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STATE OF INDIA'S NEWBORNS 2014

NATIONAL NEONATOLOGY FORUM

Save the Children®

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STATE OF INDIA'S
NEWBORNS 2014

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Dr. Harsh Vardhan

Message

India has been a champion in devising new policies and programmes regularly as a response to unfavourable health outcomes, particularly in areas of maternal, new-born and child health care. Navjaat Shishu Suraksha Karyakaram (NSSK), Janani Shishu Suraksha Karyakaram (JSSK), Home Based Newborn Care (HBNC) and Facility Based Newborn Care (FBNC) are some of the important programmes being implemented towards making a dent in the mortality trends of newborns.

2. Newborn health challenge faced by India is bigger than that experienced by any other country. The high rates of mortality are compounded by rural-urban, poor-rich and gender differentials. There is an interplay of different demographic, educational, socio-economic, biological and care seeking factors, which are responsible for the high burden of neonatal mortality.

3. The increasing coverage of maternal, newborn, and child health care services is intrinsically associated with the expected improvements in the maternal and child health. "State Of India's Newborn" presents an in depth analysis of the current situation and also presents the way forward which will be very useful to the policy makers and programme managers alike. I would like to congratulate all the contributors to this compendium on newborn health and wish it all success.

(Dr. Harsh Vardhan)

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Shri Lov Verma
Secretary, Health and Family Welfare

Foreword

As India makes progress in addressing childhood mortality, reducing new-born deaths remain a critical challenge, making up a growing percentage of child deaths. Undoubtedly, India has experienced considered improvement in accelerating coverage in MNCH care since the Millennium Declaration, 2000. However, the persistent inequity in access to maternal and child health care across different economics groups is masked by the average improvement in the majority of States.

India has many wonderful policies; some really effective community/home-based, facility based prgrammes under the umbrella of NHM; and has contributed towards improvement in health system and programmes resulting in accelerated rate of decline in neonatal mortality in recent years. Measures to improve the functioning of health systems for improving the access and coverage of all the programmes is ongoing.

"State Of India's Newborn" traverses the journey of newborn health care in the country highlighting the positives and areas of improvement too. It also elaborates the innovations in the field of equipments and education in new-born health.

It gives me great pleasure to dedicate this report to all the programme managers and policy makers working for uplifting the newborn care in the India, who will use this book as a guide while framing new policies.

(Lov Verma)

New Delhi
13th August, 2014

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Foreword

Save the Children, through its Saving Newborn Lives programme, is pleased to have supported this 2014 edition of the State of India's Newborn (SOIN) report. Reading the first SOIN report, issued in 2004, provides a clear reminder of the global leadership India has provided over the years in newborn health, as well as how much progress has been made since 2004 for India's youngest citizens. India continues to be a global pioneer in demonstrating, even in low resource settings, how effective and high impact programmes can be developed and implemented to improve the outcomes for mothers and their newborns. This second edition of the SOIN report reviews the evidence generated progress and learning in newborn health in India over the past ten years, and actions needed to accelerate progress in newborn health and survival in the decade ahead.

This SOIN report comes at a time when the potential for accelerating progress is both optimal and unprecedented. The Government of India is making massive investments through the National Rural and National Urban Health Missions to reach the poorest and most vulnerable segments of society with improved reproductive, maternal, newborn, child and adolescent health services (RMNCH+A). It is precisely those 184 districts that contribute to the highest numbers of deaths among babies under one month of age. A number of new policies are now in place in India that support the introduction, implementation, and effective scale up of the high impact, evidence-based newborn health interventions. Importantly, India has the programme platforms and resource allocations needed to facilitate the rapid and effective expansion of coverage of these life-saving maternal and newborn interventions. The newly launched India Newborn Action Plan (INAP) is tangible evidence of the government's commitment to focus increased attention on newborn health and survival, and we commend the government for setting ambitious targets for reducing newborn mortality within the context of a continuum of care as reflected in the overall RMNCH+A programme. The 2014 SOIN report provides an up to date assessment of the status of the newborn, what has been done and learned, and suggests actions needed to further accelerate progress in support of the INAP.

We are grateful for the guidance and encouragement provided by the Ministry of Health and Family Welfare in the preparation of this report. We also want to express our gratitude to the talented and dedicated team from the Public Health Foundation of India and the All India Institute for Medical Sciences in New Delhi who worked tirelessly to prepare this report. Finally, we wish to thank the Bill & Melinda Gates Foundation for supporting the preparation of this report, and for their support for newborn health work in India since 2001 through Save the Children's Saving Newborn Lives programme. Save the Children is honored to be a part of this historic effort on behalf of mothers and newborns in India.

Joy Riggs-Perla

Mr. Thomas Chandy
CEO
Save the Children India

Message

India has made considerable progress over the last two decades in the area of maternal and child health, through innovative and comprehensive health packages that covers the spectrum of Reproductive Child Health (RCH). Newborns however have missed out on the attention. The neonatal mortality rate (NMR) has declined at a slower pace compared to that of under-five mortality rate (U5MR). Of the 6.6 million under-five child deaths that occur globally every year, about 44 percent occur in the neonatal period; the proportion is much higher – around 56 percent – in India. The Millennium Development Goal-4 (MDG-4), which stipulates a two-thirds reduction in under-five deaths by 2015, obviously cannot be achieved without ensuring a substantial reduction in the NMR.

The country has a profound responsibility towards caring for its newborns, and ensuring that each has a fighting chance of survival to adulthood, realizing his or her potential and capacity for self- actualisation. It is only fitting that reducing neonatal mortality is central to the national agenda. Various initiatives taken by the government during the past two decades have demonstrated the country's strong commitment to improve newborn health and survival. The National Rural Health Mission (NRHM) in 2005 and the recently launched Reproductive Maternal Newborn Child and Adolescent Health strategy (RMNCH+A strategy) of Continuum of Care approach are two of the recent milestones. With a 6% decline in NMR observed for the past two successive years, the country seems to be on the right track; however there is much work to be done yet.

The State of India's Newborn (SOIN) report 2014 provides a detailed picture of the situation of newborn health in the country, and comes exactly a decade after the release of the first SOIN report in 2004. This 2014 report not only encapsulates a large body of program-relevant research from all over the country, but also elaborates on the significant progress made by the country during the last decade.

I wish to express my admiration for the hard work put in by the teams from the Public Health Foundation of India (PHFI) and the All India Institute for Medical Sciences (AIIMS), New Delhi, who worked tirelessly under the astute leadership of Professor Vinod Paul and Professor Sanjay Zodpey. I will also like to express my gratitude to the Ministry of Health and Family Welfare, Government of India, for supporting and guiding us in developing this document.

Lastly a word about Save the Children: The organisation has a long standing commitment to the cause of ending newborn deaths, thus ensuring that all children have a fighting chance to realise their dreams. I would like to thank Save the Children India's Saving New Born Lives (SNL) team, for not only providing technical support, but also for pushing the agenda on newborn health at the highest levels of government.

It is my heartfelt wish that this enormous effort reaches its fruition in distinctly improved health outcomes of the nation's newborns.

Thomas Chandy

Foreword

National Neonatology Forum (India) has great pleasure as the State of India's Newborns report 2014 is released. Such documents provide a strong ground on which action plans and strategies can be based.

The world shall be looking at the Indian experience in tackling high neonatal mortality for quite some time to come. The India Newborn Action Plan (INAP) that is being unveiled and the strategic implementation that shall follow will determine the course of events and the success that we are able to achieve. Understanding situation and proper planning of required action is first and very important and essential part. Implementation of planned actions and periodic analysis and undertaking corrective steps are then required to complete the circle and get the results.

It is crystal clear to all concerned that the zone of decisive action shall be states and in states, district and sub-district places. Extra and directed efforts will be necessary in overcoming barriers at community interfaces of maternal and neonatal services. The interfaces between health services and beneficiary that need effective crossing are at health facilities as well as in the community. Barriers crossing will need awareness, health education & demand creation in community; socioeconomic upliftment of population and physical (roads etc) & communication infrastructure development on one hand and manpower development and their effective deployment in health sector on the other. Luckily India is posed to attend to both spheres and has excellent health as well as general development strategies.

NNF has been working exclusively in the field of newborn health now for 34 years. It has covered wide grounds on situational analysis, solution searching, and manpower development. It has worked closely with central and state governments and NGOs. It feels happy that time is ripe today for concerted efforts by all stakeholders.

The SOIN report will serve a very useful purpose in this context. We congratulate the team behind it and wish that the report is fully utilized for purpose of improving newborn health in our country and around.

Dr. Shikhar Jain

Dr. Vikram Dutta

PUBLIC HEALTH FOUNDATION OF INDIA

Preface

It is with our great pleasure that we present before you the State of India's Newborns (SOIN) - 2014.

The past few decades have witnessed a sea change in the state of newborn in the country. Since the seminal publication of the Report of the Task Force on Minimum Perinatal Care by the Ministry of Health and Family Welfare, Government of India, and creation of National Neonatology Forum in 1980s, newborn care has evolved tremendously. India has been successfully able to bring newborn care high in the national agenda. The care and delivery of services to the poorest of the poor find a place in the national and state level programmes. Pioneering evidence on prevention and treatment of newborn illnesses through innovative strategies has raised India's contribution to global policies.

SOIN 2014 attempts to capture the trends and the status of newborn health in the country, in particular since the first SOIN Report in 2004. It highlights the existing evidence, implementation status of programmes, innovations to improve implementation of programmes, and an analysis of health system and policies from newborn care perspective. This report synthesizes the data and evidence available in various reports, manuscripts and published literature. The state fact sheets developed for the report give an overview of the status of newborns in individual states.

SOIN 2014 captures the story of neonatal health as nurtured by the National Rural Health Mission. SOIN 2014 is truly a tribute to the health workers, nurses, doctors, specialists and program managers who collectively translated policy decisions into action on the ground. It is also a tribute to the academics, professional leaders, industry and researchers who converted complex scientific principles into affordable interventions, tools and technologies.

This piece of work is a result of significant contributions of several professionals. Indian Institute of Public Health-Delhi (IIPHD), Public Health Foundation of India (PHFI) led the project in collaboration with All India Institute of Medical Sciences (AIIMS), New Delhi, and was supported by Saving Newborns' Lives initiative of Save the Children. The stellar contribution of invited authors and reviewers, and the esteemed participants of the stakeholders' meeting is a matter of pride for us.

As we begin to reflect on the magnitude of this work, we fall short of words to cheer the multitude of hidden supports behind this accomplishment. We salute all those, be it individuals or the organizations, without which this work couldn't be a success.

We received unstinted support and guidance from our advisors and mentors, namely, Prof. K. Srinath Reddy, Dr. Rakesh Kumar and Dr. Steve Wall. We acknowledge the contribution made by Dr. Ajay Khera, Dr. Prabhakar and Dr. Renu Srivastava, among other colleagues at the Ministry of Health and Family Welfare, towards enriching the contents of the report. We are thankful to Save the Children's Saving Newborn Lives Programme for supporting this endeavour.

We acknowledge the sincere support extended by Dr. Rajiv Tandon in initiating the whole process, and to Dr. Rajesh Khanna for carrying it through. Inputs received from Dr. Abhay Bang have helped us immensely in improving the quality of the report. We are profoundly grateful to invited authors and reviewers who have contributed significantly in giving shape to this report.

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List of Abbreviations

AARR	Average Annual Rate of Reduction
AHIP	Affordable Housing in Partnership
AHS	Annual Health Survey
AIIMS	All India Institute of Medical Sciences
AMC	Annual Maintenance Contract
ANC	Antenatal Checkup
ANM	Auxiliary Nursing Midwife
ARI	Acute Respiratory Infection
ASHA	Accredited Social Health Activist
ASNI	Assessing and Supporting NIPI Interventions
AWC	Anganwadi Centre
AWW	Anganwadi Worker
AYUSH	Ayurveda, Yoga & Naturopathy, Unani, Sidhha and Homeopathy
BCC	Behaviour Change Communication
BCG	Bacillus Calmette Guerin
BEmOC	Basic Emergency Obstetric Service
BLAC	Block Level Advisory Committees
BPL	Below Poverty Line
BSUP	Basic Services for the Urban Poor
BW	Birth Weight
CARE	Cooperative for American Relief Everywhere
CCSP	Comprehensive Child Survival Programme
CD	Compact Disk
CEHAT	Centre for Enquiry into Health and Allied Themes
CEmOC	Comprehensive Emergency Obstetric Care
CEmONC	Comprehensive Emergency Obstetric and Newborn Care
CES	Coverage Evaluation Survey
CFL	Compact Fluorescent Light
CFR	Case Fatality Rate
CHC	Community Health Centre
CHG	Community Health Guide
CI	Class Interval
CPAP	Continuous Positive Airway Pressure Course
CPD	Continuing Professional Development
CRM	Common Review Mission
CSSM	Child Survival and Safe Motherhood
DH	District Hospital
DLAC	District Level Advisory Committees
DLHS	District Level Household Survey
DPT	Diphtheria, Pertussis and Tetanus
EAG	Empowered Action Group
EmNC	Emergency Newborn Care
EmOC	Emergency Obstetric Care
EmONC	Emergency Obstetric and Newborn Care
EMRI	Emergency Management and Research Institute
ENAP	Every Newborn Action Plan
ENC	Essential Newborn Care
ENMR	Early Neonatal Mortality Rate
FBNC	Facility Based Newborn Care
FHW	Female Health Worker
FIMNCI	Facility Based Integrated Management of Neonatal and Childhood Illnesses
FOGSI	Federation of Obstetric and Gynaecological Societies of India
FRU	First Referral Unit
GDP	Gross Domestic Product
GIS	Geographic Information System
GNM	General Nursing Midwife
GOI	Government of India
GP	Gram Panchayat
GVK	Ganapati Venkata Krishnanreddy
HBNC	Home-based Newborn Care
HBPNC	Home-based Postnatal Care
HIE	Hypoxic Ischemic Encephalopathy
HIV	Human Immunodeficiency Virus

HPS	High Performing States
HRH	Human Resources for Health
IANN	Indian Association of Neonatal Nurses
ICATT	IMNCI Computerized Adaptation and Training Tool
ICDS	Integrated Child Development Service
ICMR	Indian Council of Medical Research
IDSP	Integrated Disease Surveillance Project
IEC	Information, Education, Communication
IEG	Institute of Economic Growth
IFA	Iron Folic Acid
IGNOU	Indira Gandhi National Open University
IHSDP	Integrated Housing and Slum Development Programme
ILCS	Integrated Low Cost Sanitation Scheme
IMCI	Integrated Management of Childhood Illnesses
IMNCI	Integrated Management of Neonatal and Childhood Illnesses
IMR	Infant Mortality Rate
INAP	India Newborn Action Plan
INHP	Integrated Nutrition and Health Project
INR	Indian Rupee
IPGMER	Institute of Post-Graduate Medical Education and Research
IPHS	Indian Public Health Standards
IPP	India Population Projects
ISHUP	Interest Subsidy Scheme for Housing the Urban Poor
ISO	International Organization for Standardization
IVR	Interactive Voice Response
IYCF	Infant and Young Child Feeding
JNNURM	Jawaharlal Nehru National Urban Renewal Mission
JSSK	Janani Shishu Suraksha Karyakram
JSY	Janani Suraksha Yojna
KMC	Kangaroo Mother Care
LBW	Low Birth Weight
LHV	Lady Health Visitor
LHW	Lady Health Worker
LMRF	Lata Medical Research Foundation
LPS	Low Performing States
MAS	Meconium Aspiration Syndrome
MBBS	Bachelor in Medicine and Bachelor in Surgery
MCH	Maternal and Child Health
MCHN	Maternal and Child Health & Nutrition
MCP	Mother Child Protection
MCQ	Multiple Choice Question
MDG	Millennium Development Goals
MIS	Management Information System
MMR	Maternal Mortality Rate
MoHFW	Ministry of Health and Family Welfare
MoWCD	Ministry of Women and Child Development
MP	Madhya Pradesh
NALS	Neonatal Advanced Life Support
NBCC	Newborn Care Corner
NBSU	Newborn Stabilization Unit
NBW	Normal Birth Weight
NCHRC	Nation Child Health Resource Centre
NCRC	Newborn Care Resource Centre
NE	North East
NFHS	National Family Health Survey
NGO	Non Governmental Organization
NHD	Nutrition and Health Day
NHM	National Health Mission
NHSRC	National Health System Resource Centre
NICU	Neonatal Intensive Care Unit
NIPI	Norway India Partnership Initiative
NMR	Neonatal Mortality Rate
NNF	National Neonatology Forum
NMBS	National Maternity Benefit Scheme
NRC	Nutrition Rehabilitation Centre
NRHM	National Rural Health Mission
NRP	Neonatal Resuscitation Programme
NSSK	Navjaat Shishu Suraksha Karyakram

NUHM	National Urban Health Mission
O&G	Obstetrics and Gynaecology
ONTOP-IN	Online Neonatal Training Orientation Programme in India
OPD	Out Patient Department
OPV	Oral Polio Vaccine
OR	Odds Ratio
ORS	Oral Rehydration Solution
OSCE	Objective Structured Clinical Examination
PATH	Programme for Appropriate Technology in Health
PGDMCH	Post Graduate Diploma in Maternal and Child Health
PGDMRCH	Post Graduate Diploma in Management of Reproductive and Child Health
PGIMER	Post Graduate Institute of Medical Education and Research
PHC	Primary Health Centre
PHFI	Public Health Foundation of India
PHN	Public Health Nurse
PIP	Programme Implementation Plan
PMR	Perinatal Mortality Rate
PNC	Postnatal Checkup
PPP	Public Private Partnership
PPTCT	Preventing Parent to Child Transmission
PRI	Panchayati Raj Institution
QA	Quality Assurance
RACHNA	Reproductive and Child Health, Nutrition and HIV/AIDS Programme
RAY	Rajiv Awas Yojana
RBSK	Rashtriya Bal Swasthya Karyakram
RCH	Reproductive and Child Health
RDS	Respiratory Distress Syndrome
RHS	Rapid Health Survey
RIMS	Real-time Institution Management Systems
RMNCH+A	Reproductive, Maternal, Newborn and Child Health + Adolescent
RR0	Relative Risk Odds
SBR	Still Birth Rate
SC	Scheduled Caste
SCNU	Special Care Newborn Unit
SD	Standard Deviation
SEARCH	Society for Education, Action and Research for Community Health
SHSRC	State Health System Resource Centre
SJSRY	Swarna Jayanti Shahari Rozgar Yojana
SMS	Short Message Service
SNCU	Special Newborn Care Unit
SNEHA	Society for Nutrition, Education and Health Action
SOP	Standard Operating Procedure
SRS	Sample Registration System
ST	Scheduled Tribe
STP	Standard Treatment Protocols
TBA	Trained Birth Attendant
THR	Take Home Ration
TT	Tetanus Toxoid
U5MR	Under-Five Mortality Rate
UCHC	Urban Community Health Centre
UFWC	Urban Family Welfare Centres
UHP	Urban Health Posts
UK	United Kingdom
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
UNOPS	United Nations Office for Project Services
UP	Uttar Pradesh
UPHC	Urban Primary Health Centre
US	United States
USHA	Urban Social Health Activist
UT	Union Territory
VHND	Village Health and Nutrition Day
VHSC	Village Health and Sanitation Committee
VLBW	Very Low Birth Weight
WHO	World Health Organization
WHO-SEARO	World Health Organization-South East Asia Regional Office

CONTENTS

EXECUTIVE SUMMARY

The decade since the publication of the first report on the State of India's Newborn in 2004 (SOIN 2004) has witnessed momentous changes in the neonatal health scenario in India. With the launch of the National Rural Health Mission (NRHM) in 2005, newborn healthcare has received unprecedented attention and resources.

The country launched several new initiatives to boost maternal-neonatal care under NRHM. The Janani Suraksha Yojana (JSY) provides for cash incentive for childbirth in facilities. The Facility – Based Newborn Care (FBNC) aims to build a three-tier system of neonatal care encompassing the Primary Health Centres (PHCs), the Community Health Centres (CHCs) and the District Hospitals.

The Home-based Newborn Care (HBNC) programme envisages home visiting by the Accredited Social Health Activists (ASHAs) for neonatal examination, sickness detection and family counselling. The Navjat Shishu Suraksha Karyakram (NSSK) aims at provision of essential newborn care including resuscitation in facilities at all delivery points. The Janani Shishu Suraksha Karyakram (JSSK) goes a step further and entitles mothers and infants to free transportation, care, medicines, and diagnostics in all public facilities.

As a part of the recently instituted Rashtriya Bal Suraksha Karyakram (RBSK), the focus has been placed on screening infants for selected birth defects and developmental delays.

The health system development has seen a transformational change in these years in increasing access of health services to the poor. More than 9,00,000 village level ASHA workers, 33,000 nurses, 14,000 paramedics, 8,000 doctors and 3,000 specialists have been inducted; more than 20,000 facilities have been constructed; and over 20,000 ambulances deployed. Medical graduate seats have increased by 55 per cent and postgraduate seats by 75 per cent. More than 500 000 village health and sanitation committees have been formed to catalyse community participation. Actual public spending together by the centre and state government on health increased by 2.27 times between the X Plan (2002-07) and XI Plan (2007-12) periods.

What difference did this make to maternal, neonatal and child health? Maternal mortality ratio (MMR per 100000 live births) declined from 254 (2004-06) to 178 (2010-12). Under-five mortality rate (U5MR) dropped by 30% from 74 per 1000 live births (2005-06) to 52 (2012). In the same period, neonatal mortality rate (NMR) decreased by 22% from 37 per 1000 live births to 29 in 2012.

These are not small achievements.

The country is presently saving additional 440 000 neonatal lives annually compared to the year 2000. The JSY has ensured that an additional 12 to 13 million women are now delivering in government facilities each year with institutional delivery rate touching 80%. More than 0.6 million newborn babies, mostly from poor families, are receiving care in the newly created Special Newborn Care Units (SNCUs) in the district hospitals across the nation each year.

The 2014 State of India's Newborns report captures the story of country's neonatal health initiatives in recent years. It is an honest effort to share the experience of the country in improving neonatal health with a wide spectrum of national and global stakeholders. It celebrates the success but also provides insights to address the gaps. Above all, it intends to ignite aspiration and hope for attaining the best possible neonatal health status in the country in near future and the long term.

The key recommendations of the Report are shown in the accompanying Panel.

WAY FORWARD

The mid- 2014 is an exciting phase in India's history. A new government has taken over at the Centre with the promise of good governance and efficient delivery; a government that aims at radical reforms of the healthcare system. There is an overwhelming sentiment of hope and of high expectations from the health sector.

It is an apt moment to reflect on the progress in improving newborn and child health which is at the centre of country's development agenda. It is also

time to outline medium and long term vision and strategies to attain the best possible survival and health of children of India in near future.

The national government is committed to a National Health Assurance Mission that ensures accessible, affordable and effective universal healthcare. Maternal, newborn and child healthcare would be at the core of this Mission. We need to make sure that no woman, no neonate and no child should be left behind as the country surges ahead in development and welfare. Inequity, whether geographic, or of class or gender, is unacceptable. Removing inequities would require addressing the key social determinants, mounting a behaviour change movement on scale and ensuring access to quality services by every mother, every baby in every part of the country. The goal of averting every preventable newborn death, and stillbirth, would require not only further acceleration of present initiatives, but also implementation of new approaches and programmatic innovations.

India's academia and industry need to develop affordable products and solutions for maternal, newborn and child care that are applicable worldwide. Indian researchers need to explore the poorly understood science of prematurity, fetal growth restriction, and brain development.

Newborns should not only survive, but also thrive and attain the highest developmental potential. This mandates that we track and take care of every child beyond survival for growth, nutrition, health and development.

India is committed to the attainment of MDG 4 which is within its reach with accelerated newborn and child survival action in the coming months. The XII Plan goal of IMR of 25 by 2017 would require NMR to be around 18 per 1000 live births.

The Every Newborn Action Plan (ENAP) that has been recently endorsed by the World Health Assembly calls for an NMR of less than 10 per 1000 live births by 2035 in all countries. This is in line with the imperatives of the goal of U5MR of 20 or less by 2035 set in the 'Committing to Child Survival: A promise renewed' initiative that India co-hosts. India has the potential to achieve the 2035 goals much earlier. But translating such aspirations into deliverables would require long term view, executional brilliance, intersectoral synergy and, above all, political resolve. The India Newborn Action Plan (INAP) being launched by the Government of India indeed incorporates these very principles. A step in the right direction, the Plan effectively sets the stage for an acceleration in neonatal survival and health.

Key recommendations

1. **Ensure that every mother-baby dyad receives quality care in labor, delivery and thereafter**
   - In order to translate increased institutional delivery rates into improved maternal-neonatal health outcomes, there is an urgent need to scale up quality improvement systems in all facilities (the 'delivery points') where births occur.

2. **Ensure increased coverage of home-based newborn care (HBNC) and of treatment for neonatal sickness**
   - The present miniscule coverage of HBNC is a missed opportunity; it is time that at least half of the country's birth cohort is covered by this programme by 2015, coupled with rapid scale up of the community-based treatment of neonates with pneumonia or sepsis, where referral is not possible.

3. **Apply best practices of care at special newborn units (SNCUs) nationwide, create mentoring teams, and further increase such units to address the unmet need**
   - The districts with weak SNCUs can imbibe best practices from the better counterparts through cross-learning, and improve further with help from mentors (experienced paediatricians, nurses) drawn from medical colleges and the private sector, even as their number is raised to meet the unmet need.

4. **Address key social determinants of neonatal health; childbirth after 20 years and birth spacing**
   - Given that young maternal age at child birth and short birth interval have disastrous consequences on newborn health and survival, it is imperative to launch a nation-wide socio-political movement to delay the age at marriage and ensure child birth after 20 years of maternal age.

5. **Focus on reducing inequities in maternal-neonatal care**
   - Make special efforts (including awareness generation, social mobilization, promotion of JSSK, and special incentives) to improve care seeking for the girl neonates; develop models of newborn care for the urban poor, and handhold states/ districts that are lagging.

6. **Strengthen techno-managerial capacity of programme teams**
   - The programme managing teams at district, state and national level dealing with maternal-newborn healthcare require strengthening in terms of size, skills and empowerment to be able to deliver more effectively.

7. **Nurture neonatal equipment industry**
   - Given that India's newborn care is powered by affordable, indigenous biomedical equipment, it is imperative to promote and incentivise this industry that is also a supplier of newborn care products to several other countries.

8. **Harness the potential of IT in neonatal health education, service delivery and behaviour change**
   - The innovative experiences in e-learning, mHealth and behaviour change communication offer extraordinary potential for improved newborn health programmes and action.

9. **Revamp monitoring of vital neonatal-perinatal data and coverage indicators**
   - Develop system to estimate trends in the burden of stillbirths, low birth weight, preterm deliveries; and to measure key indicators of coverage of maternal-neonatal health more frequently than at present.

10. **Develop a roadmap to ending all preventable neonatal deaths and stillbirths**
    - Having set sights on a neonatal mortality rate of under 10 in foreseeable future as a part of its international commitments, it is imperative for the country to develop an action plan.

Summary of

INDIVIDUAL CHAPTERS

1. STATUS OF NEWBORNS IN INDIA

About 0.76 million neonates die every year in India, the highest for any country in the world. The neonatal mortality rate (NMR) of the country did decline from 52 per 1000 live births in 1990 to 29 per 1000 live births in 2012 (SRS 2012) but the rate of decline has been slow, and lags behind that of infant and under-five child mortality rates. The slower decline has led to increasing contribution of neonatal mortality to infant mortality. With the current infant and under-five child mortality rates of 42 and 52 per 1000 live births respectively (SRS 2012), about 70% of infant deaths and more than half of under-five child deaths occur in the neonatal period, the first 4 weeks of life.

Among neonatal deaths, the rate of decline in early neonatal mortality rate (ENMR) is much lower than that of late NMR. Indeed, of all the components of the under-five mortality, early neonatal mortality has been the slowest to decline. Given that the current ENMR is 23 per 1000 live births (SRS 2012), the first week of life alone accounts for about 45% of total under-five child deaths that happen in the country. The slow decline of neonatal mortality, and in particular that of early NMR, is a major stumbling block that could derail India's otherwise steady march towards reaching the Millennium Development Goal-4. The high level and slow decline in early neonatal deaths are also reflected in a high and stagnant perinatal mortality rate in India.

The rate of decline in NMR, and to an extent ENMR, has accelerated with the introduction of National Rural Health Mission (NRHM) in mid-2005. The AARR for NMR was zero, just before introduction of NRHM (between 2003 and 2005), but has increased to 4.6% per year in the period between 2009 and 2011. This is true for almost all states but there is still a huge disparity in NMR between and even within the states because of the different baseline rates. The disparity is further compounded by rural-urban, poor-rich, and gender differentials. There is an interplay of different demographic, educational, socio economic, biological and care seeking factors, which are responsible for the differentials and the high burden of neonatal mortality. Equity is one of the cross cutting issues that requires immediate attention.

The three major causes of neonatal deaths are preterm birth complications, infections, and intrapartum related complications; together, they contribute to nearly 90% of total neonatal deaths. While almost all of intrapartum-related deaths and majority of prematurity-related deaths occur in the first week of life, more than half of infection-related deaths occur after the first week of life. This has implications for the home/community-based postnatal care of neonates.

The stillbirth rate (SBR) for 2012 is estimated to be 22 per 1,000 births. The country lacks reliable system of estimating the stillbirth burden and epidemiologic correlates thereof.

About 47,000 maternal deaths occur in India each year. The maternal mortality ratio (MMR) has declined from 560 per 100,000 live births in 1990 to 178 per 100,000 live births in 2010-2012. This translates into an annual reduction of 5.7%. With this rate of decline, India is on track to attain its MDG 5.

Recommendations

- Measure key indicators of coverage of maternal-neonatal health more frequently than at present for effective programme implementation.
- Include ENMR as an indicator to monitor newborn health programmes; report disaggregated NMR and ENMR for rural, urban populations
- Prioritise strategies to address the early neonatal mortality within the broad frame work of maternal-neonatal health programme:
    - Improve the quality of care in health facilities in labor and delivery, and in the immediate postnatal period

- Improve detection, referral and treatment of sepsis and pneumonia in the postnatal period

- Eliminate inequities in NMR between and within states by decentralized district level strategies and action
- Develop system to count all stillbirths, particularly to distinguish stillbirths before or during the intrapartum period

2. SOCIAL DETERMINANTS OF NEWBORN HEALTH

The health outcomes are shaped not just by biological factors but also by the social, economic and cultural environment. Understanding of these determinants is a pre-requisite for informed policy and programmatic approaches to achieve the objective of neonatal survival, health and well being. There is a wide gap in neonatal health status and coverage of interventions in different states and within states across districts, populations and communities. Care seeking for female newborns is often compromised as compared to males.

Two socio-demographic determinants, namely young maternal age at child birth and short birth interval have disastrous consequences on newborn health and survival. Child birth before the age of 20 years and a birth interval of less than 24 months are associated with excessive risk of neonatal mortality. Thus, family planning has huge neonatal survival benefits. Women's education plays an important role in improving neonatal health outcomes.

Recommendations

- Launch a nation-wide socio-political movement to delay the age at marriage and ensure child birth after 20 years of maternal age; this would lead to a substantial improvement in neonatal survival.
- Promote birth spacing universally; it has many benefits including better neonatal and maternal health and survival.
- Drive and monitor maternal and newborn health programmes by data disaggregated by equity indicators including gender differentials.
- Make special efforts (including awareness generation, social mobilization, promotion of JSSK, and special incentives) to improve care seeking for the girl neonates.
- Ensure inter-sectoral convergence among health, nutrition, education, women's empowerment, water & sanitation, and rural development departments; monitor their synergy at the highest level of government

3. COMMUNITY AND HOME-BASED NEWBORN CARE

India has contributed immensely towards generating evidence that community and home based newborn care save lives. In a model developed in rural Gadchiroli (Maharashtra) by Dr. Abhay Bang in the 90's, the delivery of a package of interventions through home visits by community health workers led to dramatic decline in neonatal deaths. Based on this experience, the Home-based Newborn Care (HBNC) programme centered around ASHAs was introduced in 2011 and is now the main community-level programme on newborn health. Earlier, the IMNCI programme was rolled out with inclusion of home visitation by AWW as an integral component. IMNCI has been implemented in 505 districts in 27 states and 4 union territories. A mix of AWWs, ASHAs, ANMs were trained. The rapid roll out of IMNCI programme made impact on newborn health on the ground. However, its intensity appears to have been diluted since 2012 when the Ministry of Health and Family Welfare decided to focus only on ANMs leaving the AWW component to the stewardship of the ICDS system.

ASHAs, the frontline workers for HBNC, are trained through four rounds of training using two modules. Around 43 percent of ASHAs in the country have received HBNC training. HBNC has been rolled out in 25 states and 4 union territories. However, the pace of uptake of the HBNC programme has been very slow. Only a total of 0.4 million neonates were covered under this programme by March 2013. This is but a small fraction of the annual rural birth cohort of over 17 million. Supportive supervision remains weak, the role of ANMs in supervision remains ambiguous and there are problems of supply

of HBNC kits. The programme has low visibility in many states.

Recently, the Government of India has developed operational guidelines on the use of intramuscular gentamicin by ANMs for management of sepsis in young infants (under 2 months of age) where referral is not possible or is refused. If a young infant is identified to have possible serious infection by IMNCI algorithm, and referral advice is not followed, ANM would offer to treat the infant with a combination of injection gentamicin plus oral amoxicillin for a period of 7 days. It is expected that this approach would reduce deaths due to sepsis and pneumonia particularly among the underserved infants.

Recommendations

- Improve the coverage and quality of the HBNC program by:
  - Operationalizing an effective supportive supervisory mechanism with role clarity of ANMs and ASHA supervisors
  - Ensuring uninterrupted supply of ASHA kits, and replenishment thereof
  - Timely reimbursement of ASHA incentives
  - Improving the reporting system
- Move rapidly from the training phase of HBNC into full operationalization; aim to cover at least 50% of the annual newborn cohort in the country under HBNC by 2015 and 80% by 2017
- Continue to train, engage and monitor AWWs in IMNCI
- Ensure that all ANMs are trained in IMNCI
- Scale up new operational guidelines allowing ANMs to treat neonates with suspected sepsis, where referral is not possible or refused, using injectable gentamicin and oral amoxicillin
- Deepen the community participation processes for maternal, newborn and child health by involving the women's groups more systematically
- Increase coverage of JSSK to overcome logistic and financial barriers to treatment of sick neonates, and connect poor families to facilities
- Invest in operations research to refine HBNC and IMNCI for more effective, efficient and equitable implementation of community-based newborn health programmes

4. FACILITY-BASED NEWBORN CARE

Neonatal units in teaching hospitals and private hospitals have been coming up in the country since the sixties. In 1994, a District Newborn Care Programme was introduced as a part of the Child Survival and Safe Motherhood Programme (CSSM) in 26 districts Facility based newborn care (FBNC) in the public health system got a boost under NRHM with a nationwide creation of Newborn Care Corners (NBCC) at every point of child birth, Newborn Stabilization Units (NBSUs) at Community Health Centres and Special Newborn Care Units (SNCUs) at district hospitals. Guidelines and toolkits for standardized infrastructure, human resources and services at each level have been developed and a system of reporting data on FBNC created. Over half a million neonates are being treated each year at SNCUs alone and the number is rising. Neonatal nursing emerges as the bedrock of newborn care infacilities.

In late 2013, there were 448 SNCUs, 1,574 NBSUs and 13,219 NBCCs in the country. A total of 6408 beds were available in SNCUs across the country. More than 600,000 babies were admitted in 2012-13, of whom 90% survived.

Setting up of SNCUs without emphasizing on creating a network of SNCUs, NBSUs and NBCCs as a composite functional unit is a concern. NBSUs have not received the desired focus and have remained a weak link in most of the districts. Shortage of doctors, shortage of beds, and absence of mechanisms for timely repair of equipment are the usual challenges. The admission overload coupled with a weak NBSU level has resulted in an overload at SNCUs. KMC has not been mainstreamed into the facility-based care.

Recommendations

- Take measures to diffuse best practices from districts with well functioning FBNC to places with poor coverage and quality; create opportunities for such cross learning
- Establish sustainable quality assurance systems for FBNC in all states to ensure high standards of care
- Focus on neonatal nursing because nurses are the backbone of neonatal care at PHCs, NBSUs, SNCUs, medical colleges; empower nurses through education, training, incentives and task shifting
- Engage medical college faculty and other eminent paediatricians to mentor FBNC
- Build effective scale up of Kangaroo Mother Care on the existing platform of FBNC
- Ensure staff policies that support retention and motivation of the staff; address negative aspects of contractual appointments, low remuneration, lack of career progression etc.
- Refine the model of NBSU to make this level of care more functional and effective
- Strengthen linkages between SNCUs, NBSUs and PHCs
- Strengthen the essential newborn care component in the NSSK training package
- Ensure quality home care and follow up of babies after discharge from facilities
- Conduct situational analysis of neonatal care services in the private sector and assess scope to improve quality therein
- Consider engaging private facilities in providing neonatal care through public – private partnership
- Invest in operations research to improve quality of care and neonatal outcomes at the facilities.

5. NEWBORN HEALTH IN URBAN INDIA

India is urbanizing rapidly, with an expectation that the urban population will be almost 600 million by 2030. The rapid population growth in India has outpaced the municipal and government capacity to build essential infrastructures that make life in cities safe and healthy. Meeting the needs of a rapidly growing population, with many migrating and landing into thousands of overcrowded and poor urban settings as slums, is a challenge. As many as 468 cities have populations of over 100,000, 53 over one million and three are megacities of over 10 million. Most of the growth has been endogenous rather than the result of rural-urban migration.

National health survey data show that overall NMR is lower in urban than in rural areas, but the figures mask substantial urban inequalities. Recent data also suggest a relative lack of progress in reducing early neonatal mortality. Socio-economic inequalities and environmental concerns pose major challenges for newborn health. Healthcare is concentrated in urban areas, but health outcomes are subject to variations in pluralistic provision and a lack of clarity in protocols, communication, referral and transfer between institutions. Fragmented and weak public health systems, a multiplicity of actors and limited public health planning capacity compromise the delivery of affordable quality health care. Data on urban newborn health are both limited and difficult to use to provide useful epidemiological and planning information.

Within the National Health Mission, the National Urban Health Mission provides an opportunity for strategic thinking and actions to improve urban newborn health. The Reproductive, Maternal, Newborn and Child Health + Adolescent initiative adds to this an opportunity to integrate health care over the life cycle. A number of pilot initiatives have begun, including private-public partnerships, community action models, demand-side financing, and insurance, but evaluation has been limited.

Recommendations

- Develop models of newborn care for urban populations with focus on the poor within the NUHM framework.
- Develop convergence mechanisms of public, private, and third sector institutions whose work affects urban newborn health: water and sanitation, urban planning, transport and building all have a role.
- Develop platforms for harmonization and sharing of data to provide epidemiologic and evaluative insights for programming.

- Review and redefine the roles of urban local bodies in public health including newborn health.
- Ensure training, deployment and support for human resources for urban healthcare to improve newborn survival.
- Define staffing norms for urban health facilities, public and private, and within and outside NUHM.
- Involve civil society and NGOs for effective implementation of the urban newborn health programmes.
- Partner with professional bodies like NNF, IAP, and FOGSI (Federation of Obstetric and Gynaecological Societies of India) for service delivery, to develop standard norms and protocols, training and quality assurance.
- Conduct operations research to demonstrate sustainable models of newborn healthcare.

6. JANANI SURAKSHA YOJNA (JSY) AND JANANI SHISHU SURAKSHA KARYAKRAM (JSSK)

JSY, a government funded nationwide scheme offering conditional cash transfers was made operational since 2005. This scheme, the most comprehensive such programme in the world (covering 11 million beneficiaries each year), has led to a quantum jump in the institutional deliveries. However, in systematic studies, the impact of the programme on neonatal and perinatal mortality has been modest.

JSSK programme launched in 2011 compliments JSY and is aimed at mitigating the burden of out-of-pocket expenses incurred by pregnant women and sick infants. It ensures that every mother and infant (up to one year of age) is entitled to get a range of services (drugs, food, transportation) free of cost at public health facilities. The uptake of JSSK is gradually increasing.

Recommendations

- Ensure high quality maternal-newborn care in facilities to attract women to come and stay for 48 hours after delivery as recommended.
- Engage more private institutions with JSY mechanism to meet the demand.
- Address problems of timely payments to clients and mobilizers; curb leaks.
- Enhance coverage of JSSK, particularly by increasing public awareness about it.
- Adopt strategies to reach the poorest, marginalized and hard to reach population through the scheme.

7. PERINATAL AND REFERRAL TRANSPORT

There was no functional model of either emergency response systems or assured transport for pregnant women and sick newborns in the public system when NRHM was launched in 2005. This scenario has changed completely in the last few years. Presently, over 20000 ambulances are in operation in the country under NRHM. Most states have developed well functioning referral transport systems coordinated by efficient call centres. This is a remarkable success of NRHM.

Recommendations

- Refine the referral transport system for mothers and newborns continuously through evaluation, use of technology, innovation and efficient management to match the very best in the world in efficiency and quality
- Develop and implement referral transport protocols including pre-transport stabilization, care during transport, handing over at referral site, communication between the referring and recipient providers/facilities, documentation
- Standardize ambulance design and equipment to enhance comfort, safety and emergency response during transportation
- Establish regional / district level call centres in the larger states to disperse the load
- Create opportunities for cross learning so that relatively weaker systems draw upon the

experiences and successes of the better off states / districts

- Provide paramedic skills to the ambulance staff to look after the mother and the baby

8. HEALTH SYSTEMS AND POLICIES FOR NEWBORN CARE IN INDIA

Health systems and polices have a critical role in the manner in which health services are delivered and utilized, which eventually affects the health outcomes. The current health systems analysis reveals a need of systems approach to measure the financial flow and its outcome on newborn care, a need for better governance and increased number and capacity for managing areas related to newborn care and better utilization of information pathways, by generating quality data and its use in evidence based decision making.

Recommendations

- Improve governance of programmes related to maternal, newborn and child health by increasing the skills of programme managing teams at district, state and national level
- Assess the quality of care provided by various cadres of health professionals and explore task shifting as a strategy to increase coverage
- Use effectively the information pathways and health management systems for informed and efficient decision making
- Strengthen pathways to enable development partners and the private sector to play a more effective role in maternal, newborn and child health programmes.

9. INNOVATING AFFORDABLE INDIGENOUS NEWBORN CARE EQUIPMENT FOR USE AT SCALE

Care of small and sick neonates requires biomedical technologies such as devices to keep babies warm (radiant warmers, incubators), resuscitate (self-inflating bags), track growth (weighing scales), treat high jaundice (phototherapy units) and provide oxygen / respiratory support (hoods, CPAP devices, ventilators). Until the nineties, most of these products were imported at a high cost and with little maintenance support. Emerging demand, and an informal collaboration of neonatologists and engineers / entrepreneurs since the nineties, led to the production of good quality equipment of several high volume categories at affordable cost in India. Indian products acquired international quality standards and were exported even to the developed nations.

This experience of small scale industry innovating affordable neonatal equipment for mass use has demonstrated the potential of Indian enterprise to meet the challenges of developing healthcare technologies. Without these efforts, India's newborn care, particularly in the facilities, would have lagged behind considerably.

Recommendations

- Encourage and incentivise industry to develop high quality, affordable equipment for newborn care through facilitation, resources and recognition
- Develop academia, industry and government partnerships for new and better neonatal equipment
- Ensure that only those devices that meet the established standards of performance and safety are marketed in the country by law.

10. HARNESSING NEW TECHNOLOGIES FOR NEWBORN CARE

Newborn care has attracted adaptation of technologies for new, innovative products with a great potential. In addition, mHealth has been used in improving access to care for neonates. The health system and regulatory frameworks in many instances have delayed the introduction of cost effective proven strategies into the health systems, and most often the expensive technologies being introduced into the private sector.

Recommendations

- Create enabling guidelines and ecosystem for introducing cost effective innovations and technologies for newborn care in public and private sectors
- Promote research and evaluation on social and technology innovations for newborn health
- Develop centres for maternal and child health biodesign
- Develop centres for technology assessment to evaluate prototypes and final products
- Launch implementation research to understand the role and potential of mHealth in newborn health
- Promote and establish partnerships for innovation in the areas of newborn health.

11. EDUCATIONAL INNOVATIONS FOR NEWBORN HEALTH

India has witnessed the launch of several programmes with newborn health content such as IMNCI, HBNC and NSSK. Training of health care providers has been an integral part of all these programmes. There is also a demand to organize refresher courses periodically to update the knowledge and skills, and to improve pre-service education. Several educational initiatives both regular (face to face) and distance learning courses that have been developed in the last decade. These courses/programmes utilize regular, distance, online, and satellite modes of teaching. E-learning on newborn health is in an exciting phase with very rewarding early uptake. It has a great potential and future.

Recommendations

- Invest in developing educational tools and connectivity for tele-health and education
- Mainstream e-learning programmes into pre-service and in-service education / training programmes on newborn health

Chapter 1

STATUS OF NEWBORNS IN INDIA

OVERVIEW

More than a quarter of global neonatal deaths occur in India. About two-thirds of infant deaths and half of under-five child deaths are during the neonatal period. The neonatal mortality rate has reduced over the years but the decline is at a much slower pace as compared to deaths in the older infant groups. Among neonatal deaths, the rate of decline in early NMR is much lower than that of late NMR. The high level and slow decline in early neonatal deaths are also reflected in the high and stagnant perinatal mortality rate.

This chapter gives an overview and a brief analysis of the burden and trends of global and national neonatal mortality, as well as of perinatal mortality, stillbirths and maternal mortality.

1. THE CHALLENGE OF NEONATAL HEALTH

1.1 Background

Of the 6.6 million under-five child deaths that occur globally every year, about 44 percent occur in the neonatal period (the first 28 days of life) [1]; the proportion is even higher – around 54 percent – in countries from the WHO South East Asia Region (SEAR). The Millennium Development Goal-4 (MDG-4), which stipulates a two-thirds reduction in under-five deaths by 2015, obviously cannot be achieved without ensuring a substantial reduction in the neonatal mortality rate (NMR).

1.2 Neonatal, perinatal and child mortality rates in India

The box below provides the most recent estimates (2012) of the child and neonatal mortality rates in the country. With the current NMR of 29 per 1,000 live births [2], about 70 percent of infant deaths and more than half of under-five child deaths in the country fall in the neonatal period (Figure 1.1). The early neonatal mortality rate (ENMR) - deaths in the first week of life - is 23 per 1,000 live births. [2] This implies that the first week alone accounts for about 45 percent of total under-five child deaths.

1.3 Burden of neonatal and child mortality

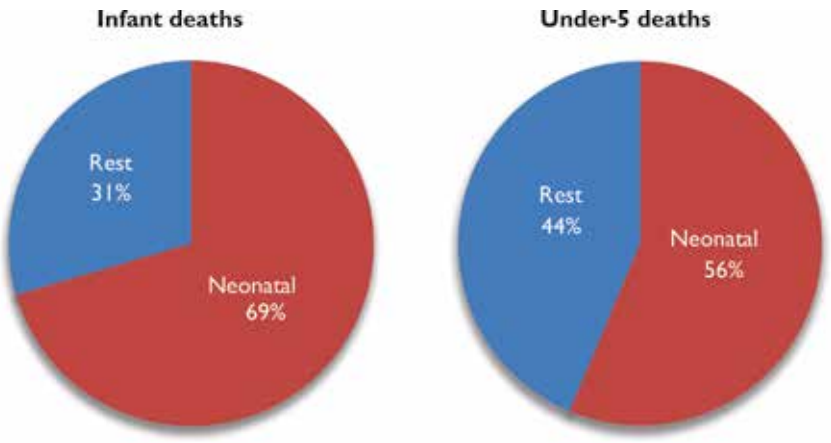
India contributes to one-fifth of global live births and more than a quarter of neonatal deaths (Figure 1.2). About 0.76 million neonates died in 2012, the highest for any country in the world that year. [2]

Current Child and Neonatal Mortality Rates (2012)	
Under-five child mortality rate (U5MR)	52
Infant mortality rate (IMR)	42
Neonatal mortality rate (NMR)	29
Early neonatal mortality rate (ENMR)	23
Late neonatal mortality rate (LNMR)	6

Note: Rates expressed per 1000 live births

Source: SRS Statistical Report, 2012 [2]

Figure 1.1: Neonatal deaths as a percentage of infant and under-five deaths



Source: SRS Statistical Report, 2012 [2]

Figure 1.2: India's contribution to global burden of neonatal deaths

Source: Child mortality report, 2013 [1]

1.3.1 Burden over the years

There has been a significant reduction in the quantum of neonatal and child deaths in the last two decades. The annual burden of neonatal deaths has reduced from 1.35 million in 1990 to 0.76 million in 2012 (Table 1.1). [3] The rate of decline in the child, infant, and neonatal mortality rates has gained momentum only in the last decade – for example, neonatal deaths reduced by 32 percent in the period from 2000 to 2012, but only by 17 percent from 1990 to 2000 (Table 1.1).

Table 1.1: Estimates of child deaths in India for years 1990, 2000 and 2012

	1990	2000	2012	Relative reduction from 1990 to 2000	Relative reduction from 2000 to 2012	Relative reduction from 1990 to 2012
Neonatal deaths (In millions)	1.35	1.12	0.76	17%	32%	44%
Infant deaths (In millions)	2.33	1.75	1.10	25%	37%	53%
Under-5 child deaths (In millions)	3.32	2.41	1.36	27%	44%	59%

Source: WHO data bank [3] and SRS Statistical Report, 2012 [2]

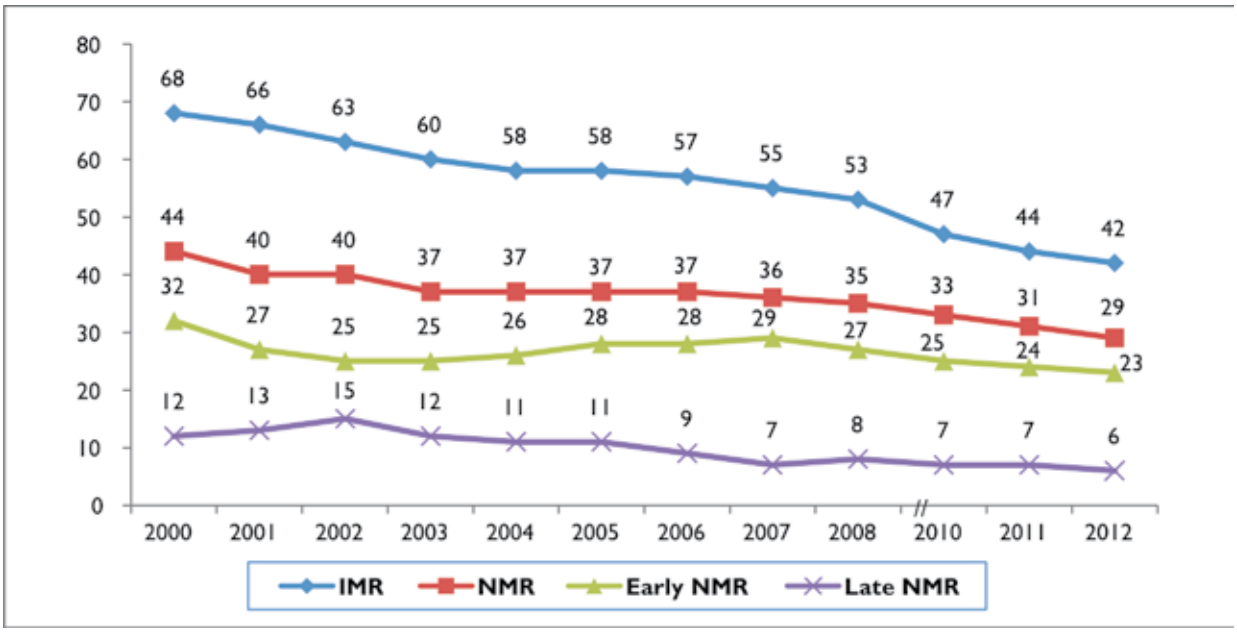
1.3.2 Trends and projections of neonatal mortality

The NMR has declined from 44 per 1000 live births in 2000 to 29 per 1000 live births in 2012, but the rate of decline has been slow and lags behind that of infant mortality rate (IMR; deaths in the first year of life) (Figure 1.3). The average annual rate of reduction (AARR) of NMR was only modest – at around 3.5 percent – in this period (Figure 1.4). The rate of reduction was less than that of IMR during the same period (4.0 percent annual reduction).

The high AARR of post-neonatal infant deaths, i.e. deaths in infants aged 1 to 12 months, as opposed to deaths during the neonatal period is the reason for this discrepancy (Figure 1.4). The slower decline in NMR has led to increasing contribution of neonatal mortality to infant mortality.

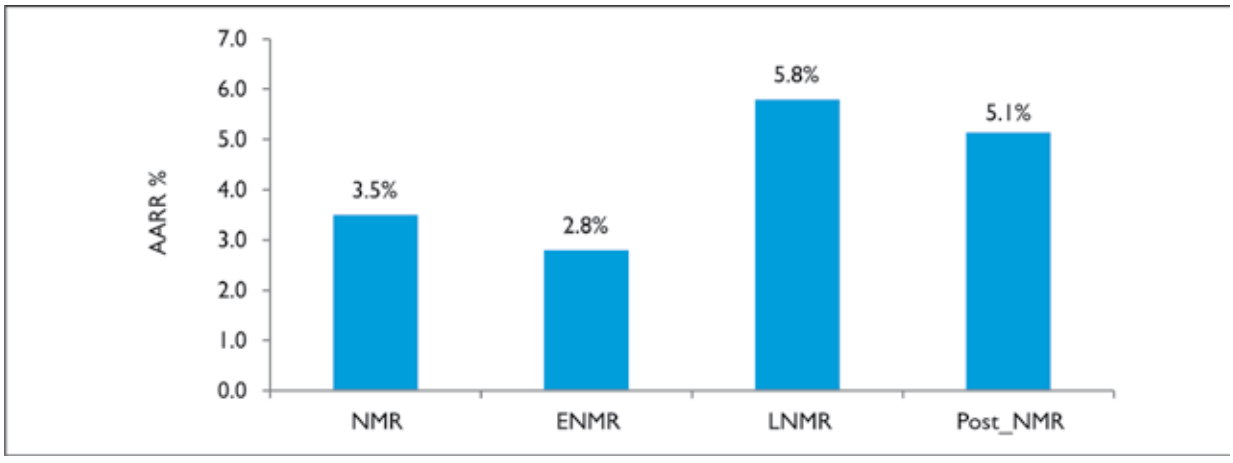
Among neonatal deaths, the rate of decline in the ENMR was much lower than in the late NMR - AARR of 2.8 percent and 5.8 percent respectively (Figure 1.4).

Figure 1.3: Trends of NMR and IMR



Source: SRS Statistical Reports (2000-2012)

Figure 1.4: Average annual rate of reduction (AARR) of NMR since 2000

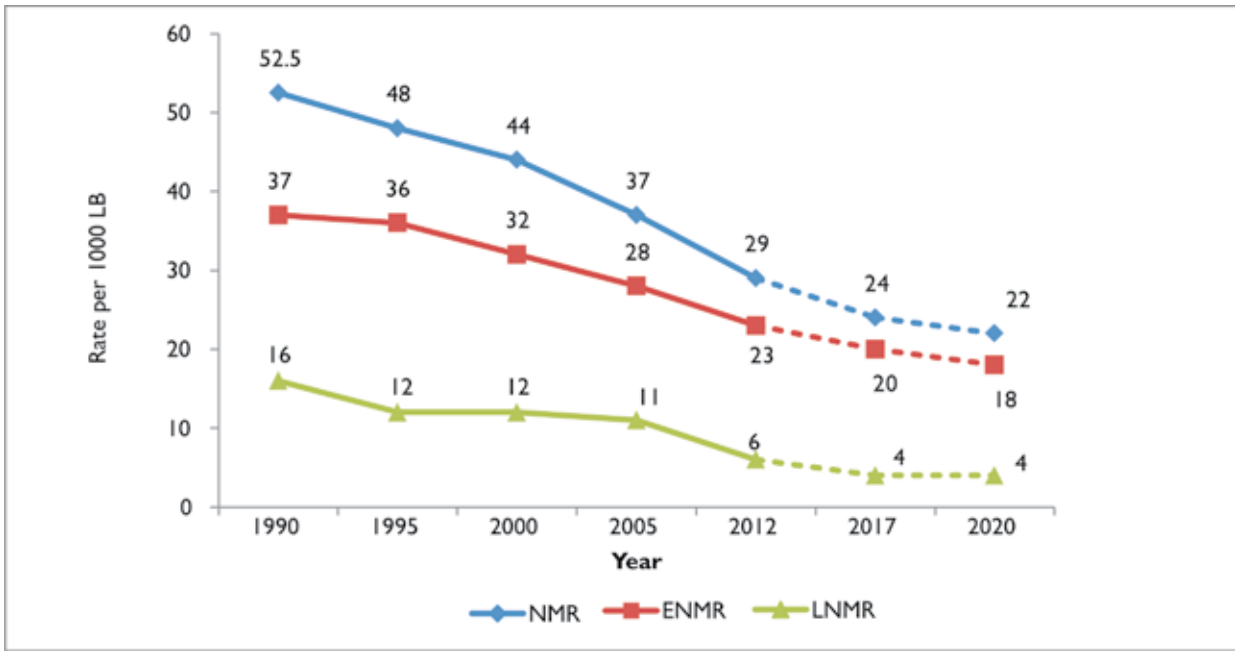


Source: SRS Statistical Reports (2000-2012)

The projected NMRs for 2017 and 2020, based on the AARR from 2000 to 2012, are 24 and 22 per 1,000 live births, respectively. The projected rates for ENMR for 2017 and 2020 are 20 and 18 per 1,000 live births, while that for late-NMR are four per 1,000 live births for each year (Figure 1.5).

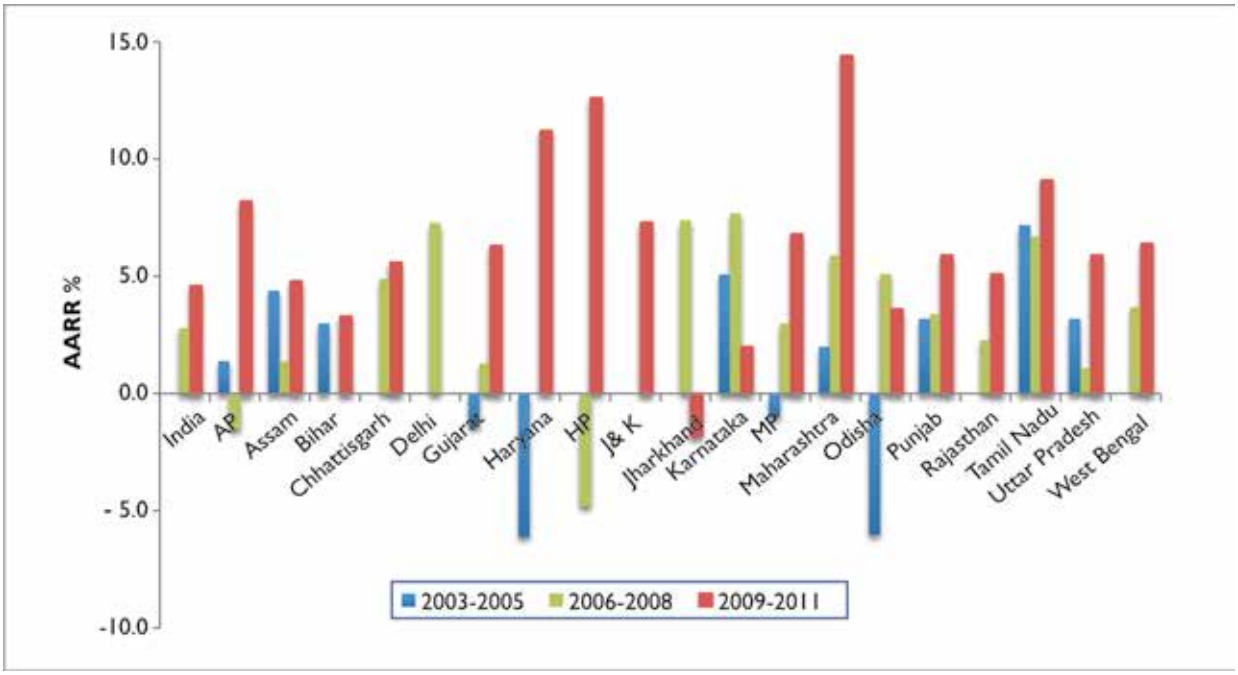
The projected rates for 2017 and 2020 are likely to be overestimates as the rate of decline in IMR and NMR has accelerated with the introduction of the National Rural Health Mission (NRHM) in mid-2005. For example, the AARR for NMR was 0 in the pre-NRHM period of 2003-2005, but had increased to 2.8 percent per year in the peri-NRHM period of 2006-2008, when the programme was being rolled-out in a phased manner, across the country. It further increased to 4.6 percent per year in the period between 2009 and 2011, when the programme had been fully implemented (Figure 1.6). Almost all states showed a similar trend in NMR reduction in the last few years. The NMRs in 2017 and 2020 are, therefore, likely to be lower than the projected rates.

