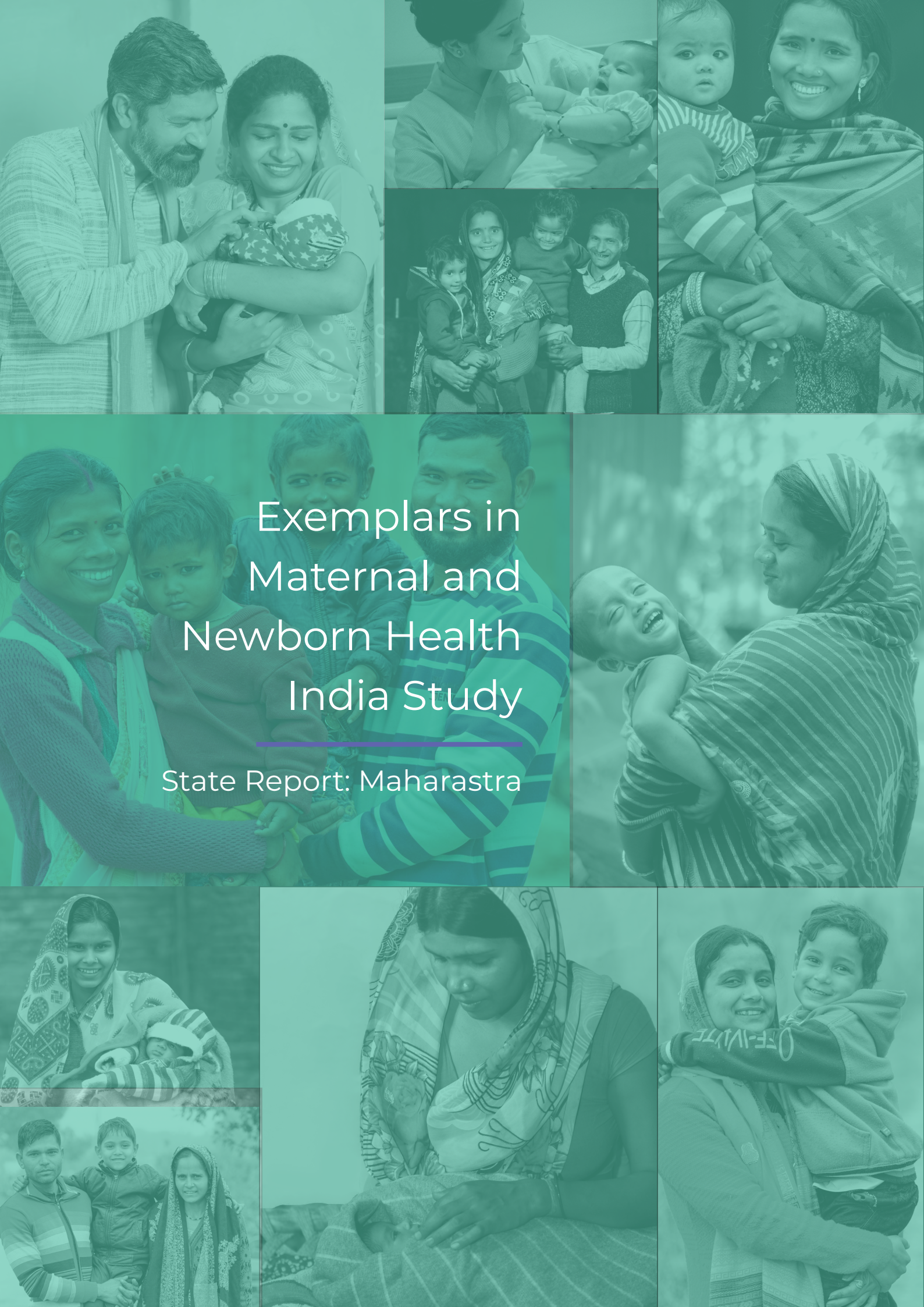
Ministry of Health & Family Welfare
Government of India

Exemplars in Maternal and Newborn Health India Study

State Report: Maharashtra

2023



Exemplars in Maternal and Newborn Health India Study

State Report: Maharastra

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ABBREVIATIONS

AARC	Average Annual Rate of Change
ANC	Antenatal Care
ANCq	Antenatal Care with Content
AMOGS	Association of Maharashtra Obstetrics and Gynaecological societies
ANM	Auxiliary Nurse Midwife
ASHA	Accredited Social Health Activist
AWW	Anganwadi Worker
AYUSH	Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homeopathy
BEmONC	Basic Emergency Obstetric and Newborn Care
BMI	Body Mass Index
CEmONC	Comprehensive Emergency Obstetric and Newborn Care
CHC	Community Health Center
CSSM	Child Survival and Safe Motherhood
DLHS	District Level Health Survey
DTT	District Training Team
EmOC	Emergency Obstetric Care
FOGSI	Federation of Obstetric and Gynecological Societies of India
FRU	First Referral Units
GBDS	Global Burden of Disease Study
HBNC	Home Based Newborn Care
HDSS	Health and Demographic Surveillance System
HIV/AIDS	Human Immunodeficiency Virus / Acquired Immune Deficiency Syndrome
HMIS	Health Management Information System
HMS	Higher Mortality States
HSC	Health Sub-Centre
ICDS	Integrated Child Development Scheme
IEC	Information Education and Communication
IHAT	India Health Action Trust
IIPS	International Institute for Population Sciences
INR	Indian Rupee
IPHS	Indian Public Health Standard
JSSK	Janani Shishu Suraksha Karyakaram
JSY	Janani Suraksha Yojana
KEM	King Edward Memorial
KPMG	Klynveld Peat Marwick Goerdeler
LaQshya	Labour room quality improvement initiative
LMS	Lower Mortality States
MCEE	Maternal and Child Epidemiology Estimation
MCTS	Mother and Child Tracking System
MD	Doctor of Medicine

MDS	Million Death Study
MGIMS	Mahatma Gandhi Institute of Medical Sciences
MMR	Maternal Mortality Ratio
MNH	Maternal and Newborn Health
MO	Medical Officer
MOCP	Medical Officer Certificate Program
NFHS	National Family Health Survey
NGO	Non-Government Organization
NHM	National Health Mission
NHSRC	National Health Systems Resource Centre
NICU	Neonatal Intensive Care Unit
NMR	Neonatal Mortality Rate
NRHM	National Rural Health Mission
OOPE	Out-of-pocket Expenditure
PCI	Per Capita Income
PHC	Primary Health Centre
PIP	Project Implementation Plan
PNC	Postnatal Care
PRI	Panchayati Raj Institution
RCH I	Reproductive and Child Health I
RCH II	Reproductive and Child Health II
RMNCAH+N	Reproductive, Maternal, Newborn, Child and Adolescent Health plus Nutrition
RMNCH	Reproductive, Maternal, Newborn, and Child Health
RMNCH+A	Reproductive, Maternal, Newborn, and Child Health plus Adolescent Health
SDG	Sustainable Development Goals
SEARCH	Society for Environmental Awareness and Rehabilitation of Child and Handicapped
SNCU	Special Newborn Care Units
SRS	Sample Registration System
TFR	Total Fertility Rate
UNFPA	United Nation Population Fund
UNICEF	United Nation's Children's Fund
UoM	University of Manitoba
VHNSC	Village Health Nutrition and Sanitation Committee
WHO	World Health Organization
ZP	Zilla Parishads

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EXECUTIVE SUMMARY

The Exemplars in Maternal and Newborn Health study documents factors associated with rapid reductions in maternal and neonatal mortality over the past two decades. This international effort aims to understand positive outliers and inform policy and practice. India was selected as one of seven "Exemplar" countries and within India the analysis was extended to examine higher- and lower-mortality state clusters separately, and to closely look at six exemplary states: Maharashtra, Tamil Nadu, Rajasthan, Odisha, Uttar Pradesh, and Madhya Pradesh. This report presents the Maharashtra sub-study and provides background information on the broader India study and research methodology. Key findings for the Maharashtra state are as follows.

- Maharashtra made major progress in reducing maternal and newborn mortality during 2000-18, greater than most other lower mortality states, achieving the 2030 Sustainable Development Goal (SDG) target for maternal mortality ratio (MMR) and nearing the SDG target for neonatal mortality rate (NMR).
- All major causes of neonatal death have reduced (prematurity, birth asphyxia, infections and other) but the greater mortality reductions were in the first 0-2 days of life, suggesting better intrapartum care and better newborn health and nutritional status.
- The gains in intervention coverage – antenatal care (ANC) with contents, institutional deliveries notably in hospitals and C-sections among rural and the poorest – have been marked and are greatest in the Reproductive and Child Health II/National Rural Health Mission (RCH II/NRHM) period (2005-12).
- Hospital deliveries have driven this increase, accounting for 77% of deliveries, where neonatal mortality rates have reduced, more so in private hospital deliveries.
- Maharashtra has continued to progress (from stage II in 2000 to late Stage IV in 2018 of the five-stage transition model) owing to reaching near universality of key interventions among disadvantaged populations, improving quality of care (increased ANC with contents and reduced NMR in hospitals) and most women delivering in facilities with comprehensive emergency capacity (C-sections and Special Newborn Care Units).
- Several health policies and system reforms have contributed to Maharashtra's success, including:
    - The state has focused on improving services in underserved (particularly tribal) areas and service/human resource availability at the existing facilities.
    - It also prioritized in-service training for medical officers, nurses, and Auxiliary Nurse Midwives (ANMs) through the Medical Officer Certificate Program and a decentralized training system.

- The state amended recruitment processes to attract Medical Officers (MOs) with higher level degrees and rewarded high performing health workers.
- The state has prioritized in-service training and education for health workers (Accredited Social Health Activists - ASHAs, medical officers) and sought to implement the Indian Public Health Standards (IPHS) and assurance of essential drugs and commodities at all levels and locations of government health facilities.
- The state has improved the early identification of high-risk pregnancies and obstetric complications, enabling timely intervention.
- The state has been particularly open to working with specific private sector actors: While the private sector overall has resisted regulation, specific private sector practitioners and associations (particularly the Maharashtra chapter of FOGSI) have been important partners to the Government of Maharashtra in developing and running trainings.
- The Government of Maharashtra endorsed FOGSI's private maternity care facility accreditation program, called Manyata, to utilize the government's LaQshya quality standards thereby creating the unique LaQshya-Manyata initiative.
- Leaders in the state government and its Ministry of Public Health and Family were highly motivated to improve maternal and newborn health and operated in a collaborative and cohesive manner.
- Pressure to improve maternal and child survival came from the state administration, as well as Maharashtra's particularly strong panchayat structure, health activists, and media.
- Maharashtra embraced geographic targeting, with intensive inputs and scrutiny given to tribal areas and was a state that took data analysis seriously for planning and accountability.
- Maharashtra decentralized responsibility for aspects of the government health system at the state-level and to the Zilla Parishads (elected panchayat governance structure at the district level), which distributed power and responsibility more widely, and enabled more responsive decision-making.
- While financial decentralization within the state began in the 1960s with direct funding for Zilla Parishads to manage primary health centres and sub-health centres, the NRHM brought additional financing and financial flexibility to the state itself.
- Maharashtra has robust community level engagement in health through committees and community-based monitoring of government health services and ASHAs, grounded in a history of community health worker programs since the 1970s.

BACKGROUND AND STUDY DESIGN

The Exemplars in maternal and newborn health (MNH) study aims to systematically and comprehensively research and document factors associated with rapid reductions in maternal and neonatal mortality over the past two decades in select countries that have experienced more rapid declines than countries with similar socio-economic progress. This study contributes to a Gates Ventures initiative on Exemplars in Global Health, which includes other subject areas such as child mortality, stunting, community health worker programs, and vaccine delivery. The study is an international effort to learn from success and understand positive outliers to inform policy and practice.

India has made major progress in improving maternal and newborn health outcomes over the past two decades. According to India's Sample Registration System (SRS), between 2000 and 2018, the maternal mortality ratio (MMR) dropped from 327 to 103 per 100,000 live births and the neonatal mortality rate (NMR) from 44 to 23 per 1,000 live births. India's decline in mortality outpaced the global and regional decline, with or without adjustment for economic growth. In 2000, India accounted for 23% of maternal deaths and 31% of neonatal deaths globally. By 2017, these proportions had reduced to 12% of maternal deaths and 22% of neonatal deaths globally.[1,2] Therefore, important lessons can be learned from a systematic investigation of the drivers of India's progress, nationally and sub-nationally, for India to build on its success and for other countries seeking to accelerate progress in MNH.

The primary objective was to systematically investigate, document and compare the contribution of health policies and systems, programs, and services, as well as changes in coverage, quality, and equity of reproductive, maternal, newborn, and child health (RMNCH) interventions and contextual factors, to the reduction in maternal and neonatal mortality in India over the past two decades nationally and sub-nationally. The study was implemented by a team led by the National Health Systems Resource Centre (NHSRC) in collaboration with the International Institute for Population Sciences (IIPS), the University of Manitoba (UoM), and the India Health Action Trust (IHAT). The Ministry of Health and Family Welfare, Government of India supported the study under the guidance of a steering committee supported by a technical working group and a core implementation team.

The mixed methods study included the following components:

- *National macro-level analysis:* Develop an understanding of India's levels and trends in maternal and neonatal mortality, and how these coincided with changes in health policies and systems, health programs and services, contextual factors, and MNH intervention coverage and equity, and identify clusters of states with varied contexts contributing most to India's national progress;
- *State-level in-depth analysis:* Gain an in-depth understanding in six exemplar states within India of the pathways by which key drivers may have led to reductions in the states' neonatal mortality rate (NMR) and maternal mortality ratio (MMR);
- *Synthesis:* Develop an analytical synthesis across the national and state-level research findings on the success factors contributing most to the reduction of maternal and neonatal mortality in India and exemplary states.

Study design

Conceptual framework for the Exemplars MNH study

The Exemplars in MNH study was guided by a conceptual framework that was developed to identify the drivers of change, dividing the interrelated factors hierarchically in distal, intermediate, and proximate drivers of maternal and neonatal mortality decline (Figure 1).[3]

On the far left of the framework, the health policy and system levers are the tools used by governments to improve MNH specifically and non-MNH issues that may have an enormous impact on MNH. Government actions include changes in policy, services, and financial resources with direct or indirect linkages to MNH. Direct changes include strategies to strengthen the health system, while indirect changes include efforts to enhance gender equity or infrastructure in underserved parts of the country that would affect MNH outcomes.

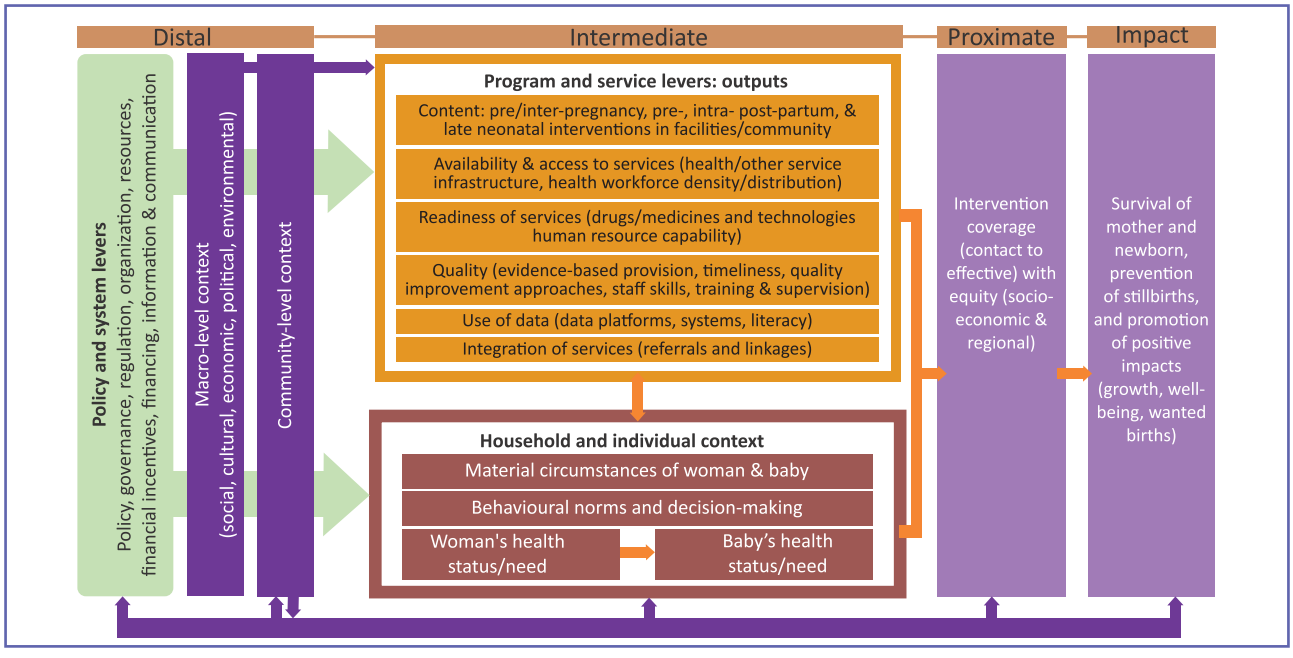
Macro- and community-level contextual factors (e.g., social, cultural, economic, political, or geographical) at the distal level may moderate the effects of health policy and system changes on program and service outputs for MNH and their impact on coverage of key MNH interventions and health outcomes. They can also directly influence the levels and equity of intervention coverage and/or maternal and newborn survival.

