1998–99**	**DLHS-2 2002–04**	**DLHS-3 2007–08**	**AHS 2010–11**
INDIA							
Total unmet need	19.5	15.8	12.8	25.3	21.1	21.3	
Spacing	11.0	8.3	6.2	10.7	8.5	7.9	
Limiting	8.5	7.5	6.6	14.6	12.7	13.4	
EAG States							
Bihar							
Total unmet need	25.1	25.7	23.1	42.0	36.7	37.2	39.2
Spacing	14.4	13.1	10.7	18.3	14.9	14.4	21.3
Limiting	10.6	12.5	12.4	23.7	21.8	22.8	17.9
Chhattisgarh							
Total unmet need	-	13.5	10.5	-	21.7	20.9	26.4
Spacing		8.0	5.4		9.3	9.1	15.5
Limiting		5.6	5.1		12.4	11.8	10.9
Jharkhand							
Total unmet need	-	21.0	23.7	-	32.9	34.7	30.5
Spacing		11.1	11.6		13.6	13.6	16.2
Limiting		9.9	12.2		19.3	21.1	14.3
Madhya Pradesh							
Total unmet need	20.5	17.1	11.8	27.2	21.0	19.3	22.4
Spacing	13.1	9.2	5.5	13.3	7.4	8.6	13.8
Limiting	7.4	7.9	6.3	13.9	13.6	10.7	8.6

Odisha							
Total unmet need	22.4	15.5	14.9	22.0	19.1	24.0	23.2
Spacing	12.7	8.7	6.8	7.6	6.0	8.2	10.8
Limiting	9.7	6.8	8.1	14.4	13.1	15.8	12.4
Rajasthan							
Total unmet need	19.8	17.6	14.7	28.3	21.8	17.9	19.6
Spacing	9.0	8.9	7.4	9.8	8.1	7.7	11.9
Limiting	10.8	8.7	7.3	18.4	13.7	10.2	7.6
Uttar Pradesh							
Total unmet need	30.1	25.4	21.9	38.4	33.6	33.7	29.7
Spacing	16.7	11.8	9.3	15.7	13.3	11.6	17.2
Limiting	13.4	13.6	12.6	22.7	20.3	22.1	12.6
Uttarakhand							
Total unmet need	-	21.0	11.3	-	26.9	20.8	23.2
Spacing	-	10.5	4.6	-	9.8	6.7	12.0
Limiting	-	10.5	6.7	-	17.1	14.1	11.2
Assam							
Total unmet need	21.7	17.0	10.5	37.6	22.5	24.3	24.0
Spacing	11.0	7.0	3.5	15.1	8.2	5.8	13.0
Limiting	10.7	10.0	7.1	22.5	14.3	18.5	11.0
Select Non-EAG States							
Andhra Pradesh							
Total unmet need	10.4	7.7	5.0	14.0	11.7	8.5	
Spacing	6.3	5.2	3.2	6.9	5.6	4.5	
Limiting	4.1	2.5	1.8	7.0	6.1	4.0	
Tamil Nadu							
Total unmet need	14.6	13.0	8.9	21.4	18.1	19.4	
Spacing	7.8	6.6	4.1	5.0	5.4	6.5	-
Limiting	6.7	6.4	4.8	16.3	12.7	12.9	

Sources: NFHS-3 (IIPS and Macro International, 2007), DLHS-1 (IIPS, 1998–99), DLHS-2 (IIPS, 2006) & DLHS-3 (IIPS, 2007–08), AHS 2010–11 (Registrar General of India, 2011a).

Table A 2.15: Number of sterilisation users, IUCD users, condom users, and oral pill users (in thousands), India

Method	**1981–82**	**1991–92**	**2001–02**	**2002–03**	**2003–04**	**2004–05**	**2005–06**
Sterilisation users	2792	4090	4827	4903	4925	4926	4705
IUCD users	751	4386	6273	6148	6115	6172	6184
Condom users	4439	13875	17785	22604	23847	23724	26188
Oral pill users	120	3366	8695	9413	9918	9135	9516

Source: Family Welfare Statistics, 2011 (MoHFW, 2011)

Table A 2.16: Sterilisation achievements

Country/State	**2006–07**	**2007–08**	**2008–09**	**2009–10**	**2010–11**	**2011–12**
INDIA	4576780	5018693	4963132	4997571	4835152	5148108
EAG States						
Bihar	147747	300918	250550	312211	496902	513541
Chhattisgarh	133094	153836	168733	173635	137025	149519
Jharkhand	101297	106383	110693	113354	130969	127715
Madhya Pradesh	367510	451896	451762	434706	625622	681845
Odisha	94309	120983	95190	117955	142641	139248
Rajasthan	288089	335029	356923	345900	314975	338574
Uttar Pradesh	429484	471891	393576	470194	333757	413150
Uttarakhand	32767	34799	33422	24462	20398	33018
Assam	17282	18669	48064	81112	77976	74778
Select Non-EAG States						
Andhra Pradesh	769253	725217	698524	665400	541582	557434
Tamil Nadu	357568	353436	343201	343908	293498	327262

Sources: Family Welfare Statistics, 2011 (MoHFW, 2011); for 2010–11 & 2011–12: MoHFW Performance Statistics, April 2011–March 2012.

Table A 2.17: IUCD achievements

Country/State	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12
INDIA	59,78,429	6072099	5530834	5749289	5637404	5362904
EAG States						
Bihar	87065	44923	41606	177495	228959	317893
Chhattisgarh	117371	118616	115643	111106	107531	79209
Jharkhand	73673	85376	103469	88961	113934	102881
Madhya Pradesh	462481	501433	560826	441410	365175	295282
Odisha	162697	161051	116454	137230	141818	142063
Rajasthan	303358	337979	353877	40956040	407122	395367
Uttar Pradesh	18,55,173	19,43,474	14,27,393	15,51,138	15,57,626	13,56,896
Uttarakhand	140899	140932	81338	98306	116640	117836
Assam	32560	27758	30062	35878	48384	71087
Select Non-EAG States						
Andhra Pradesh	405355	407513	409270	403191	358215	323425
Tamil Nadu	360601	354311	310205	344887	349654	288034

Sources: Family Welfare Statistics, 2011 (MoHFW, 2011); for 2010–11 & 2011–12: MoHFW Performance Statistics, April 2011–March 2012.

Table A 2.18: Number of condom users

Country/State	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12
INDIA	2,67,36,594	2,67,99,246	1,90,67,888	1,67,42,009	1,51,40,673	1,50,21,589
EAG States						
Bihar	70897	48977	51389	66824	90102	115117
Chhattisgarh	695880	335506	211279	188361	146,395	98177
Jharkhand	115326	162801	190424	166023	125275	104767
Madhya Pradesh	1365079	1667900	1184076	1005778	609775	255934
Odisha	362494	327968	252810	250701	196359	192503
Rajasthan	177638	1783437	1437385	1653472	1276493	1084700
Uttar Pradesh	1692131	1687378	890202	888782	786626	686782
Uttarakhand	112924	135073	96181	79145	57407	82589
Assam	39659	20190	27779	44641	63439	88182
Select Non-EAG States						
Andhra Pradesh	773586	906076	913274	834383	680932	515533
Tamil Nadu	148252	159570	168282	167472	167258	118105

Sources: Family Welfare Statistics, 2011 (MoHFW, 2011); for 2010–11 & 2011–12: MoHFW Performance Statistics, April 2011–March 2012.

Table A 2.19: Number of oral pill users

Country/State	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12
INDIA	9713999	10893390	8814497	8153025	7423833	6497891
EAG States						
Bihar	30055	6882	16202	45594	47735	81074
Chhattisgarh	405775	228376	114823	111458	91448	104171
Jharkhand	69567	82806	88684	86423	90820	79996
Madhya Pradesh	577490	609535	520126	484150	393451	213220
Odisha	199151	189828	164879	177885	174287	187449
Rajasthan	863610	882338	813861	861324	731013	577318
Uttar Pradesh	819008	821282	554788	662353	365217	231177
Uttarakhand	46489	48239	46908	47424	34209	44714
Assam	37766	31275	43556	62647	81296	111756
Select Non-EAG States						
Andhra Pradesh	340340	598224	348121	366592	292541	284784
Tamil Nadu	129196	130868	131228	90395	119469	71051

Sources: Family Welfare Statistics, 2011 (MoHFW, 2011); for 2010–11 & 2011–12: MoHFW Performance Statistics, April 2011–March 2012.

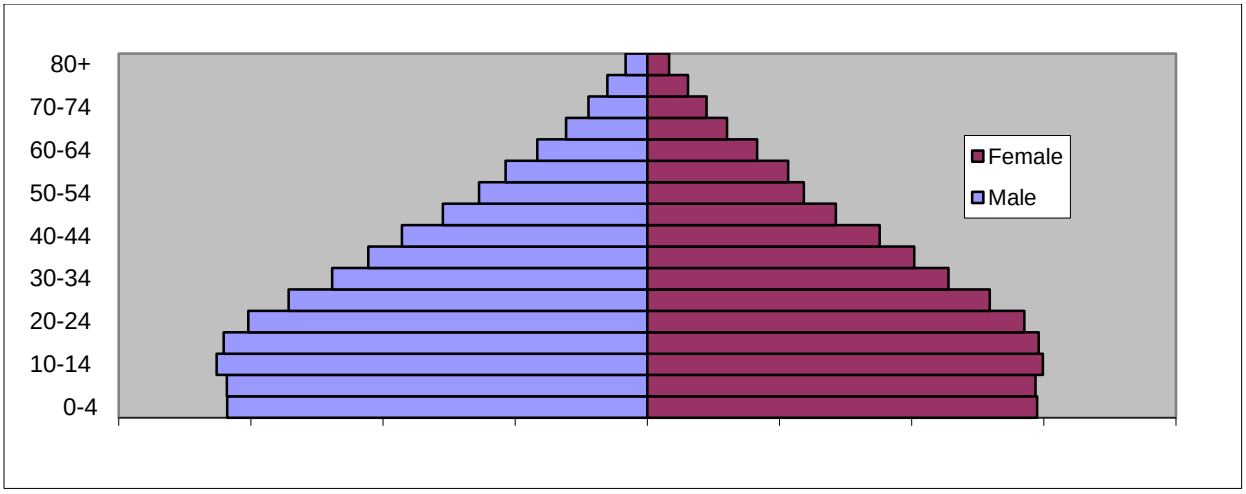
Table A 2.20: Percentage of institutional deliveries

Country/State	2006–07	2007–08	2008–09	2009–10	2010–11
INDIA	56.7	62.2	70.6	73.9	78.5
EAG States					
Bihar	27.7	58.2	69.9	84.7	85.4
Chhattisgarh	22.0	26.4	31.8	43.4	54.4
Jharkhand	23.9	29.7	37.9	50.3	77.8
Madhya Pradesh	51.8	72.3	80.1	80.3	83.9
Odisha	46.2	62.8	70.0	77.1	82.3
Rajasthan	52.1	66.1	75.7	86.2	88.5
Uttar Pradesh	45.3	39.9	50.6	49.3	57.9
Uttarakhand	27.1	40.7	41.6	59.5	60.7
Assam	54.6	66.9	70.3	78.1	78.1
Select Non-EAG States					
Andhra Pradesh	86.7	88.1	89.7	92.3	94.4
Tamil Nadu	96.6	98.2	99.4	99.5	99.8

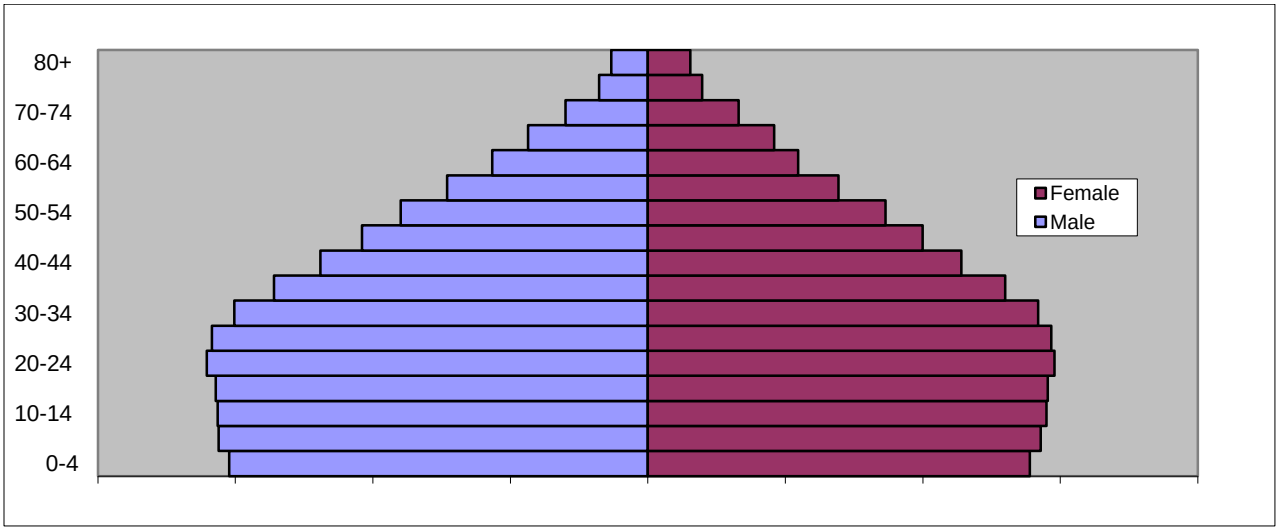
Source: Family Welfare Statistics, 2011 (MoHFW, 2011).

ANNEX 3: FOR CHAPTER 3

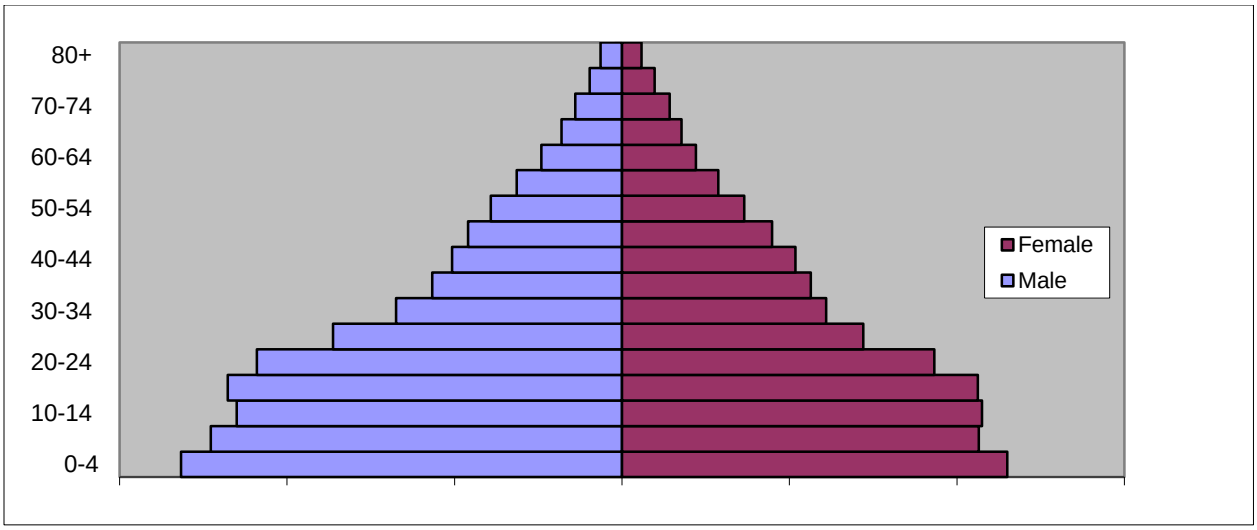
Age-sex structure of India in base year 2011 under Scenario A



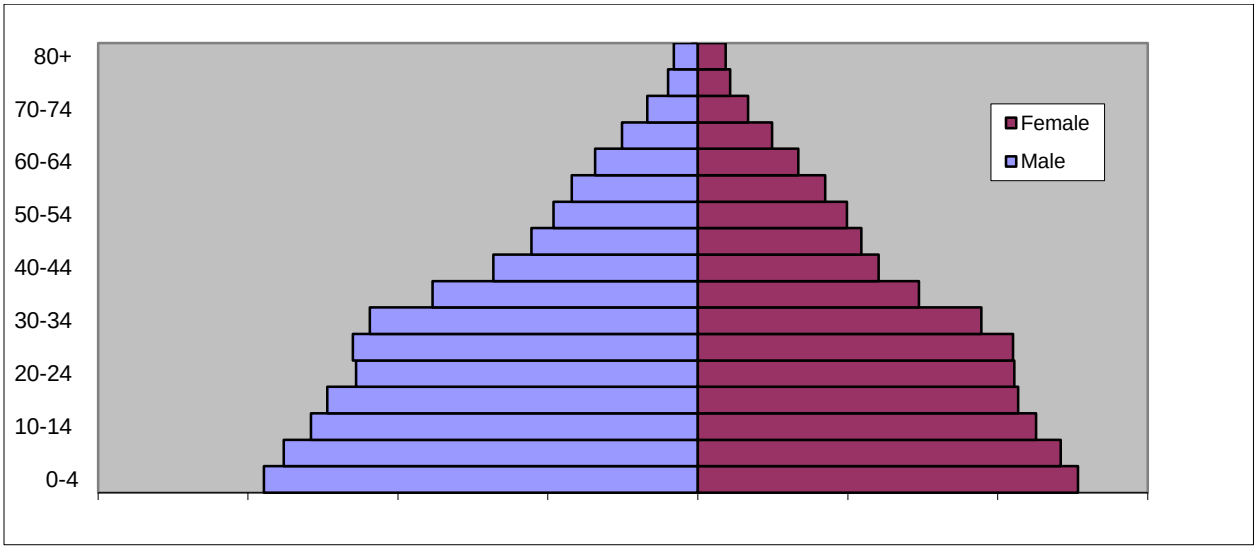
Age-sex structure of India in 2022 under Scenario A



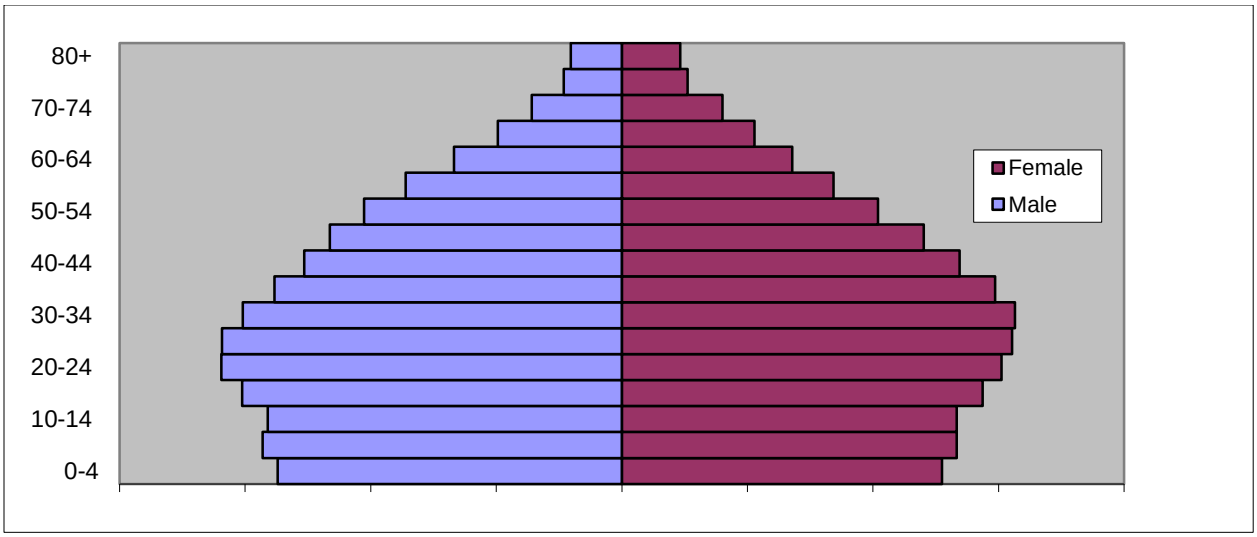
Age-sex structure of UP in base year 2011 under Scenario A



Age-sex structure of UP by 2022 under Scenario A



Age-sex structure of Tamil Nadu in base year 2011 under Scenario A



Age-sex structure of Tamil Nadu by 2022 under Scenario A

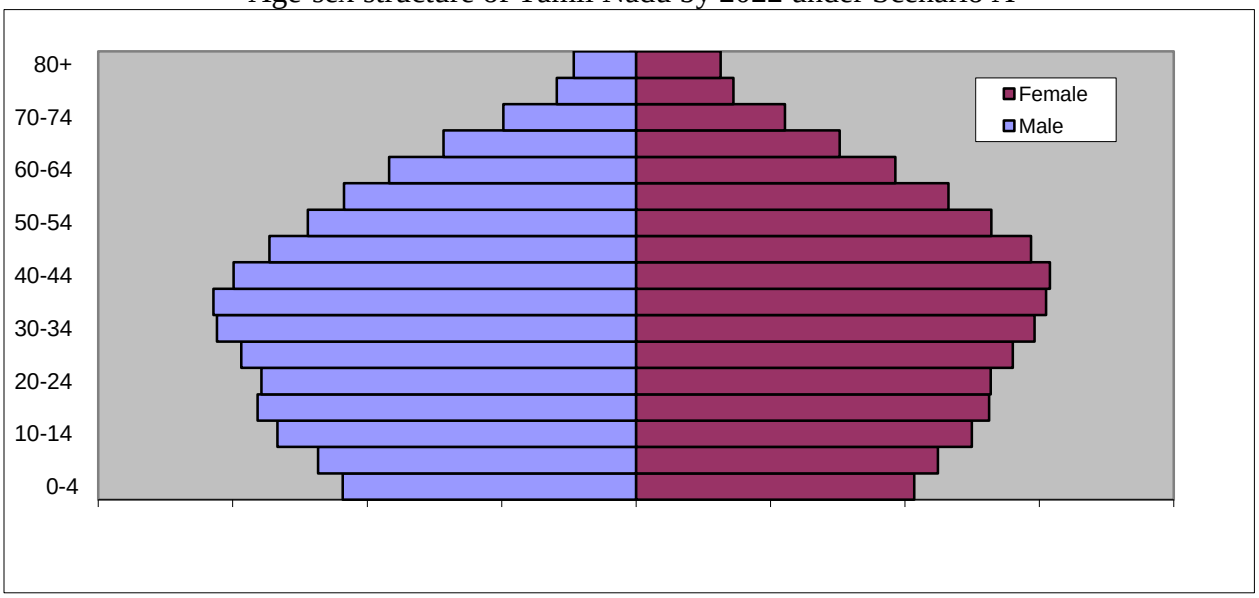


Table A 3.1: Summary of demographic indicators: UTTAR PRADESH

SCENARIO A											
Fertility	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Calculated TFR	3.38	3.33	3.27	3.17	3.09	3.01	2.91	2.81	2.71	2.59	2.44
GRR	1.58	1.56	1.53	1.48	1.44	1.4	1.36	1.31	1.26	1.21	1.14
NRR	1.4	1.39	1.37	1.33	1.31	1.28	1.24	1.2	1.16	1.12	1.06
Child-woman ratio	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4
Mortality											
Male LE	62.5	63	63.5	64	64.5	65	65.4	65.9	66.4	66.8	67.3
Female LE	64.5	64.9	65.3	65.7	66.2	66.6	67	67.4	67.8	68.2	68.7
Total LE	63.4	63.9	64.4	64.8	65.3	65.7	66.2	66.6	67.1	67.5	68
IMR	55.5	53.5	51.6	49.7	47.7	45.8	44	42.2	40.4	38.6	36.8
U5MR	73.9	70.8	67.8	64.8	61.9	59	56.3	53.8	51.2	48.7	46.1
Vital Rates											
CBR per 1,000	25.8	25.9	25.8	25.5	25.2	24.8	24.2	23.5	22.7	21.8	20.5
CDR per 1,000	8.7	8.5	8.3	8.1	8	7.8	7.6	7.4	7.3	7.1	6.9
GR per cent	1.51	1.53	1.54	1.53	1.51	1.49	1.45	1.4	1.34	1.26	1.15
Annual Births and Deaths											
Births (Millions)	5.2	5.4	5.4	5.5	5.5	5.5	5.4	5.4	5.3	5.1	4.9
Deaths (Millions)	1.8	1.8	1.8	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Population (Millions)											
Total (Millions)	199.6	203.1	206.7	210.4	214.1	217.8	221.6	225.3	229	232.6	236
Male (Millions)	104.6	106.4	108.3	110.3	112.2	114.2	116.2	118.2	120.2	122.1	123.9
Female (Millions)	95	96.6	98.3	100.1	101.8	103.6	105.4	107.1	108.8	110.5	112.1
Per cent 0–4	12.14	11.98	11.87	11.76	11.68	11.61	11.48	11.3	11.08	10.8	10.44
Per cent 5–14	22.42	22.22	22.02	21.83	21.63	21.42	21.26	21.13	21.01	20.91	20.76
Per cent 15–24	21.32	21.16	20.92	20.63	20.33	20.01	19.7	19.4	19.13	18.9	18.8
Per cent 15-49	51.4	51.65	51.83	51.99	52.14	52.28	52.42	52.58	52.75	52.95	53.27
Per cent 15–64	60.66	61.05	61.37	61.66	61.93	62.19	62.45	62.72	62.99	63.3	63.72
Per cent 65 and over	4.77	4.76	4.75	4.75	4.76	4.78	4.81	4.86	4.92	4.99	5.08
Per cent females 15–49	51.47	51.74	51.95	52.11	52.22	52.31	52.37	52.43	52.51	52.61	52.86
Sex ratio	110.13	110.15	110.17	110.21	110.25	110.31	110.36	110.42	110.48	110.53	110.59
Dependency ratio	0.65	0.64	0.63	0.62	0.61	0.61	0.6	0.59	0.59	0.58	0.57

Table A 3.1: Summary of demographic indicators: UTTAR PRADESH (contd.)

SCENARIO B											
Fertility	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Calculated TFR	**3.38**	**3.34**	**3.28**	**3.19**	**3.12**	**3.04**	**2.95**	**2.86**	**2.77**	**2.67**	**2.53**
GRR	1.58	1.56	1.53	1.49	1.46	1.42	1.38	1.34	1.29	1.25	1.18
NRR	1.4	1.39	1.37	1.34	1.32	1.29	1.26	1.22	1.19	1.15	1.1
Mortality											
Male LE	62.5	63	63.5	64	64.5	65	65.4	65.9	66.4	66.8	67.3
Female LE	64.5	64.9	65.3	65.7	66.2	66.6	67	67.4	67.8	68.2	68.7
Total LE	63.4	63.9	64.4	64.8	65.3	65.7	66.2	66.6	67.1	67.5	68
IMR	55.5	53.5	51.6	49.7	47.7	45.8	44	42.2	40.4	38.6	36.8
U5MR	73.9	70.8	67.8	64.8	61.9	59	56.3	53.8	51.2	48.7	46.1
Vital Rates											
CBR per 1,000	25.8	26	25.9	25.6	25.4	25	24.5	23.9	23.2	22.3	21.2
CDR per 1,000	8.7	8.5	8.3	8.2	8	7.8	7.6	7.4	7.3	7.1	6.9
Annual Births and Deaths (Millions)											
Births	5.2	5.4	5.5	5.5	5.5	5.6	5.5	5.5	5.4	5.3	5.1
Deaths	1.8	1.8	1.8	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Growth rate (%)	1.5	1.5	1.6	1.5	1.5	1.5	1.5	1.4	1.4	1.3	1.2
Population											
Total (Millions)	203.1	206.7	210.4	214.1	217.9	221.7	225.5	229.3	233	236.6	240
Male	106.4	108.3	110.3	112.3	114.3	116.3	118.3	120.3	122.3	124.2	126.1
Female	96.6	98.3	100.1	101.9	103.6	105.4	107.2	109	110.7	112.4	114
Per cent 0–4	12.14	11.99	11.88	11.79	11.72	11.68	11.57	11.42	11.23	10.98	10.66
Per cent 5–14	22.42	22.21	22.02	21.82	21.62	21.4	21.24	21.11	21	20.9	20.76
Per cent 15–24	21.32	21.16	20.92	20.63	20.32	20	19.68	19.37	19.09	18.85	18.74
Per cent 15–49	51.4	51.64	51.83	51.98	52.11	52.24	52.36	52.5	52.65	52.82	53.1
Per cent 15–64	60.66	61.04	61.36	61.65	61.91	62.15	62.38	62.62	62.87	63.14	63.51
Per cent 65 and over	4.77	4.76	4.75	4.74	4.75	4.77	4.81	4.85	4.91	4.98	5.06
Per cent females 15–49	51.47	51.74	51.94	52.09	52.2	52.27	52.32	52.36	52.4	52.48	52.69
Sex ratio	110.13	110.15	110.17	110.21	110.26	110.31	110.36	110.42	110.48	110.54	110.6
Dependency ratio	0.65	0.64	0.63	0.62	0.62	0.61	0.6	0.6	0.59	0.58	0.57

Table A 3.2: Summary of demographic indicators: MADHYA PRADESH

SCENARIO A											
Fertility											
Calculated TFR	3.04	2.98	2.89	2.8	2.74	2.65	2.55	2.42	2.32	2.2	2.1
GRR	1.46	1.42	1.38	1.34	1.31	1.27	1.22	1.16	1.11	1.05	1
NRR	1.3	1.27	1.24	1.21	1.18	1.15	1.11	1.06	1.02	0.97	0.93
Child-woman ratio	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Mortality											
Male LE	61.4	61.6	61.9	62.1	62.4	62.6	62.9	63.1	63.4	63.7	63.9
Female LE	64.2	64.6	64.9	65.3	65.6	65.9	66.3	66.6	67	67.3	67.7
Total LE	62.7	63	63.3	63.6	63.9	64.2	64.5	64.8	65.1	65.4	65.7
IMR	58.7	57.4	56.1	54.8	53.6	52.3	51.1	49.9	48.6	47.4	46.1
U5MR	78.8	76.8	74.8	72.8	70.9	69	67.1	65.2	63.3	61.4	59.5
Life table: Coale-Demeny West											
Vital Rates											
CBR per 1,000	25.3	25.1	24.6	24.1	23.7	23.1	22.3	21.3	20.3	19.2	18.3
CDR per 1,000	9	8.9	8.8	8.7	8.6	8.5	8.4	8.3	8.2	8.1	8
GR per cent	1.63	1.61	1.58	1.54	1.51	1.46	1.39	1.29	1.21	1.11	1.02
Annual Births and Deaths											
Births (Millions)	1.87	1.88	1.88	1.87	1.87	1.85	1.8	1.74	1.69	1.61	1.55
Deaths (Millions)	0.66	0.67	0.67	0.67	0.68	0.68	0.68	0.68	0.68	0.68	0.68
Population (Millions)											
Total (Millions)	73.83	75.05	76.25	77.45	78.64	79.8	80.93	82	83.01	83.95	84.82
Male (Millions)	38.23	38.85	39.47	40.08	40.69	41.28	41.86	42.4	42.91	43.38	43.82
Female (Millions)	35.6	36.19	36.78	37.37	37.95	38.52	39.07	39.6	40.1	40.56	41
Per cent 0–4	11.11	11.12	11.14	11.15	11.15	10.98	10.76	10.48	10.16	9.78	9.37
Per cent 5–14	21.33	20.99	20.67	20.36	20.07	19.95	19.87	19.8	19.74	19.7	19.65
Per cent 15–24	20.55	20.39	20.17	19.93	19.67	19.41	19.16	18.92	18.69	18.49	18.31
Per cent 15–49	53.18	53.29	53.37	53.43	53.48	53.52	53.56	53.64	53.73	53.85	54.01
Per cent 15–64	62.79	63.13	63.44	63.74	64.01	64.27	64.54	64.82	65.12	65.45	65.8
Per cent 65 and over	4.77	4.75	4.75	4.75	4.77	4.8	4.84	4.9	4.98	5.07	5.18
Per cent females 15–49	52.95	53.11	53.22	53.3	53.33	53.34	53.33	53.32	53.33	53.38	53.47
Sex ratio	107.38	107.34	107.3	107.26	107.22	107.17	107.12	107.07	107.01	106.95	106.89
Dependency ratio	0.59	0.58	0.58	0.57	0.56	0.56	0.55	0.54	0.54	0.53	0.52

Table A 3.2: Summary of demographic indicators: MADHYA PRADESH (contd.)