Figure 1.5: Projected NMR, early- and late- NMR for years 2017 & 2020



Note: The projections are based on the AARR of NMR from 2000 to 2012; the intervals in X-axis are not uniform

Figure 1.6: AARR during in different periods (2003-2011) for selected states



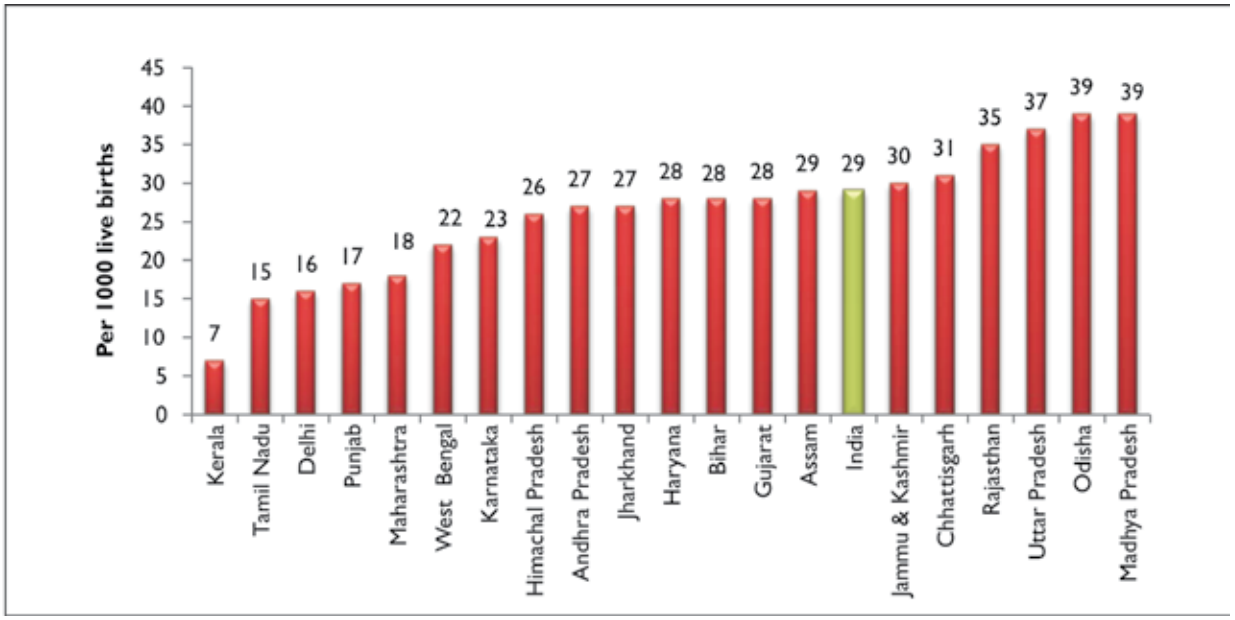
Note: AARR of Kerala has not been depicted because of very low baseline NMR; AARR for India was 0 during 2003-2005

1.3.3 Neonatal mortality in different states

The neonatal mortality rate is not uniform across the country. While Kerala and Tamil Nadu have low NMRs (less than 20 per 1,000 live births), Odisha, Madhya Pradesh, and Uttar Pradesh have very high NMRs (37 or more per 1,000 live births; Figure 1.7). [2]

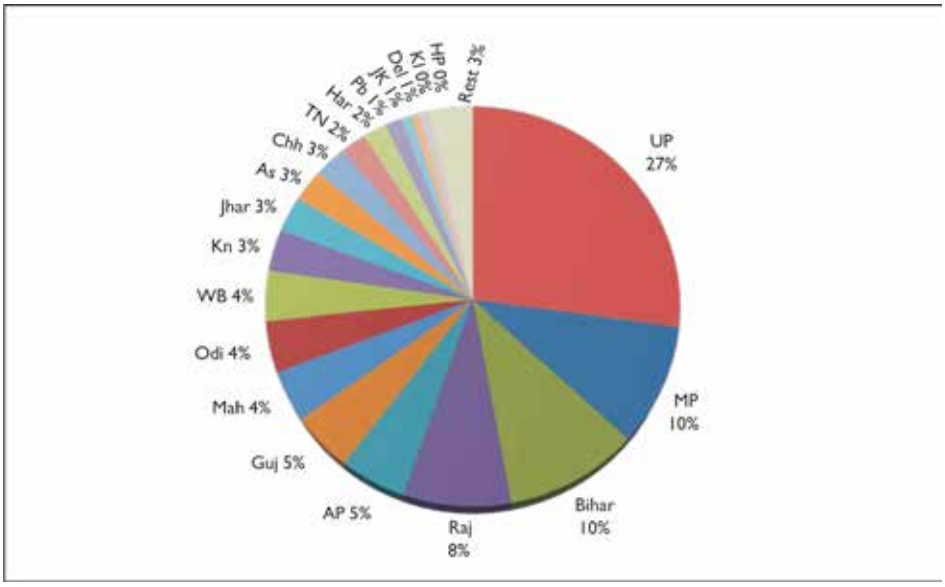
Four states – Uttar Pradesh, Madhya Pradesh, Bihar, and Rajasthan – alone contribute to about 55 percent of total neonatal deaths in India (Figure 1.8) [4,5] and to about 15 percent of global neonatal deaths that occur every year.

Figure 1.7: NMR in India and larger states



Source: SRS Statistical Report, 2012 [2]

Figure 1.8: Burden of neonatal deaths in Indian states



Note: 'Rest' includes smaller states like Uttarakhand, Goa, and all union territories; based on state population [4], crude birth rate & NMR [5] for year 2011

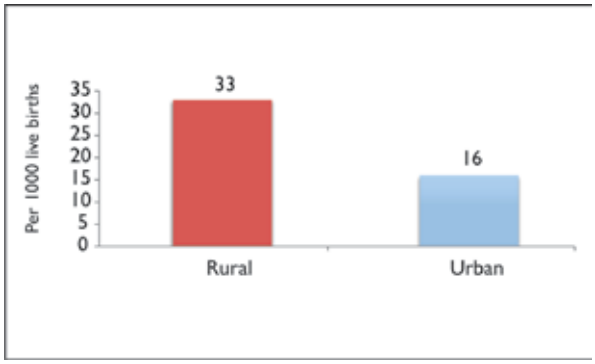
1.3.4 Neonatal mortality: differentials

Rural-urban, poor-rich differences

There are important rural-urban and socioeconomic differentials in the NMR. The NMR in rural areas is twice that in urban areas (33 vs. 16 per 1,000 live births, respectively). [2] The discrepancy is more marked - i.e., a difference of 60 percent or more - in Andhra Pradesh, Assam, Jharkhand and Kerala (Figure 1.9).

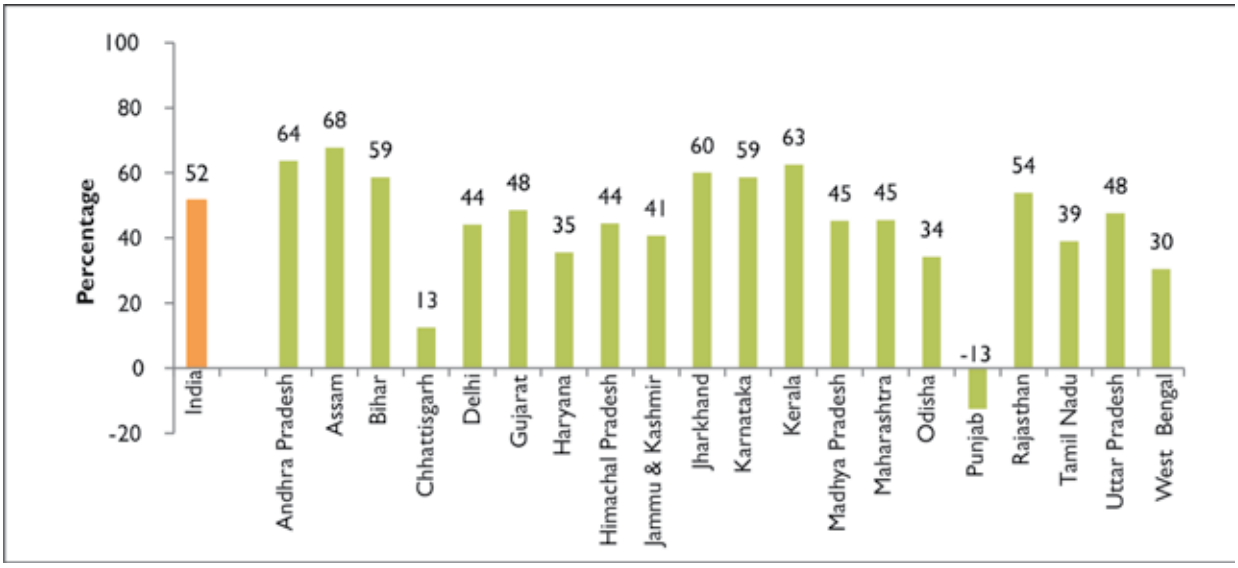
Similarly, an analysis of the NFHS-3 (2005-2006) data shows that the NMR among the poorest 20 percent of the population is more than double that of the NMR of the richest 20 percent. [6]

Figure 1.9A: Rural-urban NMR of India



Source: SRS Statistical Report, 2012 [2]

Figure 1.9B: Relative difference between rural and urban NMR of major states



Source: SRS Statistical Report, 2012 [2]

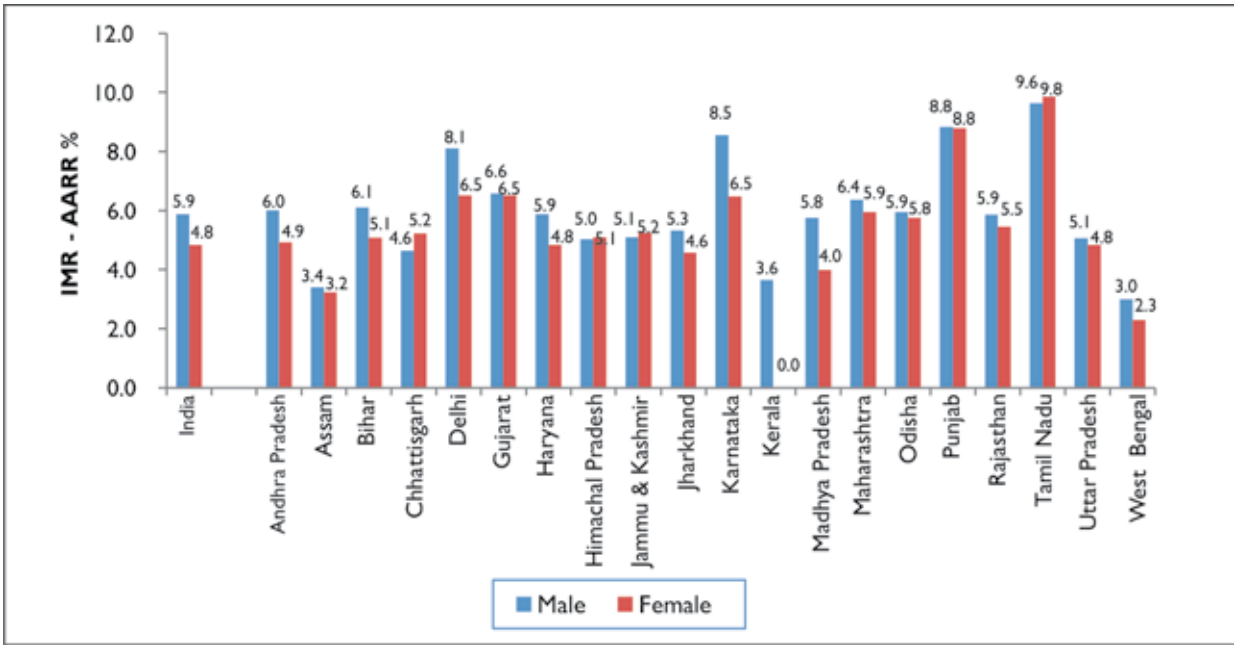
Gender differences

Although recent sex-differentiated NMR estimates are not available, given the gender-based differences in care seeking in India, the NMR estimates for females are likely to be higher than those for males. A close proxy of NMR, the IMR, confirms this – 41 for males and 44 for females (per 1,000 live births). [2] The annual rate of IMR decline from 2007 to 2012 is also higher for males – 5.9 percent, compared to 4.8 percent for females. The differential rate of decline is specially marked in some states – Andhra Pradesh, Delhi, Karnataka, Kerala, and Madhya Pradesh (Figure 1.10).

Per capita GDP and NMR

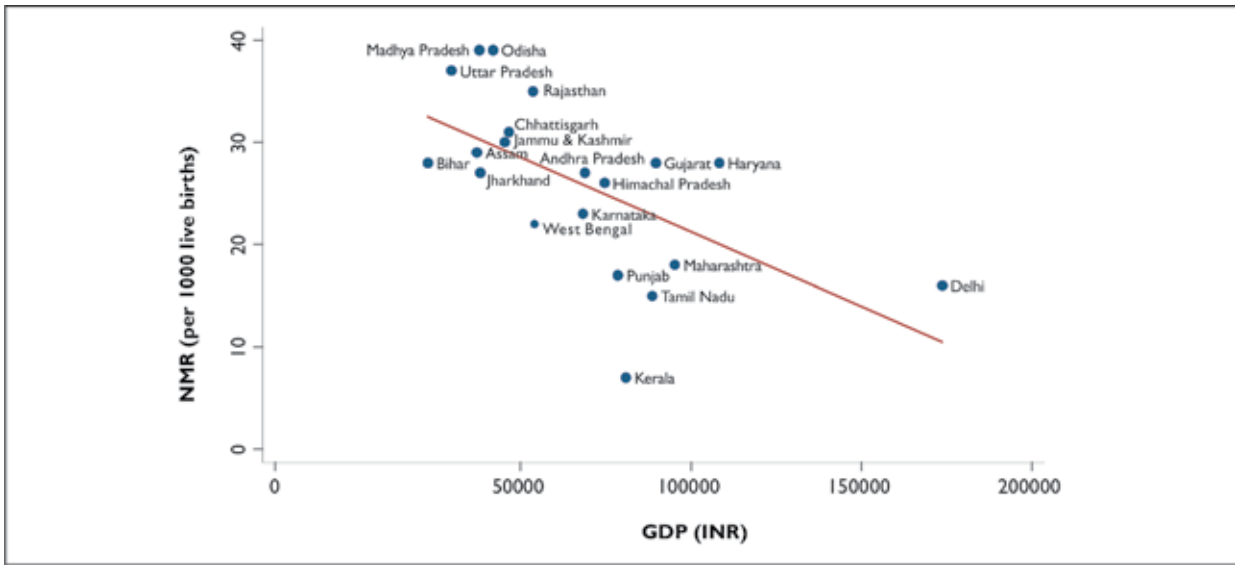
An inverse relationship exists between the per capita net state domestic product and NMR – states with a high NMR usually have a low per capita GDP. [7] However, there are a few exceptions – Haryana and Gujarat have a similar or higher per capita GDP than Tamil Nadu, but almost double the NMR (Figure 1.11).

Figure 1.10: AARR for infant mortality rate (IMR) of Males and Females



Source: SRS Statistical Reports, 2007-2012

Figure 1.11: Relationship between NMR and per capita net GDP of the large states

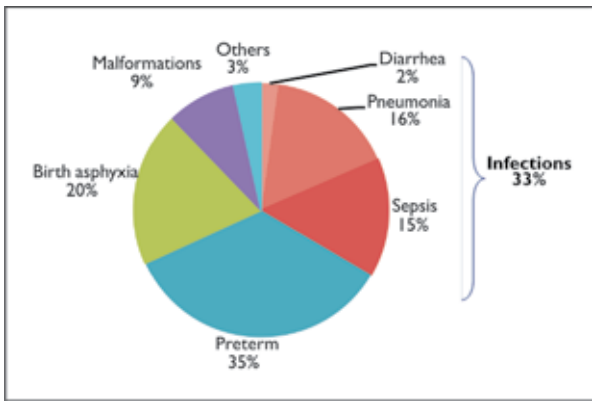


Source: SRS, 2012 and Planning Commission [2,7]

1.4 Causes of neonatal mortality

A systematic analysis of global, regional, and national causes of child mortality in 2012 identified prematurity and infections to be the major causes of neonatal deaths in India. [8] The review, which included data from the Million Death Study from India [9], found perinatal asphyxia and malformations to be the other two significant causes of neonatal mortality (Figure 1.12). These findings are similar to the overall global pattern. [8]

Figure 1.12: Causes of neonatal deaths



Source: Liu 2012 [8]

1.5 Timing of neonatal deaths

1.5.1 Timing of neonatal deaths due to all causes

A pooled analysis of the data from three studies on the timing of neonatal deaths indicates that about three-fourths of all neonatal deaths occur in the first week of life. The first 24 hours account for more than one-third (36.9 percent) of the deaths that occur in the entire neonatal period (Figure 1.13A and 1.13B).

Figure 1.13A: Distribution of deaths (week-wise)

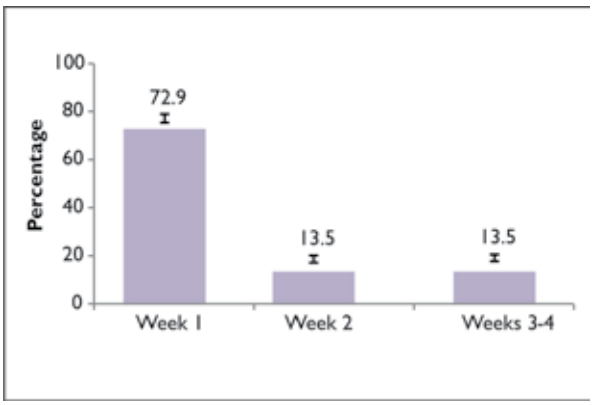
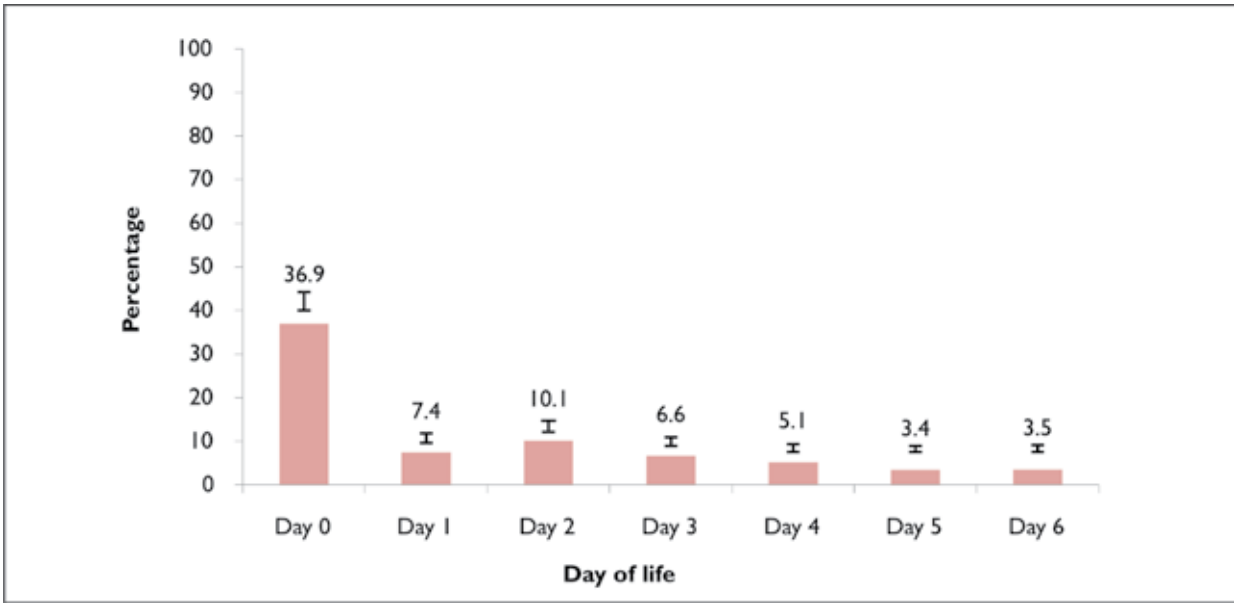


Figure 1.13B: Proportion of neonates dying in the first week of life



Source: Sankar MJ 2014 (Systematic review - under publication)

1.5.2 Timing of neonatal deaths from specific causes

A recent prospective study by Baqui et al provides data on the timing of cause-specific neonatal deaths: [10]

Asphyxia: Almost all deaths due to asphyxia (97.8 percent) occur in the first week of life (Figure 1.14A), with 70 percent of them occurring within the first 24 hours (day 0).

Preterm birth complications: About three-fourths of deaths due to prematurity (74.8 percent) occur in the first week of life, with 30 percent in the first 24 hours (day 0) (Figure 1.14B).

Sepsis: Less than 50 percent of neonatal deaths secondary to sepsis occur in the first week of life (Figure 1.14C). About 30 percent of sepsis-related deaths occur in the second week, while around one-fifth in weeks 3 to 4.

Malformations: Three-fourths of the deaths due to malformations occur in the first week of life, with day 0 alone contributing to nearly half of these deaths (Figure 1.14D).

Figure 1.14A: Distribution of deaths due to asphyxia

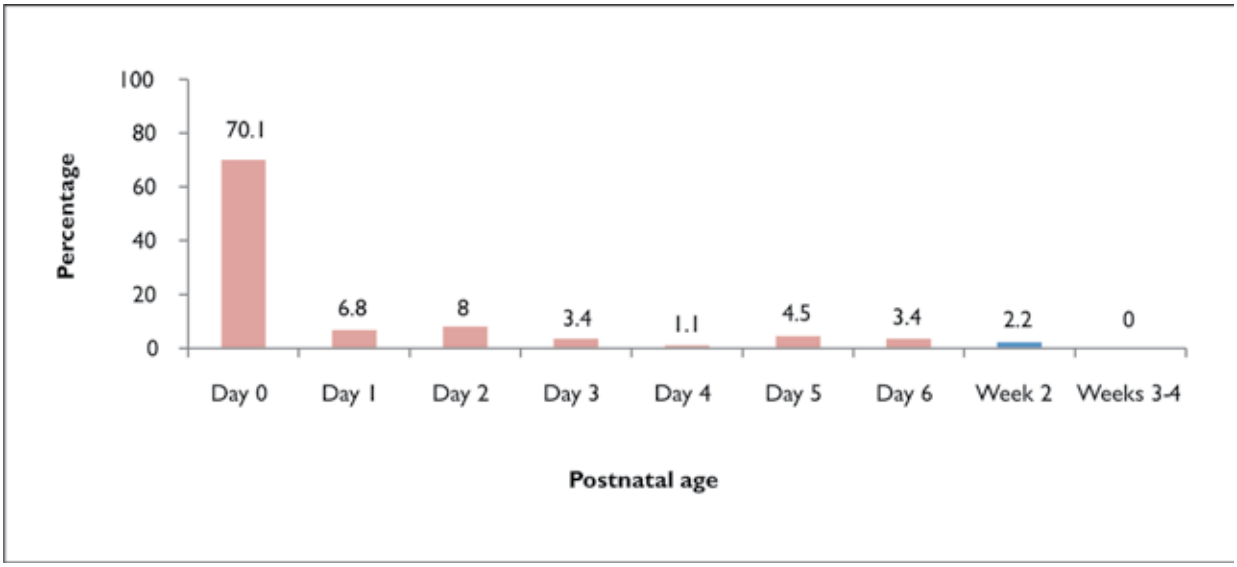


Figure 1.14B: Distribution of deaths due to prematurity

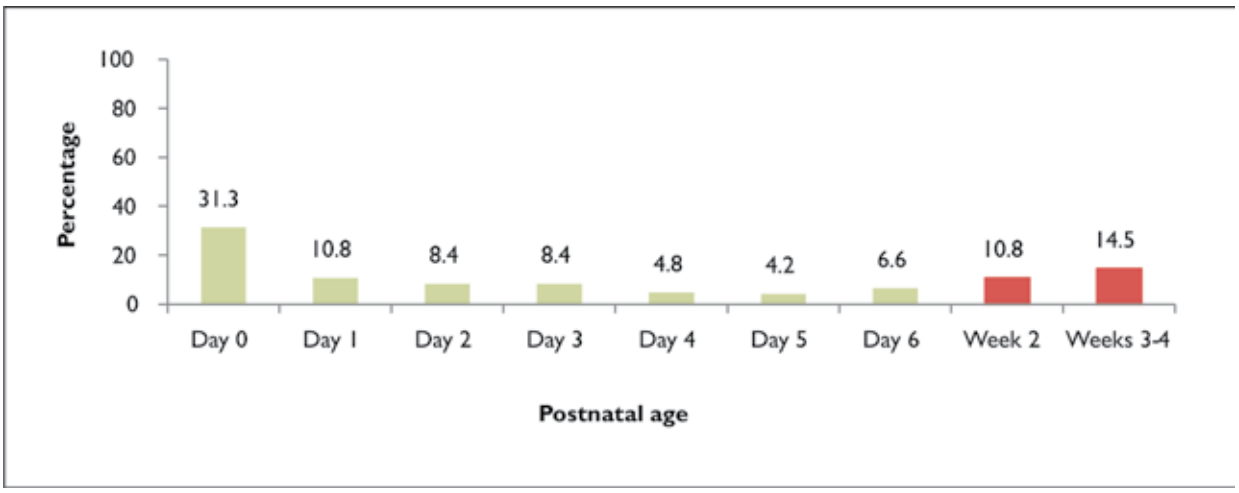


Figure 1.14C: Distribution of deaths due to sepsis

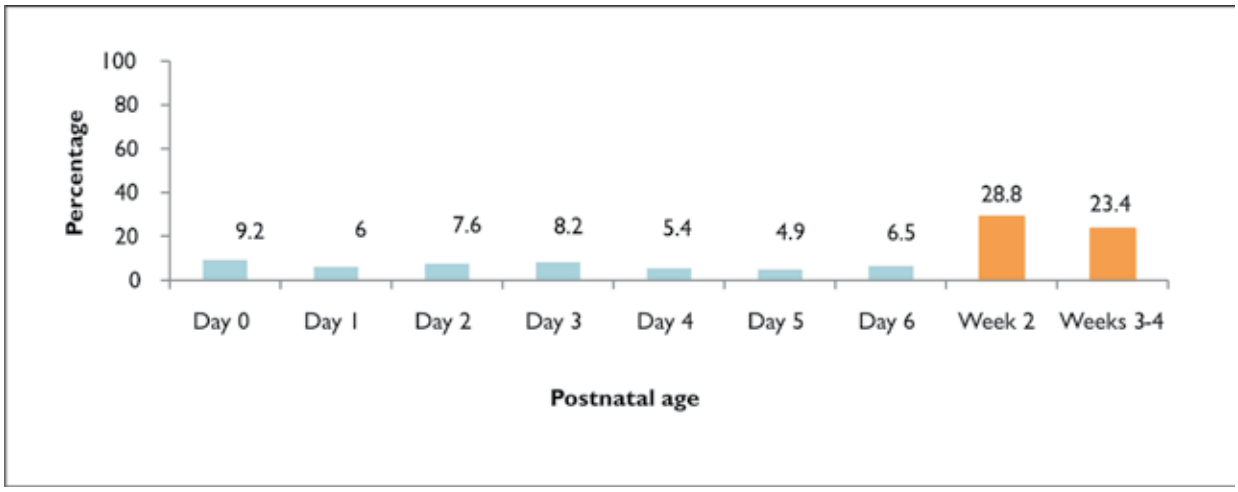
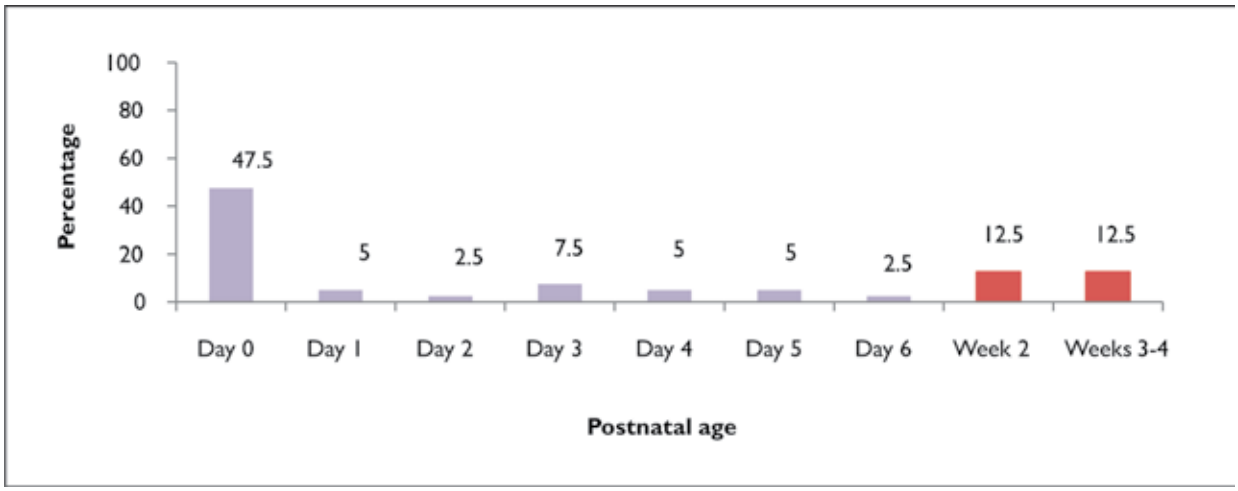


Figure 1.14D: Distribution of deaths due to malformations



Source: Baqui 2006 [10]

1.6 Neonatal morbidities

Neonatal morbidities constitute a huge burden to the health system and society in general. The SEARCH study by Bang et al. (1995-96) provided a detailed insight into the burden of common morbidities in rural community settings. [11] The most common morbidities identified in this study were breastfeeding problems (25.6 percent), umbilical sepsis (19.8 percent), neonatal sepsis/ pneumonia (18.0 percent), and hypothermia (17.0 percent).

A recent study conducted at an urban Reproductive and Child Health (RCH) center and a district hospital in Lucknow assessed the distribution of neonatal illnesses among the urban poor. [12] Parents of about 50 percent of the neonates who were followed up at six weeks reported at least one symptom of illness during the neonatal period. The most common morbidities reported were upper respiratory tract infection, diarrhea, septicaemia, and pneumonia (Table 1.2). The mean (SD) number of illnesses per neonate was 1.09 (0.28).

1.6.1 Morbidities: Low Birth Weight (LBW) / preterm birth

Nearly 30% of neonates in India - 7.5 million - are born with a low birth weight (<2500 g). [13] This accounts for 42% of the global burden, the largest for any country. About 60% of the LBW infants are born at term, but subjected to intrauterine growth restriction, while the remaining 40% are born preterm. [14] Each year, around 3.5 million preterm

Table 1.2: Common neonatal morbidities among urban poor in Lucknow

Morbidity	Point prevalence (N=481)
Upper respiratory infection	9.5%
Diarrhea	7.0%
Septicemia	6.2%
Pneumonia	5.2%
Physiological jaundice	3.3%
Fever	2.9%
More than 10 pustules	2.3%
Dermatitis	2.3%
Conjunctivitis	1.7%
Persistent diarrhea	1.4%
Umbilical sepsis	1.0%
Pathological jaundice	1.0%
Ear discharge	0.8%
Diarrhea with dehydration	0.8%
Meningitis	0.4%
Others	4.1%

Source: Srivastava 2009 [12]

(before 37 weeks of gestation) neonates are born in India. This constitutes a quarter of the global burden of preterm births. [13]

LBW/preterm infants are at higher risk of dying in the neonatal period and beyond, as compared to term normal birth weight (NBW) babies. Community based studies indicate that the LBW infants are 11 to 13 times more at risk of dying than NBW infants. [15] Indeed, more than 80% of all neonatal deaths occur among LBW/preterm neonates. These infants are also at a higher risk of asphyxia, sepsis, hypothermia, and feeding problems.

LBW increases the odds of underweight, stunting, and wasting in the first 5 years of life - 28% of underweight and stunting and 22% of wasting, at 6 months of age can be attributed to LBW. About 16-21% cases of wasting, 8-16% cases of stunting, and 16-19% cases of underweight between 1 year and 5 years of age are attributed to low birth weight. [16] Preterm/LBW infants are at a high risk of major neuro-developmental disabilities – around 10% of LBW infants have major developmental disabilities at 3 years of corrected age. The mean IQ of LBW infants at six years of age, though within normal limits, is significantly lower than that of NBW infants. [17] LBW infants are also predisposed to a variety of adult onset diseases in later life because of the anomalous programming of affected fetuses.

1.6.2 Morbidities: Neonatal sepsis

Burden of neonatal sepsis in India is enormous - hospital-based studies suggest an incidence of 30 per 1000 live births [14], while community-based studies indicate an incidence of 2.7% to 17% of all live births [15]. Sepsis is the most common morbidity in neonates referred to a hospital from home or another health facility – up to 40% of these neonates are labeled as having neonatal sepsis during their hospital stay. [14]

Sepsis is one of the commonest causes of neonatal mortality and of severe morbidity. Nearly one-fifth of neonates with sepsis die in the hospital; the figure rises to 50% for those with culture-proven sepsis (Delhi Sepsis Registry – under publication). They stay longer in the hospital, consume more resources, and are also at a high risk of major neuro-developmental disabilities at a later age.

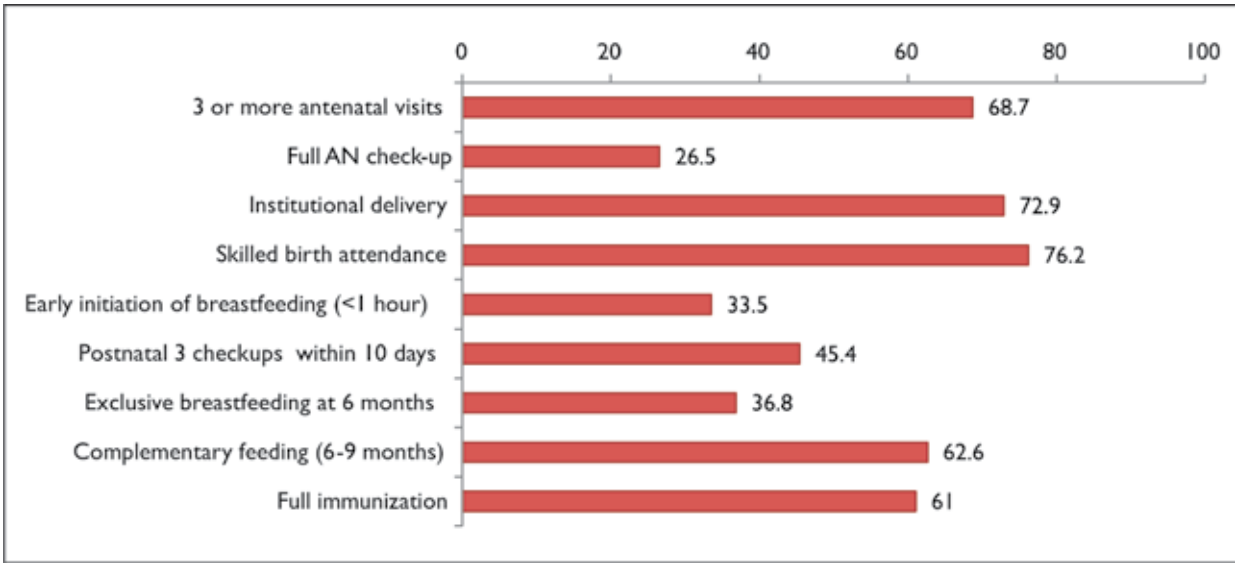
1.6.3 Morbidities: Perinatal asphyxia

Perinatal asphyxia not only leads to neonatal deaths but also accounts for a significant proportion of still-births. It is difficult to estimate the true burden of asphyxia because of the different definitions used in the studies undertaken on the subject. The reported incidence varies from 2% to 16.2% in community-based studies [18], with the case fatality rates ranging from 38.5% to 74%. About 2.8% and 5.6% of all live-births had moderate and severe asphyxia, respectively in a large hospital based study; the case fatality rate was relatively low, at about 8.7%. [14]

1.7 Coverage of key interventions during antenatal, natal and postneonatal periods

Figure 1.15 depicts the coverage of key interventions in antenatal, natal, and postnatal periods, and during infancy (Coverage Evaluation Survey, 2009). [19] Only a quarter of pregnant women have full antenatal check-up, i.e., 3 or more antenatal checkups, at least 1 tetanus toxoid injection and at least 100 (>/=100) iron and folic acid tablets. About 73% of women

Figure 1.15: Coverage of key interventions in antenatal, natal, and postneonatal periods



Source: Coverage Evaluation Survey 2009 [19]

have institutional deliveries, and more than three-fourths are attended by a skilled birth attendant during delivery.

Only one third of neonates are breastfed within one hour after of birth. [19] Less than half of the infants received experience 3 postnatal visits from health care providers in the first 10 days of life. Exclusive breastfeeding rate reduces to about one third by six months of age (Figure 1.15).

2. PERINATAL MORTALITY AND STILLBIRTH RATE

The perinatal mortality rate (PMR) is defined as the number of stillbirths and infant deaths of less than seven days per 1,000 total births (live births and stillbirths) during the year, while stillbirth rate (SBR) is defined as the number of stillbirths per 1,000 total births during the year.

The current PMR of India (2012) has been estimated to be 28 per 1,000 births. [2] It ranges from 17 per 1,000 births in urban areas to 31 per 1,000 births in rural areas. As with NMR, the PMR is not uniform across the country – the PMR of Kerala is only 10 per 1,000 births, whereas that of Odisha is 37 per 1,000 births. [2]

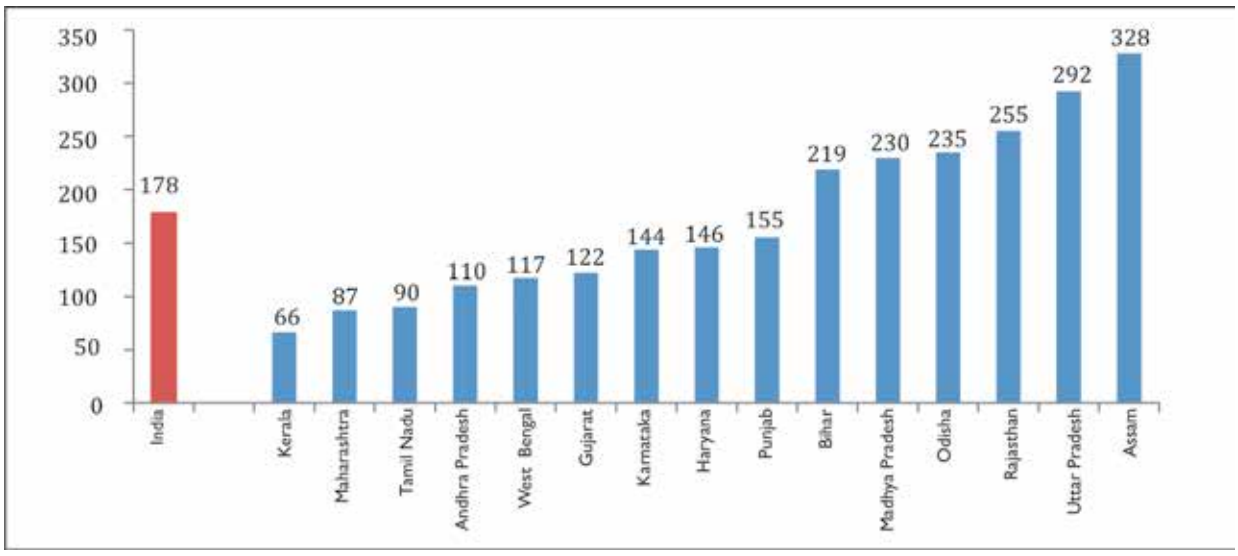
The SBR of India for 2012 is estimated at five per 1,000 births. [2] The estimated values of both SBR and PMR are likely to be underestimates, as data on stillbirths is difficult to capture. Interestingly, the estimated SBR of India for the year 2009 is 22.1 per 1000 births [20]; in contrast, the SBR as reported by SRS for year 2010 was only 7 per 1000 births.

3. MATERNAL MORTALITY: BURDEN AND TRENDS

Maternal death is defined as the death of women while pregnant or within 42 days of the termination of pregnancy from any cause related to or aggravated by pregnancy or its management. The maternal mortality ratio (MMR) is the number of maternal deaths per 100,000 live births.

MMR in India was very high in the year 1990 with 560 women dying during child birth per 100,000 live births, which meant approximately 150,000 women dying every year. [21] The latest available estimate of MMR for the year 2010-2012 is 178 per 100, 000 live births. [22] This translates into 47,000 maternal deaths in India each year. The states of Kerala, Maharashtra, and Tamil Nadu have achieved the MMR level of below 100 (Figure 1.16). Assam continues to be the state with the highest MMR (328), followed by Uttar Pradesh/Uttarakhand (292) and Rajasthan (255).

Figure 1.16: Current MMR (2010-12) of larger states



Source: SRS special bulletin on MMR [22]

For MDG 5, India needs to reduce its MMR by three-fourths from its level in 1990 to 141 per 100,000 live births by the year 2015. As per the estimates, the current compound annual rate of decline of MMR from 2007-09 to 2010-12 is 5.7%. At this rate of decline, India is well on track to attain its MDG 5.

4. WAY FORWARD

Evidence

- Of every four newborn babies who die in the world, one dies in India. The annual burden of 0.76 million neonatal deaths in India is the highest for any country.
- The slower decline of NMR has led to increasing contribution of neonatal mortality to infant and under-five mortality – 70% of infant deaths and 56% of under-five child deaths occur in the neonatal period.
- The NMR is not uniform across the country; also, there are important rural-urban, poor-rich, gender, and socioeconomic differences in NMR. Equity is one of the cross cutting issues that requires immediate attention.
- About three-fourths of all neonatal deaths occur during in the first week of life. Indeed, the first week alone accounts for about 45% of all under-five child deaths. The high level and slow decline of ENMR is also reflected in the stagnant perinatal mortality rate (PMR).
- The country has witnessed a significant improvement in neonatal health after the introduction of the National Rural Health Mission (NRHM) in mid-2005. But the rate of reduction of NMR and ENMR is still less than that of IMR and U5MR. The country is likely to miss the MDG-4 if effective interventions known to reduce NMR and ENMR are not implemented and/or scaled up in the next 2-3 years.
- The three major causes of neonatal deaths are complications from preterm birth (35%), infections (33%), and intra-partum related conditions or birth asphyxia (20%). Almost all asphyxia related deaths and majority of prematurity related deaths happen within the first week of life, while more than half of infection related deaths occur after the first week.

Recommendations

- Implement and/or scale-up appropriate strategies to accelerate the decline in neonatal and early neonatal mortality rates:
  - Improve the quality of care in health facilities during birth and in the immediate postnatal period
  - Facilitate postnatal home visits/contacts with the mother-infant dyads in the second/ third week of life in settings with high infection related deaths
- Eliminate inequities in NMR between and within states by decentralized district level planning
- Address socioeconomic, gender, and rural-urban and other demographic differentials in NMR
- Strengthen vital registration systems across the country to facilitate accurate estimation of the burden of neonatal mortality and morbidities; ensure accurate monitoring of stillbirths
- Identify causes of stillbirths; implement optimal strategies to reduce stillbirth and perinatal mortality rates

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Chapter 2

DETERMINANTS OF NEWBORN HEALTH IN INDIA

OVERVIEW

The health outcomes of newborns are shaped not just by biological factors but also by the social, economic, and cultural environment. Evidence suggests that wealth, gender, and maternal education are significant determinants of newborn health, with their impact stretching to the coverage of maternal and newborn healthcare services. Understanding these determinants is a pre-requisite for informed policy and programmatic approaches to reach the underserved. Sustainable gains in maternal-neonatal health cannot be achieved without addressing these equity issues. There is need for concerted efforts to focus on the delivery of interventions to the most vulnerable populations and to prioritize cross-sectional actions.

1. BACKGROUND

Health outcomes are shaped not just by biological factors but also by the social, economic, and cultural environment. Social hierarchies, living conditions, and inequitable distribution of power, money, and resources produce significant inequalities in the health and well-being of people. The resulting inequitable health outcomes are reflected at local, national, regional, and global levels.[1, 2] Children, particularly newborns, being dependent on others for care, are perhaps the cohort most susceptible to socioeconomic inequities.

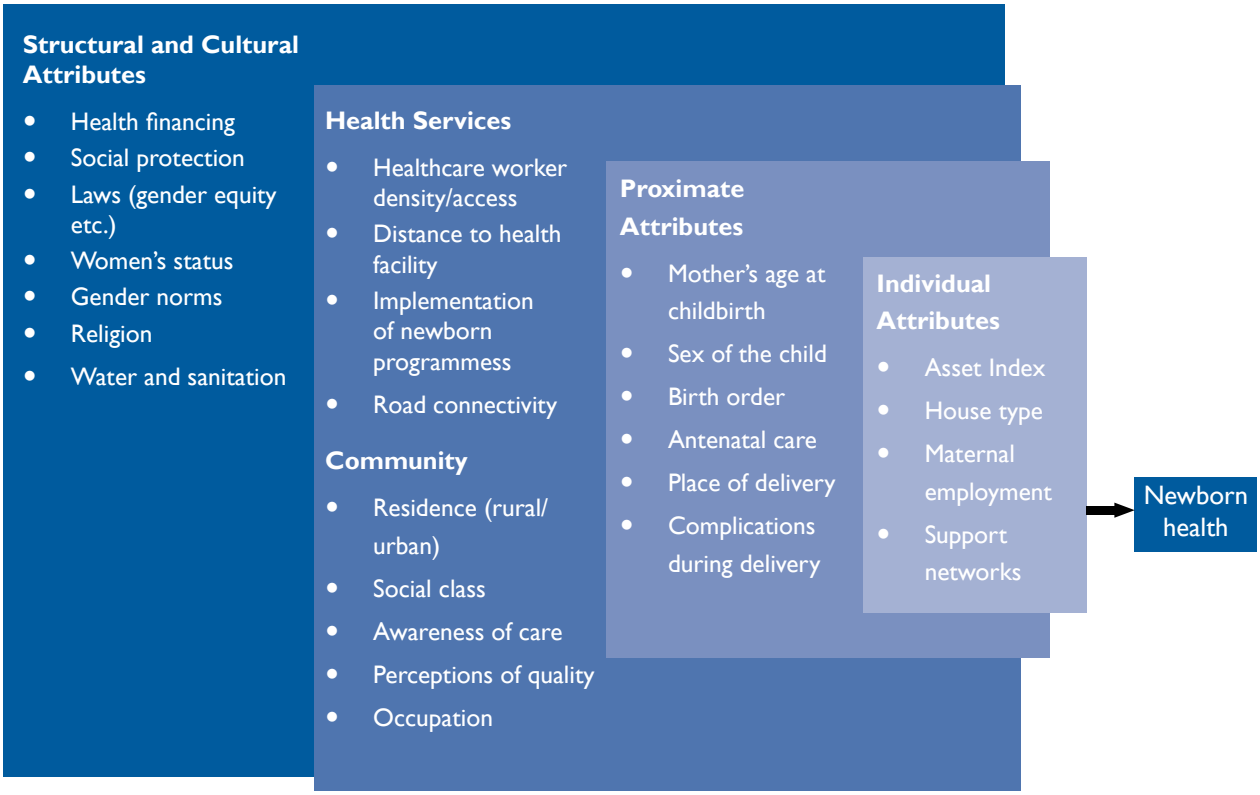
1.1 Conceptual framework for inequalities of neonatal health india

Child and maternal health outcomes differ widely among different population subgroups, ethnicity, and geographical location, with the poorest likely to be the most disadvantaged. An improved mortality rate in a particular subgroup often hides relentless inequalities within that segment of population: the mortality among some sections may remain unchanged or even increase despite an aggregate improvement.[3-6]

Understanding the determinants of inequity in health is the first step in removing these inequities by helping to identify entry points for action and setting priorities for long-term improvement in neonatal survival.

In the early 1980s, Mosley and Chen [7] suggested a framework of determinants for identifying proximate factors that affect child survival directly and underlying factors that are related to child mortality indirectly. WHO's conceptual model that was developed recently (2008) for social determinants illustrates that structural factors lead to stratification in society by distribution of power, wealth, and position, which are the root causes of inequities in health. Access to health and preventive services is influenced by structural factors through their impact on intermediary and proximate determinants, including living conditions, healthcare systems, and behavioral factors that shape health outcomes.[7, 8]

Figure 2.1: Framework of determinants of neonatal health



Adapted from WHO [9] UNDP (2011)[10] and Singh et al. (2013) [11]

2. EXPLORING DETERMINANTS OF NEONATAL HEALTH IN INDIA

In India, inequities with corresponding underlying axes of caste, class, gender, and geographical differences, define a very large segment of the population. A High Level Expert Group (HLEG) appointed by the Planning Commission of India observed that considering the health inequality and social inequality interface, the poorest and most disadvantaged have a higher risk for diseases. This includes the urban and rural poor, women and children, specially-abled persons, and traditionally marginalized and excluded communities like adivasis, or scheduled tribes (ST), dalits, or scheduled castes (SC), and ethnic and religious minorities. They also have a higher probability of being excluded from the health services. [12] The neonates born in these populations are expected to be the most vulnerable to morbidity and mortality. [13]

2.1 Determinants of newborn health

The inequities in newborn health outcomes were analyzed based on "priority public health conditions analytical framework" [14] with links to potential structural interventions, entry points, and barriers for child health (Table 2.1).

Table 2.1: Framework for analysis of inequities in child health

Category	Relevant factors for child health and nutrition	Indicators
Socio-economic context and position	Family income, assets	Asset index
	Parental education	Education among women Education among men
Differential exposure	Water, sanitation, hand washing	Water supply Sanitation Hand washing Sanitary disposal of child's stool
	Crowding, housing, air pollution	Solid fuel for cooking
Differential vulnerability	Factors affecting incidence Infant and young child feeding practices	Timely initiation of breast feeding
	Antenatal and delivery care	Antenatal care Skilled delivery care Postnatal visit
	Under nutrition, stunting, wasting, underweight	Anemia Low birth weight Stunting Underweight Wasting
Differential consequences	Mortality	Neonatal mortality Infant mortality Under-5 mortality Cause specific mortality

Source: Barros et al. (2010) [14]

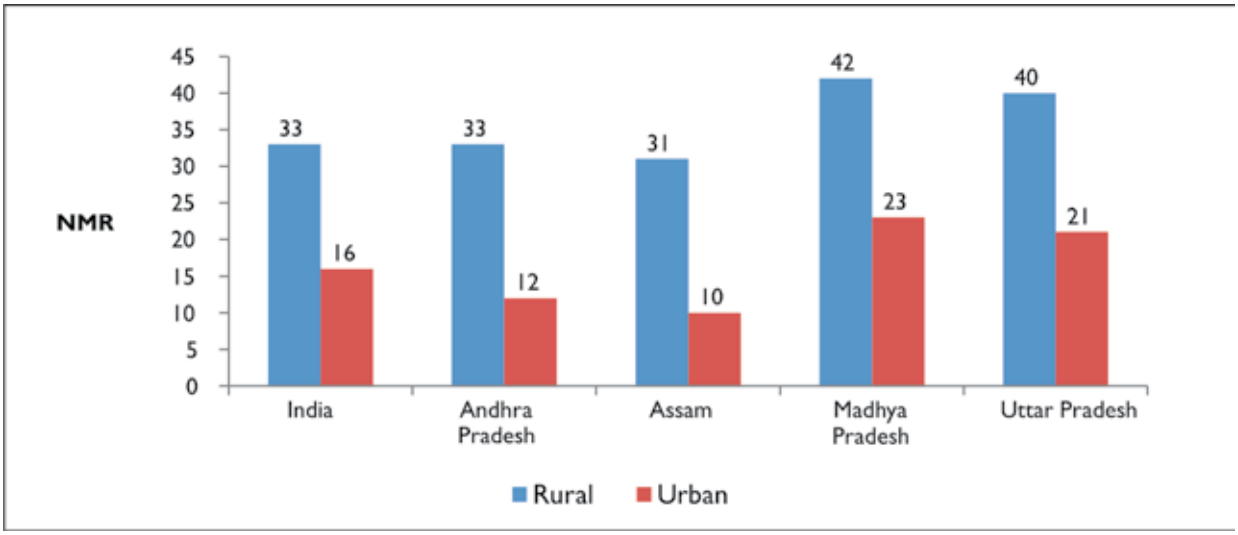
2.2 Structural factors and neonatal mortality

2.2.1 Geographical Location

Urban/ rural disparities impact newborn health and neonatal mortality since the availability of healthcare and magnitude of inequality differs in urban and rural areas.[14] Recent Sample Registration System (SRS) data reflects that in rural areas neonates are at two times more risk of dying, as compared to their urban counterparts. (Figure 2.2) There are wide disparities in neonatal survival in different states of India. (SRS 2012) While progressive states (for example, Kerala) have an NMR close to developed countries, many other states are still struggling to reach the MDGs.

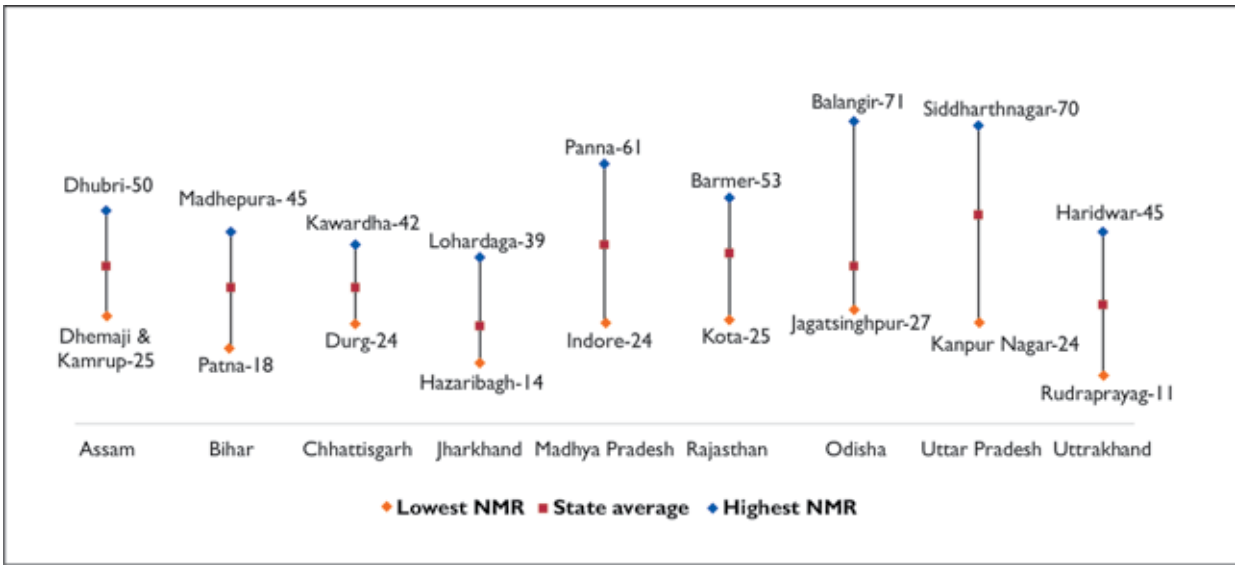
Wide disparities are also observed in survival rates across districts within states (Figure 2.3). It is evident that within a given state, NMR may be more than twice as high in the 'worst' districts as in the 'best' one. [15, 16]

Figure 2.2: Rural/urban difference in NMR



Source: SRS, 2012 [17]

Figure 2.3: Inter-state variation in NMR



Source: AHS, 2012-13 [13]

2.2.2 Income and poverty

Poverty is perhaps the most important determinant of mortality. Relative to children from the lowest wealth quintile, children from the highest three wealth quintiles have a significantly lower probability of dying in the neonatal period.[18]

2.2.3 Social status

In India's caste-based social hierarchy, the scheduled castes (SC), dalits, and scheduled tribes (ST), adivasis are the most backward and disadvantaged. [19] NFHS-3 data highlights significant disparities in neonatal mortality rate among different social groups. (Table 2.2) [20] The SC and ST population is the most disadvantaged group socially and contributes a higher burden of neonatal mortality.

A recent study has documented a higher vulnerability of SC children as compared to ST children: the odds of neonatal mortality among STs are lower by 28 percent as compared to SC communities in rural areas. [11]

Family characteristics contribute significantly in determining the status of newborn health. Upadhyay et al found that low educational status of parents [OR 2.1, 95 percent CI; 1.4, 3.3]; father's occupation [OR 1.8, 95 percent CI; 1.0, 3.0]; and caste [OR 2.0, 95 percent CI; 1.2, 3.4] appears to explain a major fraction (45.7 percent) of neonatal deaths in Haryana.[21]

2.2.4 Gender differentials

Gender disparities, reflected in preference for sons and the higher status of sons in the family, play a vital role in child survival and child health in India. Gender discrimination at each stage of the female life cycle contributes to gender-based health disparities including sex selective abortions, neglect in care of the girl child, and poor access to healthcare for girls. [22]

It is well documented that the girl child often faces discrimination in healthcare. Girls are brought to the facility in more advanced stages of illness; are taken to less qualified doctors; and less money is spent on their treatment, as compared to boys in the same family. [23] Studies have also documented that in India, a girl is 30 to 50 percent more likely to die between her first and fifth birthdays than is a boy.[23-25]

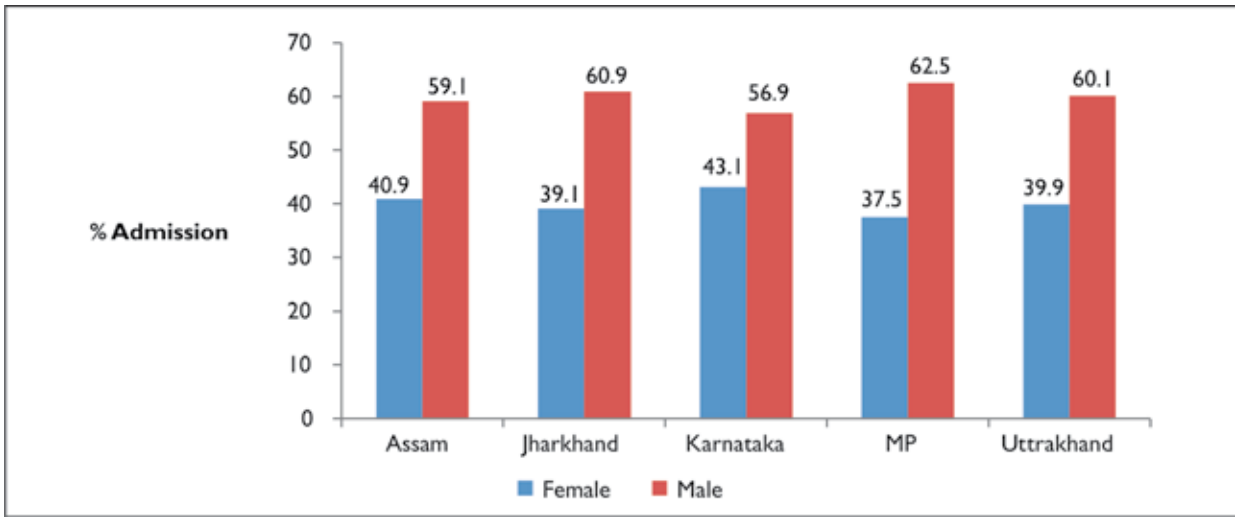
A study conducted in UP demonstrates that while the overall use of healthcare providers is similar across gender, the average expenditure for healthcare during the neonatal period is nearly four-fold higher in households with male newborns (Rs 243.3±537.2) compared to those with female newborns (Rs 65.7±100.7) (p=0.07). Households with female newborns use cheaper public care providers whereas those with males prefer to use private providers who are perceived to deliver more satisfactory care.[26]

Table 2.2: Social determinants of neonatal mortality based on secondary analyses of NFHS-3 sample

Socioeconomic parameter		NMR (2,164 neonatal deaths)	
		Odds ratio (95% CI)	Population attributable risk
Maternal age at child birth	20 years or more	1.00	9.4%
	Less than 20 years	1.48 (1.28-171)	
Maternal literacy	Literate	1.00	13.0%
	Illiterate	1.30 (1.12-1.49)	
Residence	Urban	1.00	15.2%
	Rural	1.24 (1.05-1.45)	
Wealth index	Middle rich & very rich	1.00	9.5%
	Poor and very poor	1.22 (1.05-1.42)	

Source: Paul VK et al. 2011 [20]

Figure 2.4: Profile of admissions to the SNCUs in five states by gender



Source: MOHFW Report, 2013 [27]

Recent data for admissions in special newborn care units (SNCUs) has also demonstrated differential care-seeking for males and females (Figure 2.4). At the district level, newborn care units typically admit about 30 percent less females than male neonates.