The health policy and system levers at the distal level aim to specifically influence program and service levers at the intermediate level, which are the concrete outputs of government actions in the health sector. These outputs include actual changes in service contents or program strategies, including access, readiness, quality, and integration of health services, necessary to increase intervention coverage and equity, and ultimately impact MNH.

Contextual factors at the intermediate level include the household and individual-level characteristics, including material circumstances (such as household assets and income), behavioural norms and decision-making, and health status/need of the women and babies concerned, which are seen to affect intervention coverage and mortality outcomes directly or indirectly.

These distal and intermediate factors are conceptualized as influencing the proximate factors, namely the coverage of interventions at promotive, preventive, and curative levels. This includes quality-adjusted coverage, and the degree that these are equitable between socio-economic groups and geographical regions. Coverage of interventions is considered most directly associated with a positive impact on maternal and newborn survival.

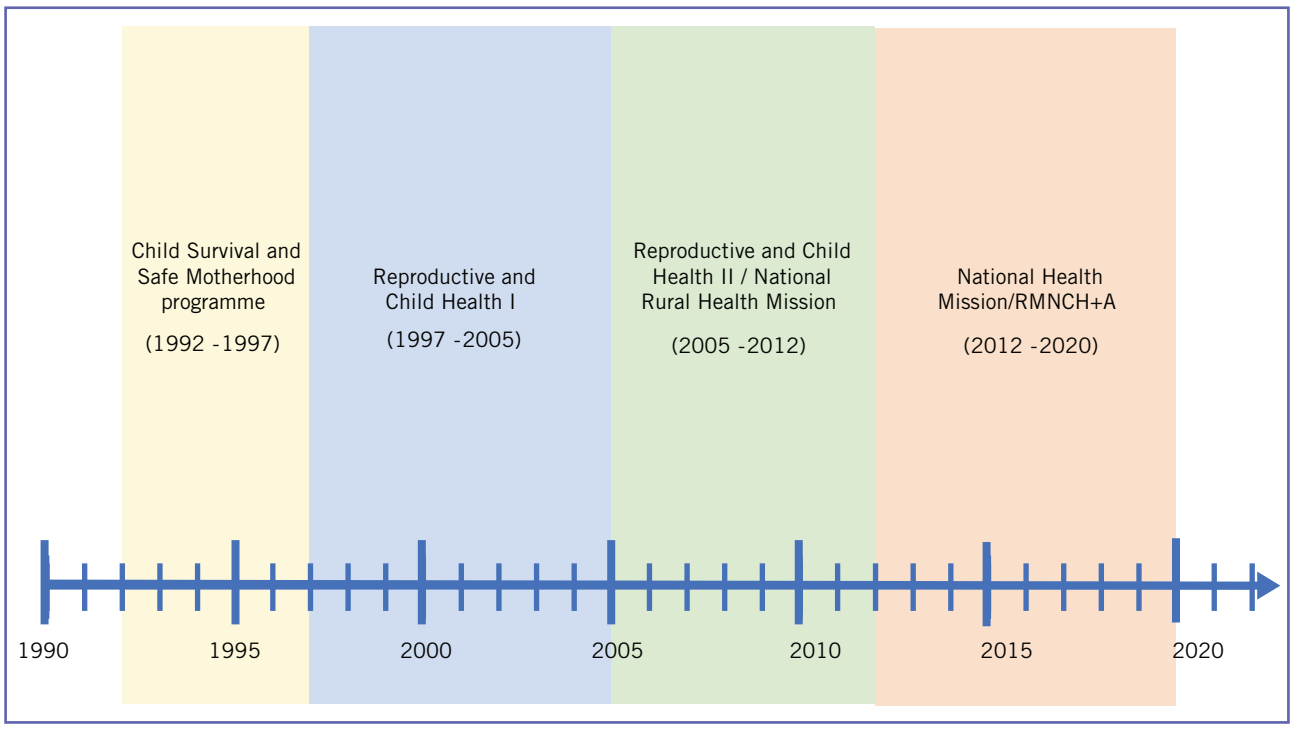
Figure 1: Conceptual framework for the study of drivers of the maternal and neonatal mortality decline, MNH Exemplars study



Identifying critical periods of policy change to guide analysis

The period of primary interest is 2000 to 2020, or the year the latest data was available. Levels and trends prior to 2000 are also relevant to understanding whether there were changes in pace of decline post-2000. To assess the possible impact of major policy and program changes implemented through the National Health Mission (NHM) to deliver services across the reproductive, maternal, newborn, child and adolescent health plus nutrition (RMNCAH+N) continuum of care across India, we divided the time period into four intervals to guide our mixed-methods analyses: the Child Survival and Safe Motherhood (CSSM) program from 1992 to 1997, the Reproductive and Child Health I (RCH I) program from 1997 to 2005, the Reproductive and Child Health II (RCH II) program and the National Rural Health Mission (NRHM) from 2005 to 2012; and the Reproductive, Maternal, Neonatal, Child and Adolescent Health (RMNCH+A) program and NHM from 2012 to 2020 (Figure 2). In addition, we assessed all annual or five-year time trends (depending on the indicator): periods of acceleration or deceleration of the decline in the relevant indicator (using the average annual rate of change).

Figure 2: India's health policy periods

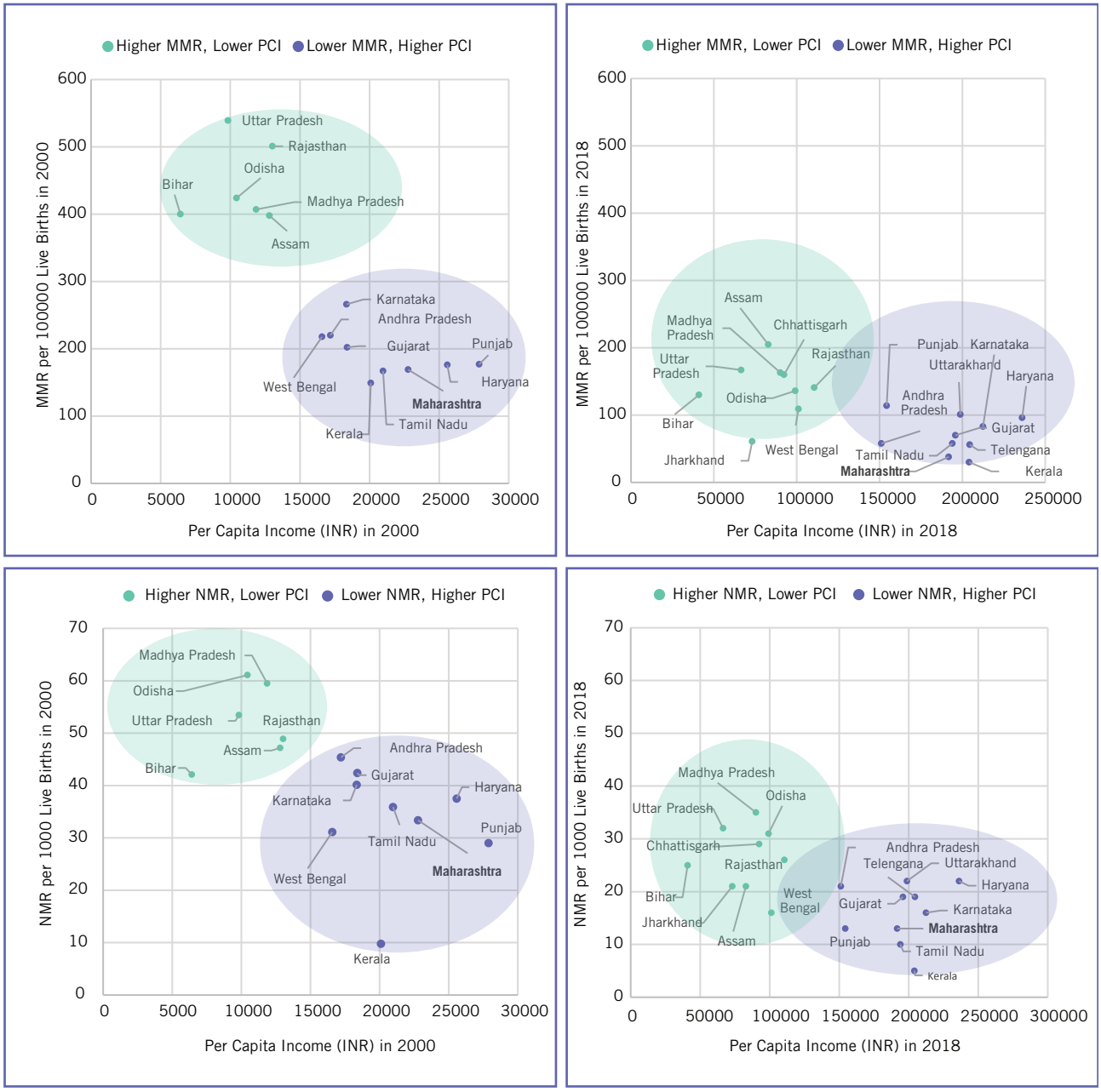


State clusters

We observed two distinct clusters of states based on the situation in 2000 and 2018: one of higher mortality states (HMS) with lower per capita income (PCI), and one of lower mortality states (LMS) with higher per capita income (Figure 3). The two state clusters resulting from this approach were:

- Lower mortality with higher PCI (47% of India's population): Andhra Pradesh, Gujarat, Haryana, Karnataka, Kerala, **Maharashtra**, Punjab, Tamil Nadu, Telangana, and West Bengal
- Higher mortality with lower PCI (49% of India's population): Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Odisha, Rajasthan, Uttar Pradesh, Uttarakhand (all of which were part of the Empowered Action Group), and Assam

Figure 3: Comparison of state-specific MMR and NMR levels in 2000 and 2018 by state per capita income



Note: West Bengal, with a similar MMR and NMR to the lower mortality states but lower per capita income in 2018 is included in the lower mortality/higher PCI cluster. Uttarakhand with a similar MMR and NMR to the higher mortality states, but higher PCI in 2018 is included in the higher mortality/lower PCI cluster.

Selection of six states for in-depth analyses

Many states in India experienced impressive declines in both maternal and neonatal mortality during 2000-17, and so it is valuable to comprehensively study how different states achieved success. At the time of state selection, we used the available data and computed average annual pace of the decline in both maternal and neonatal mortality during 2000-17 and selected the six best performing states, to reflect the two main outcomes of the study. We also considered population size, and different dimensions of equity (available for the neonatal mortality outcome). However, the results provide variable conclusions on the six states with most progress, and there is more uncertainty because of larger sampling errors for disaggregated data. Hence, considering the key objective of selecting states that have achieved fastest declines in MMR and NMR since 2000, the strongest indicator is the sum of a state's NMR and MMR average annual rates of change (AARCs).

All major (large population) states were considered in the selection process. The AARCs in maternal and neonatal mortality during 2000-17 were used as the main statistics for selection. The selection was based on SRS data, with its high consistency over time and availability for both indicators. The National Family Health Survey (NFHS) also provides trend data on neonatal mortality. The NFHS mortality data are more limited as they are only available for neonatal mortality, and there are more data quality-related and sample size-related issues that affect state-level trends.

The contribution of the cluster of higher mortality states to the India's progress was over 70% for maternal mortality and over 60% for neonatal mortality. Therefore, four of the six states selected for in-depth analysis were from the higher mortality cluster of states, and two from the lower mortality cluster of states. Conducting in-depth analysis in diverse states also provides scope for analyzing the drivers of success within different health systems, socio-economic and demographic contexts over time.

The AARCs for maternal and neonatal mortality are measures of common unit and scale. Therefore, we added the two rates to obtain an overall score for ranking the states within the cluster. The sum of the maternal mortality and neonatal mortality AARCs is shown in Table 1 below. Based on the sum of the two AARCs, the top-ranking four states overall among the high mortality state cluster are Rajasthan (-10.1%), Odisha (-9.9%), Uttar Pradesh (-9.3%) and Madhya Pradesh (-8.5%), followed by Bihar and Assam. In the lower mortality state cluster, the top states overall are Maharashtra (-13.2%) and Tamil Nadu (13.0%), with Kerala and Andhra Pradesh slightly below (both around -11%).

Table 1: Average annual rate of change (AARC) for maternal mortality and neonatal mortality by state (SRS, 2000-17) (states ranked within state cluster by total AARC)

	MMR			NMR			Sum of AARCs	Rank
State	1999-2001	2016-18	AARC	2000	2017	AARC		
Higher mortality states								
Rajasthan	501	164	-6.6	48.9	27.0	-3.5	-10.1	1 (selected)
Odisha	424	150	-6.1	61.1	32.0	-3.8	-9.9	2 (selected)
Uttar Pradesh	539	197	-5.9	53.5	30.0	-3.4	-9.3	3 (selected)
Madhya Pradesh	407	173	-5.0	59.5	33.0	-3.5	-8.5	4 (selected)
Bihar	400	149	-5.8	42.1	28.0	-4.5	-8.1	5
Assam	398	215	-3.6	47.2	22.0	-2.4	-8.2	6
Lower mortality states								
Maharashtra	169	46	-7.7	33.4	13.0	-5.5	-13.2	1 (selected)
Tamil Nadu	167	60	-6.0	35.9	11.0	-7.0	-13.0	2 (selected)
Kerala	149	43	-7.3	9.8	5.0	-3.9	-11.2	3
Andhra Pradesh	220	65	-7.2	45.4	23.0	-4.0	-11.2	4
Karnataka	266	92	-6.2	40.2	18.0	-4.7	-10.9	5
Gujarat	202	75	-5.8	42.4	21.0	-4.1	-9.9	6
West Bengal	218	98	-4.7	31.1	17.0	-3.6	-8.3	7
Haryana	176	91	-3.9	37.5	21.0	-3.4	-7.3	8
Punjab	177	129	-1.9	29.0	13.0	-4.7	-6.6	9

Data sources

We used the SRS for maternal and neonatal mortality and fertility trends. The national household surveys including the National Family Health Survey[4] (NFHS, 5 rounds: NFHS-1 1992-93; NFHS-2 1998-99; NFHS-3 2005-06; NFHS-4 2015-16; and NFHS-5 2019-21), and the District Level Household Survey[5] (DLHS, 3 rounds: DLHS-1 1998-99; DLHS-2 2002-04; and DLHS-3 2007-08) were pooled for the trends in intervention coverage and equity analyses. For causes of death trends, we used the Million Death Study (MDS) for 2005-06, [6,7] and reviewed estimates from WHO/Maternal and Child Epidemiology Estimation (MCEE),[8] and the Global Burden of Disease Study (GBDS).[9]

For the qualitative component, we organized a national stakeholder meeting (length: 2 hours and 10 minutes) with 14 experts in June 2021 to identify key drivers of mortality declines. Key informant interviews (KIIs), averaging 1.5 hours) were conducted during July-November 2021. We invited 21 experts active since 2000 in MNH policy and implementation from the government, donor organizations, private, civil society, and academic spheres, of which 13 consented. We held one round table discussion with state-level experts in the six selected exemplar states separately (n=11 each on average) in March-April 2022 to identify key policy and health system drivers of mortality declines (averaging 3.15 hours). All were conducted on Zoom in English, audio-recorded, and transcribed. Ethical approvals were obtained from the International Institute for Population Sciences [#33/2021] and University of Manitoba [#HS24416] review boards.

Analytical methods

We analysed quantitative trends by computing average annual rates of change (AARC) through using exponential growth rate[10] for the different national policy periods. To measure ANC with contents and intensity-related components, we computed a composite index called ANCq[11], which has a 13-point scale. After adaptation to India, our ANCq index consisted of the number of ANC visits, timing of ANC, at least one ANC by skilled provider, blood pressure checked, weight measured, abdomen examined, blood sample collected, urine sample collected, and the number of tetanus toxoid vaccinations during pregnancy.

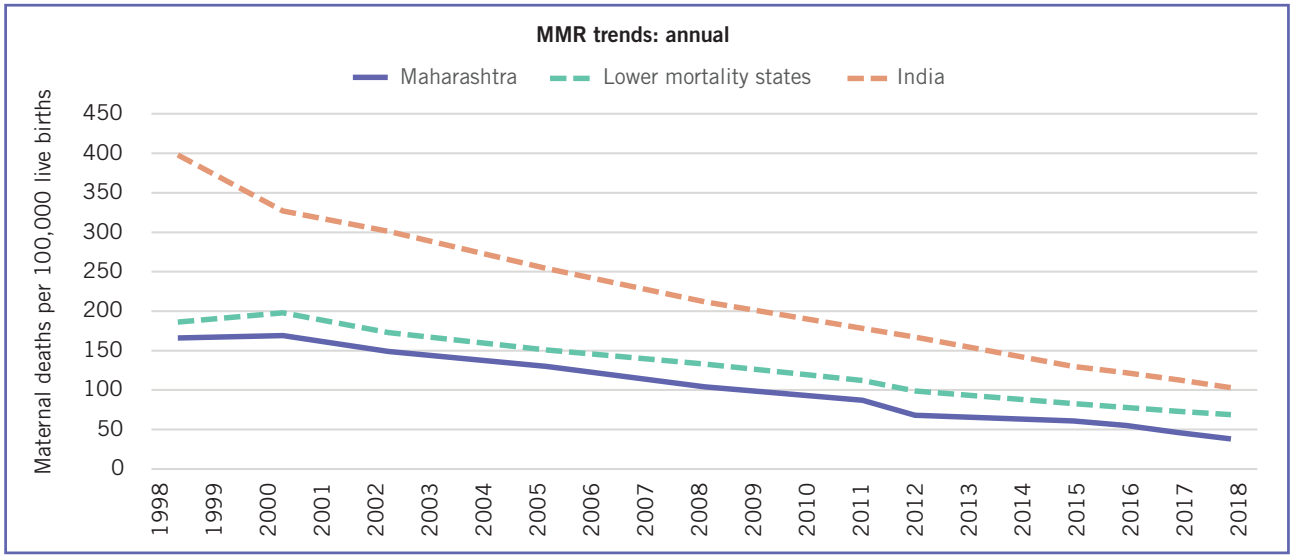
We coded the qualitative transcripts in Dedoose software using a codebook developed based on *a priori* topics, with additional emergent sub-codes. We shared synthesized results with key informants anonymously to finalize the results.