SCENARIO B											
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Fertility											
Calculated TFR	3.55	3.48	3.42	3.36	3.31	3.27	3.22	3.17	3.12	3.08	3.03
GRR	1.72	1.69	1.66	1.63	1.61	1.59	1.56	1.54	1.51	1.49	1.47
NRR	1.56	1.54	1.52	1.50	1.48	1.47	1.45	1.44	1.42	1.41	1.39
Mortality	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Male LE											
Female LE											
Total LE	65.5	65.8	66.2	66.5	66.9	67.2	67.5	67.9	68.2	68.6	69
IMR	66.6	67	67.4	67.8	68.2	68.6	69	69.4	69.9	70.3	70.7
U5MR	66	66.4	66.8	67.1	67.5	67.9	68.3	68.6	69	69.4	69.8
Vital Rates											
CBR per 1,000	27.00	27.00	27.00	27.10	27.10	27.20	27.10	26.90	26.60	26.30	25.80
CDR per 1,000	7.40	7.40	7.30	7.20	7.10	7.00	6.90	6.80	6.70	6.50	6.40
Annual Births and Deaths (Millions)											
Births	2.87	2.92	2.98	3.05	3.12	3.19	3.24	3.28	3.31	3.34	3.34
Deaths	0.79	0.80	0.81	0.81	0.82	0.82	0.83	0.83	0.83	0.83	0.83
Growth rate (%)	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9
Population											
Total (Millions)	106.16	108.27	110.43	112.64	114.90	117.20	119.52	121.86	124.21	126.55	128.87
Male	55.32	56.38	57.47	58.59	59.74	60.90	62.07	63.26	64.45	65.63	66.80
Female	50.85	51.89	52.96	54.05	55.17	56.30	57.45	58.60	59.76	60.92	62.06
Per cent 0–4	11.06	11.33	11.65	12.01	12.4	12.44	12.47	12.48	12.45	12.4	12.29
Per cent 5–14	22.37	21.59	20.84	20.16	19.55	19.43	19.41	19.49	19.64	19.85	20.1
Per cent 15–24	22.07	22.12	22.05	21.86	21.55	21.13	20.61	20.02	19.4	18.75	18.13
Per cent 15–49	52	52.34	52.61	52.77	52.83	52.78	52.63	52.42	52.17	51.89	51.64
Per cent 15–64	61.84	62.31	62.72	63.02	63.19	63.23	63.17	63.02	62.82	62.59	62.36
Per cent 65 and over	4.74	4.76	4.79	4.82	4.86	4.9	4.95	5.02	5.08	5.16	5.25
Per cent females 15–49	52.25	52.56	52.8	52.92	52.91	52.76	52.49	52.15	51.76	51.36	50.99
Sex ratio	108.8	108.66	108.53	108.4	108.28	108.16	108.05	107.94	107.84	107.73	107.64
Dependency ratio	0.62	0.6	0.59	0.59	0.58	0.58	0.58	0.59	0.59	0.6	0.6

Table A 3.3: Summary of demographic indicators: BIHAR

SCENARIO A											
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Fertility											
Calculated TFR	**3.55**	**3.5**	**3.44**	**3.38**	**3.3**	**3.19**	**3.07**	**2.93**	**2.76**	**2.6**	**2.41**
GRR	1.73	1.7	1.67	1.64	1.6	1.55	1.49	1.42	1.34	1.26	1.17
NRR	1.57	1.55	1.53	1.51	1.48	1.44	1.39	1.33	1.26	1.19	1.11
Child-woman ratio	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4
Fertility table: Custom											
Mortality											
Male LE	65.6	65.9	66.3	66.6	67	67.3	67.6	68	68.3	68.7	69.1
Female LE	66.7	67.1	67.5	67.9	68.3	68.7	69.1	69.6	70	70.4	70.8
Total LE	66.1	66.5	66.8	67.2	67.6	68	68.4	68.8	69.1	69.5	69.9
IMR	44.2	42.7	41.2	39.7	38.2	36.7	35.2	33.8	32.3	30.9	29.6
U5MR	56.8	54.6	52.5	50.4	48.2	46.1	43.9	41.8	39.6	37.8	36.1
Life table: Coale-Demeny West											
Vital Rates											
CBR per 1,000	27	27.1	27.1	27.2	27	26.5	25.9	24.9	23.7	22.4	20.9
CDR per 1,000	7.4	7.4	7.3	7.2	7.1	7	6.9	6.7	6.6	6.5	6.4
GR per cent	1.9	1.9	2	2	2	1.9	1.9	1.8	1.7	1.6	1.4
Annual Births and Deaths											
Births (Millions)	2.87	2.93	3	3.06	3.1	3.11	3.09	3.04	2.94	2.82	2.67
Deaths (Millions)	0.79	0.8	0.81	0.81	0.82	0.82	0.82	0.82	0.82	0.82	0.81
Population (Millions)											
Total (Millions)	106.18	108.32	110.51	112.76	115.04	117.33	119.6	121.82	123.94	125.94	127.8
Male (Millions)	55.33	56.41	57.51	58.65	59.81	60.97	62.11	63.23	64.31	65.32	66.25
Female (Millions)	50.85	51.91	52.99	54.11	55.23	56.37	57.49	58.58	59.63	60.62	61.54
Per cent 0–4	11.06	11.35	11.68	12.04	12.43	12.41	12.32	12.15	11.86	11.48	10.99
Per cent 5–14	22.37	21.59	20.84	20.15	19.55	19.44	19.46	19.58	19.8	20.08	20.37
Per cent 15–24	22.07	22.12	22.05	21.86	21.55	21.14	20.64	20.09	19.52	18.95	18.41
Per cent 15–49	52	52.33	52.59	52.75	52.82	52.79	52.71	52.6	52.49	52.42	52.42
Per cent 15–64	61.83	62.3	62.7	62.99	63.17	63.25	63.26	63.24	63.22	63.23	63.31
Per cent 65 and over	4.74	4.76	4.79	4.82	4.86	4.9	4.96	5.03	5.12	5.21	5.33
Per cent females 15–49	52.25	52.55	52.78	52.9	52.89	52.77	52.57	52.33	52.09	51.89	51.77
Sex ratio	108.8	108.66	108.53	108.4	108.28	108.16	108.05	107.94	107.84	107.74	107.65
Dependency ratio	0.62	0.61	0.59	0.59	0.58	0.58	0.58	0.58	0.58	0.58	0.58

Table A 3.3: Summary of demographic indicators: BIHAR (contd.)

SCENARIO B											
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Fertility											
Calculated TFR	3.6	3.5	3.4	3.4	3.3	3.2	3	2.9	2.7	2.5	2.3
GRR	1.73	1.69	1.66	1.63	1.59	1.53	1.47	1.39	1.3	1.22	1.12
NRR	1.57	1.54	1.52	1.5	1.46	1.42	1.37	1.3	1.22	1.15	1.06
Mortality											
Male LE	65.6	65.9	66.3	66.6	67	67.3	67.6	68	68.3	68.7	69.1
Female LE	66.7	67.1	67.5	67.9	68.3	68.7	69.1	69.6	70	70.4	70.8
Total LE	66.1	66.5	66.8	67.2	67.6	68	68.4	68.8	69.1	69.5	69.9
IMR	44.2	42.7	41.2	39.7	38.2	36.7	35.2	33.8	32.3	30.9	29.6
U5MR	56.8	54.6	52.5	50.4	48.2	46.1	43.9	41.8	39.6	37.8	36.1
Vital Rates											
CBR per 1,000	27	27	27	27	26.7	26.2	25.5	24.4	23.1	21.7	20
CDR per 1,000	7.4	7.4	7.3	7.2	7.1	7	6.9	6.7	6.6	6.5	6.3
Annual Births and Deaths (Millions)											
Births	2.9	2.9	3	3	3.1	3.1	3	3	2.9	2.7	2.5
Deaths	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Growth rate (%)	1.9	1.9	2	2	1.9	1.9	1.8	1.7	1.6	1.5	1.3
Population											
Total (Millions)	106.2	108.3	110.5	112.7	115	117.2	119.5	121.6	123.6	125.6	127.3
Male	55.3	56.4	57.5	58.6	59.8	60.9	62	63.1	64.2	65.1	66
Female	50.9	51.9	53	54.1	55.2	56.3	57.4	58.5	59.5	60.4	61.3
Per cent 0–4	11.06	11.34	11.66	12.02	12.38	12.33	12.21	12.01	11.68	11.26	10.72
Per cent 5–14	22.37	21.59	20.84	20.16	19.56	19.46	19.48	19.6	19.82	20.09	20.38
Per cent 15–24	22.07	22.12	22.05	21.86	21.56	21.15	20.67	20.13	19.56	19	18.48
Per cent 15–49	52	52.33	52.6	52.77	52.85	52.84	52.78	52.69	52.62	52.58	52.63
Per cent 15–64	61.83	62.31	62.71	63.01	63.2	63.3	63.34	63.35	63.37	63.42	63.56
Per cent 65 and over	4.74	4.76	4.79	4.82	4.86	4.91	4.97	5.04	5.13	5.23	5.35
Per cent females 15–49	52.25	52.56	52.79	52.91	52.92	52.82	52.64	52.42	52.22	52.05	51.97
Sex ratio	108.8	108.66	108.53	108.4	108.28	108.16	108.05	107.95	107.85	107.75	107.66
Dependency ratio	0.62	0.6	0.59	0.59	0.58	0.58	0.58	0.58	0.58	0.58	0.57

Table A 3.4: Summary of demographic indicators: RAJASTHAN

SCENARIO A											
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Fertility											
Calculated TFR	3.07	3.01	2.93	2.84	2.75	2.66	2.57	2.48	2.39	2.3	2.21
GRR	3.07	3.01	2.93	2.84	2.75	2.66	2.57	2.48	2.39	2.3	2.21
NRR	1.45	1.42	1.38	1.34	1.3	1.25	1.21	1.17	1.13	1.09	1.04
Child-woman ratio	0.43	0.43	0.43	0.43	0.44	0.43	0.42	0.41	0.4	0.39	0.37
Mortality											
Male LE	65.1	65.4	65.7	65.9	66.2	66.5	66.8	67.1	67.4	67.7	68
Female LE	68.8	69.3	69.7	70.2	70.6	71	71.4	71.9	72.3	72.7	73.2
Total LE	66.9	67.2	67.6	68	68.3	68.7	69	69.4	69.8	70.1	70.5
IMR	41.5	40.1	38.6	37.2	36	34.7	33.5	32.3	31	29.8	28.5
U5MR	52.3	50.2	48.1	46.1	44.5	42.8	41.2	39.6	37.9	36.3	34.7
Vital Rates											
CBR per 1,000	25.1	24.9	24.6	24	23.4	22.8	22.1	21.4	20.6	19.7	18.8
CDR per 1,000	7.4	7.3	7.2	7.1	7	6.8	6.7	6.6	6.5	6.4	6.3
GR per cent	1.71	1.7	1.67	1.63	1.58	1.53	1.48	1.41	1.35	1.27	1.19
Births (Millions)	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.7	1.6	1.6	1.5
Deaths (Millions)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Population (Millions)											
Total (Millions)	69.8	71.1	72.3	73.6	74.9	76.1	77.4	78.7	79.9	81.1	82.3
Male (Millions)	36.3	36.9	37.6	38.2	38.9	39.5	40.2	40.8	41.5	42.1	42.7
Female (Millions)	33.6	34.2	34.8	35.4	36	36.6	37.2	37.8	38.4	39	39.6
Per cent 0–4	10.89	11	11.12	11.22	11.3	11.11	10.87	10.6	10.31	9.99	9.65
Per cent 5–14	21.39	20.85	20.35	19.89	19.49	19.41	19.39	19.42	19.47	19.51	19.5
Per cent 15–24	21.3	21.2	21	20.8	20.5	20.2	19.8	19.3	18.9	18.5	18.1
Per cent 15–49	53.18	53.43	53.64	53.8	53.9	53.96	53.98	53.98	53.98	53.99	54.06
Per cent 15–64	62.78	63.22	63.61	63.95	64.24	64.48	64.67	64.84	65	65.17	65.4
Per cent 65 and over	4.94	4.93	4.93	4.94	4.96	5	5.06	5.14	5.23	5.33	5.46
Per cent females 15–49	53.1	53.36	53.57	53.72	53.79	53.79	53.74	53.65	53.56	53.48	53.47
Sex ratio	107.97	108	108.02	108.02	108.03	108.02	108	107.98	107.95	107.91	107.86
Dependency ratio	0.59	0.58	0.57	0.56	0.56	0.55	0.55	0.54	0.54	0.53	0.53

Table A 3.4: Summary demographic indicators: RAJASTHAN (contd.)

SCENARIO B											
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Fertility											
Calculated TFR	3.07	3	2.92	2.82	2.72	2.62	2.52	2.44	2.34	2.25	2.15
GRR	1.45	1.42	1.38	1.33	1.28	1.24	1.19	1.15	1.11	1.06	1.01
NRR	1.34	1.32	1.29	1.25	1.21	1.17	1.13	1.1	1.05	1.01	0.97
Child-woman ratio	0.43	0.43	0.43	0.43	0.44	0.43	0.42	0.41	0.39	0.38	0.37
Fertility table: Custom											
Mortality											
Male LE	65.1	65.4	65.7	65.9	66.2	66.5	66.8	67.1	67.4	67.7	68
Female LE	68.8	69.3	69.7	70.2	70.6	71	71.4	71.9	72.3	72.7	73.2
Total LE	66.9	67.2	67.6	68	68.3	68.7	69	69.4	69.8	70.1	70.5
IMR	41.5	40.1	38.6	37.2	36	34.7	33.5	32.3	31	29.8	28.5
U5MR	52.3	50.2	48.1	46.1	44.5	42.8	41.2	39.6	37.9	36.3	34.7
Vital Rates											
CBR per 1,000	25.1	24.9	24.5	23.9	23.2	22.5	21.7	21.1	20.2	19.3	18.3
CDR per 1,000	7.4	7.3	7.2	7.1	6.9	6.8	6.7	6.6	6.5	6.4	6.3
GR per cent	1.71	1.69	1.66	1.62	1.56	1.5	1.44	1.38	1.31	1.23	1.14
Annual Births and Deaths											
Births (Millions)	1.8	1.8	1.8	1.8	1.7	1.7	1.7	1.6	1.6	1.6	1.5
Deaths (Millions)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Population (Millions)											
Total (Millions)	69.9	71.1	72.4	73.6	74.8	76	77.2	78.3	79.4	80.4	81.4
Male (Millions)	36.3	36.9	37.6	38.2	38.8	39.5	40.1	40.7	41.2	41.7	42.2
Female (Millions)	33.6	34.2	34.8	35.4	36	36.5	37.1	37.6	38.2	38.7	39.2
Per cent 0–4	10.89	11	11.11	11.2	11.26	11.04	10.77	10.48	10.17	9.83	9.47
Per cent 5–14	21.39	20.85	20.35	19.9	19.5	19.43	19.41	19.44	19.48	19.5	19.48
Per cent 15–24	21.29	21.19	21.03	20.8	20.51	20.16	19.78	19.37	18.95	18.54	18.19
Per cent 15–49	53.18	53.44	53.65	53.81	53.93	54.01	54.05	54.06	54.08	54.11	54.21
Per cent 15–64	62.78	63.22	63.62	63.97	64.27	64.53	64.75	64.93	65.12	65.32	65.58
Per cent 65 and over	4.94	4.93	4.93	4.94	4.96	5.01	5.07	5.14	5.24	5.34	5.47
Per cent females 15–49	53.1	53.36	53.58	53.73	53.82	53.83	53.8	53.73	53.65	53.6	53.62
Sex ratio	107.97	108	108.02	108.02	108.02	108.02	108	107.97	107.94	107.9	107.85
Dependency ratio	0.59	0.58	0.57	0.56	0.56	0.55	0.54	0.54	0.54	0.53	0.52

Table A 3.5: Summary of demographic indicators: ODISHA

SCENARIO A											
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Fertility											
Calculated TFR	3.07	3	2.92	2.82	2.72	2.62	2.52	2.44	2.34	2.25	2.15
GRR	1.45	1.42	1.38	1.33	1.28	1.24	1.19	1.15	1.11	1.06	1.01
NRR	1.34	1.32	1.29	1.25	1.21	1.17	1.13	1.1	1.05	1.01	0.97
Child-woman ratio	0.43	0.43	0.43	0.43	0.44	0.43	0.42	0.41	0.39	0.38	0.37
Fertility table: Custom											
Mortality											
Male LE	65.1	65.4	65.7	65.9	66.2	66.5	66.8	67.1	67.4	67.7	68
Female LE	68.8	69.3	69.7	70.2	70.6	71	71.4	71.9	72.3	72.7	73.2
Total LE	66.9	67.2	67.6	68	68.3	68.7	69	69.4	69.8	70.1	70.5
IMR	41.5	40.1	38.6	37.2	36	34.7	33.5	32.3	31	29.8	28.5
U5MR	52.3	50.2	48.1	46.1	44.5	42.8	41.2	39.6	37.9	36.3	34.7
Life table: Coale-Demeny West											
Vital Rates											
CBR per 1,000	25.1	24.9	24.5	23.9	23.2	22.5	21.7	21.1	20.2	19.3	18.3
CDR per 1,000	7.4	7.3	7.2	7.1	6.9	6.8	6.7	6.6	6.5	6.4	6.3
GR per cent	1.71	1.69	1.66	1.62	1.56	1.5	1.44	1.38	1.31	1.23	1.14
Annual Births and Deaths											
Births (Millions)	1.8	1.8	1.8	1.8	1.7	1.7	1.7	1.6	1.6	1.6	1.5
Deaths (Millions)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Population (Millions)											
Total (Millions)	69.9	71.1	72.4	73.6	74.8	76	77.2	78.3	79.4	80.4	81.4
Male (Millions)	36.3	36.9	37.6	38.2	38.8	39.5	40.1	40.7	41.2	41.7	42.2
Female (Millions)	33.6	34.2	34.8	35.4	36	36.5	37.1	37.6	38.2	38.7	39.2
Per cent 0–4	10.89	11	11.11	11.2	11.26	11.04	10.77	10.48	10.17	9.83	9.47
Per cent 5–14	21.39	20.85	20.35	19.9	19.5	19.43	19.41	19.44	19.48	19.5	19.48
Per cent 15–24	21.29	21.19	21.03	20.8	20.51	20.16	19.78	19.37	18.95	18.54	18.19
Per cent 15–49	53.18	53.44	53.65	53.81	53.93	54.01	54.05	54.06	54.08	54.11	54.21
Per cent 15–64	62.78	63.22	63.62	63.97	64.27	64.53	64.75	64.93	65.12	65.32	65.58
Per cent 65 and over	4.94	4.93	4.93	4.94	4.96	5.01	5.07	5.14	5.24	5.34	5.47
Per cent females 15–49	53.1	53.36	53.58	53.73	53.82	53.83	53.8	53.73	53.65	53.6	53.62
Sex ratio	107.97	108	108.02	108.02	108.02	108.02	108	107.97	107.94	107.9	107.85
Dependency ratio	0.59	0.58	0.57	0.56	0.56	0.55	0.54	0.54	0.54	0.53	0.52

Table A 3.5: Summary of demographic indicators: ODISHA (contd.)

SCENARIO B	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Fertility											
Calculated TFR	**3.07**	**3.01**	**2.93**	**2.84**	**2.75**	**2.66**	**2.57**	**2.48**	**2.39**	**2.3**	**2.21**
GRR	3.07	3.01	2.93	2.84	2.75	2.66	2.57	2.48	2.39	2.3	2.21
NRR	1.45	1.42	1.38	1.34	1.3	1.25	1.21	1.17	1.13	1.09	1.04
Child-woman ratio	0.43	0.43	0.43	0.43	0.44	0.43	0.42	0.41	0.4	0.39	0.37
Mortality											
Male LE	65.1	65.4	65.7	65.9	66.2	66.5	66.8	67.1	67.4	67.7	68
Female LE	68.8	69.3	69.7	70.2	70.6	71	71.4	71.9	72.3	72.7	73.2
Total LE	66.9	67.2	67.6	68	68.3	68.7	69	69.4	69.8	70.1	70.5
IMR	41.5	40.1	38.6	37.2	36	34.7	33.5	32.3	31	29.8	28.5
U5MR	52.3	50.2	48.1	46.1	44.5	42.8	41.2	39.6	37.9	36.3	34.7
Vital Rates											
CBR per 1,000	25.1	24.9	24.6	24	23.4	22.8	22.1	21.4	20.6	19.7	18.8
CDR per 1,000	7.4	7.3	7.2	7.1	7	6.8	6.7	6.6	6.5	6.4	6.3
GR per cent	1.71	1.7	1.67	1.63	1.58	1.53	1.48	1.41	1.35	1.27	1.19
Annual Births and Deaths											
Births (Millions)	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.7	1.6	1.6	1.5
Deaths (Millions)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Population (Millions)											
Total (Millions)	69.8	71.1	72.3	73.6	74.9	76.1	77.4	78.7	79.9	81.1	82.3
Male (Millions)	36.3	36.9	37.6	38.2	38.9	39.5	40.2	40.8	41.5	42.1	42.7
Female (Millions)	33.6	34.2	34.8	35.4	36	36.6	37.2	37.8	38.4	39	39.6
Per cent 0–4	10.89	11	11.12	11.22	11.3	11.11	10.87	10.6	10.31	9.99	9.65
Per cent 5–14	21.39	20.85	20.35	19.89	19.49	19.41	19.39	19.42	19.47	19.51	19.5
Per cent 15–24	21.3	21.2	21	20.8	20.5	20.2	19.8	19.3	18.9	18.5	18.1
Per cent 15–49	53.18	53.43	53.64	53.8	53.9	53.96	53.98	53.98	53.98	53.99	54.06
Per cent 15–64	62.78	63.22	63.61	63.95	64.24	64.48	64.67	64.84	65	65.17	65.4
Per cent 65 and over	4.94	4.93	4.93	4.94	4.96	5	5.06	5.14	5.23	5.33	5.46
Per cent females 15–49	53.1	53.36	53.57	53.72	53.79	53.79	53.74	53.65	53.56	53.48	53.47
Sex ratio	107.97	108	108.02	108.02	108.03	108.02	108	107.98	107.95	107.91	107.86
Dependency ratio	0.59	0.58	0.57	0.56	0.56	0.55	0.55	0.54	0.54	0.53	0.53

Table A 3.6: Summary of demographic indicators: JHARKHAND

SCENARIO A											
Fertility	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Calculated TFR	2.87	2.83	2.77	2.7	2.62	2.53	2.46	2.39	2.31	2.22	2.15
GRR	1.4	1.38	1.35	1.32	1.28	1.24	1.2	1.16	1.13	1.08	1.05
NRR	1.28	1.26	1.24	1.21	1.18	1.15	1.12	1.09	1.06	1.02	0.99
Child-woman ratio	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Mortality											
Male LE	65.6	65.9	66.2	66.6	66.9	67.3	67.6	68	68.3	68.7	69.1
Female LE	66.7	67.1	67.4	67.9	68.3	68.8	69.2	69.6	70	70.4	70.8
Total LE	66.1	66.5	66.8	67.2	67.6	68	68.4	68.8	69.2	69.6	69.9
IMR	44.3	42.7	41.3	39.7	38.4	36.6	35.2	33.6	32.2	30.8	29.6
U5MR	57	54.7	52.7	50.4	48.4	45.9	43.9	41.6	39.6	37.7	36.1
Vital Rates											
CBR per 1,000	24.1	24.1	23.9	23.5	23.1	22.5	22	21.4	20.8	19.9	19.1
CDR per 1,000	7.2	7.2	7.2	7.1	7	6.9	6.9	6.8	6.7	6.7	6.6
GR per cent	1.64	1.64	1.62	1.6	1.56	1.51	1.46	1.41	1.35	1.28	1.21
Annual Births and Deaths											
Births (Millions)	0.81	0.82	0.83	0.83	0.83	0.82	0.81	0.8	0.79	0.77	0.75
Deaths (Millions)	0.24	0.25	0.25	0.25	0.25	0.25	0.25	0.26	0.26	0.26	0.26
Population (Millions)											
Total (Millions)	33.55	34.13	34.71	35.29	35.87	36.44	37	37.54	38.08	38.59	39.08
Male (Millions)	17.21	17.5	17.8	18.09	18.38	18.66	18.94	19.22	19.49	19.74	19.99
Female (Millions)	16.34	16.63	16.91	17.2	17.49	17.77	18.05	18.32	18.59	18.85	19.09
Per cent 0–4	10.07	10.28	10.51	10.74	10.96	10.84	10.68	10.48	10.25	9.98	9.69
Per cent 5–14	20.56	19.86	19.2	18.62	18.13	18.04	18.06	18.15	18.29	18.45	18.57
Per cent 15–24	21.75	21.63	21.42	21.11	20.72	20.25	19.73	19.17	18.59	18.01	17.49
Per cent 15–49	54.22	54.42	54.57	54.65	54.65	54.58	54.45	54.29	54.11	53.94	53.83
Per cent 15–64	64.83	65.22	65.56	65.81	65.98	66.06	66.08	66.05	66	65.95	65.96
Per cent 65 and over	4.54	4.63	4.73	4.83	4.94	5.06	5.18	5.32	5.46	5.62	5.78
Per cent females 15–49	54.25	54.47	54.62	54.7	54.68	54.58	54.4	54.18	53.94	53.72	53.56
Sex ratio	105.36	105.29	105.22	105.15	105.09	105.02	104.95	104.89	104.82	104.76	104.69
Dependency ratio	0.54	0.53	0.53	0.52	0.52	0.51	0.51	0.51	0.52	0.52	0.52

Table A 3.6: Summary of demographic indicators: JHARKHAND (contd.)