2.2.5 Women's education

Enhancing female education is crucial to reducing the high burden of neonatal mortality. A woman's education not only influences her status and decision-making power within the household,but also leads to improved health status of her children. Education implies better knowledge about health systems, the ability and power to negotiate with healthcare providers,understanding the need and urgency of timely use of healthcare services, and responsiveness to new ideas.[29-31] Evidence from India and other low- and middle-income countries demonstrates that maternal education is the most effective and proven strategy to improve neonatal survival as it maximizes the utilization of maternal and neonatal healthcare services. Kerala's achievement of stabilizing population growth and low levels of infant and neonatal mortality is partly attributed to its high female education levels.[32]

2.2.6 Age at child birth

NFHS -3 data shows that almost half (44.5 percent) of the women in the 20 to 24 age group in India are married before the age of 18. [33] Early marriage leads to a high likelihood of early motherhood, which is associated with increased risk of neonatal death and stillbirth, low birth weight infants, and child and infant morbidity and mortality.[34] These disproportionate risks may be related to social and health-related vulnerabilities among adolescents, including increased rates of poverty, malnutrition, and lack of access to healthcare.[35-37]

The median maternal age at first child birth in India is 19.9 years; about 30 percent of girls give birth before the age of 20 and account for 21 percent of all deliveries. [32] It is estimated that the risks of neonatal mortality and low birth weight are increased by almost 50 percent if maternal age at childbirth is less than 20 years. It is also estimated that shifting age at childbirth to above 20 years would reduce overall NMR by 9.4 percent. [20]

2.2.7 Environment conditions

In contrast to children born in better-off families, poorer children are more at risk for diseases due to inadequate water and sanitation, indoor air pollution, crowding, and poor housing conditions. [38] Access to clean water supply and sanitation and good hygienic practices, especially at delivery points, are crucial for a safe delivery and prevention of maternal and newborn mortality.

An improved household environment has a positive bearing on neonatal mortality because the availability of clean toilet facilities and electricity reduces the risk of neonatal death significantly.[11, 39, 40] By creating conditions for better hygiene and reduced exposure to contamination, it makes children less susceptible to diseases and infections that may eventually lead to death.

2.3 Proximate factors: utilization of health services

A recently published systematic review on inequity in maternal health in India highlighted the fact that women of some population groups remained systematically and consistently disadvantaged in terms of access to and use of maternal and reproductive health services, including safe delivery and antenatal care (ANC) services.[41] Programme initiatives based on average performance achievements of states rather than on deprived groups increases disadvantages for vulnerable populations within high achieving states.[42, 43]

Contextual factors such as economic status, social position (registered caste or tribe), education, age, and gender norms influence the utilization of antenatal and delivery care services (ANC check-up, institutional delivery, and postnatal newborn care [PNC]).[41, 44]

In addition, inadequate funding, poor infrastructure and insufficient manpower at health facilities, and bad governance pose major challenges to equitable access to free or affordable health services, often forcing poor households to making high out-of-pocket expenditures on healthcare.

Although several initiatives, such as Janani Suraksha Yojana (JSY) and Janani Shishu Suraksha Karyakram (JSSK), have attempted to address these issues, their impact remains limited due to poor governance, shortage of health workers in primary healthcare facilities, and lack of preparedness of health facilities. [45]

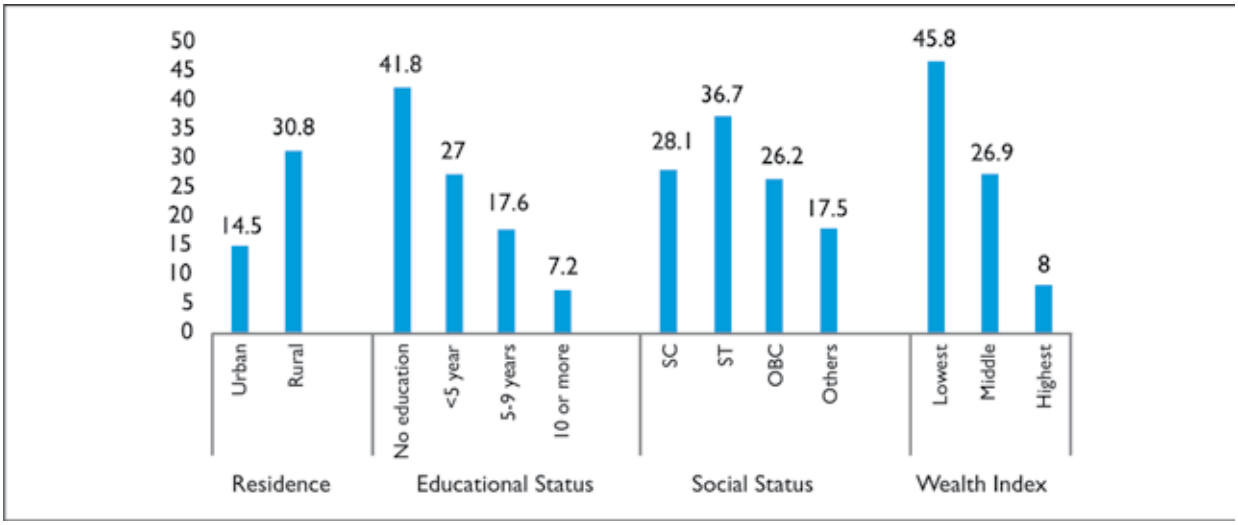
2.3.1 Access and utilization of antenatal care services

The likelihood of not receiving ANC is highest among women who a) live in rural areas, b) are SC or ST, c) have had no education, and d) belong to the lowest wealth quintiles. Adolescents have poorer access to services than other age groups (Figure 2.5). An analysis of NFHS-3 data on utilization of maternity care services among married adolescents (15–19 years) in rural India reveals that only 14 percent had full coverage of ANC (three ANC visits, Iron Folic Acid [IFA] and Tetanus Toxoid [TT]2/ booster), 46 percent had attendants at birth, and 35 percent received PNC.[46]

2.3.2 Institutional deliveries

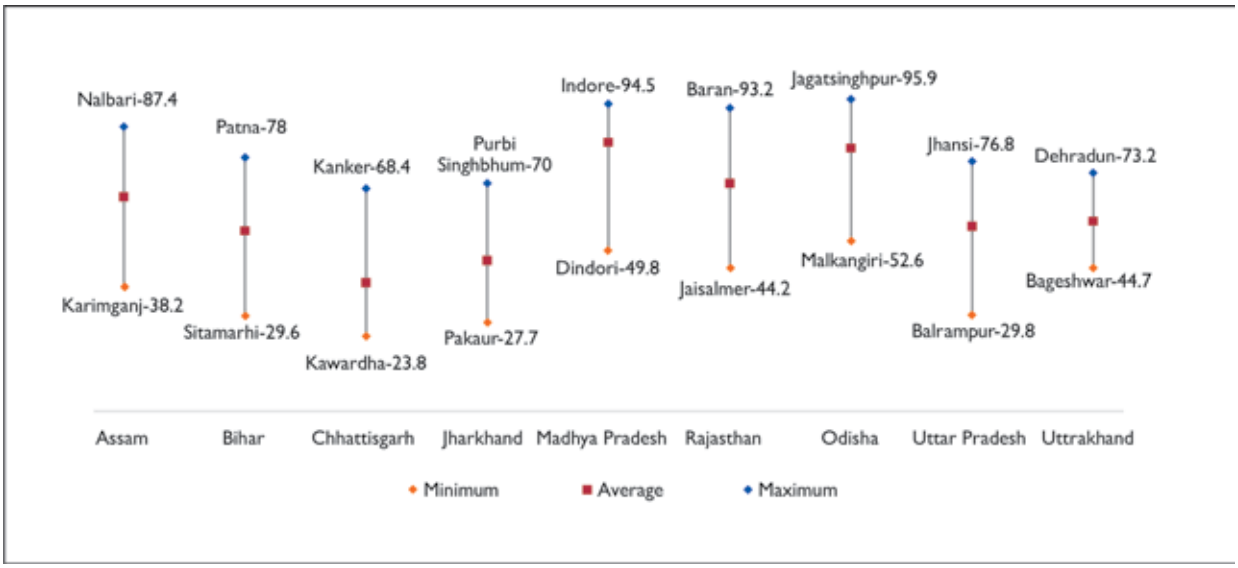
It is documented that states with higher institutional births (e.g., Kerala) have lower neonatal mortality than those with lower institutional births. (e.g. Uttar Pradesh).[18, 48]The introduction of JSY has greatly helped in increasing the rate of institutional births across the country.[49] AHS data demonstrates that there has been wide variation in the proportion of institutional deliveries between and within states, with the rate varying two to four times across different districts in the same state (Figure 2.6).

Figure 2.5: Proportion of mothers who had no ANC visits



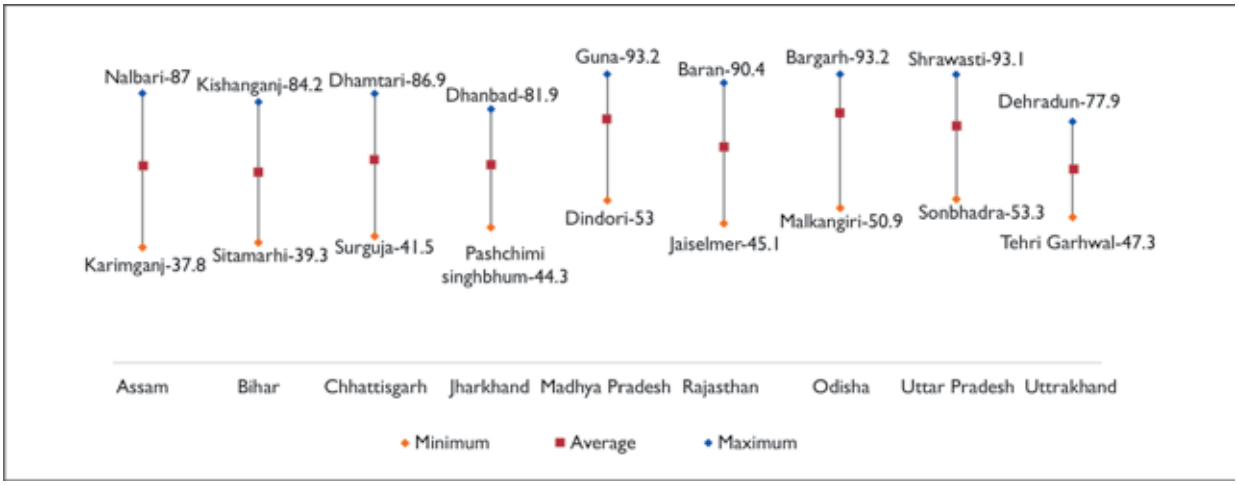
Source: DLHS 3, 2007-08 [47]

Figure 2.6: Proportion of institutional deliveries: variation across districts within states



Source: AHS, 2012-13 [13]

Figure 2.7: Proportion of newborns checked within 24 hours of birth: variation across districts within states



Source: AHS, 2012-13 [13]

2.3.3 Postnatal maternal and newborn care

The time the child is born and the immediate postpartum period are most critical for both mother and baby.[50] Care following birth is critical for survival and for the well-being of the mother and the newborn. Evidence from developing countries proves that postnatal home visits within the first two days of life by trained community health workers can significantly reduce neonatal mortality.[51]

Although PNC has been an integral component of government strategy for reducing neonatal mortality, it has received little focus in implementation. The coverage of postnatal services remains stratified in population subgroups. AHS data highlights disparities within states in the proportion of newborns checked within 24 hours (Figure 2.7).

2.3.4 Initiation of breastfeeding within one hour

Several studies have reported a low rate of initiation of breastfeeding within an hour after birth in India. [52, 53] According to NFHS-3, it is 23.5 percent. [32] Breastfeeding practices are determined by sociocultural factors, [52] as is evident from the marked differences in the rate of initiation of breastfeeding within one hour depending on the

region, place of residence, caste, and the education status of the mother. (DLHS-3) An analysis of NHFS -3 data also shows that ANC visits by the mother and delivery in a health centre are associated with higher rates of timely initiation of breastfeeding.[54] Late initiation of breastfeeding is associated with higher newborn mortality.[55]

2.3.5 Birth order and birth spacing

Researchers have reported that high parity births have a higher risk of child mortality than lower parity births. Rehman et al observed that neonatal mortality increases 1.8 times for the first birth order compared to birth orders two and three.[56]

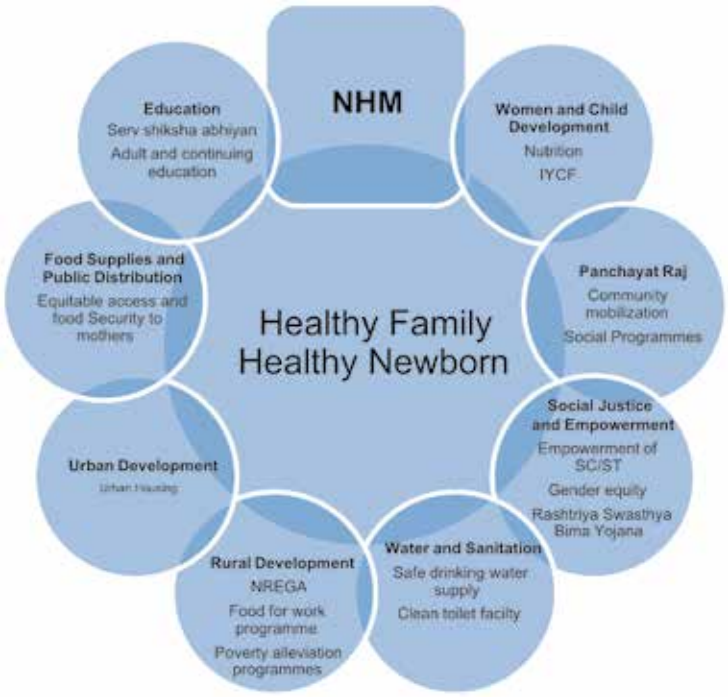
Kozuki et al analyzed demographic and health survey data (DHS) of 47 low- and middle-income countries to study the causal links between high parity and mortality. They concluded that the short birth interval children of higher birth order born to women who have high fertility had a high risk of death.[57] In the NFHS-3 sample, there was a 76-percent excess risk of mortality among neonates born with birth interval of under 24 months compared to those with longer intervals.[20] As much as 17.4 percent of neonatal mortality was attributed to short (<24 months) birth interval among second or higher order births.

2.4 Inter-sectoral convergence to address social determinants

The heterogeneity in health service coverage plays a significant role in producing inequitable health outcomes. The substantial challenges related to the community and health systems need contextually relevant solutions.

Ensuring equitable access to health services requires a clear understanding of the multiple levels of inequity across many sectors. Many ministries and departments have a direct and/or indirect role in addressing the determinants of health (Figure 2.8). It is important that all public policies have synergy with health policies and programmes. International organizations, national and state governments, civil society, and research and academic institutions have a major role to play in ensuring equitable service delivery and improved health governance. The inter-sectoral approaches need to be promoted within and between departments. Improving access to safe water and sanitation, providing adequate food security, and poverty alleviation measures complemented by an equitable health system can ensure better health outcomes for every neonate in India.[58]

Figure 2.8: Convergence of newborn health services across ministries



3. WAY FORWARD

Evidence

- Social and economic factors can negatively affect neonatal health through proximate determinants, particularly poverty, rural location, social groups, and gender inequity.
- There is a significant variation in neonatal mortality among states and across different districts within states.
- Coverage of maternal and newborn services varies considerably within states and across districts; marginalized communities and families belonging to scheduled castes and tribes have lower access to services.
- Women's education plays an important role in improving neonatal health outcomes.
- Childbirth before the maternal age of 20 years is associated with a high newborn mortality.
- A birth interval of less than 24 months increases the risk of neonatal mortality substantially; thus, family planning has huge neonatal survival benefits.
- Care seeking for female newborns is often compromised as compared to that for males.

Recommendations

- Launch a nationwide socio-political movement to delay the age at marriage and ensure childbirth after 20 years of maternal age; promote birth spacing more widely.
- Drive and monitor maternal and newborn health programmes by data disaggregated by equity indicators including gender differentials.
- Make special efforts (including awareness generation, social mobilization, promotion of JSSK, and special incentives) to improve care seeking for girl neonates.
- Ensure inter-sectoral convergence among health, nutrition, education, women's empowerment, water and sanitation, and rural development departments; monitor their synergy at the highest level of government.

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Chapter 3

COMMUNITY AND HOME-BASED NEWBORN CARE

OVERVIEW

India has contributed immensely towards generating evidence on two key domains of newborn care: home-based newborn care (HBNC) and community mobilization. In a model developed in Gadchiroli (Maharashtra) in the 1990s, a package of Interventions delivered by community health workers during home visits led to a dramatic decline in neonatal deaths. Based on this experience, the HBNC programme centered around ASHAs was introduced in 2011, and is now the main community-level programme on newborn health. In 2004, the IMNCI programme was rolled out with inclusion of home visits by AWW as an integral component.

This chapter focuses on the evidence generated on community and home-based interventions related to newborn health, the implementation status of various programmes, the key findings of assessments undertaken to understand the implementation challenges in scaling up these initiatives; and possible solutions.

1. BACKGROUND

Community-based interventions are those interventions that can be delivered by a community health worker in close proximity to the beneficiary's home, including services delivered at home or to the family and through outreach sessions. [1]

There are more than 40 documented interventions to reduce mortality caused by sepsis, asphyxia, and preterm birth complications. [2] Packaging of interventions is a cost-effective and practical way of delivering them on scale. The delivery platform could be the community and/or the facility.

The various approaches to deliver intervention packages at the level of the community are:

- Home visits by ASHAs/Anganwadi workers (AWWs)/ANMs
- Community mobilization, using women's organizations or support groups
- Training of Traditional Birth Attendants (TBAs) to deliver newborn care and home visits (for ANC and during delivery)

Community-based interventions thus broadly consist of two approaches: delivery of packages through home visits, and community mobilization. [3-16] Several studies have demonstrated the effect of home visits and community mobilization in isolation and also in combination. The effect size is, however, based on the baseline NMR and the population coverage. [9,10]

2. EVIDENCE FROM INDIA ON COMMUNITY AND HOME-BASED NEWBORN CARE

2.1. Early studies

2.1.1. Risk-approach strategy (Pune study)

This strategy involves identifying local risk factors, screening the population for vulnerable individuals, and providing them with extra care in proportion to their needs according to a risk-based management plan.

An uncontrolled study in the early 1980s by Pratinidhi et al, in 22 villages with a population of 47,000, in Sirur near Pune, noted that community health guides (CHGs) were trained to identify high-risk newborns within 48 hours of delivery at home. [11] Under the supervision of a field medical officer, follow-up visits were made on days eight and 29. The management plan consisted of domiciliary care or referral depending on the number of risk factors and the severity of illness. With this approach, the NMR (per 1,000 live births) dropped from 51.9 in 1981 to 38.8 in 1982.[11]

2.1.2 Domiciliary neonatal care (Dahanu study)

From 1987 to 1990, Daga and colleagues tested a model of domiciliary neonatal care by a TBA with referral services provided by a Primary Health Centre (PHC) and a Community Health Centre (CHC) in Dahanutaluka of Thane district in Maharashtra. [12]

Lady Health Visitors (LHV), who are trained paramedical workers, trained the TBAs, who then provided ANC, conducted deliveries, and took postnatal care of neonates. TBAs used foot-length measurements to identify very low birth weight (LBW) infants. The small and sick neonates identified by TBAs were taken to the PHC where they were initially stabilized and then referred to the community hospital (with facilities for admissions), as needed.

At the end of the intervention, there was a significant decline in the PMR (from 74.7 per 1,000 births during 1987 to 57.1 during 1990) and in the NMR (from 33.6 per 1,000 live births during 1987 to 28.7 during 1990).

2.1.3 Care of LBW infants in a rural community (Ambala study)

Datta et al. studied the feasibility of implementing a specific intervention package likely to reduce morbidity and mortality among LBW babies during the first year of life in two community development blocks of Haryana. [13] The study included 970 newborns in 16 control villages and 1,061 newborns in 19 intervention villages.

The package of services included TT immunization of pregnant women, delivery of infants using a clean

delivery kit, and promotion of breastfeeding. For the first time in a community setting in India, oral penicillin was administered by primary health care workers for five days, for treatment of moderate to severe respiratory infections. [14]

The intervention resulted in a 42 percent reduction in IMR in LBW infants, with an even greater reduction in the post-neonatal mortality rate (60 percent) than in the NMR (30 percent). Treatment of Acute Respiratory Infection (ARIs) in LBW infants with penicillin resulted in a significant decline in the Case Fatality Rate (CFR) (8.7 per 100 episodes in intervention areas versus 24.6 per 100 episodes in control areas). [13,14]

2.2 Home-based neonatal care

2.2.1 Gadchiroli study

Dr. Abhay Bang conducted path-breaking research on home-based care of neonates in Gadchiroli district in Maharashtra from 1993 to 1998. [17] A quasi-experimental design (with 39 intervention and 47 control villages) was adopted to evaluate the impact of the intervention for two years (from 1993 to 1995). The baseline NMR was 62 and 58 per 1,000 live births in intervention and control areas, respectively. Village health workers trained in neonatal care attended deliveries (and managed birth asphyxia, if indicated) and made home visits (on Day 1, 2, 3, 5, 7, 14, 21, 28, and on any other day if called by the family). They administered oral co-trimoxazole and injectable gentamicin to suspected cases of sepsis.[18] The neonatal, infant, and perinatal mortality rates reduced by 62.2, 45.7 and 71 percent, respectively. (Table 3.1) A reduction in cause-specific mortality was noticed particularly in neonatal sepsis. (Table 3.2) This model has since then been accepted by the Government of India as a key approach for addressing neonatal deaths in underserved populations.

2.2.2 Ankur study

The replicability of the home-based newborn care model was tested through the ANKUR project in 2004–2005. It was replicated by seven non-governmental organizations (NGOs) in different parts of Maharashtra. The NGOs selected included those working in tribal, rural, and urban slum areas. Each NGO covered a population of 10,000–20,000 people. Village health workers were trained in newborn care, including administering injections.

The data (from 1,475 live births) showed that the coverage of home-based newborn care increased to between 70 to 90 percent for key indicators, at the end of the first year of intervention. The NMR declined by 51 percent at the end of the project. [19] The impact continued beyond the neonatal

Table 3.1: Changes in key neonatal mortality indicators in Gadchiroli from 1995 to 1998

	Neonatal Mortality Rate/1,000 Live births		Infant Mortality Rate/1,000 Live births		Perinatal Mortality Rate/1,000 Births	
	Intervention area	Control area	Intervention area	Control area	Intervention area	Control area
Baseline (1993-95)	62	57.7	75.5	77.1	68.3	64.9
Intervention (1995-98)	25.5 (62.2% reduction)	59.6	38.8 (45.7% reduction)	74.9	47.8 (71% reduction)	91.5

Table 3.2: Change in cause-specific mortality rates in intervention area from 1995-1998

Cause of death	Cause-specific mortality rate (1995-1996)	Cause-specific mortality rate (1997-1998)	Change (%)
Prematurity	7.9	6.6	-16.5
Birth Asphyxia	10.5	5.5	-47.6
Neonatal sepsis	27.5	6.6	-76.0
Other	1.3	1.1	-15.4
Not known	5.2	4.4	-15.4

period, leading to a further reduction in infant and child mortality. [19]

2.2.3 Home-based management of young infants: ICMR project

The Indian Council of Medical Research (ICMR) implemented the Gadchiroli model in five districts between 2002 and 2009. It was modified to include young infants (0–2 months). The project featured a package of interventions delivered by specially recruited health workers, Shishu Rakshak, in one arm and AWW in the other. The third (control) arm included usual care. Compared to the control arm, there was a significant decline in the ENMR, PMR, and IMR in the Shishu Rakshak arm, but not in the AWW arm. [20]

2.2.4 Impact of integrated management of neonatal and childhood illness

During the mid-1990s, the WHO, in collaboration with United Nations Children's Fund (UNICEF) and several other agencies, institutions, and individuals, developed a strategy known as Integrated Management of Childhood Illness (IMCI). In 2005, this strategy was extended to neonates as Integrated Management of Neonatal and Childhood Illness (IMNCI). [21] Home visits were included as one of the components.

The effectiveness of the package was evaluated through a cluster randomized trial (covering 60,702 live births) in Haryana between 2008 and 2010. Community health workers were trained to conduct postnatal home visits (three visits for normal newborns and six for LBW babies). Evidence showed that NMR beyond 24 hours was significantly lower in those clusters where IMNCI was implemented, as compared to that in the control clusters (adjusted hazard ratio 0.86; 0.79 to 0.95). [22] The NMR was found to be significantly lower in the intervention clusters among those born at home. Though the effect of the intervention was seen only among home births, it led to a reduction in post neonatal mortality rate both among home births (adjusted hazard ratio 0.73; 0.63 to 0.84) and facility births (0.81; 0.69 to 0.96).

2.2.5 Other studies

The Integrated Nutrition and Health Programme (INHP) was implemented through the infrastructure of the Ministry of Women and Child Development (MoWCD) and the Ministry of Health and Family Welfare (MoHFW) in eight states between 2001 and 2006. The newborn package aimed to increase the frequency of those behaviours during antenatal, delivery, and postnatal periods that have proven benefits for mothers and newborns. The package included providing warmth at birth and in the first month, cleanliness in handling the neonate, early and exclusive breast feeding, early recognition and care of low birth weight babies. The impact of INHP on the newborn health component was evaluated in one of the eight states using this quasi-experimental design. The frequency of home visits increased during both antenatal (16 percent to 56 percent) and postnatal periods (3 to 39 percent), as did the frequency of maternal and newborn care practices. That, however, did not translate into a reduction in NMR on the whole. This was attributed primarily to limited coverage. [16]

2.3 Studies on community mobilization from India

2.3.1 Behaviour change management for newborn care: Shivgarh trial

A three-arm cluster randomized efficacy trial was conducted in Shivgarh, a rural area of UP (3,688 live births) in 2003 to evaluate the impact of behavior change management on NMR. One intervention arm received a preventive package for Essential Newborn Care (ENC) and the other intervention arm included ENC plus use of a liquid crystal hypothermia indicator (Thermospot). Community health workers delivered the packages via collective meetings and two antenatal and two postnatal household visits. The interventions were delivered through a behaviour change management framework developed for the trial. [23,24]

There were improvements in birth preparedness, hygienic delivery, thermal care, and breastfeeding in the intervention arms, but little change in care-seeking. There was a significant reduction in NMR in the ENC arm (RR0.46; 0.35–0.60) and the ENC plus Thermospot arm (RR0.48; 0.35–0.66). Adjusted

perinatal mortality also reduced in both the ENC arm (RR 0.59; 0.47–0.74) and the ENC plus Thermospot arm (RR=0.62; 0.47–0.81).[25] There were also significant improvements in maternal health equity and outcomes, including knowledge of danger signs. [26] The study concluded that socioculturally contextualized, community-based interventions targeted at high risk newborn care practices can lead to behavioral modification and reduction in neonatal mortality.

2.3.2 Effect of participatory interventions with women's groups: Ekjut trial

This intervention through women's groups was evaluated in a cluster randomized controlled trial among the tribal and rural population of select districts in Jharkhand and Odisha between 2005 and 2008 (covering 19,030 births). It involved local female facilitators guiding women's groups through a cycle of activities involving participatory learning and action, during which women identify, prioritize, and analyze local maternal and neonatal health problems and subsequently devise and implement strategies to address them.

The primary outcomes were NMR and maternal depression scores. There was a reduction by 32 percent in the intervention clusters adjusted for clustering, stratification, and baseline differences (OR 0.68, 95 percent CI 0.59–0.78) during three years. The impact on ENMR was pronounced (OR 0.62, 95 percent CI 0.52–0.73) [27]. The effects were substantially stronger among the most socioeconomically marginalized groups. The NMR declined by 59 percent among the most marginalized and 35 percent in the less marginalized population. [28, 29]

After the trial was over, between 2008 and 2011, women's groups in the interventions clusters continued to take part in a new cycle of participatory learning and action through their own initiative (Zone 1). The original control group also began a cycle of meetings to discuss maternal and neonatal health (Zone 2). The effect of the intervention was sustained in Zone 1 (NMR declined from 41.3 to 34.2). Zone 2 also observed a decline in NMR (57.0 to 41.0). The researchers concluded that the effect of participatory women's groups on neonatal survival was sustainable and replicable. A recently completed cluster randomised controlled trial in five districts of Jharkhand and Odisha (2010-12) tested the impact of ASHAs facilitating a cycle of participatory learning and action with meetings with local women. Nearly 152 ASHAs successfully led such meetings. The intervention led to one-third reduction in NMR in intervention areas compared to control areas. The reduction in neonatal mortality was greatest among the poorest wealth quintile. (Tripathy et al; under publication)

2.4 Lessons learnt

It has been established that community-based intervention packages result in a significant decline in mortality rates. A meta-analysis of all community-based interventions till 2010 demonstrated a reduction in NMR (RR=0.76; 95 percent CI 0.68–0.84), early NMR (RR=0.74; 0.64–0.86), still births (RR=0.84; 0.74–0.97) and perinatal mortality (RR=0.80;0.71–0.91). It also showed an increase in referrals to health facility for pregnancy-related complications (RR=1.40; 1.19–1.65) and improved rates of early breastfeeding (RR=1.94; 1.56–2.42)[3]. The results were significant when impact was estimated for early neonatal mortality (RR=0.74;0,.64–0.86).

It is well documented that higher reductions in NMR were achieved in the proof-of-principle studies; the meta-analysis estimate showed a 45 percent reduction (95 percent CI 37 to 52). However, the results of the trials in south Asia in programmatic settings showed substantially lower reductions. The summary estimate represents an overall reduction in NMR of 12 percent (95 percent CI 5 to 18). [31].

The results are more encouraging if the proven interventions are implemented effectively with high coverage and targeted at areas and population where they are needed the most. [9] Increasing access to a continuum of care from home and community to facility is the goal. [10]

While family, outreach, and clinical services have their own merits, the importance of each one depends heavily on the baseline NMR. [10] The effect of community-based interventions declines as baseline NMR decreases and as NMR gets to below 50. Community-based interventions have

to be supported by facility-based interventions. [9,10] With phased planning, outreach and family-based services can be effective in ensuring access of the poor to basic services, while professional clinical care is being strengthened and made more equitable. Even with a relatively weak health system, it is possible to achieve measurable reduction in mortality with adequate coverage of community-based services.

Studies have shown that HBNC interventions can prevent 30 to 60 percent of newborn deaths in high mortality settings under controlled conditions. [15] A meta-analysis of interventional studies (with home visits as the key intervention) gives a pooled relative risk of 0.62 (95 percent CI=0.44–0.87). A greater effect on mortality was observed with both curative (injectable antibiotics) and preventive interventions (RR-0.52; 0.30–0.85) as compared to only preventive interventions (RR-0.70; 0.44–1.12). Higher coverage (>=50 percent) was associated with better survival (RR-0.54; 0.42–0.70) than lower coverage (RR-1.06; 0.81–1.38). Pooled data showed a reduced risk of still births (RR-0.76; 0.65–0.89). [10] Yet another review suggests that home visits within the first 48 hours have maximum impact. [9]

Community mobilization through participatory women's groups has the potential to improve birth outcomes. It is defined as a process through which communities plan and act together. A meta-analyses of seven trials on community mobilization through women's groups showed that exposure to women's groups was associated with a 37 percent reduction in maternal mortality (odds ratio 0.63, 95 percent CI 0.32–0.94), a 23 percent reduction in neonatal mortality (0.77, 0.65–0.90), and a 9 percent non-significant reduction in stillbirths (odds ratio 0.91, 0.79–1.03). The analysis concluded that with the participation of at least a third of pregnant women and an adequate population coverage, women's groups practicing participatory learning and action are a cost-effective strategy to improve maternal and neonatal survival in low-resource settings. [23] In addition, counselling by community health workers also played an important role in improving newborn care practices and care seeking.

3. COMMUNITY AND HOME-BASED NEWBORN CARE SERVICES UNDER NRHM

The existing evidence-based interventions have been packaged into two programmes:

- Integrated Management of Newborn and Childhood Illness
- Home-Based Newborn Care

3.1 Integrated management of newborn and childhood illness

IMNCI was rolled out in 2004. It recognizes that a large proportion of sick children do not come in contact with health workers, but most can be reached by AWWs and or ASHAs. ANMs are also trained as providers and supervisors. Home visits are a critical component of the programme. Under IMNCI, the ANM/AWW/ASHA visits the home to evaluate the newborn using an algorithm, detects and refers the sick ones, and provides simple treatment and counseling for the rest.

IMNCI was rolled out in the following phases:

- Introductory phase: Zero to three months after inclusion in state Programme Implementation Plan (PIP)
- Early implementation phase: three to 12 months after inclusion in PIP; up to 50 percent training completed
- Expansion phase: 50 percent to 90 percent training completed
- Consolidation phase: More than 90 percent training completed

The status of implementation of IMNCI from 2008 to 2011 is given in Figure 3.1. With time, the training component was expanded. The trend of reporting status was slow to pick up. [32]

Integrated Management of Neonatal and Childhood Illnesses
Goals • Standardized case management of sick newborns and children in communities and facilities (FIMNCI) • Nutrition assessment and counselling for all sick infants and children • Homecare and visits for newborns to provide essential newborn care • Improved recognition of illness for newborns and older children, and timely care seeking
Delivery channel Community component: AWW, ANMs, ASHAs and link volunteers Facility component: ANM, LHV, Medical Officers
Activities • Conduct home visits • Provide information and skills to the mother and family on newborn care • Examine every newborn for low birth weight • Identify illness in the newborn and provide appropriate care at home or provide referral • Identify illness in older children (2 months–5 years) and provide appropriate care at home or provide referral
Number of home visits and days • Days 1, 3 and 7 for normal newborns • Days 1, 3, 7, 14, 21 and 28 for low birth weight newborns
Training duration: Eight-day training package using IMNCI training material for health workers. In addition, a three-day package on follow-up training (supervision) for supervisors
Kit: Kit contains baby weighing scale with sling, thermometer and digital watch, essential medications and consumables, which are to be replenished regularly.
Supervision: Each frontline worker is supposed to consolidate the monthly reports and send them to the subcentres and subsequently to the PHCs and to the district nodal officer. The supervisors perform on-the-job supportive supervision of the frontline workers as per the monthly supervisory plan prepared at each PHC level.
Payment to the health worker: No compensation

Figure 3.1: IMNCI implementation in 14 states in India (2008-2011)

Source: IMNCI Factsheets for 14 states [32]

The latest report (2013) indicates that IMNCI has been rolled out in 505 districts in 27 states and four union territories. [33] Among the personnel trained for IMNCI between 2004 and 2008, 56 percent were AWWs, 14 percent ASHAs, and 15 percent ANMs. Among the personnel trained for IMNCI between 2008 and 2011, 47 percent were AWWs, 30 percent ASHAs and 16 percent ANMs.

3.1.1 Assessment of IMNCI

There has been only one systematic assessment of IMNCI.[34] The data of DLHS-2 (2002 to 2004) and DLHS-3 (2007 to 2008) from 12 districts (seven states) showed the difference between IMNCI and non-IMNCI districts. [34] The coverage of home visits under IMNCI reached only 64 percent of target neonates, and those newborns not reached were likely to be vulnerable. The reasons for the slow-uptake of home visits included absence of workers in several villages, poor supervision, and lack of motivation of the workers for this additional task.

On the positive side, the quality of home visits was found to be satisfactory. More than 80 percent of sick children were correctly classified and treated. The major bottlenecks were poor supervision and monitoring, and poor availability of logistics and supplies. The component of training was assessed to be good in six out of seven districts. However, supervision was poor in most districts. The programme appears to have an impact on the improvement of the coverage of all the indicators, but this improvement was not statistically significant.

Skills on assessing and classifying illnesses based on guidelines were conflicting in different studies. The authors concluded that training without effective implementation plans will not result in long term skill retention. [35-39]

Since 2012, IMNCI programme has seen a change. The Ministry of Health and Family Welfare decided to train only the ANMs in IMNCI and left the training and engagement of AWWs to the Women and Child Development Department.

3.2 Home-based newborn care

The model of home-based care includes provision of services at the community level through home visits based on the Gadchiroli model. The Government of India launched the HBNC programme in 2011 with the purpose of improving community newborn care practices and early detection of neonatal illnesses through home visits by the ASHAs. [40]

Home-Based Newborn Care

Objectives

- Provide essential care to all newborns and prevent the onset of complications
- Detect early low birth weight newborns and provide special care in cases of pre-term labour
- Identify illness in the newborn and provide appropriate care and referral
- Support the family in adopting healthy practices and behaviour, and build the confidence and skills of the mother to safeguard her health and that of her newborn

Provider: ASHA

Activities

- Mobilize all pregnant mothers and ensure that they receive the full package of antenatal care
- Undertake birth planning and birth preparedness with the mother and family to ensure access to safe delivery
- Conduct home visits
- Impart information and skills to the mother and family of every newborn to ensure better health outcomes
- Examine every newborn for low birth weight
- Identify early on, illness in the newborn, and provide appropriate care at home, or provide referral.
- Follow up of sick newborns after they are discharged from facilities
- Counsel the mother on postpartum care, recognition of postpartum complications and enable referral
- Counsel the mother on adoption of appropriate family planning methods

Number of home visits and days

- Six visits in the case of institutional delivery (days 3, 7, 14, 21, 28, and 42)
- Seven visits in the case of home delivery (days 1, 3, 7, 14, 21, 28, and 42)
- Additional visits will be required for babies that are low birth weight, preterm, or ill

Training duration: ASHAs are trained on HBNC through four rounds of training of five days each, using ASHA training Module 6 and 7. All rounds to be completed within one year. There is a gap of at least 10 to 12 weeks between two consecutive rounds. This training is followed by certification.

Kit: ASHA kit contains baby weighing scale with sling, digital thermometer and digital watch, essential medications and consumables, which are to be replenished regularly.

Supervision: Field-level facilitators provide on the job mentoring, monitoring, and support. Block-level review meetings are utilized for problem solving and building linkages for referral.

Payment: The ASHA is paid Rs. 250 for conducting home visits for the care of the newborn and post-partum mother. The amount is paid based on the completed home visit form, validated by the facilitator. This is paid on the 45th day, subject to the following:

- The birth weight is recorded in the Maternal and Child Protection (MCP) Card
- The newborn is immunized with BCG, first dose of OPV and DPT
- Birth registration is completed
- Both mother and newborn are safe until the 42nd day of delivery

3.2.1 Status of implementation

Training

ASHAs are trained on HBNC through four rounds of training, using Modules 6 and 7, over a period of one year. The latest report of February 2013 indicates that HBNC has been rolled out in 25 states and four union territories. Around 43 percent of ASHAs in the country have been trained, and additional trainings are ongoing. The coverage in non-North Eastern (NE) high focus states, NE states, and non-high focus states are 39, 72, and 46 percent respectively. [41]

Coverage

The pace of uptake of the HBNC programme has been slow. Only 0.4 million neonates were visited at home under the programme by March 2013. [41] This is a very small proportion of the annual rural birth cohort of over 17 million.

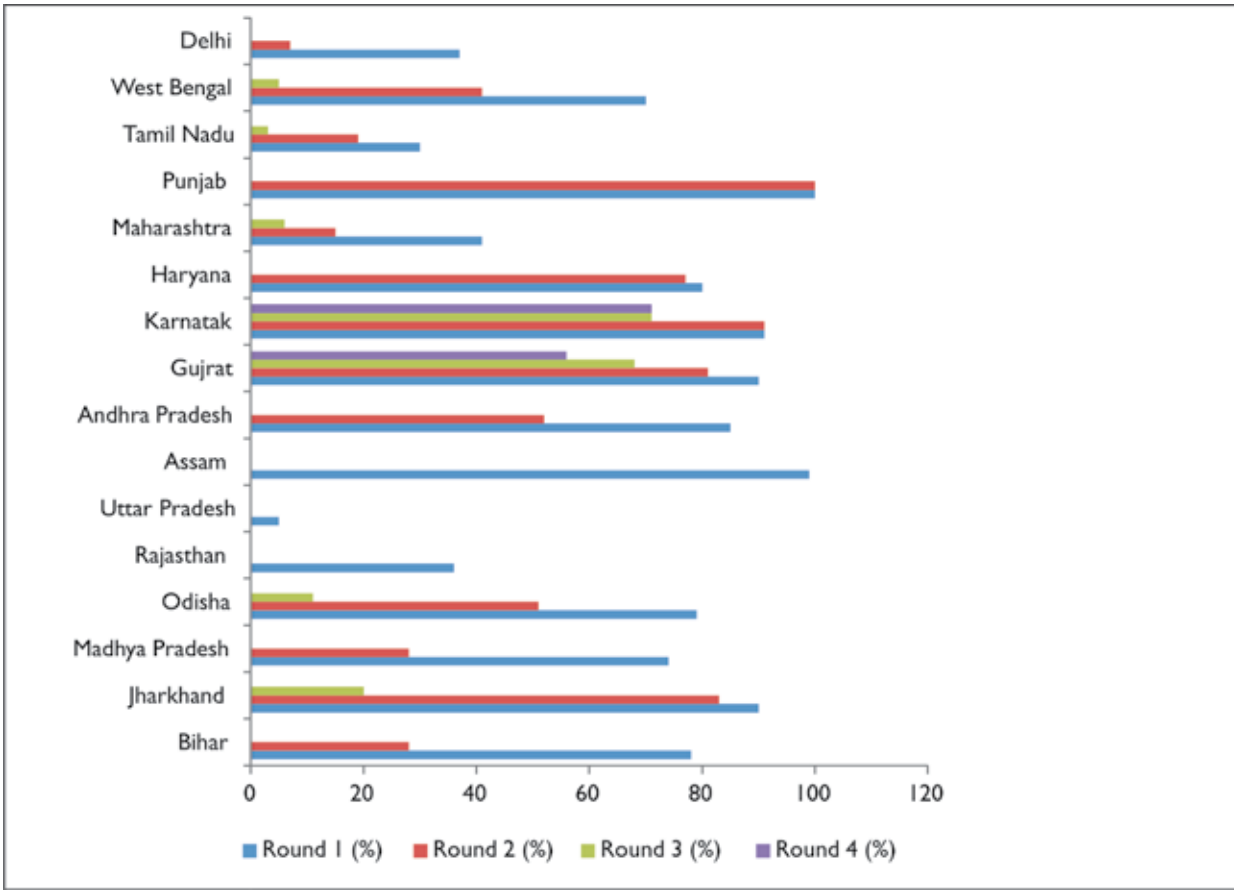
3.3 Adaptations of community/ home-based newborn care

A comprehensive package of newborn care is currently being implemented in four states with high IMR – Madhya Pradesh, Rajasthan, Bihar, and Odisha. Norway India Partnership Initiative (NIPI)-United Nations Office for Project Services (UNOPS) with technical support for National Neonatology Forum (NNF) and the Institute of Post-Graduate Medical Education and Research (IPGMER), Kolkata, are involved in it.

The success of the package is based on increasing access to a minimum set of essential services that would significantly reduce NMR. [43] It is a collection of the following services:

- Home-based postnatal care, initiated through a package of newborn care services by ASHAs.

Figure 3.2: State-wise status of HBNC training (as on June, 2013, NHSRC)



Source: National Health System Resource Centre, 2013 [42]

- SNCUs developed in district hospitals through NRHM mechanisms.
- District and block maternal and child health managers inducted to support programme management process.
- Yashoda - care and counselling service to the mother and newborn to be given by Yashoda, a birth companion in the maternity ward.
- Mobile money transfer to ASHA: A new system of using mobile money transfer introduced to help distribute incentive payments to ASHAs, and monitor ASHA-related funds and activities at each block.

Under this programme, 14,684 ASHAs were oriented on home-based postnatal care (HBPNC) [44], 440,718 mother-newborn pairs were provided six home visits by ASHA, and 6,096 sick newborns were identified and referred to health facilities. A supportive supervision mechanism for the HBPNC programme was established through an external agency, and a computerized management information system was institutionalized for data generation.

Assessing and Supporting NIPI Interventions (ASNI) is an Operations Research project conducted between November 2009 and September 2011 in Rajasthan and Odisha, two NIPI focus states in India. This was a quasi-experimental design study with an intervention and control district in each of the states to assess NIPI activities within the continuum of care approach, focusing on both demand and supply side issues, and to strengthening NIPI to achieve NRHM goals. [45]

The data showed improvement in key newborn care indicators, such as birth registration and weighing of newborn in the intervention districts. The proportion of mothers who reported receiving counselling specific to newborn care (breastfeeding, birth registration, immunization) from ASHAs during their postnatal home visits was significantly higher in the intervention districts, compared to the control districts. The identification of danger signs and subsequent referrals, including use of referral funds, too, were higher in intervention districts, but the actual proportions reporting these were still low, indicating potential for significant improvement. The training methods, content, and supportive supervision, including field-level follow-up, were perhaps the main reasons for the differences in newborn outcomes observed between the intervention and control districts.

4. VILLAGE HEALTH AND NUTRITION DAYS

Outreach strategies are a systematic attempt to provide health services beyond conventional limits of community-based and facility-based settings. Such strategies are designed to reach peripheral and marginalized communities, in circumstances where the community is unable to reach the facility, or, community-based health services are unable to reach the community in question. The concept of outreach services was initially used for immunization services. The concept of integrated services related to health and nutrition was first introduced in the Reproductive and Child Health, Nutrition and HIV/AIDS Programme (RACHNA) implemented by CARE India. [46, 47, 48]

Village Health and Nutrition Days (VHNDs) are organized once every month at the Anganwadi Centre (AWC) in villages in every state. This is seen as a platform for interfacing community with the health system. Programme managers at district and block levels ensure availability of necessary supplies and expendables in adequate quantities, and are responsible for the quality of services delivered through these sessions. ASHAs, ANMs, AWWs and Panchayati Raj Institutions (PRIs) have a specific role to play.

Acknowledging the social importance of village leaders, an institutional arrangement was conceived, constituting Village Health and Sanitation Committees (VHSCs) under the headship of the Gram Panchayat (GP). Elected GP members are part of VHSCs and are responsible for monitoring and implementing health services at the village level. The VHSC, comprising the ASHAs, the AWWs, the ANMs, and the PRI representatives, are fully involved in organizing VHNDs, which aim to bring about a dramatic change in the way people perceive health and healthcare practices.

Package of child health services at VHNDs (VHND guidelines 2007)

Infants up to one year

- Registration of new births
- Counselling for care and feeding of newborns
- Follow up on sick newborns
- Complete routine immunization
- Immunization for dropout children
- First dose of Vitamin A, along with measles vaccine
- Micronutrient supplementation
- Growth monitoring

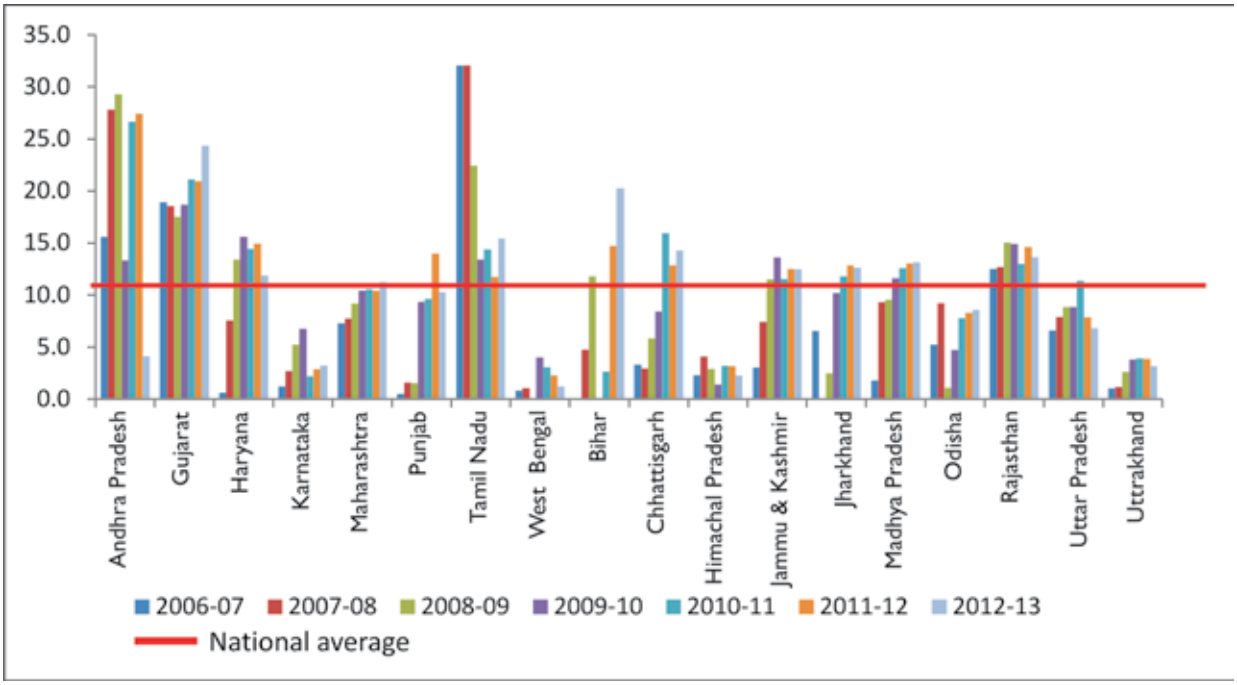
VHNDs have now become an integral part of NRHM, and states have been adhering to the guidelines as is evident from the figure below (Figure 3.3).

There has been an increase in the level of awareness among pregnant women in the community about VHNDs, according to existing reports. [49,50] Assessments from Uttar Pradesh and Jharkhand indicate an improvement in the quality of services over a period of four years.

At the national level, VHNDs are being organized by all VHSCs. The average all-India number of VHNDs conducted in a year, per VHSNC, per village, is around 11. [46] An important observation here is that there has been a consistent increase in the average number of VHNDs.

According to an evaluation on VHNDs, as well as on the role of VHSNCs, conducted in seven states, neither has had an impact on motivating pregnant women to utilize ANC services, either from public

Figure 3.3: Average number of VHNDs per village per year



Source: NRHM reports, 2013[51]

Good practices to strengthen monitoring to improve VHND performance

To strengthen the VHND, NRHM has in place a comprehensive supportive monitoring and evaluation system on the quality of VHNDs. To carry out the monitoring, checklist have been developed and circulated at all levels, along with guidelines. As per the guidelines, health officials at the state-level, district-level, and block-level have been instructed to carry out VHND monitoring every Wednesday, and submit the checklists to the state headquarters. An online system has been developed in-house under the "Integrated MIS 6 System" to capture and analyze the findings.

Quality of VHND

To strengthen the quality of services delivered through VHNDs, attempts were made in four districts of Madhya Pradesh to enhance the capacity of service providers, increase inter-sectoral convergence, and improve monitoring mechanisms, including community monitoring of VHNDs. Similar initiatives were undertaken in Tripura, and by Vistaar in Jharkhand and UP.

Source: Prayas report 2012; NRHM Assam; [52,53,54]

or private health facilities. However, VHNDs do have a significant positive impact on utilization of public health facilities for delivery care and immunization. The impact on utilization of services for newborn care was beyond the scope of the study. [49]

5. SYSTEMATIC EVALUATIONS OF ASHAs WITH FOCUS ON NEWBORN CARE

ASHAs are involved in providing a wide range of services related to newborn, maternal, reproductive and child health. The following studies give brief summaries. [49, 55-58]

5.1 Evaluation of the ASHA programme (2011)

The National Health System Resource Centre (NHSRC) evaluated the ASHA programme in two districts in each of the eight states – Bihar, Odisha, West Bengal, Rajasthan, Kerala, Assam, Jharkhand & Andhra Pradesh. [55] The evaluation was conducted on 100 ASHAs, 600 beneficiaries or service users, 100 Anganwadi workers, 100 elected Panchayati Raj members and 25 ANMs from well-performing districts, and those with a high proportion of scheduled castes/tribes.

In most states, the minimum level of training was achieved, but the pace of training fell far short of what was required. Competency-based training did not figure in the design of the training modules it was found that the ASHAs were actively performing their tasks and duties, although the timeliness with which the incentives reached them was a matter of concern. Some states were reported to have robust mechanisms of accounting and timely payment. ASHAs were supplied with drug kits, and regular replenishment was being undertaken.

The ASHAs' responsibilities include counselling women on all aspects of pregnancy and promotion and coordination for immunization programmes. The third most common activity undertaken was visiting the newborn: this was higher than 80 percent in ten out of 16 districts surveyed.

There was no evidence of the ASHA charging fees, setting up private practice, becoming a dai or a tout of the private sector. There was no evidence of any major conflict between ANMs, AWWs, and ASHAs though this is one of the most commonly heard problems as perceived by the programme managers.

5.2 ASHA evaluation by Institute of Economic Growth (IEG), Planning Commission (2010)

The Programme Evaluation Organization of the Planning Commission of India commissioned a performance evaluation of the National Rural Health Mission in 2010. One of the objectives was to study the role played by the ASHAs in creating awareness of health and nutrition among the rural population. The study was conducted in 296 villages, across 37 districts, in the seven selected states. [49]

It emerged from the study that the ASHAs in all the states had received training and were playing all three of their primary roles: health awareness in the community, basic curative care, and facilitation of access to services from the health system.

However, disbursements of incentives and allowances, as well as the replenishment of medical supplies for their drug kits were not regular. The ASHAs undertook home visits; more than 65 percent beneficiaries confirmed that ASHAs visited them between 15 to 30 days, and 80 per cent of them reported that they were given medicines free of cost. The ASHAs role in motivating mothers to utilize public health facilities for their children's complete immunizations also turned out to be significant and positive. The analysis indicated a close correlation between ASHA visits and pregnant women utilizing ANC from public healthcare facilities.

The ASHAs regular visits to households improved the probability of utilization of public health facilities from 54 to 71 percent. Similarly, there was an improvement in the probability of using public health facilities for PNC (from 55 to 66 percent) and a significant shift from no-use to use of public health facilities. A larger percentage of ASHAs reported positively on their key functions related to awareness building, providing services, and coordinating with the ANM and AWW. The evaluation, however, highlights

that incentive disbursement and regular supply of drugs, two important mechanisms to motivate and sustain the ASHA, continue to be problematic.

5.3 Sixth Common Review Mission (CRM) (2012)

The Sixth Common Review Mission led by the Ministry of Health and Family Welfare was undertaken in 15 states. It studied extensively all aspects of NRHM implementation including community processes. [56]

The key findings were that ASHAs across all states have been described as "vibrant" and "enthusiastic". Most ASHAs worked to promote institutional deliveries. Their role as community-level care provider was limited, even where three rounds training of Module 6 and 7 had been completed. Performance monitoring based on functionality indicators has been introduced in some of the states.

Ad hoc measures used for replenishment of ASHA drug kits led to frequent stock out of drugs. Support structures for the ASHA programme have been set up in most states. However, the strengthening of support structures with appropriate training has not been undertaken.

Delays in payments and irregular payments were a problem in many states. Many states also provide non-monetary incentives. Assam has introduced a medical insurance scheme for ASHAs, while Chhattisgarh has a more elaborate welfare programme.

Reports of grievances being addressed through an informal process during monthly meetings were shared from states like Odisha, Tripura, and Uttar Pradesh. Rajasthan has also started a helpline for complaints related to payment, but awareness about the helpline was found to be low among ASHAs.

5.4 ASHA evaluations from Karnataka and Nagaland (2012)

The evaluation of the ASHA programme in both states was undertaken combining qualitative and quantitative methods. [57] In three districts from Karnataka, acceptance of ASHAs had increased in the community over the years, and particularly after the HBNC services were introduced. The majority of ASHAs were actively promoting institutional deliveries and immunization. About 73 percent reported undertaking newborn visits. However, a large majority of the non-beneficiaries were from poor households. This points towards a much larger concern that ASHAs are unable to reach the most vulnerable and marginalized sections of the community.

In the three districts of Nagaland, most of the ASHAs were undergoing training. Though, a high functionality of the ASHAs was noted in promoting institutional deliveries and counselling for women on all aspects of pregnancy, low levels of effectiveness was observed in terms of providing maternal and newborn care services. Home deliveries occurred in 60 percent of cases. Non-availability of transport facilities (in 35 percent cases), family pressure/tradition and faith in family members rather than public health system (in 27 percent cases) and low coverage seem to limit the effectiveness of the ASHAs in promoting institutional births. Counselling on postnatal care showed variable patterns. Interestingly, in case of a sick newborn, 42 to 50 percent of the service users across all districts sought the ASHAs' help for care of the newborn.

5.5 Scale-up of SEARCH's home-based newborn care in Karnataka and Andhra Pradesh (2012): Lessons from implementation to achieve high quality and coverage

The Governments of Karnataka and Andhra Pradesh decided to scale up the HBNC in 2010 with technical support from SEARCH, Gadchiroli and the Society for Elimination of Rural Poverty (SERP) respectively. In Karnataka, the HBNC was implemented through the Health Activists (Under Ministry of Rural Development), whereas in Andhra Pradesh, the HBNC was initiated in 62 pilot mandals across the 22 districts, through the primary health service providers, under National Rural Health Mission (NRHM), called Accredited Social Health Activists (ASHAs). In both the places, home-based management of sick newborns was not included.

The documentation aimed at identifying the processes undertaken, as well as the challenges

and successes encountered in the process related to state-level adaptation and implementation of the SEARCH's home-based newborn care package, and at drawing lessons from this process for scale-up of other newborn care interventions. [58]

Supervision was the weak component in scaling up. Service provision by ASHA under HBNC was largely limited to health education and referral. Direct service provision in the form of care was limited. Ownership appeared to be limited.

The link of the ANM is weak in the programme, and her position vis-à-vis ASHAs was not the most desired one. ASHAs presence has substantially increased the proportion of institutional deliveries. However, there was no special cadre of staff exclusive for HBNC at any level, or a system for supervision, monitoring or remuneration exclusive for HBNC.

The turnover of ASHA was 10 to 15 percent in all districts. Supply and distribution of kits was another problem that seriously affected the efficiency of the programme. They are supplied late, not replenished or maintained, nor is the condition of the kit monitored. Procurement was centralized in the initial phase, but later kits were to be bought from VHSC funds. Forms for newborns were not being filled, and not even distributed as much as required.