This report presents the results of these analyses for Maharashtra according to the framework (Figure 1) from right to left. This presentation order reflects the iterative approach to the analyses, working from observed trends in mortality outcomes and intervention coverage to describing hypothesized changes in health policy, systems, and service levers, as well as relevant contextual factors in Maharashtra over the last two decades. Then the study analyzed the linkages between drivers and outcomes to explain how major drivers combined to influence Maharashtra's maternal and neonatal mortality declines.

MATERNAL AND NEONATAL MORTALITY TRENDS

During 2000-18, the maternal mortality ratio (MMR) declined faster than the neonatal mortality rate (NMR) in Maharashtra (AARC of -8.3% versus -5.2%) (Figure 4 and Table 2). The state had achieved the SDG target of an MMR of 70 in 2012, way ahead of 2030. In 2018, Maharashtra recorded an NMR of 13, close to the SDG goal of 12. The state recorded fastest decline in MMR during the RCH-II/NRHM period (2005-12), with an AARC of -9.3% (Table 2). For the NMR, the fastest decline was during CSSM period (1992-97) with an AARC of -5.9%. Maharashtra's MMR and NMR both were consistently lower than its state cluster and all India.

Figure 4: Maharashtra's MMR (1998-2018) and NMR (1971-2019) levels and trends compared to lower mortality state cluster and all India (SRS)



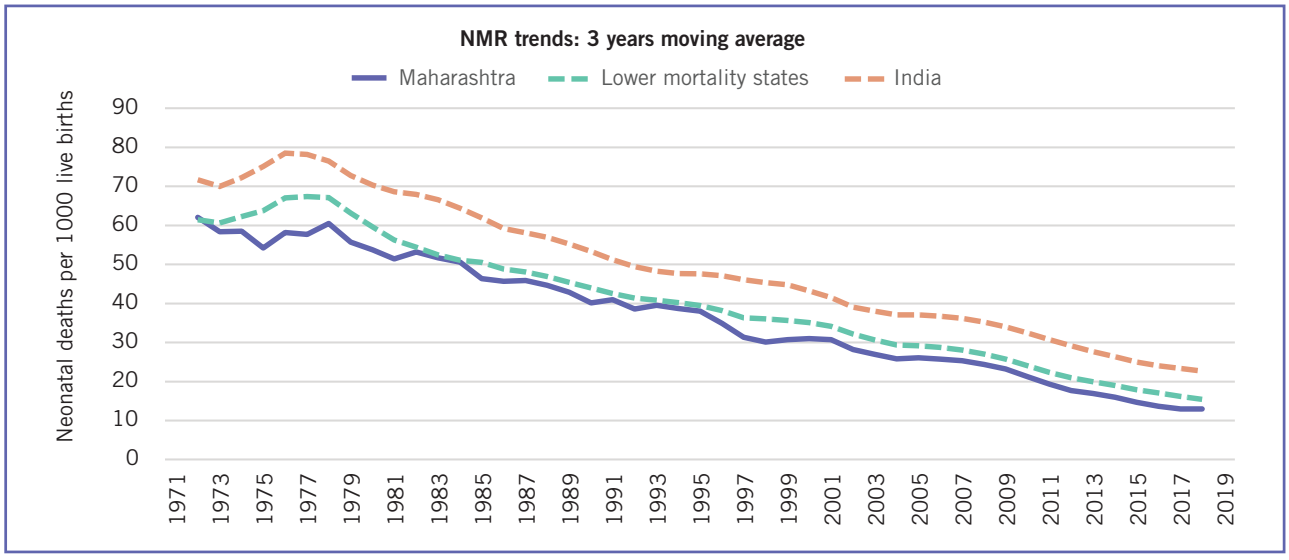


Table 2: Average annual rates of change (AARC) in MMR (1997-2018) and NMR (1971-2019), Maharashtra, lower mortality state cluster and all India (SRS)

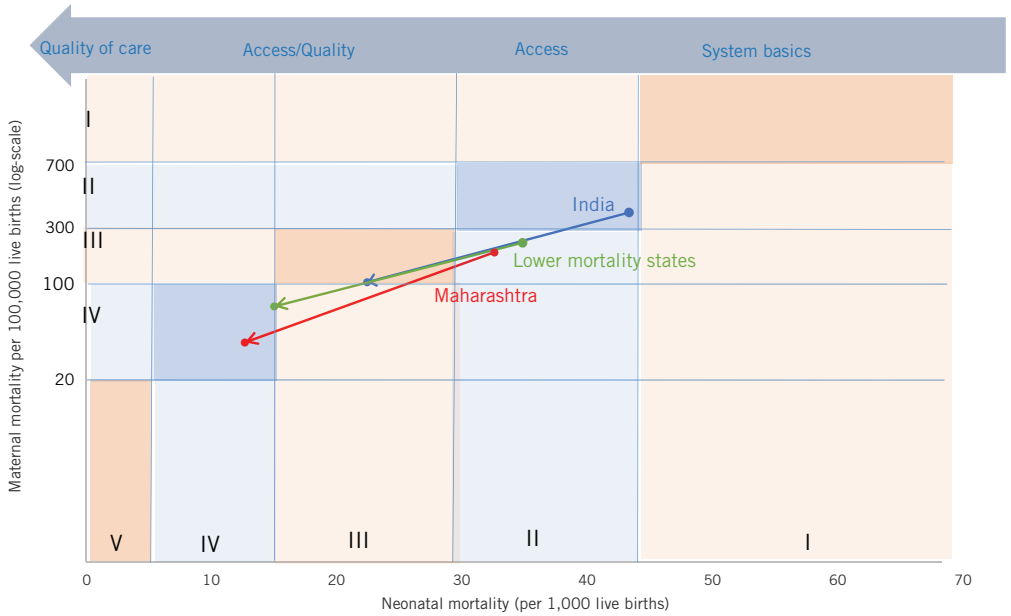
Policy period	Maharashtra	Lower mortality states	India
AARC in MMR (%)			
1997-2005 (RCH I)	-3.5	-3.0	-6.4
2005-12 (RCH-II/NRHM)	-9.3	-6.0	-6.0
2012-18 (NHM/RMNCH+A)	-9.7	-6.0	-8.1
2000-18	-8.3	-5.9	-6.4
1997-2018 (Overall)	-7.4	-5.0	-6.8
AARC in NMR (%)			
1992-97 (CSSM)	-5.9	-3.0	-1.6
1997-2005 (RCH I)	-2.9	-3.0	-2.8
2005-12 (RCH-II/NRHM)	-4.9	-4.7	-3.4
2012-19 (NHM/RMNCH+A)	-4.6	-5.3	-3.9
2000-18	-5.2	-4.7	-3.7
1971-2019 (Overall)	-4.4	-4.0	-3.0

Maternal and neonatal mortality transition

Maharashtra's success in reducing maternal and neonatal mortality is presented (Figure 5) against a five-stage mortality transition model for maternal and neonatal mortality developed over the course of the Exemplars in MNH study. Stage I in this model indicates the highest levels of mortality, where access to services is extremely limited, inequalities are large, infectious diseases are a common cause of death, and fertility is high. Populations move across Stage II, III and IV as access to health services increases, quality improves, inequality patterns change from top to bottom inequality, infectious diseases and peri-partum conditions decrease in importance as causes of death, and fertility decline. Stage V is the lowest possible maternal and neonatal mortality, wherein mothers and newborns have universal access to high quality care and (almost) all preventable deaths are eliminated.

During 2000-18, Maharashtra has transitioned from Stage II to Stage IV, achieving a four-fold reduction in maternal mortality and reducing the peri-neonatal mortality by half (Figure 5).

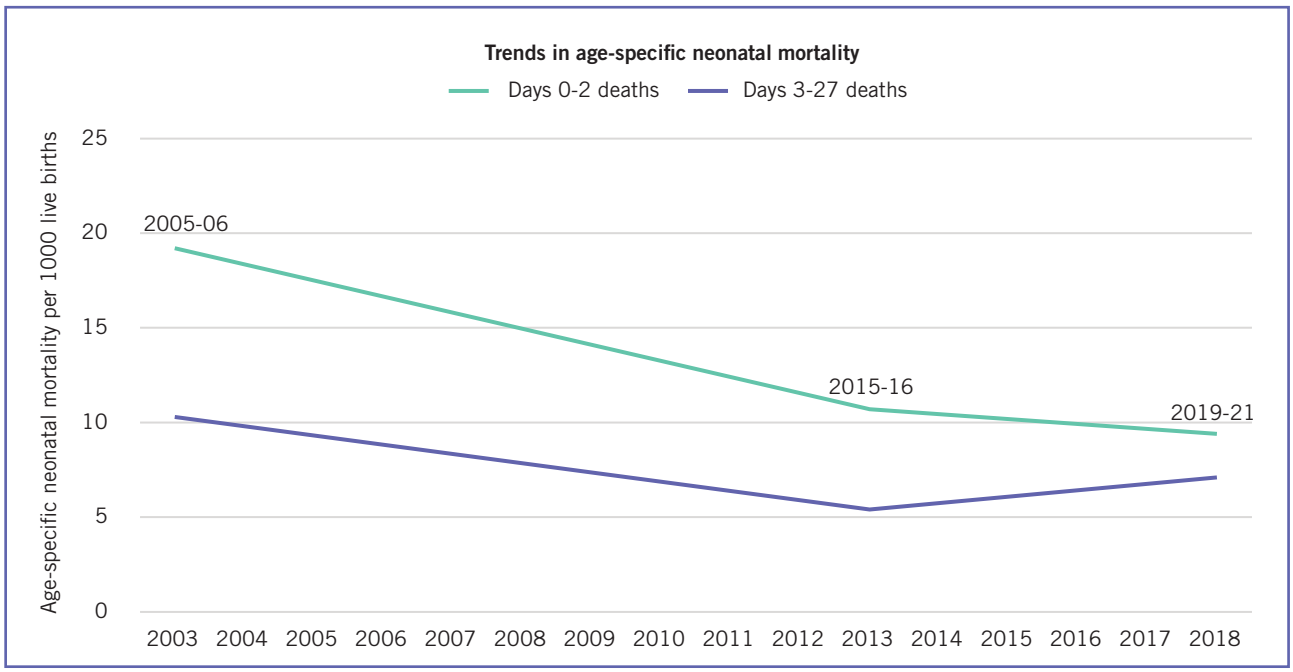
Figure 5: Mortality transition in Maharashtra, lower mortality state cluster and all India (SRS 2000-18)



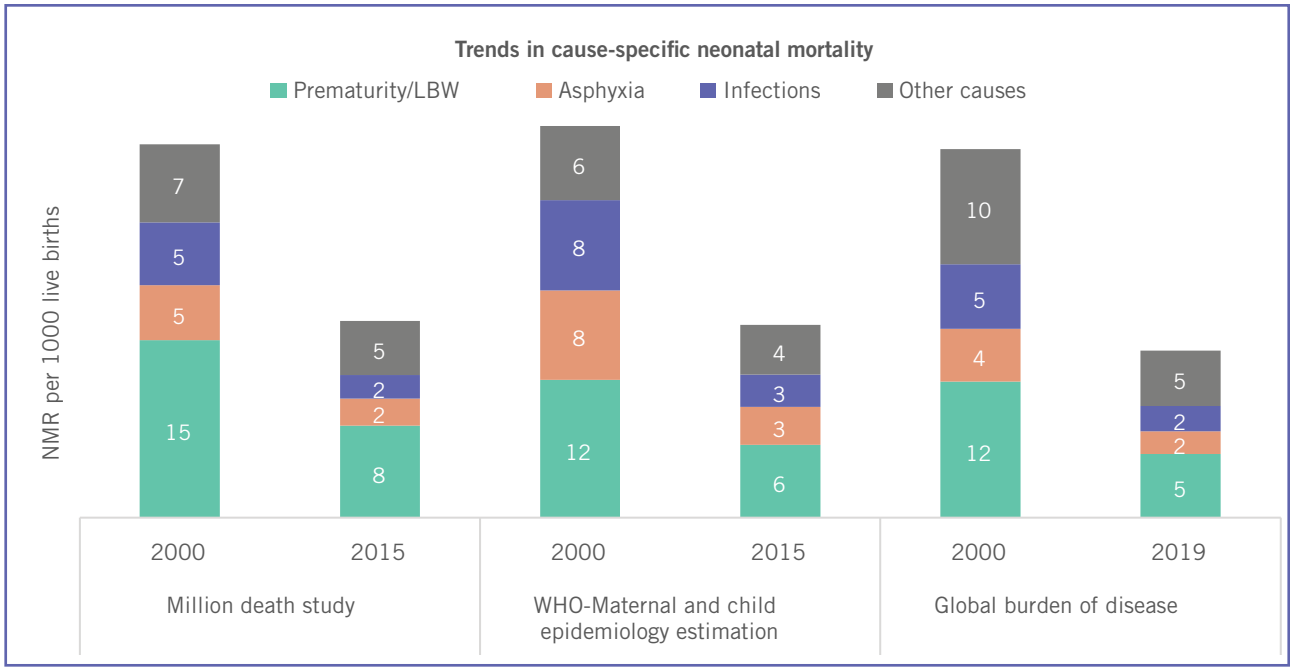
Age and cause-specific neonatal mortality

During 2003-13, Maharashtra was especially successful in bringing down mortality in the first two days of life (days 0 to 2), indicative of improvements to quality of delivery care and the newborn's health status (Figure 6). The state recorded a slight increase in the neonatal mortality on days 3 to 27 during 2013-18, while the neonatal mortality on days 0-2 only declined marginally. The estimates from the GBDS indicate that the state has achieved major declines in all leading causes with preterm births contributing 36% to the total decline, newborn infections including lower respiratory infections 19% and birth asphyxia another 15%. Preterm births contributed most to the decline as per MDS and WHO/MCEE data as well.

Figure 6: Trends in age-specific neonatal mortality during 2003-18 (NFHS 2005-06, 2015-16 and 2019-21*) and cause-specific neonatal mortality during 2000-19 (global data 2000, 2015 and 2019), Maharashtra



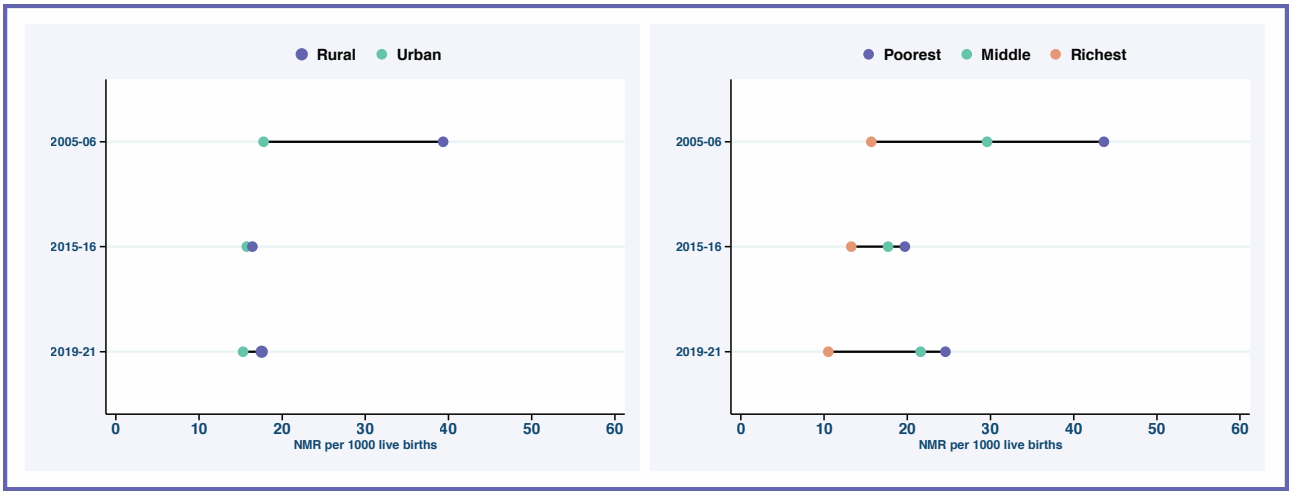
*We included mortality from births in the five years preceding each NFHS round and have taken 2003, 2013 and 2018 as the midpoints for the estimates from NFHS 2005-06, 2015-16 and 2019-21, respectively.



Equity in neonatal mortality

The state has succeeded in reducing the differences in NMR according to urban-rural residence and household wealth tertile considerably (Figure 7).