SCENARIO B											
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Fertility											
Calculated TFR	2.87	2.83	2.77	2.69	2.61	2.53	2.45	2.37	2.29	2.2	2.12
GRR	1.4	1.38	1.35	1.31	1.27	1.23	1.19	1.15	1.11	1.08	1.04
NRR	1.28	1.26	1.24	1.21	1.18	1.15	1.11	1.08	1.05	1.01	0.98
Mortality											
Male LE	65.6	65.9	66.2	66.6	66.9	67.3	67.6	68	68.3	68.7	69.1
Female LE	66.7	67.1	67.4	67.9	68.3	68.8	69.2	69.6	70	70.4	70.8
Total LE	66.1	66.5	66.8	67.2	67.6	68	68.4	68.8	69.2	69.6	69.9
IMR	44.3	42.7	41.3	39.7	38.4	36.6	35.2	33.6	32.2	30.8	29.6
U5MR	57	54.7	52.7	50.4	48.4	45.9	43.9	41.6	39.6	37.7	36.1
Vital Rates											
CBR per 1,000	24.1	24	23.8	23.5	23	22.5	21.9	21.3	20.5	19.8	18.9
CDR per 1,000	7.2	7.2	7.2	7.1	7	6.9	6.9	6.8	6.7	6.7	6.6
Annual Births and Deaths (Millions)											
Births	0.81	0.82	0.83	0.83	0.83	0.82	0.81	0.8	0.78	0.76	0.74
Deaths	0.24	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.26	0.26	0.26
Growth rate (%)	1.64	1.64	1.62	1.59	1.55	1.51	1.46	1.4	1.33	1.26	1.19
Population											
Total (Millions)	33.6	34.1	34.7	35.3	35.9	36.4	37	37.5	38.1	38.6	39
Male	17.2	17.5	17.8	18.1	18.4	18.7	18.9	19.2	19.5	19.7	20
Female	16.3	16.6	16.9	17.2	17.5	17.8	18	18.3	18.6	18.8	19.1
Per cent 0–4	10.07	10.28	10.51	10.73	10.94	10.82	10.65	10.44	10.2	9.92	9.62
Per cent 5–14	20.56	19.86	19.2	18.62	18.13	18.04	18.06	18.16	18.29	18.44	18.57
Per cent 15–24	21.75	21.63	21.42	21.11	20.72	20.26	19.74	19.18	18.6	18.03	17.5
Per cent 15–49	54.22	54.42	54.58	54.66	54.66	54.59	54.47	54.31	54.14	53.99	53.89
Per cent 15–64	64.83	65.22	65.56	65.82	65.99	66.08	66.1	66.08	66.04	66.01	66.02
Per cent 65 and over	4.54	4.63	4.73	4.83	4.94	5.06	5.19	5.32	5.47	5.62	5.79
Per cent females 15–49	54.25	54.47	54.62	54.7	54.69	54.59	54.42	54.21	53.98	53.77	53.61
Sex ratio	105.4	105.3	105.2	105.2	105.1	105	105	104.9	104.8	104.8	104.7
Dependency ratio	0.54	0.53	0.53	0.52	0.52	0.51	0.51	0.51	0.51	0.51	0.51

Table A 3.7: Summary of demographic indicators: CHHATTISGARH

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
SCENARIO A											
Fertility											
Calculated TFR	**2.65**	**2.59**	**2.53**	**2.46**	**2.38**	**2.31**	**2.23**	**2.17**	**2.1**	**2.02**	**1.95**
GRR	1.29	1.26	1.24	1.2	1.16	1.12	1.09	1.06	1.02	0.99	0.95
NRR	1.2	1.18	1.16	1.13	1.09	1.06	1.03	1.01	0.97	0.94	0.91
Child-woman ratio	0.39	0.39	0.38	0.38	0.37	0.37	0.36	0.35	0.34	0.33	0.32
Mortality											
Male LE	61.4	61.6	61.9	62.1	62.4	62.6	62.9	63.1	63.4	63.7	63.9
Female LE	68.7	69.1	69.5	69.9	70.2	70.6	70.9	71.3	71.6	72	72.4
Total LE	65	65.4	65.7	66	66.3	66.6	66.9	67.2	67.5	67.8	68.2
IMR	50	48.7	47.4	46.2	45	43.8	42.7	41.6	40.5	39.4	38.3
U5MR	65.3	63.4	61.4	59.4	57.6	56	54.5	52.9	51.3	49.7	48.2
Vital Rates											
CBR per 1,000	22.2	22	21.7	21.2	20.7	20.2	19.6	19.2	18.5	17.9	17.2
CDR per 1,000	8.3	8.2	8.2	8.1	8.1	8	7.9	7.9	7.8	7.8	7.7
GR per cent	1.33	1.31	1.29	1.25	1.21	1.16	1.11	1.07	1.01	0.95	0.88
Annual Births and Deaths											
Births (Millions)	0.58	0.58	0.58	0.57	0.57	0.56	0.55	0.54	0.53	0.52	0.5
Deaths (Millions)	0.21	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.23
Population (Millions)											
Total (Millions)	25.91	26.27	26.63	26.98	27.33	27.67	27.99	28.31	28.62	28.91	29.19
Male (Millions)	13.01	13.18	13.35	13.52	13.68	13.84	13.99	14.14	14.28	14.42	14.54
Female (Millions)	12.9	13.09	13.28	13.47	13.65	13.83	14	14.17	14.34	14.49	14.64
Per cent 0–4	10.31	10.22	10.14	10.05	9.95	9.79	9.59	9.38	9.15	8.91	8.64
Per cent 5–14	20.5	20.14	19.8	19.47	19.19	18.97	18.79	18.64	18.5	18.35	18.19
Per cent 15–24	20.11	20.01	19.86	19.67	19.46	19.23	18.99	18.73	18.48	18.23	17.99
Per cent 15–49	53.2	53.37	53.5	53.61	53.7	53.76	53.81	53.85	53.89	53.96	54.06
Per cent 15–64	63.94	64.34	64.71	65.06	65.38	65.68	65.95	66.21	66.46	66.72	67
Per cent 65 and over	5.24	5.3	5.35	5.41	5.49	5.57	5.66	5.77	5.88	6.02	6.17
Per cent females 15–49	52.79	52.96	53.09	53.18	53.25	53.28	53.29	53.29	53.28	53.3	53.35
Sex ratio	100.81	100.66	100.52	100.38	100.23	100.08	99.93	99.78	99.63	99.47	99.3
Dependency ratio	0.56	0.55	0.55	0.54	0.53	0.52	0.52	0.51	0.5	0.5	0.49

Table A 3.7: Summary of demographic indicators: CHHATTISGARH (contd.)

SCENARIO B	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Fertility											
Calculated TFR	2.65	2.59	2.52	2.44	2.36	2.27	2.19	2.13	2.05	1.96	1.88
GRR	1.29	1.26	1.23	1.19	1.15	1.11	1.07	1.04	1	0.96	0.92
NRR	1.2	1.18	1.15	1.12	1.08	1.05	1.01	0.98	0.95	0.91	0.88
Mortality											
Male LE	61.4	61.6	61.9	62.1	62.4	62.6	62.9	63.1	63.4	63.7	63.9
Female LE	68.7	69.1	69.5	69.9	70.2	70.6	70.9	71.3	71.6	72	72.4
Total LE	65	65.4	65.7	66	66.3	66.6	66.9	67.2	67.5	67.8	68.2
IMR	50	48.7	47.4	46.2	45	43.8	42.7	41.6	40.5	39.4	38.3
U5MR	65.3	63.4	61.4	59.4	57.6	56	54.5	52.9	51.3	49.7	48.2
Life table: Coale-Demeny West											
Vital Rates											
CBR per 1,000	22.2	21.9	21.6	21.1	20.5	20	19.3	18.8	18.1	17.4	16.6
CDR per 1,000	8.3	8.2	8.2	8.1	8	8	7.9	7.9	7.8	7.8	7.7
Annual Births and Deaths (Millions)											
Births	0.58	0.58	0.57	0.57	0.56	0.55	0.54	0.53	0.52	0.5	0.48
Deaths	0.21	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22
Growth rate (%)	1.33	1.31	1.28	1.24	1.19	1.14	1.08	1.03	0.97	0.9	0.83
Population											
Total (Millions)	25.9	26.3	26.6	27	27.3	27.6	28	28.3	28.6	28.8	29.1
Male	13	13.2	13.3	13.5	13.7	13.8	14	14.1	14.3	14.4	14.5
Female	12.9	13.1	13.3	13.5	13.6	13.8	14	14.2	14.3	14.5	14.6
Per cent 0–4	10.31	10.22	10.13	10.03	9.91	9.72	9.5	9.27	9.01	8.74	8.45
Per cent 5–14	20.5	20.14	19.8	19.48	19.2	18.98	18.81	18.65	18.5	18.35	18.17
Per cent 15–24	20.11	20.01	19.86	19.68	19.47	19.25	19.01	18.76	18.51	18.27	18.04
Per cent 15–49	53.2	53.37	53.51	53.63	53.73	53.8	53.87	53.92	53.99	54.09	54.21
Per cent 15-–64	63.94	64.34	64.72	65.08	65.41	65.72	66.02	66.3	66.59	66.88	67.2
Per cent 65 and over	5.24	5.3	5.35	5.42	5.49	5.57	5.67	5.77	5.9	6.03	6.19
Per cent females 15–49	52.79	52.96	53.09	53.2	53.27	53.32	53.35	53.36	53.38	53.42	53.51
Sex ratio	100.81	100.66	100.52	100.38	100.23	100.08	99.93	99.78	99.62	99.46	99.3
Dependency ratio	0.56	0.55	0.55	0.54	0.53	0.52	0.51	0.51	0.5	0.5	0.49

Table A 3.8: Summary of demographic indicators: UTTARAKHAND

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
SCENARIO A											
Fertility											
Calculated TFR	2.28	2.25	2.19	2.12	2.06	1.98	1.91	1.84	1.77	1.69	1.62
GRR	1.07	1.06	1.03	1	0.97	0.93	0.9	0.87	0.83	0.8	0.76
NRR	0.96	0.95	0.93	0.91	0.88	0.85	0.82	0.8	0.77	0.74	0.71
Child-woman ratio	0.39	0.37	0.36	0.35	0.34	0.33	0.32	0.3	0.29	0.28	0.26
Fertility table: Custom											
Mortality											
Male LE	62.5	63	63.4	63.9	64.4	65	65.5	65.9	66.3	66.8	67.3
Female LE	64.5	64.9	65.4	65.8	66.2	66.6	66.9	67.3	67.9	68.3	68.7
Total LE	63.5	63.9	64.4	64.8	65.3	65.7	66.2	66.6	67.1	67.5	68
IMR	55.5	53.5	51.6	49.7	47.7	45.8	44	42.2	40.4	38.6	36.8
U5MR	73.9	70.8	67.8	64.9	61.9	59	56.3	53.8	51.2	48.7	46.1
Life table: Coale-Demeny West											
Vital Rates											
CBR per 1,000	20.5	20.2	19.7	19.1	18.4	17.5	16.8	16	15.2	14.3	13.6
CDR per 1,000	9.5	9.3	9.1	8.9	8.7	8.5	8.4	8.2	8.1	8	7.9
GR per cent	1.07	1.07	1.04	0.99	0.94	0.87	0.67	0.61	0.68	0.61	0.54
Annual Births and Deaths											
Births (Millions)	0.21	0.21	0.21	0.2	0.2	0.19	0.18	0.17	0.17	0.16	0.15
Deaths (Millions)	0.1	0.1	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Population (Millions)											
Total (Millions)	10.2	10.31	10.42	10.53	10.63	10.73	10.82	10.91	10.98	11.05	11.12
Male (Millions)	5.2	5.26	5.32	5.38	5.43	5.48	5.53	5.58	5.62	5.66	5.7
Female (Millions)	5	5.05	5.1	5.15	5.2	5.25	5.29	5.32	5.36	5.39	5.42
Per cent 0–4	10.2	9.94	9.67	9.38	9.04	8.8	8.5	8.18	7.85	7.49	7.15
Per cent 5–14	19.66	19.53	19.44	19.35	19.27	19.04	18.81	18.56	18.28	17.97	17.59
Per cent 15–24	20.3	19.95	19.57	19.19	18.85	18.56	18.31	18.11	17.96	17.85	17.81
Per cent 15–49	53.89	54.1	54.28	54.47	54.68	54.93	55.21	55.51	55.85	56.2	56.6
Per cent 15–64	64.39	64.77	65.13	65.48	65.86	66.28	66.74	67.22	67.73	68.27	68.86
Per cent 65 and over	5.75	5.75	5.76	5.79	5.83	5.88	5.95	6.04	6.14	6.26	6.4
Per cent females 15–49	53.97	54.13	54.26	54.39	54.55	54.73	54.95	55.19	55.45	55.73	56.06
Sex ratio	103.95	104.08	104.2	104.32	104.44	104.57	104.69	104.81	104.91	105.02	105.12
Dependency ratio	0.55	0.54	0.54	0.53	0.52	0.51	0.5	0.49	0.48	0.46	0.45

Table A 3.8: Summary demographic indicators: UTTARAKHAND (contd.)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
SCENARIO B											
Fertility											
Calculated TFR	2.28	2.25	2.2	2.14	2.08	2	1.94	1.88	1.82	1.75	1.68
GRR	1.07	1.06	1.04	1.01	0.98	0.95	0.92	0.89	0.86	0.82	0.79
NRR	0.96	0.95	0.94	0.91	0.89	0.86	0.84	0.82	0.79	0.76	0.74
Mortality											
Male LE	62.5	63	63.4	63.9	64.4	65	65.5	65.9	66.3	66.8	67.3
Female LE	64.5	64.9	65.4	65.8	66.2	66.6	66.9	67.3	67.9	68.3	68.7
Total LE	63.5	63.9	64.4	64.8	65.3	65.7	66.2	66.6	67.1	67.5	68
IMR	55.5	53.5	51.6	49.7	47.7	45.8	44	42.2	40.4	38.6	36.8
U5MR	73.9	70.8	67.8	64.9	61.9	59	56.3	53.8	51.2	48.7	46.1
Life table: Coale-Demeny West											
Vital Rates											
CBR per 1,000	20.5	20.3	19.8	19.2	18.6	17.8	17.1	16.3	15.6	14.8	14.1
CDR per 1,000	9.5	9.3	9.1	8.9	8.7	8.5	8.4	8.2	8.1	8	7.9
Annual Births and Deaths (Millions)											
Births	0.21	0.21	0.21	0.2	0.2	0.19	0.18	0.18	0.17	0.16	0.16
Deaths	0.1	0.1	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Growth rate (%)	1.07	1.07	1.05	1	0.96	0.89	0.7	0.64	0.72	0.65	0.59
Population											
Total (Millions)	10.2	10.31	10.42	10.53	10.64	10.74	10.83	10.92	11	11.08	11.15
Male	5.2	5.26	5.32	5.38	5.43	5.49	5.54	5.59	5.63	5.67	5.71
Female	5	5.05	5.11	5.16	5.2	5.25	5.29	5.33	5.37	5.4	5.43
Per cent 0–4	10.2	9.95	9.69	9.4	9.08	8.86	8.59	8.29	7.98	7.65	7.33
Per cent 5–14	19.66	19.53	19.44	19.35	19.26	19.02	18.79	18.55	18.27	17.98	17.62
Per cent 15–24	20.3	19.95	19.57	19.19	18.84	18.55	18.29	18.09	17.93	17.81	17.77
Per cent 15–49	53.89	54.09	54.27	54.45	54.65	54.89	55.15	55.44	55.75	56.08	56.45
Per cent 15–64	64.39	64.77	65.12	65.47	65.83	66.24	66.67	67.13	67.61	68.12	68.67
Per cent 65 and over	5.75	5.75	5.76	5.79	5.82	5.88	5.95	6.03	6.13	6.25	6.38
Per cent females 15–49	53.97	54.13	54.26	54.38	54.52	54.69	54.89	55.12	55.36	55.62	55.91
Sex ratio	103.95	104.08	104.2	104.32	104.45	104.57	104.69	104.81	104.93	105.03	105.14
Dependency ratio	0.55	0.54	0.54	0.53	0.52	0.51	0.5	0.49	0.48	0.47	0.46

Table A 3.9: Summary demographic indicators: Assam

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
SCENARIO A											
Fertility											
Calculated TFR	**2.33**	**2.25**	**2.18**	**2.13**	**2.08**	**2.04**	**2**	**1.95**	**1.91**	**1.87**	**1.82**
GRR	1.14	1.1	1.07	1.04	1.02	0.99	0.97	0.95	0.93	0.91	0.89
NRR	1	0.97	0.95	0.92	0.91	0.89	0.88	0.86	0.84	0.83	0.81
Child-woman ratio	0.39	0.37	0.35	0.33	0.31	0.3	0.3	0.29	0.29	0.28	0.27
Fertility table: Custom											
Mortality											
Male LE	61.3	61.6	61.8	62.1	62.4	62.6	62.9	63.2	63.5	63.8	64
Female LE	63.6	64	64.3	64.7	65.1	65.4	65.8	66.1	66.4	66.8	67.1
Total LE	62.4	62.7	63	63.4	63.7	64	64.3	64.6	64.9	65.2	65.6
IMR	60	58.6	57.3	55.9	54.6	53.3	51.9	50.6	49.3	48	46.7
U5MR	81	78.9	76.7	74.6	72.5	70.4	68.4	66.4	64.4	62.4	60.4
Vital Rates											
CBR per 1,000	19.7	19.1	18.6	18.2	17.9	17.6	17.3	17	16.6	16.3	15.9
CDR per 1,000	7.7	7.7	7.6	7.6	7.6	7.6	7.5	7.5	7.5	7.5	7.6
GR per cent	1.12	1.07	1.03	0.99	0.96	0.93	0.9	0.9	0.83	0.8	0.76
Annual Births and Deaths											
Births (Millions)	0.62	0.61	0.6	0.59	0.59	0.59	0.58	0.58	0.57	0.56	0.55
Deaths (Millions)	0.24	0.24	0.25	0.25	0.25	0.25	0.25	0.26	0.26	0.26	0.26
Population (Millions)											
Total (Millions)	31.59	31.95	32.31	32.65	33	33.33	33.66	33.98	34.29	34.59	34.88
Male (Millions)	16.13	16.31	16.48	16.65	16.82	16.98	17.14	17.29	17.45	17.59	17.73
Female (Millions)	15.46	15.65	15.83	16	16.18	16.35	16.52	16.68	16.84	17	17.15
Per cent 0–4	10.5	10.02	9.54	9.05	8.56	8.39	8.24	8.11	7.98	7.85	7.71
Per cent 5–14	21.23	20.96	20.7	20.46	20.24	19.73	19.23	18.73	18.22	17.72	17.21
Per cent 15–24	20.09	20.08	20.05	20	19.91	19.79	19.64	19.47	19.29	19.11	18.94
Per cent 15–49	55.53	55.9	56.24	56.55	56.81	57.03	57.21	57.35	57.48	57.6	57.73
Per cent 15–64	64.76	65.43	66.08	66.71	67.29	67.84	68.35	68.83	69.3	69.76	70.24
Per cent 65 and over	3.51	3.59	3.69	3.79	3.9	4.03	4.18	4.33	4.49	4.66	4.84
Per cent females 15–49	55.21	55.52	55.82	56.08	56.3	56.47	56.61	56.72	56.83	56.92	57.04
Sex ratio	104.31	104.22	104.13	104.04	103.94	103.85	103.76	103.67	103.58	103.48	103.39
Dependency ratio	0.54	0.53	0.51	0.5	0.49	0.47	0.46	0.45	0.44	0.43	0.42

Table A 3.9: Summary demographic indicators: Assam (contd.)

SCENARIO B											
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Fertility											
Calculated TFR	2.33	2.25	2.19	2.13	2.09	2.05	2.01	1.97	1.93	1.88	1.84
GRR	1.14	1.1	1.07	1.04	1.02	1	0.98	0.96	0.94	0.92	0.9
NRR	1	0.97	0.95	0.93	0.91	0.9	0.88	0.87	0.85	0.84	0.82
Mortality											
Male LE	61.3	61.6	61.8	62.1	62.4	62.6	62.9	63.2	63.5	63.8	64
Female LE	63.6	64	64.3	64.7	65.1	65.4	65.8	66.1	66.4	66.8	67.1
Total LE	62.4	62.7	63	63.4	63.7	64	64.3	64.6	64.9	65.2	65.6
IMR	60	58.6	57.3	55.9	54.6	53.3	51.9	50.6	49.3	48	46.7
U5MR	81	78.9	76.7	74.6	72.5	70.4	68.4	66.4	64.4	62.4	60.4
Vital Rates											
CBR per 1,000	19.7	19.1	18.7	18.3	18	17.7	17.4	17.1	16.7	16.4	16.1
CDR per 1,000	7.7	7.7	7.6	7.6	7.6	7.6	7.5	7.5	7.5	7.5	7.6
Annual Births and Deaths (Millions)											
Births	0.62	0.61	0.6	0.6	0.59	0.59	0.59	0.58	0.57	0.57	0.56
Deaths	0.24	0.24	0.25	0.25	0.25	0.25	0.25	0.26	0.26	0.26	0.26
Growth rate (%)	1.12	1.07	1.03	0.99	0.97	0.94	0.91	0.91	0.85	0.81	0.78
Population											
Total (Millions)	31.6	32	32.3	32.7	33	33.3	33.7	34	34.3	34.6	34.9
Male	16.1	16.3	16.5	16.7	16.8	17	17.1	17.3	17.5	17.6	17.7
Female	15.5	15.6	15.8	16	16.2	16.4	16.5	16.7	16.9	17	17.2
Per cent 0–4	10.5	10.02	9.54	9.06	8.58	8.41	8.27	8.14	8.02	7.9	7.77
Per cent 5–14	21.23	20.96	20.7	20.45	20.24	19.73	19.22	18.72	18.22	17.73	17.22
Per cent 15–24	20.09	20.08	20.05	19.99	19.91	19.78	19.63	19.46	19.28	19.1	18.93
Per cent 15–49	55.53	55.9	56.24	56.55	56.81	57.02	57.19	57.33	57.45	57.56	57.68
Per cent 15–64	64.76	65.43	66.08	66.7	67.28	67.82	68.33	68.8	69.26	69.72	70.18
Per cent 65 and over	3.51	3.59	3.69	3.79	3.9	4.03	4.18	4.33	4.49	4.66	4.84
Per cent females 15–49	55.21	55.52	55.82	56.07	56.29	56.46	56.59	56.7	56.79	56.88	56.99
Sex ratio	104.31	104.22	104.13	104.04	103.94	103.85	103.76	103.67	103.58	103.49	103.39
Dependency ratio	0.54	0.53	0.51	0.5	0.49	0.47	0.46	0.45	0.44	0.43	0.42

Table A 3.10: Summary demographic indicators: ANDHRA PRADESH

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
SECNARIO A											
Fertility											
Calculated TFR	**1.8**	**1.8**	**1.8**	**1.8**	**1.8**	**1.8**	**1.8**	**1.8**	**1.8**	**1.8**	**1.8**
GRR	0.87	0.86	0.87	0.87	0.88	0.88	0.88	0.88	0.88	0.88	0.88
NRR	0.82	0.8	0.82	0.82	0.83	0.83	0.83	0.83	0.84	0.84	0.84
Child-woman ratio	0.28	0.28	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.26
Mortality											
Male LE	63.7	64	64.3	64.6	64.9	65.1	65.4	65.6	65.9	66.2	66.4
Female LE	68.5	68.9	69.3	69.8	70.1	70.5	70.9	71.3	71.6	72	72.4
Total LE	66.1	66.5	66.8	67.2	67.5	67.8	68.1	68.4	68.8	69.1	69.4
IMR	44.5	43.2	41.8	40.4	39.1	38	36.8	35.7	34.6	33.5	32.4
U5MR	57	54.9	52.8	50.7	48.7	47.1	45.7	44.2	42.7	41.2	39.8
Vital Rates											
CBR per 1,000	16.5	16.2	16.4	16.3	16.1	16	15.8	15.5	15.2	14.9	14.6
CDR per 1,000	8.5	8.5	8.4	8.4	8.4	8.4	8.3	8.3	8.3	8.3	8.3
Growth rate %	0.77	0.74	0.76	0.76	0.74	0.73	0.71	0.69	0.66	0.63	0.61
Annual Births and Deaths											
Births (Millions)	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.3
Deaths (Millions)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8
Population (Millions)											
Total (Millions)	85.3	85.9	86.6	87.3	88.0	88.7	89.3	90.0	90.6	91.2	91.8
Male (Millions)	42.8	43.1	43.4	43.7	44.1	44.4	44.7	45.0	45.3	45.6	45.8
Female (Millions)	42.5	42.8	43.2	43.6	43.9	44.3	44.6	45.0	45.3	45.6	45.9
Per cent 0–4	7.93	7.83	7.77	7.71	7.66	7.62	7.6	7.52	7.44	7.33	7.22
Per cent 5–14	16.62	16.29	16	15.74	15.51	15.29	15.07	14.9	14.77	14.67	14.58
Per cent 15–24	19.32	18.97	18.56	18.12	17.68	17.24	16.8	16.38	15.98	15.62	15.29
Per cent 15–49	56.93	56.95	56.89	56.78	56.63	56.46	56.27	56.05	55.8	55.54	55.25
Per cent 15–64	69.35	69.7	69.96	70.17	70.33	70.45	70.55	70.61	70.65	70.65	70.64
Per cent 65 and over	6.09	6.18	6.27	6.38	6.5	6.64	6.79	6.96	7.15	7.35	7.56
Per cent females 15–49	56.78	56.78	56.7	56.57	56.39	56.18	55.93	55.66	55.36	55.02	54.67
Sex ratio	100.65	100.57	100.5	100.43	100.35	100.27	100.19	100.1	100	99.91	99.8
Dependency ratio	0.44	0.43	0.43	0.43	0.42	0.42	0.42	0.42	0.42	0.42	0.42

Table A 3.10: Summary demographic indicators: ANDHRA PRADESH (contd.)

SCENARIO B											
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Fertility											
Calculated TFR	**1.8**	**1.8**	**1.8**	**1.8**	**1.8**	**1.8**	**1.8**	**1.8**	**1.8**	**1.8**	**1.8**
GRR	0.87	0.86	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
NRR	0.82	0.8	0.82	0.82	0.83	0.83	0.83	0.83	0.83	0.84	0.84
Mortality											
Male LE	63.7	64	64.3	64.6	64.9	65.1	65.4	65.6	65.9	66.2	66.4
Female LE	68.5	68.9	69.3	69.8	70.1	70.5	70.9	71.3	71.6	72	72.4
Total LE	66.1	66.5	66.8	67.2	67.5	67.8	68.1	68.4	68.8	69.1	69.4
IMR	44.5	43.2	41.8	40.4	39.1	38	36.8	35.7	34.6	33.5	32.4
U5MR	57	54.9	52.8	50.7	48.7	47.1	45.7	44.2	42.7	41.2	39.8
Vital Rates											
CBR per 1,000	16.5	16.1	16.4	16.3	16.1	15.9	15.7	15.4	15.2	14.9	14.6
CDR per 1,000	8.5	8.5	8.4	8.4	8.4	8.4	8.3	8.3	8.3	8.3	8.3
Growth rate %	0.77	0.74	0.76	0.75	0.74	0.73	0.71	0.68	0.66	0.63	0.6
Annual Births and Deaths											
Births	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.3
Deaths	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8
Population											
Total (Millions)	85.3	85.9	86.6	87.3	88.0	88.6	89.3	89.9	90.6	91.2	91.7
Male	42.8	43.1	43.4	43.7	44.1	44.4	44.7	45.0	45.3	45.6	45.8
Female	42.5	42.8	43.2	43.6	43.9	44.3	44.6	44.9	45.3	45.6	45.9
Per cent 0–4	7.93	7.83	7.77	7.71	7.65	7.61	7.58	7.51	7.41	7.31	7.19
Per cent 5–14	16.62	16.29	16	15.74	15.52	15.29	15.07	14.9	14.77	14.66	14.57
Per cent 15–24	19.32	18.97	18.56	18.12	17.68	17.24	16.8	16.38	15.99	15.62	15.3
Per cent 15–49	56.93	56.95	56.89	56.78	56.64	56.47	56.28	56.06	55.82	55.56	55.27
Per cent 15–64	69.35	69.7	69.96	70.17	70.34	70.47	70.56	70.63	70.67	70.68	70.67
Per cent 65 and over	6.09	6.18	6.27	6.38	6.5	6.64	6.79	6.96	7.15	7.35	7.57
Per cent females 15–49	56.78	56.78	56.7	56.57	56.39	56.18	55.94	55.67	55.37	55.04	54.69
Sex ratio	100.65	100.57	100.5	100.43	100.35	100.27	100.18	100.1	100	99.9	99.8
Dependency ratio	0.44	0.43	0.43	0.43	0.42	0.42	0.42	0.42	0.42	0.41	0.42

Table A 3.11: Summary demographic indicators: TAMIL NADU

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
SCENARIO A											
Fertility											
Calculated TFR	1.66	1.64	1.62	1.61	1.60	1.59	1.58	1.57	1.57	1.57	1.57
GRR	0.81	0.79	0.79	0.78	0.78	0.77	0.77	0.76	0.76	0.76	0.76
NRR	0.76	0.75	0.75	0.75	0.74	0.74	0.74	0.73	0.74	0.74	0.74
Child-woman ratio	0.26	0.25	0.25	0.24	0.23	0.23	0.23	0.22	0.22	0.22	0.22
Mortality											
Male LE	67.4	67.7	68.1	68.5	68.8	69.2	69.6	69.9	70.3	70.6	70.9
Female LE	70.5	70.9	71.4	71.8	72.3	72.7	73.2	73.7	74.1	74.6	75.1
Total LE	68.9	69.3	69.7	70.1	70.5	71	71.4	71.8	72.2	72.6	73
IMR	33.1	31.7	30.3	28.9	27.6	26.2	24.8	23.4	22.3	21.1	20.1
U5MR	40.7	38.8	37	35.2	33.4	31.6	29.7	27.9	26.4	25	23.7
Vital Rates											
CBR per 1,000	14.00	13.60	13.30	13.00	12.80	12.50	12.20	12.00	11.80	11.60	11.50
CDR per 1,000	8.70	8.60	8.50	8.50	8.40	8.40	8.30	8.30	8.30	8.20	8.20
GR per cent	0.50	0.47	0.45	0.43	0.41	0.39	0.36	0.34	0.32	0.31	0.30
Annual Births and Deaths											
Births (Millions)	1.01	0.99	0.97	0.96	0.94	0.93	0.91	0.89	0.88	0.87	0.87
Deaths (Millions)	0.63	0.63	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62
Population (Millions)											
Total (Millions)	72.53	72.89	73.24	73.58	73.90	74.21	74.50	74.77	75.03	75.29	75.53
Male (Millions)	36.32	36.49	36.66	36.82	36.97	37.11	37.25	37.37	37.49	37.60	37.71
Female (Millions)	36.21	36.40	36.58	36.76	36.93	37.10	37.25	37.40	37.55	37.69	37.83
Per cent 0–4	7.18	7.00	6.81	6.61	6.39	6.26	6.14	6.03	5.92	5.81	5.72
Per cent 5–14	15.08	14.93	14.81	14.69	14.57	14.33	14.06	13.78	13.49	13.21	12.96
Per cent 15–24	16.49	16.18	15.87	15.59	15.33	15.12	14.93	14.78	14.64	14.53	14.39
Per cent 15–49	55.66	55.51	55.33	55.15	54.96	54.79	54.63	54.46	54.28	54.07	53.78
Per cent 15–64	70.11	70.30	70.46	70.60	70.75	70.90	71.05	71.20	71.32	71.42	71.45
Per cent 65 and over	7.63	7.76	7.92	8.10	8.29	8.51	8.74	9.00	9.27	9.56	9.86
Per cent females 15–49	55.93	55.72	55.48	55.21	54.95	54.69	54.43	54.15	53.86	53.53	53.14
Sex ratio	100.31	100.27	100.21	100.16	100.10	100.04	99.98	99.91	99.84	99.77	99.69
Dependency ratio	0.43	0.42	0.42	0.42	0.41	0.41	0.41	0.4	0.4	0.4	0.4

Table A 3.11: Summary demographic indicators: TAMIL NADU (contd.)