5.6 Improving the performance of Accredited Social Health Activists in India (2011)

This study presents findings from Bihar, Chhattisgarh, Rajasthan, UP, and Assam concerning issues of recruitment, responsibilities, training, incentives, and supervision. [59] The findings indicate that selection processes and criteria were not being met in several areas. While most ASHAs claimed to understand their roles and responsibilities, the actual site visits and qualitative data proved otherwise. They were unable to specify all their job responsibilities.

The level and depth of knowledge of the ASHAs was not upto the mark as most did not complete the stipulated 23 days of training. It was recommended that an assessment of the knowledge of the ASHAs is necessary before they are able to work in the field. Pictorial job aids and frequent refresher trainings are crucial to ensure that the ASHA retain her skills.

There are several key issues regarding incentives and compensation for ASHAs, which, if mitigated, would greatly improve their motivation and performance, even though monetary compensation is not the sole motivating factor for them. The desire to serve the community, increase their knowledge, become a part of the formal health system and the social prestige in the community associated with the position were reasons reported for becoming an ASHA. Regular and reliable supervision appeared to be a weak link in the system.

6. IMPACT AND CHALLENGES

The commitment of the government to reach out to its most vulnerable and poorest citizens is reflected in the investment that has gone into the expansion of community-based programmes. Started in 2004, IMNCI is now being put into practice in 505 districts. HBNC, which is being rolled out in all the states since 2011, is at varying stages of implementation. There is a huge pool of trained people in each community to deliver these services. Despite this, the execution of the programmes is fraught with several challenges, detailed below.

6.1 Supervision and monitoring

Supportive supervision is the cornerstone of any community-based programme – and has been identified as a weak area in IMNCI and HBNC programmes. [58,59] Unlike facility-based programmes, where supervision can be carried out on site, supervising community-based programmes is challenging.

Out of all the districts where IMNCI is being implemented, only one-third had reported supervision. The proportion of supervisors trained varies from 0 percent to around 70 percent. [32,34] Performance monitoring helps identify causes of non-functionality, and thus lead to actions for improvements. Assessments show that a formal structure for supervision of ASHAs is lacking. At the ground level, it is unclear whether the ANM or the ASHA facilitator is the key supervisor for HBNC.

Improve supportive supervision
• Peer supervision by one of the trained frontline workers • Encouraging ANMs to supervise home visits by ASHAs (as demonstrated in UP) • Recognizing ANMs formally as the HBNC supervisors of ASHA • Restructuring ASHA monthly meetings to include multiple fixed days in smaller groups (as demonstrated in UP) • Introducing ASHA facilitators and ASHA - Sahayoginis, who can report to Integrated Child Development Services (ICDS) officers (as demonstrated in Assam and Rajasthan) • Involving NGOs for monitoring community-based programmes (as by Self Employed Women's Association [SEWA] in Gujarat)

6.2 Capacity building

Good quality training is critical to the functionality of frontline workers. Capacity building occurs not only during induction, but is a continuous ongoing process. There is a need to have refresher courses. Training curricula should be specific to training needs and target groups. [45, 59]

Reports have indicated that quality of training get compromised as scaling up takes place. Besides adhering to the stipulated duration of training, the quality of trainers should be ensured. [54, 55]

Possible methods to improve training
• Utilizing monthly meetings for continuing education or refresher courses (as in UP) • Using more pictorial and concise teaching aids (as in NIPI districts) • Using information technology to improve quality of training

6.3 Care seeking behaviour

Care seeking is the cumulative effect of the knowledge and attitude of the family in seeking care for a family member, and the accessibility of health services in general. It is now well established that mothers who seek care during their pregnancy are more likely to do so for their children. It is not only important to have the attitude to seek care but it is also necessary to seek care from the right sources. On the whole, people mostly prefer non-government sources. [60]

The general reasons behind poor utilization of care services for newborns are poor recognition of illness, sociocultural traditions of newborn seclusion, distance from the facility or provider, poor quality of care at facilities, lack of financial resources to access care or transport, opportunity costs of missed work or child care. The JSSK programme aims to overcome some of these logistic and financial barriers to care seeking.

The gender of the child influences care seeking to a very large extent and is significantly associated with perception of neonatal illnesses. [60] For instance in UP, recognition of the first illness was on the 11th day where the newborn was female while it was on the 9th day for males. In a study, overall rate of perceived illness was lower for females (56 percent versus 68 percent for boys). Reports from UP and Maharashtra suggest that households tend to use expensive private unqualified providers (who are seen as being more efficient) than free government-provided facilities more often for male neonates compared to females (65 percent versus 43 percent). [61]Not surprisingly, there is twice the number of admissions of males to hospitals and other facilities compared to females.

Improving care seeking
• Educating families to recognize newborn sickness early • Achieving high coverage of home visiting by ASHAs • Using the VHND platform for health education effectively • Raising awareness about JSSK that entitles infants to free transportation, and care in facilities • Making special efforts to improve care seeking for sick girl neonates (awareness generation, social mobilization, special incentives)

6.4 Increasing opportunities to treat sick neonates

The purpose of community and home-based newborn care is to promote healthy practices (such as breastfeeding, hygiene, warmth, extra care for low birth weight babies), solving common problems (such as feeding problems) and to detect serious illness early. Both IMNCI and HBNC aim to achieve these objectives.

Despite best efforts, however, some babies will fall ill. The illness must be detected early and treated effectively to avoid complications and death. Serious illness, often in the form of systemic bacterial infections (e.g. sepsis, pneumonia) requires antibiotic treatment and supportive care (fluids, feeding, thermal protection, and monitoring). Ideally, such care is provided within the facilities. A vast majority of the ill neonates, however, do not reach facilities for a variety of reasons.

In addition to addressing barriers to accessing facility-based care, another approach is to bring effective treatment to families. A large body of research has demonstrated that: a) community health workers (such as ASHAs, AWWs and ANMs) can identify neonates and infants with possible sepsis, and b) a large proportion of neonates with sepsis (who are not critically sick and do not require oxygen or IV fluids etc.) can be treated safely on an ambulatory basis with one oral antibiotic and intramuscular gentamicin.

After careful scrutiny of evidence and programme imperatives, the Government of India has developed operational guidelines on the use of intramuscular gentamicin by ANMs for management of sepsis in young infants (under two months of age), where referral is not possible or is refused. If an infant is identified to have possible serious infection by IMNCI algorithm, and referral advice is not followed, ANM would offer to treat the infant with a combination of injection gentamicin plus oral amoxicillin for a period of seven days. [62] It is expected that this approach would reduce deaths due to sepsis and pneumonia particularly among the underserved infants.

Another approach is to engage the private sector in treating sick neonates through a voucher, insurance or any other financing mechanism. The thrust of the public health programme should be to maximally utilize the JSSK programme to connect sick neonates to the health facilities. It is equally important that facilities (CHCs, DHs, medical college hospitals etc.) have well-functioning newborn care services and infrastructure.

7. WAY FORWARD

Evidence

- India has contributed immensely towards generating global evidence on HBNC and community mobilization.
- Community- and home-based newborn care approaches reduce neonatal mortality substantially when implemented effectively.
- The rapid roll out of the IMNCI programme made an impact on newborn health on the ground; its continuation at the AWW level appears to have been diluted.
- Scale of HBNC has been slow; although training has been accomplished well in most states, coverage is low.
- Supportive supervision remains a weak link in community-based programmes.
- VHNDs have emerged as effective convergence points, as well as platforms for maternal, newborn, and child health action.
- Care seeking for sick neonates, especially girls, remains poor.

Recommendations

- Improve the coverage and quality of the HBNC programme by:
  - Improving the pace and quality of training
  - Operationalizing an effective supportive supervisory mechanism with role clarity of ANMs and ASHA supervisors
  - Ensuring uninterrupted supply of ASHA kits and replenishment thereof
  - Timely reimbursement of ASHA incentives
  - Improving the reporting and data collection system
- Move rapidly from the training phase of HBNC into full operationalization; aim to cover at least 50 percent of the annual newborn cohort in the

country under HBNC by 2015 and 80 percent by 2017.

- Continue to train, engage, and monitor AWWs in IMNCI.
- Ensure that all ANMs are trained in IMNCI.
- Scale up new operational guidelines allowing ANMs to treat neonates with suspected sepsis, where referral is not possible or refused, using injectable gentamicin and oral amoxicillin.
- Deepen community participation processes for maternal, newborn, and child health by involving the women's groups more systematically.
- Increase coverage of JSSK to overcome logistic and financial barriers to treatment of sick neonates and connect poor families to facilities.
- Invest in operations research to refine HBNC and IMNCI for more effective, efficient, and equitable implementation of community-based newborn health programmes.

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Chapter 4

FACILITY-BASED NEWBORN CARE

OVERVIEW

Neonatal units in teaching hospitals and private hospitals have been coming up in the country since the sixties. In 1994, a District Newborn Care Programme was introduced as a part of the Child Survival and Safe Motherhood Programme (CSSM) in 26 districts. Facility-based newborn care (FBNC) in the public health system got a boost under NRHM with a nationwide creation of Newborn Care Corners (NBCC) at every point of child birth, Newborn Stabilization Units (NBSUs) at Community Health Centres, and Special Newborn Care Units (SNCUs) at district hospitals. Guidelines and toolkits for standardized infrastructure, human resources and services at each level have been developed and a system of reporting data on FBNC created. Over half a million neonates are being treated each year at SNCUs alone and the number is rising.

This chapter gives an overview of FBNC under NRHM. Various assessments on FBNC are described briefly. Gaps, challenges, and possible solutions are discussed.

1. BACKGROUND

Facility-based newborn care (FBNC) refers to clinical services provided by skilled personnel at health facilities round-the-clock.[1,2] Historically, the care of small and sick has always been at newborn nurseries and neonatal intensive care units in hospitals. In India, neonatal care facilities for secondary level care began in the early 1960s in a few teaching hospitals. However, the expansion of these services was tardy until the 1980s.[3] The pace gradually picked up in the private sector, as well as in larger public sector hospitals, and in the late 1980s the first district level newborn care unit in the public health system was established in Kanchipuram, Tamil Nadu, by Dr. S. Jaya.

In 1991, the National Neonatology Forum (NNF) established accreditation norms, which set the tone for quality institutional care in India. With the launch of the Child Survival and Safe Motherhood (CSSM) programme, newborn care received special focus for the first time in a national programme and organized newborn services were introduced. Essential newborn care was included as package of interventions and operationalization of facility-based district newborn care began in 26 districts in 1994. [4] The initiative included strengthening district hospitals, first referral units and PHCs with equipment (radiant warmers, resuscitation equipment, weighing scale, phototherapy units), training of doctors and nurses, and supportive oversight.

In 1997, the Reproductive and Child Health programme expanded the coverage of the CSSM programme. In the meanwhile, there was a consistent growth of neonatal care units in teaching institutions and the private healthcare sector [5].

The feasibility of establishing and operating a SNCU at the district level was first demonstrated in Purulia district of West Bengal. [6] The unit was developed in a district hospital in 2003 and run by relocated staff from within the district and managed by a non-profit organization. NMR among the admitted newborns reduced by 14 percent in the first year and by 21 percent in the second year after the SNCU became functional. At the population level, this was estimated to have led to a reduction of NMR by about 10 percent in the district in two years. [7] With this, the present concept of FBNC was born.

The Ministry of Health, Government of India, adapted this model (with extension to the CHCs and PHCs) for scale up. With the launch of NRHM, the focus on newborn care has become central to the child health strategy both at the community and at facility level. The need for facility-based newborn care has increased further since the introduction of JSY in 2005, a cash transfer incentive scheme for promoting institutional deliveries.[8] UNICEF India played a lead role in partnership with state governments in the early operationalization of FBNC in the country. The operational guidelines were formulated to provide details of designing the SNCUs at the district level, NBSUs at first referral units, and NBCCs at all active delivery points in a district. It also provides information on equipment required, manpower details, data collection system, and newborn care protocols.[9, 10]

2. STRUCTURE

2.1 Newborn care facilities at different levels

Three levels of newborn care have been defined in the literature. [11-14] The complexity of management of sick newborns has been used to define the level of care that can be provided for newborns at different health facilities. The service provided at each level is a product of infrastructure, availability of skilled manpower, and the referral capacity of the institution. [9]

The facility-based care for newborns has the following components (Table 4.1):

- **Essential Newborn Care (ENC) to all Newborns:** All newborns delivered at a health facility receive essential newborn care: warmth, resuscitation, early initiation of breastfeeding, prevention of infection, timely identification of illnesses, and referral for complications.
- **Care of Sick Newborns:** All sick newborns receive appropriate special care, especially those with low birth weight, or those with infections, or management other complications (excepting those requiring mechanical ventilation)

Table 4.1: Newborn services at various levels of facilities

	Newborn care corner (at all Delivery Points)	Newborn Stabilization units (FRUs/CHCs)	Special Newborn Care Unit (Sub District/ District)
Care at birth	Resuscitation, provision of warmth, prevention of infection early initiation of breastfeeding, weighing the newborn	Resuscitation, provision of warmth Prevention of infection, early initiation of breastfeeding Weighing the newborn	Resuscitation, provision of warmth, prevention of infection, early initiation of breastfeeding and weighing the newborn
Care of normal newborn	Breastfeeding/ feeding support	Breastfeeding/ feeding support	Breastfeeding/ feeding support
Care of sick newborn	Identification and prompt referral of 'at risk' and 'sick' newborn	Management of low birth weight infants ≥1800 grams with no other complication Phototherapy for newborns with hyper-bilirubinemia Management of newborn sepsis Stabilization and referral of sick newborns and those with very low birth weight(rooming in) Referral services	Managing of low birth weight infants <1800grams Managing all sick newborns (except those requiring mechanical ventilation and major surgical interventions) Follow-up of all babies discharged from the unit and high risk newborns Referral services

Source: Facility based Newborn care: Operational Guidelines. 2011, Ministry of Health and Family Welfare, Govt. of India [9]

The services to be provided at different levels under NRHM are summarized in Table 4.2. [9]

Access to emergency obstetric care (EmOC) has a critical role to play in reducing neonatal mortality. [15] Facility-based care of neonates should be operationalized in tandem with maternal health services. Skilled birth attendance must be ensured at all points of child birth, and EmOC ensured where neonates receive secondary and tertiary care. EmOC includes services aimed at improving the availability, accessibility, quality, and use of services for the treatment of complications that arise during pregnancy. There are two levels of emergency obstetric care, namely, Basic Emergency Obstetric Care (BEmOC), and Comprehensive Emergency Obstetric Care (CEmOC). It is recommended that a population of 500,000 should have five EmOC-providing facilities, with at least one providing CEmOC.[16]

Indian Public Health Standards (IPHS) have been set for facility-based care. These standards have been used as the reference point for public healthcare infrastructure planning and up-gradation in the states and union territories (UTs) for newborn care as well. Flexibility is allowed to suit the diverse needs of the states and regions. These IPHS guidelines acts as the main driver for continuous improvement in quality, and serve as the bench mark for assessing the functional status of health facilities. States and UTs have adopted these IPHS guidelines for strengthening the public healthcare institutions, and put in their best efforts to achieve high quality of healthcare across the country. [17]

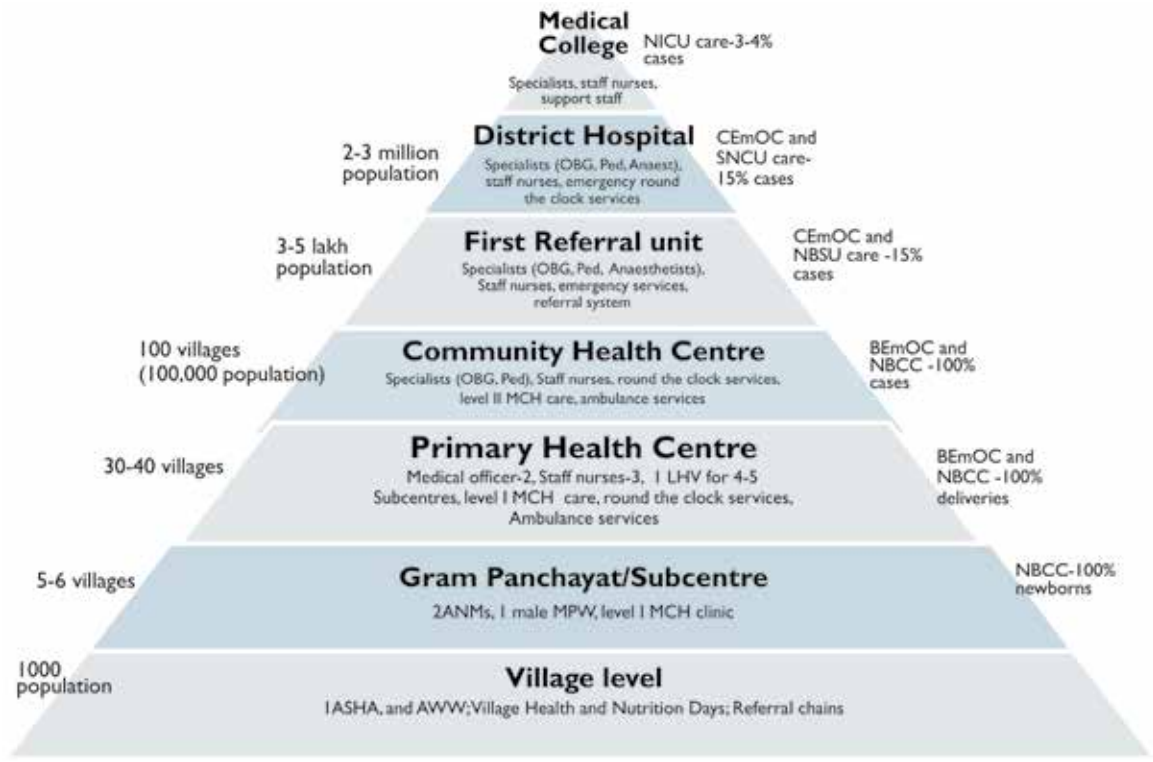
Operational guidelines for FBNC have been developed, and are made accessible to those involved in managing and implementing FBNC. [9, 10]

Table 4.2: Infrastructure for delivery of newborn care

	Newborn care corner (at all Delivery Points in PHCs, CHCs and DHs)	Newborn Stabilization Corner (FRUs/CHCs)	Special Newborn Care Unit (Sub District/District)
Beds	1	4	12 - 20
Area (sq. feet)	20-30 sq. feet	200 sq. feet	Min. 1200 sq. feet (100 sq. ft/extra bed)
Location	Within labour room & OT	Close to thelabour room	Vicinity of labour room
Civil work	None or minimum	Power supply, water supply, lighting, floor spaces and walls	Power supply, floor spaces, walls, water supply, lighting, temperature
Equipment	Radiant warmer and resuscitation kits	Radiant warmers, resuscitation kit, weighing scale, phototherapy unit	Same as NBSU, plusoxygen hoods, oxygen concentrator, syringe pump (desirable: Irradiance meter, multi sign monitor, transport incubator)
Personnel Specialist Doctors Nurses ANMs	 0 1 1 1	 0 1 4 -	 1 3 10 -
NBCC: FRUs and DHs: also set up NBCC in operation theatres, where caesarean sections are conducted. **NBSU:** In addition, 2 beds in the postnatal ward should to be dedicated for rooming in **SNCU:** 12 beds for catering to 3000 deliveries per year and 4 beds may be added for each 1,000 deliveries - additional space for step-down unit (at least 30 percent of SNCU beds e.g. for 12 bedded unit, 4 beds for Step down are required			

Source: Facility based Newborn Care: Operational Guidelines 2011, Ministry of Health and Family Welfare, Govt. of India [9]

Figure 4.1: Health infrastructure to deliver newborn care



2.2 Human resources

Skilled human resources are the key driver to deliver FBNC at all levels. Norms have been put forth to ensure smooth delivery of services in terms of their numbers and training needs. (Figure 4.1, Tables 4.2, 4.3)

2.3 Training

2.3.1 Navjat Shishu Suraksha Karyakram (NSSK)

NSSK was launched in 2009 under the NRHM framework to reduce neonatal mortality. It focuses on the following four main aspects: prevention of hypothermia, prevention of infection, early initiation of breast feeding, basic newborn resuscitation (Table 4.3).

A simple and scalable training module on ENC and resuscitation has been developed for this programme. It encompasses important evidence-based procedures in a simple language to all healthcare providers dealing with care during delivery and care of newborns. The health provider after training will furnish all the required care at birth, identify and manage common complications, stabilize (if necessary) and refer/transfer newborns needing additional interventions. It is estimated that this skill-based training can prevent approximately 1–2 lakh newborn deaths every year.

2.3.2 Facility-based IMNCI (F-IMNCI)

F-IMNCI is the integration of the facility-based care package with the IMNCI package to empower health personnel with skills to manage newborn and childhood illness at the community level, as well as at the facility level. The integrated approach of IMNCI and facility-based care (F-IMNCI) therefore ensures continuum of quality care for severely ill newborns and children from the community to the facility. The majority of health facilities (24x7 PHCs, first referral units [FRUs], CHCs and district hospitals) do not have trained pediatricians to provide specialized care to the referred sick newborns and children. Thus F-IMNCI training helps in skill building of medical officers and staff nurses posted in these health facilities to provide this care (Table 4.3).

Table 4.3: Training programmes for facility-based newborn care at various levels

	Newborn Care Corner (at all Delivery Points)	Newborn Stabilization Unit (FRUs/CHCs)	Special Newborn Care Unit (Sub District/ District)
Training	Navjat Shishu Suraksha Karyakram (NSSK)	Facility-based IMNCI (F-IMNCI)	Facility-Based Newborn Care (FBNC)
Duration	2 days	11 days for those who have not been trained in IMNCI and 5 days for those who are already trained in IMNCI	4 days training followed by 2 weeks of observership
Target groups	ANMs, nurses and medical officers	Nurses and medical officers	Nurses, medical officers and specialists
Trainers	Pediatricians from medical colleges and district hospitals	Senior pediatricians in district hospitals, faculty members of Dept of Pediatrics and Community Medicine of medical colleges	National facilitators from NNF, Indian Association of Neonatal Nurses (IANN), faculty members from Dept of Neonatology of national and regional SNCU collaborative centres
Venue	District hospitals/ medical colleges	Medical college, district hospital/ private health facility with adequate number of deliveries and admitted cases of sick newborns	SNCU or a medical college with MCH level III unit
Batch size	32	16	20–24

Source: Facility Based Newborn Care: Operational Guidelines 2011, Ministry of Health and Family Welfare, Govt. of India [9]

2.3.3 FBNC Training programme

All doctors and nurses posted in SNCUs need to undergo more intensive training, including an observership at a recognized centre.The programme includes skill-based training on essential and special care, skills on clinical management, and additional training on housekeeping and maintenance of equipment. As part of the operational guidelines, collaborative centres have been envisioned to facilitate improvement of FBNC (Table 4.3).

2.4 Role of NNF

The NNF came into existence in 1980, through the initiative of a handful of leading pediatricians working in neonatology, with the primary objective of supporting and improving newborn care delivery in India and helping the country in reducing its burden of neonatal mortality.

There has been a long felt need to formalize the training structure on FBNC. Collaborative centres at national, regional, and state levels have been proposed tot support and implement facility-based care across the country.[9]

NNF has played an important role by providing one of the earliest accreditation norms in 1991 and those setting the tone for quality institutional care in India. These guidelines were revised later in 2012 to be in sync with the contemporary needs of technology, medicines, management practices and other factors. These guidelines and requirements aim to foster understanding of the local needs for delivery of care while ensuring that the basic necessities of delivery care are in place. The accreditation is valid for two years, with surveillance visits/audits taking place on an annual basis. [18] As per the NNF accreditation assessment undertaken as per revised Level II guidelines in 2012–2013, 28 units are accredited, out of which 26 are accredited as level II units and 2 as level III.[19]

2.5 Strategies towards quality assurance in newborn health

Based on the quality assurance process, the government has taken a number of important steps such as planning for quality at the facility level and proposing constituting of state level and district level Quality Assurance (QA) Committees. Along with the proposal of building QA cells, many of the related national and state level guidelines on home-based and facility-based care, including those of IPHS and NNF, have been developed to support the process. [20]

A number of measures for quality assurance and continuous quality assessment have been postulated. [20] The National Health Systems Resource Centre (NHSRC) and State Health System Resource Centres (SHSRCs) have been set up as technical assistance agencies for building capacity (managerial, technical, HR, knowledge management, information sharing and convergence) on healthcare management and qualitative strengthening of institutions. The government has put in place protocols for quality assurance, including clinical guidelines for RCH. A certification process is being instituted to accredit First Referral Units (FRUs) on the basis of infrastructure, staff, drugs, supplies, and quality of services.

3. IMPLEMENTATION STATUS

According to government data, 448 districts have an SNCU each. In November 2013, 1,574 NBSUs and 13,219 NBCCs were functional in the country,

Table 4.4: Progress of FBNC in India (in November 2013)

Year	No. of functional SNCUs	No. of functional NBSUs	No. of functional NBCCs
2009-10	222		
2010-11	263	1120	6403
2011-12	340	1210	9824
2012-13	421	1554	13167
2013-14 (till Nov. 2013)	448	1574	13219

Source: Department of Child Health, Ministry of Health and Family Welfare, Govt of India [24]

although the distribution of functional in CHCs is a concern. [21-24] A total of 6,408 beds were available in SNCUs. More than 600,000 babies were admitted in 2013 and the survival rate was 89 percent (Table 4.4).

4. EVALUATIONS OF FACILITY-BASED NEWBORN CARE

Several assessments have been undertaken by different organizations and institutions to understand the operational issues related to FBNC. [25- 34]

4.1 Assessment of eight special care newborn units, 2009–2010

An assessment of SNCUs which were functional for one year in eight rural districts of India was conducted in 2009–2010.[25] The results indicated that admission rates increased from a median of 16.7/100 deliveries (2008) to 19.5/ 100 deliveries (2009). Case fatality rate reduced within a year of functioning (range of reduction= 4 to 40 percent). Proportional mortality due to sepsis and low birth weight declined significantly over two years (LBW <2.5kg). The major reasons for admission as well as the major causes of deaths were: birth asphyxia, sepsis, and LBW or prematurity.

The units had varying nurse: bed ratios (1:0.5 to 1:1.3). Bed occupancy rates ranged from 28 to 155 percent (median: 103 percent) and average length of stay ranged from 2 to 15 days (median: 4.75 days). Repair and maintenance of equipment remained a major concern (Table 4.5). The findings may not be generalizable to the country but it underscores the status of the initial SNCUs, where the maximum investments were made in terms of time and money.

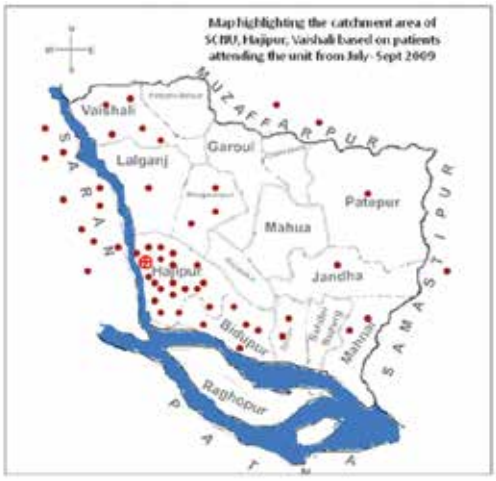
Table 4.5: Assessment of SNCUs performance (2010)

Name of the unit	No. of beds	Downtime of essential equipment (months)	Asepsis score (out of 11)	Average length of stay (days)	Bed occupancy rate (%)
Tonk	12	6	5	5.1	106
Dibrugarh	17	1.5	8	4.4	137
Mayurbhanj	12	6	3	4	155.3
Purulia	14	1.5	9	15	100
Lalitpur	12	3	5	3.4	52
Vaishali	13	1.5	5	2.2	28.1
Guna	20	0.5	7	5.5	130
Port Blair	14	6	9	5.6	96

Source: Department of Child Health, Ministry of Health and Family Welfare, Govt of India [24]

Figure 4.2: Catchment area of SNCUs in two districts (2010)

Without Neonatal Stabilization Units



With Neonatal Stabilization Units

The assessment showed that expansion of SNCUs did not correlate with an increase in the number of NBSUs and NBCCs. [26] (Figure 4.2) The catchment areas of the SNCUs of two districts were compared one with a good network of NBSUs, and another without a good network. The reach of services to the community was much wider with a good network of SNCUs and NBSUs, than those that didn't[25]

4.2 Evaluation of skill-based child health training (2012)

An assessment of training programmes was conducted in 2012 by the Deloitte group in Maharashtra, Karnataka, Madhya Pradesh, Rajasthan, Bihar, and UP. [27]

The Selection of trainees was highlighted as a concern, since they often included ANMs posted at outreach centres, or those who were never posted to labour rooms. The report indicated that people who organize the training programmes should be trained on specific points like maintaining adequate trainer: trainee ratios and ensuring all training aids are available at the training site. At deployment sites, retention of knowledge and skills corresponded with the delivery load of institutions. Quite a few facilities did not have adequate infrastructure, equipment, and drugs.

The training could have been more effective if the training materials had been translated into local languages in addition to Hindi, and the training duration for ANMs and LHVs increased to three days, the report said. Another suggestion was to group doctors and paramedical staff separately while conducting the theory sessions under NSSK. A robust monitoring and evaluation mechanism to assess the performance of the trained staff, coupled with supportive supervision to initiate corrective action, were among the recommendations for improving the impact of the training.

4.3 Sixth Common Review Mission (2012)

The Common Review Missions have served as an important mechanism for monitoring the progress of programmes under NRHM, and in providing timely course correction.[28] The findings of the sixth Common Review Mission organized in 2012 are discussed here.

Seven states from the high focus group (Bihar, Chhattisgarh, Madhya Pradesh, Odisha, Rajasthan, Uttarakhand, Uttar Pradesh), three from the North-Eastern group (Assam, Manipur, Tripura) and five were from the non-high focus group (Delhi, Kerala, Punjab, Tamil Nadu, West Bengal) were studied. A total of 171 resource persons constituted the 15 state teams.

The findings showed that there has been significant progress in creating new facilities and infrastructure at subcentre, community health centre (CHC) and district hospital (DH) levels, but not at PHCs level whose numbers have stagnated or declined. Availability of drugs had increased at all levels. Interrupted and inappropriate supplies, due to poor logistics, continued to be a problem.

There was a marked increase in attention to quality of care across all states. Some elements of quality such as clean toilets, patient amenities, clinical protocols, grievance redressal, signages, and bio-waste management showed progress in all facilities visited.

4.4 Two year progress of SNCUs in India: A brief report (2014)

This report, prepared by the Child Health division, MoHFW together with Saving Newborn Lives project of Save the Children, provides a comprehensive review of the progress made by the country in terms of establishment and functionality of SNCUs during the two year period (April 2011 to March 2013). Information available from the routine monitoring system was used to prepare this report. Submission of written records was considered an essential pre-requisite for SNCU to qualify as an 'operational unit', with less than 4 beds were not considered for the final analysis.[21]

Compared to the baseline figure of 253 SNCUs in April 2011, the number of reporting units increased to 391 in March 2013, indicating an increase of 138 units (55%). However, 13 States/UTs did not report even a single operational unit. SNCUs were present in 318 districts, representing 49% of all the districts in the country, and 41% (76/184) of the High Priority Districts (HPDs) under the RMNCH+A Strategic Approach.

There was considerable improvement in bed strength as per the recommended norm of 12 or more beds per SNCU. In March 2013, 86% of SNCUs in the EAG and NE states had bed strength of 12 or more, while the proportion of such units in the non-high focus states and UTs was 73%. However adequacy of human resources was a matter of concern, with only 53% units having an adequate number of doctors, and less than 50% units having an adequate number of nurses.

During the year 2011-12, there were a total of 3,60,173 admissions reported from the SNCUs, out of which 40,686 babies died, resulting in an annual mortality rate of 11.3%, while during the year 2012-13, a total of 57,050 babies died out of 4,89,154 admissions, suggesting an annual mortality rate of 11.7%.

A detailed profile of the admissions was available for the year 2012-2013 only. During this year, the Inborn Admission Rate in the SNCUs (out of the total live births in the facility) was 19% for the country, with 17% rate in the EAG & NE States (range: 6-45%), and 22% in the Non High Focus States & UTs (range: 7-56%). Out-born babies constituted 38% of the total admissions, and the proportion of out-born admissions ranged between 30-50% in most states. The proportion of female babies admitted in the SNCUs was lower than that of male babies among both inborn and out-born babies (42% versus 39%), but the difference was higher among out-born babies. LBW babies made up more than half of the total admissions (55%), and these included 14% Very Low Birth Weight babies (VLBW babies with birth weight less than 1500 gms). The three main reasons for admission to the SNCUs were birth asphyxia (22%), others (18.3%) and sepsis (18%) (Others include hypothermia, hypo-glycaemia, congenital malformation, other causes of respiratory distress).

Almost 75% of the admissions were discharged alive, while 6% sick babies were referred to higher facilities and 5% left against medical advice. The majority of the babies stayed in these units for 1-7 days, with equal proportion staying for either 1-3 days or 4-7 days. Nearly one-third of all the admissions (36% for inborn admissions) were due to intrapartum complications (birth asphyxia and meconium aspiration syndrome). These were also among the most common causes of death reported from the SNCUs.

4.5 Assessment of FBNC in Andhra Pradesh, with special emphasis on SNCUs (2012)

The Government of Andhra Pradesh, in collaboration with UNICEF Hyderabad, undertook an assessment of the existing 14 SNCUs within the government sector in 2012. [29] Out of the 14 SNCUs reviewed, only two were sanctioned neonatal units. The infrastructure and design of most of the SNCUs were neither uniform nor consistent with the standards developed by the Government of India, NNF, or UNICEF. Most SNCUs had a huge patient load and limited resources.

Most labour rooms and operation theatres did not have a functioning NBCC. A gross deficit in human resources, a severe shortage of nursing staff, and inability to retain trained nurses was observed in all the SNCUs. Among those working, a large proportion of nurses and doctors had not undergone any formal training in newborn care.

Water supply was erratic in a few facilities. There was no safe drinking water available for making formula feeds in most of the facilities. The hand washing facilities were inadequate in the existing as well as in some of the planned new SNCUs. More importantly, the hand washing protocols were seldom followed.

The electricity supply was reported to be fluctuating, and no facility had adequate and exclusive generator back-up. There was no side laboratory, triage room, and counselling room for mothers in most units. Equipment for safe transfer of newborns from labour room and operation theatre to the SNCU was not available in any of the facilities.

The staff posted in the units were not trained to use and maintain the equipment. A large proportion of equipment remained unutilized due to pending repairs. The number of biomedical engineers was highly inadequate. The quality of care being delivered was seriously compromised. Handwashing compliance was inadequate. Standard operating procedures for waste disposal, disinfection of equipment, or housekeeping were not in place.

There was no tracking of discharged neonates and regular follow-up clinics in almost all the units. The average SNCU mortality rate calculated from April to October 2011 for the 14 facilities was 16.9

percent. The three leading causes of neonatal deaths in the SNCUs were respiratory distress syndrome, birth asphyxia, and sepsis.

4.6 A rapid assessment of Newborn Stabilization Units (2012)

A national-level rapid assessment was carried out in 23 NBSUs (at FRUs, sub-district hospitals and CHCs) and 46 NBCCs across the six states (two districts in each state) - three EAG states (Assam, Odisha, and Rajasthan) and three non-EAG states (Gujarat, Tamil Nadu, and West Bengal). [31]

The maintenance of equipment was a major issue in the NBSUs. Most of the critical equipment like infusion pumps and pulse oximeter were unused due to poor maintenance support. Supply of drugs and consumables was not regular. The drugs supplied were in adult dose, making their administration to children difficult. Often drugs had to be purchased by the patients' families from outside, leading to out-of-pocket expenditure for poor patients.

CEmOC services were offered in more than half facilities (65 percent) but an in-house blood bank was not available at 88 percent of the facilities whereas blood storage facilities were available in 43 percent of the visited facilities. Only 17 percent of NBSUs had staff nurses dedicated to the units and about one-third of the units had an operational system of round-the-clock nurse availability with a medical officer on call.

Most of the facilities visited were found to be grossly underutilized in terms of admissions and duration of stay. Only one-fifth of the NBSUs had average monthly admissions of more than 10. The proportion of LBW admission was low and LBW babies were being admitted mainly for referral purpose and were not being managed since none of the facilities had average duration of stay at NBSU of more than 24 hours.

About half of the NBSUs had experienced supervisory visits by the state or district officials but a mechanism of continuous technical support and mentoring was lacking in more than 90 percent of the units. The concept of FBNC in the health system was weak as referral linkages were poor.

A rapid assessment of 46 NBCC facilities undertaken also revealed a somewhat similar picture. The conditions in the labour rooms were not very encouraging. The protocols for infection control were not being followed regularly and techniques for the asepsis were inadequate. The infrastructure of the labour rooms was in varying conditions of being poor to inadequate and under repair. The toilets were unclean. The staff working in the labour room did not have a clear idea about essential newborn care. Most of them lacked basic skills for the care of the newborn in the golden first minute.

The condition of the postnatal wards was similar, being overcrowded and neglected. The postnatal ward, labour rooms and NBCC were mostly managed by personnel posted at labour rooms and hence they were always overworked. It was observed that only two-third of the patients stayed back for 48 hours. The discharge advice was usually given by the staff nurses and was mostly inadequate due to lack of time.

4.7 Effect of facility-based neonatal care interventions in Nagaur and Chattarpur districts (2010–2012)

To study the impact of facility-based neonatal intervention on neonatal survival outcomes, an operational follow-up research study was done to compare changes from baseline to current neonatal care delivery status (2009-10) in Nagaur district of Rajasthan and Chhatarpur district of Madhya Pradesh.[32] In both the districts, one district hospital and two community health centres were chosen for study.

Assessment of facility readiness for providing ENC showed improvement in infrastructure in all the six facilities as compared to the baseline level. Basic infrastructural facilities (water, electricity and delivery rooms) were available in all facilities. SNCUs were started in both the district hospitals and NBSUs were established in the CHCs. Availability of human resource (pediatricians and staff nurses) was found to be compatible in the majority of SNCUs and NBSUs.

Most essential and emergency drugs were available at all facilities. Almost all ENC equipment was

available in the district hospitals but gaps existed at the CHCs. The quality of newborn care at peripheral facilities is a major concern due to the absence of functioning essential equipment.

Healthcare professionals demonstrated improvements in knowledge but this did not translate into correct practices. Major gaps were identified in the skills of paramedical staff in providing ENC services such as the use of bag and mask for resuscitation, measurement of axillary temperature, and infrequent practice of Kangaroo Mother Care (KMC). Record keeping was good in district hospitals but inadequate in CHCs. Prematurity with LBW, asphyxia, and infections emerged as the three major causes of neonatal deaths.

The facility-based NMR was 16.3 in DH Nagaur and 41.1 per 1,000 live births in Chhatarpur. There was a slight decline in mortality due to asphyxia and infections in both the DHs. Interviews with the clients showed that counselling at the time of discharge was inadequate.

4.8 Facility readiness to deliver essential newborn care services

The readiness of facilities to provide essential care to newborns gives an insight into the existing situation of the facilities. Several efforts are underway to do it objectively, either independently or as part of other initiatives. [26, 31, 33, 34] Maternal and Child Health Integrated Programme (MCHIP) developed a checklist to measure the facility readiness objectively. The assessment included different types of health facilities including SCs, PHCs and CHCs from Jharkhand, Haryana, and UP. The key components considered were infrastructure, delivery services, newborn care corners, essential drugs and equipment, record keeping and reporting, knowledge and skills of care providers, and infection control measures. [33]

The facilities were classified into achiever (if total score exceeded 80 percent), partial achiever (between 50 and 79 percent), and non-achiever (less than 50 percent).

On the whole it appeared that

- infrastructure (including newborn care corners and delivery services), essential drugs and supplies were average;
- knowledge of care providers was average to good ;
- skills were predominantly poor but in some places average; and
- infection control practices were poor and needed considerable attention.

4.9 Quality Assurance for newborn care

Attention to quality of care across all states is increasing but there is also considerable fragmentation. Some elements of quality clean toilets, patient amenities, clinical protocols, grievance redressal, signages, and bio-waste management show progress in all facilities visited, but other areas are neglected. [27]

Table 4.6: Facility readiness assessment for essential newborn care (2010–13)

Parameters	Jharkhand 2010 (20 facilities)	Haryana2013 (31 facilities)	UP 2011 (24 facilities)
Infrastructure	average	average	average
Delivery practices and services related to essential newborn care	average	average	poor
Human resource	poor	average	poor
Essential drugs, equipment, and supply	average	average	poor
Register and case records	average	poor	poor
Protocols and guidelines	poor	poor	poor
Aseptic measures	poor	poor	poor
Providers' knowledge and skills	poor	poor	average

Source: MCHIP report, 2012 [33]

Quality Assurance for improving newborn health: Experience from Bihar

UNICEF Bihar, in partnership with Indian Institute of Public Health, Delhi, and State Health Society, Bihar developed and implemented a quality assurance mechanism to improve the system, processes, and outcome of the facility-based newborn care in the state. [35,36]

One of the main objectives of the task was to ensure supportive supervision and quality monitoring of the facilities as an ongoing process. The model originally conceptualized had an internal monitoring system (to be used by doctors, nurses and managers of SNCUs) coordinated by civil surgeons. The external monitoring component required a team of people to visit the facilities every quarter, assess them based on a checklist, and give feedback to the staff. A reporting system was created to enable smooth flow of data that was compiled at the State Health Society from the field. The process was streamlined in a year. The gaps identified were analyzed using root cause analysis and doable recommendations were put forth.

The government showed a lot of commitment in creating a pool of people who would be involved in the activity. They also complied with the recommendations that emerged and suggested practical solutions to the problems. For instance, to address the problem of equipment, they proposed recruitment of biomedical engineers. Till the time they were in place, it was suggested that at least one nurse and one doctor from each unit be trained in handling minor repairs. This kind of sensitization was done during quarterly meetings by a group of engineers.

The impact of the model is evident from the growing numbers of fully functional NBCCs. During the process several fully functional NBCCs became partially functional since aseptic measures were not followed. [36]

Infection control was a problem in all states except Tamil Nadu. Quality Assurance committees exist, but their functioning and value addition is uncertain. There is no "measurement" of quality improvement, except in a few instances where more comprehensive quality management systems were set up.

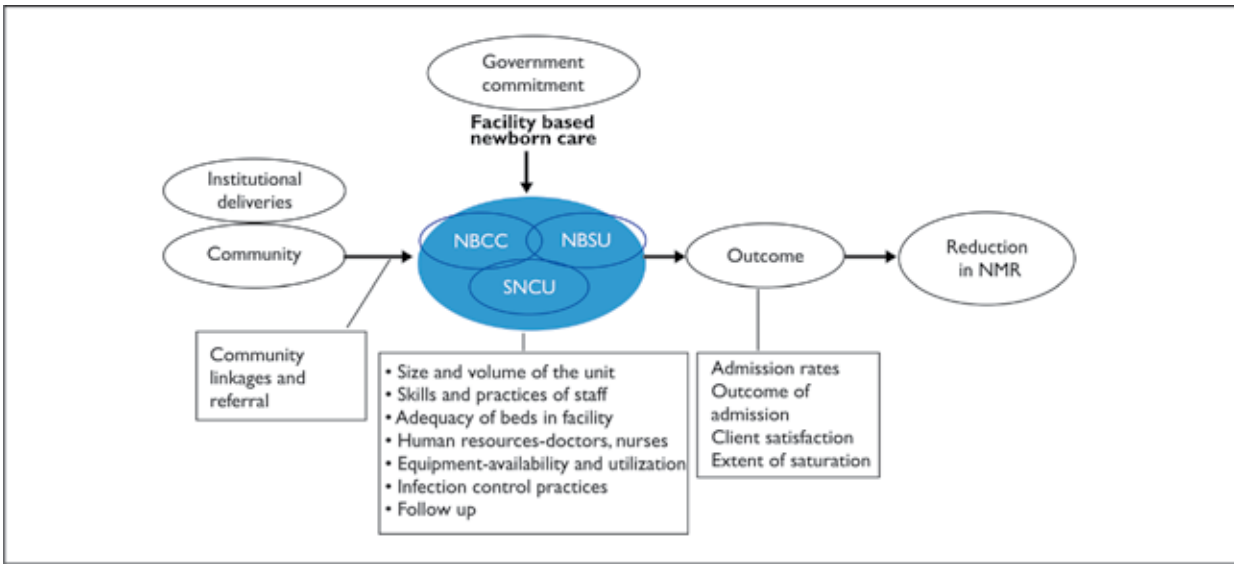
Several states have state-level Quality Assurance Committees: Assam, Bihar, Chhattisgarh, Kerala, Madhya Pradesh, Manipur, Odisha, Rajasthan, Uttar Pradesh, and West Bengal. The following states also have district-level Quality Assurance Committees: Assam, Bihar, Odisha, Rajasthan, and West Bengal. [35]

5. IMPACT AND CHALLENGES

The country has witnessed a huge leap in terms of FBNC in the past 10 years. Since the time the first model was set up in 2003, the number of facilities has grown exponentially. Guidelines and protocols have been developed in accordance with the IPHS standards to guide the entire process of expansion. A strong political commitment has enabled the states to take forward the agenda of FBNC.

A conceptual framework to understand the parameters influencing facility-based care is depicted below (Figure 4.3)

Figure 4.3: Conceptual framework for key parameters that influence facility-based newborn care



Source: An evaluation of special care newborn units in eight districts of India, 2010 [25]

Utilization of services in facilities is the outcome of its functionality, number of institutional deliveries and linkages with the community. Clearly, the utilization of FBNC services has increased over time.

5.1 Impact

Quality of facility-based care is likely to improve newborn survival. An indirect marker (outcome) is the case fatality rate (CFR) among hospital admissions, in particular, the SNCUs. The overall picture reflects that most of the units have demonstrated a decline in CFR. It is noteworthy that overall mortality in SNCUs is around 11 percent. [24]

5.2 Challenges and bottlenecks in assuring quality

Most studies indicate that infrastructure has been well developed over the past decade and simultaneously delivery of services has also increased. However, quality of services is a concern. This is due to some bottlenecks, which can be surmounted with suggested measures, identified below.

5.2.1 Ensure skilled manpower

Apart from the low numbers of trained people, retention of the existing pool of trained people is an emerging problem. This is mainly attributed to low pay, lack of incentives to work in rural areas,

Possible solutions to address shortage of human resources

Solution 1: Task-shifting: lowering the bar

- **From pediatricians to graduate doctors**

In Gujarat, to combat the shortage of pediatricians for newborn care, the state government launched a short course on "Emergency Newborn Care for Medical Officers" (EmNC) for graduate medical officers. The duration of the course is 120 days, out of which 30 are spent in an FRU or district hospital, managing newborns. The nomination is based on an undertaking by the state government that after training, the medical officers will be posted in one of the pre-identified FRUs or CHCs. An online course has also been rolled out on FBNC. Medical graduates working in SNCUs can undergo training through these courses.

- **From nurses to nursing aides and Yashoda**

Nurses perform specialized and unspecialized functions. In Purulia district in West Bengal to partly overcome the severe shortage of trained nurses for SCNU, newborn aides were engaged. Local young women with 10 to12 years of school education were provided hands-on training for six months, followed by a six-month internship at SCNU. They performed simple housekeeping functions and took care of newborns, under the supervision of trained nurses. Assessment by external experts suggested that they had acquired reasonable levels of skills. Their involvement freed the limited number of nurses for more specialized functions.

Yashoda, a facility-based ASHA, was introduced in NIPI districts in 2008, as an innovative pilot effort to improve quality of newborn and related maternal care in the district hospitals' maternity wards with high delivery load. Yashoda is a volunteer support worker paid a performance-linked incentive, who acts as a catalyst and supports the nursing staff. These volunteer workers are provided with appropriate training and service kits. The mechanisms for their supervision, monitoring, reporting, and recording are in place.

Solution 2: Attract, retain, and motivate human resources

Providing special care to newborns requires higher skills and often more strenuous work conditions than in many other disciplines. By providing improved work conditions, higher remuneration, and recognition of their work in public, the state government of Madhya Pradesh and UNICEF have been able to attract and retain pediatricians and nurses for the special care newborn units. In many cases, these initiatives have reversed the brain drain: many doctors have left private practice (some even their career overseas) and joined these units.

Besides improving the remuneration and working conditions for the staff working in newborn care units, this programme also identified pediatricians working at PHC level where their skills were not being adequately utilized and relocated them to functional SCNUs. The pediatricians undergoing training in Neonatology are posted at various SNCUs and this takes care of the shortage of doctors.

Solution 3: Ensure optimum skills among doctors and nurses

- Use tele-education for training and refresher courses
- Enrol personnel in on line courses
- Conduct on site mini workshops to sharpen skills

absenteeism (because of private practice), and brain drain. [37]

Almost half of all the SNCUs have inadequate nurses and doctors. [25,29] Availability of doctors is not an issue but many of them are multi-tasking and involved in other activities besides SNCUs. In the absence of an adequate pool of doctors, they are mobilized from the PHCs leaving those positions vacant. It is also known that despite advertisements for doctors to be appointed on contractual basis, they refuse to join because of absence of clear cut guidelines about promotions and financial benefits. [38] The problem of doctors and nurses may be addressed by task shifting.

The quality of care in a facility is the outcome of trained personnel, adherence to guidelines and adequate manpower. Good quality training of personnel involved in delivery of newborn care is the key solution and guidelines are in place but unfortunately these have not kept pace with the demand of expansion. While some studies indicate that the duration of training is different from what is advocated by NNF, there are others that have shown that staff has been put on a job without any formal training.[25,31-32]

5.2.2 Ensuring functional equipment

The neonatal services are equipment-driven services. The reasons behind poor functionality of equipment are the following: poor quality of supplies, lack of power backup for the SNCUs (not relying on the hospital generator), absence of annual maintenance contract (both preventive and corrective), delayed repair of equipment, absence of local biomedical engineers, and lack of training on how to use equipment. [39]

5.2.3 Meeting the challenge of admission overload

All assessments have reported admission overload and this calls for action since it directly compromises the quality of care delivered. The prime reasons behind this – apart from the vast numbers - are lack of adherence to admission and discharge guidelines and inability to refuse admissions on social or moral grounds. Institutional deliveries have increased and so has the demand for FBNC. This has resulted in sharing of beds by already vulnerable neonates. Clearly, if the pressure to admit more babies is there, there is a possibility of discharging babies prematurely and in such cases, the re-admission rate goes up.

The average length of stay is another component that influences the quality of care. This is further aggravated as the FBNC is not developed as a three-tier system.

It is estimated that for a one million population of a district (with a crude birth rate of 20/1,000 population and 20 percent of babies requiring special care, and the average length of stay of five days), the total number of beds required in a district would be 55-60. [13, 14] Clearly, the number of existing beds is short of the estimates. Ultimately, each district would require 2-3 SNCUs. [24, 25, 29]

Possible solutions to address the problem of equipment
• Carry out a power audit of the units and ensure stable power input (demonstrated by Assam) • Build a five-year AMC into the procurement contracts (as in MP) • Train SNCU staff in equipment use, troubleshoot before installation, and perform preventive maintenance (as in Bihar) • Engage local biomedical engineers for repair of equipment (as in MP) • Earmark funds for local repair of equipment and empower the SNCU head to use funds without going through administrative hassles (as in MP) • Conduct regular audits of equipment functionality and performance (as in Assam) • Accreditation of the units are currently under consideration

Possible solutions to address admission overload

Solution 1: Task-shifting: lowering the bar

- Emphasise that doctors and staff nurses must follow admission and discharge criteria
- Create a Kangaroo Mother Care in every facility of six to ten beds to provide care to stable babies
- Involve mothers in care of sick newborns to improve outcomes and reduce the workload of nurses.
- Develop linkage with NBSUs and the entire network of NBCCs, NBSUs and SNCUs instead of focusing on SNCU alone.

5.2.4 Ensuring adherence to infection control

Protocols exist but proper adherence to them is a challenge. [25,27,29-31] The reasons could be related to the attitude of the staff but more commonly it is because of lack of adequate number of people, admission overload, less number of taps inside the unit, and so on.

The findings from assessments of Purulia and Port Blair SNCUs gave very useful insights in this regard. Both units fared well in adherence to infection control protocols. The members were able to narrate the measures that nurses and doctors followed and instructions given to the mothers even three months after their discharge. [25] The authors corroborated these with the quality of training that the staff underwent before starting their work in SNCUs. This underscores the fact that the quality of training does have an influence on the performance of the staff and the units.

Possible solutions to improve adherence to infection control measures

- Ensure 24x7 availability of running water for hand hygiene; ensure alcohol hand rub as required
- Ensure quality training and refresher sessions (demonstrated in Purulia and Port Blair)
- Use surprise check and CCTV monitoring

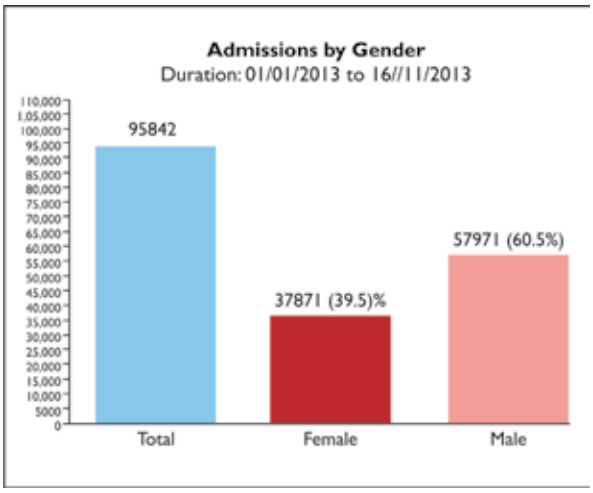
5.2.5 Ensuring post-discharge care and follow up

As many as 10 percent of neonates would die after being discharged from SNCUs, as highlighted in a report. [24] It was therefore thought essential to link SNCU care to a strong follow up and home care programme. In some states like MP this is ensured through a mobile phone enabled tracking system in which mothers and ASHAs are connected to the SNCU for follow up contacts. There is a need to replicate this model in all states.

5.2.6 Ensuring access to both girls and boys

Discrimination resulting from gender bias results in more admissions of male sick newborns as compared to females. (Figure 4.4) Data from select states have shown that male admissions are twice the number of female admissions. [40]

Figure 4.4: More male admissions to SNCUs resulting from gender bias in care seeking



Source: SNCU Online Data: MP, Maharashtra and Haryana, 2013 [40]

Measures to improve care seeking at the community level have been discussed in earlier chapters (2 and 3). The health professionals working at facilities should be aware of this reality and make sure that girl neonates do not face any barrier to care.

A study conducted in Chhatarpur (MP) and Nagaur (Rajasthan) revealed that the deaths after discharge from SNCUs were higher for females. [41] This underlines the need to ensure extra efforts by ASHAs to support female neonates at homes post-discharge through HBNC.

Possible solutions to improve compliance
• A separate room for follow up of babies, open on all days, is necessary. It should be duly emphasized at the time of discharge. • A mechanism to track babies discharged from SNCUs. This has been demonstrated as a good practice in MP. • Strengthening the network of FBNC as a three-tiered system (with linkages between NBCCs, NBSUs and SNCUs) should be our aim.

5.2.7 Affordability barriers for the poor

This pertains to low income/resources, corrupt practices of staff, and the high cost of private sector care. Usually services provided at the facilities are available at no or minimal cost. Yet families spend money on treatment of babies if they are admitted. Exit interviews in Punjab and Odisha showed that most antibiotics for sick newborns were purchased from outside. [27] There were provisions for free treatment of BPL families before JSSK was launched, but unfortunately families did not ask for or get information on this at the time of admitting the baby for treatment. However, with the advent of JSSK and awareness created in the community, this is being resolved. [42]

5.2.8 Monitoring FBNCs

Use of data for monitoring the status of FBNC is crucial. Maintenance of record as well as transmission is a critical challenge at various levels in the system. Lack of uniform guidelines and lack of awareness and motivation were the major hurdles in the way of efficient data management initially. However, with the current thrust that is being laid on this component, uniform guidelines have been issued to the states and as a result the reporting system has improved. [45]

The Madhya Pradesh government and UNICEF have developed a real-time, online data management and follow-up tracking system which monitors the quality of care at SNCUs and tracks newborns till they are one year old. This is now being rolled out in the country in phases.

In addition, supervisory and monitoring checklists are also available that can enable anyone to assess the key parameters with ease. Checklist-based interventions aid management of complex or neglected tasks and have been shown to improve performance of health systems. Results from a pilot, pre-and post-intervention study conducted in a district level birth subcentre in Karnataka between July and December 2010 have shown that it markedly improved delivery of healthcare practices. [46]

Possible solutions to improve affordability issue
• In Tamil Nadu, the nodal officer of NICU (pediatricians) along with another pediatrician, has already been nominated by the State Health society to conduct weekly visits to well baby clinics in the PHCs in the blocks with high IMR. These clinics will provide an array of diagnostic and preventative care services. The volunteers placed in the villages will be providing follow up support for high risk babies. The strategy has been implemented in 10 identified high IMR blocks in the year 2012–2013. [43] • In Gujarat, under the Bal Sakha scheme, all babies born to BPL mothers in the state (approximately 3,00,000 births per annum) are covered for neonatal care by partnering pediatricians, including care in their Neonatal Intensive Care Unit (level 2), at no cost to the beneficiary. This model based on public-private-partnership aims to reduce NMR in the state. [44] • Availability of antibiotics in dosages that are suitable for newborns is a challenge – which is the reason according to doctors for patients having to purchase them. In Purulia, a separate system to supplying drugs suitable for neonates directly to SNCUs has been initiated instead of relying on the share that they used to get from the Pediatrics Department's supply.

Figure 4.5: A snapshot of the online data monitoring system for FBNC

6. WAY FORWARD

Evidence

- The number of SNCUs, NBSUs and NBCCs has grown at a very rapid pace, however the quality of care is variable.
- Guidelines and protocols on FBNC are currently in place
- The linkages of SNCUs with NBSUs and NBCCs are weak.
- NBSUs have not received the required attention and have remained a weak link in most districts.
- Increased demand for services coupled with absence of an intermediate level has resulted in an overload at SNCUs.
- Shortage of doctors and beds, and absence of mechanisms for timely repair of equipment are common challenges.

Recommendations

- Take measures to diffuse best practices from states/districts with well-functioning FBNC to states/districts with poor coverage and quality; create opportunities for this cross learning.
- Establish sustainable quality assurance systems for FBNC in all states to ensure high standards of care.
- Engage medical colleges' faculty and other eminent paediatricians to mentor quality FBNC.
- Build effective scale up of Kangaroo Mother Care on the existing platform of FBNC.
- Ensure staff policies that support retention and motivation of the staff; address negative aspects of contractual appointments, low remuneration, lack of career progression and other issues.
- Strengthen the model of NBSU (by integrating KMC facilities, standardizing protocols and having a follow up system in place) to make this level of FBNC more functional and effective.

- Strengthen linkages between SNCUs, NBSUs, and PHCs.
- Improve skills and motivation of care providers to follow standard algorithms and protocols.
- Ensure quality home care and follow up of babies after discharge from facilities.
- Conduct situational analysis of neonatal care services in the private sector and assess scope to improve their quality.
- Consider engaging private facilities in providing neonatal care through public–private partnership.
- Invest in operations research to improve quality of care and neonatal outcomes at the facilities.

Acknowledgement

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Chapter 5

NEWBORN HEALTH IN URBAN INDIA

OVERVIEW

The rapid population growth in urban India has outpaced the municipal capacity to build essential infrastructures that make life in cities safe and healthy. Local and national governments alike are grappling with the challenges of urbanization, with thousands migrating from villages to cities. Many of them ultimately end up living in slums, which are, in fact, a product of this uncontrolled migration. Thus urbanization in India has been accompanied by a concentration of poverty and urban public health has emerged as one of the most pressing priorities facing our country.

Children's health is primarily determined by socioeconomic conditions, which in turn are shaped by the distribution of power and resources. The consequences of having too little of both are evident in informal settlements and slums.

This chapter focuses on newborn health in urban areas in India. It discusses the challenges, roadblocks, efforts, and initiatives by the government and other national and international organizations, possible options, research priorities and the other requirements needed to gear up the urban health systems to cater to newborn health.