Figure 7: Trends in NMR by urban-rural residence and household wealth tertile, Maharashtra (NFHS 2005-06, 2015-16 and 2019-21)



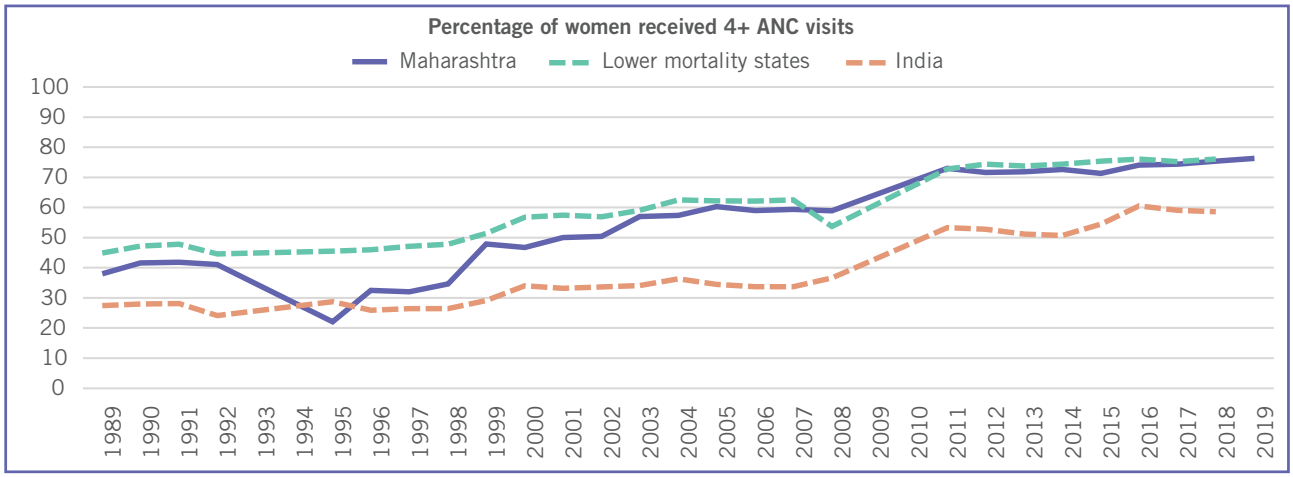
INTERVENTION COVERAGE AND EQUITY

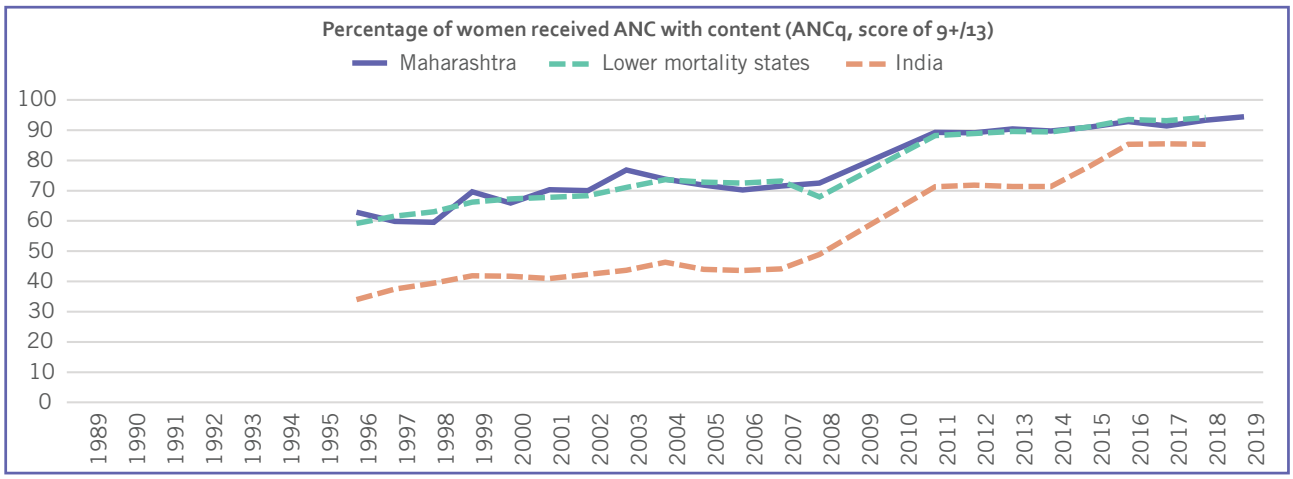
How did Maharashtra achieve these major mortality reductions since 2000? In this section, we analyse the trends and equity in the coverage of key interventions in the state against the backdrop of the various national health policy periods.

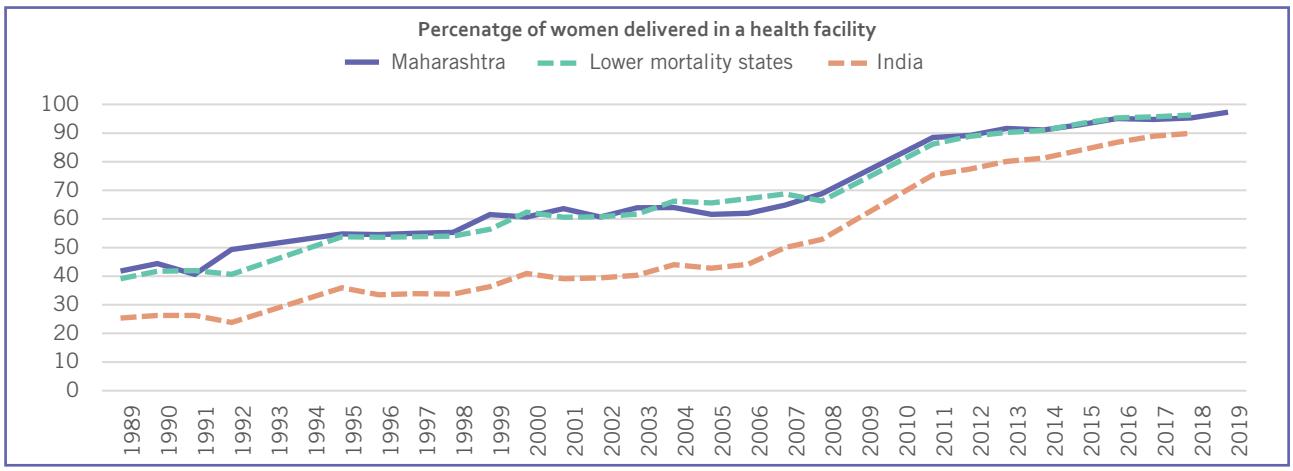
Antenatal and delivery care

The coverage of key interventions has improved in Maharashtra according to the pooled NFHS and DLHS data (Figure 8). Rapid increases in antenatal and delivery care coverage were observed during the NRHM years, with institutional delivery reaching over 97% by 2019.

Figure 8: Trends in antenatal and delivery care coverage, Maharashtra, lower mortality state cluster and all India (NFHS and DLHS pooled data, 1989-2019)

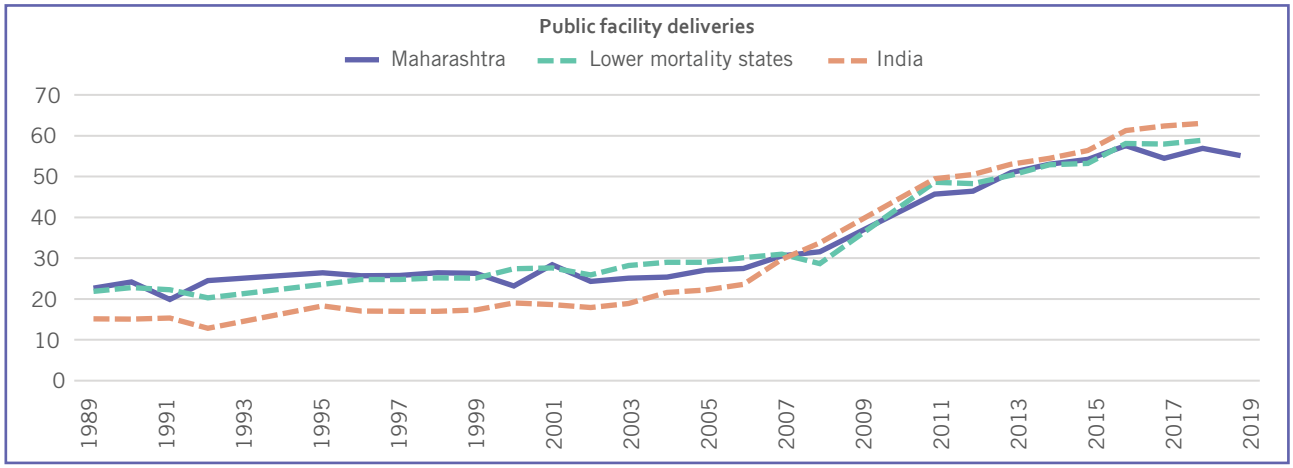


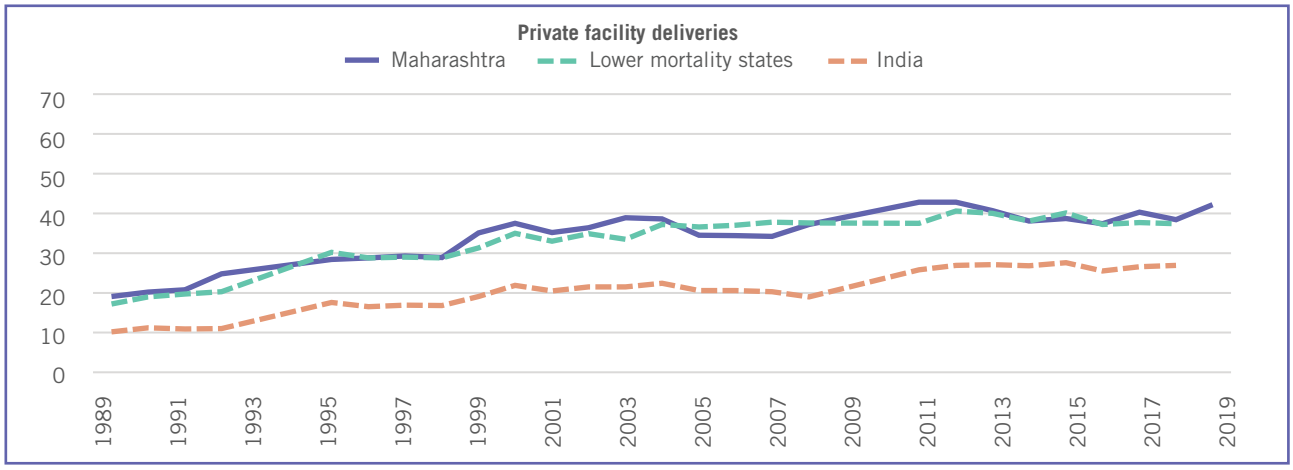




Increases in institutional deliveries was mainly driven by public facilities, however private facility deliveries also increased (Figure 9). Until 2008, private facility deliveries constituted more than half of all institutional deliveries in Maharashtra, after which the share of public facility deliveries went up, reaching 57% in 2019. The greatest increase in public facility deliveries was during the RCH-II/NRHM period (2005-12) with an AARC of 7.7% (data not shown).

Figure 9: Trends in public and private health facility deliveries, Maharashtra, lower mortality state cluster and all India (NFHS and DLHS pooled data, 1989-2019)





Maharashtra's major increases in institutional delivery was possible because the rural and the poorest women were reached, and disparities were reduced substantially (Figure 10). Majority of institutional deliveries in Maharashtra were hospital deliveries (Figure 11). Hospital deliveries accounted for 77% of all deliveries in the

state during 2019-21. The national analysis indicated that NMR decline is strongly associated with increases in hospital deliveries (MNH Exemplar Study, National Report).

Figure 10: Trends in institutional delivery by urban-rural residence and household wealth tertile, Maharashtra (NFHS 1998-99, 2005-06, 2015-16 and 2019-21)

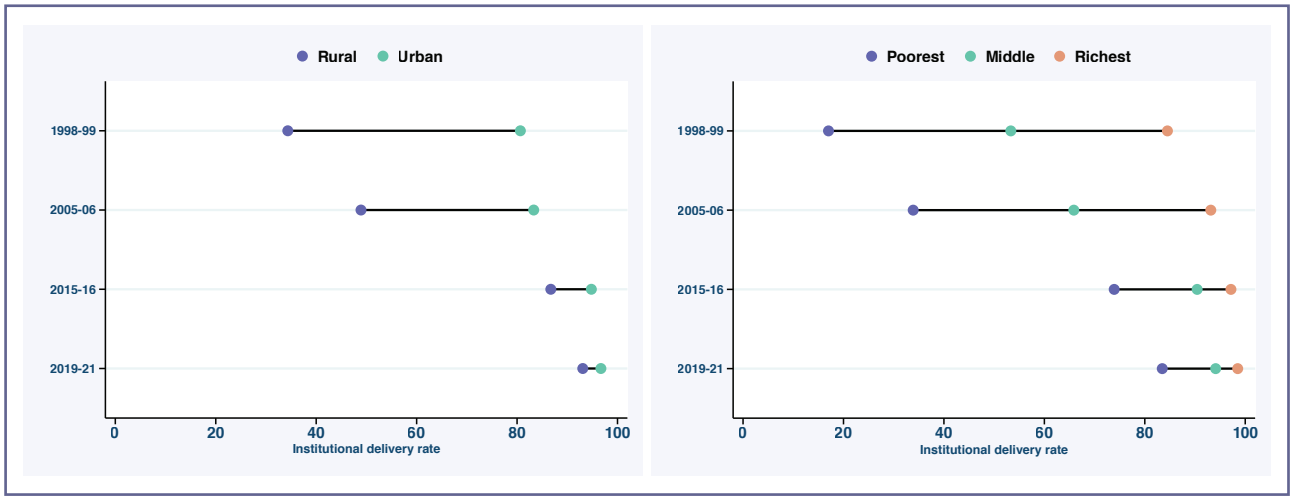
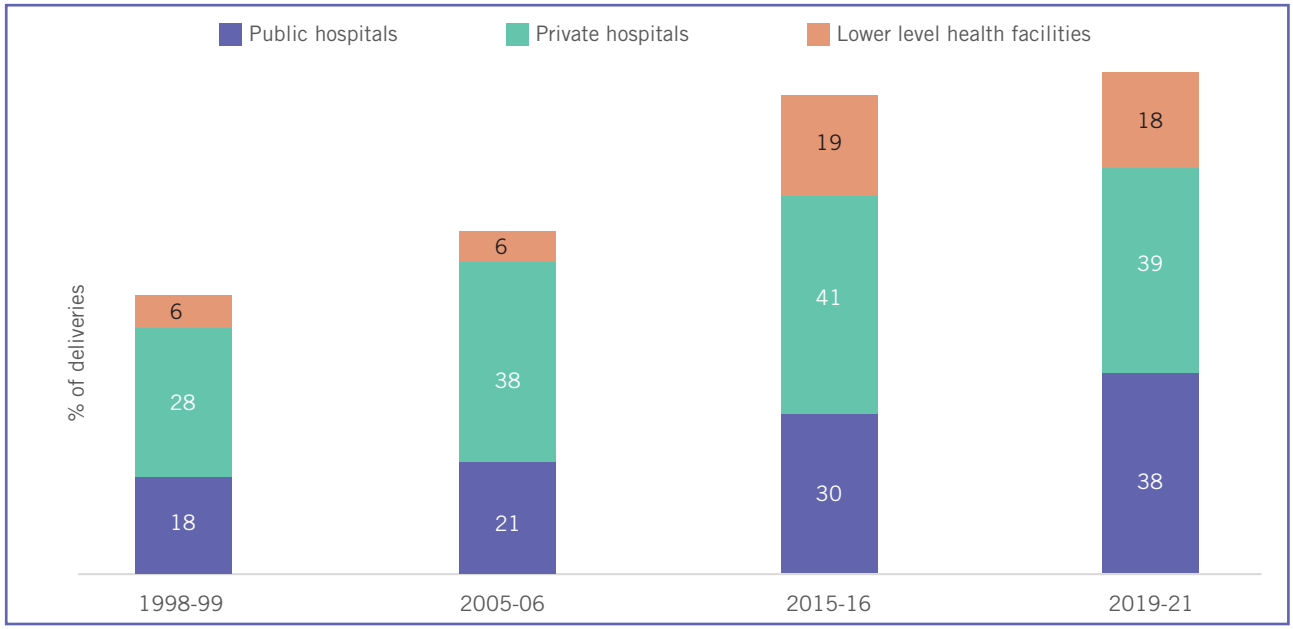