SCENARIO B	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Fertility											
Calculated TFR	1.66	1.63	1.62	1.61	1.60	1.58	1.57	1.56	1.56	1.56	1.56
GRR	0.81	0.79	0.79	0.78	0.77	0.77	0.76	0.76	0.76	0.76	0.76
NRR	0.76	0.75	0.75	0.74	0.74	0.74	0.73	0.73	0.73	0.73	0.73
Mortality											
Male LE	67.40	67.70	68.10	68.50	68.80	69.20	69.60	69.90	70.30	70.60	70.90
Female LE	70.50	70.90	71.40	71.80	72.30	72.70	73.20	73.70	74.10	74.60	75.10
Total LE	68.90	69.30	69.70	70.10	70.50	71.00	71.40	71.80	72.20	72.60	73.00
IMR	33.10	31.70	30.30	28.90	27.60	26.20	24.80	23.40	22.30	21.10	20.10
U5MR	40.70	38.80	37.00	35.20	33.40	31.60	29.70	27.90	26.40	25.00	23.70
Vital Rates											
CBR per 1,000	13.90	13.50	13.30	13.00	12.70	12.40	12.20	11.90	11.70	11.50	11.40
CDR per 1,000	8.70	8.60	8.50	8.50	8.40	8.40	8.30	8.30	8.30	8.20	8.20
Annual Births and Deaths (Millions)											
Births	1.01	0.99	0.97	0.96	0.94	0.92	0.91	0.89	0.88	0.87	0.86
Deaths	0.63	0.63	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62
Growth rate (%)	0.50	0.47	0.45	0.42	0.40	0.38	0.35	0.33	0.31	0.30	0.29
Population											
Total (Millions)	72.53	72.89	73.24	73.57	73.89	74.19	74.48	74.74	75.00	75.24	75.48
Male	36.32	36.49	36.66	36.81	36.96	37.10	37.23	37.35	37.47	37.58	37.68
Female	36.21	36.40	36.58	36.75	36.92	37.09	37.24	37.39	37.53	37.67	37.80
Per cent 0–4	7.18	7.00	6.81	6.60	6.37	6.24	6.12	6.00	5.88	5.78	5.68
Per cent 5–14	15.08	14.93	14.81	14.69	14.57	14.33	14.06	13.78	13.49	13.20	12.95
Per cent 15–24	16.49	16.18	15.87	15.59	15.33	15.12	14.94	14.78	14.65	14.54	14.40
Per cent 15–49	55.66	55.51	55.34	55.15	54.97	54.81	54.65	54.49	54.31	54.10	53.82
Per cent 15–64	70.11	70.30	70.46	70.61	70.76	70.92	71.07	71.22	71.36	71.46	71.50
Per cent 65 and over	7.63	7.76	7.92	8.10	8.30	8.51	8.75	9.00	9.27	9.56	9.87
Per cent females 15–49	55.93	55.72	55.48	55.22	54.96	54.70	54.44	54.17	53.89	53.56	53.17
Sex ratio	100.31	100.26	100.21	100.16	100.10	100.04	99.98	99.91	99.84	99.76	99.69
Dependency ratio	0.43	0.42	0.42	0.42	0.41	0.41	0.41	0.4	0.4	0.4	0.4

Table A 3.12: Summary demographic indicators: INDIA

SCENARIO A											
Fertility	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Calculated TFR	2.36	2.33	2.3	2.26	2.22	2.19	2.15	2.1	2.06	2.02	1.97
GRR	1.12	1.11	1.09	1.08	1.06	1.04	1.02	1	0.98	0.96	0.94
NRR	1.04	1.03	1.02	1.01	1	0.98	0.97	0.95	0.93	0.91	0.9
Mortality											
Male LE	65.5	65.8	66.2	66.6	67	67.4	67.8	68.2	68.6	69	69.4
Female LE	68.4	68.8	69.1	69.5	69.9	70.2	70.6	70.9	71.3	71.6	72
Total LE	66.9	67.3	67.6	68	68.4	68.8	69.1	69.5	69.9	70.2	70.6
IMR	41.3	39.8	38.3	36.9	35.4	33.9	32.6	31.3	30	28.7	27.3
U5MR	52.2	50.1	48	45.9	43.8	41.8	40.1	38.3	36.6	34.8	33.1
Life table: Coale-Demeny West											
Vital Rates											
CBR per 1,000	20.4	20.2	19.9	19.6	19.3	18.9	18.5	18.1	17.6	17.2	16.7
CDR per 1,000	7.3	7.3	7.2	7.1	7.1	7	7	6.9	6.8	6.8	6.7
GR per cent	1.31	1.29	1.27	1.25	1.22	1.19	1.16	1.12	1.08	1.04	0.99
Annual Births and Deaths (Millions)											
Births	25	25.08	25.06	24.99	24.88	24.73	24.46	24.15	23.81	23.42	23
Deaths	9	9.02	9.07	9.11	9.14	9.17	9.19	9.22	9.24	9.26	9.29
Population											
Total (Millions)	1226.6	1242.7	1258.7	1274.6	1290.3	1305.9	1321.1	1336.1	1350.6	1364.8	1378.5
Male	631.2	639.4	647.5	655.6	663.6	671.5	679.3	687	694.4	701.6	708.7
Female	595.4	603.3	611.2	619	626.7	634.3	641.8	649.1	656.2	663.1	669.8
Per cent 0–4	9.94	9.77	9.61	9.45	9.29	9.17	9.04	8.88	8.72	8.54	8.34
Per cent 5–14	20.09	19.76	19.44	19.14	18.86	18.56	18.29	18.04	17.81	17.59	17.38
Per cent 15–24	19.78	19.65	19.5	19.33	19.13	18.91	18.68	18.45	18.2	17.96	17.73
Per cent 15–49	54.36	54.63	54.87	55.06	55.21	55.32	55.38	55.42	55.44	55.45	55.46
Per cent 15–64	64.84	65.26	65.65	66.01	66.33	66.63	66.9	67.15	67.41	67.67	67.94
Per cent 65 and over	5.13	5.21	5.31	5.41	5.52	5.65	5.78	5.92	6.06	6.21	6.35
Per cent females 15–49	54.38	54.64	54.86	55.03	55.16	55.25	55.3	55.31	55.31	55.3	55.29
Sex ratio	106.03	105.98	105.95	105.92	105.89	105.87	105.85	105.83	105.82	105.81	105.8
Dependency ratio	0.54	0.53	0.52	0.51	0.51	0.5	0.49	0.49	0.48	0.48	0.47

Table A 3.12: Summary demographic indicators: INDIA (contd.)

SCENARIO B											
Fertility	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Calculated TFR	2.4	2.33	2.3	2.26	2.23	2.19	2.15	2.11	2.07	2.03	1.99
GRR	1.12	1.11	1.09	1.08	1.06	1.04	1.03	1.01	0.99	0.97	0.95
NRR	1.04	1.03	1.02	1.01	1	0.99	0.97	0.95	0.94	0.92	0.9
Child-woman ratio	0.38	0.37	0.36	0.35	0.35	0.34	0.34	0.33	0.33	0.32	0.31
Mortality											
Male LE	65.5	65.8	66.2	66.6	67	67.4	67.8	68.2	68.6	69	69.4
Female LE	68.4	68.8	69.1	69.5	69.9	70.2	70.6	70.9	71.3	71.6	72
Total LE	66.9	67.3	67.6	68	68.4	68.8	69.1	69.5	69.9	70.2	70.6
IMR	41.3	39.8	38.3	36.9	35.4	33.9	32.6	31.3	30	28.7	27.3
U5MR	52.2	50.1	48	45.9	43.8	41.8	40.1	38.3	36.6	34.8	33.1
Life table: Coale-Demeny West											
Vital Rates											
CBR per 1,000	20.4	20.2	19.9	19.6	19.3	19	18.6	18.2	17.7	17.3	16.8
CDR per 1,000	7.3	7.3	7.2	7.1	7.1	7	7	6.9	6.8	6.8	6.7
GR per cent	1.31	1.29	1.27	1.25	1.22	1.2	1.16	1.13	1.09	1.05	1
Annual Births and Deaths											
Births (Millions)	25	25.1	25.1	25	24.9	24.8	24.6	24.3	23.9	23.6	23.2
Deaths (Millions)	9	9	9.1	9.1	9.1	9.2	9.2	9.2	9.2	9.3	9.3
Population (Millions)											
Total (Millions)	1226.6	1242.7	1258.7	1274.6	1290.4	1306.1	1321.4	1336.4	1351.1	1365.4	1379.3
Male (Millions)	631.2	639.4	647.5	655.6	663.7	671.6	679.5	687.2	694.7	702	709.1
Female (Millions)	595.4	603.3	611.2	619	626.8	634.4	641.9	649.3	656.5	663.4	670.2
Per cent 0–4	9.94	9.77	9.61	9.45	9.3	9.19	9.06	8.91	8.75	8.57	8.38
Per cent 5–14	20.09	19.76	19.44	19.13	18.86	18.55	18.28	18.04	17.81	17.59	17.38
Per cent 15–24	19.78	19.65	19.5	19.33	19.13	18.91	18.68	18.44	18.2	17.96	17.72
Per cent 15–49	54.36	54.63	54.87	55.06	55.21	55.31	55.37	55.4	55.42	55.43	55.43
Per cent 15–64	64.84	65.26	65.65	66	66.33	66.62	66.88	67.13	67.38	67.64	67.9
Per cent 65 and over	5.13	5.21	5.31	5.41	5.52	5.64	5.78	5.92	6.06	6.2	6.34
Per cent females 15–49	54.38	54.64	54.85	55.03	55.16	55.24	55.28	55.3	55.29	55.28	55.26
Sex ratio	106.03	105.98	105.95	105.92	105.89	105.87	105.85	105.83	105.82	105.81	105.8
Dependency ratio	0.54	0.53	0.52	0.52	0.51	0.5	0.5	0.49	0.48	0.48	0.47

Table A 3.13: Number of condom users, India and states, 2012–2022

SCENARIO A												
	Numbers (Millions)											
State	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Uttar Pradesh	3.7	3.8	3.8	3.8	3.8	3.7	3.7	3.6	3.5	3.4	3.2	3.1
Madhya Pradesh	0.8	0.9	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8
Bihar	0.3	0.3	0.4	0.5	0.5	0.6	0.7	0.8	1.0	1.1	1.3	1.4
Rajasthan	1.4	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4
Odisha	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3
Jharkhand	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.5
Chhattisgarh	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.6	0.7
Uttarakhand	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Assam	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3
Andhra Pradesh	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2
Tamil Nadu	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5
India	15.5	16.0	16.3	16.6	16.9	17.2	17.4	17.7	18.0	18.2	18.5	18.7
SCENARIO B												
Numbers (Millions)												
State	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Uttar Pradesh	3.7	3.8	4.0	4.2	4.5	4.8	5.1	5.5	5.8	6.1	6.5	7.0
Madhya Pradesh	0.8	0.9	0.9	0.9	1.0	1.0	1.0	1.1	1.1	1.2	1.2	1.2
Bihar	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6
Rajasthan	1.4	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4
Odisha	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Jharkhand	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4
Chhattisgarh	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2
Uttarakhand	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4
Assam	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3
Andhra Pradesh	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Tamil Nadu	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.3
India	15.5	16.0	16.5	16.9	17.4	17.9	18.4	18.9	19.4	19.8	20.3	20.8

Table A 3.14: Number of pills users, India and states

SCENARIO A												
		Numbers										
State	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Uttar Pradesh	1.08	1.12	1.15	1.19	1.25	1.30	1.35	1.41	1.47	1.52	1.58	1.66
Madhya Pradesh	0.27	0.28	0.31	0.34	0.37	0.40	0.44	0.47	0.51	0.55	0.60	0.64
Bihar	0.31	0.33	0.36	0.40	0.44	0.48	0.53	0.59	0.66	0.74	0.82	0.91
Rajasthan	0.41	0.42	0.46	0.49	0.53	0.57	0.61	0.65	0.70	0.74	0.79	0.84
Odisha	0.94	0.97	0.96	0.96	0.95	0.94	0.92	0.90	0.88	0.86	0.83	0.80
Jharkhand	0.29	0.30	0.31	0.33	0.36	0.38	0.41	0.44	0.47	0.49	0.52	0.55
Chhattisgarh	0.05	0.05	0.07	0.08	0.09	0.10	0.12	0.13	0.14	0.16	0.18	0.19
Uttarakhand	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.11
Assam	1.06	1.14	1.18	1.21	1.23	1.23	1.23	1.23	1.23	1.22	1.21	1.19
Andhra Pradesh	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.11	0.12
Tamil Nadu	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.05
India	14.16	14.62	14.54	14.45	14.33	14.17	13.97	13.77	13.53	13.26	12.96	12.62
SCENARIO B												
Numbers												
State	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Uttar Pradesh	1.07	1.11	1.16	1.23	1.32	1.41	1.49	1.59	1.68	1.79	1.90	2.05
Madhya Pradesh	0.27	0.28	0.29	0.30	0.32	0.33	0.34	0.35	0.36	0.37	0.39	0.40
Bihar	0.31	0.33	0.35	0.37	0.39	0.42	0.44	0.48	0.51	0.56	0.60	0.65
Rajasthan	0.41	0.42	0.44	0.45	0.47	0.49	0.51	0.52	0.54	0.56	0.57	0.59
Odisha	0.94	0.97	1.00	1.03	1.06	1.10	1.13	1.15	1.18	1.21	1.24	1.26
Jharkhand	0.29	0.30	0.31	0.32	0.34	0.36	0.38	0.40	0.42	0.43	0.45	0.47
Chhattisgarh	0.05	0.05	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.08	0.08
Uttarakhand	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.10	0.10	0.10
Assam	1.06	1.14	1.22	1.29	1.36	1.41	1.47	1.52	1.58	1.63	1.69	1.74
Andhra Pradesh	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Tamil Nadu	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
India	14.16	14.64	15.06	15.51	15.95	16.39	16.81	17.27	17.72	18.16	18.60	19.03

Table A 3.15: Number of IUCD users, India and states, 2011–2022

SCENARIO A												
Numbers (Millions)												
State	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Uttar Pradesh	0.34	0.36	0.44	0.54	0.66	0.79	0.92	1.08	1.25	1.43	1.63	1.88
Madhya Pradesh	0.07	0.08	0.13	0.18	0.24	0.30	0.36	0.43	0.51	0.58	0.67	0.75
Bihar	0.10	0.10	0.13	0.16	0.19	0.22	0.26	0.31	0.36	0.42	0.49	0.56
Rajasthan	0.19	0.22	0.24	0.27	0.30	0.33	0.36	0.40	0.43	0.46	0.50	0.54
Odisha	0.04	0.05	0.06	0.07	0.07	0.08	0.09	0.10	0.11	0.12	0.13	0.14
Jharkhand	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.07	0.08	0.08	0.09	0.10
Chhattisgarh	0.04	0.05	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.13	0.14
Uttarakhand	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04
Assam	0.08	0.08	0.09	0.09	0.10	0.10	0.11	0.11	0.11	0.12	0.12	0.12
Andhra Pradesh	0.09	0.09	0.10	0.11	0.12	0.12	0.13	0.14	0.15	0.15	0.16	0.17
Tamil Nadu	0.31	0.33	0.34	0.36	0.37	0.38	0.40	0.41	0.43	0.44	0.45	0.46
India	2.02	2.09	2.62	3.18	3.76	4.37	5.01	5.68	6.38	7.10	7.85	8.63
SCENARIO B												
Numbers (Millions)												
State	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Uttar Pradesh	0.34	0.35	0.37	0.39	0.42	0.45	0.48	0.51	0.54	0.57	0.61	0.65
Madhya Pradesh	0.07	0.08	0.08	0.08	0.09	0.09	0.09	0.10	0.10	0.10	0.11	0.11
Bihar	0.10	0.10	0.11	0.12	0.12	0.13	0.14	0.15	0.16	0.17	0.19	0.20
Rajasthan	0.19	0.20	0.21	0.21	0.22	0.23	0.24	0.24	0.25	0.25	0.26	0.27
Odisha	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Jharkhand	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06
Chhattisgarh	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05
Uttarakhand	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04
Assam	0.08	0.08	0.09	0.09	0.10	0.10	0.11	0.11	0.11	0.12	0.12	0.12
Andhra Pradesh	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Tamil Nadu	0.31	0.31	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
India	2.02	2.09	2.15	2.22	2.28	2.34	2.40	2.47	2.53	2.59	2.66	2.72

Table A 3.16: Number of IUCD acceptors, selected states and India, 2011–2022

SCENARIO A												
Number (Millions)												
State	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Uttar Pradesh	0.24	0.32	0.40	0.48	0.57	0.66	0.77	0.89	1.01	1.16	1.34	1.54
Madhya Pradesh	0.05	0.10	0.14	0.18	0.22	0.26	0.31	0.36	0.41	0.47	0.53	0.60
Bihar	0.07	0.09	0.11	0.13	0.16	0.19	0.22	0.26	0.30	0.35	0.40	0.46
Rajasthan	0.10	0.14	0.17	0.21	0.24	0.28	0.32	0.36	0.40	0.44	0.49	0.54
Odisha	0.02	0.03	0.04	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.10	0.12
Jharkhand	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.14	0.15	0.17
Chhattisgarh	0.01	0.02	0.03	0.03	0.04	0.05	0.06	0.06	0.07	0.08	0.09	0.10
Uttarakhand	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03
Assam	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.09
Andhra Pradesh	0.07	0.07	0.08	0.08	0.09	0.09	0.10	0.10	0.11	0.11	0.11	0.12
Tamil Nadu	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.30	0.31	0.31	0.32
India	1.42	1.92	2.30	2.70	3.12	3.55	4.01	4.49	4.98	5.49	6.01	6.61
SCENARIO B												
Number (Millions)												
State	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Uttar Pradesh	0.24	0.25	0.27	0.29	0.31	0.33	0.35	0.37	0.39	0.42	0.45	0.49
Madhya Pradesh	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.08
Bihar	0.07	0.07	0.08	0.08	0.09	0.10	0.10	0.11	0.12	0.13	0.14	0.15
Rajasthan	0.10	0.11	0.11	0.11	0.12	0.12	0.13	0.13	0.13	0.14	0.14	0.15
Odisha	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Jharkhand	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06
Chhattisgarh	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Uttarakhand	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Assam	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.09
Andhra Pradesh	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Tamil Nadu	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.22	0.21	0.21	0.21	0.21
India	1.42	1.45	1.50	1.54	1.58	1.62	1.67	1.71	1.75	1.79	1.83	1.88

Table A 3.17: Implied unmet need, CPR, and TFR, India and states

SCENARIO A										
	UNMET NEED (%)			M-CPR (%)	Implied M-CPR (%)		TFR	Implied TFR		
State	2011*	2017	2022	2011*	2017	2022	2011*	2017	2022	Year of reaching 2.1*[24]
Uttar Pradesh	29.7	22.6	12.5	31.4	38.5	48.6	3.4	3.0	2.4	2027
Madhya Pradesh	22.4	16.6	9.4	57.0	62.8	69.9	3.1	2.7	2.0	2025
Bihar	39.2	31.4	16.5	33.3	41.1	56.0	3.6	3.2	2.3	2021
Rajasthan	19.6	14.0	8.2	58.8	64.4	70.2	3.1	2.7	2.2	2021
Odisha	23.2	17.0	11.6	44.0	50.2	55.6	2.2	1.9	1.7	2010
Jharkhand	30.5	23.2	15.3	37.8	45.0	53.0	2.9	2.5	2.2	2018
Chhattisgarh	26.4	19.5	13.2	49.4	58.2	68.8	2.7	2.3	2.0	2022
Uttarakhand	23.2	17.6	11.6	55.4	61.0	67.0	2.3	2.0	1.6	2022
Assam	24.0	14.9	9.6	35.4	44.5	49.8	2.3	2.0	1.8	2019
Andhra Pradesh	4.7	4.7	4.7	67.3	67.3	67.3	1.81	1.81	1.81	2002
Tamil Nadu	8.5	6.3	5.1	60.0	62.2	62.7	1.7	1.7	1.6	2000
India	12.8	9.0	5.1	50.0	53.8	57.7	2.4	2.2	2.0	2021
SCENARIO B										
	UNMET NEED (%)			M-CPR (%)	Implied M-CPR (%)		TFR	Implied TFR		
State	2011*	2017	2022	2011	2017	2022	2011*	2017	2022	Year of reaching 2.1*
Uttar Pradesh	29.7	22.6	12.5	31.4	38.5	48.6	3.4	3.0	2.5	2027
Madhya Pradesh	22.4	16.6	9.4	57.0	62.8	69.9	3.1	2.6	2.1	2025
Bihar	39.2	31.4	16.5	33.3	41.1	56.0	3.6	3.2	2.4	2021
Rajasthan	19.6	14.0	8.2	58.8	64.4	70.1	3.1	2.6	2.2	2021

[24]

Odisha	23.2	17.0	11.6	44.0	50.2	55.6	2.2	1.9	1.7	2010
Jharkhand	30.5	23.2	15.3	37.8	45.0	53.0	2.9	2.5	2.1	2018
Chhattisgarh	26.4	19.5	13.2	49.4	58.2	68.8	2.7	2.3	1.9	2022
Uttarakhand	23.2	17.6	11.6	55.4	61.0	67.0	2.3	2.0	1.7	2022
Assam	24.0	14.9	9.6	35.4	44.5	49.8	2.3	2.1	1.8	2019
Andhra Pradesh	4.7	4.7	4.7	67.3	67.3	67.3	1.8	1.8	1.8	2002
Tamil Nadu	8.5	6.3	5.1	60.0	62.2	62.7	1.7	1.7	1.6	2000
India	12.8	9.0	5.1	50.0	53.8	57.7	2.4	2.2	2.0	2021

REFERENCES FOR SECTION 1

Bhat, P.N. Mari. 2009. *India's Changing Dates with Replacement Fertility: A Review of Recent Fertility Trends and Future Prospects*. New York: United Nations (ed.), Completing the Fertility Transition, Population Division, United Nations. Retrieved August 30, 2013, from http://www.un.org/esa/population/publications/completingfertility/RevisedBHATpaper.PDF.

Bongaarts, J. 1978. "A Framework for Analyzing the Proximate Determinants of Fertility." *Population and Development Review* 4(1): 105–132.

Bongaarts, J., and J. Stover. 1986. *The Population Council Target-setting Model: A User's Manual*. New York: The Population Council.

Coale, A.J., P. Demeny, and B. Vaughan. 1983. *Regional Model Life Tables and Stable Populations*, Second Edition. New York: Academic Press.

Kumar, S., and K.M. Sathyanarayana. 2012. "District-level Estimates of Fertility and Implied Sex Ratio at Birth in India." *Economic and Political Weekly* 47(33), 66–72.

International Institute of Population Studies (IIPS). 2007. *District Level Household and Facility Survey (DLHS-3)*, 2007–08. Mumbai: IIPS.

IIPS. 2006. *District Level Household and Facility Survey (DLHS-2)*, 2002–04. Mumbai: IIPS.

IIPS. 1995. *National Family Health Survey (NFHS–1)* (MCH and Family Planning), India 1992–93: Bombay: IIPS.

IIPS and Macro International. 2007. *National Family Health Survey (NFHS-3)*, 2005–06: India: Volume I. Mumbai: IIPS.

IIPS and ORC Macro. 2000. *National Family Health Survey (NFHS-2)*, 1998–99: India: Volume I. Mumbai: IIPS.

James, K.S. 2011. "India's Demographic Change: Opportunities and Challenges." *Science* 333(576). Retrieved August 31, 2013, from http:// isites.harvard.edu/fs /docs/icb.topic1071923.files/e210_Lect13_Science-2011-James_India.pdf.

Ministry of Health and Family Welfare (MoHFW). 2011. *Family Welfare Statistics in India, 2011*. New Delhi: Department of Family Welfare, MoHFW.

MoHFW. 2000. *National Population Policy, 2000*. New Delhi: Department of Family Welfare, MoHFW.

MoHFW.1983. *National Health Policy, 1983.* New Delhi: Department of Family Welfare, MoHFW.

Office of the Registrar General, India. 2012. *Sample Registration System: Statistical Report 2011.* New Delhi: Office of the Registrar General, India.

Office of the Registrar General, India. 2011a. *Sample Registration System: Statistical Report 2010.* New Delhi: Office of the Registrar General, India.

Office of the Registrar General, India. 2011b. *Sample Registration System (SRS)*. New Delhi: Ministry of Home Affairs, Government of India.

Office of the Registrar General, India. 2011c. "SRS Based Abridged Life Tables." Retrieved February 13, 2014, from http://www.censusindia.gov.in/vital_statistics/SRS_Based/SRS_Based.html.

Office of the Registrar General, India. 2009. *SRS Compendium on India's Fertility and Mortality Indicators, 1971–2007* (Based on Sample Registration System). New Delhi: Office of the Registrar General, India.

Office of the Registrar General, India. 2006a. *Population Projections for India and States 2001–2026.* Report of the Technical Group on Population Projections Constituted by the National Commission on Population.

Office of the Registrar General, India, 2006b. *Report of the Technical Group on Population Projections Constituted by the National Commission on Population.* Office of the Registrar General, India.

Office of the Registrar General, India. *Sample Registration System Bulletins.* Various Issues. New Delhi: Office of the Registrar General, India.

Office of the Registrar General and Census Commissioner, India. 2011a. *Annual Health Survey, 2010–11*. New Delhi: Ministry of Health and Family Welfare.

Office of the Registrar General and Census Commissioner, India. 2011b. *Annual Health Survey, 2010–11* Fact Sheet. Various States. New Delhi: Office of the Registrar General and Census commissioners, India.

Office of the Registrar General and Census Commissioner, India. 2011c. *Census of India 2011:* Retrieved from http://censusindia.gov.in/2011-prov-results/paper2/data_files/india/Rural_Urban_2011.pdf.

Office of the Registrar General and Census Commissioner. 2011d. *Provisional Population Totals, 2011*. New Delhi: Office of the Registrar General, India.

Sharma, O.P., and C. Haub. August 2008. *Sex Ratio at Birth Begins to Improve in India.* Population Reference Bureau. Retrieved August 10, 2013, from http://www.prb.org/Articles/2008/indiasexratio.aspx.

Srinivasan, K. 1998. "Population Policies and Programmes Since Independence: A Saga of Great Expectations and Poor Performance." *Demography India* 27(1): 1–22.

Stover, J. 1998. "Revising the Proximate Determinants of Fertility Framework: What Have We Learned in the Past 20 Years?" *Studies in Family Planning* 29(3): 255–267.

Stover, J., J.T. Bertrand, and J.D. Shelton. 2000. "Empirically Based Conversion Factors for Calculating Couple-years of Protection." *Evaluation Review* 24(1): 3–46

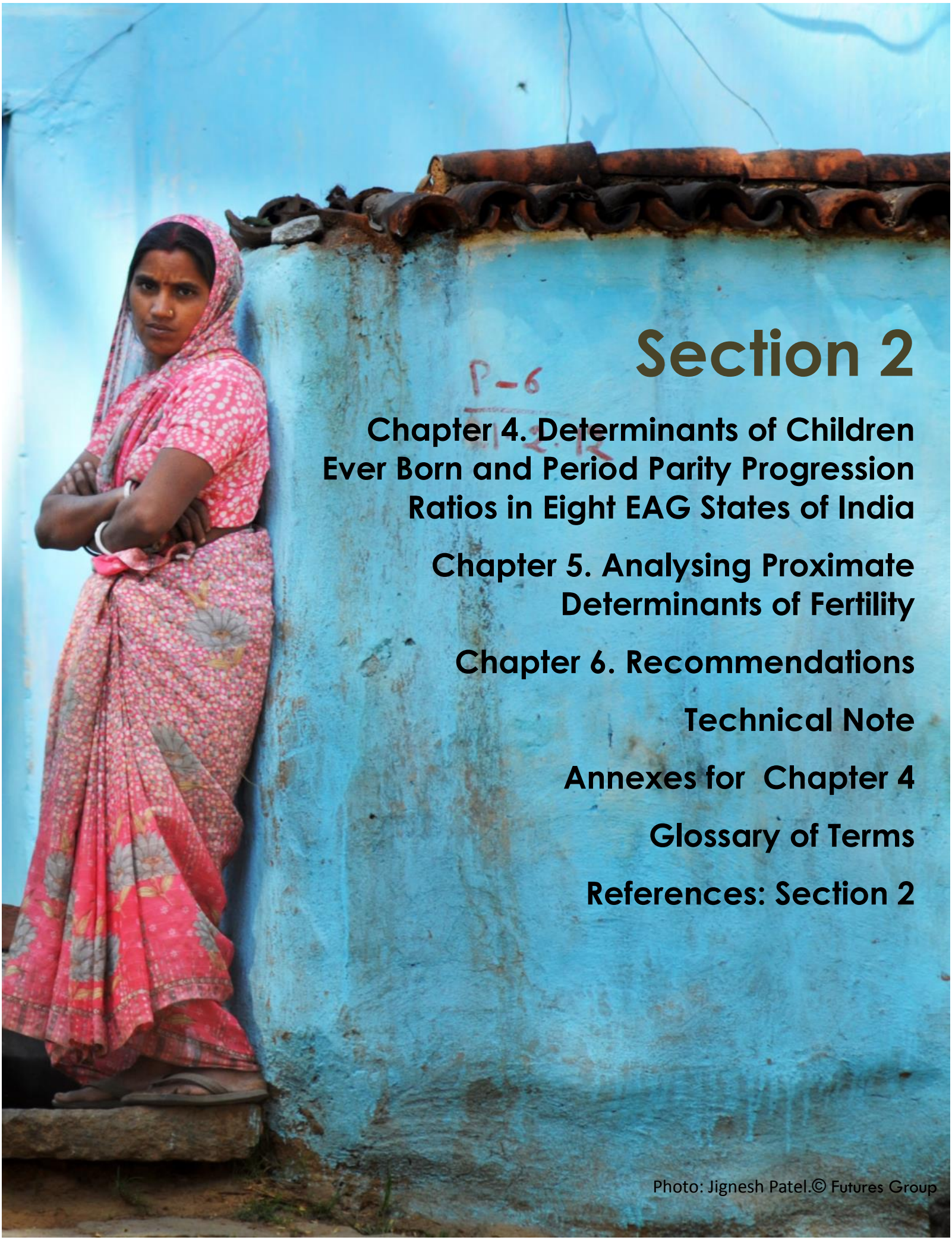
Stover, J., J.T. Bertrand, S. Smith, N. Rutenberg, and K. Meyer-Ramirez. 1997. *Empirically Based Conversion Factors for Calculating Couple-Years of Protection*. Chapel Hill, NC: The EVALUATION Project.