1. URBAN HEALTH SYSTEM IN INDIA

1.1 Health service provision in urban areas: a historical perspective

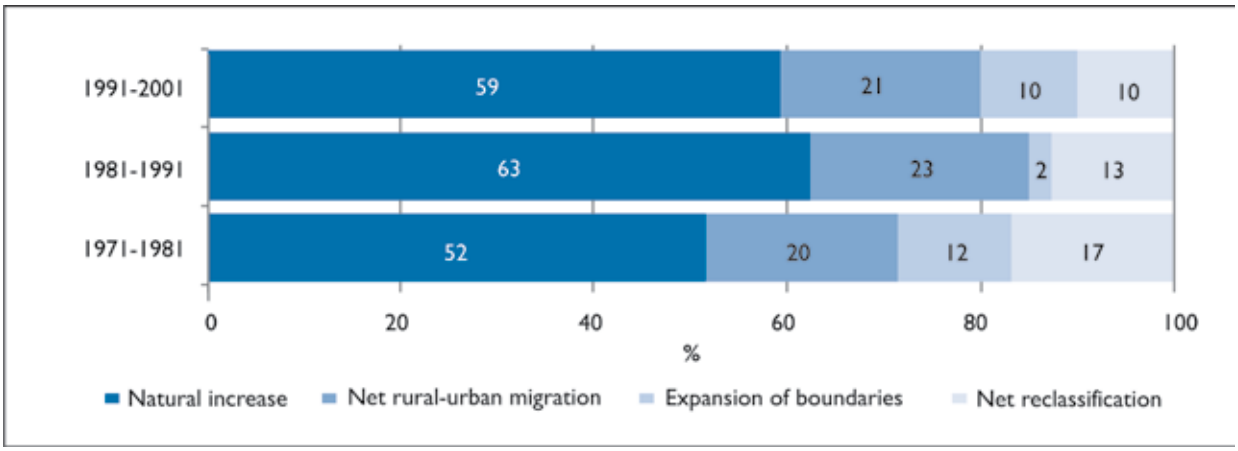
Urban Family Welfare Centres (UFWCs) have been functioning in India since the first family planning programme launched in 1951. In the 1980s, as a result of the recommendations of the Krishnan Committee Report, 1982, Urban Health Posts (UHPs) were opened to provide primary healthcare for urban slums and the urban poor. The major responsibilities of these posts are to work as channels for providing integrated service delivery including antenatal, natal and postnatal care; child immunization; treatment of minor ailments; and advice and services to family planning acceptors. The UHPs were initiated under the Urban Revamping Scheme sponsored by the Central Government. The Ministry of Health and Family Welfare, Government of India, provides an annual grant for UFWCs and UHPs.

Over the years, various committees such as the Bhore Committee 1946, Jungalwalla Committee 1967, Bajaj Committee 1996, Mashelkar Committee 2003, and the National Commission on Macroeconomics and Health 2005, have suggested ways to strengthen the health sector. Subsequently, the Ministry of Health and Family Welfare has launched a National Health Mission (NHM) with two sub-missions: NRHM (already approved by Cabinet for continuation upto 2017) and a new sub-mission National Urban Health Mission (NUHM).

1.2 Population trends in urban India

India's urban growth has been described as following a "2-3-4-5" pattern: annual population growth of 2 percent, urban population growth of 3 percent, mega-city growth of 4 percent, and slum population growth of 5 percent. [1, 2] Urbanization – the increasing proportion of the population who live in urban areas – happens in three ways. First, people move from rural to urban areas. Although this is perceived as the primary form of migration, it has not been the main driver of India's recent urban growth. [3] Second, urban populations grow, and if this growth is greater than that of rural areas – if urban birth rates remain high and death rates fall compared with those in rural areas – urban population growth exceeds rural population growth. Third, areas that were classified as rural or peri-urban are reclassified as urban: the city sprawls and the spaces between satellite towns are filled in. Figure 5.1 summarizes the sources of increase in the urban population. Natural increase is the main driver. Though a substantial contributor, rural-urban migration has contributed a fairly steady 20 percent to urban growth over three decades.

Figure 5.1: Proportionate contributors to urban growth in India, 1971-2001



Source: HPEC, 2011 [3]

Figure 5.2 shows India's steady rise in urbanization, to 31 percent in 2011. The 2011 Census describes an urban population of over 377 million within a total population of 1.21 billion. [4] This is expected to grow to 590 million by 2030. [5] Assuming a crude birth rate of 18 per 1,000, [6] about 18,600 babies are born every day in urban India.

1.3 Where do the urban poor live?

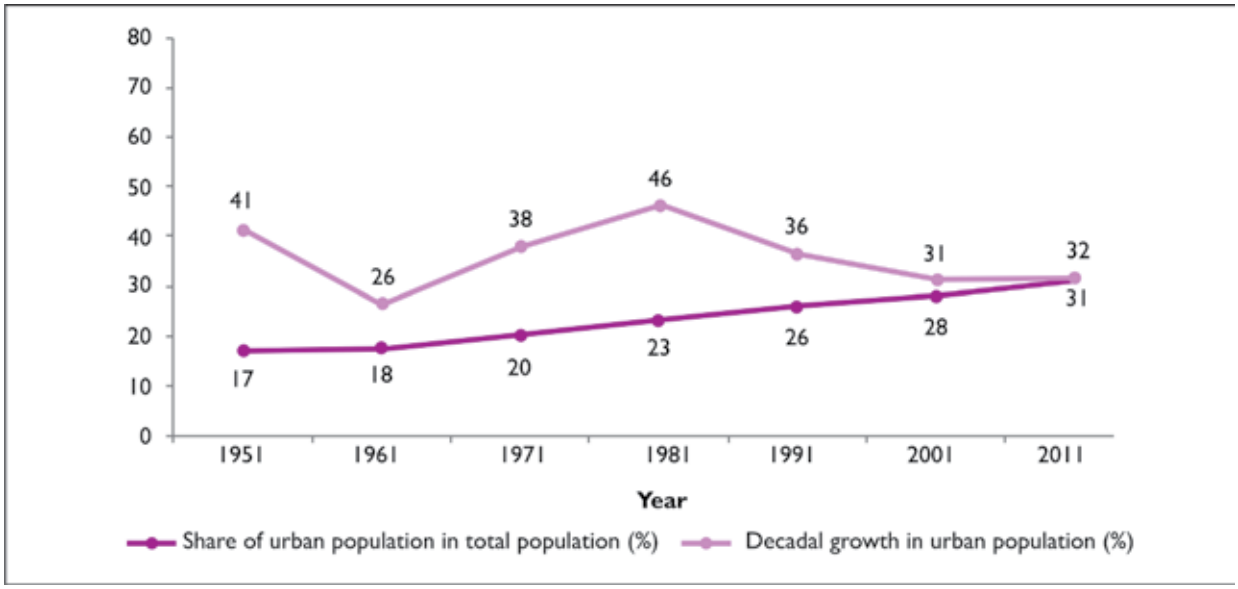
Urban Indians live in 7,935 towns and cities, of which 468 have populations of at least 100,000 and house 70 percent of urban residents. Of the 53 cities that have populations of over one million, three – Mumbai, Delhi, and Kolkata - are mega-cities of over 10 million. Although the idea of urban India conjures up images of these mega-cities, the fact is that they have functional municipal corporations with a long history of grappling with urban concerns and – at least to some degree – the health of their people. The most vulnerable healthcare systems are in rapidly growing smaller towns with less prepared governmental bodies with more fragile health services. [8]

While India awakes to the challenges of urban health, the reality is that city-dwellers are often over-supplied with healthcare choices. State government hospitals and municipal facilities at primary, secondary, and tertiary levels are accompanied by private sector providers from allopathic, Ayurvedic, Unani, Siddha, and Homoeopathic traditions (AYUSH). From single-handed practitioners to super-speciality hospitals, the market provides something for everyone - from the richest to the poorest – and this raises the possibility that the fundamental challenges may be more about quality than quantity. [9]

1.3.1 Slums and urban poverty

The 2011 Census of India defined slums as residential areas in which dwellings are unfit for human habitation because of dilapidation, overcrowding, faulty arrangement of the building design, narrowness of streets, and lack of ventilation, light, or sanitation facilities, or any combination of these factors detrimental to safety and health. Such areas are compact, have a population of at least 300 (60-70 households), and may have been formally notified, governmentally recognized as slums, or identified but unrecognized. [10] According to the 2011 Census, 63 percent of towns reported at least one slum block and 108,227 slums were included. Overall, about 17 percent of urban households are in slums, but the proportion varies across states.

Figure 5.2: Urban population in India, 1951-2011



Source: HPEC, 2011 [3]

Table 5.1 illustrates the distributions for eight cities. While 42 percent of the wealthiest third of Meerut residents live in a slum, 90 percent of Indore's poorest live in non-slum areas. There has been much debate about the classification of poverty in India, and about the differences between urban and rural poverty. That aside, the worrying issues are - although the headcount ratio of urban poverty has fallen steadily, it has fallen more slowly than that of rural poverty; the urban poverty gap is greater than the rural poverty gap; non-waged informal employment is the dominant characteristic of urban livelihoods; and urban poverty reduction has been uneven across the country. [7] The most recent estimates for 2011-2012, based on modified methods, put 14 percent of urban people below a poverty line of Rs 1,000 per person per month (compared with 26 percent of rural people, at a poverty line of Rs 816). [11, 12]

2. Urban newborn health

2.1 Indicators

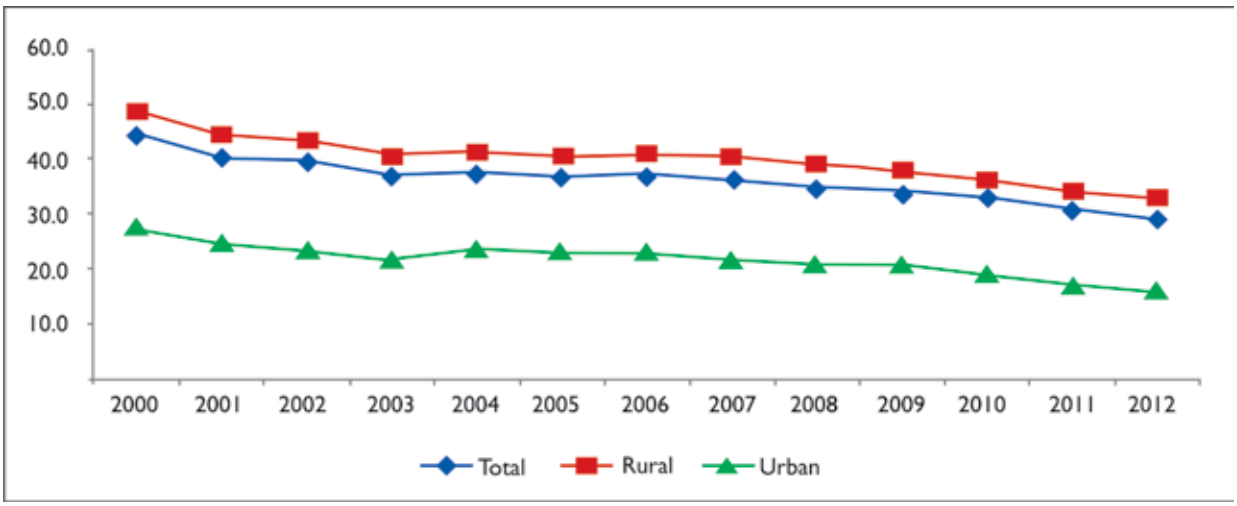
Findings from the Sample Registration Survey, and the Annual Health Survey (covering 284 districts of nine high priority states), institutional records, and isolated studies (Figure 5.3) illustrate the steady fall in neonatal mortality rates over a decade, especially, the fact that they are lower overall in urban than in rural areas, and reflect the relative lack of progress in reducing early neonatal mortality. Reliable and disaggregated urban data, especially disaggregated city data or census data that include slums focusing on the most vulnerable city dwellers (that are frequently not counted) is completely absent.

Table 5.1: Distribution of slum and non-slum population across three socioeconomic groups, in eight city samples (NFHS-3, 2005-2006)

	Poor		Middle		Rich		All	
	Slum %	Non Slum %	Slum %	Non Slum %	Slum %	Non Slum %	Slum %	Non Slum %
Delhi	60	40	72	28	14	86	21	79
Meerut	62	38	69	31	42	58	46	54
Kolkata	86	42	58	68	32	65	35	65
Indore	10	90	18	82	21	79	20	80
Mumbai	47	53	77	23	56	44	57	43
Nagpur	53	47	52	48	33	67	37	64
Hyderabad	29	71	25	75	17	83	17	83
Chennai	39	61	38	62	16	85	19	81

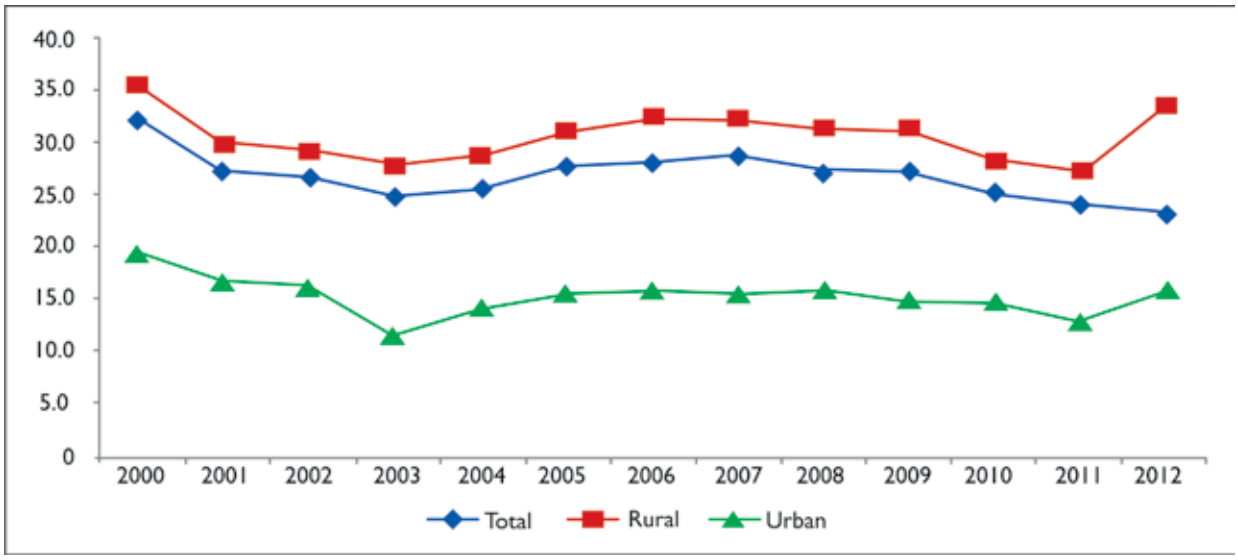
Adapted from: Goli et al 2011 [8]

Figure 5.3: Neonatal Mortality Rates by rural and urban residence



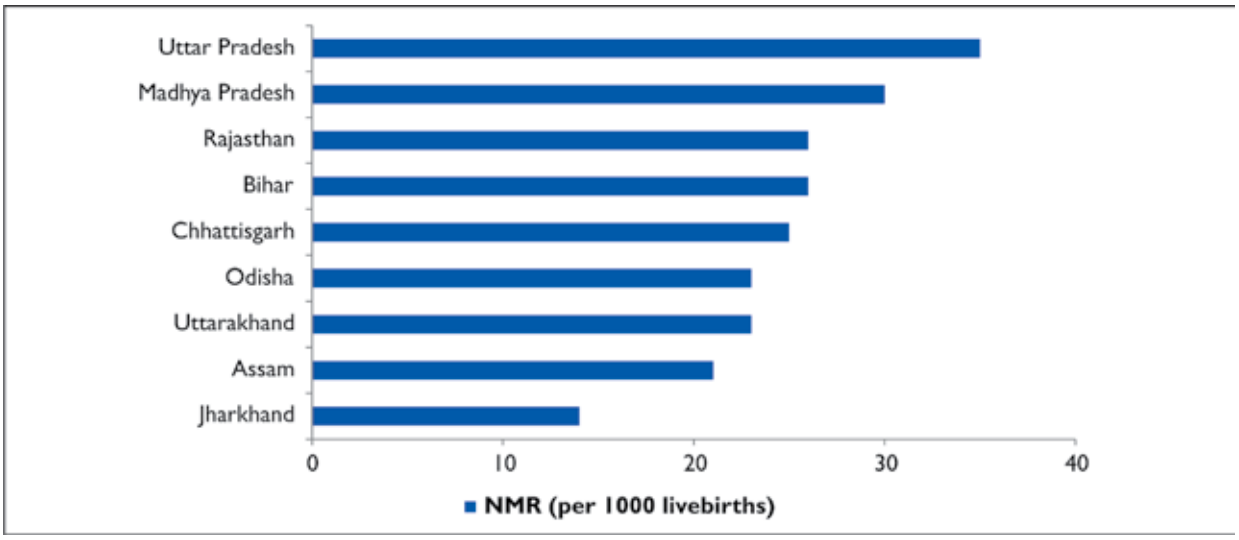
Source: SRS, RGI 2012 [13]

Figure 5.4: Early Neonatal Mortality Rates by rural and urban residence



Source: SRS, RGI 2012 [13]

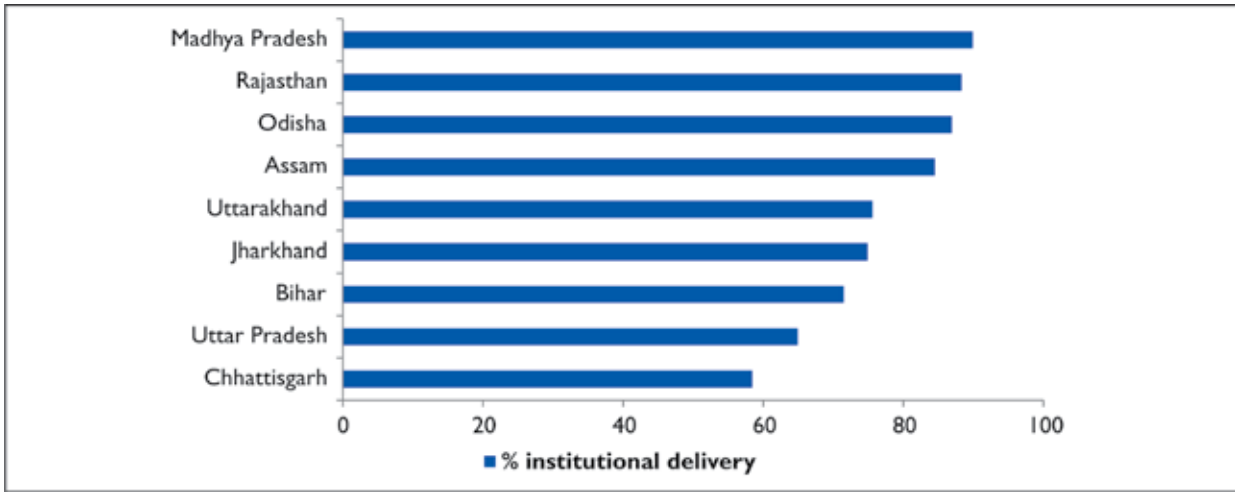
Figure 5.5: Neonatal Mortality Rate (per 1000 livebirths) in urban area of 8 EAG states and Assam



Source: AHS, 2012-13 [14]

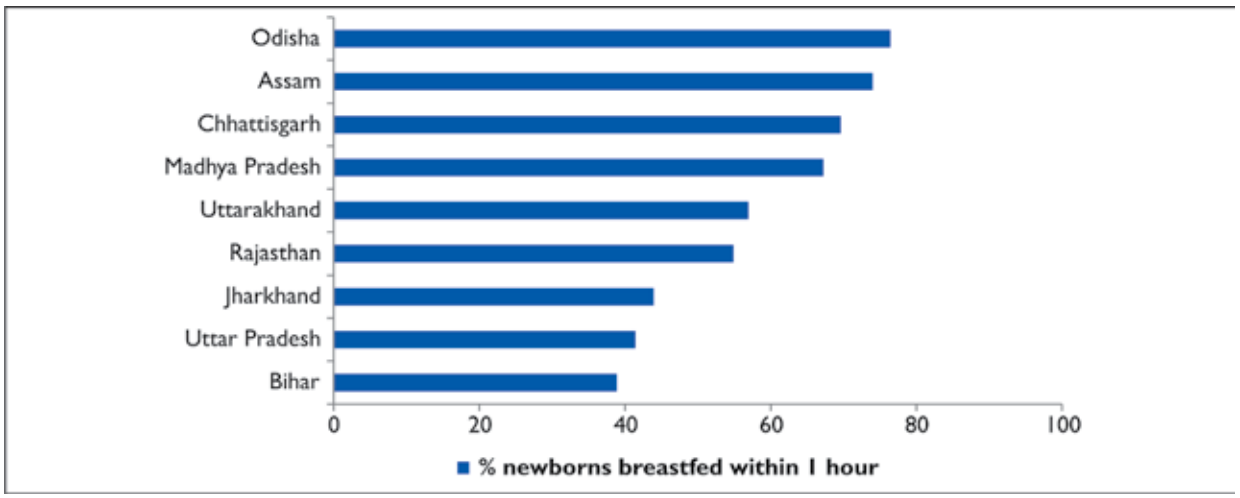
Figure 5.5 presents a series of findings from urban districts. Urban NMR varies from 14 in Jharkhand to 35 per 1,000 live births in Uttar Pradesh; this raises a question on the aspect of underreporting than about the range itself. Institutional delivery in urban areas ranges grossly between 60 percent and 90 percent, duration of hospital stay varies widely, and early breastfeeding is reported as ranging from around 40 percent to 80 percent. Low birth weight continues to be a common aspect in all states, with particular prevalence in Rajasthan.

Figure 5.6: Proportion of institutional delivery in urban area of 8 EAG states and Assam



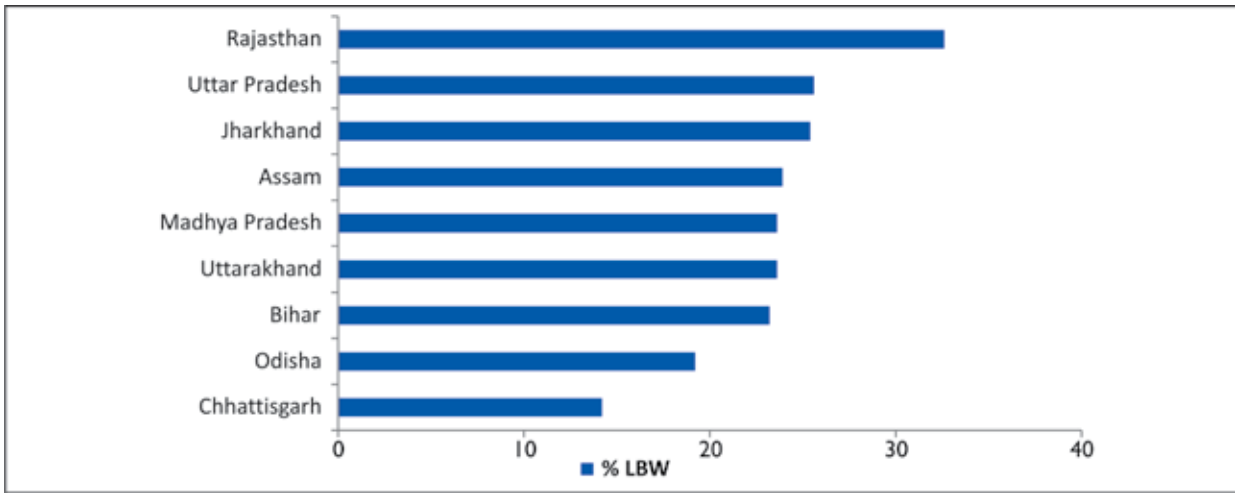
Source: AHS, 2012-13 [14]

Figure 5.7: Proportion of newborns breastfed within one hour of birth in urban area of 8 EAG states and Assam



Source: AHS, 2012-13 [14]

Figure 5.8: Proportion of newborns with Low Birth Weight (<2500g) in urban area of 8 EAG states and Assam



Source: AHS, 2012-13 [14]

2.2 Causes of newborn mortality

The causes of stillbirth and newborn deaths in urban areas are similar to those in rural areas, with some difference in the proportional breakdown. Although few studies have examined the causes of newborn mortality in urban India, the evidence from one of the studies in Mumbai slums reflect that 75 percent of neonatal deaths occurred in the first week. Intra-partum related deaths made up 28 percent, prematurity 23 percent, and severe infection 22 percent. [15] In a study of 120 neonatal deaths from Vellore, 39 percent were ascribed to asphyxia and 21 percent to prematurity. [16]

3. TOWARDS BETTER URBAN NEWBORN HEALTH

Since urban health involves the convergence of domains, a number of programmes and policies implemented by the Ministry of Housing and Urban Poverty Alleviation are also important. Launched in 2005 and revised in 2009, the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) covers the provision of basic services for the urban poor (BSUP) and the Integrated Housing and Slum Development Programme (IHSDP) in 65 cities. The Swarna Jayanti Shahari Rozgar Yojana (SJSRY, revised 2009) targets skill development for livelihoods. Other relevant schemes include Affordable Housing in Partnership (AHIP), the Interest Subsidy Scheme for Housing the Urban Poor (ISHUP), and the Integrated Low Cost Sanitation Scheme (ILCS). Launched by the Prime Minister in 2009, the Rajiv Awas Yojana (RAY) envisages a slum-free India, and proposes affordable housing by merging the AHIP and ISHUP and extending JNNURM support to states that are willing to assign property rights to people living in slum areas. The idea is that existing slums will be formalized and provided with amenities.

A few city initiatives and innovations in Uttar Pradesh, Maharashtra, and Gujarat have definitely brought forth the evidences of effectiveness of Behaviour Change Communication (BCC), KMC and other innovative strategies. However, by and large, the service delivery structure and mechanisms in the urban areas continue to be rudderless, with complete lack of clarity on roles and responsibilities vis-à-vis the rural areas, where the district administration is structured and responsible for service provision. In addition, lack of demonstrated political will to assume responsibility and accountability for urban services as well as absence of interdepartmental coordination between the Departments of Public Health, Urban Development, Medical Education, the Municipal Corporations and the local bodies have further made matters worse.

Although there are not much information on the status of newborn health and services in urban India, there were several sporadic initiatives that were undertaken in different parts of the country. Some of these are summarized below.

3.1 Public private partnership

Through policy dialogue, the Government of Gujarat and the Urban Health Alliance have addressed public-private partnership in a number of ways. Major initiatives include the Chiranjivi Yojana and the Balsakha Yojana, both of which aim to improve newborn survival. In 2011-2012, 72 percent of deliveries in Gujarat took place in private healthcare institutions and 13 percent were covered by the Chiranjivi Yojana. [17-19]

3.1.1 Private maternity and child care for lower-income families

The Lifespring initiative responds to the preference for private healthcare in lower-income groups. In 2005, a chain of hospitals was set up in Hyderabad, Andhra Pradesh, by a partnership between Acumen Fund, a private enterprise social fund, and HLL Lifecare Ltd, a public sector company. Small private maternity hospitals have been set up in low-income catchment areas (urban slums) to provide affordable, high-quality maternity care at low cost. Complicated deliveries are referred to nearby charitable hospitals. The model is for-profit, but aims at cost-minimization through the use of leased buildings, collaboration with government ambulance services, the deployment of nurse-administrators and auxiliary nurse midwives, and careful stock control for pharmaceuticals and consumables.

In Uttar Pradesh, Merrygold has implemented a private sector social franchise that provides

maternal and child care through 70 hospitals, 700 clinics and 10,000 workers across about half the state. The franchise hospitals are 15-20 bedded and pay a license fee that effectively buys them into a multi-partner private sector system with protocols, information systems, purchasing and supply networks, and quality assurance.

3.1.2 Behaviour change communication and community mobilization

In the context of multiple providers, it does seem possible to help families to choose appropriate practitioners to care for their newborn infant's illness. A study in urban Lucknow, Uttar Pradesh, examined the effect of behaviour change communication at two public hospitals on newborn care-seeking with qualified clinicians. Mothers were counselled and provided with a Neonatal Well-Being Card (Navjat Shishu Raksha Card). The odds of consulting a qualified practitioner doubled after the intervention. [20]

Along with BCC, social mobilization should be a component of efforts to improve perinatal health. [21] In Mumbai, SNEHA (Society for Nutrition, Education and Health Action) introduced a combination of supply- and demand-side approaches to newborn health in slum communities. [22] One axis sought to address low uptake of antenatal care at health posts, lack of protocols for case management, disorganized referral systems, and technical and interpersonal skill deficiencies among public health workers. In partnership with the Municipal Corporation of Greater Mumbai, mixed cadres worked together to develop protocols and systems. Health posts were equipped and their antenatal services reinstated, regional referral links were cemented, and feedback loops implemented. The model is currently being transferred to three other municipal corporations in Maharashtra, with WHO support.

The other axis hoped to build on the success of community participation through women's groups, which has improved newborn (and maternal) survival in rural south Asia. [23] In each of 24 slum areas, a facilitator supported women's groups through an action learning cycle in which they discussed perinatal experiences, improved their knowledge, and took local action. An analysis of over 18,000 births over three years did not confirm improvements in uptake of antenatal care, institutional delivery, early and exclusive breastfeeding, care-seeking, or perinatal mortality. [24] The inferences were that community-based work needs to target the most vulnerable groups more effectively, that newborn health should be integrated with other concerns, and that quality of care remained an issue.

3.1.3 Gujarat Urban Health Alliance

Gujarat is India's third most urbanized state (42 percent). [25] The Gujarat Urban Health Alliance has attempted to achieve convergence through a series of plans: an urban health system plan; an urban health administrative structural plan including state, regional, and zonal bodies; an urban reproductive and child health service plan; an urban health monitoring plan; and the formation of urban health societies.

The Gujarat Urban Health Project aims to develop and strengthen primary healthcare delivery systems in urban areas, with a focus on the health needs of poor and vulnerable groups. In consonance with the NUHM, its approaches seek to promote, support and institutionalize the involvement of urban local bodies and district, region and state bodies, and develop their management capacity, and to do the same for public-private and community partnerships. State-level oversight is provided by the Director of Urban Health, with administrative, financial, monitoring and evaluation assistance, and by professionals drawn from the NRHM.

Urban Primary Health Centres (U-PHCs) in Gujarat's eight cities with municipal corporations will be developed by upgrading existing units. New U-PHCs will be created according to mapped requirements, which will be the norm in other municipalities. Subcentres will be considered for remote slum areas and will function according to NUHM guidelines. The system will include schemes such as JSY and JSSK. Efforts have been made to provide reproductive and child health services at all levels, through outreach workers including ANMs, sanitary inspectors, Anganwadi workers, Mahila Arogya Samiti, and USHAs, with additional village health and nutrition days (Mamta Divas). Real-time Institution Management Systems (RIMS) have been introduced and the Integrated Disease Surveillance Project (IDSP) made functional.

3.1.4 Urban Health Initiative, Uttar Pradesh

The Urban Health Initiative (UHI) is part of a multi-country family planning effort to improve contraceptive use and reduce unplanned pregnancy, as a key strategy to improve maternal and infant survival. UHI strategies facilitated increased access to services and supplies, and improved communication to increase and sustain demand.

UHI works in 1,802 slums all 11 cities of Uttar Pradesh. UHI supported cities reported 148,895 new users, including 87,043 acceptors of long acting and permanent family planning methods, since 2010. UHI supports 4,464 fixed service days that provided services to 27% of all new users. UHI supports 1,958 community workers who reached 783,293 couples with counseling and referral. UHI communication strategies to generate demand also included mass media on TV, radio and cable across Uttar Pradesh and mid-media marketing in eleven cities.

3.1.5 Sure Start, Maharashtra

A recent commission on healthy cities recommended the option of trying out a range of approaches to improving urban health and choosing successful features from among them. [26] Implemented by PATH, the Sure Start initiative aimed to improve maternal and newborn health through action in slums in seven cities in Maharashtra. In each case, a common minimum programme was implemented and city-specific models – developed in partnership with NGOs, academic institutions, public health training institutions, and municipal corporations – piggybacked on it.

Sure Start Solapur aimed to mobilize communities through volunteers and self-help groups. It focused on building the capacity of group members and student volunteers to act as change agents. Sure Start Pune established linkages with integrated counselling and testing centres, working to integrate HIV and maternal and newborn status monitoring systems. In Nagpur, Sure Start established emergency health funds, through which women's groups saved money for use in emergencies. The project also tested prepaid maternal and newborn health cards that could be redeemed for healthcare services.

In Navi Mumbai, PATH collaborated with the municipal corporation and community-based organizations to develop a city model in which the private and public sectors shared responsibility for public health. The partnership included professional bodies, NGOs, and hospitals, and activities were undertaken at four levels: demand generation at household level, outreach at community level, antenatal clinics at urban health posts, and referral systems and protocols at hospitals.

Sure Start Malegaon concentrated on client satisfaction. Norms for quality of care were developed in partnership with the municipal corporation and client satisfaction was monitored by Swasthya, an NGO, and other community partners. In Mumbai, Sure Start was implemented in partnership with another NGO, SNEHA, and focused on the development of community resource centres within slums. The centres provided information and support across a range of community concerns and the model has been modified and is currently being tested in a randomized controlled trial. [27] Finally, in Nanded, a local NGO implemented a community-based insurance model to improve institutional delivery and reduce out-of-pocket expenses. An annual premium of Rs. 450 per family covered maternal and child inpatient services and some transport costs.

3.2 Current initiatives

3.2.1 National Urban Health Mission

The Government of India's Twelfth Five Year Plan builds on the National Rural Health Mission and converts it into a National Health Mission for the whole country. In doing so, it incorporates the developing National Urban Health Mission as a sub-mission.

Urban health posts are divided into four types: type A (less than 5,000 population), type B (5,000 to 10,000), type C (10,000 to 25,000), and type D (above 25,000). Almost 75 percent UHPs are of type D. The UHPs, however, are located mainly in big towns. Small towns continue to be deprived of these facilities.

Though the UHPs are expected to carry out the same activities as PHCs, their sanctioned staff strength is lesser. Type A and B have only one nurse midwife; Type C has two nurse midwives. While a subcentre with a population of 5,000 has one ANM

and one multi-purpose worker a type A - UHP has only one ANM. Services expected to be provided by the UHPs and UFWCs include ANC, PNC, intranatal care, immunization, and treatment for RTI/STI and diarrhea.

Health structures and mechanisms: Key aspects

- The ultimate responsibility of providing health services in urban areas is not clear as it is in rural areas where the district administration is in charge of public health.
- All resources invested in urban healthcare deal primarily with curative services.
- Urban health posts mainly provide three types of services: Regular (including preventive, curative, IEC activities, and training), seasonal (pre-monsoon and monsoon-related activities), and disaster management.
- The urban healthcare system is focused on secondary and tertiary care, and not on primary level services.

Service provision: Key aspects

- Health services vary from city to city. Some cities have a well-established ICDS in place. A few large cities like Mumbai, Kolkata, and Chennai have used the Indian Population Project to focus on the health infrastructure establishment in urban slums.
- Only a few large municipal Corporations with good revenue resources have demarcated special resources to provide urban health services.
- Referral services are available in corporation hospitals/district hospitals/medical college hospitals as well as several private hospitals.
- There is no mechanism for a health worker to make community or home visits and thus no outreach and follow-up services are available.
- There is no definite system of referral; no linkages between domiciliary, health centre, and hospital; and no protocols for admissions to primary, secondary, and tertiary levels.
- A link worker or community health volunteer has been appointed in a few cities that are effectively implementing the NRHM (Urban Component) and RCH II project. The main role of the link worker is family welfare, maternal and child health, immunization, health education, and demand generation.

NUHM aims to meet the healthcare needs of the urban population, with a focus on the urban poor, by making available to them essential primary healthcare services and reducing their out-of-pocket expenses for treatment. This will be achieved by strengthening the existing healthcare service delivery system, targeting the people living in slums, and converging with various schemes relating to wider determinants of health like drinking water, sanitation, and school education implemented by the Ministries of Urban Development, Housing and Urban Poverty Alleviation, Human Resource Development, and Women and Child Development.

NUHM endeavours to achieve its goal specifically through a need-based city-specific urban healthcare system that will meet the diverse healthcare needs of the urban poor and other vulnerable sections and through institutional mechanism and management systems to meet the health-related challenges of a rapidly growing urban population.

The goal of the NUHM is to improve the health of the urban population in general, and particularly of the poor and other disadvantaged groups, by facilitating equitable access to quality healthcare through a revamped public health system, partnerships, and community-based mechanisms, with the involvement of urban local bodies. Focusing

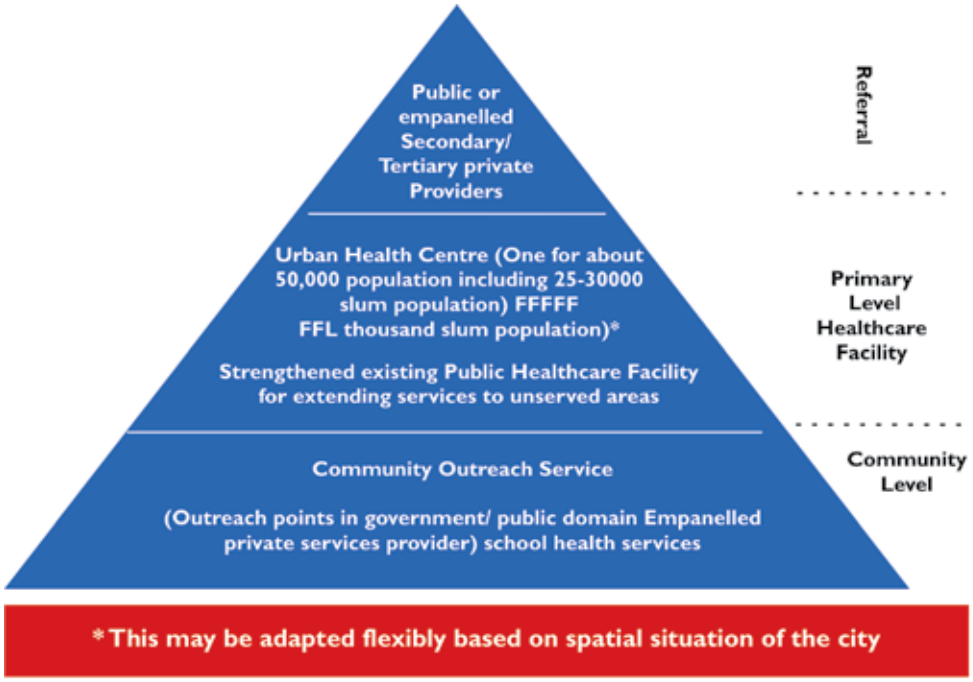
Structural and human resource propositions of the NUHM

Proposition		Serving
Urban Primary Health Centre	U-PHC	50,000 - 60,000 population
Urban Community Health Centre	U-CHC	250,000 – 360,000 population 5-6 U-PHCs in larger cities
Auxiliary Nurse Midwife	ANM	10,000 population
Accredited Social Health Activist (Urban Social Health Activist)	ASHA (USHA)	200 - 500 households 1,000 – 3,000 population

on the primary healthcare needs of the urban poor, the NUHM will be implemented in 779 cities and towns with populations of more than 50,000.

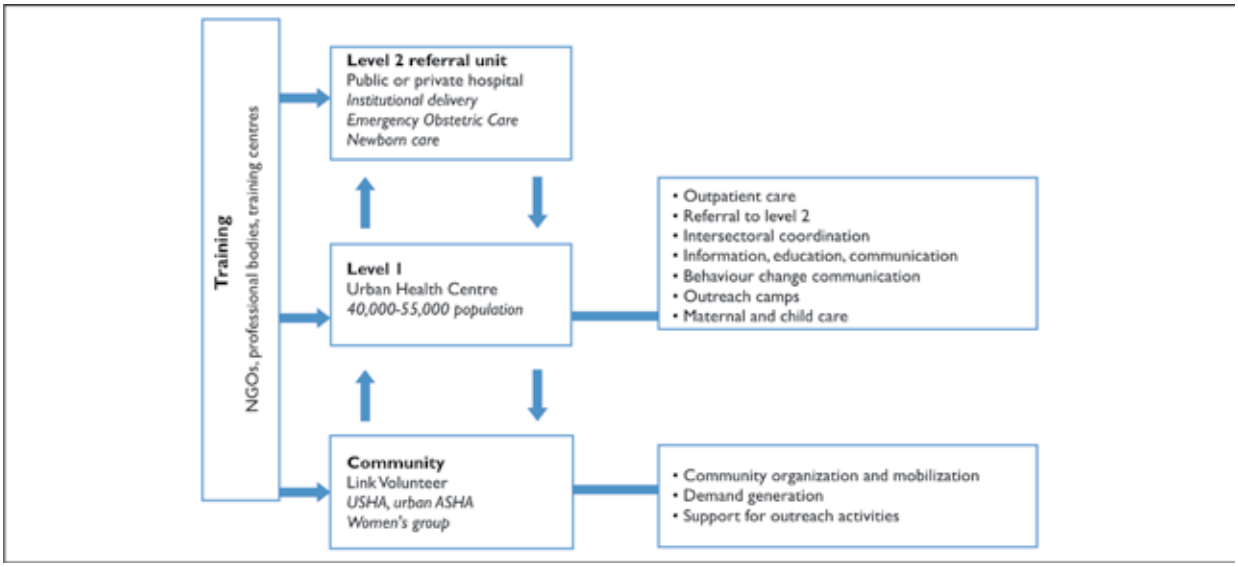
In response to the needs for convergence and public health management, the NUHM plans that every Municipal Corporation, municipality, Notified Area Committee, and town Panchayat will be a planning unit in its own right, with its own approved norms for setting up health facilities. These urban local bodies will prioritize services for the urban poor (in both listed and unlisted slums), and for vulnerable groups such as the homeless, rag pickers, street children, rickshaw pullers, construction and brick and lime kiln workers, and sex workers. Sanitation, clean drinking water, and vector control will be central to the public health remit.

Figure 5.9: Urban healthcare delivery model



Source: NUHM Framework, Ministry of Health and Family Welfare, 2013 [28]

Figure 5.10: RMNCH+A service package for urban areas



3.2.2 Reproductive, Maternal, Newborn and Child Health + Adolescent (RMNCH+A)

RMNCH+A calls for a continuum of care over the life cycle and distinguish adolescence as a distinct life stage. It includes packages of interventions for each stage, including antenatal, intra-partum, and a specific newborn package. In urban areas, the strategy focuses on unreached people in underserved localities, particularly slum dwellers, the homeless, street children, ragpickers, temporary migrants, and construction workers. A systematic plan has been developed for urban areas, including a service package summarized in Figure 5.10.

RMNCH+A will be monitored with a scorecard covering 16 indicators. Maternal indicators include early antenatal registration and three check-ups, iron and folic acid supplementation, receipt of tetanus toxoid, referral for complications, skilled birth attendance at home deliveries, registered institutional deliveries, and caesarean sections. Newborn indicators include the proportion of infants who were initiated breastfeeding within one hour, discharge within 48 hours of delivery, low birth weight, and visits within 24 hours of home deliveries.

4. CHALLENGES FOR URBAN NEWBORN HEALTH

4.1 Inequalities

Nearly every city in the country has pockets of extreme deprivation together with extreme wealth.

Table 5.2: Maternal and newborn health indicators in eight cities (NFHS 3, 2005-06)

		NMR (per 1,000)	Antenatal care: 3 or more visits (%)	Skilled birth attendance (%)	Institutional delivery (%)	Caesarean section (%)	Postnatal check within 2d (%)	Newborn put to breast within 1hr (%)
Meerut	Slum	46	61	43	35	12	51	6
	Non-Slum	36	61	60	56	15	67	7
Indore	Slum	42	84	80	76	17	76	32
	Non-Slum	31	85	76	73	17	78	28
Delhi	Slum	36	58	42	33	7	44	18
	Non-Slum	24	80	71	68	17	63	23
Nagpur	Slum	28	81	81	78	21	70	48
	Non-Slum	33	94	87	85	35	74	50
Hyderabad	Slum	24	91	90	89	33	79	22
	Non-Slum	26	91	95	93	37	84	29
Mumbai	Slum	24	90	82	83	13	62	50
	Non-Slum	27	93	93	91	15	77	71
Chennai	Slum	23	99	99	98	23	96	62
	Non-Slum	17	100	100	100	39	95	48
Kolkata	Slum	20	81	81	80	24	67	26
	Non-Slum	34	90	93	92	41	76	22
		29	75	73	67	17	53	30
India urban		43	44	37	29	6	25	22
India rural		46	61	43	35	12	51	6

Source: NFHS 3, 2005-06 [32]

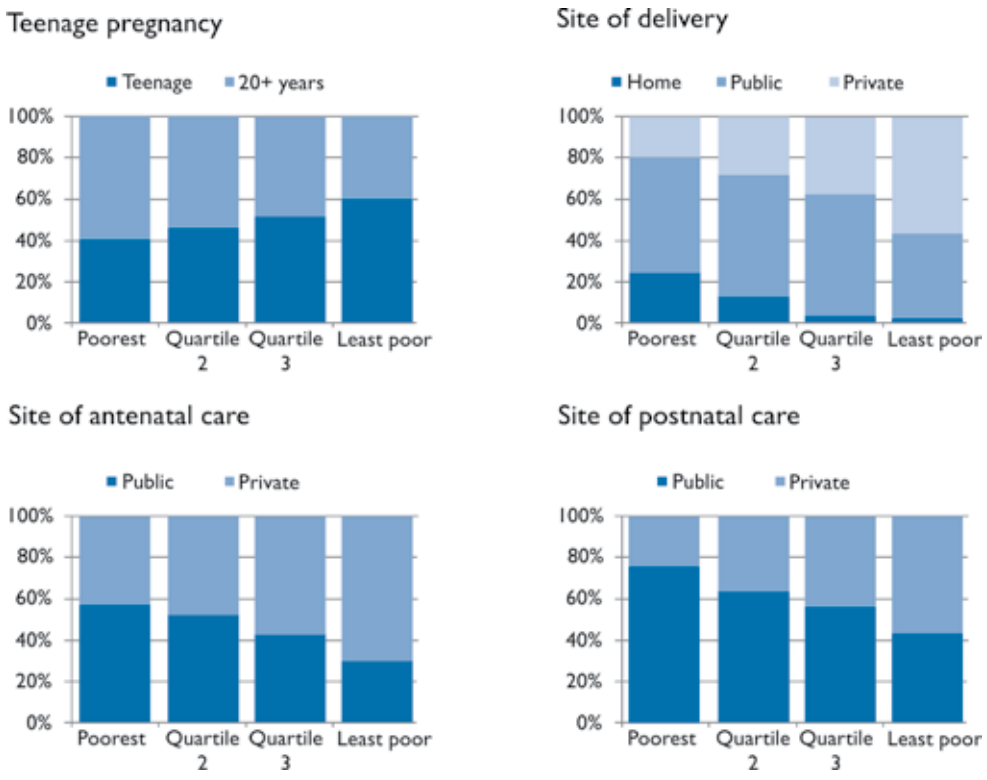
There are people who over-consume healthcare and people who forego the most basic and essential care for financial and other reasons. Certain city dwellers suffer disproportionately from poor health, and these inequities can be traced back to differences in their social and living conditions. There are no doubt that India's towns and cities enjoy a health advantage, but it has become increasingly obvious that the net benefits of urban living conceal substantial inequalities. [29, 30]

In order to see the effects of the social determinants of health, there is a need to view urban data with a greater depth of focus. The Urban Health Resource Centre used an asset score to break NFHS-3 (2005-2006) findings down into quartiles of socioeconomic status. In urban areas in Delhi and six states, compared with wealthier groups women in the poorest quartile were substantially less likely to make at least three antenatal care visits (54 percent compared with 83 percent) and to have a birth assisted by a health provider. Their children had higher under-five mortality rates, lower immunization rates (40 percent compared with 65 percent) and higher proportions of stunting (54 percent compared with 33 percent). [31]

The high neonatal mortality rates seen in Meerut and Indore slums underline concerns about health in rapidly growing cities. Even in the best circumstances (Chennai), rates of early breastfeeding were poor. A study involving about 300 mothers from 11 slums in Indore examined birth preparedness: 70 percent of mothers identified a birth attendant, 64 percent identified a health facility for an emergency, 30 percent arranged for transport, 77 percent saved money in advance. [33]

At a tighter level of focus, a study in 48 areas in Mumbai demonstrated clear inequalities between socioeconomic groups, even though all the participants lived in slums. [34] There was a stepwise increase from the lowest to the highest quartile in uptake of antenatal care, consumption of iron and folic acid supplements during pregnancy, and institutional delivery, and a stepwise decrease in teenage pregnancy and low birth weight. (Figure 5.11)

Figure 5.11: Maternity care for women in 48 slum areas, by quartiles of socioeconomic status, Mumbai 2005-2006



Source: JHPN, 2010 [33]

4.2 Environmental challenges and the need for convergence

Communities suffer deficiencies in water supply and sanitation, [35] and poor housing fabric, poor ventilation, and the density of homes contributes to the spread of infectious disease and the burden of respiratory illness. Many homes are close to sources of industrial smoke and toxins, contaminated areas such as garbage dumps and water bodies, or hazards such as railway lines. Figure 5.12 illustrates the proportions of pucca homes, access to improved sources of drinking water, and access to private improved toilets in eight cities, based on data from the NFHS-3 (2005-2006). Most slum dwellers use shared toilets, many homes are fairly robust in construction (although far short of safety levels in other countries), and the high access to improved sources of water reflects the lack of specificity of the definition in an urban context.

The mandate for provision of municipal services is unclear when settlements are not notified and their residents do not have tenure, [36] with implications for water supply and collection of waste. [37] There is a lack of coordination between the relevant departments, [28] and absence of convergence between infrastructural (water and sanitation, housing, transport) and health domains. Programmatic convergence is critical within health departments, so that maternal and newborn health is linked with reproductive health, and with malaria, tuberculosis, HIV, and immunization programmes.

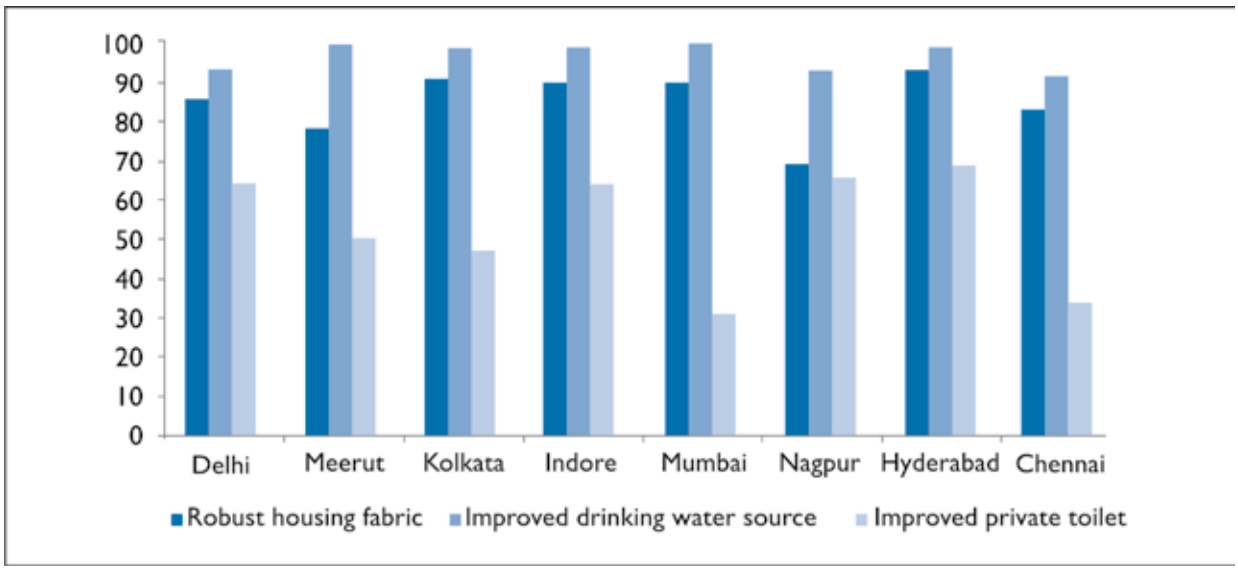
4.3 Public sector healthcare concerns

There are two general concerns for newborn healthcare: quantity and quality. In terms of quantity, the social exclusion experienced by residents of unlisted slum areas extends to provision of healthcare facilities and outreach. [37]

The varying quality of public healthcare is the product of a matrix of infrastructural weakness, deficiencies in equipment and consumables, human resource shortfalls, and limited provider competencies.

For maternal and newborn care, there is a lack of norms for service provision at different levels of health facility. No protocols exist for identifying women at risk and referring them for specialized care. Referral chains have been undefined and based more on a hospital's reputation and bed availability than on a regional plan, and referrals themselves have been unsystematic. [37, 38] Clients are sent to hospitals that have not been warned and may not have beds, the paper trail is sketchy at best, accountability is minimal, and transport is often the responsibility of the family.

Figure 5.12: Housing fabric, drinking water, and toilets in slum populations in eight cities



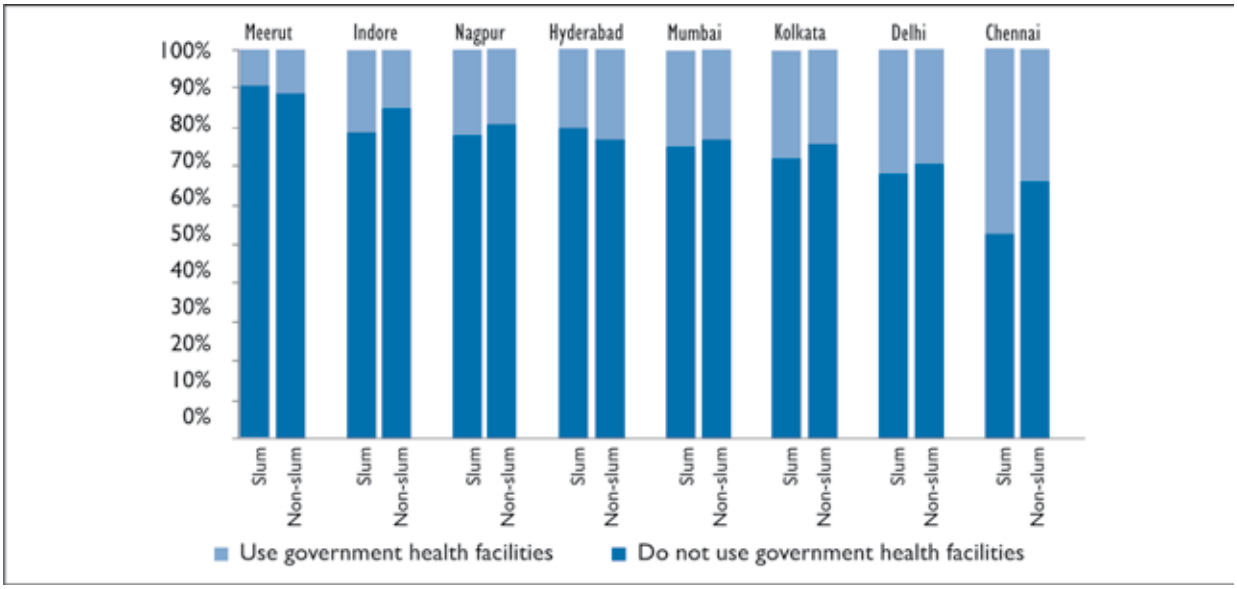
Source: Goli et al 2011[8]

4.4 Private sector healthcare concerns

A central issue is the multiplicity of providers, [39] with limited accreditation and quality assurance [40-43]. Despite the policy emphasis on state and municipal healthcare provision, 80 percent of outpatient consultations in India are with private providers. This is illustrated by the predomination of the use of non-government services in both slum and non-slum areas (with little to tell between them) in Figure 5.13.

Private healthcare clusters in towns and cities, and – through a self-organizing complex system that takes into account ability to pay - serve both the poor and the wealthy. [44, 45] The kinds of services available in Delhi are summarized below.

Figure 5.13: General use of government and non-government health facilities, for slum and non-slum areas in eight cities



Source: Goli et al 2011[8]

Multiple service providers for maternal and newborn care in urban areas: the example of Delhi	
Sector	**Provider**
Public sector	Delhi Government
	Central Government
	Municipal Corporation
	New Delhi Municipal Corporation
	Employees' State Insurance
	Central Government Health Scheme
	Railways
	Cantonment
Private sector	Corporate hospitals
	Large private hospitals
	Small private hospitals
	Nursing and maternity homes
	Non-government organizations
	Individual practices: allopathic, AYUSH, combination
	Traditional birth attendants

A study of 261 private hospitals in 10 districts of Maharashtra (India's second most urbanized state) confirmed the rising use of private care. Many hospitals are understaffed – particularly in terms of qualified health workers: more than half did not have a single qualified nurse at the time of the study – and accreditation is limited. [46] Countrywide, 86 percent of health expenditure is out-of-pocket.

Reports of malpractice, over-medication, inappropriate prescription practices and treatments, and excessive use of diagnostic tests, are common. [40] Health payments for delivery at a private health centre are about three times those for a public facility. [47] Out-of-pocket payments can be impoverishing. [48] Expenditure on maternity often requires borrowing and can be catastrophic for poor households. [49] Often, record keeping is poor and data is seldom used for improving services.

There have been efforts to ease the situation, including some form of partnership between private and public sector hospitals. Following the grant of concessional land allotment rates to private hospitals in Delhi, they are expected to allot 10 percent of inpatient beds and 25 percent of outpatient consultations free of charge to clients with monthly incomes of less than Rs. 4000. Overstretched public hospitals are expected to facilitate this through a formal system of inter-sectoral referral. [50]

4.5 Identifying beneficiaries and closing data gaps

Data on the vulnerable population in urban areas is grossly incomplete, missing out a sizable number of unlisted slums in any city. A need for targeting the most vulnerable as well as addressing the needs of the differentially vulnerable requires identification, mapping, and assessment of all slums in order to locate the hitherto missed slums and also for focusing on the neediest.

The Below Poverty Line (BPL) card system gets rather complicated due to slum notification issues. A specific information problem relates to lack of harmonization between sources, and a lack of accessibility to some of them. Bringing together the municipal data from a wide range of sources, including public and private hospitals and maternity homes, health posts, crematoria, and local surveys poses challenges and, even if successful, may systematically exclude the most vulnerable. Most cities lack epidemiological data, information on the urban poor and illegal clusters, and information on private health facilities. [28]India's cities also lack information management systems that can help with urban planning, particularly in terms of slum areas. [51]

Hidden Cities, a report by the WHO and UN-Habitat, reveals the urban health inequities that are the result of the circumstances in which people grow, live, work, and age, and the health systems they can access. [52] The report demonstrates how aggregated data often mask substantial health inequities within urban populations – inequities that are revealed when this same information is disaggregated according to defining characteristics of city dwellers, such as their socioeconomic status or place of residence. It illustrates that the urban poor suffer disproportionately from a wide range of diseases and health problems, and that disadvantage and disease tend to cluster within certain neighbourhoods of cities. In every city, disaggregated data can help identify people and areas most in need of intervention and support.

5 .WAY FORWARD

Evidence

- India is urbanizing rapidly, with an expectation that the urban population will be almost 600 million by 2030. There are 468 cities with populations of over 100,000; 53 over one million; and three are megacities of over 10 million. Most of the growth has been endogenous rather than the result of rural-urban migration.
- National health survey data show that overall neonatal mortality rates are lower in urban than in rural areas, but the figures mask substantial urban inequalities. Recent data also suggest a relative lack of progress in reducing early neonatal mortality.
- There are wide variations in urban accommodation between cities and states, and a long history of debate about urban slum policy and practice.