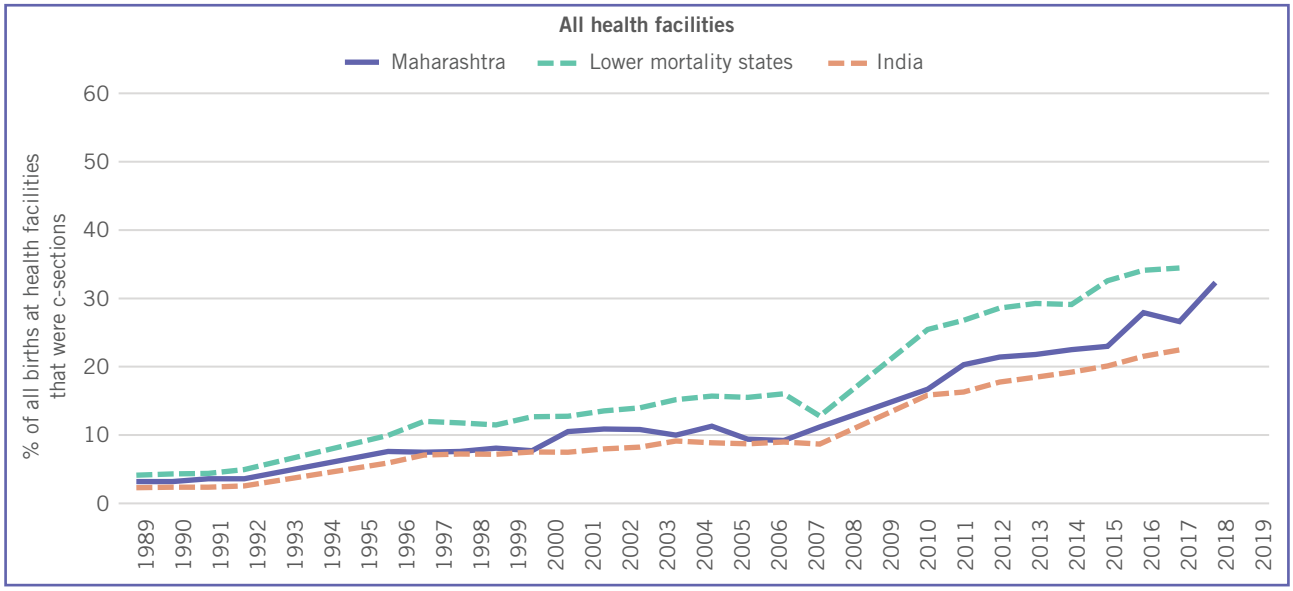
Figure 11: Trends in institutional delivery by health facility level, Maharashtra (NFHS 1998-99, 2005-06, 2015-16 and 2019-21)

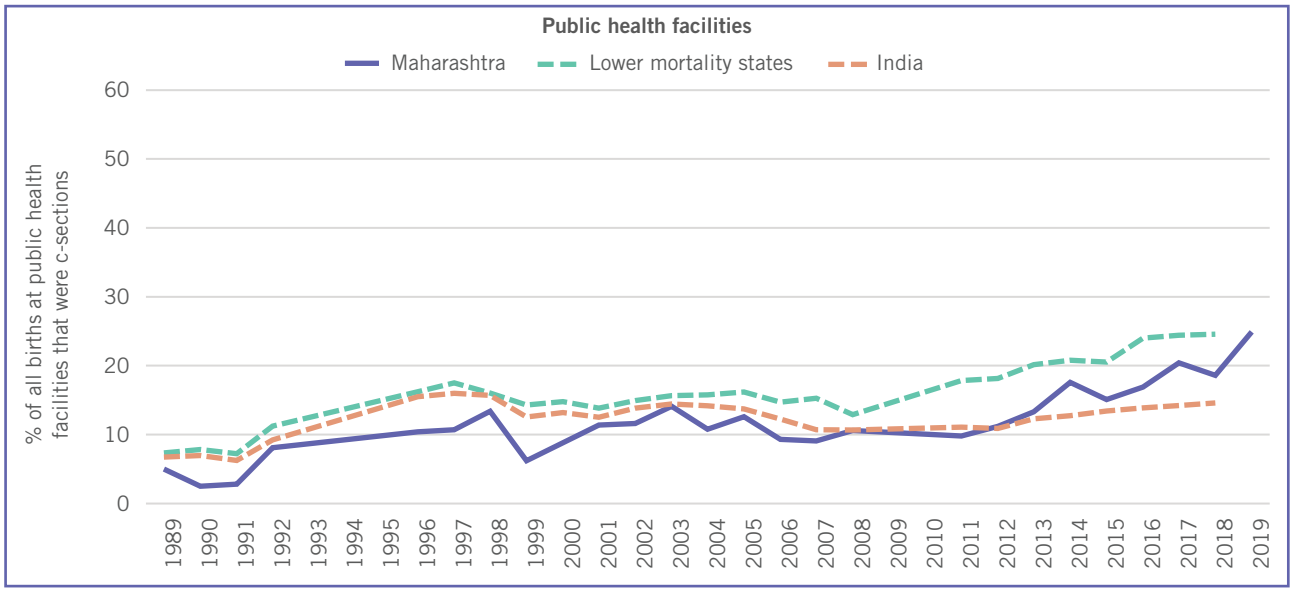


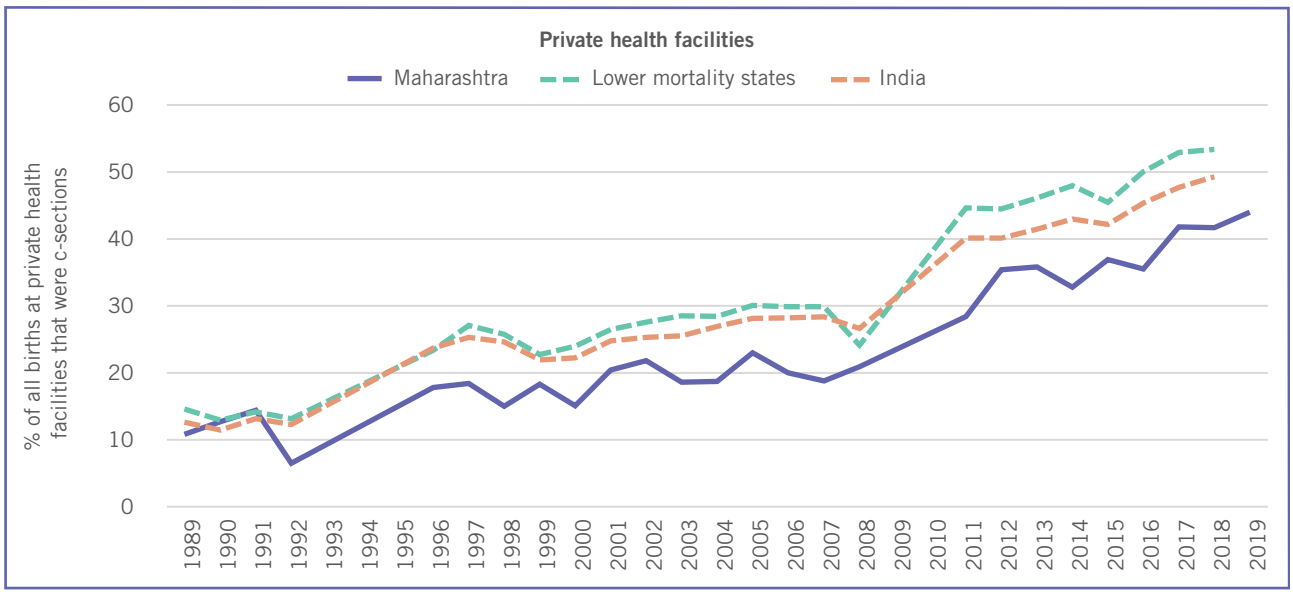
C-sections

C-section rates have increased four-folds in Maharashtra from 8% in 2000 to 32% in 2019 (Figure 12). The greatest increase was in the RCH-II/NRHM period (2005-12; AARC of 8.4%, data not shown). The share of private facilities in c-section deliveries was between 69%-75% during the RCH-II/NRHM period. During this period, the c-section rate was 2-3 times as high among private facility deliveries as among public sector deliveries. The state has shown considerable rise in c-section deliveries in the public health facilities during the recent years (2013-18), faster than all India.

Figure 12: Trends in c-section delivery rates by health facility type, Maharashtra, lower mortality state cluster and all India (NFHS and DLHS pooled data, 1989-2019)

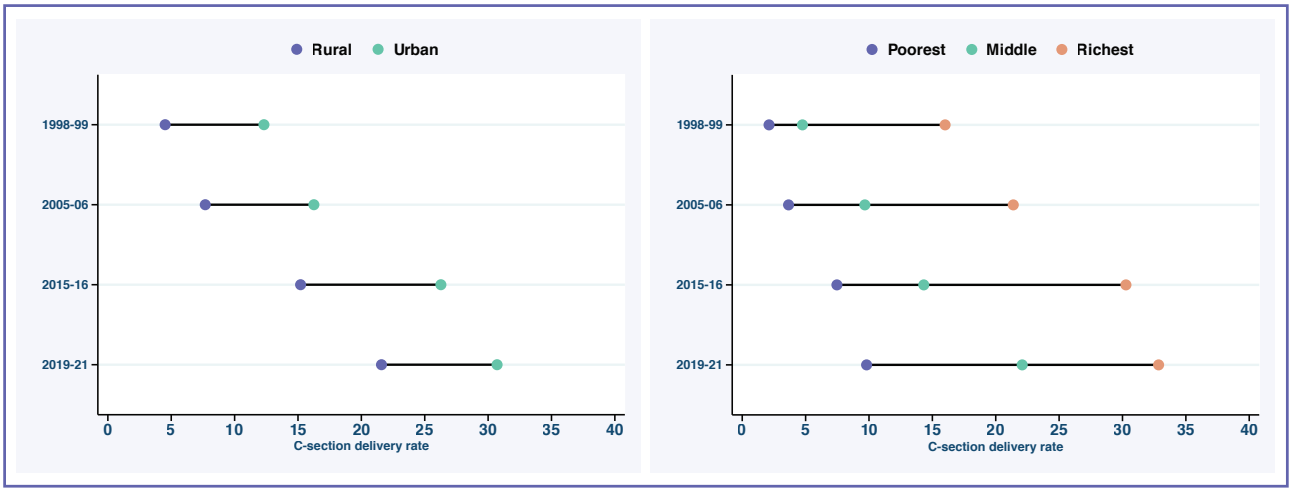






About 10-15% of deliveries is considered an acceptable range for medically indicated c-sections.[12,13] By 2019-21, Maharashtra recorded a five-fold increase in c-section rates among the rural (reaching 22%) and among the poorest (reaching 10%) and suggesting that the need for this life saving intervention is now largely being met (Figure 13). C-section rates among the urban and the wealthy have doubled to more than 30%, going beyond recommended levels, indicating over-use.

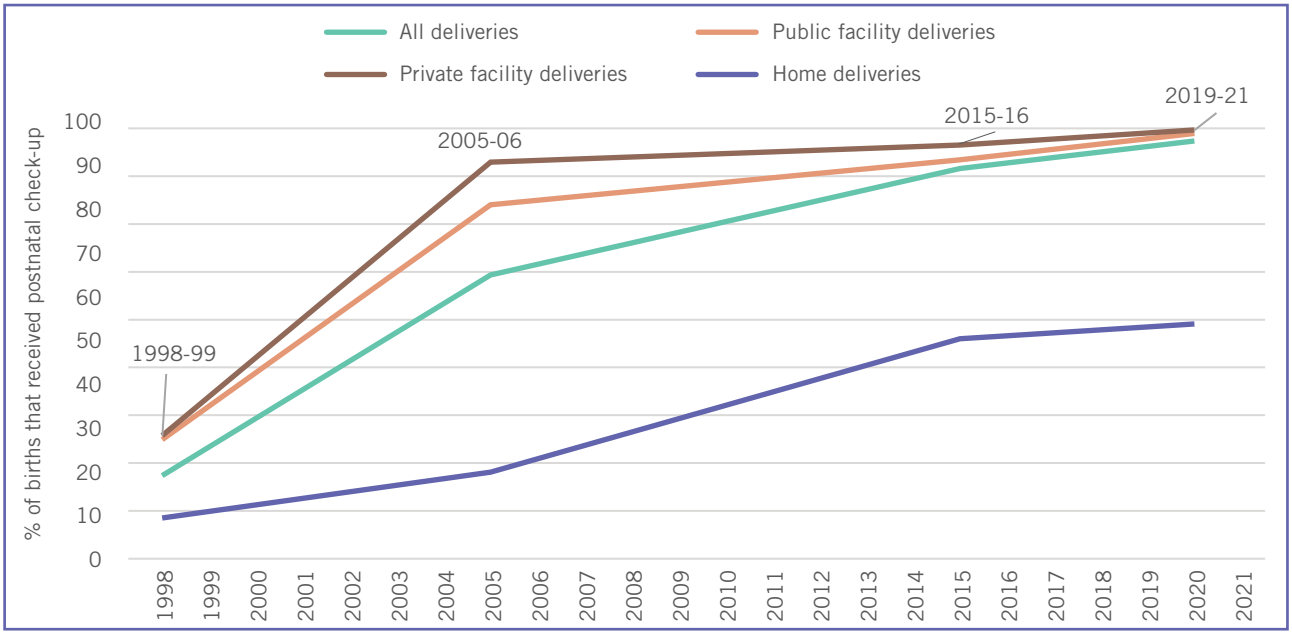
Figure 13: Trends in C-sections delivery rates by urban-rural residence and household wealth tertile, Maharashtra (NFHS 1998-99, 2005-06, 2015-16 and 2019-21)



Postnatal care and essential newborn care including early initiation of breastfeeding

Figure 14 presents the percentage of mothers/newborns in Maharashtra who had a postnatal check-up within 48 hours after delivery, either in the health facility or at home by either a trained professional such as a nurse, auxiliary nurse midwife (ANM) or a doctor or a community health worker. Coverage of any postnatal check-up (PNC) increased five-folds from 17% for births during 1998-99 to 87% for births during 2019-21. The PNC coverage in the recent times has almost converged in both public and private health facilities reaching at almost 90%. Nonetheless, coverage was the lowest for home deliveries.

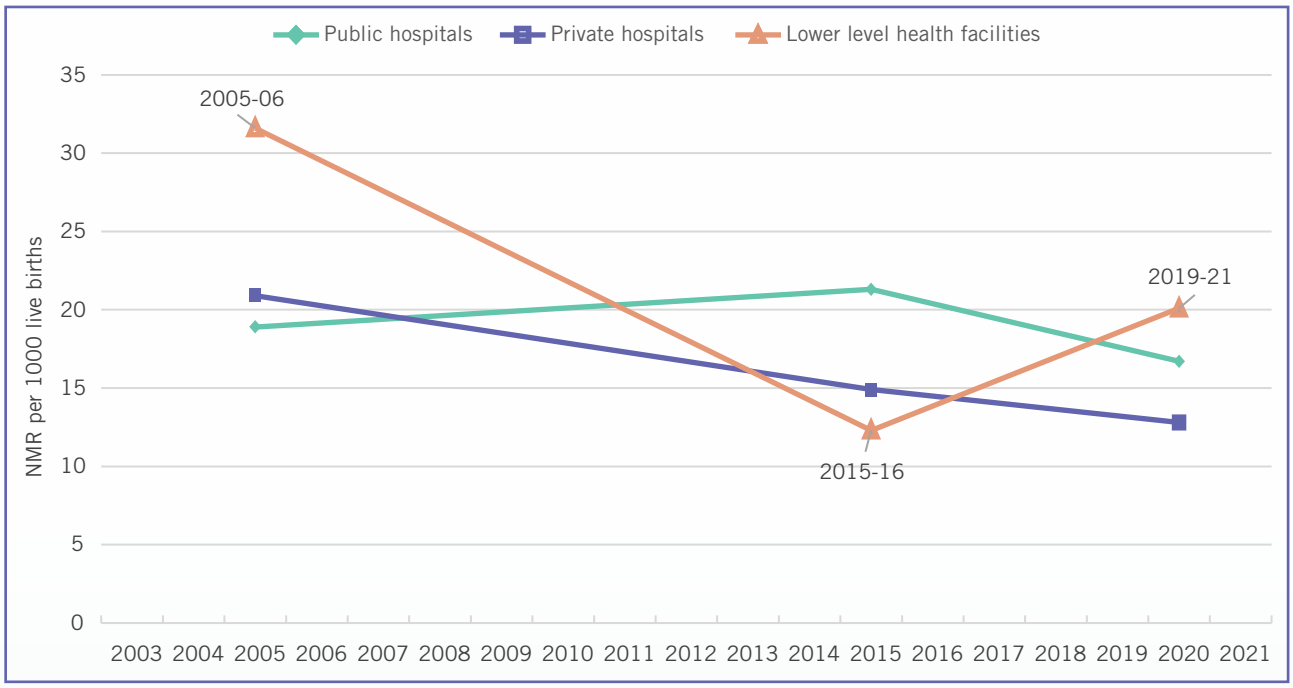
Figure 14: Postnatal care coverage for either the mother or the child within 0-2 days after delivery by place of delivery, Maharashtra (NFHS 1998-99, 2005-06, 2015-16 and 2019-21)



NMR by place of delivery

NMR in institutional deliveries declined substantially in private hospitals (from 21 per 1000 live births in 2005-06 to 13 in 2019-21), but the decline was very slow in public hospitals (from 19 per 1000 in 2005-06 to 17 in 2019-21) (Figure 15). The other facilities include lower-level health facilities such as CHCs, PHCs, HSCs, and private non-hospitals. The sample size was small in 2005-06 in Maharashtra for other facility deliveries, and to that extent, the NMR decline there is likely an over-estimate.

Figure 15: Trends in NMR among institutional deliveries by health facility level, Maharashtra (NFHS 2005-06, 2015-16 and 2019-21)



DEMOGRAPHIC AND SOCIO-ECONOMIC CONTEXTUAL SHIFTS

Maharashtra is a mix of dense urban, peri-urban and very remote and tribal rural areas; underserved areas with high rates of poverty and poor maternal and neonatal health indicators exist alongside major economic and industrial centres. Experts reflected that it is difficult to know what drives success but recognized the value of Maharashtra's "small family norm," which reduced pregnancy among high-risk women, investments in women's education, rising per capita income, and urbanization, which improved access to facilities, even while rural access also improved.