Stover, J., and L. Heaton. 1999. *Famplan*. Version 4. *A Computer Program for Projecting Family Planning Requirements: Spectrum System of Policy Models*.

United Nations. 2013a. “Component Method.” Retrieved August 10, 2013, from http://www.un.org/esa/population/techcoop/PopProj/manual3/chapter1.pdf.

United Nations. 2013b. *World Population Prospects, the 2008 Revision*. New York: United Nations. Retrieved from http://esa.un.org/wpp/Documentation/pdf/WPP2012_Press_Release.pdf.

United Nations. 1982. “Model Life Tables for Developing Countries. Department of International Economic and Social Affairs.” *Population Studies* 77. New York: United Nations.



Section 2

Chapter 4. Determinants of Children Ever Born and Period Parity Progression Ratios in Eight EAG States of India

Chapter 5. Analysing Proximate Determinants of Fertility

Chapter 6. Recommendations

Technical Note

Annexes for Chapter 4

Glossary of Terms

References: Section 2

Photo: Jignesh Patel.© Futures Group

CHAPTER 4: DETERMINANTS OF CHILDREN EVER BORN AND PERIOD PARITY PROGRESSION RATIOS IN EIGHT EAG STATES OF INDIA

Multivariate Analysis of Parity Progression Ratios − Impact of Socioeconomic Variables

4.1 Introduction

This chapter presents the analysis for measuring the impact of selected demographic and socioeconomic factors on fertility decline. As described in the previous chapters, considerable heterogeneity has been observed in the pace at which fertility has declined over the past couple of decades in different states. In the context of low or declining fertility, parity and birth order statistics are becoming increasingly important in understanding fertility trends and patterns for policy and programmatic interventions. Parity refers to the number of live births that a woman has had, and birth order implies whether a birth is a first, second, third, or higher-order birth for a woman. To understand fertility transitions, one of the most important and widely used tools is PPRs. PPRs include two concepts: cohort and period parity progression ratios (PPPRs). The analysis of PPR has several advantages because it captures the contingent nature of fertility behaviour, i.e., the decision to have a child often is shaped by the number of previous births a woman has had; PPR can be used to gauge whether certain family sizes by number of children are becoming more common; and the decomposition of PPR can be used to estimate the relative contribution of reduction of births at different orders to overall fertility decline (Spoorenberg and Dommaraju, 2012).

Several empirical studies have highlighted the socioeconomic and demographic determinants of PPR, both cohort and PPPR, utilising alternate multivariate analytical techniques, such as factor analysis, binary logit regression, hazard regression model, etc. (Yang, 1994; Gandotra et. al., 1998; UNFPA, 2004). Alternative techniques have been used for the estimation of PPR using data on children ever born and open and closed birth intervals (IIPS, 1994; Gandotra et al., 1998; UNFPA, 2004). This study has used data on children ever born to currently married women in the EAG states, along with a host of explanatory variables under a multinomial model, towards estimation of PPR.

4.2 Objective

This study is intended to highlight the effects of selected socioeconomic and demographic factors on fertility and the family building process, characterised by the children ever born and PPPR amongst currently married women ages 15−49 in the eight EAG states, i.e., UP, Bihar, MP, Rajasthan, Odisha, Jharkhand, Uttarakhand, and Chhattisgarh, using NFHS-3 survey data.

4.3 Data and Methodology

NFHS-3 collected detailed information on fertility, mortality, family welfare, and important aspects such as nutrition, sexual behaviour, domestic violence, adolescent reproductive health, and testing of adult population for HIV, among others. Primary data from 29 states comprising about 99 per cent of India's population and union territories (UTs) of the country were collected from 109,041 households, 124,385 women ages 15−49, and 87,925 currently married women ages 15–49 and cohabiting with their husbands. The households were selected using a systematic, multistage, stratified sample design. Information related to a wide range of socioeconomic, demographic, and cultural characteristics pertaining to selected households and eligible women facilitated the multivariate analysis in this study.

Study on PPR is more complicated due to the incomplete nature of the survey data in terms of *selectivity* and *censoring* built-in such datasets as identified by various researchers (Rodriguez and Hobcraft, 1980 and Ryder, 1983). The survey data typically does not provide longitudinal data and hence information on birth histories is incomplete and parity progression ratios cannot be computed directly. *Selectivity* refers to the fact that transition from parity *i* to *i*+1 or higher can only be calculated for women who have reached parity *i* at the time of the survey. To a certain extend this can be overcome by introducing appropriate controls into the analysis like analysing information on women who have completed their family building process (say by restricting analysis to age group 40–49 or who were sterilised at the time of the survey).

Censoring could arise if some women who have reached parity *i* at the time of the survey, are included in the analysis although they have not yet reached the next parity, *i*+1. For these women, two outcomes are possible: either they will never reach parity *i*+1 or they will reach it after an unknown interval beyond the survey date. This *censoring* renders the definition of PPRs ambiguous. Life table techniques are designed to deal with the issue of *censoring*.

Several empirical studies have highlighted socioeconomic and demographic determinants of PPRs, both Cohort and Period PPRs, utilising alternate multivariate analytical techniques like factor analysis, binary logit regression, hazard regression model, etc. (Yang, 1994; Gandotra *et. al.*, 1998; UNFPA, 2004). Alternate techniques have been employed for estimation of PPRs using data on children ever born, open and close birth intervals (IIPS, 1994; Gandotra et al, 1998; UNFPA, 2004).

This study has used data on children ever born* to currently married women in the EAG states towards estimation of PPRs and is confined to eliciting the effects of selected socioeconomic and demographic factors on fertility and PPRs in the EAG states of India. Woman's parity is characterized by the number of children ever born to the women till the time of the survey. Further, PPR is defined as the proportion of women of a specified parity who eventually go to have at least one more child (Gandotra et. al., 1998). Thus, PPR indicates the extent to which women progress from lower parity to the higher parities and depicts the family building process of women during their reproductive life. Alternatively, the PPR indicates the proportions of women proceeding from one event of childbearing sequence to next. In a probabilistic sense, PPR indicates the chance of a woman of parity *i* to go parity *i*+1" (to have an additional child) in a year (Pandey, A and Suchindran CM, 1997). Thus, for analysing the family building process one needs to examine the proportion of women ever becoming mothers out of all women born. Of those who have a first child, what proportion goes on to have a second? Of those who have a second child what proportion progresses to a third, and so on (Feeney G, 1991).

Additionally, the multivariate analysis has been extended by restricting to currently married women in the age group 40–49 and currently married women who have adopted limiting method of contraception to avoid the *selectivity* and *censoring* (on a limited sense) biases.

4.4 PARITY PROGRESSION RATIOS IN EIGHT EAG STATES AND INDIA

The PPRs indicate the chance of a woman of parity "i" to go to "i+1th" parity (have an additional child) in a year. Thus, PPR "a_i" for parity "i" can be calculated as follows:

$$a_i = \frac{\text{No of women of parity (i+1) and above}}{\text{No of women of parity i and above}}$$

Declines in PPRs beyond parity 2 in all of the EAG states except Odisha are slower, even compared to India, and much slower than the southern states of Kerala, Tamil Nadu, and Andhra Pradesh.

Estimated PPRs for different parities for all India, the eight EAG states (Bihar, UP, MP, Odisha, Rajasthan, Jharkhand, Uttarakhand, and Chhattisgarh), and three non-EAG states (Kerala, AP, and TN) are plotted in Figure 4.1 and presented in Table A 4.1 (see Annex 4). The PPRs have been estimated for progressions from parity 0 → 1, 1→2, 2 →3, and 3 → 4 or 4+.

Figure 4.1 reveals that the progression up to the second parity, as expected, is uniform in all of the states and India, whereas the PPR trajectory clearly began deviating from the second parity onwards in states like Kerala, AP, and TN. These three states show a much faster decline in PPR slopes compared to the other states' PPR progressions. It is evident that all of the EAG states are showing a marginal decline in the PPR from parity two onwards. In other words, women from the EAG states are more likely to move from lower parity to higher parity compared to their counterparts from non-EAG states. Among the EAG states, progression to third and higher parities in Odisha is lower compared to the other seven EAG states, and the slope is on a par with India's PPR. The slowest decline in PPR progression has been experienced in Bihar and UP.

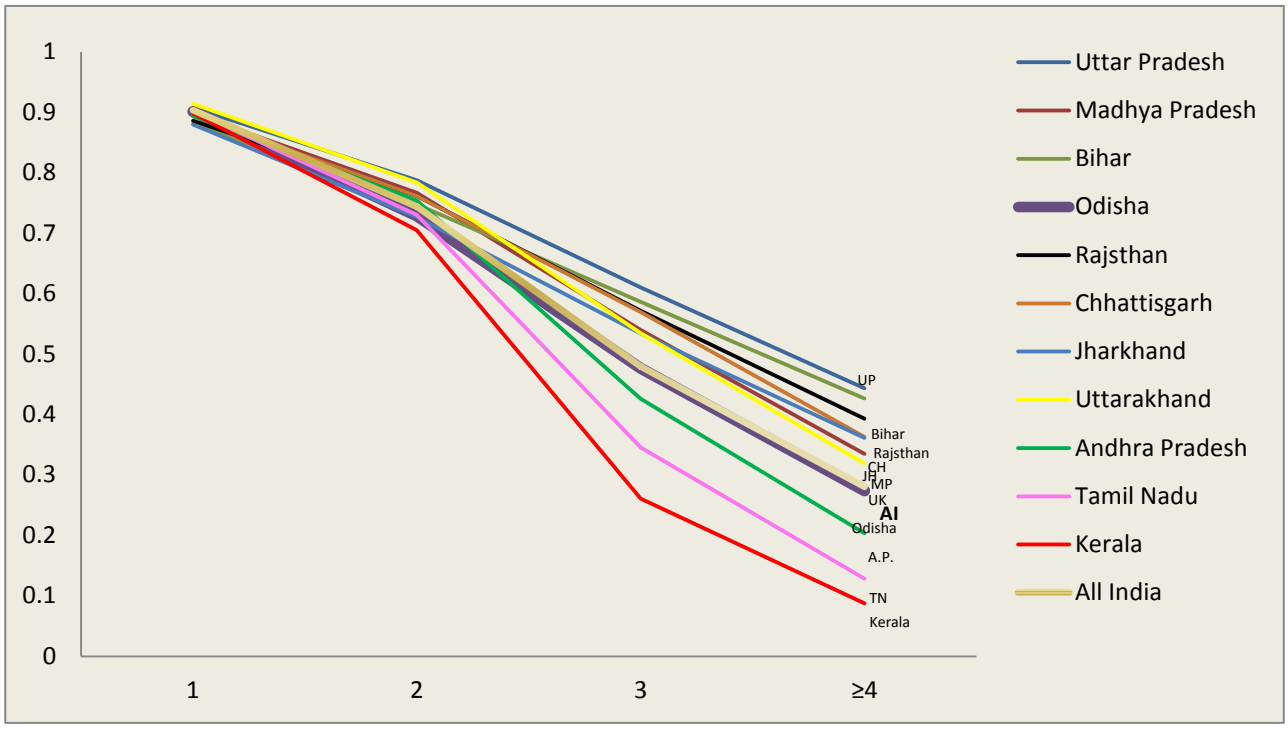


Figure 4.1: Parity progression ratios of currently married women, India and selected states

4.5 BIVARIATE DISTRIBUTION OF CHILDREN EVER BORN BY SELECTED CHARACTERISTICS IN THE EAG STATES OF INDIA

The bivariate distribution of children ever born by selected variables is presented in Annex 4 (Table A 4.2). Figures 4.2 through 4.7 plot the proportion of women with children ever born, categorised into zero, one, two, three, and four+ children, by woman's current age, woman's age at marriage, contraception usage, child mortality experience, woman's education, and wealth index during the family-building process.

The results of the bivariate analysis are consistent with general expectations. Clearly, the percentage of women marrying at 21 years and beyond is much lower in the higher children ever born or higher parity categories, such as 3 and 4+, compared with women marrying at under 18 years of age. Women using modern contraception methods are found much less in the higher parities compared with women not using them. The percentage of women who are more educated is much less in the higher parities compared with uneducated women. Interestingly, the impact of women's occupational hierarchy is shown to be much more pronounced in 4+ parity women. However, the percentage of women experiencing physical and sexual violence does not show any systematic pattern, along with parity or children ever born. Other background characteristics showing a systematic linkage with children ever born are exposure to electronic media such as television, a woman's say in her own healthcare utilisation, proximity to a health facility, and a wealth index elicited based on 31 household inventory items. Muslim women are found much more often in the high parity categories compared with other women. Age at marriage seems to be closely associated with fertility, characterised by the number of children ever born (CEB).

Age at marriage, usage of modern contraception, and experience of infant and child death are closely associated with higher fertility.

Figure 4.2: Children ever born, by age of women, EAG states of India

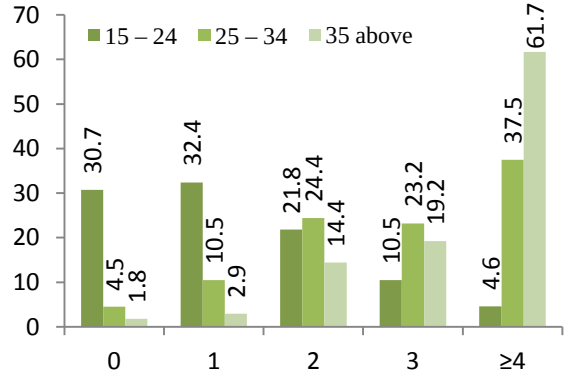


Figure 4.3: Children ever born, by age at marriage, EAG states of India

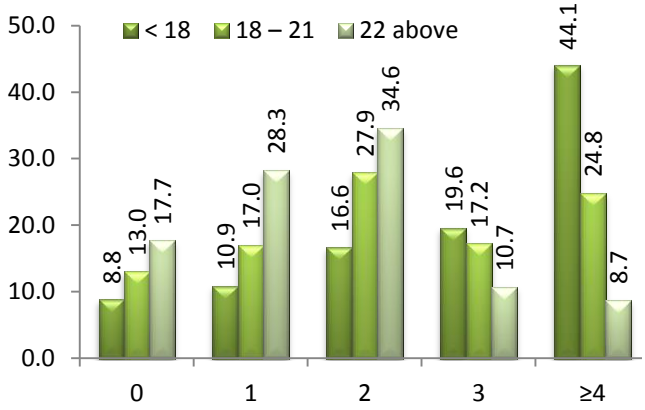


Figure 4.4: Children ever born, by current contraception use, EAG states of India

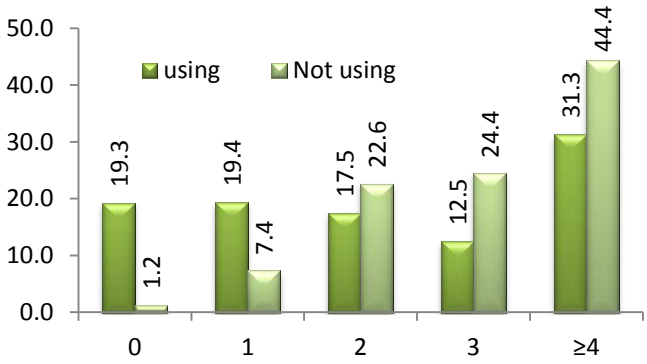


Figure 4.5: Children ever born, by experience of any child died or not, EAG states of India

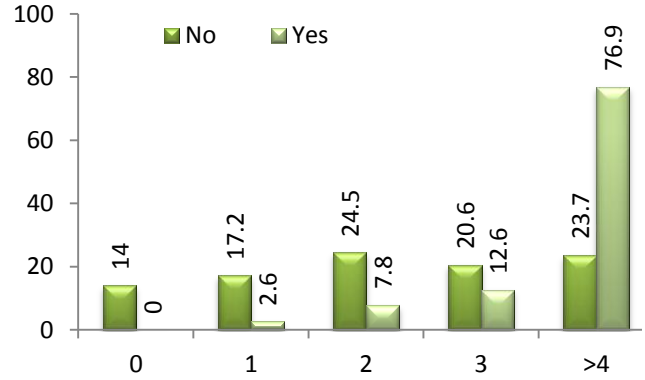


Figure 4.6: Children ever born, by women's educational label, EAG states of India

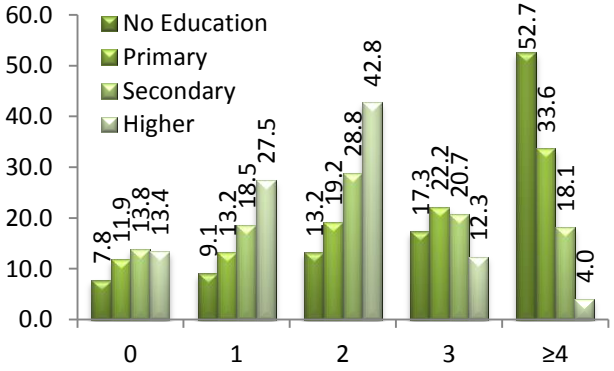
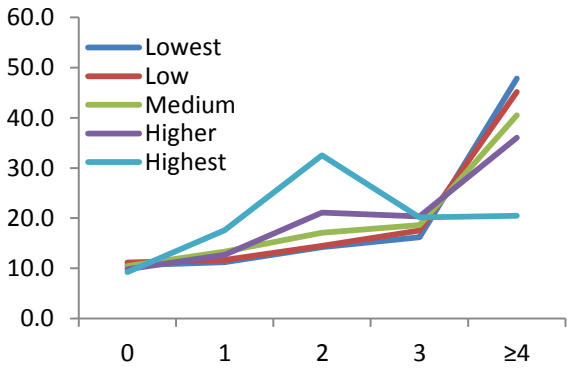


Figure 4.7: Children ever born, by wealth index, EAG states of India



4.6 MULTINOMIAL LOGIT REGRESSION RESULTS

Parametric estimates of the multinomial logit regression model with all the predictor variables are presented in Table 4.1. The estimated coefficients (βi) suggest the additive effect of one unit change in the predictor variable (X_i) on the log of odds (log Ω_i) or (log p_i/p_0) of the response variable. Equivalently, the term ($e^{\beta i}$) suggests the multiplicative effect on the odds ratio or the ratio at which the odds of the response variable would increase or decrease, depending upon the positive or negative sign of the coefficient, respectively. Parametric estimates of the coefficients and levels of significance of underlying models for children ever born numbering one, two, three, and four+ are provided in Table 4.1.

Table 4.1: Multinomial logit regression coefficients of the model with CEB1, CEB2, CEB3, CEB4, using CEB 0 as reference category in the response variable, EAG states

Predictor Variable (x_i)	Log(p1/p0)		Log(p2/p0)		Log(p3/p0)		Log(p4/p0)	
	β_i	μ	β_i	μ	β_i	μ	β_i	μ
Intercept	1.329	.000	1.284	.000	2.242	.000	1.622	.000
Age	.100	.000	.248	.000	.316	.000	0.397	.000
Age at Marriage	-.116	.000	-.272	.000	-.417	.000	-0.498	.000
Contraception Use	-1.590	.000	-2.610	.000	-3.264	.000	-3.325	.000
Any Child Died	9.940	.000	10.731	.000	11.271	.000	12.739	.000
Years of Education	.010	.457	.007	.593	-.067	.000	-0.187	.000
Women's Occupation	-.083	.001	-.115	.000	-.149	.000	-0.185	.000
Husband Ever Slapped or Not	.322	.000	.520	.000	.750	.000	0.813	.000
Sexual Violence	-.110	.313	-.177	.115	-.274	.020	-0.299	0.01
Watching Television	.064	.316	.073	.286	.084	.247	-0.1	0.17
Say on Own Healthcare	-.128	.000	-.174	.000	-.220	.000	-0.272	.000
Distance to Health Facility	.122	.029	.122	.042	.244	.000	0.322	.000
Wealth Index	.056	.030	.058	.036	-.035	.245	-0.189	.000
Place of Residence	.090	.183	-.071	.327	-.216	.006	-0.107	0.19
Religion	-.029	.728	.062	.474	.442	.000	1.31	.000
N	4,044		6,076		5,592		11,472	

μ: Level of significance.
N: Number of observations being 30,285 currently married women ages 15−49 years in the EAG states.
N=3101: Women of parity zero in the reference category.

A perusal of Table 4.1 reveals that the effects of demographic variables, such as woman's age and age at marriage, significantly affect all women at different stages of the family-building process or their fertility as characterised by children ever born. The effect of age at marriage turns out to be significant and negative on children ever born. Interestingly, the intensity or strength of the impact increases amongst higher-parity women, characterised by increasing values of regression coefficients (βi's) from lower- to higher-parity women. Alternatively, the negative impact of age at marriage on children ever born becomes more pronounced amongst higher-parity women or women with a larger number of children ever born, as the coefficients (βi's) increase from -0.116 amongst single parity women to -0.498 amongst four+ parity women. Similarly, we find that usage of modern contraceptives shows a negative and significant impact on children ever born amongst all parity women, such as βi's increasing from -1.590 amongst one parity women to -3.325 amongst four+ parity women. Alternatively, a tendency or inclination towards having a larger number of children drops significantly

amongst women using modern methods of contraception compared with women either not using any methods or using traditional/natural methods, such as rhythm, withdrawal, etc.

The experience of child mortality by women, characterised by child died or not, shows a positive impact on the tendency to have a larger number of children ever born. However, the impact of the child mortality experience turns out to be significant and positive amongst women in all parity categories, without any directional tendency of increasing or decreasing impact, along with parity.

Women's education and occupational hierarchy also shows a significant impact on the log of odds of having higher-order births. As expected, we find that women's education shows a negative impact on the tendency or probability of higher-order births. Again, we find that the impact becomes more pronounced amongst higher-parity women compared with zero-parity women. Alternatively, more educated women tend to have a smaller number of children ever born compared to less educated or uneducated women. The occupational hierarchy of women, as is clear from the way it has been categorised in this study, shows a negative impact on the number of children ever born.

Women's status, characterised by the experience of physical or sexual violence by a husband or a say in healthcare utilisation in the house, also shows a significant and expected impact on the number of children ever born. We find that women who experience physical violence, thus characterising their lower status in the house, show higher fertility or children ever born. Similarly, women having no say in the utilisation of healthcare also show a tendency or probability of having a larger number of children ever born.

A programme factor, such as a lack of accessibility to a health facility, characterised by a woman's opinion as to whether distance from a health facility is problematic or not, also shows a positive impact on the probability of having a larger number of children ever born. However, women residing in urban areas show a significant and negative impact log of odds of having higher-order births, especially amongst third-parity women. Similarly, a wealth index, defined on the basis of a principal component analysis comprising around 31 household inventory items, shows a significant and negative impact on the probability of having four or more number of children ever born.

Religion, i.e., characterising women as Muslim or non-Muslim in this study, shows Muslim women having a significant impact only on four+ parity women. Alternatively, Muslim women show a significantly higher tendency towards having a larger number of children ever born compared to others, despite controlling for other socioeconomic and demographic factors impacting the number of children ever born to currently married women.

The multinomial analysis indicates a much higher number of children born, implying higher PPRs among women who marry, do not use contraception, are less educated, are low in the occupational hierarchy, and have low status as characterised by being subjected to greater levels of physical and sexual violence. Further, the number of children ever born to rural women is higher compared with urban women. The analysis also suggests that women from households with low standards of living, characterised by a low wealth index, show a higher likelihood of being in the higher parities compared with women from higher wealth index households. Furthermore, women who do not have any say in seeking healthcare and are less exposed to electronic media such as television also show a higher tendency of having a larger number of children ever born. Also, Muslim women have a significantly higher likelihood of having a larger number of children ever born compared to other women, despite controlling for other crucial socioeconomic and demographic characteristics within the purview of the present study.

Women's education and gainful employment have significant impacts on parity progression beyond two children.

4.6.1 Multinomial Logit Regression Results – All Currently Married Women Aged 40–49

Table 4.2 provides the results of multinomial analysis when restricted to those women who have completed their family formation process (age group 40–49) in the EAG states. Among the variables considered, age at marriage is found to be impacting the progression of women to higher parities. Women married at higher ages, i.e., married after 18 years compared to the group of women who married before 18 were less likely to move to higher parities, which is especially significant at 3rd and higher order parities. Use of contraception, the other variable considered for the analysis, is found to be determining the shifting to higher parities as women who used some form of contraception are likely to have fewer births compared to women who did not use any contraception.

Table 4.2: Multinomial logit regression coefficients of the model with CEB 1, CEB2, CEB3, CEB4, with CEB 0 as the reference category in the response variable for women aged 40-49 in EAG states

Predictor Variables	$Log(p_1/p_0)$		$Log(p_2/p_0)$		$Log(p_3/p_0)$		$Log(p_4/p_0)$	
	β	σ	β	σ	β	σ	β	σ
Intercept	.294	.893	3.775	.042	5.254	.004	6.486	.000
Age	.024	.602	-.002	.962	.030	.437	.053	.153
Age at marriage	.071	.033	.018	.542	-.091	.003	-.153	.000
Contraception use	-2.054	.000	-3.432	.000	-4.157	.000	-3.885	.000
Any child died	9.151	.000	9.839	0.000	10.176	.000	11.769	.000
Years of education	.040	.592	.083	.184	.013	.835	-.141	.022
Women's occupation	-.074	.436	-.116	.162	-.165	.049	-.242	.004
Husband ever slapped or not	-.339	.264	-.524	.038	-.572	.020	-.612	.010
Sexual violence	-.349	.490	-.625	.136	-.593	.139	-.622	.102
Watching television	.007	.985	.006	.984	.193	.497	.061	.826
Say on own health care	-.199	.227	-.146	.290	-.105	.439	-.204	.124
Distance to health facility	-.128	.663	-.190	.437	-.091	.704	.092	.693
Wealth index	-.044	.748	.226	.047	.136	.221	.062	.564
Place of residence	.437	.226	.186	.535	.143	.628	.088	.761
Religion	-1.401	.001	-1.458	.000	-.901	.003	.150	.581
N	153		799		1174		4169	

Note: The women parity zero are 111 and total women aged 40-49 are 6,414

The analysis clearly indicates that the experience of child death significantly compelled women to move to higher parities compared to women who never experienced any child death in her life time. While controlling other variables, women's education seems to be not significant enough to provide any valid conclusion except for the highest parity considered (i.e., 4 and above). Women who belong to Muslim religion were more likely to have higher number of children compared to women from the other religious groups.

When the analysis restricts to the age group 40–49, results are found to be different from the results obtained when all currently married women in the reproductive age group are considered (mentioned in previous section).

4.7 Adjusted Probabilities of Being in Different Categories of Children Ever Born or Parities by Selected Background Characteristics in EAG States

Table 4.3 provides results of multiple classification analysis for adjusted probabilities with respect to specific reference group for the currently married women in the age group 40-49. Nearly half of the women (46%) whose age at marriage was above 24 were likely to have maximum of three children in their life span when compared to women who married below 18 years of age, more than 70 per cent of whom moved to four or higher parity. Among those women who had no experience of child death, nearly 47 per cent had three or less children as compared to more than 87 per cent of women who ever experienced child death and moved to fourth or higher parity.

Similarly, women's education played a crucial role in restricting family formation process as nearly three-fourth with higher educated women (above secondary education) had restricted their family size below fourth parity; 56 per cent of secondary educated women had maximum of three children while more than 76 per cent of illiterate women moved to fourth or higher parities. Overall, women's education was not significantly affecting the parity when controlled for other variables. Religious factors were found to play a crucial role in family building processes as 88 per cent of Muslim women moved to fourth and higher parity compared to 69 per cent of non-Muslim women who reached fourth or higher parities.

Multinomial analysis and subsequent multiple classification analysis results are quite similar—when the analysis includes women who adopted limiting methods of contraception and women who are non-sterilised but aged 40 and above—and hence not explained separately (please refer tables 4.4 and 4.5).