- Socioeconomic inequalities and environmental concerns pose major challenges for newborn health. Healthcare is concentrated in urban areas, but health outcomes are subject to variations in pluralistic provision and a lack of clarity in protocols, communication, referral, and transfer between institutions. Fragmented and weak public health systems, a multiplicity of actors, and limited public health planning capacity compromise the delivery of affordable quality healthcare.
- Data on urban newborn health are both limited and difficult to use to provide useful epidemiological and planning information.
- Within the National Health Mission, the National Urban Health Mission provides an opportunity for strategic thinking and actions to improve urban newborn health. The Reproductive, Maternal, Newborn and Child Health + Adolescent initiative adds to this an opportunity to integrate healthcare over the life cycle.
- A number of pilot initiatives have begun, including private-public partnerships, community action models, demand-side financing, and insurance, but evaluation has been limited.

Recommendations

- Develop models of newborn care for urban populations with focus on the poor within the NUHM framework.
- Develop convergence mechanisms of public, private, and third sector institutions whose work affects urban newborn health: water and sanitation, urban planning, transport and building all have a role.
- Develop platforms for harmonization and sharing of data –to provide epidemiologic and evaluative insights for programming.
- Review and redefine the roles of urban local bodies in public health including newborn health.
- Training, deployment, and support for human resources for urban healthcare remaincentral to efforts to improve newborn survival.
- Define staffing norms for urban health facilities, public and private, and within and outside NUHM.
- Involve civil society and NGOs for effective implementation of the urban newborn health programmes.
- Partner with professional bodies like NNF, IAP, and FOGSI (Federation of Obstetric and Gynaecological Societies of India)for service delivery, to develop standard norms and protocols, training and quality assurance.
- Conduct operations research to demonstrate sustainable models of newborn healthcare.

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Chapter 6

JANANI SURAKSHA YOJNA AND JANANI SHISHU SURAKSHA KARYAKRAM

OVERVIEW

Access to skilled attendance at birth is the cornerstone of any initiative to improve maternal and newborn health. Affordability barriers often impede the utilization of existing services. To overcome these, 'Janani Suraksha Yojna', a government funded, nationwide scheme offering conditional cash transfers, was made operational in 2005. This has led to a quantum jump in the utilization of services, reflected in the increase in institutional deliveries with no significant impact of neonatal mortality rate. Several assessments have been undertaken to analyze the benefits and challenges of the world's largest scheme. This chapter gives an overview of the scheme and highlights the key bottlenecks. Measures to overcome these problems have been instituted through 'Janani Shishu Suraksha Karyakram'.

1. BACKGROUND

The adoption of the Millennium Development Goals in 2001, specifically Goal 5, renewed the global emphasis on reducing maternal mortality. This global commitment gained political attention and many low income countries prioritized improving women's access to maternal health services. [1-3]

Around a third of women delivered in facilities as reported in NFHS 2 (1998-99).[3] Between 1992 and 2006, India focused primarily on strengthening the health system infrastructure to better support Emergency Obstetric Care services especially in the public sector. A concerted effort was made to increase the capacity for institutional deliveries by upgrading facilities to improve access to skilled birth attendance and EmOC. [4] NFHS 3 showed that the institutional deliveries increased to 39 percent only despite huge government investment. [5,6] However, much of the increase was in private facilities.

While it is extremely important to invest in EmOC facilities, it is equally important to develop strategies that increase the use of these services, especially by the poor who suffer the largest burden of maternal deaths. [7] Most deaths can be avoided by prompt access to EmOC services. However, despite strengthening of the supply side (facilities), poor women are still at risk as they face a number of barriers, particularly financial, to accessing EmOC. This, in the absence of social security nets and widely prevalent out-of-pocket payment mechanisms. [8]

2. JANANI SURAKSHA YOJNA: CONDITIONAL CASH TRANSFER PROGRAMME TO INCREASE BIRTHS IN HEALTH FACILITIES

Using the platform of the NRHM, the government introduced demand-side financing initiatives for maternal health, to reduce financial barriers that often preclude women from accessing skilled attendance at birth. [9] Janani Suraksha Yojna (JSY) is a government-funded nationwide scheme offering Conditional Cash Transfers (CCT) for safe motherhood since 2005. It has been initiated by modifying the existing National Maternity Benefit Scheme (NMBS). While NMBS is linked to the provision of better diet for pregnant women from Below Poverty Line (BPL) families, JSY integrates the cash assistance with antenatal care during pregnancy period and institutional care during delivery and immediate postpartum period in a health centre. It does this by establishing a system of coordinated care by field-level health workers. (Table 6.1, 6.2)

The goals of the scheme are to reduce overall the maternal mortality ratio and the infant mortality rate and to ensure 100 percent institutional deliveries in BPL/SC/ST populations. [10]

Key features of JSY

- Focuses on the poor pregnant woman with special dispensation for states having low institutional delivery rates, namely Uttar Pradesh, Uttaranchal, Bihar, Jharkhand, Madhya Pradesh, Chhattisgarh, Assam, Rajasthan, Odisha, and Jammu and Kashmir. These states have been named Low Performing States (LPS), and the rest are called High Performing States (HPS).
- Cash assistance linked to institutional delivery: The benefits under the scheme is linked to availing of antenatal check-ups by the pregnant woman and getting her delivery conducted in a health centre or hospital. While the beneficiaries are encouraged to register themselves with the health workers at the subcentres, Anganwadis or PHCs for availing of at least three antenatal check-ups, postnatal care and neonatal care, the disbursement of enhanced benefits under the scheme are linked to institutional delivery.
- Cash assistance on a graded scale: One of the accepted strategies for reducing maternal mortality is to promote deliveries in health institutions by skilled personnel like doctors and nurses. Accordingly, cash assistance is provided to eligible women, enabling them to deliver in health institutions.

Table 6.1: The assistance package

Category	Rural area			Urban area		
	Mother's package (INR)	ASHA's package (INR)	Total (INR)	Mother's package (INR)	Urban area ASHA's package (INR)	Total (INR)
Institutional Delivery						
Low Performing States (LPS)	1,400	600	2,000	1,000	400	1,400
High Performing States (HPS)	700	600	1300	600	400	1000
Home Delivery						
Low Performing States % High Performing States	500	NA	500	500	NA	500

*ASHA incentive is not applicable for pregnant women preferring to deliver in an accredited private institution.

Source: MOHFW, Janani Suraksha Yojna, Guidelines for Implementation, Ministry of Health and Family Welfare, Govt. of India: New Delhi[10]

Table 6.2: Eligibility criteria for a JSY beneficiary

Institutional Delivery	
Low Performing States - 8 EAG, Assam, and J&K	All pregnant women delivering in government health centres like subcentre, PHC, CHC, FRU, general wards of district and state hospitals or accredited private institutions
High Performing States)- Remaining states and UTs	BPL/SC/ST pregnant women, delivering in government or accredited private institutions
Home Delivery	
All states and UTs	Only BPL women (BPL certificate is essential to avail the benefit)

Source: MOHFW, Janani Suraksha Yojna, Guidelines for Implementation, Ministry of Health and Family Welfare, Govt. of India: New Delhi [10]

Initially, the eligibility criteria to obtain monetary incentives under the JSY were uniform across the LPS and HPS. According to these criteria, only those women who were 19 years of age or above, and belonged to the BPL families were eligible for the benefit. The benefits was restricted to the first two live births.

In the low performing states, women were eligible for the benefit for the third birth as well, provided the beneficiary opted for sterilization immediately after delivery. The monetary incentives were also identical in LPS and HPS as far as rural areas were concerned. These eligibility rules were deemed to be too strict, especially in the low performing states, and hence, new guidelines were issued.

As per the most recent guidelines, the conditionalities of age of the mother and restriction of two live births to avail JSY benefit have been removed. [10]

Paid after child birth, the incentive is conditional upon either in-facility delivery or home delivery conducted by skilled personnel. Women are encouraged to avail free antenatal and postnatal care in public facilities, but no incentive is linked to such care. The scheme is sponsored by the Central Government and is implemented in all states and Union Territories, with special focus on low-performing state. [11, 12] JSY is being implemented through community-level health workers (ASHAs), who identify pregnant women and help them to get to a health facility. ASHAs receive payments of Rs. 400 in urban areas and Rs 600 in rural areas per in-facility delivery assisted by them in all the states. According to JSY's guidelines, ASHAs or other health workers associated with the scheme should provide or help women to receive at least three antenatal care visits, arrange immunization of the newborn baby, do postnatal checkups, and counsel for initiation and continuation of breastfeeding.

JSY payment mechanism
The payment to the expectant mother is to be made in one installment. For ASHAs or equivalent workers, payment is made in two installments. The amount required for meeting transport cost and a part of the compensation money is paid in advance. The balance amount is to be treated as cash incentive to ASHA. Fifty percent of this is given as the first installment after discharge of the JSY beneficiary from the health centre, provided ASHA or an equivalent worker has accompanied and stayed with the pregnant woman in the health facility for delivery. The remaining 50 percent of the cash incentive is given a month after delivery when BCG vaccine has been administered and the worker has helped in postnatal care and registration of birth of the newborn.

2.1 Accreditation of private institutions under JSY

To increase a woman's choice of services and to ensure the availability of a delivery care institution (where government or public sector healthcare institutions are not available), there is provision for bringing in the private sector by providing accreditation to willing private hospitals or nursing homes for providing delivery services. An accredited private institution should meet all the eligibility criteria as per JSY accreditation guidelines. They are responsible for any postnatal complication arising out of the cases handled by them. They should not deny services to any referred expectant mother.

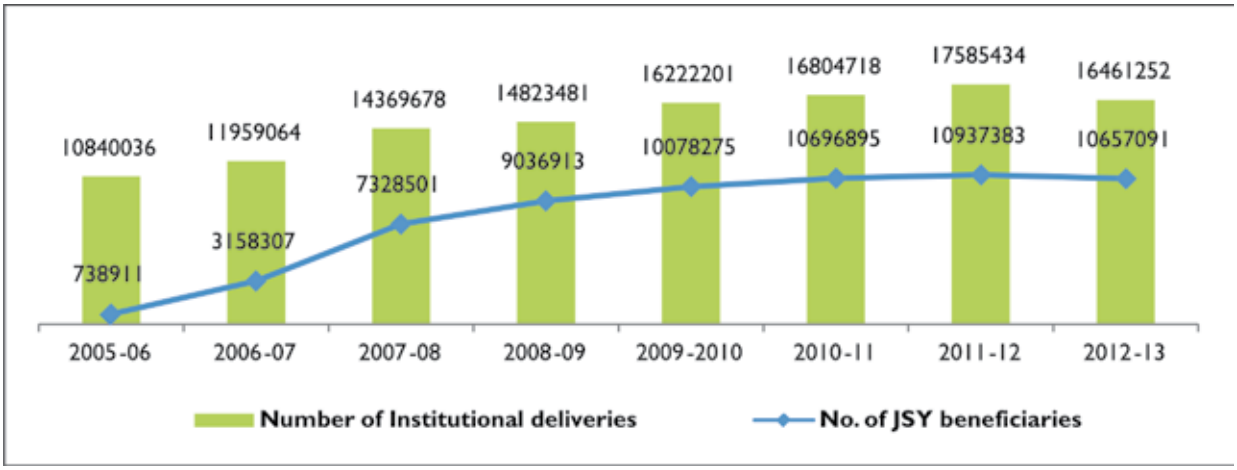
At least two accessible private health institutions willing to provide the required services per block have to be empanelled by the District Health Society/ RCH Society.

2.2 implementation status of JSY

Sharply increasing trends have been observed in the number of JSY beneficiaries. Starting with an initial number of 7.39 lakh beneficiaries in 2005–2006, it reached 106.57 lakh during 2012–2013 (NRHM, 2013). [13] As per DLHS-3 (2007-2008), beneficiaries under JSY in the country are reported to be at 73.7 percent [14]. High focus NE states were poor performers as compared to other category states. The best coverage was reported for Bihar (97.6 percent). [15]

A total of 8,070 private institutions were accredited under JSY. There is a differential distribution of accredited private institutions lower in high focus states (718) as compared to non-high focus states (7,352), and lowest in high focus NE states (60). [13, 15]

Figure 6.1: Increase in institutional deliveries and JSY beneficiaries



Source: NRHM Report, 2013 [13]

2.3 Impact of JSY

The aim of the scheme was to increase in institutional deliveries. However, delivery in a facility does not always ensure safety. What is important is the quality of the institutional care.

Several assessments have been undertaken in different parts of the country to understand the impact of JSY in terms of increase in the proportion of institutional deliveries and reduction in NMR and MMR.

2.3.1 Institutional delivery

One of the most significant impacts of JSY is the sudden and sharp increase in institutional deliveries, as evident from various nationwide and state/district surveys and analyses. Starting with a modest number of slightly over 1 crore institutional deliveries during 2005–2006, it has now crossed 1.5 crore in 2012–2013. The analysis shows that the proportion of institutional deliveries was not even half (38.7 percent, NFHS-3, 2005–06) when the JSY was launched to what it is today (82.66 percent, NRHM, 2013).

Table 6.3: State-wise institutional deliveries and JSY beneficiaries (NRHM, 2013)

States/UT	Institutional Deliveries No. (%)	Beneficiaries of JSY No. (%)
All India	16461252 (82.7)	10657091 (53.5)
Arunachal Pradesh	14329 (95.0)	12200 (80.9)
Assam	484526 (82.9)	421359 (72.1)
Manipur	27922 (76.1)	18145 (49.5)
Meghalaya	41184 (51.1)	21082 (26.1)
Mizoram	17052 (86..)	12057 (60.8)
Nagaland	15141 (72.9)	17609 (84.8)
Sikkim	6598 (88.6)	2668 (35.8)
Tripura	45028 (86.2)	18682 (35.8)
Bihar	1422367 (75.8)	1829916 (97.6)
Chhattisgarh	299488 (61.5)	277653 (57.0)
Himachal Pradesh	75117 (75.5)	13626 (13.7)
J & K	136129 (86.1)	127041 (80.3)
Jharkhand	432667 (71.2)	282169 (46.4)
Madhya Pradesh	1165026 (85.3)	979822 (71.7)
Odisha	565855 (86.7)	547648 (83.8)
Rajasthan	1337053 (92.3)	1072623 (74.0)
Uttar Pradesh	2035640 (62.6)	2186401 (67.2)
Uttarakhand	108768 (71.6)	89506 (58.9)
Andhra Pradesh	1046849 (93.1)	341041 (30.3)
Goa	17488 (99.6)	1387 (7.9)
Gujarat	1048294 (94.8)	308880 (27.9)
Haryana	379736 (83.2)	61902 (13.5)
Karnataka	837276 (98.1)	407611 (47.7)
Kerala	492190 (99.8)	116816 (23.7)
Maharashtra	1726348 (96.1)	364039 (20.3)
Punjab	341343 (82.8)	79511 (19.3)
Tamilnadu	949569 (99.8)	358224 (37.)
West Bengal	1017129 (72.9)	659996 (47.3)
A&N Island	4716 (94.5)	298 (6.0)

States/UT	Institutional Deliveries No. (%)	Beneficiaries of JSY No. (%)
Chandigarh	23124 (94.4)	449 (1.8)
D&N Haveli	6385 (84.6)	786 (10.4)
Daman& Diu	3566 (93.8)	0 (0)
Delhi	301733 (94.7)	21722 (6.8)
Lakshadweep	578 (100)	494 (85.5)
Puducherry	35038 (99.9)	3728 (10.6)

Institutional Delivery (%)=Total no. of reported delivery*100/Total no. of institutional delivery
Beneficiaries of JSY (%)=Total no. of reported delivery*100/Total no. of JSY beneficiaries

Source: NRHM, All India Executive Summary: Status as on 31st March. 2013, National Rural Health Mission [13], NRHM, State wise Executive Summary. Status as on 31st March 2013. National Rural Health Mission [15]

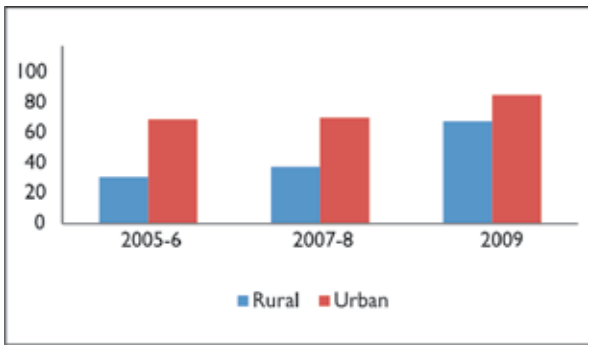
Table 6.4: Comparison of rate of institutional delivery

States/UT	2005–06 (NFHS-3)	2007–08 (DLHS-3)	2009 (CES)	2013 (NRHM)
All India	38.7	47	72.9	82.7
Arunachal Pradesh	58.9	47.6	69.9	95.0
Assam	22.4	35.1	64.4	82.9
Manipur	29	41	80	76.1
Meghalaya	59.8	24.5	63.6	51.1
Mizoram	11.6	55.7	83	86.0
Nagaland	47.2	NA	30.4	72.9
Sikkim	46.9	49.5	68.9	88.6
Tripura	32.6	46.2	82.6	86.2
Bihar	19.9	27.5	48.3	75.9
Chhattisgarh	14.3	18	44.9	61.5
Himachal Pradesh	50.2	48.3	50.3	75.5
J & K	45.9	54.9	80.9	86.1
Jharkhand	18.3	17.7	40.1	71.2
Madhya Pradesh	26.2	46.9	81	85.3
Odisha	35.6	44.1	75.5	86.7
Rajasthan	29.6	45.4	70.5	92.3
Uttar Pradesh	20.6	24.5	62.1	62.6
Uttarakhand	-	30	53.5	71.6
Andhra Pradesh	64.4	71.8	94.2	93.1
Goa	43	96.4	99.8	99.7
Gujarat	52.7	56.4	78.1	94.8
Haryana	35.7	46.8	63.3	83.2
Karnataka	64.7	65.1	86.4	98.1
Kerala	99.3	99.4	99.9	99.8
Maharashtra	64.6	63.5	81.8	96.1
Punjab	51.3	63.1	60.3	82.8
Tamilnadu	87.8	94	98.4	99.8
West Bengal	42	49.1	69.5	73.0
A&N Island	-	76.4	88.1*	94.5
Chandigarh	-	76.1		94.4
D&N Haveli	-	44		84.6
Daman& Diu	-	64.1		93.8

States/UT	2005–06 (NFHS-3)	2007–08 (DLHS-3)	2009 (CES)	2013 (NRHM)
Delhi	92.3	68.7	83.6	94.7
Lakshadweep	-	90.7		100.0
Puducherry	-	99		99.9

Sources: IIPS, National Family Health Survey (NFHS-3), India. 2005-06, International Institute for Population Sciences: Mumbai [6], NRHM, All India Executive Summary :Status as on 31st March. 2013, National Rural Health Mission [13], IIPS, District Level Household and Facility Survey (DLHS-3), 2007-08: India. 2010, International Institute for Population Sciences Mumbai [14], UNICEF, Coverage Evaluation Survey, 2009, Ministry of Health and Family Welfare. Govt of India [16]

Figure 6.2: A comparison of institutional deliveries in rural and urban areas



Source: NFHS3, DLHS 3, CES [6,14,16]

It is also encouraging to note here that the impact is more pronounced in rural areas. [6,16].

2.4. Systematic evaluations

2.4.1 India's Janani Suraksha Yojana, a conditional cash transfer programme to increase births in health facilities: an impact evaluation

The evaluation used the data from the nationwide district-level household surveys done in 2002–2004 and 2007–2009 to assess receipt of financial assistance from JSY as a function of socioeconomic and demographic characteristics. It used three analytical approaches to assess the effect of JSY on antenatal care, in-facility births, and perinatal, neonatal, and maternal deaths [17]:

The implementation of JSY in 2007–2008 was highly variable across state. The proportion of women giving birth who received cash payments from JSY varied from less than 5 percent to 44 percent. In terms of categories, it was highest in women of the middle wealth quintile, those belonging to scheduled caste/tribe, as well as women having their first child. There was reportedly a poor uptake of JSY by Muslim and Christian women. The poorest and least educated women too did not always have the highest odds of receiving JSY payments.

But JSY did have a significant effect on increasing antenatal care and in-facility births. In the matching analysis, JSY payment was associated with a reduction of perinatal deaths and neonatal. In the with-versus-without comparison, the reductions were 4.1 (2.5 to 5.7) perinatal deaths per 1,000 pregnancies and 2.4 (0.7 to 4.1) neonatal deaths per 1,000 live-births.

2.4.2 Concurrent assessment of Janani Suraksha Yojna Scheme in selected states of India (UNFPA, 2008)

The assessment study was carried out in five states (Bihar, Madhya Pradesh, Odisha, Rajasthan, and Uttar Pradesh) covering a sample of 1,200 mothers in each state who had delivered between January and December 2008. [11]

The awareness about JSY was good, ranging from 76 percent to 95 percent across states. The women reported having obtained this knowledge mainly from the ASHAs and from their friends and relatives.

Overall, the combined estimates indicate that 55 percent of births occurred in institutions and the direct beneficiaries of JSY (delivering either in a government facility or in an accredited private facility) were 47 percent. PHCs and CHCs were the institutions of choice in the all the states.

Duration of stay post-delivery was variable across states. Tempos and four wheelers were the main types of vehicles used by the respondents as mode of transport in almost all the states. Among the JSY beneficiaries in the five states put together, 76 percent received money after their delivery. However, the timing of disbursement of the incentive was an area of concern.

2.4.3 Evaluation of the Janani Suraksha Yojna (NHSRC, 2011)

The scheme was evaluated by NHSRC in 2010 in the eight high-focus states of Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Odisha, Rajasthan, Uttar Pradesh, and Uttarakhand, which together account for 84.3 percent and 66 percent of India's maternal mortality and infant mortality respectively. [18]

The evaluation concluded that JSY had clearly increased the number of institutional deliveries: over 50 percent of women who had a previous home delivery had opted for an institutional delivery. The study also demonstrated equity in access to institutional deliveries, given that the representation of SC/ST and BPL in the sample was higher than the population representation, except in two states - Jharkhand and Chhattisgarh.

Despite the increase in institutional delivery, there were some persistent home deliveries in most districts studied (about 40 percent). Women who delivered at home were more likely to be SC/ ST, belonged to the BPL category, and more likely to be illiterate or primary school drop outs. The CHC/PHC appeared as the institution of choice for delivery.

A total of 8,070 private institutions were accredited under JSY. There was a differential distribution of accredited private institutions being lower in high focus states (718) as compared to non-high focus states (7,352) and lowest in high focus NE states (60). It was found that the private sector accounted for about 12.5 percent of all institutional deliveries. For "any", complication private sectors providers accounted for 60 percent of all care given. For those complications that required hospitalization 55.2 percent of patients (of a sample of 250) were treated in private nursing homes, and the rest in government.

The ability to provide institutional newborn care was limited. For example, a small item like the simple bag and mask that should be available for assisted home delivery was absent in about half the facilities and further resuscitation or sick newborn management was not available. The radiant warmer was present in many facilities, but rarely used.

Superfluous out-of-pocket expenditure ranged between Rs 500 and Rs 1,500. It occurred mainly for the purchase of consumables like drugs, gloves, syringes, formal and informal fees, expenses on food for self, blood for transfusion, costs of laboratory tests and ultrasound.

2.4.4 India's conditional cash transfer programme to promote institutional birth: Is there an association between institutional birth and maternal mortality?

Data from the Sample Registration Survey of India were analysed to describe trends in the proportion of institutional births before (2005) and during (2006–2010) the implementation of the JSY. Data from the Annual Health Survey (2010–2011) for all 284 high focus districts were analyzed to assess relationship between MMR and institutional births [19].

When compared with pre-programme levels, the proportion of institutional births at the state level increased two to three times over a period of five years since the programme began. However, there were district-level variations associated with the socioeconomic characteristics. Districts with higher literacy and larger urban populations tended to have a higher proportions of institutional birth, whereas poverty and high fertility rates adversely affected the utilization of institutional delivery services. The higher proportion of institutional deliveries did not correlated with a reduction in MMR.

2.4.5 Janani Suraksha Yojna in Rajasthan: A study of the implementation in selected districts

This midterm evaluation, conducted by the Udaipur Population Research Centre, aimed to examine awareness about and implementation status of JSY from the perspectives of the beneficiaries and stakeholders. The results of this study are based on interviews, informal discussions, and observations involving 200 JSY beneficiaries and 30 stakeholders. [20]

The majority of JSY beneficiaries were registered within three months of their pregnancy, received three ANC check-ups, consumed IFA tablets, received postnatal check-ups, had a trained ASHA in their village, received cash amounts, and had an ASHA with them at the time of delivery. The general assessment showed that subcentre and home deliveries decreased and deliveries at CHC//

PHC increased. Overall, the status of ANC and PNC services has also improved among women. Equity was an issue as there were few JSY beneficiaries from the SC/ST category and minority religions.

2.4.6 Impact of Janani Suraksha Yojna on selected family health behaviours in rural Uttar Pradesh

This formative study was carried out in four districts selected from western UP, central UP and eastern UP. [21] It utilized both quantitative and qualitative approaches to collect data on the barriers and facilitating factors with respect to target behaviors.

The study reported an increase of 44 percent in institutional deliveries and further showed that the share of institutional deliveries in private hospitals declined, and reciprocally, the share increased in public health institutions (63 percent) due to JSY incentives. The proportion of women who had undergone at least three ANC checkups has increased significantly from 19.2 percent during 1992–1993 to 34.2 percent in 2009. The monetary incentive were received by 79 percent beneficiaries. This helped in averting out-of-pocket expenditure on deliveries.

2.4.7 Impact of Janani Suraksha Yojna on institutional delivery rate and maternal morbidity and mortality: An observational study from MP

An observational study was conducted in a tertiary-care hospital of Madhya Pradesh, before and after implementation of JSY, with a sample of women who had opted for institutional delivery. [22] The study showed a 42.6 percent increase in institutional delivery after implementation of JSY. This included women from rural areas and those who were illiterate and literate up to primary level, and belonged to the lower socioeconomic strata. The scheme appeared to increase institutional delivery by at-risk mothers, this has the potential to reduce maternal morbidity and mortality, improve child survival, and ensure equity in maternal healthcare in India. It showed that around 85 percent of beneficiaries belonged to socially-deprived sections.

There was also an apparent increase in maternal deaths after implementation of JSY in one of the tertiary hospitals. But the authors mentioned that this initial increase could be due to more referrals of high risk women.

2.4.8 Who participates and who doesn't - A report from Ujjain district

A cross-sectional study was conducted from January to May 2011 among women giving birth in 30 villages in Ujjain district of Madhya Pradesh. [23] To summarize the results: the majority of deliveries (76 percent) took place in facilities; 81 percent of all mothers below poverty line were JSY beneficiaries; 90 percent of the women had prior knowledge of the programme. Most women participating in the programme reported receiving the cash incentive within two weeks of delivery. The ASHA's influence on the mother's decision on where to deliver appeared limited. Women who were uneducated, multiparous, or lacked prior knowledge of the JSY programme were significantly more likely to deliver at home.

2.4.9 Addressing maternal healthcare through demand-side financial incentives: Experience of Janani Suraksha Yojna programme in Odisha

The study was conducted in three districts of Odisha utilizing data from the Health Management Information system. Group discussions and interviews explored the perceived impact of JSY on in-facility delivery, healthcare costs, quality of care, and performance motivation of community health workers. [24]

The number of institutional deliveries, antenatal and postnatal care visits increased after the introduction of JSY with an annual net growth of 18.1 percent, 3.6 percent, and 5 percent respectively. The financial incentive provided partial financial risk-protection as it could cover only 25.5 percent of the maternal healthcare cost of the beneficiaries in rural areas and 14.3 percent in urban areas.

2.4.10 Hardship financing of healthcare among rural poor in Odisha, India

Using survey data of 5,383 low-income households in Odisha, one of the poorest states of India, this study investigated the factors influencing the risk of hardship financing. [25]

Overall, about 25 percent of the households (that had any healthcare cost) reported hardship financing during the year preceding the survey. Among households that experienced a hospitalization, this percentage was nearly 40 percent, but even among households with outpatient or maternity-related care, around 25 percent experienced hardship financing.

Hardship financing is explained not merely by the wealth of the household (measured by assets) or how much is spent out-of-pocket on healthcare costs, but also by when the payment occurs, its frequency and its duration (e.g. more severe in cases of chronic illnesses). The location where a household resides remains a major predictor of the likelihood of having hardship financing when all other factors were taken into consideration.

2.4.11 State and socio-demographic group variation in out-of-pocket expenditure, borrowings and Janani Suraksha Yojana programme use for birth deliveries in India

An evaluation was undertaken using secondary analysis of data from the District Level Household Survey (DLHS-3), 2007–2008. [26] Mean and median out-of-pocket expenditure, percentage use of JSY and percentage of families needing to borrow money to pay for delivery associated expenditure was estimated for institutional and home deliveries.

There was considerable state-level variation in use of the JSY programme for normal deliveries (15 percent nationally; ranging from 0 percent in Goa to 43 percent in Madhya Pradesh). Even among women who had normal deliveries in public institutions, JSY use was less than 50 percent in 29 of the 34 states/UTs in India, highlighting the scope for further improvement. The percentage of families having to borrow money to pay for a caesarean-section in a private institution was 47 percent nationally, ranging from 7 percent in Goa to 69 percent in Bihar. Increased literacy and wealth were associated with a higher likelihood of an institutional delivery, higher out-of-pocket expenditure but no major variations in use of the JSY.

2.5. Challenges to JSY implementation

2.5.1 Operational barriers

The following factors are seen as barriers to proper implementation of JSY: varied perception of eligibility guidelines in different states, low awareness of the programme, the amount disbursed, documentation, delays in disbursement of incentives to the beneficiaries, and low or irregular financial incentives to ASHAs. Communication strategies, independent of literacy, need to be created, emphasizing the importance of institutional delivery, to get the maximum benefit out of the programme. The existing mechanisms, such as the VHND, are not utilized optimally for creating awareness. Important components of JSY, such as micro birth planning, are not emphasized. Additionally, a grievance redressal system needs to be instituted.

2.5.2 Availability of skilled healthcare providers

Availability of providers skilled in management of obstetric emergencies is another major gap across states. Given the increase in the institutional deliveries, it is imperative to map the facilities and strengthen them in order to match the increased demand. The differential in uptake of JSY by districts within the same state, as reported by Lim et al, can be attributed to variations in facility infrastructure, and the difficult terrain in some districts that impedes access to health facilities.[17] These issues can be resolved by engaging more institutions from the private sector as per the availability, requirement, and demand for Basic and EmOC services. Also the VHND platform should be maximised utilized to counsel mothers during the antenatal period.

Possible solution- Gujrat experience

One way to address the shortage of skilled healthcare providers and obstetricians in rural and remote areas has been shown by the Government of Gujarat through the Chiranjeevi Yojna. Private practitioners are recompensed (per 100 deliveries) for providing maternity services to poorer women free of cost at the point of care. The scheme is the first large scale experience of involving private obstetricians in skilled birth attendance and emergency obstetric care for poorer women. Around 500 obstetricians are currently involved, largely in urban areas. The result is that institutional delivery rates have increased and fewer maternal and neonatal deaths have been reported among beneficiaries.

Source: Chiranjeevi Yojna, A Health Financing Scheme for Maternity Services in Gujarat, Health and Family Welfare Department, Government of Gujarat [27].

2.5.3 Shortage of accredited private institutions

As per the guidelines, at least two accessible private health institutions willing to provide the required services per block have to be empanelled by the District Health Society/ RCH Society. But the situation is far from adequate and demands immediate action to improve the uptake of the JSY facility. Involving more private institutions will be really helpful in peripheral and remote areas and where government or public health facilities are scarcely available. Of course, continued monitoring and evaluation of the quality of care provided in private facilities will be crucial to ensuring a positive effect on maternal and child health outcomes.

2.5.4 Equity issues

Although JSY beneficiaries had an equal or higher representation of the poor then general population, a substantial number of the poorest are still unable or unwilling to access institutional delivery. Physical access can be a substantial barrier for women in the lowest socioeconomic group since JSY payment is made in government and accredited health facilities only. Another possible barrier in lower socioeconomic groups is the cultural barrier against in-facility births, as evident from the poor uptake of JSY by Muslim and Christian women. Similarly, the fact that the poorest and the least educated women do not consistently have the highest uptake of JSY benefits indicates that there is need for improvement in the targeting strategy of this programme. [17] Not reaching the most disadvantaged seems to be a common challenge for other large national programmes, which have succeeded in expanding within a short period.

2.5.5 Quality of services

The disconnect between the quality of care expected of deliveries in institutions and what is actually available is a concern. It is clear that unless such care reaches to basic minimum threshold of quality of care, the number of beneficiaries may increase, but would not be matched by commensurate reductions in maternal and neonatal mortality. This will happen when the quality of care and the management of complications improve. In such a demand-driven programme, supply side improvements should happen simultaneously. Another common challenge is women being discharged too soon after delivery, well before the minimum recommended stay.

Possible solution- West Bengal experience- Ayushmati Scheme

The Government of West Bengal has initiated the Ayushmati Scheme with the objective of increasing the number of institutional deliveries by partnering with private sector facilities. The services are cashless and the beneficiaries are pregnant women from BPL and all SC/ST families, having registered with the ANMs and having received at least three antenatal check-ups at any of the subcentres or nearby public facilities. The private sector facilities are empanelled against certain determined criteria and the quality of service delivery is ensured by stringent monitoring and supervision. The empanelled facility is reimbursed on a capitation payment basis, according to which they get a fixed rate for deliveries conducted by them. The payments are made on a monthly basis for a batch of 100 deliveries at a time, inclusive of both normal and complicated deliveries (including caesarean section), at a fixed rate (Rs. 1515/-) for each delivery conducted by them.

Source: Guidelines for Ayushmati Scheme. [28]

2.5.6 Out-of-pocket expenditure

It is generally understood that wealth is the strongest determinant affecting the uptake of private rather than public/government health services. [29] Since the launch of JSY, a large proportion of women have delivered under the programme and received cash incentives, mostly reporting timely receipt of the cash transfer. Nevertheless, there is still a substantial proportion of women from poor households delivering at home. They do not or cannot access emergency obstetric care under the programme and remain at risk of maternal death. The JSSK programme has attempted to mitigate high out-of-pocket expenditure of obstetrical care.

3. JANANI SHISHU SURAKSHA KARYAKRAM

Despite an increase in the number of institutional deliveries, many pregnant women either hesitated to access health facilities or, if they did, they were not willing to stay for 48 hours after delivery. This means that women and their newborn babies are not accessing essential post natal and neonatal care, respectively, to the extent they should be. The main reason cited was high out-of-pocket expenditure, either as user fees or for medicines and consumables or for transport to and from the health facility.

Hence, notwithstanding substantial investments to improve delivery of maternal and child healthcare, the burden of out-of-pocket expenses for pregnant women and children persists in public health systems across most states.

In June 2011, the Union Ministry of Health and Family Welfare launched the Janani Shishu Suraksha Karyakram (JSSK) from Mewat district of Haryana, to invoke a new approach to healthcare that utmost emphasises on entitlements and eliminates of out-of-pocket expenditure for both pregnant women and sick neonates. [30] The scheme envisages free and cashless services to pregnant women and includes normal deliveries, caesarean operations, and also treatment of sick newborns and infants (up to one year after birth) in all government health institutions across all states/UTs. The initiative promotes institutional delivery, eliminates out-of-pocket expenses (a major barrier to accessing health services), and facilitates prompt referral through free transport.

JSSK supplements the cash assistance given to a pregnant woman under Janani Suraksha Yojana. and is aimed at mitigating the burden of out-of-pocket expenses incurred by pregnant women and sick newborns. This could be a major factor in enhancing access to health services.

Entitlements for pregnant women
• Zero expense delivery and caesarean section • Free drugs and consumables • Free essential diagnostics (blood, urine test and ultra sonography etc.) • Free food during stay in health institutions (upto three days for normal delivery and seven days for caesarean section) • Free provision of blood for cases requiring transfusion • Free transport from home to health institution • Free transport between facilities in case of referral • Drop back from to home after 48 hours stay • Exemption from all kinds of user charges

Entitlements for sick newborns and infants upto one year after birth
• Free and zero expense treatment • Free drugs and consumables • Free diagnostics • Free provision of blood for cases requiring transfusion • Free transport from home to health institution • Free transport between facilities in case of referral • Drop back from institutions to home • Exemption from all kinds of user charges

4. WAY FORWARD

Evidence

- JSY, a government-funded nationwide demand side financing scheme, offering conditional cash transfers, is the largest scheme in the world.
- It aims to provide access to services of skilled attendants at birth to all mothers and newborns in the country.
- Since the introduction of JSY, utilization of skilled attendants at birth has increased more among women belonging to backward castes and BPL families.
- There has been no significant impact on MMR or NMR attributable to JSY.
- The roll out of the scheme since 2005 has seen an unprecedented rise in institutional deliveries.
- Apart from institutional deliveries, proportion of mothers availing antenatal check-ups has also increased.
- There is a significant number of instances where beneficiaries and community mobilizers suffer delays in payments.
- There exists a lack of awareness on the scheme.
- JSSK ensures that every mother and infant (upto one year of age) ensured access to get a range of health services free of cost.The uptake of this scheme is still slow.

Recommendations

- Improve the quality of services an ensure high quality maternal-newborn care in facilities to attract women to come and stay for 48 hours after delivery as recommended.
- Engage more private institutions with JSY mechanism to meet the demand.
- Address problems of timely payments to clients and mobilizers; curb leaks.
- Enhance coverage of JSSK, particularly by increasing public awareness about it.
- Adopt strategies to reach the poorest, marginalized and hard to reach population through the scheme.

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Chapter 7

PERINATAL AND REFERRAL TRANSPORT

OVERVIEW

The nation had no functional model of either emergency response systems or assured transport for pregnant women and sick newborns when NRHM was launched in 2005. Only hospital-linked private ambulance services were functional, catering to limited populations in major cities. A few experiments with ambulance services outsourced to local non-government organizations (like GVK EMRI) and successful testing of other local solutions like Haryana Swasthya Vahan Sewa and Janani Express in some states gave birth to todays' National Ambulance Service (NAS). National Ambulance Service has two sub categories: dial 102 to cater to the needs of pregnant women and children; and dial 108 catering to the patients of critical care, trauma, and accident victims. The biggest contributors to this achievement are increased focus on public health under NRHM, flexible planning, some robust technological innovations, local solutions, some brilliant minds and political will.

This chapter gives an overview of different referral models operating across the country. It also highlights the referral transport provided under NRHM, its key features and implementation status.

1. BACKGROUND

Continuum of care entails care across different stages of the life cycle. It also ensures continuity and linkages of services between the community and facilities and vice versa. Services delivered at each level reap benefits but these get multiplied manifold with the establishment of a mechanism that can help bind these together. This was the philosophy with which the concept of regionalization for perinatal care was envisaged in 1976. [1]

A review of the association between duration of inter-facility transport and perinatal mortality shows that neonates transported for a long duration had higher odds/rates of death than those transported for a short duration. [2] The long duration of transport is considered a probable risk factor for adverse neonatal health, but it cannot be changed because this depends on the distance between hospitals.

To partially overcome the problem, the effect of a maternity waiting facility on perinatal health was examined in developing countries in the past decade. A maternity waiting home is a facility within easy reach of a hospital or health centre that provides emergency obstetric care, where women stay at the end of their pregnancy. The aim is to improve accessibility and thus reduce morbidity and mortality for mothers and neonates, should complications arise. Reviews suggest that perinatal death rate in the users group was less compared to the non-users. (19.1 percent v/s 32.2percent, risk ratio= 1.7). [3]

The procurement of trained staff, well equipped ambulances, and the mode of transport system adopted is largely dependent on the paying capacity of parents. However in Indian settings, ignorance and illiteracy adds to the problem, as often parents end up paying thousands of rupees for a private vehicle to transport the neonate rather than arranging for an ambulance. Most of the transports for delivery in India are manned by paramedics or by relatives (through their own vehicle). Recent studies have shown that prolonged neonatal road transport in expert hands is feasible and realistic. [4]

It is a fact that the womb is the best "transport incubator" and that referral transport for mothers is extremely important for the survival of their newborns. [5] However, the decision to transfer a mother at sufficiently high risk to benefit from higher level care is not always easy to make. In addition to the difficulties associated with medical decision making, intrauterine transfers might not be readily accepted by some mothers because large hospitals may be perceived as being impersonal, the technology could arouse anxiety and traveling could impose considerable financial hardship and family disruption [6].

There is limited experience and evidence of transporting newborns compared with transporting women with obstetric emergencies.[7,8] A study from Bangladesh suggests that it is possible to achieve high rates of compliance to referrals but this requires an extensive infrastructure. [7] A community health promotion programme, in combination with improved supply of health services, was tested in a trial through contracting it out to the non-public sector. Making the required improvements in the public sector was estimated to be prohibitively expensive. Evidence suggests the private sector may be able to provide primary care which is superior to that provided by the public sector and at a lower cost. [9]

To avert any avoidable complications, the second delay of the "three delays" model, i.e. delay in reaching a healthcare facility, explains the need for an effective and affordable referral transport services. Women should be able to access the obstetric services irrespective of the place of residence and ability to pay. [5,10] The same theory of second delay applies for sick newborns as well, underlying the requirement of referral transport at all levels of healthcare.

2. SOME REFERRAL MODELS

The delivery of prompt services is a critical factor to the success of many health programmes. An effective perinatal referral transport has the potential to prevent maternal and neonatal deaths. In 2005, when NRHM was launched, the nation had no functional model of either emergency response systems or assured transport for pregnant women in any state or region. There were a large number of hospital-linked private ambulance services that

catered to limited populations in major cities. There were a few experiments with ambulance services outsourced to local non government organizations in West Bengal and Tamil Nadu.

Organization of publicly-financed referral transport systems was not a significant part of the NRHM or the RCH-II project designs. It was not a major feature of the Eleventh Five-Year Plan either. Nevertheless, now almost 22 states have one or other form of these services, all of which are highly visible and reasonably functional. Over an estimated 4,500 publicly financed ambulances ply in these 22 states linked to call centres (Figure 7.1). This is besides the tie-ups that rescue or shift over 20,000 patients per day. [11]

There are many contributors to this success. Flexible financing, administrative interventions, and the public health environment under NRHM provided the space for states to innovate and create different models of referral transport, making it one of India's most brilliant public health advances in the last five years. [11]

Several state-level models have been in operation in the last decade. In many states, these have been adapted contextually to meet the requirements at the ground level. The local adaptations have been summarized as district-level models. The following are some successful referral models that have evolved in the last few years:

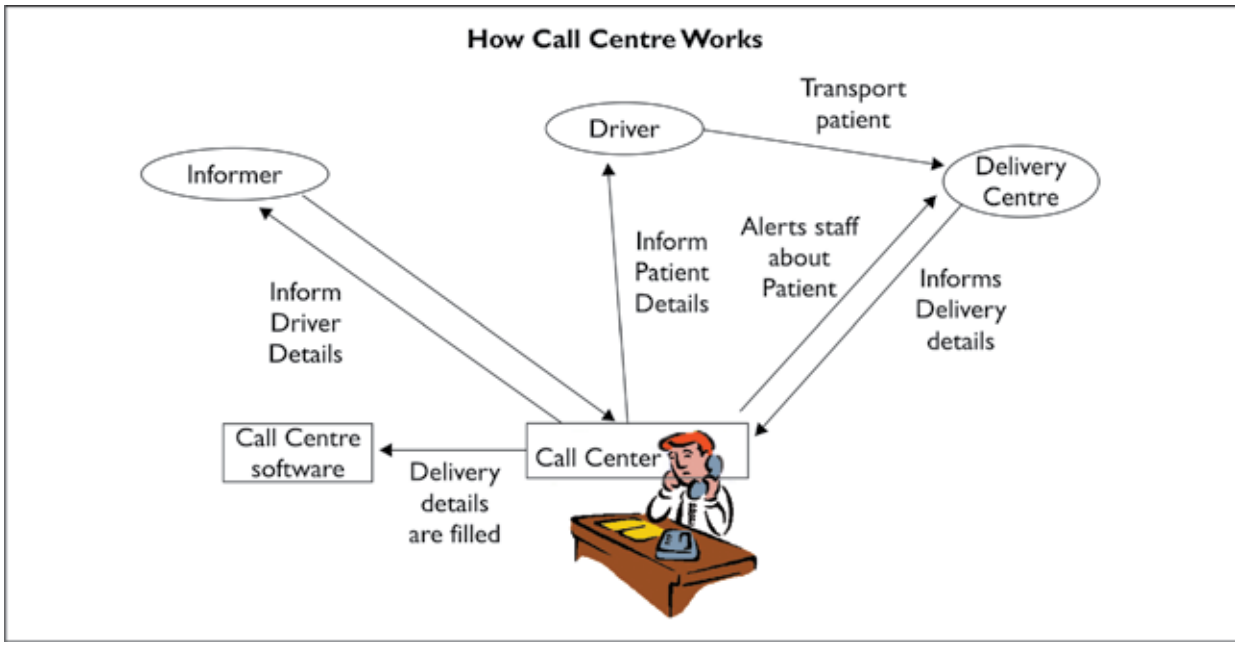
2.1 State-level models

2.1.1 Emergency Management and Research Institute (EMRI) model

GVK EMRI is a pioneer in Emergency Management Services in India. As a state level not-for-profit professional organization operating in the Public Private Partnership (PPP) mode, GVK EMRI is the most widespread Emergency Response Model (Dial 108 Emergency service) in India. With a modest beginning with 30 ambulances in 2005, it expanded its service to cover the entire population of Andhra Pradesh with a fleet size of 802 ambulances within one year. [12]

The standards for "108 Ambulance" are to reach patients/sites within 20 minutes in urban areas and 40 minutes in rural areas and to shift the patient to the nearest hospital within 20 minutes after reaching him/her. The transportation is coordinated by a state-of-art emergency call response centre, which is operational 24-hours a day, seven days a week. The call to the number 108 is a toll-free service accessible from landline or mobile. Service to all categories of patients is cashless with the

Figure 7.1: Schematic representation of how referral system works through call centres



Adapted from: Operating perinatal referral transport service in rural India, Toolkit. UNICEF; 2010 [5]

government undertaking to reimburse the full costs of the provider. Each ambulance has a staff of three drivers and three paramedical emergency technicians with two supervisors for every 15 vehicles.

All states that have this model have outsourced it to a management agency. While in some states, GVK EMRI is providing its service, in others, Ziqitza Health care Limited manages it. In an assessment conducted in Haryana and Andhra Pradesh, obstetric causes accounted for 25 percent of usages. [11]

2.2 District-level models

2.2.1 Haryana Swasthya Vahan Sewa

The Haryana Swasthya Vahan Sewa was launched on 14 November 2009 with the main objective of providing assured referral transport for pregnant women in labour and newborns, as well as attending to other emergencies. The scheme offers transportation from the site of accident or home or any other place to the nearest appropriate medical facility in case of medical need, and transportation from a medical facility to a higher medical facility. Free transportation services are provided to pregnant women, victims of roadside accidents, patients belonging to BPL or notified slums, postnatal cases in case of emergency (till six weeks after delivery), neonates in case of emergency (till 14 days after birth), freedom fighters, and ex-defence personnel. For all other categories of patients, user-fees are charged which amounts to Rs 7 per kilometre. The scheme is run by the government in collaboration with District Red Cross Societies. [11]

2.2.2 Janani Express Yojna (JEY)

Janani Express Yojana is a district-level Public-Private Partnership model launched by the Department of Health and Family Welfare, Government of Madhya Pradesh, in 2006 as a cost-effective referral transport innovation aimed at addressing the "second delay" contributing to MMR and IMR. On similar lines, the Janani Express Yojna was started in few districts of Odisha and Karnataka. [5, 11]

Under JEY, pregnant women, sick infants and BPL families can call a call centre and request for a vehicle to take them to the hospital at crucial emergency moments and drop them home after treatment. [13] It includes government (district/block level) and contracted private vehicles and the services are managed by the District Health Society. It is basically a vehicle hired locally by the Rogi Kalyan Samitis for a period of one year, to ensure provisioning of 24 hours transport availability at the field level (block level) in order to bring pregnant women to the health institutions. [11]

2.3 Decentralized community-based models

In some remote and difficult-to-reach areas, community-based models are also functioning. With support from UNICEF, the District Health Societies have developed low cost models by utilizing the existing resources to provide referral services. The referral models for Khunti district of Jharkhand, Guna in Madhya Pradesh and Dholpur, Rajasthan, for example, are being managed by community-based organizations with significant involvement of communities and private vehicles owners. Typically the vehicles are not dedicated to referral transport.

Several states are also using central helplines/call centres for managing the referral transport These include the JSY helplines in Chhattisgarh, Jharkhand and Manipur; call centres in Madhya Pradesh; and obstetric helplines in Rajasthan. Some states have tried mobile health clinics under Public Private Partnership (PPP) models to provide clinical services as well as referral transport. Andhra Pradesh and Haryana provide free bus passes to SC, ST and BPL pregnant women in rural areas. Non-governmental organizations too are involved. Deepak Foundation in Vadodara district, along with the Government of Gujarat, has been operating an emergency transport facility across several blocks in the district. Bihar and other states also operate the 102 Emergency Service through the government health network. [5]

2.3.1 Call Centre in Guna

Owned by the District Health Society in Guna, the call centre pooled vehicles from various sources for emergency transport. These vehicles are strategically placed at 24 institutional delivery points located across the district in such a way that no village takes more than 30 minutes to access. The drivers are trained in first aid and vehicles are provided with oxygen cylinder. But there is no provision of trained medical or paramedical staff in these vehicles. [14]

A centrally located 24 x 7 call centre is required to control the fleet of vehicles and to ensure coordinated contact. The call centre is located in the district hospital campus and has four dedicated operators on an eight-hour duty shift. It is provided with two dedicated telephone lines one of which is toll-free number 102; both the numbers are publicized in the community through radio, posters, banners, and ASHA workers. The call centre is also equipped with a computer in which all details of the informer and patient are kept. On receiving the call the operator diverts the nearest vehicle to the village and also informs the nearby delivery centre to be prepared for an incoming patient. The software uses the information stored to generate a monthly report which is then used by the District Health Society to take corrective actions.

2.3.2 Boat Clinic

The Boat Clinic of Assam is a good example of improving perinatal transport in areas areas difficult to reach by road. This innovative outreach initiative was designed by the Centre for North East Studies and Policy Research (C-NES) and launched in 2005 in Dibrugarh district, as an emergency response to provide basic health services to the communities living on the riverine islands. A boat – Akha (Asha) the Ship of Hope equipped with medical officers, health counsellors, stock of vaccines, medicines, ORS and other health related supplies navigated the Brahmaputra to reach out to children and women with critical healthcare support. [15] During the visits on specified days, pregnant women and children with complications are referred to specialists who are transported through boat clinics.

2.3.3 Voucher Initiative

The voucher scheme is for transporting pregnant women belonging to BPL/ SC/ST families for delivery at the government health facilities and private institutions empanelled under the Ayushmati scheme. [16] It was started in Bankura, West Bengal, as a pilot initiative in September 2007. The scheme provides for beneficiaries (pregnant women) holding vouchers to avail free transportation services for going to an approved health facility. All pregnant women belonging to BPL, SC and ST families residing in rural areas are eligible to get benefits. These vouchers are valid only for delivery and postnatal complications but not for ANC check-ups. A voucher value of Rs 150 is provided to the identified beneficiaries for travel up to 10 km up and down, Rs 250 for travel between 10 and 20 km up and down and Rs 350 for travel between 20 and 30 km up and down.

The transportation of delivery patients under the scheme is undertaken by the PPP ambulances at the block level. Other ambulance/private vehicle operators in the block, who are willing to participate in this scheme, follow the terms and conditions specified in the scheme.

Key features of referral transport
• Referral transport to be linked, district-wise or state-wise as required, with a centralized 24x7 call centre having a universal toll free number.
• Vehicles to be fitted with GPS for equitable geographical distribution and effective network and utilization.
• A prudent mix of basic level ambulances and emergency response vehicles to be established with a focus on adequate coverage by basic-level ambulances.
• Free referral transport to be ensured for all pregnant women and sick neonates accessing public health facilities.
• Response time for the ambulance to reach the beneficiary should be within 30 minutes and the woman should reach the health facility within the next 30 minutes.
• There should be rigorous and regular monitoring of the use of the vehicles.
• Universal access to referral transport throughout the state, including transport to and from hard to reach areas, to be ensured.
Steps to be taken for ensuring assured referral transport
• During the 1st ANC, the toll free number called for ambulance must be recorded in the MCP card, and the beneficiary and her attendants informed about it.
• All referral vehicles must have information on the functional delivery points, such as PHCs and CHCs to avoid any delay in seeking treatment.
• Raise general awareness on the availability of the transport and its use.

3. NATIONAL AMBULANCE SERVICES

The Government of India has a mandate to establish a network of basic patient-care transportation ambulances with the objective of reaching beneficiaries in rural areas within 30 minutes of receiving a call.

With fund support from NRHM, states have introduced various models of referral transport services. The government has taken a policy decision that all patient transport vehicle/ambulances funded under NRHM must have a standardized display and function under one name National Ambulance Service, which is simple, apt, and understandable across the country. [17]. The two types of referral transport systems functional under National Ambulance Service are described below.

3.1 Referral transport for all: Dial 108

The concept of perinatal referral transport took its shape from emergency rescue and retrieval transport pioneered by GVK-EMRI, which is the largest professional Emergency Service Provider in the country.

Dial 108 is predominantly an emergency response system for all medical, police, or fire emergencies. It is primarily designed to attend to all patients of critical care and trauma and accident victims. However, this emergency response approach is also being utilized to serve and assure complete pre-hospital emergency care for sick newborns and children from point of pick-up to evacuation and reaching them to an appropriate hospital. For 108 emergency transports, the capital expenditure of the ambulances is supported under the National Health Mission and the operational cost is supported on a diminishing scale of 60 percent in the first year, 40 percent in the second year, and 20 percent thereafter. [18]

3.2 Referral transport for pregnant women and sick newborns: Dial 102

To augment the existing 108 ambulance service, the dial 102 ambulance services were initiated, which essentially consist of basic patient transport. It caters to the needs of children and pregnant women, though other categories are also taking benefit and are not excluded. JSSK entitlements such as free transfer from home to facility, inter-facility transfer in case of referral, and drop-back for mother and children are the key focus of the 102 service. The reason for having a separate number is to make it popular and differentiate it from the other Emergency Response System. For 102 transports, both capital and operational cost are fully supported by the government. [18]

Figure 7.2: Snapshot of the sides of vehicles used for National Ambulance Service

Given India's scale and diversity, there is no one-size-fits-all referral transport service. Flexibility has been given to the states for establishing such referral linkages between home and health facility, between different levels of health facilities, and for drop-back home for pregnant women before and after delivery, and sick neonates. These services are provided free of cost as envisioned under the JSSK. The states have come up with their own innovative models and at present, there are a number of systems for emergency or referral transport services operating in rural India, with varying modes of operation and catering to different situations. Samajvadi Swasthya Sewa in Uttar Pradesh utilizes the dial 108 ambulance services, whereas, Mahtari Express in Chhattisgarh utilizes the dial 102 ambulance services.

3.3 Implementation status

Currently 28 states/UTs have the facility for people to dial 108 or 102 for calling an ambulance. Advanced Life Support and Basic Life Support ambulances are being supported under 108 emergency transport systems across the country. A total of 8,122 ambulances are operating as 102 patient transport services. Besides, 4,769 empanelled vehicles are also being used in some states to provide transport to pregnant women and children. These include Janani express in Madhya Pradesh and Odisha, Mamta Vahan in Jharkhand, Nishchay Yan Prakalpa in West Bengal, and Khushiyoki Sawari in Uttarakhand. Implementation of the National Ambulance Service guidelines has been made mandatory for all the ambulances whose operational and capital costs are supported under NHM. [18] The total number of ambulances available exceeds 20,000, as per the latest data.

Table 7.1: Emergency Referral Services vehicles approved under NHM

Sl. No	State/UT	102-Type	108-Type	Total
1	Bihar	895	50	945
2	Chattisgarh	300	240	540
3	Himachal Pradesh	0	171	171
4	Jammu & Kashmir	175	0	175
5	Jharkhand	0	274	274
6	Madhya Pradesh	0	604	604
7	Odisha	0	167	167
8	Rajasthan	400	464	864
9	Uttar Pradesh	1972	988	2960
10	Uttarakhand	90	140	230
11	Arunachal Pradesh	94	0	94
12	Assam	450	380	830
13	Manipur	40	0	40
14	Meghalaya	114	0	114
15	Mizoram	60	0	60
16	Nagaland	76	0	76
17	Sikkim	0	0	0
18	Tripura	0	0	0
19	Andhra Pradesh	0	802	802
20	Goa	0	39	39
21	Gujarat	0	506	506
22	Haryana	344	0	344
23	Karnataka	200	617	817
24	Kerala	283	346	629

Sl. No	State/UT	102-Type	108-Type	Total
25	Maharashtra	2368	590	2958
26	Punjab	0	240	240
27	Tamil Nadu	0	606	606
28	West Bengal	0	0	0
29	A & N Islands	11	0	11
30	Chandigarh	0	10	10
31	D & N Haveli	0	0	0
32	Daman & Diu	10	5	15
33	Delhi	120	0	120
34	Lakshadweep	0	0	0
35	Puducherry	10	0	10
Total		**8122**	**7239**	**15361**

4. WAY FORWARD

Evidence

- The government has integrated diverse systems of emergency referral transport into dial 102/108 under the National Ambulance Service and the core features are identical and mandatory all across the country.
- There are more than 20,000 ambulances across the nation under NRHM.
- Although these services cater to neonates also, these are largely utilized for pregnant women

Recommendations

- Standardize ambulance design and equipment to enhance comfort, safety and emergency response during transportation
- Develop and implement referral transport protocols (including pre-transport stabilization, care during transport, handing over at referral site, communication between the referring and recipient providers/facilities, documentation)
- Establish regional / district level call centres in the larger states to disperse the load
- The referral transport system for mothers and newborns should be continuously improved through evaluation, use of technology and efficient management
- Skilled health staff should be present inside the ambulance especially for pregnancy-related communications; particularly where travel times are high and the woman is in an advance stage of labour.

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Chapter 8

HEALTH SYSTEMS AND POLICIES FOR NEWBORN CARE IN INDIA

OVERVIEW

Health systems and policies have a critical role to play in determining the manner in which health services are delivered and utilized, which eventually affects the health outcomes. Using the WHO health systems framework, we have tried to assess the preparedness of health systems in India in delivering services related to newborn care. Since maternal and newborn care need coordinated services, it is difficult to separate one from the other. This analysis has been able to highlight the gaps in service and the need for a systems approach to measure the financial flow and its outcome on newborn care; better governance; an increase in numbers and capacity for managing areas related to newborn care; and better utilization of information pathways by generating quality data and its use in evidence-based decision making.

1. BACKGROUND

Article 21, 'Protection of Life and Personal Liberty', of the Constitution of India provides every citizen of India the fundamental right to live, which in any civilized society implies the right to food, water, decent environment, education, medical care and shelter. [1] And thus it allows us to interpret that the right to live emphasises the need of programmes and services that allows everyone to live, from a newborn child to an old person, including when the child is in mother's womb. Through this interpretation we can also imagine that it is the role of government to ensure the safety and survival of mothers and newborns in the country.

In India, health policies are framed and implemented by Ministry of Health and Family welfare. Its first national population programme was announced in 1951. However, the first National Health Policy of India (NHP) came only in 1983. [2] The main focus of the policy was provision of primary health care to all by 2000. This was to be achieved by setting up network of primary health care services, using health volunteers and simple technologies, establishing well worked referral systems and an integrated network of specialty facilities. This resulted into programmes on maternal and child health and universalization of immunization services in India. NHP 2000 further built on NHP 1983, with an objective of provision of acceptable quality of good health to general public, through decentralization, use of private sector and increasing public expenditure on health care. [3] It also emphasized increasing the use of alternate form of medicines and strengthening decision making processes at decentralized state level.