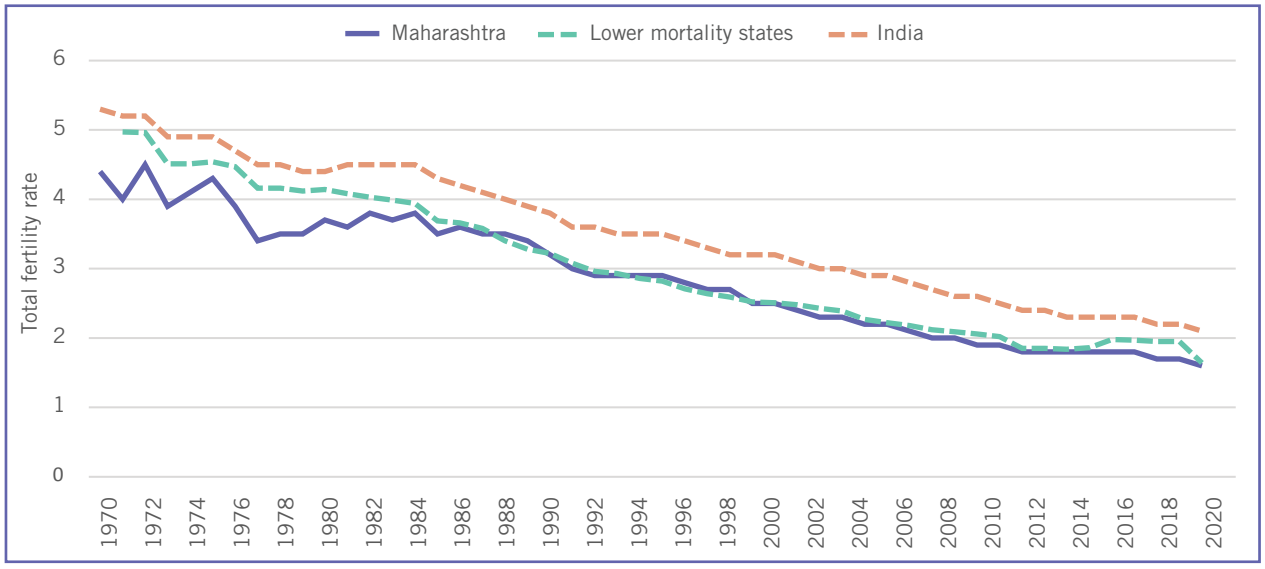
Household-level context

Fertility declines

Fertility in Maharashtra has been declining from a total fertility rate (TFR) of 3-4 children per woman during 1976-91 to below 2 post 2009 (Figure 16). However, the number of live births declined only slightly from 2.0 to 1.9 million annual births, due to population momentum (data not shown). The TFR in Maharashtra declined from less than 4 in the mid 1980s to 2.5 children per woman in 2000 and further to 1.6 in 2019. Since 2000, the state has consistently recorded lower TFR levels than the lower mortality state cluster. Fertility rates were overall higher in rural areas. However, the gap narrowed as the fertility rates declined faster in the rural than urban areas (data not shown).

Our analyses using Jain's decomposition method[14] showed that Maharashtra's fertility declines during 2000-18 contributed 41% and 46% of the maternal and newborn lives saved and 35% of the reductions in MMR and 35% of NMR reductions (data not shown).

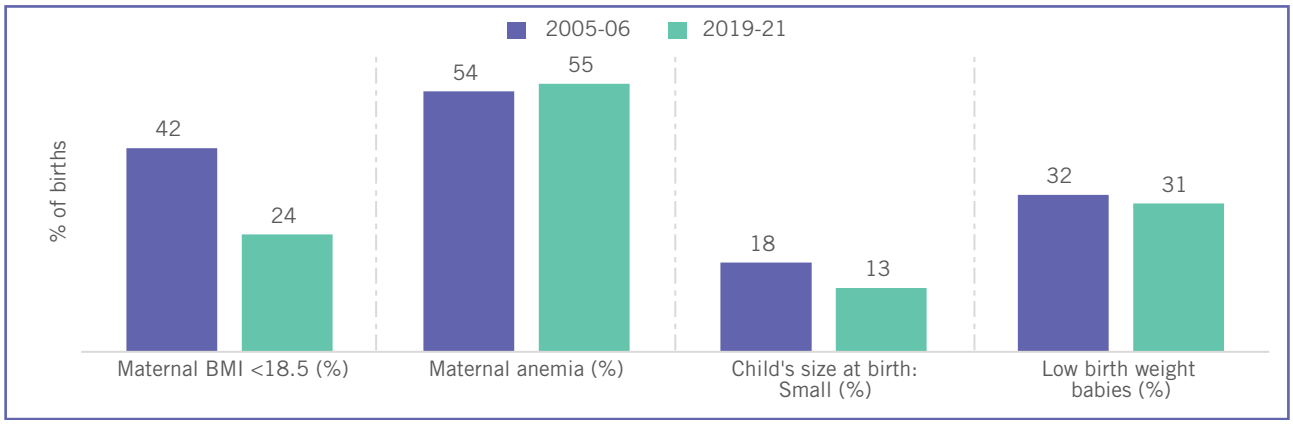
Figure 16: Trends in total fertility rate, Maharashtra, lower mortality state cluster and all India (SRS 1970-2019)



Nutritional status

Maharashtra was the first state to tackle malnutrition in a "Mission mode" (with special funding and administrative structures) with the (2005) Rajmata Jijau Mother-Child Health & Nutrition Mission.[15] NFHS data showed that the proportion of births to women with a body mass index (BMI) lower than 18.5 (considered underweight) declined from over 40% to 24% between 2005-06 and 2019-21 (Figure 17). Anemia, however, did not reduce during the same period. Child size at birth showed improvement; the proportion of newborns considered by their mothers to be small for gestational age declined from 18% to 13% during the same period. However, proportion of low-birth-weight babies showed a decline of one percentage point only, from 32% to 31%. An analysis of Health and Demographic Surveillance System (HDSS) data from the selected villages of Maharashtra's Pune district, also found an increase in birth weight from an average of 2640 grams [95% CI 2602–2687] in 2004 to 2781 grams [95% CI 2750–2798] in 2016.[16] These small improvements in maternal nutrition, and to a greater extent newborn nutrition, may not have been as significant as other contextual factors to reducing mortality among mothers and newborns in Maharashtra.

Figure 17: Trends in maternal nutrition, maternal anemia and reported child's size at birth and low birth weight babies, Maharashtra (NFHS 2005-06 and 2019-21)



Women's empowerment and educational status

Age at first cohabitation (after marriage) in Maharashtra has increased from a median of 18 years to 19 years between 2005-06 and 2019-21 (Table 3). The increase was faster in rural than in urban areas, where it was higher in both the survey periods. The proportion of women with some education has also improved in this period, from 70% to 82% who were literate, and 63% to 78% who had secondary or higher education. The gaps also closed between rural and urban areas in female literacy rates and the proportion with secondary education, more so in case of the latter (the absolute difference in secondary education halved from 25 to 13 percentage points). Compared to the births to women with some education, the NMR was higher among births to women with no education in both the survey periods, and the NMR declined faster among the latter (data not shown).

In terms of decision-making roles, the proportion of women reporting that their husbands solely decided on their healthcare reduced from 28% to 16%, while those jointly made decisions with their husbands about their healthcare increased markedly from 34% to 71% between 2005-06 and 2019-21 (which was somewhat similar in rural and urban areas).

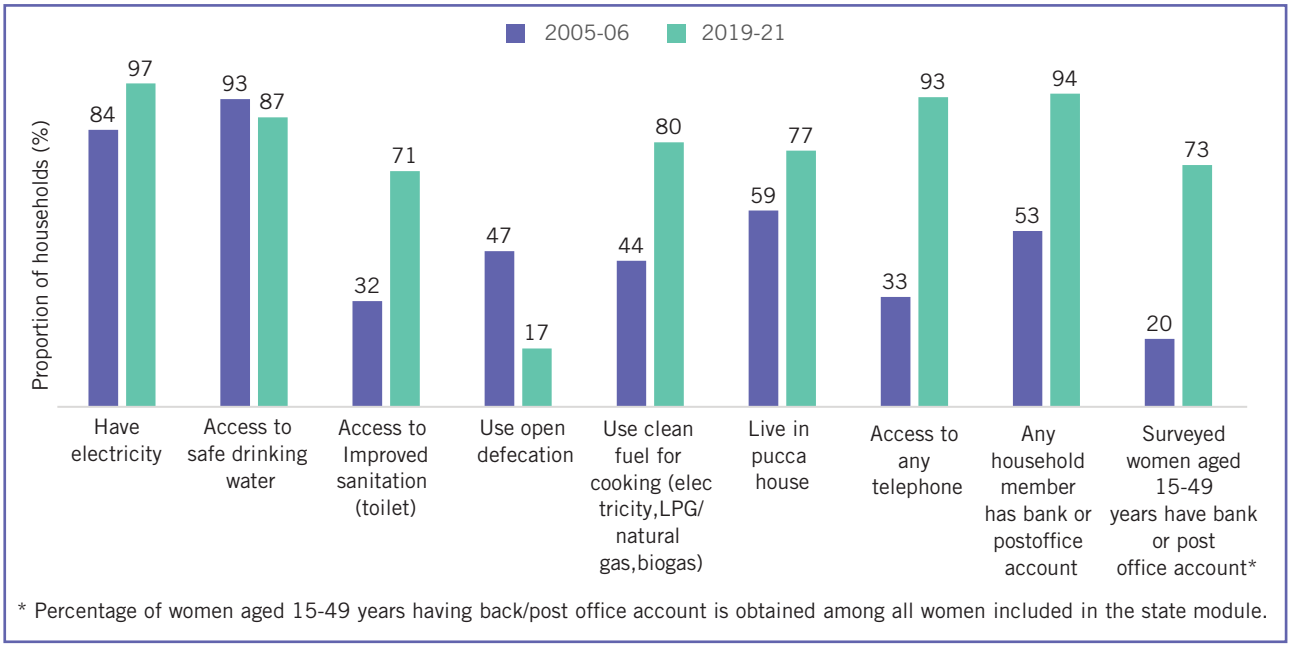
Table 3: Trends in selected indicators of women's empowerment, Maharashtra overall and by place of residence (NFHS 2005-06 and 2019-21)

	Maharashtra		Rural		URBAN	
	2005-06	2019-21	2005-06	2019-21	2005-06	2019-21
Median age at first cohabitation, women aged 25-49 (in years)	17.8	19.2	16.7	18.8	18.9	20.4
Women aged 15-49 who are literate (%)	70.3	82.3	58.7	76.9	81.6	88.2
Women aged 15-49 with secondary or higher education (%)	63.0	78.2	50.2	71.9	75.3	85.1
Mainly husband decides on woman's health care (%)	27.7	16.2	30.0	18.5	25.2	13.3
Husband and wife jointly decide on woman's health care (%)	34.0	70.6	29.9	68.0	38.3	74.1

Community-level context

Household's access to basic amenities such as electricity, safe drinking water, improved sanitation, clean fuel for cooking, telephone/mobile and bank account has improved substantially in the state between 2005-06 and 2019-21 (Figure 18). Nearly 97% of the households now have electricity and 87% have access to safe drinking water. Percentage of households having access to improved sanitation more than doubled from 32% in 2005-06 to 71% in 2019-21. Concurrently, households reporting open defecation reduced markedly from 47% to 17%. Use of clean fuel for cooking nearly doubled from 44% in 2005-06 to 80% in 2019-21. More than three-fourths of the households in the state now live in pucca houses and 93% have a telephone. Percentage of households that reported any member having a bank or post office account increased from 53% to 94% during the same period. The corresponding rise was even sharper for women aged 15-49 years (from 20% to 73%).

Figure 18: Trends in selected indicators of community development, Maharashtra (NFHS 2005-06 and 2019-21)



* Percentage of women aged 15-49 years having back/post office account is obtained among all women included in the state module.

Societal-level context

Economic growth and inequality reduction

Maharashtra has experienced substantial economic growth in the past two decades. The net state domestic product in Maharashtra has risen rapidly, from INR 23,011 in 1999-2000[17] (INR 79,474 in 2019 INR[a]) to INR 1,26,815 in 2015 (INR 1,53,981 in 2019 INR) and 1,96,100 in 2019-20 (in 2019 INR).[18] However the state's Gini coefficient for consumption, a common measure of income inequality where '0' is perfect equality and '1' is total inequality, has increased slightly from 0.32 in 1994 to 0.35 in 2012.[19] The percentage of population below poverty line has also reduced from 38% in 2004-05 to 17% in 2011-12.[20] From 2000 to 2015, the state has also experienced increased urbanization, the proportion of urban population increasing from 42% to 49%.

a We considered an average annual inflation rate of 6.39% from 1999-2019 and 4.97% from 2015-2019 (http://www.inflationtool.com/indian-rupee)

MAJOR HEALTH POLICY AND SYSTEMS DRIVERS

This section draws from consultations with policy experts, as well as policy and literature review, to present major health policies and health system drivers of improved maternal and newborn survival. We first present the state's efforts to increase MNH service availability and quality including (1) healthcare infrastructure and services, (2) human resource for health; (3) clinical and technical innovations and quality assurance; and (4) the role and regulation of the private sector. We then present the broader policy implementation and administrative reforms underpinning these changes to service availability and quality, including: (1) political will and leadership for MNH; (2) decentralized governance and financial flexibility; (3) accountability, progress review and data systems; (4) community participation and demand generation; and (5) partnerships.

Transitions in MNH service availability and access to quality

Expanding service availability, access and integration

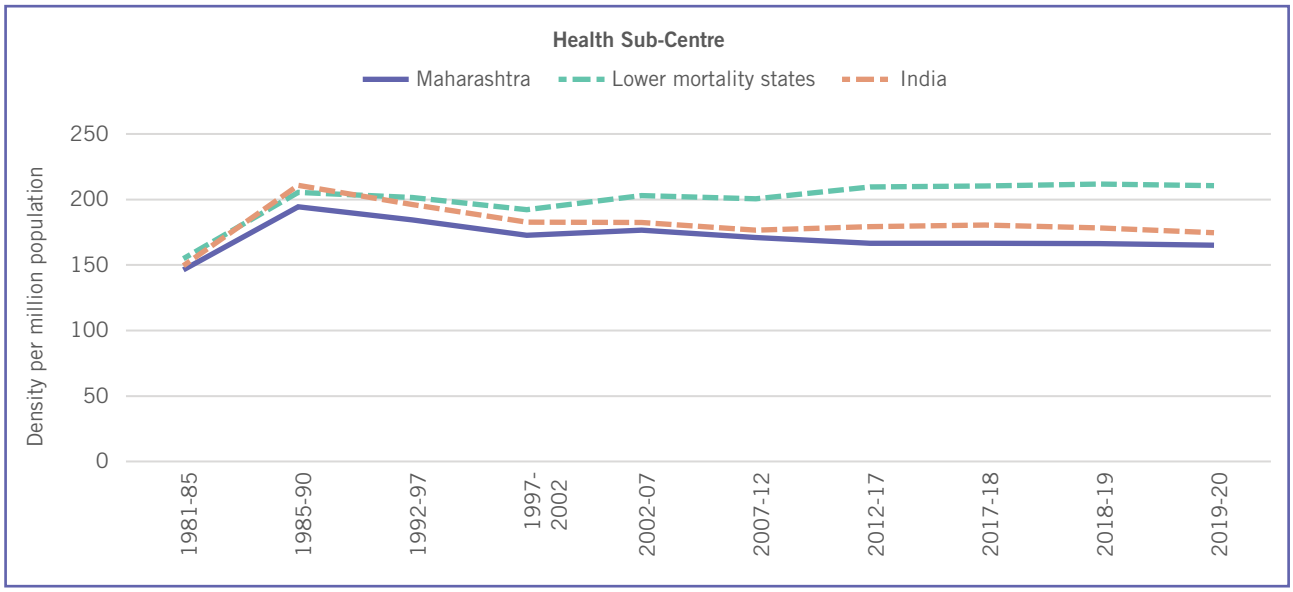
- Increasing rural health infrastructure density was less of an issue in Maharashtra. Instead the focus was on improving services in underserved (particularly tribal) areas and service/human resource availability at the existing facilities