Table 4.3: Multiple Classification Analysis results of adjusted values of probabilities (pj) from the model of CEB1, CEB2, CEB3, CEB4 with CEB0 as Reference Category* for women 40-49 in the EAG States

Predictor Variables	p_0	p_1	p_2	p_3	p_4
Age					
***p* age 40**	0.000	0.012	0.102	0.186	0.699
***p* age 45**	0.000	0.011	0.081	0.174	0.734
***p* age 49**	0.000	0.010	0.068	0.163	0.759
Age at marriage					
***p am*18**	0.000	0.014	0.100	0.183	0.702
***p am* 21**	0.000	0.025	0.150	0.197	0.628
***p am* 24**	0.000	0.042	0.215	0.203	0.540
Contraception use					
Not Using®	0.000	0.006	0.072	0.196	0.726
Using	0.001	0.216	0.090	0.118	0.575
Any child died					
No®	0.009	0.058	0.146	0.259	0.528
Yes	0.000	0.007	0.035	0.087	0.871
Education					
No education®	0.000	0.020	0.065	0.148	0.767
Primary	0.000	0.034	0.128	0.221	0.617
Secondary	0.000	0.050	0.223	0.290	0.437
Higher	0.000	0.063	0.337	0.331	0.269
Women's occupation					
Not working®	0.000	0.022	0.078	0.167	0.732
Agricultural	0.000	0.034	0.104	0.193	0.669
Professional	0.000	0.044	0.125	0.209	0.622
Husband ever slapped or not					
No®	0.000	0.023	0.083	0.173	0.720
Yes	0.000	0.030	0.089	0.176	0.704
Watching television					
No®	0.000	0.026	0.088	0.163	0.723
Yes	0.000	0.024	0.082	0.183	0.711
Says own healthcare					
Respondent Alone®	0.000	0.025	0.082	0.161	0.732
Respondent with other	0.000	0.025	0.088	0.188	0.700
Other only	0.000	0.024	0.094	0.217	0.665
Distance to health facility					
No Problem®	0.000	0.027	0.095	0.186	0.691
Problem	0.000	0.023	0.077	0.165	0.736
Wealth index					
Lowest®	0.000	0.033	0.062	0.155	0.750

Predictor Variables	p_0	p_1	p_2	p_3	p_4
Middle	0.000	0.026	0.083	0.173	0.719
Highest	0.000	0.020	0.109	0.190	0.682
Religion					
Non-muslim®	0.000	0.028	0.096	0.187	0.689
Muslim	0.000	0.008	0.025	0.084	0.884

** Reference category is no child ever born and p denotes likelihood of occurrence of the event compared with the reference category*

Table 4.4: Multinomial logit regression coefficients of the model with CEB 1, CEB2, CEB3, CEB4, with CEB 0 as the reference category in the response variable for sterilised women at any age and non-sterilised women aged 40-49 in EAG states

Predictor Variables	$Log(p_1/p_0)$		$Log(p_2/p_0)$		$Log(p_3/p_0)$		$Log(p_4/p_0)$	
	β	**σ**	**β**	**σ**	**β**	**σ**	**β**	**σ**
Intercept	2.417	.113	7.687	.000	9.588	.000	9.108	.000
Age	-.017	.624	-.079	.015	-.039	.226	.026	.428
Age at marriage	.081	.015	.031	.297	-.106	.000	-.171	.000
Contraception use	-2.823	.000	-4.286	.000	-5.145	.000	-4.925	.000
Any child died	8.809	.000	9.238	0.000	9.920	0.000	11.580	.000
Years of education	.032	.649	.072	.236	-.014	.824	-.135	.026
Women's occupation	-.063	.494	-.147	.074	-.175	.034	-.231	.005
Husband ever slapped or not	-.535	.064	-.675	.005	-.537	.024	-.531	.024
Sexual violence	-.450	.342	-.501	.189	-.585	.120	-.601	.106
Watching television	.158	.633	.088	.751	.205	.457	.042	.877
Say on own health care	-.165	.291	-.117	.381	-.147	.271	-.198	.133
Distance to health facility	-.084	.762	-.173	.464	-.063	.790	.037	.874
Wealth index	.044	.734	.262	.016	.147	.174	.022	.839
Place of residence	.142	.676	.103	.724	.142	.623	.141	.622
Religion	-1.484	.001	-1.354	.000	-.760	.007	.143	.599
N	202		2037		3121		6963	

Note: The women parity zero are 111 and total women aged 40-49 are 12,434

Table 4.5: Multiple Classification Analysis Table of adjusted values of probabilities (pj) from the model of CEB1, CEB2, CEB3, CEB4 with CEB0 as Reference Category* for sterilised women at any age and non-sterilised women aged 40-49 in the EAG States

Predictor Variables	p_0	p_1	p_2	p_3	p_4
Age					
***p* age 40**	0.000	0.014	0.094	0.242	0.650
***p* age 45**	0.000	0.013	0.062	0.196	0.729
***p* age 49**	0.000	0.012	0.044	0.162	0.782
Age at marriage					
***p am*18**	0.000	0.020	0.137	0.267	0.576
***p am* 21**	0.000	0.036	0.211	0.272	0.482
***p am* 24**	0.000	0.060	0.303	0.259	0.378
Contraception use					
Not Using®	0.000	0.006	0.098	0.275	0.622
Using	0.001	0.430	0.102	0.122	0.344
Any child died					
No®	0.002	0.029	0.182	0.340	0.447
Yes	0.000	0.003	0.033	0.122	0.842
Education					
No education®	0.000	0.012	0.086	0.233	0.668
Primary	0.000	0.019	0.155	0.299	0.527
Secondary	0.000	0.026	0.253	0.346	0.375
Higher	0.000	0.033	0.370	0.359	0.239
Women's occupation					
Not working®	0.000	0.013	0.105	0.254	0.628
Agricultural	0.000	0.020	0.124	0.277	0.579
Professional	0.000	0.027	0.138	0.292	0.544
Husband ever slapped or not					
No®	0.000	0.015	0.114	0.259	0.612
Yes	0.000	0.015	0.100	0.262	0.622
Watching television					
No®	0.000	0.014	0.100	0.245	0.640
Yes	0.000	0.015	0.100	0.275	0.610
Says own healthcare					
Respondent Alone®	0.000	0.015	0.094	0.254	0.637
Respondent with other	0.000	0.015	0.106	0.270	0.609
Other only	0.000	0.015	0.119	0.285	0.581
Distance to Health Facility					
No Problem®	0.000	0.016	0.110	0.270	0.605
Problem	0.000	0.015	0.094	0.257	0.635

Predictor Variables	p_0	p_1	p_2	p_3	p_4
Wealth Index					
Lowest®	0.000	0.016	0.068	0.225	0.691
Middle	0.000	0.015	0.099	0.261	0.624
Highest	0.000	0.014	0.141	0.296	0.549
Religion					
Non-Muslim®	0.000	0.017	0.109	0.272	0.602
Muslim	0.000	0.004	0.033	0.149	0.813

** Reference category is no child ever born and p denotes likelihood of occurrence of the event compared with the reference category*

4.8 Conclusion

A high parity progression is widespread within the high-fertility EAG states compared to the southern states, which have relatively much lower levels of fertility. The multivariate analysis indicates a much higher probability of being in the higher parities, especially three and four+, among women who marry early, do not use modern contraceptive methods, and experience infant or child deaths during their family-building careers. Women's education plays a very important role towards curtailment of fertility beyond two children ever born. The likelihood of women attaining parity three or four+ is substantially lower amongst educated compared to less or uneducated women. Women's status characterised by no experience of domestic violence, especially physical violence, has a substantial impact on the likelihood of women getting into higher parities. PPRs tend to be considerably lower amongst women exposed to electronic media, i.e., watching television. Rural women tend to show a higher probability of entering into the higher parities compared to their counterparts from urban areas. Women expressing problems as to proximity to a health facility also show higher fertility. Further, we find that women from families with a higher wealth index, thus showing a higher standard of living, also show a much lower tendency towards getting into the higher parities. Differentials in the probability or likelihood of entering into four+ parities are substantially higher among Muslim women compared to women from other religions.

Nevertheless, we find that women's age at marriage, use of modern methods of contraception, and experience of any infant or child deaths during their family-building careers have a very strong impact on the likelihood or tendency amongst women to get into the higher parities. Thus, wider use of modern contraceptives and motivating women to get married later after using their adolescence to achieve higher standards of education would facilitate a faster reduction in fertility and also improve women's health. Further, women's status, as adjudged by their education, gainful employment, and absence of domestic violence, also has a strong and negative impact on their fertility and facilitates their limiting their family-building process at lower parities.

It may be of interest to note that most of the demographic predictors show a much stronger impact on the family-building process amongst women in the higher parities. Alternatively, the impact of demographic factors such as age at marriage, use of contraception, and experience of infant and child mortality has much more pronounced effects on the probability or likelihood of women's progression or entry into higher parities, especially three and four+. Thus, with the objective of attainment of replacement fertility, concerted efforts are required to work on these demographic indicators.

Other socioeconomic factors, such as women's education and gainful employment, are factors towards enabling women's status improvement; for a holistic approach, we must also work on these important indicators. Further, economic development would improve the standard of living indicated by the wealth index,

which has a significant and negative impact on higher-parity women. Religious differentials affecting the probability of entry into the higher parities suggest that some extra effort to curtail prolonged childbearing by Muslim women may need to be made.

CHAPTER 5: ANALYSING PROXIMATE DETERMINANTS OF FERTILITY

5.1. Introduction

Fertility has declined substantially in India over the past several years, and the country is in a state of demographic transition. The TFR declined from 3.4 (NFHS-1) to 2.68 (NFHS-3) in 12 years (1992–93 to 2005–06). The NFHS-3 data revealed that at current fertility levels, a woman in India will have an average of 2.68 children in her lifetime if she experiences the current age-specific fertility rate (ASFR). However, the states at present are at different stages of fertility decline. The fertility rates are at or below the replacement level of 2.1 children per woman in about 10 states, whereas in another six states, TFR levels are close to replacement level (TFR 2.4). In contrast, fertility rates still are much higher in several other states, including the more populous states such as Bihar, UP, MP, and Rajasthan.

Causes of variations in fertility levels and their changes generally are measured and analysed based on the impact of socioeconomic factors. Such procedures have a broad appeal to policymakers. Despite this appeal, the relationships of socioeconomic factors with fertility levels are found to differ not only in magnitude but in direction depending on different settings and at different times.

The biological and behavioural factors through which socioeconomic, cultural, and environmental variables affect fertility are known as intermediate fertility variables. The primary characteristic of an intermediate fertility variable is its direct influence on fertility. Analysis of intermediate fertility variables provides substantial insights on specific mechanisms through which the socioeconomic variables operate. In the mid-1950s, Kingsley Davis and Judith Black identified a list of 11 intermediate fertility variables that directly impact fertility levels. In 1978, John Bongaarts (Bongaarts, 1978) listed eight proximate determinants or biological or behavioural factors of fertility through which all the sociocultural and economic processes must interact.

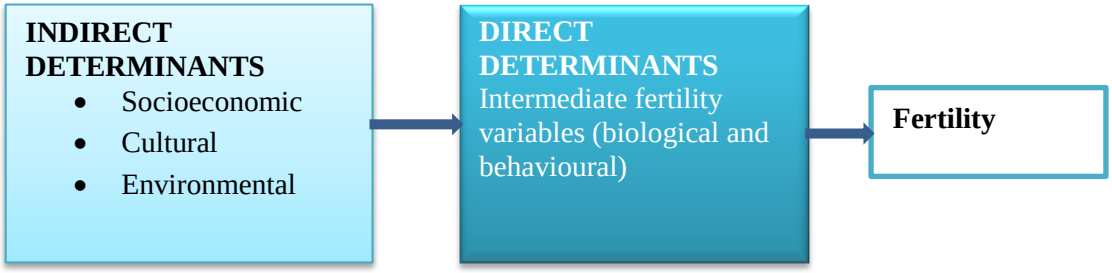
I. Exposure factors
   1. Proportion married

II. Deliberate marital fertility control factors
   1. Contraception
   2. Induced abortion

III. Natural marital fertility factors
   1. Lactational infecundability
   2. Frequency of intercourse
   3. Sterility
   4. Spontaneous intrauterine mortality
   5. Duration of the fertile period

However, the available evidence suggests little variation between populations in the proximate determinants of natural fertility, such as the risk of spontaneous intrauterine mortality or the incidence of permanent sterility or natural infecundability. Bongaarts demonstrated that 96 per cent of the variance in fertility levels among societies is explained by the remaining four proximate determinants of regulated fertility—the proportion of females married, prevalence of contraceptive use, incidence of induced abortion, and the fertility-inhibiting effect of breastfeeding.

The following diagram shows the relationships among the direct and indirect determinants affecting the level of fertility in any population.



5.2. Objectives

The present chapter on the analysis of proximate determinants of fertility has been undertaken at the request of the Family Planning Division, Ministry of Health and Family Welfare (MoHFW), Government of India, as part of the Technical Report aimed at understanding the fertility dynamics and family planning programme in India. The study has been commissioned with a view to identifying the following:

(a) Contribution of intermediate fertility variables in understanding the declining of fertility in India and the states; and

(b) Comparison of the results obtained for the different variables and an analysis of the probable reasons for whatever differences are found to exist.

5.3. Overview of the Intermediate Fertility Variables

Studies of the causes of fertility levels and their changes often seek to measure directly the impact of socioeconomic factors. Substantial insights can be gained if, in addition to the socioeconomic factors influencing fertility, the specific mechanisms through which these factors operate are identified. The Bongaarts model presents a simple but comprehensive method for analysing the relationships between intermediate fertility variables and level of fertility. The model has been used extensively in fertility analysis across regions.

Each of the intermediate fertility variables may be described briefly as follows:

1. Proportion married: Demographers have long recognised marriage as one of the principal proximate determinants of fertility. In most societies, women spend substantial proportions of their potential reproductive years out of marriage; either before first marriage or after a marriage has ended due to divorce, separation, or death of the husband. In addition, some women never marry. To make a quantitative assessment of the fertility effect of different marriage patterns, a simple method was proposed by Ansley Cole (Coale and Trussell, 1974). He calculated three indexes: one for the level of overall fertility, one for the fertility of married women, and one for the proportion married. These indices are constructed so that the index of overall fertility equals the product of the other two. A similar approach will be taken here, but employing a different set of indexes for overall fertility (TFR), marital fertility (TM), and proportion married (Cm).

   The index of the proportion married is calculated as the weighted average of the age-specific proportions married, m(a) (a=age), with the weights given by the age-specific marital fertility rates, g(a).

$$Cm = \frac{\sum m(a)\, g(a)}{\sum g(a)} = \frac{TFR}{TM}$$

2. Contraception: Among populations, contraceptive practice is the intermediate fertility variable primarily responsible for the wide range in the levels of fertility within marriage. To estimate the effect of contraception on marital fertility, the following equation expresses marital fertility as the interaction of contraceptive practice and natural fertility.

   TM = Cc X TNM
   where TM = total marital fertility rate
   TNM = total natural marital fertility rate, equal to TM in the absence of contraception and induced abortion;
   Cc = index of noncontraception
   Cc can be estimated as
   $Cc = 1 - 1.18ue$
   where
   u = average proportion of married women currently using contraception (average of age-specific used rates);
   e = average contraceptive effectiveness

3. Induced abortions: Although reliable measurements of the prevalence of induced abortion are often lacking, it is well known that induced abortion is practised in many societies. Even in cases where good estimates are available, it has proven difficult to determine the reduction in fertility associated with the practice of induced abortion.

   The births averted per induced abortion, b, may be estimated with the equation
   $b = 0.4(1 + u)$
   where *u* equals the proportion protected by contraception among women who have had an induced abortion. Since this information is almost never available, the variable *u* is taken to equal the proportion of all married women currently using contraception.

4. Lactational infecundability: Lactation has an inhibitory effect on ovulation and thus increases the birth interval and decreases natural fertility.
   The ratio of the average birth intervals without and with lactation is called the index of lactational infecundability.
   $$Ci = \frac{20}{18.5 + i}$$
   where
   Ci = index of lactational infecundability;
   i = average duration (in months) of infecundability from birth to the first postpartum ovulation.
   The relationship between lactation and the total natural marital fertility rate, TNM, is summarised by the equation
   TNM = *Ci* X TF
   where
   TF = total fecundity rate is equal to the total natural marital fertility rate in the absence of lactation.

In the formulation explicated by Bongaarts, the TFR is expressed as the product of four indices measuring their fertility-inhibiting effect and the total fecundity (TF) rate. The TF rate is the average number of live births expected among women who, during their entire reproductive period, remain married, do not use any contraception, do not have any induced abortions, and do not breastfeed their children. In such a hypothetical situation, the value of TF is found to vary between 13 and 17, but Bongaarts has suggested the mean value of

15.3 births while testing the model. According to the model, TFR = C(m) x C(c) x C(a) x C(i) x TF, where TFR is the total fertility rate, C(m) is the index of proportion of women married, C(c) is the index of contraception, C(a) is the index of induced abortion, C(i) is the index of lactational infecundability, and TF is the total fecundity rate.

The present analysis will focus on understanding the fertility dynamics and major contributing factors that affect the fertility decline in India and the EAG states. This involves decomposing the contribution of each of the proximate determinants to the realisation of current levels of the TFR. The analysis has been carried out mainly with the national-level data of NFHS-1, -2, and -3, and extended to cover the mutually agreed-upon states (EAG states).

5.4. Data Sources

The appropriate data for present analyses have been extracted from the three rounds of the NFHS, conducted in 1992−93 (round I), 1998−99 (round II), and the latest in 2005−06 (round III); it covers almost the entire country. The main objectives of these NFHS surveys were to provide state- and national-level estimates of fertility, the practice of family planning, infant and child mortality, and utilisation of health services provided to mothers and children.

The intermediate fertility variables under study are similar to those used in the Bongaarts model and have been compiled from data from NFHS surveys to explain the impact on fertility indicators. The use of the model also has limitations in availability of recent data on the abortion rate and postpartum insusceptibility. For this purpose, these variables have been computed from NFHS-2 survey data for India and the states.

The major analysis has been carried out to assess the impact of four intermediate fertility variables for the years 2005−06 (NFHS-3). To assess the change in the level of intermediate fertility variables, a comparison has been made with the analysis of NFHS-1 data by Visaria (1999) and Stover (1997).

5.5. Methods of Estimation

Variables	Method of Estimation	Remarks
Index of Intermediate Fertility Variables		
Cm = index of proportion married	$Cm = \frac{\sum m(a)\, g(a)}{\sum g(a)} = \frac{TFR}{TM}$	
Cc = index of non-contraception	$Cc = 1 - 1.18ue$	
Ca = index of induced abortion	$Ca = \frac{TFR}{(TFR + bXTA}$	
Ci = index of lactational infecundability	$Ci = \frac{20}{18.5 + i}$	
Fertility Measures		
TFR = total fertility rate	Sum of observed age-specific fertility rates, excluding illegitimate births.	

Variables	Method of Estimation	Remarks
	$TFR = Cm\ X\ Cc\ X\ Ca\ X\ Ci\ X\ TF$ $= Cm\ X\ Cc\ X\ Ca\ X\ TNM$ $= Cm\ X\ TM$	
Tm = Total marital fertility rate	Sum of observed age-specific marital fertility rates. $TM = \frac{TFR}{Cm} = Cc\ X\ Ca\ X\ Ci\ X\ TF$ $= Cc\ X\ Ca\ X\ TNM$	
TNM = total natural marital fertility rate	$TNM = \frac{TFR}{Cm\ X\ Cc\ X\ Ca\ X\ Ci} = \frac{TM}{Cc\ X\ Ca}$ $= \frac{Ci}{TF}$	
TF = total fecundity rate	$TF = \frac{TFR}{Cm\ X\ Cc\ X\ Ca\ X\ Ci} = \frac{TM}{Cc\ X\ Ca\ X\ Ci}$ $= \frac{TNM}{Ci}$	
Required Input Measures		
m(a) = age-specific proportions married	As observed	NHFS
g(a) = age-specific marital fertility rate	As observed (may be approximated)	NHFS
u = average proportion of married women currently using contraception	As observed	NHFS
e = average effectiveness of contraception	As observed	
b = births averted per induced abortions	$b = 0.4(1 + u)$	
TA = total induced abortion rate	As observed (excluding extramarital induced abortions)	
i = average duration of lactational infecundability (months)	As observed	NHFS

5.6 Decomposition of a Change in Fertility between Two Points in Time

Any change in a population fertility level can be the result of a change in one or more of the proximate determinants. Thus, it is possible to say that the decomposition of a trend in the TFR is based on the following equation, which links the TFR to the fertility-inhibiting effects of the four principal proximate variables:
TFR= Cm*Cc*Ca*Ci*TF

Considering 2005 and 1992 as the first and last years of the time period for which decomposition is required. A change in the TFR from TFR_{1992} in the year 1992 to TFR_{2005} in the year 2005, and with simultaneous changes in the indexes from Cm_{1992} to $Cm_{2005,}$ from Cc_{1992} to $Cc_{2005,}$ from Ca_{1992} to $Ca_{2005,}$ from Ci_{1992} to $Ci_{2005,}$ and from TF_{1992} to TF_{2005} between the years 1992 and 2005, the ratio TFR_{2005}/TFR_{1992}, can be expressed as

$$\mathbf{TFR_{2005}/TFR_{1992} = Cm_{2005}/Cm_{1992} * Cc_{2005}/Cc_{1992} * Ca_{2005}/Ca_{1992} * Ci_{2005}/Ci_{1992} * TF_{2005}/TF_{1992}}$$

Proportional change in TFR between the years 1992 and 2005

$$P_f = \frac{TFR2005 - TFR1992}{TFR1992}$$

Proportional change in TFR due to a change in the index of marriage between the years 1992 and 2005

$$P_m = \frac{Cm2005 - Cm1992}{Cm1992}$$

Proportional change in TFR due to a change in the index of contraception between the years 1992 and 2005

$$P_c = \frac{Cc2005 - Cc1992}{Cc1992}$$

Proportional change in TFR due to a change in the index of induced abortion between the years 1992 and 2005

$$P_a = \frac{Ca2005 - Ca1992}{Ca1992}$$

Proportional change in TFR due to a change in the index of postpartum infecundability between the years 1992 and 2005

$$P_i = \frac{Ci2005 - Ci1992}{Ci1992}$$

Proportional change in TFR due to a change in the remaining proximate variables—natural infecundability, spontaneous intrauterine mortality, and permanent sterility— between the years 1992 and 2005

$$P_r = \frac{TF2005 - TF1992}{TF1992}$$

Therefore,

$$P_f = P_m + P_c + P_a + P_i + P_r + I$$

Where
I is the interaction factor

Thus, the proportional change in TFR between 1992 and 2005 is "equal to the sum of the proportional fertility changes due to the different proximate determinants plus an interaction term."

5.7. The Recent Decline of Fertility in India

Fertility has declined throughout the country, albeit at a varying pace, as is evident from Table 5.1. The table shows that the fertility levels in two non-EAG states have gone much below the replacement level, while states like Odisha, Chhattisgarh, and Uttarakhand are marginally away from the replacement level, and can be expected to achieve the level faster than the other EAG states. During the period from NFHS-1 to NFHS-3 (1992–2005), the fertility in two non-EAG states (i.e., Andhra Pradesh and Tamil Nadu) declined at a faster pace (31% and 27%, respectively) compared to other states. Among the EAG states, the decline in fertility was almost uniform in UP, MP, and Odisha and in line with the national average (about 20%). This provides the prospect of a further decline in fertility in India that is likely to reach the replacement level in the next few years. However, there has been an unprecedented increase in the level of the TFR during the six years between NFHS-1 and NFHS-2 in the states of Bihar and Jharkhand.

Table 5.1: Change in total fertility rate, India and selected states, 1992–2005

	Total Fertility Rate			Percentage Change		
	NFHS-1	NFHS-2	NFHS-3	NFHS 1–2	NFHS 2– 3	NFHS 1–3
India	3.39	2.85	2.68	15.9	6.0	20.9
Bihar	4.00	3.70	4.00	7.5	-8.1	0.0
Chhattisgarh	Na	2.79	2.62		6.1	
Jharkhand	Na	2.76	3.31		-19.9	
Madhya Pradesh	3.90	3.43	3.12	12.1	9.0	20.0
Odisha	2.92	2.46	2.37	15.8	3.7	18.8
Rajasthan	3.63	3.78	3.21	-4.1	15.1	11.6
Uttarakhand	Na	2.61	2.55		2.3	
Uttar Pradesh	4.82	4.06	3.82	15.8	5.9	20.7
Andhra Pradesh	2.59	2.25	1.79	13.1	20.4	30.9
Tamil Nadu	2.48	2.19	1.80	11.7	17.8	27.4

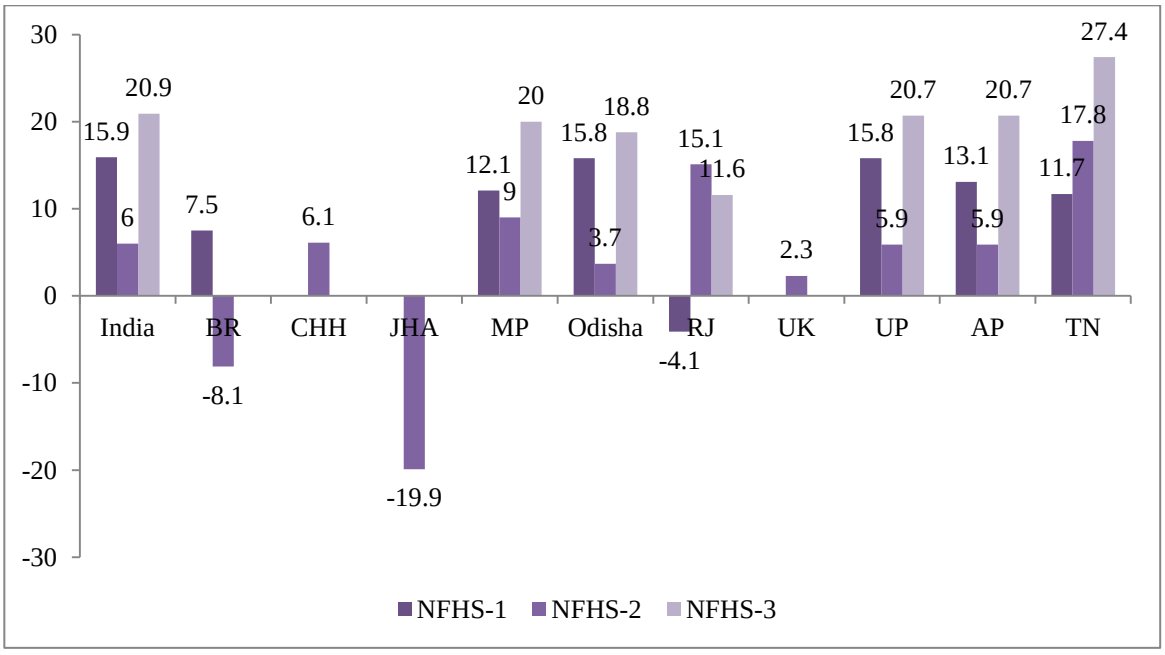


Fig 5.1: Change in fertility levels (TFR), India and selected states, 2005–06

5.8 Role of Proximate Determinants

Observed variations in the fertility levels of populations are due to variation in one or more of the proximate determinants. The four important proximate determinants under study are the following: (1) proportion of married women (of reproductive age), (2) proportion of couples using contraception, (3) extent of induced abortion, and (4) the length of lactation infecundability.

The present study primarily aims to examine the role of these four important proximate determinants in explaining the fertility levels in the EAG states—UP, Bihar, MP, Rajasthan, Odisha, Jharkhand, Chhattisgarh, and Uttarakhand. A comparison has been made with the findings from the two non-EAG states of the country—Andhra Pradesh and Tamil Nadu.

Bongaarts presented a multiplicative model, such that the decomposition of the changes in the fertility of a population can be effected into changes in four proximate determinants, i.e., the proportion married, contraception, induced abortion, and lactational infecundability. These proximate determinants are considered inhibitors of fertility because fertility is lower than its maximum as a result of the effect of each. It may be noted that for a population, four different types of fertility levels can be identified from which the impact of the proximate variables can be derived. With the inhibiting effects of all proximate determinants, the actual level of fertility (TFR) for a population can be measured.

If the fertility-inhibiting effect of delayed marriage and marital disruption is removed without other changes in fertility behaviour, fertility will increase to a level TM (total marital fertility rate). If all practice of contraception and induced abortion also is eliminated, fertility will rise further to a level TN (total natural marital fertility rate). Also removing the practice of lactation and postpartum abstinence further increases fertility to what will be called the TF rate. The TFR, TM, and TN vary widely among the population, whereas the TFs of most populations would fall within the range of 13–17 births per woman, with an average of 15 births per woman (Bongaarts and Potter, 1983).

The TF is relatively invariant because the three remaining proximate factors (natural infecundability, spontaneous intrauterine mortality, and permanent sterility) that determine TF usually cause only modest changes in fertility. The fertility effects of the four most important proximate determinants—proportion married, contraception, induced abortion, and postpartum infecundability—are measured in Bongaart's model, mentioned earlier, by four indexes—Cm, Cc, Ca, and Ci, respectively—that can take values between 0 and 1. When there is no fertility-inhibiting effect of a given intermediate variable, the corresponding index will take the value 1; if the fertility inhibition is complete, it will take the value 0. Each index by definition thus equals the ratio of the fertility levels in the presence and absence of inhibition caused by the corresponding intermediate factor.

(a) *Marriage*: Marriage is among the most important of the proximate determinants, since it is a primary indicator of women's exposure to the risk of pregnancy. Early age at first marriage in a population is usually associated with a longer period of exposure to the risk of pregnancy, and thus higher fertility levels. The early initiation of childbearing associated with early marriage may also adversely affect women's and children's health. The age at marriage (or entry into sexual union) and the proportion of women remaining single determine the number of women exposed to the risk of pregnancy and the duration of time for which they would be exposed.

Marriage in India marks the point in a woman's life when childbearing becomes socially acceptable. Table 5.2 presents the distribution of women by current marital status for the various age groups between ages 15−49. The age at marriage in India has been observed to be increasing gradually; as a result, the proportion of women married in the initial age groups has been declining. As per the NFHS-3 survey, one out of four women of reproductive age was not currently married in India. The situation varies from state to state. The proportion of

currently married women was mostly at higher levels among all of the EAG states except Odisha and Chhattisgarh.

The increase in the age at marriage has significantly contributed to the declining proportion of married women in the age group 15–19 in the state of Uttarakhand (0.11). However, the proportion of married women in this age group was nearly 50 per cent in such states as Uttar Pradesh, Bihar, and Jharkhand. In these states, proportionately more women are exposed to sexual relations and thus to the risk of pregnancy.

Table 5.2: Proportion of women married, India and selected states, 2005–06

Age Group	Proportion Married									
	India	Bihar	Chhattis-garh	Jhar-khand	MP	Odisha	Rajasthan	Uttara-khand	AP	TN
15–19	0.27	0.45	0.25	0.45	0.28	0.23	0.31	0.11	0.30	0.13
20–24	0.74	0.88	0.75	0.82	0.82	0.66	0.84	0.64	0.78	0.58
25–29	0.91	0.96	0.92	0.89	0.93	0.88	0.95	0.93	0.93	0.85
30–34	0.93	0.96	0.91	0.93	0.96	0.92	0.96	0.95	0.90	0.90
35–39	0.91	0.94	0.86	0.90	0.93	0.90	0.95	0.95	0.88	0.89
40–44	0.89	0.91	0.89	0.89	0.92	0.90	0.91	0.93	0.86	0.83
45–49	0.87	0.93	0.81	0.86	0.89	0.90	0.88	0.84	0.82	0.79
Total	0.75	0.81	0.72	0.78	0.78	0.72	0.79	0.76	0.77	0.71

Throughout the world, women are at risk of pregnancy between the ages of 15 and 49, or for about 35 years. However, this duration is truncated when age at marriage or entry into sexual union is postponed, or exit from marriage is advanced due to divorce, separation, or death of a spouse. Further, assuming that there is no childbearing outside of marriage, if some proportion of women does not enter marriage at all, overall fertility is reduced.