Table 8.1: Health programmes and missions for mothers and children

Name	Year	Plan period	Focus areas
National Family Planning Programme	1952	1st five year plan	Decrease fertility rates and provide access to maternal health care
Maternal and Child Health Programme	1977	5th five year plan	Basic Health care needs of mother and child
National Diarrheal Disease Control Programme	1978	5th five year plan	Oral Rehydration Therapy
Expanded Immunization Programme (EIP)	1978	5th five year plan	Reduce vaccine preventable diseases
Universal Immunization Programme (UIP)	1985	6th five year plan	Expanding coverage of EIP
Technology Mission on Immunization	1986	7th five year plan	Monitoring UIP and its coverage from 0-12 months
Acute Respiratory Infection (ARI) Control Programme	1990	7th five year plan	Prevention and cure of ARI
Child Survival and Safe Motherhood (CSSM) Programme	1992	8th five year plan	Improve the health status of neonates, infants, child and maternal morbidity and mortality
Reproductive and Child Health Phase I (RCH I)	1997	8th five year plan	Promoting maternal, newborn and child health; family planning
National Rural Health Mission (NRHM)	2005	10th five year plan	Improving overall health indicators of rural India
Reproductive and Child Health Phase II (RCH II)	2005	10th five year plan	Reducing maternal, newborn and child mortality in rural India, by 24 hours service provision through community health centers and 50% primary healthcare centers; family planning
National Health Mission (NHM)	2012	12th five year plan	Improving overall health indicators of country in rural and urban areas both; replaced NRHM
Reproductive, Maternal, Newborn Child and Adolescent health (RMNCH+A) Strategy	2013	12th five year plan	Comprehensive and integrated health services most importantly for the adolescents, mothers and children; family planning

1.1 Planning phases of newborn care programmes in India

In India, major policies and programme implementation are planned and implemented during the 5 year planning phase. Even though there are no explicit programmes on newborn child care in India, various programmes on provision of services related to mother and child care have been implemented as shown in Table 8.1.

Most of the programme initiatives have focused on mother and child care and the need to focus on newborn care has been felt. It was in 1992 with the launch of the CSSM programme that included an essential newborn care component, that neonatal health care became an integral part of the maternal and child health programmes.

The 10th five year plan document acknowledged the role of policies on the reduction of fertility and investment on the reduction of child mortality. However, it noted that though IMR had decreased, the number of babies with low birth weight did not decrease. It also highlighted the role of institutional deliveries and community health workers in reducing NMR, the importance of referral services to treat illnesses related to newborns, and a need to generate evidence on efficacy of various interventions. During this phase, newborn care facilities were operationalized at the primary healthcare level in collaboration with NNF. [4]

1.2 National Rural Health Mission (NRHM) and Reproductive, Maternal, Newborn, Child and Adolescent Health (RMNCH+A)

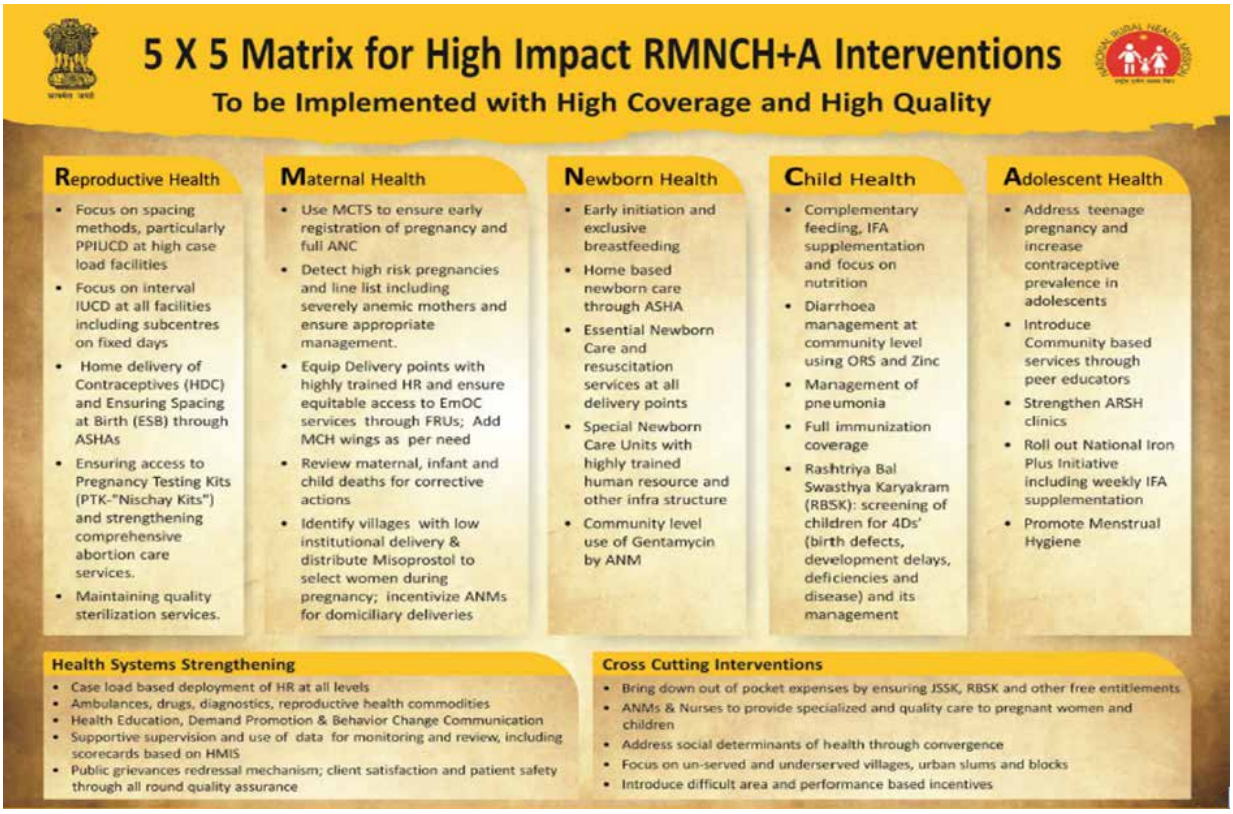
NRHM was a watershed for the health sector in India. The programme for reproductive and child health was integrated into the NRHM. The core focus of NRHM was on reduction of maternal and child mortality. It envisaged increasing public expenditure on health care, decreasing inequity, decentralization and community participation in operationalization of health care facilities based on IPHS norms. IPHS norms also helped in assessing the human resource needs at facility level for provision of care. The detailed analysis of this is done later in the chapter. However, it is important here to take a note of the programmes focusing on newborn implemented through NRHM. [5]

In 2013, the Ministry of Health and Family Welfare released the RMNCH+A strategic document. This envisaged inducing greater momentum under NRHM and accelerate the pace of decreasing IMR and MMR, along with NMR, and improving adolescent health. Its 5x5 matrix clearly outlines the continuum of care approach and provision of care to mother right from their adolescent age till post natal services.

Table 8.2: Major initiatives affecting newborn care under NRHM

Initiative	Purpose
Janani Suraksha Yojana (JSY)	Increasing institutional delivery through demand side financing
Integrated Maternal Newborn Child Initiative (IMNCI)	Standard management of major causes of childhood morbidity and mortality
Navjat Shishu Suraksha Karyakram (NSSK)	Basic newborn care and resuscitation programme
Facility Based Integrated Maternal Newborn Child Initiative (F-IMNCI)	Standard management of major causes of childhood morbidity and mortality at facility level
Setting up Blood Storage Units at first referral units	Decreasing maternal mortality
Home Based Newborn Care (HBNC)	Decreasing neonatal morbidity and mortality by early detection by frontline worker
Janani Shishu Suraksha Karyakram (JSSK)	Strengthening referral system for decreasing maternal and child morbidity and mortality
Joint Maternal and Child Protection Card (MCP)	Programme delivery
Tracking anemia during pregnancy and child birth	Decreasing maternal and child mortality
Mother and child tracking system	Tracking every mother and newborn

Figure 8.1: Matrix of RMNCH+A interventions



Source: NRHM, 2013 [5]

The strategic document includes the following interventions for the newborn child:

- Delivery of antenatal care package and tracking of high-risk pregnancies;
- Skilled obstetric care emergency obstetric and post-partum care for mother;
- Home-based newborn care and prompt referral;
- Facility-based care of the sick newborn; and
- Integrated management of common childhood illnesses (diarrhoea, pneumonia and malaria)

It identifies the roles to be played at each level of care and the service provision and health systems requirements in terms of manpower and commodities for each of them. Subcentres and Primary Health Centres are designated as delivery points; Community Health Centres (which are the First Referral Units) and district hospitals have been made functional 24 X 7 to provide basic and comprehensive obstetric and newborn care services. Only those health facilities can be designated as FRUs that have the facilities and manpower to conduct a Caesarean section.

Under NRHM, facilities with a high case load are managed and monitored by a dedicated Maternal and Child Health wing. To meet the human resource need of these facilities, short-term training for healthcare professionals is developed, which can strengthen the capacity of MBBS doctors and allied healthcare professionals to provide primary care to mother and child. There are also provisions for postnatal visits and clear indicators are developed to monitor it.

This strategic document identifies the required capacity-building efforts, for which NRHM has produced manuals. So far out of 116 capacity-building manuals, 10 are dedicated to newborns. The document also has guidance for reaching remote inaccessible areas to ensure that services related to maternal and child health care are provided there. [5]

On of the key aspects of the document and one that certainly contribute to its comprehensive nature is the involvement of various stakeholders in its development. Apart from the core drafting team of the Ministry of Health and Family

Welfare, the technical support team is highly represented by the development partners, academic partners, practitioners, nationally and internationally. As a policymaking process, wider stakeholder representation including development partners, programme managers, policy makers and academicians has been there which is one the most important steps for wider adaptation of processes, crucial for implementation success.

1.3 State policies on newborn care

Health is a state subject. The centre issues guidelines, it is the States that have the final prerogative on policies and implementation of the initiatives. In certain states a substantial proportion of the support may come from the state's budget and in others it may come from the central budget. The share can only be ascertained after a detailed public expenditure tracking exercise, which is beyond the scope of this report.

In the context of the programme implementation and financial allocation at the state level, we undertook analyses of the PIP of four geographically separated states, to give an indication of the inclusion of activity related to newborn care and its implementation, using finance allocation as a surrogate marker.

Most of the states have adopted the 'continuum of care' approach for newborn care, implementing all the programmes initiated on newborn care as part of their PIP, but there has been no resource allocation for implementation. The new comprehensive RMNCH+A strategy is yet to take off at the state level, so, currently it only shows intent in implementing policies.

At the state level there are certain south Indian states where the NMR and IMR rates are below national average and are as good as developed nations. Understanding polices and processes of these states provide an opportunity to improve services related to newborn care. Tamil Nadu has been successful in decreasing NMR below the national average primarily because of a strong health system.

Thus it can be seen that over a period of time India has taken policy initiatives towards improving newborn care in India. However, the main challenge as for any government is to implement policies into tangible health outcomes.

In the context of infant, neonatal and maternal mortality rates in India are disproportionately higher than in the world. [6,7]. And according to the World Health Report (WHR) 2008 [8], WHR 2000 [9] and WDR 1993 [10], the synergistic role of different components of the health system has a direct effect on health outcomes, inclusive of IMR, MMR, and NMR [11,12]. There is a global agreement on this, [13] but there is less agreement on the areas of priority [14], which contribute significantly towards reduction of NMR. And hence, it is important to understand the Indian health care system and the manner in which it performs in the context of newborn care. In the following section, we will initially explain India's health care delivery system and then explain WHO framework, which we have used to undertake health system preparedness assessment using data available through NRHM.

2. HEALTH SYSTEM IN INDIA

India's health care system consists of a mix of public, run by states and union territories, and private sector providers of health services. Networks of health care facilities at the primary, secondary and tertiary level, run mainly by state governments, provide free or very low cost medical services. Under the public health system, the distribution of health care infrastructure as well as human resources for health and financial resources allocation are based on the IPHS norms, which also takes into account the accessibility due to physical terrain and hard to reach areas. Health in India is a state subject, and along with the budgetary support from the state, support is also given by central government in form of grants to the state.

Centre also supports the state through NRHM, and the support to the states is based on the existing burden of disease and the capacity that state has to address it. Under NRHM, states are categorized as high focused north eastern states, high focused non north eastern states, non-high focused large states and non-high focused small states and union territories.

Case study: Comprehensive Emergency Obstetric and Newborn Care services (CEmONC)-Tamil Nadu's initiative in providing newborn care (2004 onwards)

One of the main objectives of Tamil Nadu Health Systems Project is to improve the access and utilization of health-care services in the state. An analysis of the maternal and infant mortality data reveals a significant decline. However, a big area of concern is the fact that 75 percent of maternal deaths occurred during intra partum and postpartum and 25 percent occurred in antepartum.

One common issue was of referral. When a hospital does not have adequate services, the pregnant patient has to be referred to another hospital. Covering the distance between two hospitals at such a critical stage can prove fatal, especially in the complex cases that are usually referred to other hospitals, especially in the rural areas. This resulted in the creation of CEmONC.

Salient features

The CEmONC centre comes equipped with both the manpower and the infrastructure required to care for the mother and the child. Intensive inputs were provided, in terms of training and physical infrastructure to ensure quality care.

The centre has obstetricians on duty in the hospital round the clock, anesthetists on call, duty doctors, duty nurses, and pediatricians. Laboratory technicians and support staffs are available round the clock. Around 508 doctors and 562 nurses have been trained and designated for CEmONC centres.

It is equipped with a fully functional maternity block, including a labour ward, blood bank and storage unit, operation theatre, newborn ward, isolation ward, and a newborn intensive care unit. Buildings worth Rs 150 crore and equipment worth Rs 40 crore have been obtained for the CEmONC centres.

Training

The focus of training was to improve technical skills in delivery and newborn care. Doctors, including obstetricians and pediatricians, staff nurses, and maternity assistants were provided training for various CEmONC services.

Other training related to maternal and child care is listed below:

- Ultrasound training by obstetricians and radiologists/sonologists of concerned medical colleges;
- Four-day training to pediatricians on using ventilators – one each of which was provided in every district headquarter;
- Training on using partographs to one obstetrics and gynaecology specialist and one staff nurse from each hospital;
- A 15-day hands-on training on emergency and labour ward skills for nurses;
- Training on setting up and maintaining the Neonatal Intensive Care Unit for pediatricians;
- 15 days training in medical colleges for obstetricians on the management of emergency obstetrics skills; and
- Blood bank training through the Tamil Nadu State Aids Control Society.

In order to ensure quality of care in the CEmONC centres, infection control and waste management is a priority. Some of the steps towards this include:

- Segregating bio-waste and disposing it through appointed agencies;
- Taking swabs from the operation theater to ensure that proper sterilization has been maintained;
- Sterilizing equipment and disposing off used needles and sharps through needle destroyers; and
- Soaking soiled sheets in sodium hypochlorite solution for 30 minutes to destroy HIV virus (to protect healthcare workers).

Initial results

- Total maternity admissions have increased by 9.9 percent;
- Complicated maternity admissions have increased by 28.4 percent;
- A corresponding increase in LSCS rate by 33.9 percent;
- Referral-in of complicated maternity admissions increased by 21.5 percent;
- Neonatal admissions increased by 10.9 percent; and
- Complicated neonatal admissions increased by 23.1 percent

Figure 8.2: Norms at Primary, Secondary and Tertiary levels

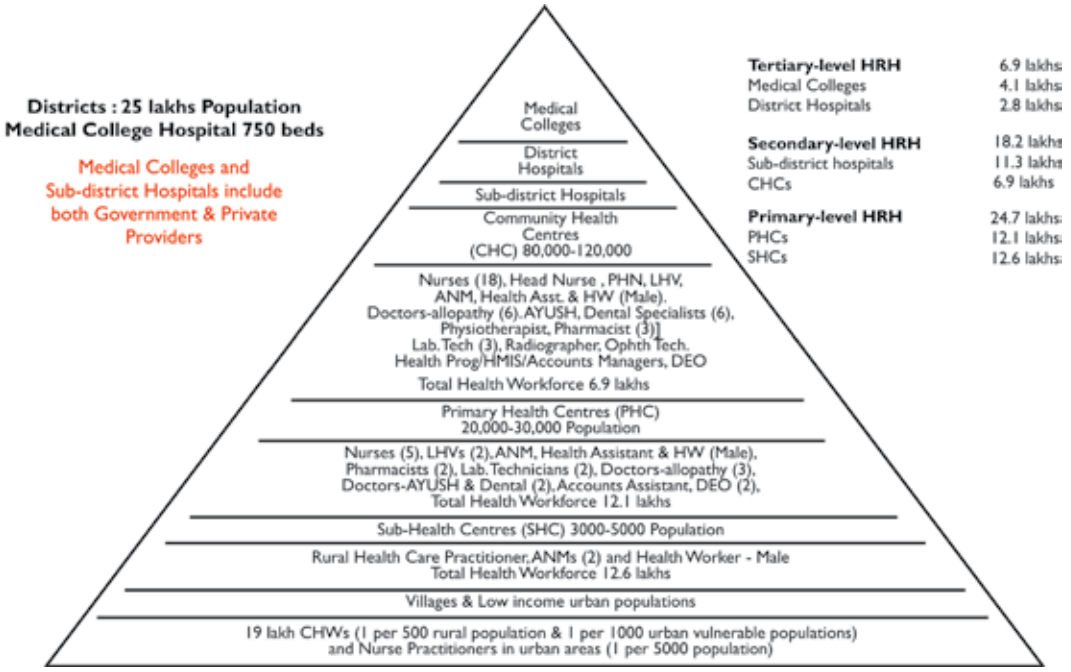


Table 8.3: Distribution of high focus and non-high focus States

High Focused Non North Eastern states	High Focused North Eastern states
Bihar	Arunachal Pradesh
Madhya Pradesh	Manipur
Chhattisgarh	Assam
Odisha	Nagaland
Himachal Pradesh	Meghalaya
Rajasthan	Tripura
Jammu & Kashmir	Mizoram
Uttar Pradesh	Sikkim
Jharkhand	
Uttarakhand	
Non High Focused Large States	**Non High Focused Small States and Union Territories**
Andhra Pradesh	Andman& Nicobar Island
Kerala	Dadar& Nagar Haveli
Goa	Delhi
Maharashtra	Chandigarh
Gujarat	Lakshadweep
Punjab	Daman & Diu
Haryana	Pudducherry
Tamil Nadu	
Karnataka	
West Bengal	

Source: NRHM, 2013 [5]

At the state level, through State Health Societies (SHS) there is integration of services provided by various national health programmes as well as state health systems. Apart from this, in India, there is also an extensive private health care sector, covering the entire spectrum from individual doctors and their clinics, to general hospitals and super speciality hospitals.

In the following section, the WHR 2000 health systems framework has been used to understand the current health system preparedness, especially public health system linked by NRHM, of India towards decreasing NMR. The initial focus is on explaining the health system building blocks of WHO and its synergy with the recently proposed health systems framework to improve Maternal and Child Health (MNCH) outcomes. The later part of the chapter looks at the building blocks in the order of healthcare financing, information system, human resources for health, service delivery, and governance. Each health system building block starts with describing the current public health scenario and its possible interaction with MNCH indicators (and not exclusively on neonatal care) and its current status in the context of NRHM.

3. WHO HEALTH SYSTEM FRAMEWORK

As with other areas of healthcare, the WHO health systems framework (Figure 8.3), gives us an opportunity to assess the preparedness on provision of newborn care. There is enough evidence of correlation between health system building blocks and health outcomes.

The positive correlation between better governance, equitable healthcare financing, availability of human resources, service delivery, medical products and technology, and use of information technology and health outcomes has been demonstrated. A weakness in any one of the health system building blocks negatively affects the health outcomes. [13]

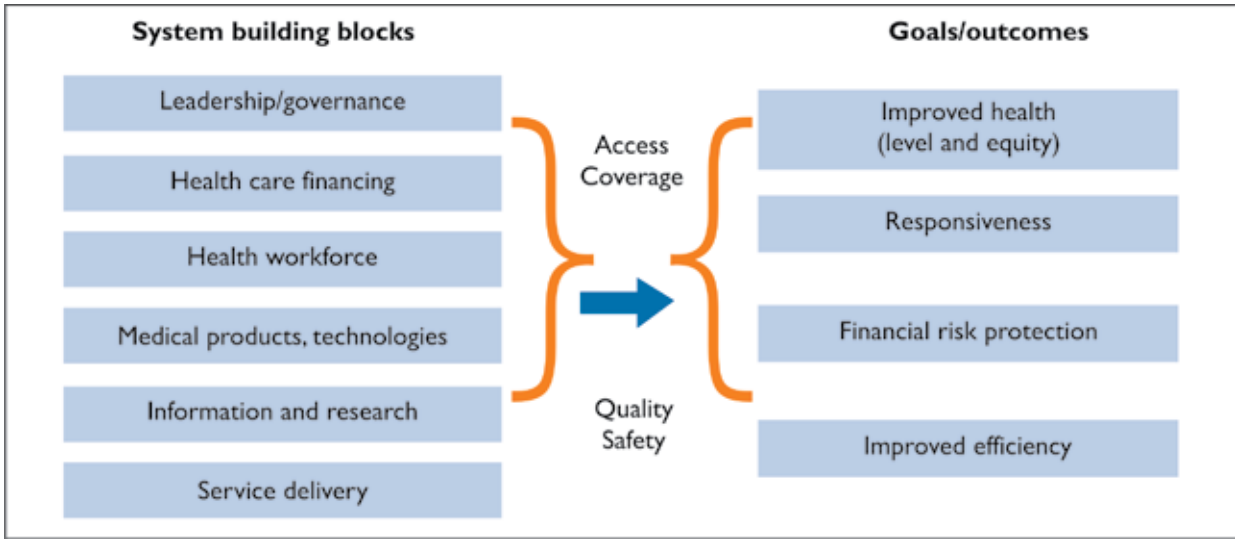
The health systems framework to improve MNCH outcomes is also aligned to the health systems framework of WHO 2000. However, the MNCH framework also lays emphasis on the social determinants of health (discussed elsewhere in the report) which have an effect on MNCH outcomes.

3.1 Leadership and governance

Governance for health requires a synergistic set of policies, many of which reside in sectors other than health and outside government and must be supported by structures and mechanisms that facilitate collaboration to determine the health outcome. [15]

Currently most of the child health initiatives are governed and provided leadership by the Ministry of Health and Family Welfare (MOHFW) and the Ministry of Women and Child Development (MWCD). MoHFW, following the continuum of care

Figure 8.3: Linkages of health system building block and outcomes



Source: WHO 2000 [9]

and life cycle approach, provides a range of services to children and young adolescent girls, including postpartum services. Most of the activities of the division are undertaken with the support of the SHS, through which NRHM/NHM is implemented at the state level.

The efficiency of SHS's leadership and governance has a direct effect on the implementation of activities related to newborn care, including the availability of funds and their utilization, achieving targets, and monitoring the activities. There are various committees within SHS responsible for the programmes, and continuous changes in the leadership also affects the policymaking and implementation process.

MoHFW, in collaboration with the MWCD, monitors service delivery to mothers and children through the Mother and Child Protection card. [16] An attempt has been made to ensure that outcome- oriented efforts are set in the context of maternal and child health. MoHFW has created a development results framework, in which activities related to universal access to maternal and child health and newborn care are given key importance. [17]

Governance also has a crucial role in bringing accountability and transparency to health systems. Even though it is difficult to ascertain the impact of governance on health outcomes, there are processes that can be measured for good governance (such as community participation in decision making process). In recent times, the role of governance in monitoring and evaluation has been a major part of the discourse on heath sector reforms. The development results framework of MoFW also stresses on the need for community participation in the decision making process as well as in monitoring and evaluation.

And, as mentioned earlier, although there is no direct indicator to attribute the effect of governance on newborn care in India the following health system indicators can be suggestive:

- **Rogi Kalyan Samiti (RKS):** It is a management structure at healthcare delivery centres consisting of members for Panchayati Raj Institutions (PRI), local representatives, government representatives, and NGOs. The main role of RKS is monitoring the delivery of healthcare and proper utilization of grants and funds in the best interest of the community and end users. [18] This enables devolution of responsibility to the community and increases their role in the decision-making processes.
- Similarly, to increase community participation in governance at the village level, there are Village Health Sanitation and Nutrition Committees (VHSNC) which report to the gram panchayat. The main role of VSHNC, which comprises of an ANM, AWW, and a PRI representative, is to make nutritional services accessible to women and children.

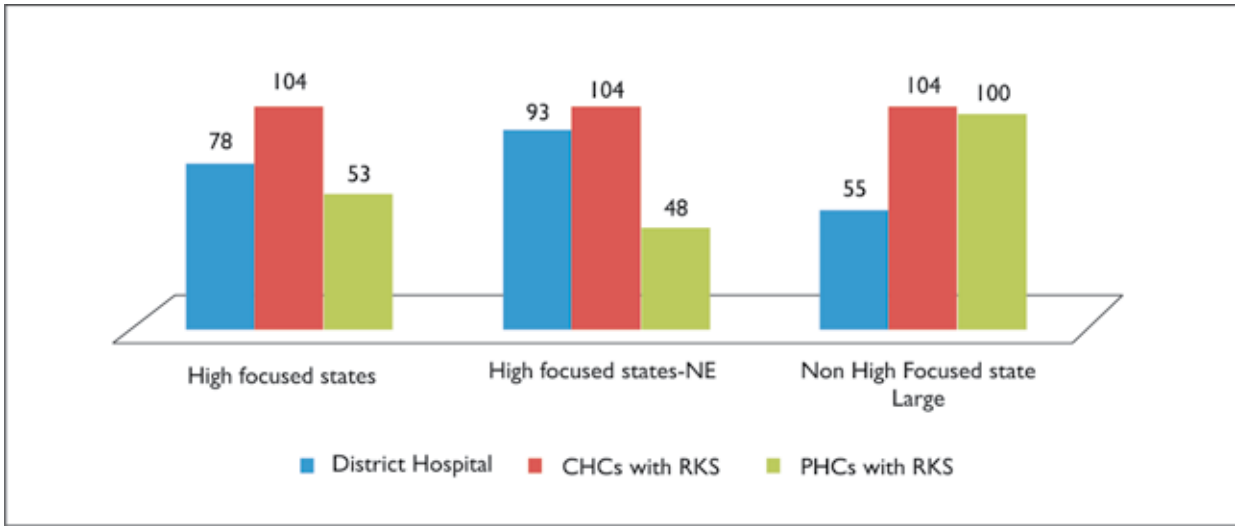
Since the RKS is established at the public facility level and the VHSNC at a village level, their decision are based on the needs of the community, which will eventually contribute to better health outcomes.

We found the percentage of healthcare facilities with RKS by dividing the number of healthcare facilities, across the level of care, with the number of RKS established across the states. And as seen in Figure 8.4, the number of RKS registered over a period of time varies across priority states and across the level of care. High focus large states as well as high level NE states have a higher percentage of district level hospitals with RKS as compared to large non-high focused states. RKS at CHCs are a constant feature across states, but RKS at PHCs are more in large non-high focus states, as compared to high focused states. This can be attributed to the fund flow mechanism: the funds flow from NRHM is more towards PHCs in large non-high focused states. However, one will need to understand why more than 100% RKS at CHC level exist in all categories of state.

A similar exercise was done to calculate the percentage of villages in states with VHSNC. At the village level, the median value of VHNSC is 90 percent for high focused large states, 100 percent for high focused NE states and 91 percent for non-high focused large states. This clearly indicates a positive move of community involvement in the decision-making process, yet their active participation needs to be improved.

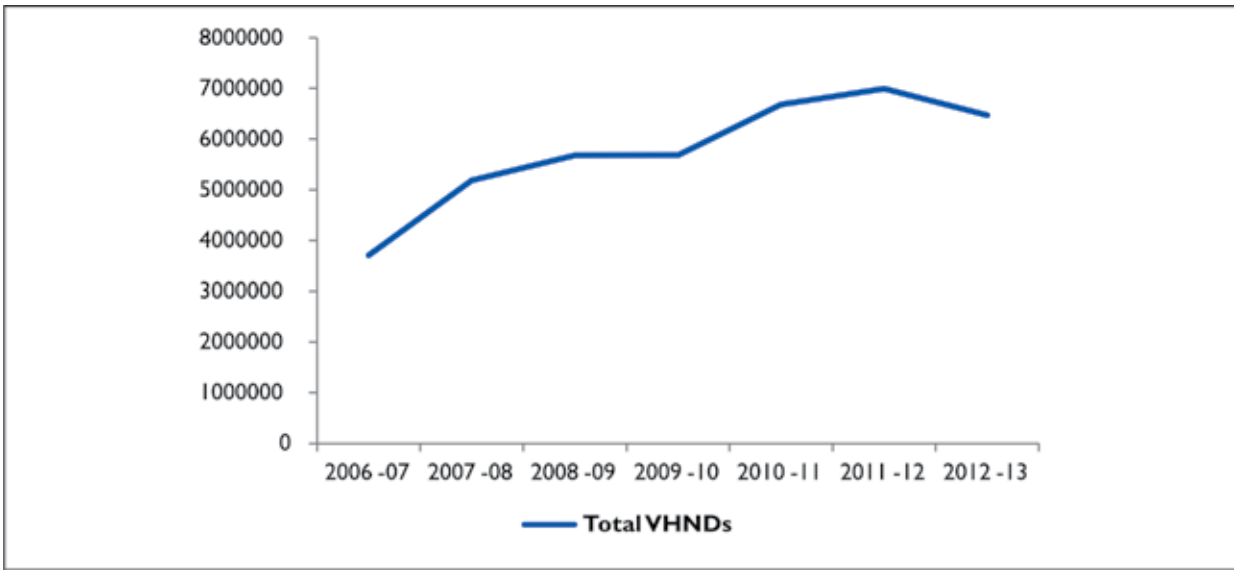
The efficiency of VHSNC can be measured by the numbers of Village Health Nutrition Days organized for providing healthcare information and access to the mother and new-born child, including immunization. There has been an increase in the number of VHNDs but there is yet no indication that it has meant an improvement in newborn care.

Figure 8.4: Number of registered Rogi Kalyan Samitis



Source: Authors' Compilation, NRHM 2013[19]

Figure 8.5: Trend analysis of VHNDs held in the country



Source: Authors' Compilation, NRHM 2013 [19]

The number of VHNDs has shown considerable increase over a period of time nationally, as can be seen in Figure 8.5. In 2012-2013, there was a decrease seen in VHNDs, attributed to an 86 percent drop in the organization of VHNDs in Andhra Pradesh and a 46 percent drop in West Bengal.

It is important to acknowledge the gaps in the governance structure for newborn care. At the national level three child health managers manage the child health programme. This kind of management responsibility is not clearly specified for newborn care at the state or district level. Such leadership gaps and frequent transfers of leadership at the state level can have a negative impact on the continuation of policies and programmes and their implementation.

Development partners have been providing technical support and health systems strengthening to the MoHFW response to newborn care. The technical support ranges from capacity building to research and financial support at various levels of health systems as could be seen from Table 8.4.

Table 8.4: Development partners and their role to strengthen health system

Agency	Role
Department for International Development (DFID)	Financial and Technical Assistance at national level and state level
United States Agency for International Development (USAID)	Financial and Technical Assistance at national level and state level
United Nations International Children's Emergency Fund (UNICEF)	Support health programmes such as the Village Health and Nutrition Days, Janani Suraksha Yojna to encourage women to have institutional deliveries, promote simple interventions which can significantly improve newborn survival, promote home based care through IMNCI, setting up SNCUs, community mobilistion and behavior change communication strategy
Maternal and Child Intergrated Programme (MCHIP)-supported by USAID	Uttar Pradesh, Jharkhand, Uttarakhand and Odisha are focus states. Specific intervention, Pre-service nursing and midwifery education (PSE) Repositioning family planning within maternal, newborn and child health, Maternal, newborn and child health intervention packages Essential newborn care (ENC) and resuscitation, strong support to VHNDs
Jhpiego- affiliate of Johns Hopkins School of Public Health	Repositioning family planning within the context of maternal, newborn and child health, Pre-service education for nurses and midwives, Safe Childbirth Checklist in Rajasthan and Pre service education in Bihar
Save the Children	Community mobilization, stake holder coordination, generating evidence, and political advocacy
United Nations Population Fund (UNFPA)	Technical assistance for effective implementation of the RCH-II programme at the national as well as state level, particularly in the states of Rajasthan, Maharashtra, Odisha and Bihar, formulating evidence-based service delivery guidelines and support for training of providers in adherence with these guidelines
White Ribbon Alliance	Advocacy
Swedish International Development Agency (SIDA)	Developing curriculum and guide for midwifery teachers
Norway India Partnership Initiative (NIPI)	Strengthening maternal, newborn and child health services in 18 districts of 5 states in India

Thus in India, through collective efforts of central government, state government, and representatives at district, block and village level, along with development partners, are providing leadership to the policies and programmes focusing on newborn care.

3.2 Healthcare financing

An efficient use of funding directly affects health outcomes by improving infrastructure and the availability of human resources and medicines. [20]

In India, financing or investing in newborn care is through three main approaches:

- Government-supported schemes
- International donors
- Private health insurance

Government-supported schemes

Both state governments and central governments finance maternal and child health programmes. In recent times, India has seen an increase in public expenditure in healthcare from 0.9 percent to 1.4

Table 8.5: Comparison of RCH fund distribution and expenditure

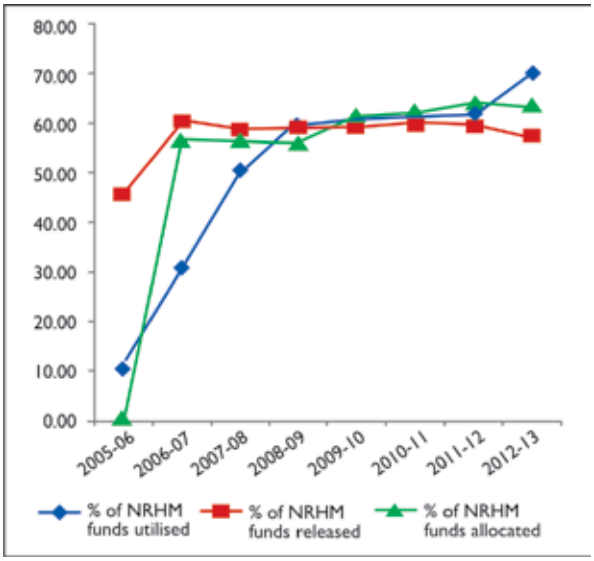
Provider	Centre Expenditure (INR in 000)	Centre Distribution (INR in 000)	State Expenditure (INR in 000)	State Distribution (INR in 000)	Total Expenditure (INR in 000)	Total Distribution (INR in 000)
Public hospitals	6,510,673	15.18	71,699,356	36.54	78,210,029	32.71
Dispensaries/PHC/ subcentres	3,310,172	7.72	40,324,708	20.55	43,634,880	18.25
Family welfare centre	41867	0.1	15,050,760	7.67	15,092,627	6.31
Public health labs, blood banks, ambulances	853,136	1.99	996,146	0.51	1,849,282	0.77
Provider of medical goods	76,486	0.18	3,842,936	1.96	3,919,422	1.64
Provision of public health & RCH programmes	18,671,869	43.55	24,581,635	12.53	43,253,504	18.09
General health administration and insurance	1,845,838	4.3	16,245,752	8.28	18,091,590	7.57
Medical education & research	8,554,518	19.95	17,015,863	8.67	25,570,381	10.69
Public health & RCH training	1,396,863	3.26	1,639,857	0.84	3,036,720	1.27
NGO provider	1,617,085	3.77	2,552,153	1.3	4,169,238	1.74
Total expenditure excluding capital expenditure	42,878,507	100	196,240,419	100	239,118,926	100

percent of the Gross Domestic Product. Out of the central government's total allocation on health in 2009, 52.2 percent was allocated to NRHM. Simultaneously, there has also been an increase in expenditure by states by 19.9 percent compounded. According to the National Health Accounts (NHA) 2009, based on 2004–2005 data on public healthcare expenditure, 18 percent of the total revenue is allocated to programmes on reproductive and child health, which provides services related to newborn care. If family welfare centers are included, the percentage of total public provider expenditure is 24 percent of the total. Maximum expenditure for RCH-related activities (43.55 percent) comes from the central government.

In recent times, most of the activities related to the maternal and child health are supported through the NRHM, which has been in operation since 2006. Within NRHM, the activities related to newborn care are part of funds under the line item of RCH flexi pool and NRHM flexi pool. Even the release of JSY money is under RCH flexi pool. Figure 8.6 shows the percent of RCH and NRHM flexi pool of the total NRHM allocation, of the total NRHM release, and total NRHM utilization. The trends clearly demonstrate that RCH and NRHM together have a significant proportion of NRHM funds allocation and release. Over a period of time there is a marginal increase in the amount of money allocated and released as part of the total NRHM money and significant improvement in utilization rates.

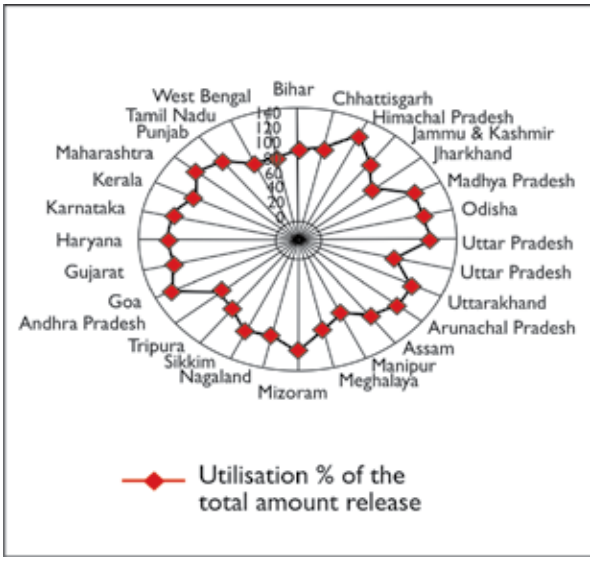
The release and utilization pattern varies across states. Median utilization rates for high focused large states is 105, while for high focuses north eastern states it is around 102, while non-focused large states have a median utilization rate of 109.

Figure 8.6: Comparative analysis of proportion of RCH flexi-pool and NRHM flexi-pool fund allotment, release and utilization as a part of total NRHM



Source: Authors' compilation, NRHM, 2013 [19]

Figure 8.7: State-wise utilization of NRHM funds released



Source: Authors' compilation, NRHM, 2013 [19]

In the context of financing distribution, private healthcare expenditure contributes significantly towards healthcare access pattern related to neonatal care. As shown in NHA, 2009, delivery care, postnatal and antenatal services and abortion and still birth, even though small in terms of percent distribution and per capita expenditure, contribute substantially to the total household out-of-pocket expenditure on healthcare. [21]

This out-of-pocket expenditure may or may not be inclusive of the premium paid for insuring neonatal care in the private health insurance market. We tried undertaking an analysis of the health insurance claims data, but since the age groups reporting is all under the age of one, we were unable to analyze claims specific to newborn care. However, in the context of private health insurance and continuum of care argument, for mother and child it has useful information.

Table 8.6: Distribution of healthcare expenditure by services

Expenditure on Healthcare Total % Distribution Per Capita Expenditure (INR)	Total	% Distribution	Per capita Expenditure (INR)
Out-patient care	614,774,538	66.10	564.53
In-patient care	218,333,032	23.48	200.49
Delivery care	31,925,528	3.43	29.32
Postnatal services	5,808,715	0.62	5.33
Antenatal care services	12,543,534	1.35	11.52
Abortion and still births	40,220	0.00	0.04
Immunization	4,851,318	0.52	4.45
Family planning services	26,279,373	2.83	24.13
Medical attention at death	15,446,918	1.66	14.18
Total Expenditure on Health	930,003,177	100.00	853.99

Source: NHA 2009 [21]

Table 8.7: Newborn care services covered through RSBY

Package Description	Length of Stay	Charges exclusive of service tax
Basic Package for Neo Natal Care (Package for babies admitted for short term care for conditions like: transient tachypnoea of newborn, mild birth asphyxia, jaundice requiring phototherapy, hemorrhagic disease of newborn, large for date babies (>4000 gm) for observational care)	<3	3,000
Specialised Package for Neo Natal Care (Package for babies admitted with mild-moderate respiratory distress, infections/ sepsis with no major complications, prolonged/persistent jaundice, assisted feeding for low birth weight babies (<1800 gms), neonatal seizures)	3-8	5,500
Advanced Package for Neo Natal Care (low birth weight babies <1500 gm and all babies admitted with complications like meningitis, severe respiratory distress, shock, coma, convulsions or encephalopathy, jaundice requiring exchange transfusion, NEC)	>8	12,000

Source: RSBY, 2011

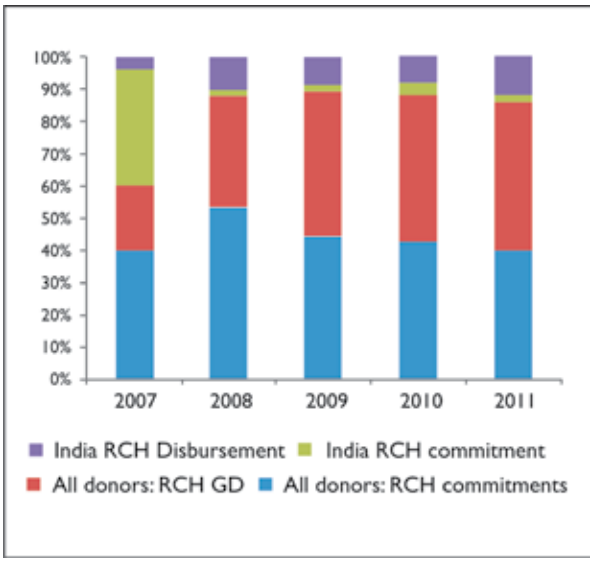
In more recent times, government-supported private health insurance schemes provide an access to newborn care through primary and secondary care services. The Government of India supported pan India scheme, Rashtriya Swasthya Bima Yojana (RSBY), has three dedicated packages for covering newborn care as shown in Table 8.7.

At state levels there are many state-supported health insurance schemes and community based health insurance schemes, but none of these schemes cover newborn care (22). However, the Employee State Insurance Corporation (ESIC) and Central Government Health Scheme (CGHS) provides comprehensive coverage to newborn care to people enrolled with them.

Government of India receives only 0.29% of its financial support from international donors, multilateral agencies, bilateral agencies, and foundations (NHA, 2009), its proportion contribution to programmes on maternal and child health is very limited.

However, in the context of international donor financing, India receives larger aid than what is committed. The commitment share of India is 3-8%, while it received 17-30 % of committed aid to RCH globally.

Figure 8.8: A comparison of India RCH commitment to disbursement versus all donors' commitment to disbursement



Source: OECD [23]

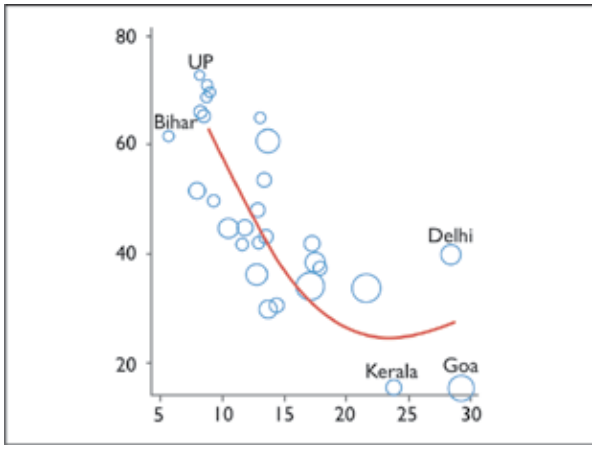
And thus it can be interpreted that most of the programmes and policy implementation to newborn care and maternal and child health are funded through public expenditure or out of pocket expenditure in the country, with latter having higher proportion than the former.

3.3 Health workforce

There is enough evidence on association between availability of human resources and health outcomes. It clearly brings out a correlation between density of Human Resources for Health (HRH) availability and infant mortality (Figure 8.9). Healthcare utilization, to a large extent, is dependent on the motivation and quality of services provided by these HRH.

However, India, like most nations, also faces shortages of human resources. The current distribution of HRH is skewed towards urban India,

Figure 8.9: Correlation between HRH density and IMR



Source: Rao K.D, et al. 2009 [24]

with most of the rural population not having access to trained and qualified HRH. NRHM, through its approach of contractual position support, has tried to mitigate the problem, but the trend of availability of key HRH responsible for newborn care is inconsistent.

The current distribution of doctors per 10,000 populations, as seen the figure above, is extremely uneven and, if we look at the distribution, it is even further skewed towards the urban market.

Availability of general duty doctors and nurses is crucial for providing healthcare to the newborn. They can play a critical role when the specialists are not available as they can be trained to deliver services related to the newborn. They are the first contact points but, there is dearth of doctors and nurses, as seen from community healthcare centre data.

Over a period of time, there has, however, been an improvement in the availability of HRH for health with different skill sets. As seen in Table 8.8, there is availability of general duty medical officers (GDMOs), paramedics, specialists, staff nurses and ANMs in the public healthcare system. However it could be seen that except the number of GDMOs and at PHC and specialits at CHC, all other health care professionals are concentrated in non-high focused states, compared to numbers in high focused large states and high focused north eastern states. This could be an outcome of contractual staff provision under NRHM.

However, even though the capacity has enhanced, there is still a lack of availability of adequate human resources in the public health system, especially specialist and radiographers as indicative in Table 8.9.

Table 8.8: Human resources available in public health systems in 2012

	India	High Focus- Non NE states (10)	High Focus- NE states	Non High Focus- large states (10)
GDMO at PHC	3939	1897	765	1083
GDMO at healthcare delivery point other than PHC	3542	730	336	2192
Paramedics	14495	3046	2126	8422
Specialist at CHC	5858	3009	142	2694
Specialist other than CHC	1082	361	14	648
Staff Nurse	35172	14047	3888	16687
ANMs	70891	30593	6740	32395

Table 8.9: A 'then and now' analysis of availability of clinical staffs

	2005			2012		
	Required	Sanctioned	In Position	Required	Sanctioned	In Position
Health Worker Female/ANM	169262	139798	133194	172415	185961	207578
Doctors at PHC	23236	24476	20308	24049	31867	28984
Surgeons, OB&GY, Physicians & Pediatricians	13384	7582	3550	19332	9914	5858
Radiographer	3346	1669	1337	4833	3126	2314
Nursing staff at PHC and CHC	46658	34061	28930	57880	67242	66424
Staff Nurse	35172	14047	3888	16687		
ANMs	70891	30593	6740	32395		

Source: Authors' Compilation from RHS, 2012[25]

Table 8.10: Number of colleges and seats of MD/DCH

	Medical Colleges with MD Pediatrics/ Diploma in Child Health			Seats per year		
	Government	Private	Total	Government	Private	Total
MD	130	112	242	717	427	1144
DCH	85	74	159	363	189	552

Source: Medical Council of India [26]

This raises an important policy discourse on the need for task shifting from doctors to nurses, as well as to ANMs and frontline health workers, and the use of performance-based incentives to attract human resources in rural India and a possibility of increasing the absolute number of human resources in the country.

Currently, as per Medical Council of India data (Table 8.10), there are 1,144 seats in MD Pediatrics and 552 seats in Diploma in Child Health. Interestingly, even though the number of seats is higher in the government sector, which is subsidized, the concentration of healthcare professionals is skewed towards private sector. There should be some form of intervention by which the public healthcare system can get the benefits of professionals trained at subsidized rates at government institutions.

In more recent times there have been some initiatives with the support of development partners to build the capacity of health workers involved in maternal child care in laboratory techniques using permanent and mobile laboratories. In a study done comparing cost of training health care workers through government system and development partners, it is shown that the cost of building capacity by a development partner is higher in comparison to a programme supported by the government. The cost increase as the number of training sessions increase and is higher for a mobile training facility compared to a permanent one. However, the cost per trainee decreases as the number of training sessions increase. There has so far been no evaluation on the patient outcomes and quality of service provision. [27]

Apart from distribution and quality of training of HRH, there are other problems that need to be addressed. Currently, the issue of salaried employees versus contractual staff, parity in salary within cadre across the states is posing a challenge for health systems in India. Also, between states, there is a great variation of salaries being paid, resulting in intra-state migration or migration to the private sector. Instad, since currently the HRH is skewed towards urban India, it is imperative to identify and strengthen their role in the provision of newborn care.

3.4 Medical products and technologies

Availability and accessibility of medicines are crucial in newborn care, especially in a facility-based care setting. For example, it is critical to provide

medicine and the best possible care to a low birth weight newborn, who has a high risk of infection. Guidelines for SNCU clearly outline the availability of medicines and equipment in newborn care units. And these drugs can be purchased under JSSK and recurring cost of NBSU, mentioned under NRHM [28] .

Though the availability of medicines has improved after NRHM was launched, some healthcare facilities still lack medicines. Because of this, antibiotics are purchased from the private market. There is also a trend towards the unwarranted use of fourth generation antibiotics.[29] This results in a huge out-of-pocket expenditure, even though under JSSK all medicines and food for mother and the newborn is to be provided free of cost.

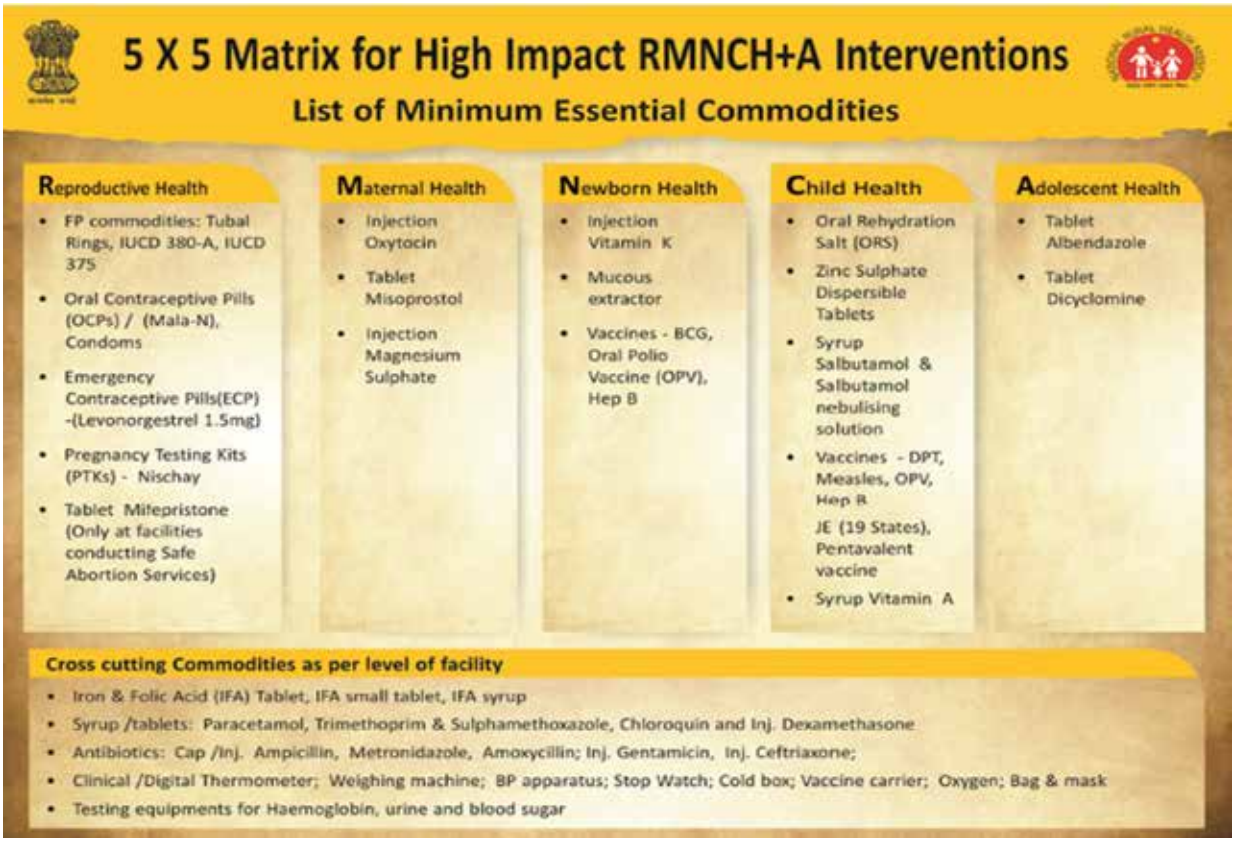
Earlier Common Review Missions (CRMs) reported that essential equipment required for newborn care was unavailable. [29-32] . Although the situation has improved over time, yet problems in operating the equipment persist. The issue of the healthcare work force not being able to operate sophisticated equipment needs to be addressed through capacity building.

The availability of constant and stable power is a primary requirement to protect the sensitive equipment in SCNUs. Evidence has shown that not only there is power backup in limited facilities but also an excessive reliance on the hospital share generator exists. Annual maintenance contracts (AMCs) are meant to ensure the provision of timely and preventive maintenance for the medical equipment, assuring accuracy, efficiency, and clinical efficacy. However, in many states even an AMC cover is no guarantee that the equipment would be repaired in time.

Some states, like Gujarat and Rajasthan, are taking the initiative of keeping an inventory of equipment, which will help them keep track of all the equipment purchased at the state level and installed at the district level. One also needs to consider that the need and access to medicines is not only confined to the early stages of newborn care, but extends throughout the continuum of care.

The recent RMNCH+A strategic document outline the commodities that should be available in order to provide continuum of care support, as shown in Figure 8.10.

Figure 8.10: 5x5 matrix on list of essential commodities RMNCH+A



Source: NRHM, 2013 [5]

However, supply chain management of essential commodities in health systems has been a constant challenge. Hence extra efforts will be required to ensure that the desired commodities are available at the healthcare facility level.

3.5 Information and research

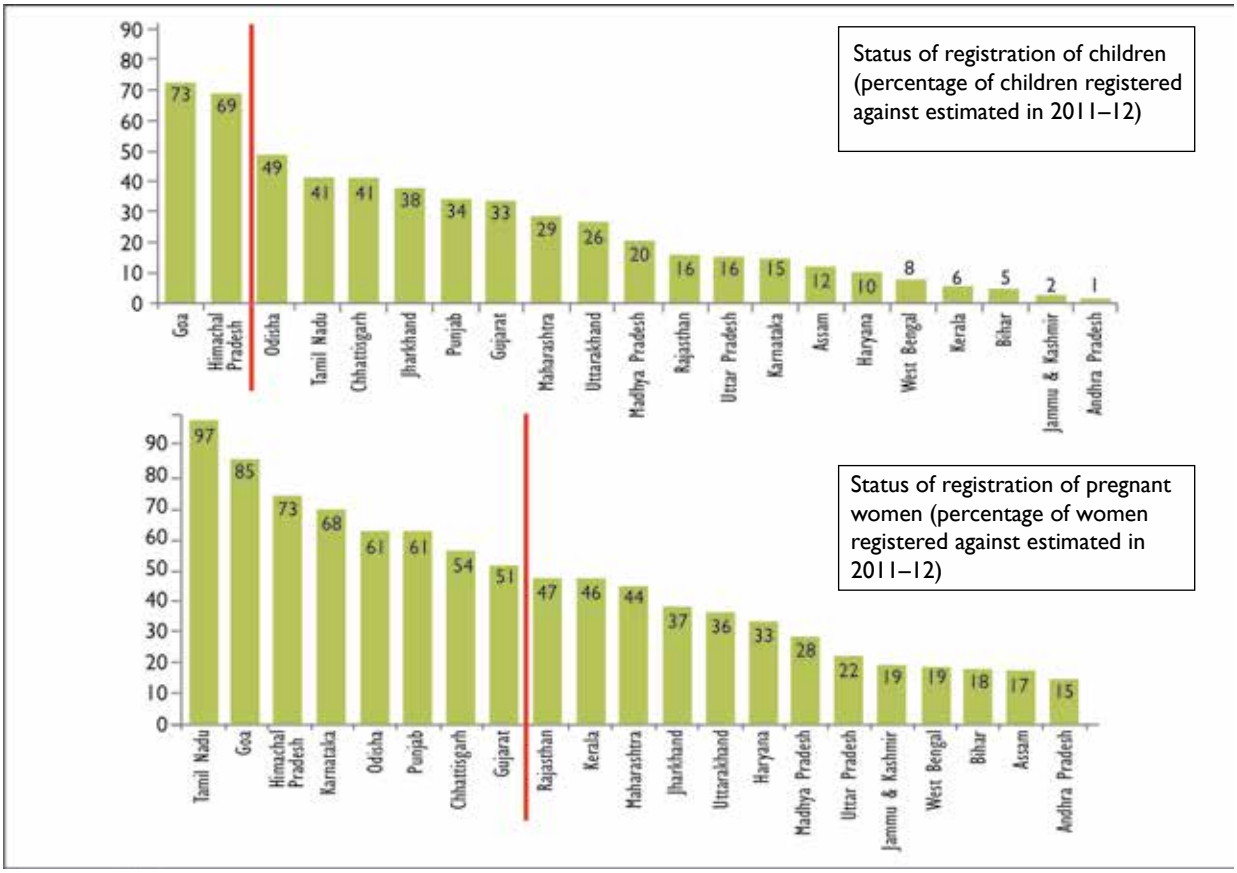
In sync with the international community, the Government of India has launched a Maternal and Child Tracking (MCTS) system in December 2009 as a mission-mode project under the National e-Governance Plan (NeGP). MCTS tracks the delivery of healthcare services to pregnant women and to children up to five years of age through name-based tracking of each beneficiary. It monitors service delivery and can be used to identify gaps and thus aid in better planning and implementation of programmes. [33]

By 2011–2012 more than 67 lakh pregnant women and 31 lakh children have been registered with MCTS, with 95 percent districts reporting data on pregnant women and 93 percent reporting data on children. Over eight lakh short messages through services (SMS) have been sent to ANMs and ASHAs to verify the data. Even though the number is large, the percentage coverage of mother and child under MCTS is very uneven at the state level, with most states having less than 50 percent of registration against estimated numbers, as seen from Figure 8.11 below.

Child mortality, newborn mortality, and skilled birth numbers are also not registered properly, again highlighting issues at the systemic and end-user levels.

Besides SRS, there are also other sources of data which have been helping informed decision making and tracking impact of policies and programmes. They are mainly Annual Health Surveys (AHS), District level household surveys (DHS), National Family and Health Surveys (NFHS), Consumer Expenditure Surveys (CES) and behavioral surveys undertaken by agencies on a regular basis.

Figure 8.11: State-wise status of registration of children and pregnant women



Source: MOHFW, 2012 [17]

3.6 Service delivery

Service provision, supplemented by appropriate readiness to deliver, can bring about the desired outcome. In the context of the health system framework, it is important to know the broad status of service delivery on newborn care. However in this section we only provide a snap shot of health care delivery points; details are presented in other chapters.

The number of SNCUs increased from 184 to 507 over a period of 5 years. More than 5 lakh sick newborns were treated in SNUCs in 2013. However, more than 50 percent of SNCUs function with fewer beds than the delivery load. India also has a network of 1,574 Newborn Stabilization Units and 13,219 Newborn care Corners. [34] Besides, 470 Maternal and Child Health wings are under construction, with a 30,000 bed capacity. [17s]

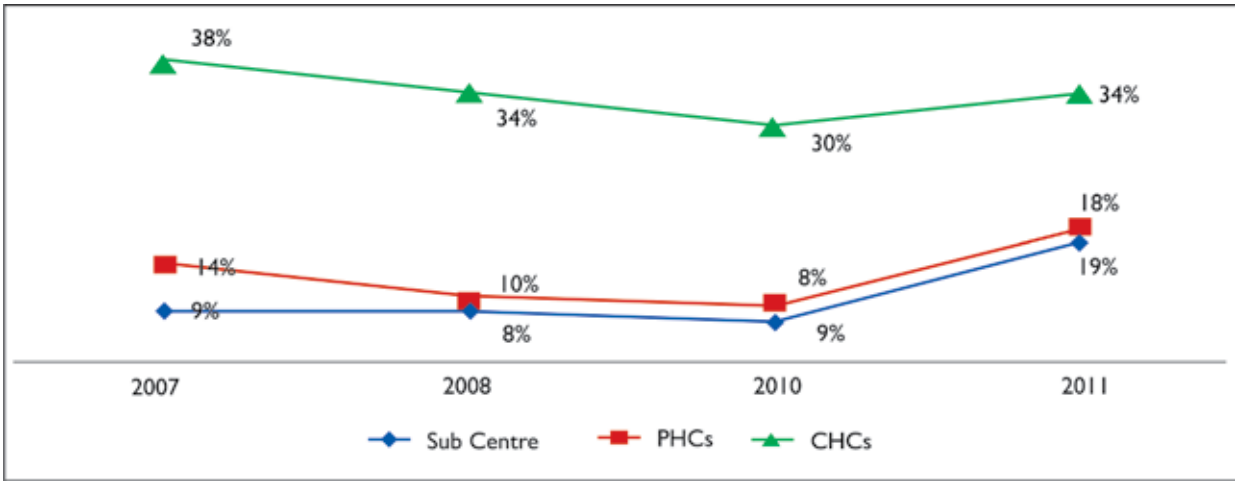
Presently, the country has 722 district hospitals, 4,833 CHCs, 24,049 PHCs and 1,48,366 SCs. [34] When compared with other nationwide data reflecting healthcare needs, these numbers indicate a shortfall in establishing the required facilities based on IPHS norms. Some of the low numbers could, however, be attributed to poor data coverage. This might explain why the shortfall in subcentres has made a sudden increase during 2011 to 17 percent from 9 to 7 percent during 2007–2010 (Figure 8.12). In an effort to reduce the gap between need and delivery, 19,854 hospitals (including district hospitals, primary health centres, community health centres, subcentres) have recently been taken up for construction and 13,217 hospital buildings have been approved for renovation. [17]

Currently, 70 percent of healthcare services are accessed in private sector and hence one can assume a significant role played by private sector in provision of newborn care. Most of the private sector healthcare services are localized in urban and peri-urban areas. But that should not take away from the important role they play, considering that 50 percent of India's population is estimated to reside in these areas by 2030.