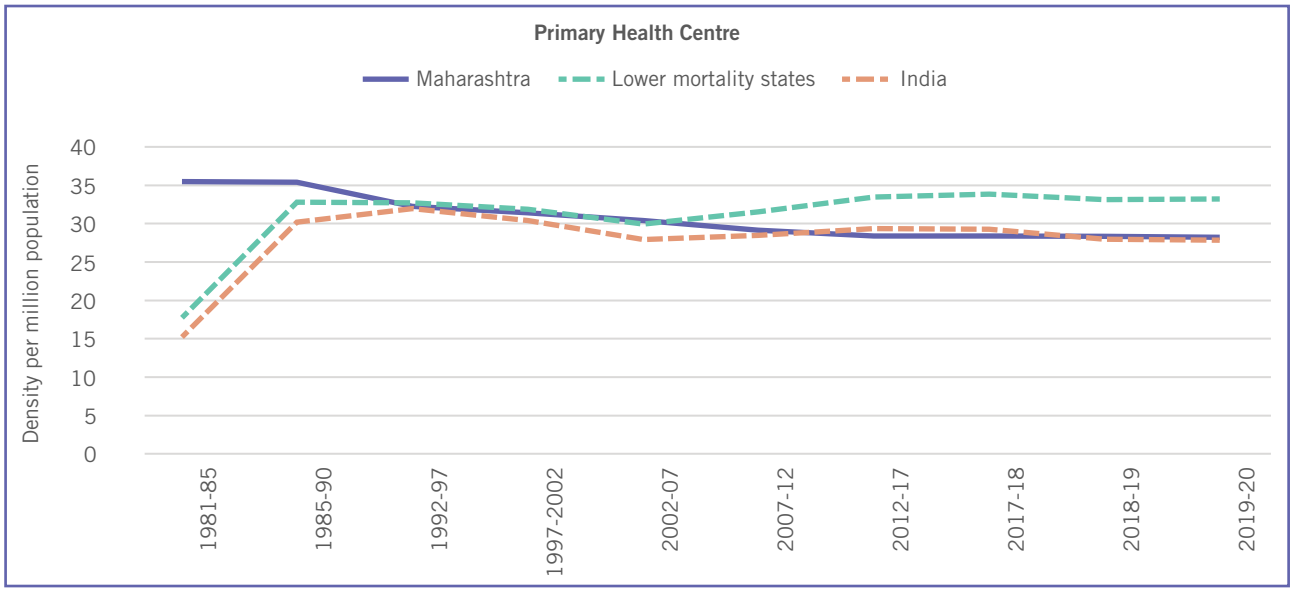
There has been little change in the density of rural health infrastructure in Maharashtra since 2000 (Figure 19). However, health policy experts who participated in a consultation meeting reported that the services available in facilities improved over time. They highlighted that the state capacitated lower-level health facilities to manage pre-eclampsia and post-partum hemorrhage and upgraded district and sub-divisional hospitals to provide comprehensive emergency obstetric and newborn care (CEmONC) through the World Bank Health System Development Project's INR 550 crore investment (1999-2005).[21] A partnership with UNICEF facilitated increase in the availability (and quality) of newborn care services. In addition to the World Bank and UNICEF funding and technical inputs, the state allocated National Health Mission (NHM) funds to upgrade special newborn care units (SNCUs) and labour rooms. These upgrades were said to be "focused" and "effective" because they were based on needs assessments to determine exactly what improvements were required and where. Maharashtra was considered by experts to have been particularly effective in upgrading community health centres to first referral units (FRUs) capable of providing c-section; by 2020 the state reported 268 active FRUs.[22]

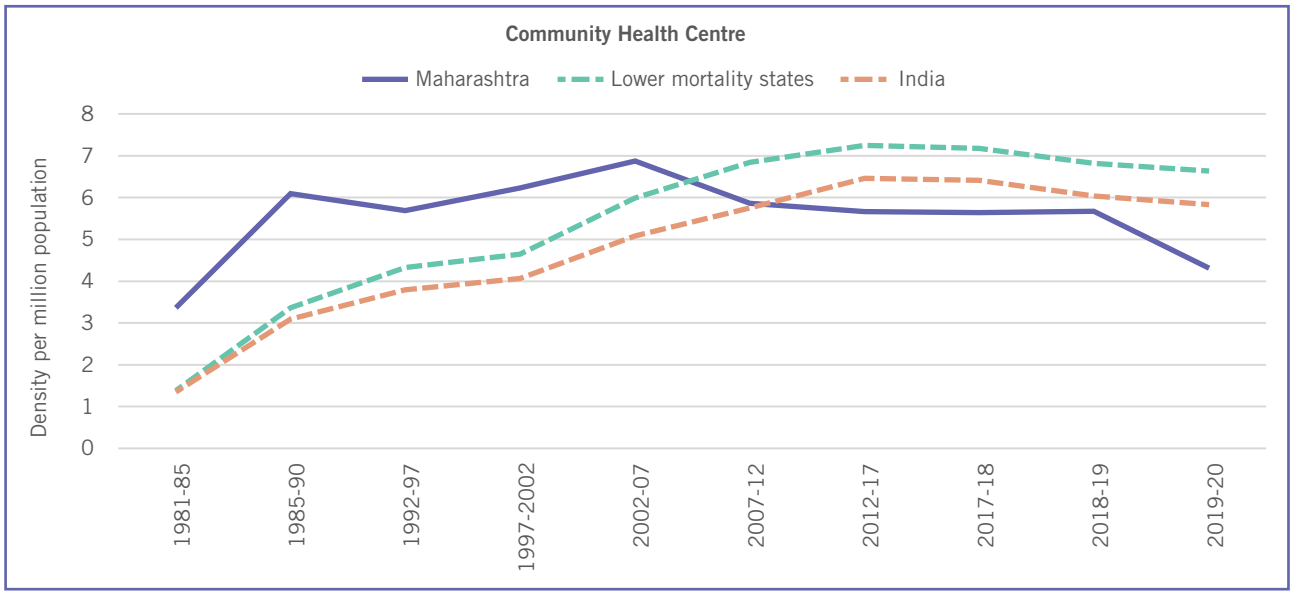
Maharashtra has a strong State Blood Transfusion Council with autonomous status and administrative staff, allowing it to coordinate with other blood-safety units in the state, and make blood transfusion services and blood storage facilities available at the regional and district levels.[23] Maharashtra's stronger administrative capacity to for blood services enabled more women to access to emergency obstetric care (EmOC) closer to home, rather than having to travel to major cities.

> *I also distinctly remember when HIV AIDS program was initiated, Maharashtra was the first in the country where availability of the blood transfusion services, blood storage facilities, at the district, below district level, all qualified or licensed blood banks were pushed through. This was another initiative which helped us [the state] and is helping to manage the cases which require interventions even at the peripheral level. (Government health system expert)*

Figure 19: Trends in the density of health sub-centres, primary health centres and community health centres per million population, Maharashtra (Rural Health Statistics 1981-85 to 2019-20)







The experts reflected that in the early 2000s investment in human resources and infrastructure was concentrated at the secondary (FRU) and tertiary levels (district hospitals and medical colleges) in Maharashtra, with a focus on CEmONC. Primary health care received less investment. However, in recent years, following the 2017 National Health Policy's recommendation that two-thirds of health financing should go towards primary care, attention has marginally shifted in favor of primary level. Future progress requires a "two-pronged attack" (stakeholder meeting, academic and health policy expert) of strengthening primary care and building up tertiary care.

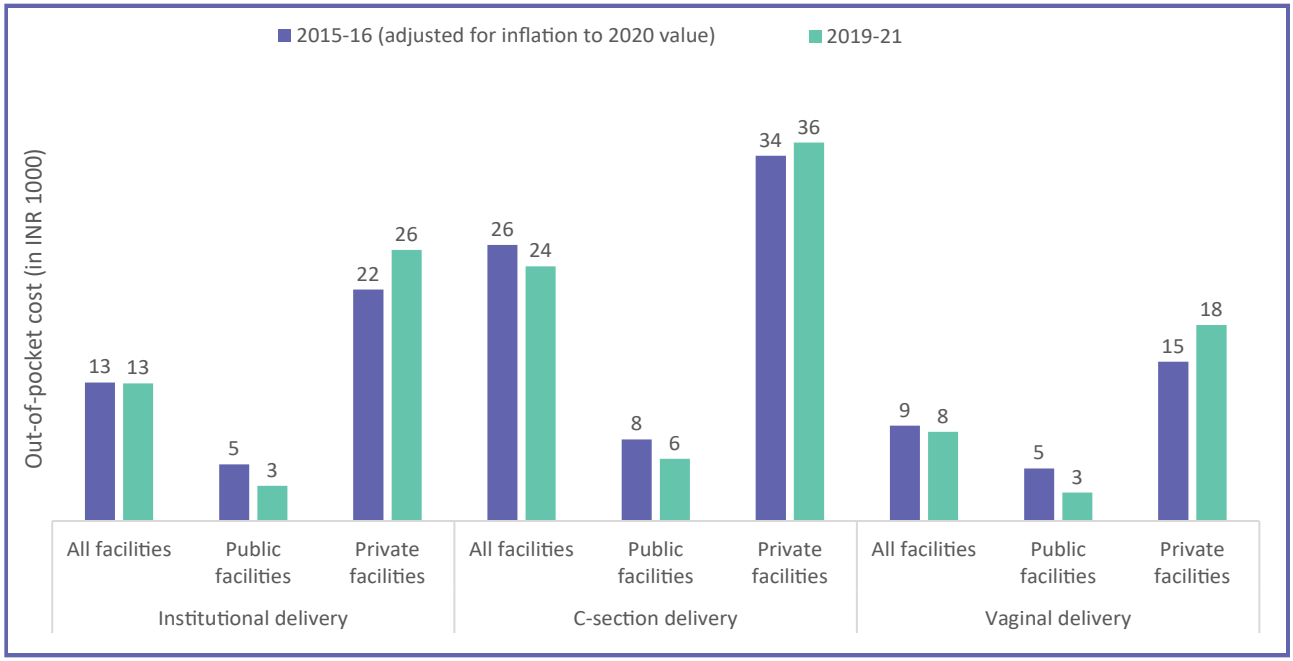
In addition to bringing emergency obstetric care closer to communities, experts identified three initiatives that drove access, particularly among poor, rural and tribal women and newborns. First, in 1997, Maharashtra introduced cash incentives (Matrutwa Anudan Yojana) to encourage pregnant women from marginalized groups to access healthcare services,[24] almost a decade before Janani Suraksha Yojana (JSY) was implemented.[25] Second, the 108-ambulance service, funded through the NHM, was an important driver of improved access to care, particularly for bringing women in tribal areas to higher level facilities. Third, Navsanjeevan Yojana improved access as well as service availability in Maharashtra's 52 tribal blocks. This program, which began in 2003, sought to integrate and improve essential services in tribal areas.[26] It introduced monitoring to identify villages with acute needs, financing for a volunteer worker program (Pada Volunteer Workers), household level screening to identify and treat malnourished children, and "flying squads" of health workers and pediatricians (who received an honorarium) to visit difficult-to-reach tribal areas.

Improved service integration was also considered an important driver of improved maternal and newborn health by round table participants. The experts noted that the treatment of co-morbidities (heart disease, diabetes, thyroid disorders, dialysis) among pregnant women has improved over time. Access to safe abortion services improved over the past two decades; Maharashtra was the first state to procure manual evacuation syringes and conduct comprehensive abortion training to almost all rural hospitals and some PHCs through a Federation of Obstetric and Gynecological Societies of India (FOGSI) and Maharashtra Ipas intervention.[27]

Analysis of NFHS data suggests that the average out-of-pocket expenditure (OOPE) for delivery (including the OOPE for transport, hospital stay, drugs, diagnostics, and other) in Maharashtra in constant 2020 rupees (i.e., 2015-16 cost adjusted for inflation to the 2020 value[b]) decreased marginally from INR 13,049 to INR 12,970 in 2019-21 (Figure 20). The average out-of-pocket costs paid for c-section deliveries was nearly three times higher than that for a vaginal delivery, and the average costs for both vaginal and c-section deliveries in the state decreased by 7% and 8% during 2015-16 and 2019-21, respectively. The OOPE for public facility deliveries for both c-section and vaginal deliveries decreased. The OOPEs were 3-4 times higher in private than public facilities, and the increase from 2015-16 was 17% in private facilities.

b We considered an average annual inflation rate of 5.09% from 2015 to 2020 (https://www.inflationtool.com/indian-rupee?amount=7124&year1=2015&year2=2020&frequency=yearly)

Figure 20: Trends in average out-of-pocket cost (in INR 1000) paid for delivery by type of delivery and health facility type, Maharashtra (NFHS 2015-16 and 2019-21)



Human resources for health

- Maharashtra is a "high production" state for health workers
- It also prioritized in-service training for medical officers, nurses, and ANMs through the Medical Officer Certificate Program (MOCP) and a decentralized training system
- The state amended recruitment processes to attract MOs with higher level degrees and rewarded high performing health workers

Maharashtra's success is closely linked to its capacity to produce health workers, recruit them into public service, and provide in-service training and reward for performance. With 52 medical colleges (23 of which are public) Maharashtra is one of five "high production" states for human resources for health. Undergraduate doctors graduating from public colleges are bonded to serve in rural areas for one year, which has helped the state achieve above-average ranking for human resource availability in primary health centres.[28] The state amended its recruitment rules to attract Medical Officers (MOs) with additional qualifications and implemented recognition incentives to provide financial incentives and promotions for high performers.

In-service training and mentoring, particularly for MOs, nurses and ANMs was considered by experts to be a key driver of the state's success in improving maternal and newborn health as this increased morale and technical quality of care at the most peripheral levels. Maharashtra developed a unique training and capacity building program for Medical Officers called the Medical Officer Certificate Program. The MOCP enabled over 2000 MOs working in rural areas to receive one-year training, fully funded by the state government, in paediatrics, medicine and surgery training. MOs from rural areas were able to enter the MOCP program as "in service candidates," earn their postgraduate degree or diploma, including a doctor of medicine (MD), and then return to rural service. Maharashtra also developed a mentoring program to provide medical officers working in FRUs with longer term support and engagement after in-service training.

> *They [mentors] continued to make themselves available to the medical officers who were there are the community level at the FRUs and that kind of guidance was extremely important. (Health expert from the state government)*

Maharashtra offered "systematic" and "robust" in-service training for ANMs and nurses in a decentralized manner by developing district training teams (DTTs) in every district, and hospital training teams in every hospital. Faculty from state government medical colleges provided frontline healthcare and also served as

mentors to government health workers. Instead of "just sitting in the four walls of the institution and enjoying themselves" (state-level health expert) faculty regularly went out into the community.

Clinical/technical innovations, quality assurance, and procurement

- Maharashtra has improved the early identification of high-risk pregnancies and obstetric complications, enabling timely intervention
- The state has prioritized in-service training and education for health workers (ASHAs, MOs) and sought to implement the Indian Public Health Standards (IPHS) and assurance of essential drugs and commodities at all levels and locations of government health facilities

Several clinical and technical innovations were identified as important drivers of MNH in Maharashtra. The state has focused on identifying high risk pregnancies early, enabling antenatal interventions (such as anemia treatment) and counselling to deliver at tertiary facilities. The identification of intrapartum complications and timely referral has improved considerably. Maharashtra was one of the first states to adopt a strategy of task shifting basic emergency obstetric and newborn care (BEmONC) to Ayurvedic practitioners in primary health centres. Beginning in 2005, Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homeopathy (AYUSH) practitioners were encouraged to undergo 14 days of training in BEmOC.[29] They have been found to showcase high levels of competence on the use of the partograph during labour,[30] which enables timely identification of complications and referral, and to have widespread acceptance in the community.[31] One expert recounted that his rural tertiary facility handles 10,000 deliveries annually and that women no longer arrive with severe complications (ruptured uterus, prolonged obstructed labour and severe eclampsia); instead risks are identified earlier, and referrals made more rapidly. In the last two decades Maharashtra has also made major gains in the procurement of lifesaving drugs, such as magnesium sulphate, thereby ensuring that health workers continuously had the supplies needed to provide lifesaving care.

Quality improvement has also driven maternal and newborn survival in Maharashtra. In-service training was an important quality improvement approach, discussed above. The state health system's administrators took national-level maternal health guidelines and the Indian Public Health Standards "very seriously" (stakeholder meeting, academic and technical expert). These were introduced down to the lowest level facility across Maharashtra's diverse contexts (urban, semi-urban and rural). Since 2017, the LaQshya quality assurance program has brought major improvements to intrapartum care for labour room and immediate postnatal period. Experts noted that the quality of care provided in urban government health facilities is lower than in rural.

Role and regulation of private sector

- Maharashtra has been particularly open to working with specific private sector actors: While the private sector overall has resisted regulation, specific private sector practitioners and associations (particularly FOGSI's Maharashtra chapter) have been important partners to the Government of Maharashtra in developing and running trainings
- The government of Maharashtra endorsed FOGSI's private maternity care facility accreditation program, called Manyata, to utilize the government's LaQshya quality standards thereby creating the unique LaQshya-Manyata initiative

Maharashtra's private facilities offer poorly regulated and often sub-standard care,[32] and frequently engage in cost inflation and medical malpractice.[33,34] OOPE for delivery in the private sector in Maharashtra has gone up, even for the poorest, and particularly for c-section. At the same time, reliance on the private sector for c-section among the poorest has also increased from 2015-16 to 2019-21.

Despite the private sector overall providing costly care of variable quality, experts noted that key private sector actors and public-private partnerships have been important contributors to improving maternal and newborn healthcare. Maharashtra has had particularly strong and proactive collaboration between government and certain private actors. Maharashtra chapters of the private professional organizations FOGSI, AMOGs, the

Indian Associations of Pediatrics, and the Neonatology Forum, developed and conducted workshops and trainings on emergency obstetric care since the early 2000s, many of which have been handed over to the government. FOGSI in particular was recognized as a "stalwart" (stakeholder meeting, academic and technical expert) in improving maternal healthcare. Government actors gained insight into how to develop NICUs in the districts through visiting the private KEM hospital in Pune.

A prime example of the state's uniquely strong collaboration between the state government and private sector is the "LaQshya-Manyata" initiative. Manyata was a quality improvement initiative developed and implemented by FOGSI for private sector maternity care facilities. In 2017 the Government of Maharashtra entered into partnership with FOGSI to endorse Manyata accreditation and to combine it with the government's LaQshya quality improvement initiative. The combined "LaQshya-Manyata" initiative adds weight to the accreditation process ensures private facilities align their standards with the national government's LaQshya and WHO standard guidelines. In addition to government engagement to improve maternity and newborn care at private facilities, private sector clinicians extended their services in government facilities through short-term rural service and conducting "camps" and outreach at PHCs in tribal areas.