Table 5.3: Total fertility rate, total marital fertility rate, and index of marriage, India and selected states, 2005–06

	TFR	TMFR	Cm
India	2.68	4.38	0.61
Bihar	4.00	5.06	0.79
Chhattisgarh	2.62	4.44	0.59
Jharkhand	3.31	4.39	0.76
Madhya Pradesh	3.12	4.73	0.66
Odisha	2.37	4.23	0.56
Rajasthan	3.21	4.61	0.7
Uttarakhand	2.55	5.10	0.5
Uttar Pradesh	3.82	5.64	0.68
Andhra Pradesh	1.79	3.19	0.56
Tamil Nadu	1.80	4.38	0.41
NFHS-1	3.40	4.77	0.71

Table 5.3 shows the level of TFR, Total Marital Fertility Rate (TMFR), and the index of the proportion married for India and states. A comparison has also been presented with three different surveys. It is evident from the table that the nuptiality pattern has been different among the EAG and non-EAG states. The increasing age at marriage has contributed significantly to a decline in the index of the proportion married. Among the states like

Bihar, Jharkhand, Rajasthan, and UP, the index of the proportion married is on the high side because of lower mean age at marriage in these states. Obviously, these are the states where fertility rates are still very high.

(b) *Use of contraception*: One of the major determinants of fertility in modern times is the use of contraception, which regulates fertility. In India, the contraceptive prevalence rate through use of modern methods has risen from about 36 per cent in 1992 (NFHS-1) to 48.4 per cent in 2005−06 (NFHS-3), in which the contribution of sterilisation has been maximized (38.3%). Table 5.4 shows the distribution of the current use of modern contraception in India and selected states. It is evident from the table that approximately 10 per cent of couples have been reported as using spacing methods, of which half are condom users. Obviously, the proportion of users of modern methods of contraception is higher among the non-EAG states.

Among the EAG states, the use of contraception by modern methods reached a maximum in the state of Uttarakhand (55.4%), followed by MP (53%) and Chhattisgarh (49%). On the other hand, the use of contraception has been substantially lower in Bihar (28.8%), UP (29%), and Jharkhand (31%). Uttarakhand, where CPR is highest among the EAG states, showed only a 34 per cent use of limiting methods. On the other hand, in MP, the use of limiting methods has been the highest among the EAG states (47%). This indicates that if sterilisation has a direct impact on fertility reduction, this state then can achieve the replacement level of fertility at the earliest time. It is evident that the use of injectables and IUDs has been ignored and has not been a priority area for the FP programme in India.

Table 5.4: Current use of modern contraception, India and selected states, 2005–06

	Contraceptive Use, by Method						CPR	Cc
	Female Ster.	Male Ster.	IUD	Pills	Condom	Injectables		
India	0.373	0.010	0.017	0.031	0.052	0.001	48.4	0.49
Bihar	0.238	0.006	0.006	0.013	0.023	0.002	28.8	0.70
Chhattisgarh	0.407	0.033	0.008	0.014	0.029	0.000	49.1	0.48
Jharkhand	0.234	0.004	0.006	0.038	0.027	0.001	31.0	0.67
MP	0.443	0.013	0.007	0.017	0.048	0.000	52.8	0.44
Odisha	0.331	0.010	0.005	0.07	0.030	0.001	44.7	0.53
Rajasthan	0.342	0.008	0.016	0.02	0.057	0.001	44.4	0.53
Uttarakhand	0.321	0.018	0.015	0.042	0.157	0.001	55.4	0.44
Uttar Pradesh	0.173	0.002	0.014	0.017	0.086	0.001	29.3	0.70
Andhra Pradesh	0.629	0.029	0.005	0.003	0.005	0.001	67.2	0.28
Tamil Nadu	0.55	0.004	0.021	0.002	0.023	0.00	60.0	0.36

Similarly, the index of non-contraception is much lower among the states where CPR is higher. Andhra Pradesh and Tamil Nadu have shown the lowest index of non-contraception (0.28 and 0.36, respectively). Among the EAG states, the index of non-contraception has been lowest in Uttarakhand and MP (0.44 each). On the other hand, UP, Bihar, and Jharkhand have shown a higher index level (about 0.7), explaining the very limited impact of contraception on fertility behaviour.

There is no doubt that the use of contraception to lower marital fertility has gone up throughout the country, although regional differences persist. According to the NFHS-3 data, among the EAG states, contraceptive use ranged from a low of 29 per cent in Bihar to a high of 55 per cent in Uttarakhand. However, in the country as a whole, sterilisation—mostly of females, but to a small extent, also of males—accounted for maximum use. The trend has been similar throughout the country. Reliance on sterilisation is high across almost all the states.

It is evident from the table that the use of contraception has affected the decline in maximum fertility levels in the states of MP and Uttarakhand among the EAG states. In the states of Bihar and UP, contraception had the

lowest effect when explaining their fertility decline. These states have the potential to promote the FP programme—specifically, terminal methods.

While the use-effectiveness of sterilisation is higher than that of other methods, and certainly much higher than traditional methods, contraceptive use cannot increase very rapidly because couples adopt it only when they are ready to limit their family size.

(c) *Abortion*: The extent to which women resort to abortion has a direct effect on fertility levels, independent of other proximate determinants, because abortion ends a pregnancy. Abortion may be spontaneous, or deliberately induced to end an unwanted pregnancy or malformed pregnancy (which may be life threatening), or a pregnancy with a foetus of the undesired sex. The extent of spontaneous abortions in a population may depend on the nutritional status of women or maternal health. However, induced abortions depend upon cultural, religious, and societal norms and attitudes, as well as on the legal status of abortion in the country. In India, induced abortion has been legal since 1972, yet there are no firm estimates of the number of such abortions performed in the country.

It is widely held that the incidence of induced abortions is grossly under-reported in surveys for a complex set of reasons. There is still a stigma attached to reporting an induced abortion. Women or couples often do not inform their immediate relatives about having resorted to abortion and are unlikely to report it to investigators. Sometimes induced abortions are reported as spontaneous abortions. Even if the reference period of the survey requires women to recollect the outcomes of all pregnancies from marriage until the time of the survey, some events, which do not result in live births, may be omitted.

The NFHS collected information on the outcomes of all lifetime pregnancies from all ever-married women in the survey and noted that women reported 4.5 and 1.3 per cent of all pregnancies as having ended in spontaneous and induced abortions, respectively. The NFHS report admits that the information collected on abortions is likely to be less accurate than that on live births. In spite of the possibility that the incidence of induced abortion in India is on the increase, its estimates tend to be very low, so that the effect of this factor on total fertility also is estimated to be very small.

Table 5.5: Abortion rate, India and selected states, 2005–06

	Abortion Rate	Ca
India	0.04	0.988
Uttar Pradesh	0.06	0.988
Bihar	0.01	0.998
Chhattisgarh	0.03	0.991
Jharkhand	0.01	0.998
Madhya Pradesh	0.03	0.992
Odisha	0.03	0.990
Rajasthan	0.02	0.992
Tamil Nadu	0.14	0.941
Uttarakhand	0.06	0.986
Andhra Pradesh	0.03	0.987

NFHS-2 data provides the estimate for the level of induced abortion for India and the states. These data have been used for our analysis and are provided in Table 5.5. It is evident from the table that abortion has not shown any impact on fertility control and its index has almost been at level 1 across the states and in India as a whole. There is evidence that fertility has been impacted by abortion in the state of Tamil Nadu.

(d) *Duration of breastfeeding and length of postpartum amenorrhoea*: It is reasonably well established that breastfeeding is the principal determinant of postpartum amenorrhoea and that with an increase in the duration of breastfeeding, the duration of amenorrhoea rises. To estimate the effect of amenorrhoea on fertility, information on the duration of breastfeeding is essential. Although breastfeeding in India is known to be both almost universal and prolonged, NFHS had collected information on the duration of breastfeeding and associated postpartum amenorrhoea.

For the country as a whole, the mean duration of breastfeeding was estimated at 24 months; however, there were significant interstate differences in the mean duration of breastfeeding, ranging from a low of 15 months in Tamil Nadu to 35 months in Jharkhand and Odisha.

Admittedly, breastfeeding of such a long duration does not protect women from conception for the entire period, partly because women do not exclusively breastfeed the children when they are older, but supplement breast milk with other foods. The NFHS has estimated that in India, the median duration of postpartum amenorrhoea is nine months, with a sizeable interstate variation. However, the period of lactational or postpartum amenorrhoea tends to overlap with that of abstinence from sexual relations between spouses. Throughout the country, childbirth is almost always followed by several months of abstinence; also, its duration, which is ritually determined, does not vary a great deal. The NFHS has estimated the overlap between postpartum amenorrhoea and abstinence and derived the duration of net postpartum non-susceptibility for the country as a whole as well as for the major states. For all India, the median duration of net no susceptibility to conception was estimated to be 10 months.

Table 5.6 : Index of postpartum amenorrhea, India and selected states, 2005–06

	Mean Duration of BF	Mean Number of Months of Amenorrhea	Mean No. of Months of Abstinence	Postpartum Insusceptibility	Ci
India	24.4	9.2	4.9	10.3	0.69
Bihar	25.4	13.3	5.7	14.3	0.61
Chhattisgarh	29.6	12.0	5.9	13.3	0.63
Jharkhand	34.8	13.3	5.7	14.3	0.61
Madhya Pradesh	23.3	12.0	5.9	13.3	0.63
Odisha	35.2	11.5	8.9	13.7	0.62
Rajasthan	23.6	10.4	3.9	11.0	0.68
Uttarakhand	25.0	10.6	5.2	12.0	0.66
Uttar Pradesh	25.4	10.6	5.2	12.0	0.66
Andhra Pradesh	23.2	11.0	7.4	12.4	0.65
Tamil Nadu	15.5	7.4	7.2	9.6	0.71

It is evident from Table 5.6 that postpartum insusceptibility by and large has been uniform all across the states, ranging from 0.61 in Bihar and Jharkhand to 0.68 in Rajasthan among the EAG states.

The NFHS does not take into account the likely overlap between postpartum amenorrhoea and the use of modern methods of contraception, other than abstinence, because some women do start using contraception prior to resumption of their menstruation. For example, health workers do encourage women to accept an IUD within a few months of childbirth. When women have attained the desired number of children, a permanent method like tubectomy is promoted and accepted a few days after delivery. To estimate accurately the net duration of postpartum infecundability, the overlap between postpartum amenorrhoea and abstinence, as well as the use of other contraceptives, needs to be estimated.

5.9 Results and Discussion

The index of marriage C(m) is estimated from the information on TFR and TMFR as reported by the NFHS-3 survey data. These rates are based on births during the three-year period of 2005−06, before the year of the survey. The index of marriage is estimated as TFR/TMFR. The values for the major states of India are shown in Table 5.7. The value of C(m) measures the effect of age at marriage on fertility and increases with an increase in the age at marriage. In other words, C(m) expresses the effect of non-marriage as a reduction in fertility per woman. The level of fertility has been impacted mostly in the states of Uttarakhand and Odisha among the EAG states, as these have shown lowest level of index of marriage. Overall, the increasing age at marriage has impacted the fertility reduction the states of Tamil Nadu and Uttarakhand by about 2.5 births, which is the maximum observed effect. The least impact of age at marriage in the decline of fertility has been in Bihar, Jharkhand, and Rajasthan. As is evident, the interstate variations in TFR ranged from a low of 2.4 for Odisha to 4.0 for Bihar.

Table 5.7: Value of intermediate fertility indices, India and selected states, 2005–06

	TFR	Cm	Cc	Ca	Ci	TF
India	2.68	0.61	0.49	0.99	0.69	13.10
Bihar	4.00	0.79	0.70	0.99	0.61	11.90
Chhattisgarh	2.62	0.59	0.48	0.99	0.63	14.80
Jharkhand	3.31	0.76	0.67	0.99	0.61	10.80
Madhya Pradesh	3.12	0.66	0.44	0.99	0.63	17.20
Odisha	2.37	0.56	0.53	0.99	0.62	13.00
Rajasthan	3.21	0.7	0.53	0.99	0.68	12.90
Uttarakhand	2.55	0.5	0.44	0.99	0.66	17.80
Uttar Pradesh	3.82	0.68	0.70	0.99	0.66	12.40
Andhra Pradesh	1.79	0.56	0.28	0.99	0.65	17.70
Tamil Nadu	1.80	0.41	0.36	0.94	0.71	18.20
NFHS-1	3.4	0.71	0.61	0.99	0.56	11.51

As is evident in the table, the values of C(a) in all of the states with the sole exception of Tamil Nadu are greater than 0.98. We thus have not considered the insignificant fertility-inhibiting effect of abortion on the model discussed here. Table 5.7 gives the values of the indices of the four proximate determinants and the estimates of total fecundity rates implied by these determinants. The indexes suggest that if the effect of delayed marriage is removed without any other change in fertility behaviour, the fertility level will increase to the total marital fertility rate (TM). If the practice of contraception and induced abortion are also eliminated, fertility will rise to the level of the total natural marital fertility rate (TN). In addition, if women do not breastfeed their children and do not practise postpartum abstinence, fertility will increase to the total fecundity (TF) rate. Fertility is below its maximum value because of delayed marriage, use of contraception, induced abortion, and postpartum infecundability induced by breastfeeding and abstinence.

The analysis of proximate determinants shows that the use of contraception has been the most important intermediate variable that signifies a variation of the level of fertility among the EAG and non-EAG states. Table 5.8 presents the overall variation in the levels of the TFR, total marital fertility rate, total natural marital fertility rate, and total fecundity rate.

Table 5.8: Total fertility rate, total marital fertility rate, total natural marital fertility rate, and total fecundity rate, India and selected states, 2005–06

	TFR	TM	TN	TF
India	2.68	4.38	9.03	13.10
Bihar	4.00	5.06	7.32	11.90
Chhattisgarh	2.62	4.44	9.34	14.80
Jharkhand	3.31	4.39	6.60	10.80
Madhya Pradesh	3.12	4.73	10.87	17.20
Odisha	2.37	4.23	8.07	13.00
Rajasthan	3.21	4.61	8.79	12.90
Uttarakhand	2.55	5.10	11.71	17.80
Uttar Pradesh	3.82	5.64	8.11	12.40
Andhra Pradesh	1.79	3.19	11.50	17.70
Tamil Nadu	1.80	4.38	12.93	18.20
NFHS-1	3.40	4.80	7.94	11.51

The Bongaarts model has shown that the TF values generally range between 13 to 17 births per woman for any given population, with an average value near 15. Any value of TF outside of this range is very likely due to some errors in data or estimation procedures. For India as a whole, the total fecundity rate is estimated to be 13.13 births; this is in the range suggested by Bongaarts. It is also evident from the table that there has been a wide variation in the level of estimated TF among the states, ranging from 10.66 births in Jharkhand to 18.27 births in Tamil Nadu. A naked-eye view of the data shows that the states with low TFR and higher use of contraception show a higher level of TF in the model; in contrast, states with high TFR and low use of contraception show a lower level of TF. This implies that contraceptive use in the model is most likely to overestimate the impact of contraception in fertility decline. It can be stated that the model has explained the variation in the level of fertility decline, but the magnitude of the impact of intermediate variables is more uncertain.

It is evident that the transition from natural fertility to controlled fertility in states like TN, AP, Uttarakhand, and MP has been accompanied by a large increase in the use of contraception. The contribution of the use of contraception in depressing total fecundity was between two to 2.5 births in the states of Jharkhand, Bihar, and UP, while it was above eight births in TN and AP. The use of contraception has affected total fecundity by about six births in the states of MP and Uttarakhand. A comparison with the NFHS-1 results shows that because of the increase in the use of modern methods of contraception, the number of births averted has increased over a period of 12 years. In India, the use of modern contraception has caused a decline of about 3.4 births during the NFHS-1 survey, which increased to 4.65 births in NFHS-3 due to the increased use of modern methods of contraception. The analysis shows that in the state of Tamil Nadu, about five births were averted due to the use of contraception during NFHS-1 while it increased to 8.5 births during the NFHS-3 survey. A similar impact has been observed in the states of AP, Uttarakhand, and MP.

The effect of the decline in the proportion married on total fecundity or the fertility-inhibiting influence of delayed marriage on total fecundity is much less than that of contraception. The impact of delayed marriage or proportion married ranges from one to 2.5 births across the states, averaging 1.7 births for India as a whole. The two states that have shown the greatest impact of delayed marriage on fertility reduction are Tamil Nadu and Uttarakhand. The smallest impact of delayed marriage in depressing total fecundity of women has been in Bihar and Jharkhand.

To estimate the contribution of postpartum insusceptibility in reducing fertility from total fecundity of women in India and states, the data have been extracted from the NFHS-2 survey. In the cases of Jharkhand, Chhattisgarh, and Uttarakhand, the estimates from their parent states have been considered. The estimated

duration of postpartum insusceptibility ranged from 11 months in Rajasthan to about 14 months in Bihar and Jharkhand among the EAG states. It is evident from the analysis that postpartum insusceptibility has contributed to fertility decline by about four births from total fecundity in India. There has been a slight increase of 0.47 from the NFHS-1 survey. The contribution of postpartum insusceptibility varies from state to state, as per the length of breastfeeding and sexual abstinence. The mean duration of breastfeeding ranges from 7.4 months in Tamil Nadu to 13.3 months in Bihar and Jharkhand.

The mean length of sexual abstinence for India has been estimated at about five months, with a variation of from 3.9 months in Rajasthan to 8.9 months in Odisha. The fertility-inhibiting impact reveals that postpartum insusceptibility has had the maximum impact on Odisha, TN, and AP among all of the states under study. A decline of more than six births from the total fecundity rate has been observed in these three states. The relatively large role of postpartum insusceptibility in depressing total fecundity in these states implies that they are highly likely to increase their fertility rate if breastfeeding practices are changed. A comparison of NFHS-1 results shows a sharp increase in declining births due to this factor in almost all of the states. There might be a possibility of some errors in the reported data and estimation procedure for postpartum insusceptibility.

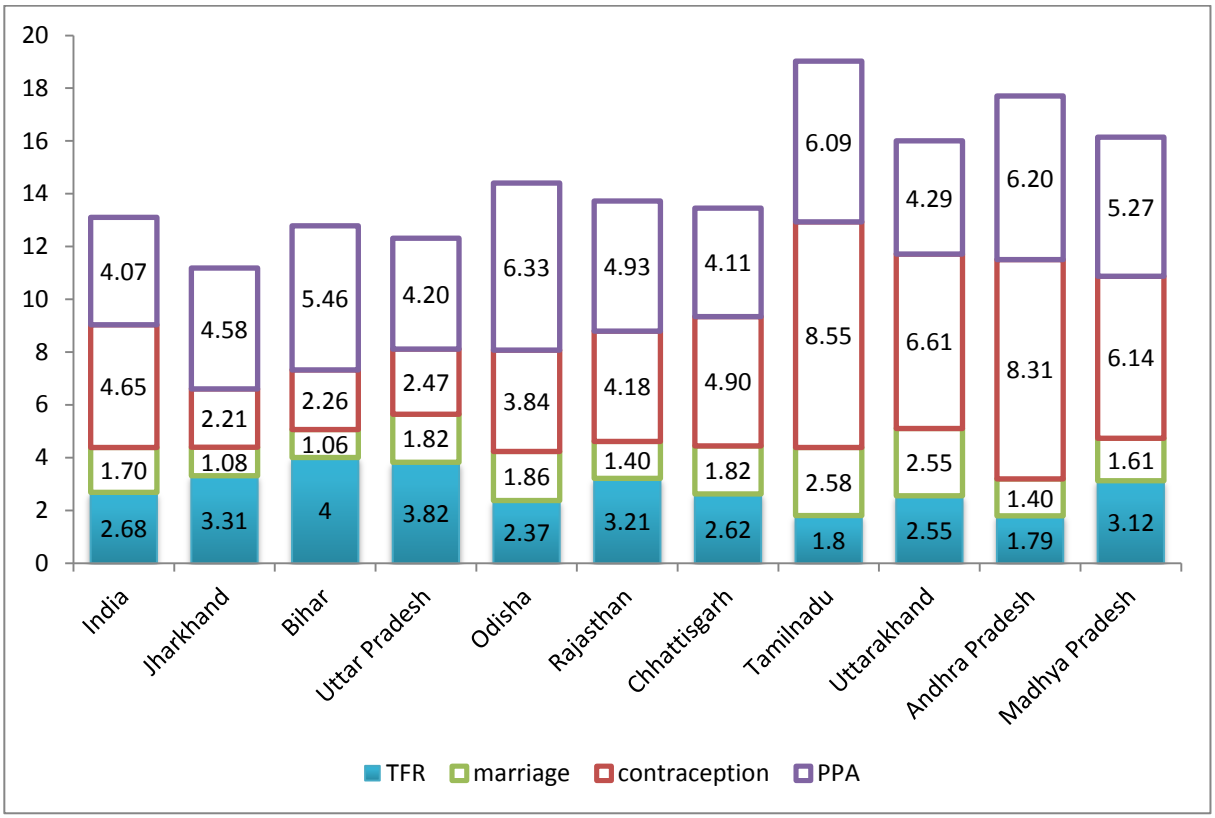


Figure 5.2: Contribution of proximate determinants in fertility decline, India and selected states, 2005–06

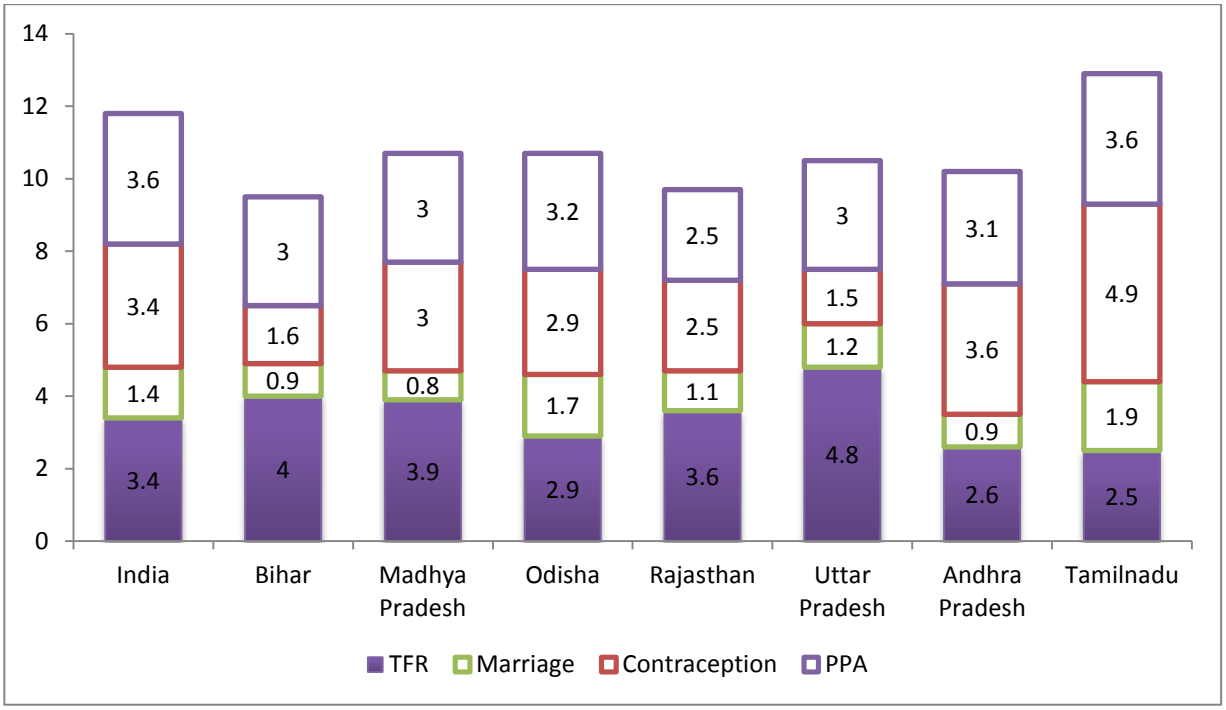


Figure 5.3: Contribution of proximate determinants in fertility decline, India and selected states, 1992–93

The estimated total fecundity rate for TN has been slightly higher and outside of the range by one birth. Also, the estimated value of TF in the states of Andhra Pradesh, Uttarakhand, and MP is about 17 births. The wide variation in the total fecundity rate among the states may be caused by errors in the reported data on the abortion rate and postpartum insusceptibility. Certainly inaccuracies in the data exist.[25]

[25] The National Family Health Surveys conducted in India contain almost all of the information required for a proximate determinants analysis. However, these surveys include births only from ever-married women. Even in India, there is also the possibility of childbearing outside of marriage. This information is not captured in these surveys and not reported in infecundability. The data on abortion rates are also either not available or available with very little reliability. Abortion rates are highly under-reported. It also appears that the variations in the level of the total fecundity rate may be due to the variations in the nutritional status of the states.

Decomposition of Fertility Decline between 1992 and 2005

The decomposition of the change in TFR in India and selected states between 1992 and 2005 is presented in Table 5.9. The table shows the percentage and absolute changes in TFR due the four major proximate determinants responsible for those changes. The decomposition results are given as distributions of the absolute change in TFR, taking into account the contributions made by various proximate variables.

Table 5.9: Decomposition of the change in TFR due to proximate determinants, 1992–2005

	Change due to Delayed Marriage		Change due to Contraceptive Practices		Change due to Induced Abortion		Change due to Postpartum Infecundability		Decline in TFR
	Per cent	Absolute	Per cent	Absolute	Per cent	Absolute	Per cent	Absolute	NFHS-3–NFHS-1
India	45.2	-0.326	51.3	-0.369	0.3	-0.002	3.2	-0.023	-0.72
Madhya Pradesh	32.7	-0.255	46.6	-0.364	1.0	-0.008	19.7	-0.154	-0.78
Odisha	32.1	-0.170	37.0	-0.196	1.3	-0.007	29.6	-0.157	-0.53
Rajasthan	23.4	-0.091	54.4	-0.212	1.1	-0.004	21.1	-0.082	-0.39
Uttar Pradesh	42.3	-0.423	35.3	-0.353	1.4	-0.014	21.0	-0.210	-1.0
Andhra Pradesh	32.5	-0.263	57.5	-0.466	0.7	-0.005	9.4	-0.076	-0.81
Tamil Nadu	48.2	-0.337	44.2	-0.309	5.5	-0.039	2.2	-0.015	-0.7

The decomposition analysis suggests that increased used of contraception (51%) has been the major cause for fertility decline in India, followed by the delayed marriage pattern (45%). The analysis does not show any impact of abortions. However, a very low decline (3%) has been caused due to the changing pattern in postpartum infecundability.

Among the EAG states, the contribution of delayed marriage has been observed maximum in the state of Uttar Pradesh (42%) while it was lowest in Rajasthan (23%). Tamil Nadu has shown maximum impact of delayed marriage (48%) in fertility decline.

In the state of Rajasthan, the major cause of fertility decline has been the increased use of contraception (54%). Thus, it is clear that change in contraceptive use is generally the main factor responsible for fertility change in Rajasthan.

In case of absolute change in TFR, there was a decline in TFR of 0.72 births per woman within the years 1992 and 2005. By decomposing the contribution of the four proximate determinants, it is possible to see that 0.33 and 0.37 births have been averted due to delayed marriage and contraceptive utilisation respectively in India. Also, changes in postpartum infecundability, which are largely due to breast feeding pattern and abstinence, contributed very little to the fertility decline witnessed in India over a period of 12 years.

UP has witnessed maximum decline in TFR of 1 birth per women over a period of 12 years. The decomposition analysis also showed that about 0.42 and 0.35 births were averted due to the delayed marriage and increased use of contraception respectively in the state.

5.10 Conclusion

In spite of data limitations, the fertility decline has been explained by proximate determinants with varying magnitude in different states and India as whole. The four proximate determinants of fertility have played important role in reducing fertility from potential level (TF) to the actual level (TFR) being the joint impact of these determinants on fertility decline higher in 2005 than in 1992. The impact is larger among the non-EAG states of Andhra Pradesh and Tamil Nadu. The substantial increase in the use of contraception and a decline in the proportion married (as result of delayed age at marriage) caused an overall decline in the total fertility rate. Important contribution has been estimated from the extended length of breastfeeding and sexual abstinence.

The analysis indicates that variations in two major factors—marriage and contraception— are the primary proximate causes of fertility differences among EAG states. The decomposition analysis conducted to assess the magnitude of change caused due the proximate determinants shows the use of contraception and delay in age at marriage are major contributing factors in the fertility decline.

As is evident from the analysis, the strongest reduction in fertility has been caused by the contraceptive utilisation, the government needs greater emphasis in increasing the availability and utilisation of contraception, especially among women with greater need. Since the delayed age at marriage has significantly contributed in fertility decline in the country, the emphasis needs to be put on this factor. While index of postpartum infecundability has been an important factor in explaining the fertility decline from potential (TF) to actual level (TFR), it has not shown impact in declining the fertility level during the 12 years period from 1992 to 2005. This index remained unchanged over the time.

Induced abortions may have not contributed so far in fertility decline; however, this factor may be expected to contribute in coming days with emphasis on providing safe abortions. Government policies can concentrate on efficiently increasing the contraceptive practices, raising the age at marriage, and encouraging breastfeeding practices.

CHAPTER 6: RECOMMENDATIONS

Population proportion of the eight EAG states and Assam is likely to exceed the population proportion of all other 26 states in India by 2020–22. This suggests that the timeframe for country's achievement of net replacement of fertility and thereby population stabilisation are largely dependent on the population growth of EAG states. Thus, the Government should focus more on family planning programmes and closely pay attention to the population growth of the EAG states and Assam in the coming years.

Some recommendations to address population growth in the EAG states and Assam are listed below:

- A marginal fall in projected population of India under the "*Scenario A*" of method mix compared to "*Scenario B*" suggests that the Government can consider the method mix proposed under Scenario A i.e., shifting the method mix as per the state circumstances. This entails Uttar Pradesh, Assam, Odisha and Uttarakhand focusing more on limiting methods and the other EAG states like Bihar, MP, Rajasthan and Chhattisgarh shifting focus towards spacing methods. State-specific method mix options for the coming years have been made available in detail in this report, and each state government can adapt respective family planning goals.
- Uttar Pradesh and Bihar need special focus as other states are nearly meeting their family planning goals in terms of achieving the numbers for sterilisation and various spacing methods, in the last couple of years. Bihar has succeeded in achieving its family planning targets, however, the state has a long way to go with a more focused approach to achieve the state's net replacement of fertility levels. The number of sterilisations and other spacing methods in Uttar Pradesh have been disappointing in recent years and the state has to come up with innovative strategies to achieve the ELAs on various family planning methods to realise the ambitious state-specific goals (CPR [65.0%] and TFR [2.7]) for the 12th Five-Year Plan period by 2016–17.
- Findings from the multivariate analysis on PPPR have helped to identify socioeconomic characteristics that are affecting fertility reduction. Results suggest that women's age at marriage, contraceptive use, experience of infant and child mortality, and women's education are strong predictors of women moving on to higher parities. Government should focus not only on family planning programmes but also on other activities to increase women's age at marriage, address activities related to improving infant and child health programmes and increase girls' education to achieve sustainable and long-term fertility goals.
- Decomposition analysis on impact of proximate determinants on fertility identifies contribution of those proximate determinants in fertility decline in India and selected states (including eight EAG states, and two non-EAG states). Findings from this analysis suggest that fertility reduction in India is largely determined by change in contraceptive practices and changes due to delayed marriages with minor contributions from the other two proximate determinants i.e., changes due to induced abortion and postpartum infecundability. States like Rajasthan, Andhra Pradesh, Odisha and MP have enough scope to bridge the gap with other states in availing the benefits of changes due to delayed age at marriage. Uttar Pradesh and Odisha have not reaped the full potential of changes in contraceptive practices in the anticipated fertility decline. These two states can focus on improving access to contraception. More than five per cent of Tamil Nadu's fertility decline has been attributed to changes due to induced abortion, which points to state Government's prioritisation and improvement of abortion-related services.

Some state-specific policy prescriptions for the study states are as follows:

- **MP:** The state is doing fairly well in meeting its ELAs, but Madhya Pradesh has enough room to affect delayed marriages to help fertility decline. The state should take necessary steps in reaping full advantage of increasing age at marriage and thereby anticipate much faster fertility decline.
- **Odisha:** Fertility decline in Odisha was attributed to two proximate determinants—change in contraceptive use and delayed age at marriage. In addition the state should work towards improving its infant and child mortality indicators to achieve the overall development goals.
- **Rajasthan:** Among the states considered for the analysis of the proximate determinants, Rajasthan has reaped lowest possible advantage of delayed age at marriage in fertility decline, though it has progresses well in terms of contraceptive use. Thus, the state should place renewed focus on improving age at marriage to accelerate fertility decline.
- **Uttar Pradesh:** Change in use of contraception seems to have the lowest impact in fertility decline in Uttar Pradesh. This prompts the state functionaries to focus on expanding access to family planning services and address the unmet need for family planning.
- **Bihar:** The state has to work hard to meet its ELAs in the coming years to achieve its fertility goals. Bihar would need to focus on delayed age at marriage and improving women's education.
- **Jharkhand:** The state has the prospect of achieving replacement level of fertility by 2021–22. Jharkhand should put in more efforts towards addressing the spacing requirements and improving the age at marriage.
- **Andhra Pradesh:** The state has reaped maximum benefit in fertility decline through changes in use of contraception. Andhra Pradesh has largely underutilised both delayed age at marriage proposition and postpartum infecundability. Planners should focus on these two aspects to improve the skewed sterilisation programmes and consolidate the gains made by the state.
- **Tamil Nadu:** Fertility decline in the state was largely governed by delayed age at marriage and widespread use of contraception. These findings point to the that fact the state should focus more on provision of quality abortion services and take necessary steps to increase the postpartum infecundability period and finally, the skewed method mix..

Giving due consideration to these state-specific interventions would help states accelerate the achievement of the fertility goals by the states.

Technical Note

Annex for Chapter 4

Glossary of Terms

References: Section 2

TECHNICAL NOTE

The relationship between the total marital fertility rate and contraceptive use and effectiveness can be estimated by means of reproductive models. For simplicity, the analysis here is confined to a population of married women, for which the following variables are defined:
a = age, in single years.
f(a) = proportion of all women that is fecund (i.e., nonsterile).
p(a) = proportion of fecund women that attempts to prevent pregnancies by contracepting. These women will be called "contraceptors."
u(a) = proportion of all women that is using contraception.
$u^1(a)$ = proportion of contraceptors that is currently using contraception; that is, the proportion not pregnant or in postpartum amenorrhea.
e(a) = contraceptive effectiveness.
N(a) = mean duration of the nonsusceptible segment of the birth interval, consisting of pregnancy and infecundable periods.
C(a) = mean duration of the susceptible ovulatory segment of the birth interval in the absence of contraception.
F(a) = fertility rate among all women (births per woman per year).
$F_n(a)$ = natural fertility rate among all women.
$F_c(a)$ = fertility rate among contraceptors.
$F_a(a)$ = fertility rate among fecund noncontraceptors.

If it is assumed that noncontraceptors are always fecund, the population can be divided into three subpopulations: the contraceptors, the fecund noncontraceptors, and the sterile women. The fertility rate of all women equals the weighted average of the fertility rates of contraceptors and noncontraceptors.

$$F(a) = p(a)\, f(a)\, F_c(a) + [1-p(a)]\, f(a)\, F_a(a) \qquad 1$$

If one further assumes that fecund women are homogenous with respect to their fecundity characteristics, then

$$F_a(a) = \frac{1}{N(a) + C(a)}$$

$$F_c(a) = \frac{1}{N(a) + \frac{C(a)}{1 - e(a)}} \qquad 2$$

$$F_n(a) = \frac{f(a)}{N(a) + C(a)} \qquad 3$$

The homogeneity assumption can be relaxed by following heterogeneity within each of the subgroups of contraceptors and noncontraceptors, but on average the two groups have to be equal in their fecundity characteristics. In either case, the exchange of women between the two groups is allowed if the proportion *p(a)* is not affected. 4

Within the subpopulation of contraceptors, a small proportion of women is in the nonsusceptible state because accidental pregnancies occur. If all other contraceptors are using contraception, then the proportion of contraceptors that is currently using equals

$$u^1(a) = \frac{\frac{C(a)}{1 - e(a)}}{N(a) + \frac{C(a)}{1 - e(a)}} \qquad 5$$

so that

$$u(a) = p(a)\, f(a) \frac{\frac{C(a)}{1 - e(a)}}{N(a) + \frac{C(a)}{1 - e(a)}} \qquad 6$$

Equation 6 can be arranged as

$$p(a) = u(a)\frac{N(a) + \frac{C(a)}{1 - e(a)}}{f(a)\ \frac{C(a)}{1 - e(a)}} \quad 7$$

Substitution of equations 2, 3, and 7 in 1 results in:

$$F(a) = F_n(a)\left[1 - \frac{u(a)e(a)}{f(a)}\right] \quad 8$$

If more than one method of contraception is employed, *u(a)* equals the total use of all methods and *e(a)* equals the weighted average effectiveness (weights given by the proportions using different methods).

The total marital fertility rate, TM, is found by summing *F(a)* over all age groups in the reproductive period (30 years between ages 15 and 45):

$$\begin{aligned} TM &= \sum F(a) \\ &= \sum F_n\,(a)\left[1 - \tfrac{u(a)e(a)}{f(a)}\right] \\ &= TNM - \sum F_a\,(a)u(a)e(a) \end{aligned} \quad 9$$

Where TNM is the total natural fertility rate and $F_a(a)$ represents the age-specific natural marital fertility rate among fecund women. Equation 9 can be simplified further because the variables $F_a(a)$ and *e(a)* vary little with age. For example, among the Hutterites, $F_a(a)$ declines from 0.571 for the age group 20–24 to 0.509 for the age group 35–39. The effectiveness of contraception can be expected to increase somewhat with age because both motivation and reliance on sterilisation are greater among older couples. One might, for example, find that *e(a)* increases from 0.85 to 0.95 between the early twenties and the late thirties. It should be noted that in addition to the relatively small changes with age, the age trends in the variables $F_a(a)$ and *e(a)* compensate one another. That is, in the older age groups, $F_a(a)$ is slightly below the average, so that the product $F_a(a)\ e(a)$ is even less age dependent than either function alone. Consequently, with good approximation,

$$TM = TNM - F_a(e)\sum u(a) \quad 10$$

With the averages F_a and e defined as 11

$$F_a = \frac{1}{30}\sum e(a)$$

$$e = \frac{1}{30}\sum e(a) \quad 12$$

If one further defines

$$u = \frac{1}{30}\sum u(a) \quad 13$$

And

$$s = \frac{\sum F_n(a)/f(a)}{\sum F_n(a)} \quad 14$$

Then equation 10 becomes

$$TM = TNM\ (1 - s\ e\ u) \quad 15$$

A value of 1.18 was obtained for *s* by substituting average estimates of $F_n(a)$ and *f(a)* found by Henry[26] in a group of historical populations. It is unlikely that s varies substantially among populations because the incidence of sterility [the determinant of *f(a)*] presumably differs little among populations, and the value of *s* is not influenced by the absolute values $F_n(a)$ as long as the age pattern remains the same. Even if the incidence of sterility is slightly higher in the poorer developing nations, this would be compensated by a higher prevalence of sterilising operations for reasons other than contraception in the developed countries. On balance, therefore, the value of $s = 1.18$ is likely to provide a good approximation for many countries.

[26] Louis Henry, "Some data on natural fertility," Eugenics Quarterly 8, no. 1 (March 1961): 81-91. This has been Cross-referenced from JOHN BONGAARTS, "A Framework for Analyzing the Proximate Determinants of Fertility," *Population and Development Review* 4(1) (1978): 105-132. Accessed from http://www.popcouncil.org/pdfs/councilarticles/pdr/pdr041bongaarts.pdf

ANNEX 4

Table A 4.1: Parity progression ratios (PPR) of currently married women (CMW), India and selected states

State		Parity of Currently Married				
		0	**1**	**2**	**3**	**≥4**
Uttar Pradesh	PPR		0.908	0.788	0.610	0.444
	CMW	830	1076	1590	1497	3980
Madhya Pradesh	PPR		0.898	0.767	0.539	0.335
	CMW	503	645	1119	1007	1649
Bihar	PPR		0.881	0.748	0.587	0.426
	CMW	356	398	483	479	1276
Odisha	PPR		0.903	0.728	0.476	0.274
	CMW	322	564	821	661	892
Rajasthan	PPR		0.886	0.761	0.571	0.393
	CMW	348	378	685	514	574
Chhattisgarh	PPR		0.894	0.761	0.570	0.3623
	CMW	288	362	523	563	833
Jharkhand	PPR		0.879	0.727	0.534	0.361
	CMW	276	351	443	396	829
Uttarakhand	PPR		0.914	0.783	0.534	0.319
	CMW	178	270	518	446	662
Andhra Pradesh	PPR		0.893	0.754	0.426	0.203
	CMW	550	717	1691	1147	1048
Tamil Nadu	PPR		0.902	0.730	0.345	0.128
	CMW	411	718	1609	908	537
Kerala	PPR		0.898	0.705	0.261	0.0875
	CMW	267	505	1163	453	229
All India	PPR		0.903	0.743	0.479	0.280
	CMW	8529	14032	23266	17473	24625

Table A 4.2: Women's children ever born by background characteristics for EAG states of India

Indicators	Children Ever Born					
	0	**1**	**2**	**3**	**≥4**	**Number of Women**
Age						
15–24	30.7	32.4	21.8	10.5	4.6	7,769
25–34	4.5	10.5	24.4	23.2	37.5	11,459
35 above	1.8	2.9	14.4	19.2	61.7	11,057
Total Numbers of Women	**3,101**	**4,044**	**6,076**	**5,592**	**11,472**	**30,285**
Age at Marriage						
< 18	8.8	10.9	16.6	19.6	44.1	22543
18–21	13.0	17.0	27.9	17.2	24.8	5313
22 above	17.7	28.3	34.6	10.7	8.7	2429
Total Numbers of Women	**3101**	**4044**	**6076**	**5592**	**11472**	**30285**
Any Child Died						
No	14.0	17.2	24.5	20.6	23.7	22212
Yes	0.0	2.6	7.8	12.6	76.9	8073
Total Numbers of Women	**3101**	**4044**	**6076**	**5592**	**11472**	**30285**
Contraception Use						
Using	19.3	19.4	17.5	12.5	31.3	15110
Not using	1.2	7.4	22.6	24.4	44.4	15175
Total Numbers of Women	**3101**	**4044**	**6076**	**5592**	**11472**	**30285**
Women's Education						
No education	7.8	9.1	13.2	17.3	52.7	16375
Primary	11.9	13.2	19.2	22.2	33.6	4170
Secondary	13.8	18.5	28.8	20.7	18.1	7483
Higher	13.4	27.5	42.8	12.3	4.0	2257
Total Numbers of Women	**3101**	**4044**	**6076**	**5592**	**11472**	**30285**
Physical Violence						
No	11.4	14.9	23.6	19.1	31.1	13195
Often during last 12 months	5.0	12.3	16.4	19.9	46.5	824
Sometimes during last 12 months	6.8	11.6	18.3	20.2	43.1	3795
Not in last 12 months	3.5	6.5	16.6	21.0	52.4	3788
Total Numbers of Women	**1935**	**2751**	**4568**	**4251**	**8097**	**21602**
Sexual Violence						
No	9.0	12.9	21.5	19.7	36.9	19285
Often during last 12 months	10.2	14.3	16.9	19.8	38.8	343
Sometimes during last 12 months	9.7	12.4	19.1	19.1	39.7	1332

Not in last 12 months	4.6	8.6	17.7	19.4	49.6	696
Total Numbers of Women	**1935**	**2751**	**4568**	**4251**	**8097**	**21602**
Religion						
Muslim	9.5	11.5	14.1	14.2	50.6	3624
Non-Muslim	10.3	13.6	20.9	19.0	36.2	26661
Total Numbers of Women	**3101**	**4044**	**6076**	**5592**	**11472**	**30285**
Watching TV						
Yes	10.3	15.2	24.3	19.9	30.4	17565
No	10.2	10.9	14.2	16.5	48.3	12720
Total Numbers of Women	**3101**	**4044**	**6076**	**5592**	**11472**	**30285**
Final Say on Own Healthcare						
Alone	6.5	11.3	19.9	19.6	42.7	7682
With others	8.0	11.9	21.0	19.2	39.9	10562
Others only	14.6	16.0	19.3	17.1	33.1	12024
Total Numbers of Women						**30268**
Place of Residence						
Urban	8.8	15.0	25.7	19.3	31.1	11265
Rural	11.1	12.4	16.7	18.0	41.9	19020
Total Numbers of Women	**3101**	**4044**	**6076**	**5592**	**11472**	**30285**
Wealth Index						
Lowest	10.6	11.2	14.2	16.2	47.8	7301
Low	11.2	11.7	14.5	17.5	45.2	5898
Medium	10.5	13.4	17.1	18.6	40.5	4981
Higher	9.8	12.7	21.1	20.4	36.0	5278
Highest	9.2	17.6	32.5	20.1	20.5	6827
Total Numbers of Women	**3101**	**4044**	**6076**	**5592**	**11472**	**30285**
Women's Occupation						
Not working	11.7	15.9	22.5	18.1	32.0	17439
Agricultural	8.7	9.7	14.5	18.4	48.7	8576
Skilled and non-skilled	8.0	8.7	17.4	21.2	44.7	2410
Services	4.4	8.6	14.9	22.4	49.7	746
Clerical and sale	4.0	7.0	29.1	19.2	40.7	449
Professional	12.8	22.3	38.3	15.4	11.2	665
Total Numbers of Women	**3101**	**4044**	**6076**	**5592**	**11472**	**30285**

Table A 4.3: Varimax rotated factor structure of selected variables for EAG states, India

Abbreviation	Variables	Factor			
		F-I	F-II	F-III	Communality
ceb	Children Ever Born	-.246	.834	.055	0.759
age	Age of Woman	.076	.812	-.078	0.672
am	Age at Gauna or Effective Marriage	.539	-.159	-.108	0.327
anychdied	Any Child Died	-.336	.537	-.071	0.406
cus	Contraception Use	-.313	-.511	-.053	0.362
wed	Woman's Years of education	.665	-.199	-.100	0.491
wocc_t	Women's Occupation	-.033	.199	.024	0.041
hes_t	Husband Ever Slapped or Not	-.190	.114	.773	0.647
sexvio_t	Sexual Violence	-.092	-.035	.786	0.627
tvw	Watching Television	.719	.027	-.008	0.518
sayh	Say on Own Healthcare	-.155	-.307	-.103	0.129
disthf	Distance to Health Facility	-.570	-.074	.008	0.331
w_index	Wealth Index	.854	.077	-.040	0.737
rues	Place of Residence	.732	.142	.127	0.572
rel_t	Religion	.029	.024	.153	0.025
props_t	Proportion Sons of Children	.192	-.110	.163	0.076
	Eigen-Values	3.224	2.164	1.333	

Table A 4.4: Descriptive statistics of the selected variables under the study of CEB of currently married women

Abbreviations	Description of the Variables	Min.	Max.	Mean	Std. Deviation
Ceb	Child Ever Born	0	4	2.60	1.37
Age	Current Age	15	49	31.31	8.62
am	Age at Gauna or Effective Marriage	15	43	16.99	3.12
Cus	Contraception Use	0	1	.499	.500
anychdied	Any Child Died	0	1	.267	.442
rewed	Year of Education	0	9	1.829	2.25
wocc_t	Women's Occupation	0	5	.683	1.06
hes_r	Husband Ever Slapped	0	1	.278	.448
sexviol_r	Experience of Sexual Violence	0	1	.077	.266
tvw_t	Watching Television	0	1	.580	.493
sayhc_t	Final Say On Own Healthcare	1	3	2.14	.794
disthf	Perception about Problem of Distance to Health Facility	0	1	.582	.493
w_index	Wealth Index	1	5	2.95	1.49
Rures_t	Place of Residence	0	1	.372	.483
Rel_t	Religion	0	1	.119	.324
	N	**30285**			

GLOSSARY OF TERMS

1. **Age-specific Fertility Rate (ASFR).** Fertility rates can also be calculated for specific age groups to see differences in fertility behaviour or to compare over time.

   For ex. Number of births to women ages 20-24 x K = 1,052,184 x 1,000 = 103.0
   Number of women ages 20-24 is 10,215,000
   In the United States in 2008, there were 103 live births for every 1,000 women ages 20 to 24.

2. **Annual Growth Rate (GR).** The rate at which the population is increasing or decreasing in a given year due to natural increase and net migration, expressed as a percentage of the base population.

3. **Children Ever Born**. The number of "children ever born" at various ages of the mother provides one measure of a population's fertility. This measure is useful only if the age group of women considered is specified. When this measure is calculated for women ages 45–49 it is called the completed fertility rate; it shows how many children a certain age cohort of women who have completed childbearing actually produced during their childbearing years.

4. **Coale-Demeny Model Life Tables**. Families of life tables derived from empirical life tables of Europe and other industrialised nations of the world. They are based primarily on data from the first half of the 20th Century.

5. **Contraception.** Any deliberate parity-dependent practice—including abstention and sterilisation—undertaken to reduce the risk of conception is considered contraception. Thus defined, the absence of contraception and induced abortion implies the existence of natural fertility.

6. **Contraceptive Prevalence Rate.** The contraceptive prevalence rate is the number of women of reproductive age who are using contraception per 100 women of reproductive age. This measure provides an indication of the number of women who have a lower risk of conception at a given time. This measure may be calculated for all women or for subpopulations, such as married women, unmarried women, or women who are sexually active. It is usually published for all contraceptive methods including modern methods (the pill, the condom), and "traditional" methods (withdrawal, natural methods).

7. **Couple Protection Rate**. Couples currently, and effectively, protected by various FP methods.

8. **Crude Birth Rate (CBR).** The birth rate (also called the crude birth rate) indicates the number of live births per 1,000 population in a given year. Most annual rates, such as the birth rate, relate demographic events to the population at midyear (July 1), which is considered to be the average population at risk of the event occurring during the year.

9. **Crude Death Rate (CDR).** The crude death rate can be particularly affected by age structure. It is therefore prudent, when comparing death rates between countries, to adjust for differences in age composition before making inferences about a country's health, economic, or environmental conditions.

10. **Decadal Growth Rate.** This gives an overview of the percentage of total population growth in a particular decade (10 years).

11. **Decomposition Method.** This is a generic term for solutions of various problems and design of algorithms in which the basic idea is to decompose the problem into sub-problems. Changes in age, sex, race-ethnicity, marital status, and many other characteristics contribute to changes in demographic indicators.

12. **Dependency Ratio.** The ratio of the economically dependent part of the population to the productive part; arbitrarily defined as the ratio of the elderly (ages 65 and older) plus the young (under age 15) to the population in the working ages (ages 15–64).

13. **Duration of Postpartum Insusceptibility.** Postpartum insusceptibility is the period after a birth during which a woman is not exposed to the risk of pregnancy either because of postpartum amenorrhea or postpartum abstinence.

14. **Frequency of Intercourse.** This variable measures normal variations in the rate of intercourse, including those due to temporary separation or illness. Excluded is the effect of voluntary abstinence—total or periodic—to avoid pregnancy.

15. **Gross Reproduction Rate (GRR).** The GRR is the average number of daughters that would be born to a woman (or group of women) during her lifetime if she passed through her childbearing years conforming to the age-specific fertility rates of a given year. This rate is like the TFR except that it counts only daughters and literally measures "reproduction"—a woman reproducing herself by having a daughter.

16. **Induced Abortion Rate.** The total abortion rate is the average number of induced abortions a woman would have if she survived to age 49 and had abortions at the prevailing age-specific rates.

17. **Infant Mortality Rate (IMR).** The number of deaths of infants under one year of age per 1,000 live births.

For ex. Number of deaths of infants under age 1 in a given year x K = 78,400 x 1,000 = 24.3
Total live births in that year 3,227,000
There were 24 deaths of infants under age 1 per 1,000 live births in Brazil in 2007.

18. **Lactational Infecundability.** Following a pregnancy, a woman remains infecundable (i.e., unable to conceive) until the normal ovulation and menstruation is restored.

19. **Life Expectancy at Birth**. Life expectancy is an estimate of the average number of additional years a person could expect to live if the age-specific death rates for a given year prevailed for the rest of his or her life. Life expectancy is a hypothetical measure because it is based on current death rates, and actual death rates change (usually improving) over the course of a person's lifetime. Each person's life expectancy changes as he or she grows older and as mortality trends change.

20. **Maternal Mortality Rate.** The maternal mortality ratio is the number of women who die as a result of complications from pregnancy or childbearing in a given year per 100,000 live births in that year. Deaths due to complications from spontaneous or induced abortions are included.

21. **Method Effectiveness.** This is the proportion of users who do not become pregnant during a year of method use. For each method used in *FamPlan*, it is necessary to specify an average effectiveness rate, or the extent by which the practice of a method of contraception lowers fecundability. It is determined by both a population's ability to conceive and the extent of contraceptive method failure.

22. **Method Mix.** Method mix is the percentage of all users who use a particular method. These figures should sum to 100 percentages.

23. **Method Protection Attributes.** Method protection attributes" refers to the characteristics of method practice that are needed to calculate the number of users, acceptors and commodities required to meet the chosen goals.

24. **Migration.** This refers to the number of migrants moving into or out of the area for which the population projection is being prepared. If the projection is for a country, this is international migration. Generally, international migration is kept zero in projection due to unavailability of data. If the projection area is a region or city, migration refers to people moving into or out of the region or city.

25. **Net Reproduction Rate (NRR).** The average number of daughters that would be born to a woman (or a group of women) during her lifetime if she passed through all her childbearing years conforming to the age-specific fertility rates and age-specific mortality rates of a given year. This is similar to the GRR except that it includes the effect of mortality that would cause some women to die before completing their childbearing years.

26. **Parity**. The number of children previously born alive to a woman; for example, 'two-parity women' are women who have had two children and 'zero-parity women' have had no live births.

27. **Parity Progression Ratio**. This indicates the chance of a woman of parity "i" to go for higher parity (to have an additional child) in a year.

28. **Population ages 0–4.** The portion of the population under age five. This group is often of interest as it may be subject to high mortality and consequently may require a large amount of healthcare relative to other age groups.

29. **Population ages 15–64.** The portion of the population generally considered to be of employment age.

30. **Population ages 5–14**. The portion of the population generally considered to be of school age.

31. **Population ages 65+.** The portion of the population generally considered to be of post-employment age.

32. **Population Projection**. Computations depicting the future course of a population's size, its structure, and its interaction with dynamics such as fertility, mortality, and migration. The projection is constructed based on assumptions about the future course of those population dynamics.

33. **Population Pyramid**. A graphic that portrays an age-sex distribution. It is so named because of its shape.

34. **Proportions Married**. This variable is intended to measure the proportion of women of reproductive age that engages in sexual intercourse regularly. All women living in sexual unions should theoretically be included, but to circumvent difficult measurement problems, the present analysis deals only with the childbearing of women living in stable sexual unions, such as formal marriages and consensual unions. For convenience, the term "marriage" is used to refer to all such unions.

35. **Population Momentum**. This refers to the tendency of a population to continue to grow after replacement-level fertility has been achieved. A population that has achieved replacement or below-replacement fertility may still continue to grow for some decades because past high fertility leads to a high concentration of people in the youngest ages. Total births continue to exceed total deaths as these youths become parents.

Eventually, this large group becomes elderly, and deaths increase to equal the number of births or outnumber them.

36. **Proximate Determinants**. Variables which directly impinge on fertility outcomes; these variables include the proportion of women in sexual union, the duration of the period of inability to conceive following a birth, the level and quality of contraceptive practice and, to a lesser degree, the underlying capability to conceive, the level of induced abortion, and the prevalence of pathological sterility.

37. **Sex Ratio at Birth.** The sex ratio at birth (the number of male births per 100 female births) is set by default to 105.

38. **Spontaneous Intrauterine Mortality.** A proportion of all conceptions do not result in a live birth because some pregnancies end in spontaneous abortion or stillbirth.

39. **Sterility.** The percentage of women childless at ages 45–49.

40. **Total Fertility Rate (TFR)**. The average number of children that would be born alive to a woman (or a group of women) during her lifetime if she were to pass through all her childbearing years conforming to the age-specific fertility rates of a given year.

41. **Total Marital Fertility Rate**. TMFR is equal to the number of births a woman would have at the end of the reproductive years if she were to bear children at prevailing age-specific marital fertility rates and to remain married during the entire reproductive period (based on the fertility of married women ages 15–45).

42. **Total Natural Marital Fertility Rate.** This is equal to the TMFR in the absence of contraception and induced abortion.

43. **Unmet Need.** Women with unmet need for spacing births are those who are able to become pregnant and are sexually active but not using any method of contraception (modern or traditional), and report wanting to delay the next child or limit their number of births. The concept of unmet need points to the gap between women's reproductive intentions and their contraceptive behaviour.

REFERENCES: SECTION 2

Bongaarts, J., and G.R. Potter. 1983. *Fertility, Biology and Behavior: An Analysis of the Proximate Determinants*. New York: Academic Press.

Bongaarts, J. March 1978. "A Framework for Analysing the Proximate Determinants of Fertility." *Population and Development Review* 4(1): 105–132.

Coale, A.J., and T.J. Trussell.1974. "Model Fertility Schedules: Variations in the Age Structure of Childbearing in Human Populations." *Population Index* 40(2): 185–258.

Feeney, G. 1991. "Fertility Decline in Taiwan: A Study Using Parity Progression Ratio." *Demography* 28(3): 467–479.

Gandotra, M.M., R.D. Retherford, A. Pandey, N.Y. Luther, and V.K. Mishra. 1998. *Fertility in India*. Hawaii. USA: International Institute of Population Sciences, Mumbai & East West Center Program on Population.

Gulati, S.C., A.R. Chaurasia, and R.M. Singh. 2008. "Contraception in India: Exploring Met and Unmet Demand." *World Health and Population* 10(2): 25–39.

Harman, H.H. 1976. *Modern Factor Analysis*. Chicago: University, Chicago Press.

International Institute for Population Sciences (IIPS), 1994. *Techniques of Population Analysis, Fertility (MPS-04), 1994.*

IIPS and Macro International. 2007. *National Family Health Survey (NFHS-3)*, 2005–06: India: Volume I. Mumbai: IIPS.

Pandey A., and C.M. Suchindran. 1997. "Estimation of Birth Intervals and Parity Progression Ratios from Vital Rates." *Sankhya: The Indian Journal of Statistics* 59(B.1): 108–122.

Retherford, R.D, and M.K. Choe. 1993. *Statistical Models for Causal Analysis.* New York: John Wiley & Sons.

Rodríguez, G. and J.N. Hobcraft. 1980. *Illustrative analysis: Life table analysis of birth intervals in Colombia.* WFS Scientific Reports No. 16. Voorburg, The Netherlands: International Statistical Institute.

Ryder, N. 1983. Cohort and period measures of changing fertility. In *Determinants of fertility in developing countries*, ed. R.A. Bulatao and R.R. Lee. New York: Academic Press. 737-756.

Spoorenberg, T., and P. Dommaraju. 2012. "Regional Fertility Transition in India: An Analysis Using Synthetic Parity Progression Ratios." *International Journal of Population Research* 2012: 1–20. Article ID: 358409.

Stover, J. 1997. "Revising the Proximate Determinants Framework of Fertility. What Have We Learned in the Past 20 Years?" *Studies in Family Planning* 29(3): 255–267.

UNFPA. 2004. "Achieving Replacement Level Fertility in Bangladesh: Challenges and Prospects." *CPD-UNFPA.* Paper 18.

Visaria, L., 1999. “Proximate Determinants of Fertility in India – An Exploration of NFHS Data.” *Economic and Political Weekly (EPW)* 34(42/43): 3033–3041.

Yadava, R.C., and A. Kumar. 2011. “On the Estimation of Parity Progression Ratios.” *Journal of Scientific Research*, Banaras Hindu University, Varanasi 55: 127–134.

Yang, Quanhe. 1994. Determinants of the Decline in Parity Progression Ratios in China, 1979–1984: A Factor Analysis of Provincial Data. East West Center Reprints Population Series, Hawaii.



POLICY UNIT

आरोग्यम् सुखसम्पदा

NATIONAL HEALTH MISSION
राष्ट्रीय स्वास्थ्य मिशन

USAID
FROM THE AMERICAN PEOPLE

HEALTH POLICY PROJECT



Photo: Satvir Malhotra © Futures Group