Policy implementation and administrative reforms

Political will and leadership for MNH

- Leaders in the state government and its Ministry of Public Health and Family were highly motivated to improve maternal and newborn health and operated in a collaborative and cohesive manner
- Pressure to improve maternal and child survival came from the state administration, as well as Maharashtra's particularly strong panchayat structure, health activists, and media
- Maharashtra embraced geographic targeting, with intensive inputs and scrutiny given to tribal areas and was a state that took data analysis seriously for planning and accountability

Maharashtra's government has a history of political commitment and experimentation to find ways to improve the health care system.[35] There has been alignment across political parties on the importance of maternal and newborn health, and leaders took an ambitious approach that demanded ongoing progress. The political leadership and bureaucracy in the state government supported and trusted the Ministry of Public Health and Family Welfare to take required action for maternal and newborn health. The Ministry committed to MNH, due to consistent and positive leadership at the levels of secretary, director and district health officer as well as "cohesion", "affection" and "team work" (stakeholder meeting, technical experts) between its clinical and public health administrative arms. The administration was open to learning from block level and frontline workers; administrators were "not dictators" (stakeholder meeting, academic and technical expert) and instead were interested in listening to suggestions and then adjusting programs based on implementation experiences. This strong foundation, which originated in the 1980s, was then infused with funding with the launch of the National Rural Health Mission, enabling accelerated gains.

Sources of political will, particularly in holding the system accountable for maternal deaths, was traced to four sources: the government administrative system, the panchayat raj institutions, activists, and the media. All four ultimately reflected demands from the household or community level. The government's administrative system placed pressure on the health system to account for maternal deaths and prevent future deaths through the district collector. The Zilla Parishad (ZP, elected panchayat governance structure at the district level) served as a link between the state government and the village-level Gram Panchayat to put pressure on the health system, including through legislative assembly questions. And the media and activists "always question" why deaths are occurring and "generate voice" to continuously demand improvement. Together, these pressures have driven the State's progress on maternal survival, partially through ensuring that maternal death reviews, discussed below, were taken seriously in the state.

Experts noted several specific administrative strategies that showcased political will and improved maternal and newborn health services. First, the state government took a targeted approach to supporting specific high need facilities, blocks and districts. Senior managers from the Ministry were deployed as focal points in blocks and mid-to-senior-level managers began visiting the same facilities repeatedly to monitor improvement. Second, the administration used data to identify issues and track progress. Data enabled the government to "zero down" on facilities with higher deaths in order to provide additional supports. Evaluations and reviews (including on JSY and Janani Shishu Suraksha Karyakaram, JSSK), many of which were conducted by the State Health Resource Centre, provided feedback and recommendations that were heeded by the State Family Welfare Bureau. Data also gave government actors a "boost" when reports, such as the 2016 SRS, reported progress. Third, Maharashtra sent health system actors to other states to learn about best practice. For example, one expert explained that they were "constantly looking at what Gujrat and Rajasthan are doing differently and used that in our own work." Gujarat was identified as an important model for the effective use of data and for the "Yashoda" model of how ASHAs handed over maternity cases to ANMs. Fourth, the state demonstrated political will with the Tribal Development Department's appointment of a committee to examine mortality in tribal areas. The committee's report was taken very seriously by the government and through advocacy, research, and presentations to politicians, it has resulted in a drastic reduction in the deaths of the children in tribal areas.

Decentralized governance and financial flexibility

- Maharashtra decentralized responsibility for aspects of the government health system at the state-level and to the Zilla Parishad, which distributed power and responsibility more widely, and enabled responsive decision-making
- While financial decentralization within the state began in the 1960s with direct funding for Zilla Parishads to manage primary health centres and health sub-centres, the NRHM brought additional financing and financial flexibility to the state itself

Maharashtra has a strong history of decentralization both within state-level administrative positions and from the state Directorate to district panchayat levels of government. Decentralization at the state level in Maharashtra enabled the directorate and deputy directorate to take many "powers as good as that of the health secretary" (stakeholder meeting, technical expert). This decentralization, as well as convergence of responsibility for health programming and family welfare programming in the Director General's portfolio, gave the directorate sufficient power to resolve most issues brought to them from the district and sub-district levels.

Maharashtra was among the first states in the country to decentralize primary healthcare administration to the Zilla Parishads. Under an act passed in 1961, Maharashtra's Zilla Parishads were given responsibility for administering primary health centres and health sub-centres and received grants-in-aid to carry out these responsibilities.[36] Decentralization to the districts encouraged local ownership of problems, resulting in strong collaboration between preventative and clinical actors at the district level. Monthly meetings reviewed maternal deaths in the district in a "meticulous" (stakeholder meeting, academic and technical expert) manner and with a focus on how to stop them. Decentralization also enabled targeted interventions for tribal areas with special needs.

The NRHM's financial flexibility and increase in health financing were essential to the state's progress. Flexible funding from the NHM was used to set up a robust monitoring mechanism to the district level for program coordinators and consultants to go to the field and give feedback to the state and district authorities on the improvement of programs.

> *To me why NRHM was a big game changer because it allowed for the first time lot of flexibility which the state budgets were not doing basically…. Flexibility was provided by the Government of India both in terms of financial support and in flexibility of recruitment. (Health expert from the state government)*

Through this flexibility, the state contracted private sector doctors to provide CEmONC,[37] entered into public-private partnerships, added ASHA workers and introduced a second ANM at health sub-centres. While these efforts to improve government healthcare service provision had mixed implementation experiences, they allowed for experimentation and in many cases did improve the availability of health workers and services in rural areas.[38,39]

Accountability, progress review and data systems

- Reviews, progress meetings, and maternal and child death audits were taken seriously by the health system administration and health care providers, with "escalation" based accountability wherein issues had to be addressed within a stipulated time period before being escalated to the next administrative level.
- Maharashtra was an early adopter of health management information systems (HMIS) which has enabled data-driven planning

Experts explained that rigorous reviews and deep engagement with health system data was central to Maharashtra's success in improving MNH. Both of these processes brought greater accountability for progress – and shortcomings – within the system. Monthly meetings from the community level (among ASHAs and ANMs) to the district level, received attention from senior administrators, and gave health workers an opportunity to report on issues and access support from supervisors. Maharashtra instituted an "escalation" based accountability system wherein issues from the community and panchayat levels were escalated first to the district health officers level, then, if not resolved, up to the directorate level.

Monthly maternal and child death audits at the district level have been taken "very seriously" in Maharashtra since 2010 with strong state and district level ownership of the process. While in some other Indian states the death review was included as an agenda item within a larger district level health meeting, in Maharashtra the monthly death review meeting is a standalone. Health workers from the private sector and government facilities participated in meetings alongside representatives from the deceased's family. During the meetings, the causes of death were "thoroughly" examined, and the focus was on preventing future events rather than laying blame. Senior leaders from the Ministry participated in many death audits to understand what needs to be addressed and to showcase the importance given to these meetings. Maharashtra has recently added Maternal Near Miss Review Audits.

Maharashtra's strong foundation of health data systems enabled an "evidence based" and "data driven" effort to reduce MMR and NMR. Maharashtra was one of the first states to implement a robust and cohesive health management information system (HMIS), in the mid-1980s.[40] Since then, Maharashtra's HMIS and registration of child births and deaths have been strengthened; in the late 2000s the state shifted from paper to an "excellent" digital HMIS called Mother and Child Tracking System (MCTS), which had "more indicators, robust system, giving feedback". Data was used to run programs and increase the accountability of the system. For example, Maharashtra's HMIS enabled a "life cycle approach" to health. Every baby was tracked for the first 1000 days to monitor vaccination, breastfeeding, complementary feeding. Data was then published on all of these components in the Akshat report. High risk pregnancies were identified early and then tracked to ensure the woman remained in care and ensure the system provided the healthcare needed.

Community participation and demand generation

- Maharashtra's Panchayat Raj Institutions (PRIs) have played a uniquely powerful role in district level management of primary health centres and sub-health centres
- Maharashtra has robust community level engagement in health through committees and community-based monitoring of government health services and ASHAs, grounded in a history of community health worker programs since the 1970s

Maharashtra's Panchayat Raj Institutions are very strong and have played an important role, as mentioned above, in demanding better MNH and administering the primary health system at the district level through the Zilla Parishads.

The role of panchayat raj system in Maharashtra is the foundation, is the strength of the state in many, many aspects and it has also positively impacted on the MCH side. (Health expert from the state government)

Village health, sanitation and nutrition committees (VHSNCs), introduced under the NRHM and sanctioned through an amendment to the Village Panchayat Act, created a platform for collective action on health. Furthermore, since 2008, Maharashtra has been one of nine pilot states that instituted a process called "community based monitoring and planning."[41] This government-sanctioned initiative involved participatory audits of government health services and, in a sub-set of regions, multi-stakeholder monitoring and planning to develop block and district level annual project implementation plans (PIPs) and budgets.[42] Community based monitoring largely operates through the village health, nutrition and sanitation committees and creates a structured processes, with official state-sanctioned support from health activist organizations to identify violations of health rights in the government sector and hold the system accountable. Community members could formally engage with the health system through village health committees and community-based monitoring to develop local health action plans, monitor government facilities, and demand better services.

Demand generating was also bolstered by ASHAs, AWWs and ANMs. The Raj Narayan scheme in the 1970s, wherein women acted as a bridge between community and the health system, and the Pada Swayamsevak male health worker program in tribal hamlets, informed the ASHA program under the NRHM. The state drew on these prior programs to develop and implement the ASHAs. Maharashtra prioritized training the "dedicated team at the village level" of ASHAs, AWWs and ANMs to identify high risk pregnancies and maternal and neonatal health issues early and refer them. The state saw ASHAs as "the main interface" between the community and the facilities, and "really pushed" resources towards ASHA training in particular. ASHA-provided HBNC was identified as an important contributor to reduced neonatal death.

In the 2000s, as emphasis shifted from family planning towards maternal health, the relationship between women and ANMs evolved from recruiting women for sterilization to providing women ANC and encouraging institutional delivery. In 2011 ANMs were asked to not only write estimated data of delivery but also record expected *place* of delivery. This seemingly "innocuous inquiry" allowed ANMs to identify those who planned for home birth and to work with the family for the remainder of the pregnancy to encourage institutional delivery. It created a "mind set" within the family to plan for delivery. Experts noted that community demands and expectations have risen over time. They explained that people have become more aware of their rights and needs, and "agitate" if something is wrong, which "keeps the system on track."

Partnerships

- Maharashtra's Public Health Department and NRHM has successfully collaborated with and learned from other branches of government, particularly the Public Works Department, Integrated Child Development Scheme (ICDS), and the Information, Education Communication (IEC) bureau, with donor and multilaterals, particularly UNICEF, the United Nations Population Fund (UNFPA) and the World Bank, with academic institutions, particularly the Mahatma Gandhi Institute of Medical Sciences, with civil society organizations (particularly SEARCH Gadchiroli), and with some corporate entities.

Maharashtra benefited from strong "need-based collaborations and partnerships" between the public health department and other actors.

So, it's a great team work that the state has been able to achieve and there are many facets of this, some of these have been pointed out. The political executive relationship, the professional executive relationship, the paramedical professional relationship, the private sector relationship, the institutional mechanism etc., and persuading with Government of India uh, at various levels. All this is part of the teamwork, everybody had him role very clearly defined. (Maharashtra state government health expert)

Partnerships across government ministries and departments enabled faster progress on health. The Public Health Department and NRHM worked the Public Works Department to develop NICUs in the districts and with the Department for Women and Children's ICDS to address undernutrition as "a joint challenge rather than individual challenges." Maharashtra's IEC Bureau, which was developed based on Jaipur's bureau, has

been very active in informing gram panchayats about government schemes through the Bureau's monthly magazine, Arogya Patrika. The Bureau also produced video clips and skill videos to train providers on national guidelines, as well as documentaries about maternal and child health that have been recognized at the national and international levels.

The Maharashtra state government benefited from engagement with non-governmental actors, specifically multilateral organizations (UNICEF, UNFPA and the World Bank), academic institutions (the Mahatma Gandhi Institute of Medical Sciences (MGIMS), civil society organizations (SEARCH Gadchiroli) and corporate actors (the consulting firm KPMG and corporate social responsibility initiatives). The World Bank's Health System Development Project brought enormous funding to rural hospitals to enable them to provide EmOC. UNICEF was instrumental in providing technical guidance on the development of neonatal intensive care units. Maharashtra's highly decentralized training to the district level was supported by UNFPA.

Faculty and students from the MGIMS provided training to government health workers and direct healthcare services in government facilities, and also graduated doctors who had exposure to and respect for rural medicine. MGIMS developed an "adopted" villages program, wherein students would work closely with ANMs to provide care for specific villages, thereby learning about the health issues facing the residents. MGIMS also set up an MCH wing in a remote tribal area which served as a centre of excellence in the region and internationally. Faculty training government nurses and doctors in PHCs, CHCs and district hospitals on post-partum hemorrhage management and other aspects of emergency obstetric care.

Maharashtra has a unique history of government willingness to learn from and cooperate with activist NGOs in the health sector.[43] Civil society activists and organizations such as SEARCH Gadchiroli played an important role in modeling effective and sustainable health care, pushing progress and demanding accountability. They undertook experimentation with new and radical health system approaches, such as early engagement of low-literacy women as community health workers. Moreover, as mentioned above, social activists played a watchdog role, as they were "always watching" the government health system to call for improvement.

> *[Activists such as Dr. Abhay Bang at SEARCH] have all the capacity to raise voice and put it into the media and bring it to the notice of everyone. Not [just] nationally but internationally. And then that also creates pressure on the system if something is going wrong. (Maharashtra state government health expert)*

Gadchiroli also provided placement opportunities for medical students and public health professionals, which sensitized them to rural health issues.

Private corporations were recognized for providing technical inputs and funding. KPMG highlighted areas of concern and supported convergence of different programs. Corporate social responsibility initiatives frequently focused on maternal health and channeled funding and technical inputs towards the government health system. Partnerships with private healthcare sector actors were also considered a contributor to success and are discussed in "Role and regulation of the private sector," above.

IMPLICATIONS FOR STRATEGIC PLANNING

As part of the Exemplars study, a five-stage integrated framework for maternal and neonatal mortality transition was developed. The framework encapsulates key factors associated with reducing mortality using data from nearly 150 countries over the past two decades, including cause-of-death patterns, fertility, health service coverage and inequalities.[44] We used the transition framework as a tool to understand change in these interrelated factors, benchmark current situations, and inform strategy development, as well as improve data quality in Maharashtra and nationally.

Comparing Maharashtra's indicators at stage IV (2017) against the median values for countries in stage V (Table 4) highlights the following key policy considerations:

- Moving into stage V requires drastic reduction in MMR, from 38 to 9 deaths per 100,000 live births, and NMR, from 13 to 3 deaths per 1000 live births.
- Reducing neonatal deaths further will require a focus on infection control and treatment during the neonatal period and peri-partum causes; infection-related causes of deaths (17%) and peri-partum causes of deaths (25%) currently contribute a far higher percentage than the average in stage V countries (7% and 14%, respectively).
- Fertility has already fallen to stage V levels, so further contributions to mortality decline are unlikely.
- In terms of intervention coverage, Maharashtra may focus on increasing access to ANC from 74% receiving 4 or more ANC visits in 2017 to the stage V average of 87%.
- Maharashtra has already achieved high rates of delivery in health facilities (95%) but can ensure the final 5% of deliveries currently outside any facility are shifted into facilities.
- Maharashtra may also ensure women in the poorest quintile can better access C-sections, given that only 7% of deliveries among women in the poorest quintile currently have C-sections, far below the WHO recommendation of 10-15% and the Stave V average of 23%.
- Maharashtra may plan to ensure all deliveries take place in hospital-level facilities.
- The poor-rich gap in delivery care (-19 percentage points) and neonatal mortality (22 deaths per 1000 live births) in Maharashtra is quite high compared to the Stage V average (-1 and 7 units, respectively); improving access for the poor is where the greatest gains in survival can be achieved.

Table 4: Summary of key indicators in 2000 and 2017 for Maharashtra and common characteristics of countries in stage V in 2017

Indicator	Maharashtra		Median stage V values, 2017
Year	2000	2017	
Stage	II	IV	
Mortality			
Maternal mortality per 100,000 LB (SRS 2000-18)	169	38	9
Neonatal mortality per 1,000 LB (SRS 2000-18)	33	13	3
Neonatal mortality, home births (NFHS 2005-06 and 2019-21)	42	32	NA
Stillbirth rate per 1,000 births (SRS)	7	5	3
Cause pattern (neonatal) (MCEE 2000 & 2015)			
Infections (Group 1)	25	17	7
Health status[1] (Group 2)	44	57	78
Peri-partum (Group 3)	31	25	14
Fertility (SRS)			
Total fertility rate	2.5	1.7	1.6
Adolescent fertility (per 1000)	50	9	13
Coverage of interventions (NFHS+DLHS)			
ANC four or more visits (%)	47	74	87
Delivery in health facility (%)	61	95	99
Delivery in hospital (%)	51	77	91
C-sections (%)	8	28	25
Inequalities			
Neonatal mortality poor-rich gap (abs) (NFHS 2005-06 and 2019-21)	40	22	7
Delivery care, rural (%) (NFHS+DLHS)	42	94	99
Delivery care, poor-rich gap (abs) (NFHS 2005-06 and 2019-21)	-73	-19	-1
C-section, poorest quintile (%) (NFHS 2005-06 and 2019-21)	1	7	23

[1] Includes prematurity, small for gestational age and congenital anomalies.

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