The private sector, which operates in this domain through private clinics and hospitals, and by supporting community-based organizations and NGOs, has offered certain strategies to provide services to the newborn [35]: service provision, financing, behavior change communication, and convergence of service provision.

The private sector also plays a key role in government initiatives. Under JSY, private healthcare provides are accredited, so that they can act as points of delivery of care. Across the country, 8066 such facilities are accredited under JSY, but 85 percent of them are in Maharashtra, Kerala, and Karnataka, which highlights the scope to further increase the private sector's involvement in a regulated manner.

Figure 8.12: Trends in shortfall of facilities



Source: Authors' Compilation, NRHM Updates, 2012 [19]

Many states, for example Gujarat, Uttar Pradesh and Bihar have successful Public-Private Partnerships in this sphere. Gujarat's Chiranjeevi PPP model, which contracted in private obstetricians, has shown that a large scale partnership with the private sector can provide skilled birth attendance and emergency obstetric care to poor women at a relatively low cost. Such initiatives can help resolve the human resource deficit in the public sector and provide skilled care to the poor, thus reducing maternal and neonatal mortality. [36, 37]

But at the moment there is little or no regulation. The following needs to be clarified prior to partnerships with private sector providers in newborn care:

- Scope and objectives;
- Policy and legal frameworks;
- Benefits;
- Technical and managerial capacity of governments and private agencies to manage and monitor such partnerships;
- Incentives for the private sector providers;
- Stakeholders' perspectives towards the partnership;
- Focus on quality and innovations; and
- Explicit benefits to the poor.

Organizations and networks like the Indian Academy of Pediatricians (IAP) and the NNF are involved in strengthening the capacity of public and private healthcare systems and doctors in providing care for the newborn. NNF undertakes health system accreditation activities and human resource capacity-building activities for neonatologist across the country. Along with its role in formulating of guidelines, IAP is also involved in capacity-building initiatives, organizing Continuing Medical Education symposia, lectures, and other such meets all over the country.

4. WAY FORWARD

Evidence

- Each component of the health system through which newborn care in India is impacted is part of a larger strategy for improving health outcomes of mother and child, and hence it is difficult to measure the direct effect of strategies on the newborn care.
- And even though there is no argument against importance of integrated approach for maternal and child care in India, there is a definite need to create and strengthen existing systems, through which we can directly measure the effect of health system programmes and policies on newborn care.
- It is also important to note that the current analysis of health systems and programmes are centrally driven and there is very little information about state lead programmes available, unless these are specifically collected primarily.
- In addition to tracking the overall expenditure on newborn health, there is a definite need to track newborn health expenditure specific to the private health care sector. Doing so will enable policy makers to develop policy and programmes aimed at mitigating financial risk as well as improving newborn health outcomes. It will also allow for assessing the efficiency of current newborn health care financing patterns.
- Currently, in the context of human resources for health, the challenges are unequal distribution, lack of availability and quality of care provided.

Recommendations

- Strengthen governance of programmes related to maternal, newborn and child healthcare; increase the number and skills of programme managers at district, state and national level.
- Assess the quality of care provided by various cadres of health professionals and explore task shifting as a strategy to increase coverage.
- Increase the absolute number of HRH and use financial as well as non-financial incentives, to motivate HRH availability in rural India.
- Use effectively the information pathways and health management systems for informed and efficient decision making.
- Strengthen pathways for development partners and the private sector to play a more effective role in maternal, newborn and child health programmes.
- Improve coordination for maternal and newborn care at all stages of planning and implementation.
- Define the role the private sector can play in delivery of services related to newborn care, the quality of services provided by them, its uptake and expansion.
- Analyze issues in coverage of newborns in the insurance schemes operating in the country, and develop models of rational insurance coverage.

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Chapter 9

INNOVATING AFFORDABLE INDIGENOUS EQUIPMENT FOR USE AT SCALE

OVERVIEW

The care of small and sick neonates requires biomedical technologies, such as devices that can keep babies warm (radiant warmers, incubators), resuscitate (self-inflating bags), track growth (weighing scales), treat high jaundice (phototherapy units), and provide oxygen or respiratory support (hoods, CPAP devices, ventilators). Until the 1990s, most of these products were procured through import at a high cost and with little maintenance support. Emerging demand and an informal collaboration of neonatologists, engineers, and entrepreneurs has led to the production of indigenously produced of several high volume categories at affordable cost in India. Radiant warmers, resuscitation bags, phototherapy units, weighing scales, and other devices manufactured by Indian small-scale industries have enabled a scale-up of neonatal care in the country, particularly in district hospitals, medical college hospitals and sub-district facilities in the public sector, as a part of the National Rural Health Mission. Indian products have acquired international quality standards, and are even exported to developed nations. This chapter captures this story of innovation and entrepreneurship in neonatal care.

1. BACKGROUND

At independence, in 1947, India was primarily an agricultural society and economy. The only significant industrial activity was in the textiles sector. This was despite the fact that the country was ready for industrial development: it had been generating electricity for two to three decades then, and railways had been around in India for almost a century.

The political leaders of the newly independent country had a vision of transforming India into an industrially developed nation in a planned and phased manner. Thus the thrust of the first several five-year plans was on developing infrastructure and heavy industries: roads, electricity generation, steel manufacturing, manufacturing of industrial machinery, and so forth.

This phase of tightly controlled growth lasted well into the 1980s. Private enterprise in India operated in an environment governed by import barriers. International products were not easily available in the country during this phase. With indigenous developments of manufactured goods being slow, the only feasible means by which international products—both industrial machines and consumer goods—could be made available in India was through partnerships between Indian companies and foreign manufacturers. Many such partnerships were, therefore, formed during this phase. The foreign participants brought in expertise and authorized their Indian partners to manufacture their products in India. The government set quotas and issued licenses that determined what a manufacturer could produce.

During this 'license raj', which lasted till the early 1990s, medical care products remained largely ignored by Indian entrepreneurs and the government. This was despite the recognition of the need to improve life expectancy and reduce infant mortality and improve other indicators.

During this phase, the Indian industry did not focus on the medical sector. Foreign products were also not available for import under the open general license. If any equipment was procured from overseas by a hospital, it was done so at a prohibitive cost, a large part of which was the customs duty. Further, the paperwork involved was cumbersome. When the equipment needed repairs, spares had to be obtained from abroad as well—the cost were prohibitive, and the procedure complicated. With the number of installations being very small, service support for the equipment was "far from robust". As a result, the foreign medical equipment in Indian hospitals often didn't work —and the standard of care of newborn infants continued to be poor.

1.1 Neonatal care becomes a priority

The NNF formulated the first set of recommendations on neonatal care in India. The NNF was instrumental in placing newborn care very high among the national health priorities. This it did through sustained advocacy, impact evaluation studies and consensus-building in key programme areas.

In the subsequent years, the state of affairs changed, and neonatal care in India received a great boost. In 1992, well before neonatal health appeared on the international health agenda, India took the lead in incorporating essential newborn care into the national programme. As a result, neonatal survival has improved greatly in India.

Behind this success lies a hitherto untold story—a story in which Indian technocrats and small-scale entrepreneurs played a crucial role.

1.2 Untold success story

In the early 1990s, India's economy was at the brink of a major change, with globalization efforts having just begun. To anyone giving the matter a thought at that time, it would have appeared obvious that it was only a question of time before international medical equipment became available in India. It would have also been evident that the issues of after-sales service too would disappear as the customer bases of the international suppliers grew in India. Over the next couple of decades, Indian business did grow accustomed to importing foreign products and re-selling them in the Indian market. Import restrictions were indeed reduced a number of times in the new millennium, and so the customs duties became much less prohibitive.

As a result of the changes in her economic environment, India could have simply become a part of the global market for biomedical equipment. With reduced customs duties, neonatal care products manufactured by international companies would have been more affordable and would have been installed in Indian hospitals, improving the health and survival of neonates.

However, what actually happened was quite different. By the time the economic changes took place, a different kind of barrier had come up in India, preventing multinational companies from marketing their goods easily in the country. Over a period of 20 years or so, the Indian medical equipment industry developed rapidly and established itself sufficiently well to offer them competition. The prices of Indian products were much lower than what the international companies could offer, while at the same time being of good quality. As a result, they were being installed increasingly in hospitals across the country, improving the quality of neonatal care offered at these hospitals. The outcome was that neonatal health and survival improved significantly.

The vigorous growth of the indigenous industry resulted from a number of chance collaborations between doctors and young entrepreneurs. The doctors were looking beyond day-to-day treatment of patients, and the industrialists were technically qualified entrepreneurs.

One of the seminal events that led to this highly effective medical industry-engineering industry collaboration took place in 1990. A conference on biomedical equipment in neonatal care was held at the All India Institute of Medical Sciences (AIIMS), New Delhi, under the aegis of the NNF. At this event, the stakeholders took stock of the needs, challenges and regulatory constraints in relation to neonatal equipment access, quality, maintenance and affordability. [1] The academic leadership of neonatology called upon Indian industry to develop affordable equipment of good quality for neonatal care. The key equipment required was specifically identified.

This event sparked off interest in the biomedical industry and enterprise. Young industrialists began to work with doctors on indigenous solutions to the health problems faced by newborns, children, and mothers. With the typical problem-solving approach of engineers, they sought to address the major health technology gaps. The small scale industry indigenously developed products that were urgently required to provide neonatal infant care—incubators, infant warmers, phototherapy units, and resuscitation bags.

No fewer than four companies developed infant warmers after the AIIMs conference (Figure 9.1). These indigenously developed products were very affordable compared with the imported alternatives—they were as much as 10 times cheaper.

Figure 9.1: Various radiant warmers made in India

Birth asphyxia was another major problem highlighted at the AIIMS meeting. From 1990, the NNF steered the Neonatal Resuscitation Programme (NRP) as perhaps the most comprehensive NRP in the developing world. Paediatricians, gynaecologists and nursing staff, even dais, were trained in neonatal resuscitation. This raised awareness about quality resuscitation bags. Resuscitation bags are simple respiratory devices, but they can save a number of lives. At this point in time, the resuscitation bags that were made in India could not be sterilized optimally. These resuscitation bags also lacked pop-off valves that would limit the pressure delivered to an infant.

More than one Indian company responded to these pointers by developing better resuscitation bags locally (Figure 9.2). They used sterile silicone material and fitted the bags with pop-off valves that ensured that the air pressure never exceeded 40 centimeters of water column. Again, the cost of the Indian resuscitation bags was very attractive compared with the imported products. [1]

The phototherapy units in use in the country until the late 1990s were the bulky units using long fluorescent lamps. The more sleek compact fluorescent light (CFL) based phototherapy units

Figure 9.2: Made in India neonatal resuscitation bags

that had made entry in the western markets were not manufactured in the country. A Chennai-based company produced a unit with CFLs within a year of starting the effort. Needless to say, the cost of the Indian product was far lower than that of the foreign equivalent. Very soon, several other companies began to make similar CFL phototherapy units, thousands of which are now installed in the Indian nurseries. These products also found acceptance in several other countries.

Figure 9.3: Made in India CFL based phototherapy units

Indeed, all the new products came to be widely used in all the major hospitals—significantly, they began to reach village-level hospitals and primary health centres. The NNF had a significant role in this deployment. They created awareness about the new equipment and provided hands-on training all over the country, including first referral units (taluk hospitals) and the primary health centres.

The NNF was also involved in various efforts aimed at strengthening the education and training of physicians and nurses in neonatal care, convinced that such education and training were important perquisites for achieving the national child health goals. The NNF provided various teaching aids on a number of topics such as hypothermia and neonatal jaundice on its website, which included instructions on the use of relevant equipment.

Thanks to rising demand, Indian medical equipment companies grew strongly. However, the development of the industry was not without hitches. Initially the indigenous products did not entirely match the imported products in quality, and there were a number of fly-by-night operators among the new entrepreneurs. But the situation improved steadily.

Only the companies that set themselves high standards survived in the market. There was an absence of Indian standards for medical equipment, and the entrepreneurs adopted international (Western) standards. Many of them obtained the CE marking and FDA approval (Table 9.1).

In recent years, advanced neonatal intensive care units have been established in teaching and non-teaching hospitals in large cities, while smaller cities and towns have witnessed a dramatic growth in the number of nurseries for newborns in small private hospitals and nursing homes. In the public sector, the delivery points at subcentres, primary health centres, community health centres, and district hospitals have been equipped with resuscitation equipment including made-in-India self-inflating bags, warmers and suction units. The government has established over 450 SNCUs in district hospitals. An SNCU was envisaged as providing Level II care with a range of equipment. The equipment installed at these facilities has all been made and procured in India (Figure 9.4). More than 15,000 infant warmers and 10,000 phototherapy units were supplied by Indian manufacturers for use in public facilities. Indian neonatal equipment is also in place in thousands of newborn care centres at delivery points across the length and breadth of the country. In sum, neonatal care in India is backed by Indian industry.

More recently AIIMS has placed on its website high quality webinars on neonatal equipment (www.newbornwhocc.org). A book on neonatal equipment also effectively raised awareness about the technical basis, quality and functioning of the equipment. [2]

Table 9.1: Conformance of Indian neonatal care equipment with international standards in 2013

Equipment	CE marking	FDA 510 (k) clearance
Phototherapy	Yes	Yes
Warmers	Yes	Yes
CPAP	No	No
Incubators	No	No

Figure 9.4.: Neonatal care equipment made in India installed at a SNCU in a district

1.3 Cost effective products

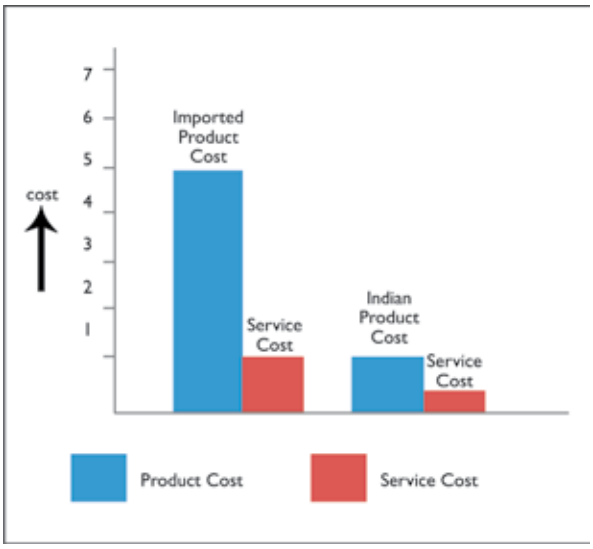
A very significant fact that made this story possible is that the Indian products were highly cost-effective (Figure 9.5). They readily gained acceptance at hospitals all over India not only in government-run institutions but also in private hospitals. Today the vast majority of privately run medical establishments in India use only Indian neonatal equipment.

This cost-effectiveness of Indian products was noticed by UNICEF, which even developed an official document on sourcing of transport incubators. It highlighted the yawning gap between Indian and international prices. As in India, the low cost of Indian medical products is of great significance in other developing countries.

Even with lower mean time between failures, the service costs of international products are higher. This is because each servicing is costlier, compared with Indian products.

At the same time, as expected after the globalization initiatives, multinational companies manufacturing neonatal care equipment entered India on their own—not through joint ventures. But to compete with the Indian manufacturers they now had no option but to set up facilities in India; products made in the United States or in Europe simply could not compete with the Indian products on price. To manufacture in India was less expensive. (It is worth noting here that China is not yet a global presence in neonatal and maternal care equipment.)

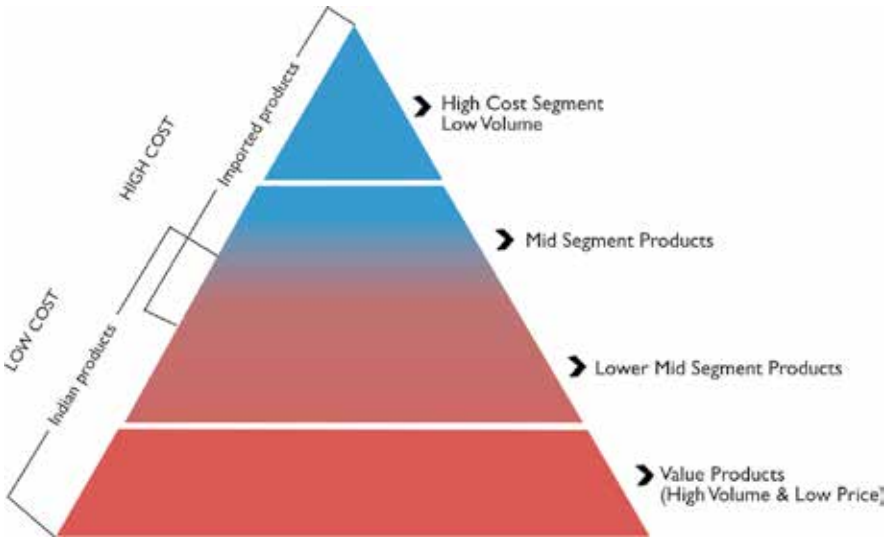
Figure 9.5: Illustration comparing typical costs of neonatal care equipment manufactured in India and international products



1.4 Innovation

Today, Indian companies no longer enjoy the advantage of lower manufacturing costs because many multinational suppliers have set up production facilities in the country. The entry of the international companies was a challenge to Indian indutry, but it had one enormous advantage: its ability to innovate, but it is notable that the Indian companies have a strength that allows them to face the competition successfully: their ability to innovate.

Figure 9.6: Neonatal care products sales pyramid



Imported products fall in the high-cost segment, and their volume of sales is correspondingly low. Indian products dominate the lower-cost section of the pyramid, with high volumes sales.

The Indian products are innovative and are user-friendly to both infant and care-giver. For example, one product features non-touch switches for examination lamps. These switches prevent cross-infection in neonatal intensive care units. In other products, the infant beds may be rotated and tilted for medical procedures. Some of these Indian innovations were greatly appreciated even by the international manufacturers who recognised the Indian neonatal care equipment industry as a competitor and incorporated these features into their own products.

Low cost is an important requirement in developing nations, and developing very good innovative products to meet this requirement is a strength of Indian industry (Figure 9.6). Steadily, the "Made in India" resuscitation bags, phototherapy units, weighing scales and radiant warmers have succeeded in meeting country's needs.

India is almost entirely self-reliant in terms of phototherapy units and infant warmers. Additionally, only Indian weighing scales and resuscitation equipment are used in Indian hospitals. But India still depends heavily on imported CPAP equipment, ventilators and incubators.

A number of the Indian ideas are patentable—some have been patented, others not. Indian industry has been focused on developing solutions for infant care. In the words of the leader of one company, 'Care for the patient, not for the patents' is the mantra. Even so, the neonatal care industry of the world is keenly interested in solutions from India. Going by present indications, Indian innovations will shape the solutions to come in the future. Indian industry can lead initiatives in meeting the Millennium Goals through products of international quality supplied at the right price.

1.5 Need for standards and regulation

India is seen as a potential global hub for affordable health technologies including biomedical devices and equipment. We already have a vibrant indigenous industry that meets our local needs to a significant extent. In addition, a plethora of foreign companies have a marketing base here for long. Others are keen on entering the research and development space, with or without partnerships with Indian companies, to generate products at affordable cost to meet the growing demand of users here and in other countries.

There is, however, no robust system to test the functioning and safety of the devices that would potentially be marketed in the country. Companies at times depend on individual researchers or professional organizations, who may have clinical expertise, but often no expertise in engineering or the key safety features.

There is a proliferation of irresponsible vendors who enter medical equipment business purely as an opportunity to make fast money without understanding the fundamental requirements of the equipment. Most users experience inadequate post-installation service support from majority of the companies.

The prevailing scene is also a dampener for companies, Indian and foreign, that aim at developing and marketing products without compromising quality - because they often cannot match the cost advantage of the opportunistic sellers/producers of low quality technology. In order to address these problems, following should be ensured:

- Any new medical equipment/device that is marketed into India must be certified by a technical group comprising clinicians, engineers and scientists for performance and safety. Such a body, that may be named as a Technology Assessment Network for Medical Devices, could be a network of institutions spread across the country because it is unlikely that any or a few institutions in a city would have all the clinico-engineering expertise in all kinds of devices across specialties (that range from newborn care, eye care, heart surgery, to endoscopy, joint implants, anesthesia, respiratory life support etc).
- Only those devices that meet the established standards of performance and safety are marketed in the country by law. Such standards need to be developed by a body such as the Bureau of Indian standards. Anyone violating

this should be liable for criminal charge. Such standards must also include post-installation service commitments by the marketing company to provide uninterrupted and efficient service no matter where in the country the equipment is installed.

- There must be a statutory regulatory authority that oversees and enforces the above and other norms. A draft Bill to create a Medical Devices Regulatory Authority has been developed by the Ministry of Science and Technology since 2006, but has not been taken up for enactment. There is an urgent need to take up this Bill and create the Authority and enforce the much needed regulation.

2. THE FUTURE

The developments of the last two decades suggest that Indian products are likely to occupy a significant place in the global biomedical equipment market in the future. Neonatal care in India has changed greatly since the 1980s and 1990s. There is a widespread awareness about neonatal care equipment. Education and government initiatives have played a role, as has the spirit of technological innovation, which drove industry to work without seeking help from the government. An increasing number of manufacturers are striving to improve product quality and design. Recognizing this, international players (such as Stanford University) and foreign companies are looking towards India to develop products for the world market.

Notwithstanding the recent successes, Indian manufacturers and healthcare stakeholders have challenges to address. Respiratory disorders are the next major neonatal affliction to be tackled. Indian incubators and CPAP devices and ventilators are still in the process of achieving international standards, whereas radiant warmers and phototherapy units have acquired international certification (CE and FDA)

The initial problems faced by Indian companies have been overcome. India is now in a position to cater to the health of the world's neonates through affordable technologies.

It is encouraging to note that a number of organizations and government agencies are now striking partnerships with Indian industry. The Department of Biotechnology has come out with a number of initiatives in which it encourages industry and innovators to participate. The Confederation of Indian Industry and the Federation of Indian Chambers of Commerce and Industry have submitted several proposals to the government to improve Indian neonatal healthcare and to develop Indian industry. Innovations are being actively supported at AIIMS and IIT Delhi in association with Indian companies.

India is described today as being at the threshold of a neonatal survival revolution, with an abiding policy commitment to newborn health and a promising strategy for maternal and neonatal health, well supported by the commitment of the states. One wonders whether the same situation would have prevailed had the message of the AIIMS conference in 1990 been delivered just some years later and the foreign manufacturers had already entered India. Likewise, what would the story have been had Indian industry not responded to the message in the way that it did.

3. WAY FORWARD

This inspirational story of small scale industry innovating affordable neonatal equipment has demonstrated the potential of Indian enterprise to meet the challenges of developing healthcare technologies for mass use. Without these efforts, India's newborn care, particularly, facility-based care would have lagged behind considerably. The programmes such as those implemented by the Department of Biotechnology (DBT / BIRAC) in support of industry and academia driven innovations will go a long way in making India a hub of affordable healthcare technologies.

Recommendations

- Encourage industry to develop high quality, affordable equipment for newborn care through facilitation, resources and recognition.
- Develop academia, industry, and government partnerships for new and better neonatal equipment.
- Ensure that only those devices that meet the established standards of performance and safety are marketed in the country by law.

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Chapter 10

HARNESSING NEW TECHNOLOGIES FOR NEWBORN CARE

OVERVIEW

Newborn care has attracted adaptation of technologies for new, innovative products with a great potential. Apart from utilizing technologies for improving treatment of various conditions, new methods have been harnessed for reaching out to the community including mHealth. Use of simple devices to screen children with low birth weight, to promote breast feeding and keep babies warm are some innovations that are worth mentioning. Swasthya slate can be used as a point-of-care diagnostic tool that incorporates multiple diagnostics and enables prophylactic and curative interventions. In addition, the convergence of mobile technologies and healthcare solutions is being explored for superior health outcomes around the world. Several such mHealth solutions are also being explored in improving access to care for neonates. This chapter captures Indian experiences with selected innovations in the use of technologies for newborn healthcare.

1. INNOVATIVE TECHNOLOGIES FOR NEONATES

The following section lists examples of innovations that are being tried out globally and may have an impact on optimizing neonatal care.

1.1 Innovative Products

1.1.1 Birth Weigh Scale

In the mid-1980s, Programme for Appropriate Technologies in Health (PATH) conducted a needs assessment of TBAs in several African countries, which resulted in the concept of an easy-to-use, yes/no indicator of low birth weight that could be used by relatively untrained midwives and TBAs. BIRTH weigh I was developed and field-tested. BIRTH weigh II, developed in the early 1990s, is a revised version designed for modern manufacturing methods and features a tactile as well as a visual indication of birth weight. More recently, PATH designed the BIRTH weigh III to meet the need for correctly dosing newborns with gentamicin to prevent serious bacterial infections. Using the same technological platform as the second scale, this colour coded scale permits non-literate birth attendants and community health workers to categorize newborns into three different weight categories (normal birth weight: ≥2,500 grams; low birth weight: 2,000–2,499 grams; very low birth weight: <2,000 grams) by PATH in several countries. Once identified, these babies can be given extra care, such as KMC and warming, or referred for higher levels of care. Little training is required, allowing health workers in the developing world to detect low birth weight in infants before complications arise. [1-4]

To use the BIRTH weigh III scale, health workers place the baby in a secure sling that is suspended by a hook on the scale. Instead of the common digital or dial readouts that report the exact weight, BIRTH weigh provides a colour coded and/or tactile indicator if the baby weighs at least 2.5 kg, the desired weight for a healthy newborn. Prototypes of BIRTH weigh III were field tested in collaboration with the Saving Newborn Lives Project in both Nepal and India in 2004. [4]

1.1.2 Neonatal Intuitive Feeding Technology (NIFTY) Cup

Infants with a high risk of breastfeeding difficulties include preterm infants and those with cleft palate. Preterm infants often require short-term assisting feeding while they transition to exclusive breastfeeding. For these reasons, WHO and UNICEF recommend manual expression of breast milk and the use of a small cup, spoon or paladai to feed newborns with feeding difficulties. Generic cups available in low-resource settings (e.g., coffee mug or medicine cup) have wide rims relative to an infant's mouth, which impede efficient feeding. Suboptimal pacing of a feeding decreases intake, and wide rims increase spilling of hand-expressed breast milk. Repeated over multiple feeds, a feeding pattern of insufficient caloric intake results in longer feeding times, reduced endurance, compromised nutritional status, and increased susceptibility to infection.

The NIFTY cup designed by PATH, is simple to use, easy to clean, inexpensive, and efficient in the delivery of expressed breast milk (or formula) to infants unable to breastfeed. [5] The cup has an extended reservoir off the cup lip that is similar in size to a neonate's mouth and a delivery channel to the reservoir with minimal grooves that is designed to optimize feeding efficiency. A novel and key feature of this product is that it combines two functions– the ability to capture hand-expressed breast milk directly into the cup and to feed an infant with the expressed mother's milk.

The product is still in its prototype stage, which is being tested at University of Washington and in Ghana. Its feasibility and acceptability in relation to hand expression of breast milk and current infant feeding practices still needs to be assessed. [6]

1.1.3 Embrace Infant Warmer

The Embrace Infant Warmer was developed by a team of Stanford University students to provide a simple solution to keep small babies warm. [7,8] A wax pouch can be inserted into the small sleeping bag and, using minimal power, the wax can be melted to safely keep the sleeping bag– and the low-weight baby inside—at an ideal body temperature of 98.6 degree F. The warmer can be run off of a generator, AC or any alternate AC power source. The design can be sanitized and reused for up to

50 babies, providing a sustainable, portable, and low-cost alternative to an incubator. Embrace has been introduced in India, and pilot programmes are ongoing in parts of Asia and Africa.

1.1.4 Life Box Pulse Oximeters

Reliable devices designed to monitor blood oxygen content, such as pulse oximeters, are usually very expensive and rarely available in the developing world. Those devices are crucial for monitoring critically ill newborns with pneumonia, birth asphyxia and other newborn pulmonary conditions. Pulse oximeters, are also useful to screen apparently healthy newborns for congenital heart disease and instrumental to ensure a patient's safety during surgical procedures. New devices, such as the Lifebox pulse oximeters, under the Helping Babies Breathe (HBB) initiative of PATH, in partnership with the international community, are designed specifically for health facilities in resource-poor settings.[9] They are robust, low cost and powered on a rechargeable battery, which is favorable in settings where electricity is not available. The Lifebox has been distributed all over the world to places including Ecuador, Tanzania, Rwanda, and South Sudan. Yet, while there are several iterations of pulse oximeters in development, their use is still very limited in resource-poor settings. [10]

1.1.5 Swasthya Slate

Swasthya Slate, developed by Public Health Foundation of India, is an affordable system that integrates multiple diagnostics and enables prophylactic, curative, nutritional, and behavioural interventions. It allows a patient-centered approach, which, when combined with health systems strengthening, can offer personalized care in an affordable and sustainable manner. [11] When coupled with the right training interventions, supportive supervision, reporting and monitoring framework, health communication and behavioural change strategies, Swasthya Slate can help adoption of the complete RMNCH+A strategy across the life cycle through optimal use of technology.

A key element of any RMNCH+A strategy has to be strengthening facilities and professionals' ability to deal with intrapartum and neonatal care. For intrapartum care, the system now includes pulse oximetry and fetal doppler which will be programmed to produce partographs. Pulse oximetry will also be employed for neonates with special adapter for neonatal fingers. Software has also been added wherein a nurse station in a PHC/ CHC can be created, where multiple patient vitals can be monitored on a single tablet.

Swasthya Slate enables patient registration with ease which will be integrated with the Mother Child Tracking System, a strategy to track every mother and newborn under NHM. This allows an on-the-spot digitization of the patient record and enables GIS mapping of patients. End-to-end reporting and monitoring enables automated filling up of the score card suggested by the RMNCH+A approach. In addition, as the data is being sent in real-time, Swasthya Slate with its remote delivery of diagnostics can be employed for reaching populations in far flung areas. The decision support system helps in taking care of most complications using the inbuilt best practices algorithm and for cases where doctor intervention is required a referral can be generated or a telemedicine consult can be performed. But this requires an internet connection that could be a problem in remote settings.

All of the innovations above, though promising, require additional research to establish their effectiveness in scaled up models. Particularly important to explore for these innovations is their cost effectiveness (as they represent a wide range of investments required), the full cost of deployment (including training, retraining), their ability to be leveraged across healthcare needs as well as the market and technology risks to the deployment of these technologies.

1.1.6 Newborn devices developed by the Stanford India Biodesign Programme

This programme is a collaboration of All India Institute of Medical Sciences, New Delhi, and the Indian Institute of Technology, New Delhi, with Stanford University funded by the Department of Biotechnology. The programme envisages selecting fellows with diverse background - science, technology and medicine who receive training in Stanford University and at AIIMS. Subsequently, they develop innovative products. Two neonatal care products have been invented through this programme:

- Sohum: A low cost device to screen neonates for hearing.
- Neo Breathe: An easy to use resuscitiation device for frontline birth attendants.

2. mHEALTH IN NEONATAL CARE

A number of new health system approaches using new technologies are being tested to help improve the state of neonatal health in India. In large measure, many of the new interventions have been inspired by the wireless revolution that has exponentially increased the mobile phone access across India to over 900 million subscribers. The ubiquity of mobile phone access now offers a platform that can be leveraged for a variety of interventions, including neonatal health. A large number of programmes targeted at improving neonatal and infant health, focused on health workers as well as patients/ consumers, are employing mobile-based solutions.

In this world of mobile health programmes, commonly referred to as mHealth, there are broadly two main areas of innovations for newborn health – mobile phone-based health messaging and mobile phone-based data capture. [12-23-] Mobile–based interventions allow for a relatively low-cost way of scaling up health information dissemination and demand generation that can help improve neonatal and infant healthcare.

2.1 Newborn mHealth

2.1.1 Mobile health messaging

Mobile phone-based health messaging programmes are amongst the emerging means of reaching out to large target populations. While a few studies have shown promising or positive behaviour change impact of mobile messaging interventions, health outcomes evidence for the impact of these programmes is only beginning to emerge. [16] Recent studies published in Africa and experiences emerging from the 500,000 mothers and families enrolled in the maternal messaging programme in Bangladesh are indicative of the outcomes impact such programmes can have. [17] Despite this, the enthusiasm for such programmes is linked to the high penetration and ubiquity of mobile phones across different strata of society. These programmes offer an opportunity to educate and empower target communities with the right health information. The key to impact through this intervention is the hypothesized potential of these messages to effect behaviour change. To do this, messages need to be configured by patient needs, acceptability, and literacy levels as well as their readiness to receive certain types of information. Despite the wide availability of mobile phones, usage patterns vary considerably. India's population remains highly diverse in terms of literacy, income and ability to use technology. Text (SMS) is not a commonly used feature by the majority of Indians and any voice-based interventions need to account for language, dialect, and literacy variations. The customization of content to address these diversities is critical for such health messaging programmes to bring about the behaviour change necessary for health outcomes impact.

2.1.2 BBC media action

As part of a Gates Foundation grant in Bihar, the BBC Media Action group has launched a number of mobile-based services focusing on maternal and child health. These services target health workers as well as consumers. Mobile Kunji and Mobile Academy are services to educate and empower the female health worker (FHW) while Kilkari is a service focused on direct health messaging to pregnant and new mothers and their families. [16]

Mobile Kunji provides a deck of 36 colour-coded cards (similar to credit cards) on a key ring. Each card provides health information about a specific period of pregnancy. The FHW shows the card to the pregnant women and her family during ANC visits to start a discussion on key areas of focus for them at that period during the pregnancy/neonatal cycle. At the end of each card is a short code, which when dialed, plays out a two minute long audio message focused on the period of pregnancy/neonatal cycle. The audio message (in local languages) reinforces the information provided by the health worker in their discussions.

Mobile Academy is an Interactive Voice Response (IVR)-based tutorial organized over 186 minutes with each session of two to five minute lengths. FHWs access the training tutorial, complete the IVR-based quiz at the end and, once they pass,

receive a certificate of completion from the Bihar government. The FHWs pay Rs 75 for the entire Mobile Academy course, which makes it a cost-effective use of technology to scale-up training needs. The technology allows for reinforcement/ refresher trainings at a fraction of the cost that an alternative training approach would take.

Kilkari is a direct-to-consumer IVR messaging programme that provides pregnant/newborn women, and their families, one message per week for 16 months at a cost of INR 1/week.The Kilkari messages re-emphasize and complement the messages from the health workers, thus complementing the efforts of the FHWs.

Mobile Kunji and Mobile Academy were launched in Bihar in 2012 and have over 74,000 and 20,000 users respectively. After extensive user testing, Kilkari was launched in Bihar in April 2013.

2.1.3 ARMMAN (mMitra messages)

Led by Dr. Aparna Hegde, a trained obstetrician/ gynecologist, ARMMAN, an NGO based in Mumbai, offers mobile messaging services in the first year of pregnancy and up to five years of the newborn under the name mMitra. [18] The content has been developed by ARMMAN's scientific team and includes weekly messages provided through an outbound dialing platform.

"ARMMAN" is the recipient of a DFID (U.K Department for International Development) grant for a randomized, clinical trial of about 1,750 women in rural Maharashtra to test the effectiveness of their voice and animation messages on maternal health. In addition, mMitra is also working on an urban middle class initiative based on a subscription model in Mumbai.

ARMMAN is exploring collaboration and validation with several professional organizations including the Federation of Obstetric and Gynaecological Societies of India (FOGSI) to have mMitra messages be introduced to pregnant women through their obstetricians.

2.1.4 Tele-counselling for exclusive breastfeeding

Based in Nagpur, Dr. Archana Patel at the Lata Medical Research Foundation (LMRF) has focused on the use of mobile phones to promote exclusive breastfeeding practices. Supported by donor funding, LMRF completed a 1,000 patient study to evaluate the effectiveness of lactational counselling provided over phones to new mothers. The project was conducted in the urban low income Maharashtra and is now planned to be scaled to a broader landscape across rural Maharashtra.[19]

Babycenter, a division of Johnson & Johnson, is a world leader in maternal messaging and is also one of the partners of the Mobile Action for Maternal Alliance (MAMA). [20] In India, Babycenter offers its configured and customized maternal and newborn messages through its online portal. Babycenter messages have reached upto 17 percent of India's internet mothers. In addition, Babycenter also invested in an IVR platform to provide voice based messages to subscribers in urban India. The target segment for these messages was the middle class in urban North India.

The "Mobile Alliance for Maternal Action (MAMA)" is a public private partnership between USAID, Johnson & Johnson, the mhealth Alliance, UN Foundation and Babycenter that aims to make vital health messages available to pregnant and new mothers around the world, and particularly in Bangladesh, South Africa and India. With close to 700,000 mothers and families enrolled in the last two years in its programmes in South Africa and Bangladesh, MAMA is planning to launch its India programme from 2014. [21]

2.1.5 Mobile-based data systems

The increased mobile phone penetration and usage across India also offers an excellent opportunity to make data capture and management seamless. Once captured, data of pregnant/new mothers and neonates can be used to track, monitor and oversee progress and key milestones of newborns and young children. This offers ease of scheduling and management for health workers to track and monitor health progress.

A number of mobile-based applications have been used globally as well as in India towards this end. Most of these applications have the following features in common-

- A mobile-based data capture interface that allows health workers to enter patient data;

- Health training materials (including videos and graphics) for mothers to showcase how to manage pregnancy as well as the health of the newborn;
- Pre-set algorithms that use the patient data to set reminders to health workers for key appointments, interventions and immunizations; and
- Systems to track key milestones to trigger incentive payment for health workers.

"Intrahealth" - Manthan runs two mobile-based programmes in the districts of Jhansi and Behraich in Uttar Pradesh. [22,23]

mSakhi is a mobile application to support the education and empowerment of the FHW in providing messaging to the pregnant women. Training material has been developed based on NRHM content and includes animations/videos from the public domain.

mNewborncare is a mobile application to track the status of the new born to ensure the conduct of the prescribed post natal visits.

3. CHALLENGES

As with most other technology interventions, there are two main barriers to evaluating recommendations for scaled-up deployment. First is the cost of scale-up and comparison with alternatives. Most new interventions are tested in small-scale pilots and a controlled environment and the cost of scaling these interventions is often quite high without a correspondingly clear and measurable outcomes impact.

Secondly, the evidence base for many of these interventions is limited in demonstrating clinical efficacy in a scaled-up model. Many studies to measure clinical impact are conducted in conditions that do not incorporate real-life variables of usability and acceptance making it difficult to extrapolate the results of these studies to scaled-up models. Finally, it is often difficult to gather clear evidence of outcomes impact in a dynamic environment and in such a situation, it remains unclear what would constitute a clear evidence base.

The ease of data capture and the ability to manage and monitor key neonatal milestones through mobile-based data systems offers an excellent opportunity to impact neonatal health. Most evaluations of such systems have been in pilot programmes and hence not tested for challenges of scale. Despite their ease of use, the deployment of such systems requires significant training effort and that is an important factor to bear in mind for large-scale deployment. Finally, these systems are not mobile phone agnostic and so the cost of delivery of these solutions must include the hardware cost of handsets. For a scaled-up programme to purchase and deploy pre-configured handsets is a significant expense to consider in evaluating scalability of such models. Another challenge to consider is the cost of management and administration of these hardware assets (managing loss, replacements etc). All of these factors increase the cost of a mobile-based data programme significantly. It would be important to conduct further analyses on the impact a scaled up mobile data programmes would have on neonatal health and whether the cost of such programmes would be justified by the health outcomes.

4. WAY FORWARD

A myriad of new technologies are emerging that have the potential to positively impact neonatal health. The health system and regulatory frameworks in many instances have delayed the introduction of cost effective proven strategies into the health systems, and most often the expensive technologies being introduced into the private sector.

Recommendations

- Create enabling guidelines for introducing cost effective innovations and technologies for newborn care in public and private sectors.
- Promote research and evaluation on social and technology innovations for newborn health.
- Develop interdisciplinary bio-design centres for innovations in maternal and newborn/ child health technologies.
- Develop centres for technology assessment to evaluate prototypes and final products.
- Launch studies and pilots to understand the role and potential of mHealth in newborn health.
- Promote and establish partnerships for innovation in the areas of newborn health.

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Chapter 11

EDUCATIONAL INNOVATIONS FOR IMPROVING NEWBORN CARE

OVERVIEW

India has witnessed the launch of several vertical programmes and integrated packages like CSSM, RCH, IMNCI, HBNC, and NSSK. Training healthcare providers has been an integral part of all these initiatives.

There is also a constant demand to organize refresher courses to update the knowledge and skills of healthcare providers. This chapter discusses several recent educational initiatives to improve their clinical and programme management skills. Ranging from a few weeks to several months in their duration, these courses utilize regular, distance, online, and satellite modes of teaching to disseminate information. They have certain eligibility criteria and patterns to assess the level of knowledge uptake. These educational initiatives have reproductive and child health issues as the basic theme, with emphasis on treatment/management of the problem/programme.

1. BACKGROUND

Care of newborns is an interaction of an array of factors. A few are simplistic since they involve promotion of age-old practices like breastfeeding and isolation of babies to prevent infections, while there are issues like socioeconomic and cultural determinants that take time to change. The other end of the spectrum involves providing care to sick newborns in specialized set-ups. Optimal care that is the right of every newborn is thus a product of knowledge and skills of each provider in his/her own capacity in this complex health system. While numerous training programmes are packaged keeping the evidence in mind, these have undergone changes from time to time to keep up with the demand of the programme, evolving pedagogy needs, and the health system.

The programmes that require training in India range from vertical programmes like breastfeeding and KMC to integrated packages/programmes such as the following:

- Child Survival and Safe Motherhood (CSSM)
- Reproductive and Child Health -
- Integrated Management of Neonatal and Childhood Illnesses (IMNCI)
- Home-based Newborn Care (HBNC)
- Navjaat Shishu Suraksha Karyakram (NSSK)

These have been discussed briefly in other chapters. There are overt overlaps between these programmes and often a subtle overlap in the target audience as well. Evaluation of these programmes have reported the following deficiencies in their training components: sup-optimal trainer:trainee ratios, lack of sufficient space for training, periodic lack of clinical cases for demonstration, gaps in the quality of training, and having medical officers and paramedical staff in the same group of audience. [1-4] Efforts are on to look into the challenges and address them appropriately. This, however, requires a lot of investment in terms of time and money.

Broadly, the two domains of educational activities that can effectively improve the performance of the system are:

- Educational initiatives to improve clinical practice; and
- Educational initiatives to improve programme management skills

The following sections give an outline of the various initiatives that have been taken towards this end.

2. EDUCATIONAL INITIATIVES TO IMPROVE CLINICAL PRACTICE

Under NRHM and other initiatives, more than 400 SNCUs have come into existence in district hospitals in EAG states, with many more expected to become operational in the coming years. With this massive expansion of services, quality of care is already reported to be a rate limiting factor, highlighting the need for training the growing number of health providers.

Many states either lack faculty members or are overburdened with clinical responsibilities and not updated with best evidence-based practices to manage sick newborns. This hampers the on-going education of healthcare professionals in the field and the capabilities of new graduates of medical nursing colleges. Continuing medical education by conducting training workshops requires enormous cost and time, both for the trainer and student.

This situation has been met by some innovative education initiatives described in this chapter.

2.1 Neonatal Resuscitation Programme

A programme that has traditionally been a part of medical colleges is the Neonatal Resuscitation Programme (NRP). With the introduction of NRP by the American Academy of Pediatrics and American Heart Academy, training programmes for instructors and care providers was launched in India under the aegis of NNF in 1990. The NNF created a national pool of doctors and nurses for NRP by conducting certification courses in various regions of the country. The pool of 150 certified members in turn trained 12,000 healthcare professionals in the following two years.

Simultaneously, in several teaching institutions, NRP was introduced into the curricula of medical

and nursing students. A uniform, systematic and action-oriented approach to the resuscitation of newborn had improved resuscitation practices. [5,6] The felt need of the programme resulted in the manufacturing of indigenous resuscitation bags of reasonable quality at an affordable cost (as discussed in the previous chapter). It also paved the way for an innovative programme called Training Resuscitation on Wheels to train doctors, health workers, and traditional birth attendants in villages.

The successful implementation of the NRP programme had led to its association with the implementation of the newborn component of CSSM. It was incorporated as a key element of the package of ENC that was rolled out in the country in different phases, the latest being NSSK in which on Day 1, basic newborn resuscitation is being taught under the leadership of flagship programme of IAP. [7]

2.2 Teaching aids on essential newborn care and webinars

AIIMS has been involved in developing training tools for newborn care for the last 15 years. They incorporate existing latest evidence-based practices, created by experts by the process of peer review and field testing among the target group. This process started in 1996–1997, when uniform standardized power point with matching script were developed on newborn care under the banner of NNF of India (http://www.nnfi.org).

The use of teaching aids helped in standardizing teaching in newborn care in pre-service, in-service, and continuing education programmes for health professionals. These were later updated and packaged as audio-visual webinars (virtual lectures) on essential and sick newborn care. (http://www.newbornwhocc.org/webinar-essential_newborn.htm). Facilitators are encouraged to use them as teaching aids and add-ons to standard methods of teaching and learning. Additional aids for real time demonstration are often supplemented with the use of audio-visual equipment podcast. The evaluation of the participants' knowledge by multiple choice questions (MCQs) and their skill by objective structured clinical examination (OSCE) following technology-based training are encouraged. Use of these webinars for clinical teaching and demonstration has been reported to be an effective and an alternative method to standard classroom teaching for nurses. [8]

From 2003–2009, a learning tool on ENC for small hospitals was developed through a process of consultation, peer review, and field testing. Seeds for this initiative were sown by UNICEF in 2000–2001, followed by Save the Children's Saving Newborn Lives programme (2004–2005) and later by WHO-SEARO (2008–2009). This culminated in the creation of Learner's and Facilitator Guides. [9] The pedagogy includes self-reading, self-evaluation, demonstration using simulation, oral drill, videos, and clinical skill demonstration. These were used for training nursing professionals in Gujarat and Karnataka. In 2010, they were handed over to the Indian Association of Neonatal Nurses for education of pre-service nursing students. Four of the modules of this package were included in the NSSK programme (http://www.nihfw.org/pdf/NCHRC-Publications/NavjaatShishuTrgMan.pdf).

2.3 Telemedicine

Distance education has the ability to reach a large number of learners simultaneously. Among the distance education methods, teaching by satellite communication is potentially most efficient and promising for a rapid scale-up of training programmes. [10] In a pilot project, in collaboration with UNICEF, AIIMS operationalized SNCUs in Andaman and Nicobar with a blend of onsite visits and telemedicine. Tele-education alone, when compared to classroom teaching of neonatal resuscitation, resulted in improved knowledge and skills, as judged by improved scores for MCQs and OSCE for teaching newborn resuscitation.

2.4 Emergency newborn training for Medical Officers: Gujarat model

As the institutional delivery rate went up with the launch of the Chiranjeevi Programme of the Government of Gujarat, this training course was designed in 2008 to train the manpower to take care of sick babies born in institutions. The aim of the course was to impart skill-based training in EmNC so as to enable the medical officer to take care of

the sick and preterm newborns in the periphery. [11]

The course material includes NNF Teaching Aids, Essentials of Newborn Care (Government of Gujarat and UNICEF Publication), Care of Newborn (Meharban Singh), Essentials of Pediatrics (O. P. Ghai), NNF Protocols, NRP manual, WHO monograph on LBW, IYCF module and videos, specially prepared handouts by faculty, log book and time frame for skills. [11]

Each batch consisted of four to six medical officers (MOs) who were provided residential quarters and they worked like resident doctors but with a structured course. They were trained in the medical college NICU for three months (January to March and July to September) and one month (April and October) in the CHC with a newborn facility to provide hands-on experience in the periphery set-up.

As the four-month course was offered by choice, it had a financial and a service bond. Hence to keep up the enthusiasm, the four-month training course later got converted into a one-month capsule course. This offered the advantage of more takers as the bond was scrapped. However, the teaching and learning had to be hastened up to get the maximum in one month. A log book of activities was strictly monitored to achieve skills within the stipulated month. Another advantage of the capsule course was that the Government decided to post a batch of one MO and two nurses from each centre to better coordinate their work after getting back to their centres. Thus each batch consisted of 8 to 10 MOs and nurses, double in number. This change made it possible to train more people within a short time. [11]

2.5 E-learning: A paradigm shift in newborn education

Online education is emerging as the cutting edge towards refinement of knowledge, attitude, and practices of physicians. It offers the added advantage of providing a platform to engage and collaborate with individuals at remote areas with flexible timings and lower training costs. It encourages self-paced learning notwithstanding standard course delivery and monitoring.

The brand value of the contents available in printed form, digital audio-visuals on CD Rom and websites provides encouragement to take the next steps of e-Learning: Online Neonatal Training Orientation Programme in India (ONTOP-IN) provided through WHO Collaborative Centre at AIIMS. [12] This uses a learning management system called Moodle for dissemination of digital contents on newborn care for a pre-designed course for continuing professional development (CPD). The greatest advantage is that cohorts of students are mentored online using synchronous and asynchronous methods of learning. Course contents are tailor-made for the needs of student in the field and updated periodically based on inputs from students and mentors. The learning incorporates online MCQs every two weeks, quizzes, online chats, and participation in discussion forums.

Each week the lessons (including webinars, podcasts, self-reading texts) for the week's topic are posted, along with two case studies describing a neonate's clinical history, physical findings, and laboratory investigations. This is followed by four to five questions which could be answered based on analytical reasoning gained from the knowledge of the week's lessons. Participants are motivated to seek clarifications and to post comments and feedback through the discussion forum which functions via wiki board – where all participants can read and share views, answer queries, and post fresh questions. The forum encourages users to interact, share concepts presented by answering questions, challenge existing practices, and post relevant citations and links to full text articles for those interested in deeper reading.

2.5.1 Essential Newborn Care course for nurses

The essential newborn nursing for small hospital module contents were digitalized, supplemented with additional resource materials, and provided online to nurses over a period of six weeks, followed by skill learning in partnering institutions. [12] A systematic evaluation was done on 108 nurses in eight institutions (including one in the Maldives) by the AIIMS team. There was also a course evaluation involving 98 nursing participants, of whom 78 (79 percent) completed the post-course assessment.

All the participants expressed satisfaction with the course content and delivery of learning methods. Participants felt that individual attention was given to them during the entire course and enrollment in the course was useful for their professional work. In addition, it increased their confidence and skills for day-to-day work and resolved their doubts to a reasonable extent. One-fifth of participants were not computer literate and did not know how to use the internet when they enrolled but none of them experienced any difficulty in understanding the lessons, with some hand-holding by a local tutor. [13] Following the success and encouraging feedback, another three courses on ENC were launched and reached nearly 1,200 in-service professionals, the majority of who were in-service staff nurses.

2.5.2 Sick Newborn Care course

This 12-week course on sick newborn care has been developed by AIIMS for enhancing the knowledge and skills of doctors (and future postgraduates) who would be manning SNCUs. Students learn management of common conditions in sick newborns, equipment, procedures, prevention of infection, and managing small hospitals or SNCUs, with follow up. This covers must-know domains for sick newborn care and augment key competencies. [12]

Following the course students are encouraged to use apps on smartphone for management of sick newborns as an Aide-memoire' by downloading it from iTunes (Sick Newborn) or android Google play (AIIMS WHO CC STPs) as a point of care tool.

The participants in the both the courses mentioned above were enrolled from India, Iran, Bangladesh, Nepal, Mauritius, Maldives, Sri Lanka, and Pakistan, while the mentors (online tutors) included local neonatologists or nursing faculty and neonatologists from Australia, UK, Canada, and Middle East countries.

2.5.3 Continuous Positive Airway Pressure course (CPAP)

This new blended course is taught online for six weeks, followed by two weeks of observership in a hospital to learn the practice of CPAP, including the equipment, the team required, clinical monitoring of baby, and the protocols in practice. [12]

3. EDUCATIONAL INITIATIVES TO IMPROVE PROGRAMME MANAGEMENT SKILLS

A lot of efforts have been put in to creating cadres and managerial positions within the health systems to bridge the gap of human resources in the country. These positions are often occupied by management personnel without a sufficient health background. On the other hand, doctors working at the district level and below lack an understanding of the principles of health management. They are busy with the clinical practice and administrative responsibilities and are also not adept with skills to use available data to improve the performance of programmes. It is, therefore, necessary to develop the capacity of the district level workforce who can be the key personnel to coordinate and support the implementation of programmes.

Courses on programme management are conducted by the National Institute of Health & Family Welfare but these focus on management principles in general and not on MNCH specifically. Besides, several training programmes and courses are already in existence in the field of RCH. There are about 15 institutes offering various courses in RCH but these are not sufficient. These courses often operate in isolation from one another, and provide very few opportunities for collaboration, shared advocacy, coordination, and other capacity-building activities. [14] Further, they are mainly carved for specialists like clinicians and nurses and not meant for non-medical persons who mainly occupy management positions at the district-level health systems.

Despite the wide variety of institutes and learning programmes in India, developing a comprehensive package of an integrated course with a focus on programme management for reproductive and child health was a felt need. Hence courses on RCH programme management were conceptualized.

3.1 Post-Graduate Diploma in Maternal and Child Health (PGDMCH)- IGNOU

The programme is intended to provide an opportunity to medical personnel and private practitioners for upgrading their knowledge and skills in MCH for providing better quality of services. [15] The programme covers the concepts, practices, and application for knowledge in the field of MCH services and aims at improving the knowledge and skills of medical personnel working both in the governmental healthcare delivery system and the private sector.

The course helps imbibe comprehensive knowledge of ongoing Maternal and Child Programmes. The Post Graduate Diploma in Maternal and Child Health programme consists of six courses, representing three broad disciplines of conventional medical education system - Community Medicine, Obstetrics and Gynaecology, and Pediatrics. Only MBBS graduates are eligible for the course. The duration is between one to three years.

3.2 Programme Management for Child Health- PGIMER

A UNICEF collaborative centre for monitoring and evaluation of MCH programmes (including newborn health) in India was set up in the School of Public Health, PGIMER, Chandigarh in 2008 with the objective of performing high quality, comparable monitoring and appraisals of key MCH programmes across states in India.[16] One of the objectives of this collaboration was to build the capacity of mid-level district managers on planning, implementation and monitoring of activities under RCH component of NRHM. Initially the workshop was primarily designed for planning and monitoring of child health activities such as IMNCI, F-IMNCI, ORS and zinc supplementation, immunization. Later on all RCH (including newborn) components were added after discussions with WHO and the MOHFW. The modules of the training were revised with the help of the Public Health Foundation of India (PHFI) and WHO. The aim was not to teach the RCH programme's technical strategies but build the skill of managers on programme planning through preparation of district action plans and monitoring.

After a series of revisions in the modules following each training, five modules were finalized: health system management, planning for RCH programmes, technical strategies, management (financial, human and material), and monitoring.

It was also envisaged that other partner institutes would be involved in organizing such workshops so that all the states could be covered in the country. Overall six workshops were organized on Child Health Planning from 2009 to 2011 in which 104 participants were trained and three RCH planning workshops were organized from 2012 to 2013 in which 81 programme managers were trained. Before the collaboration with UNICEF ended in June 2013, the course was made online, and is yet to be pilot-tested.

3.3 Post-Graduate Diploma in Management of Reproductive and Child Health Programmes (PGDMRCH)

This course was developed to address the training needs for both medical and non-medical students and those with some work experience in the community, and to build the capacity of programme managers working on RCH at all levels. The course has been designed by PHFI in collaboration with UNICEF to bridge the gap between programme planning and management skills of the healthcare workforce. [17]

This one-year online course, launched in 2013, is open to health professionals involved in or planning to be involved in managing the RCH programme at the state or district level. Applicants should have at least a Bachelor's degree in Medicine or Nursing or higher degrees in Public Health, Nutrition, Social Work, or Management.

PHFI uses the platform 'Adobe Connect' for its distance learning programmes . The course includes one pre-recorded lecture on a pre-specified topic (for of approximately one hour duration) that is uploaded every week and six hours of reading per week. In addition, live interactive online sessions are held every month. There is an e-mail tutorial support and group discussion through a web-based system.

3.4 Short Course on RCH Programme Management

In response to the felt need, WHO, in collaboration with PHFI, has designed a combined RCH package of training and developed a comprehensive Short Course in Reproductive and Child Health (RCH) Programme Management to build the planning and implementation capacity of programme managers in 2012-13. The development of the course utilized the expertise from various training centres like UNICEF and MoHFW to merge diverse course modules and training guidelines into a comprehensive short course. The training was originally for ten days and the methodology included plenary introductory presentations, individual reading with exercises and feedback, group discussions, role plays and group presentations. Based on the felt need, the duration of the course has now been reduced to five days. [18]

The course is designed primarily for district and sub-district managers of programmes related to RCH who are responsible to convert the vision for RCH described by the national-level planners in the strategic plan and turn it into action on the ground. The course is based on the premise that to improve maternal newborn and child survival and health, planning should be done for delivering targeted district-level interventions to address local needs and ask for funds accordingly rather than on resource-based planning. This course covers the epidemiology and technical interventions in RCH, as well as steps in planning and managing implementation of programmes at national or sub-national levels. In addition, the training emphasises inter-sectoral collaboration and planning to achieve broad goals at the district level. It includes sessions on management of human, material and financial resources; monitoring and data analysis; quality of care; supportive supervision; multi-sectoral coordination and advocacy; strengthening community participation; managing behaviour change communication; and ensuring equity and outreach to vulnerable populations.

3.5 IMCI Computerized Adaptation and Training Tool (ICATT)

ICATT is an innovative computerized software application for IMCI. It provides the possibility of adapting the IMCI guidelines, including translation into various languages. ICATT offers an innovative approach to training and can be used with different training approaches. ICATT has been used for pre-service, in-service and distance learning based training of health workers. [19] The application has two main interfaces:

- The Open interface – the ICATT Builder and Manager: The Open Interface is intended for use by the experts at the global, national and sub-national levels. This interface allows the technical content and language of the guidelines to be revised, library and educational materials to be added, and a tailor-made training course to be created. The interface is user-friendly and does not require special computer skills.
- The Closed interface – the ICATT Training Player: The Closed Interface contains the training materials that have been modified during the adaptation process in the ICATT Builder and Manager (open interface). It can be used in many ways, for self-learning, classroom teaching, distance learning, etc.

The ICATT Builder and Manager (open interface) is specifically targeted at professionals who are responsible for adapting the IMCI guidelines and developing IMCI training courses (e.g. ministries of health, medical and paramedical schools, WHO). The IMCI Training Player (closed interface) is targeted at IMCI training institutions, IMCI trainers and IMCI trainees. The library can be used by professionals at any level for reference and for broadening the training beyond the generic IMCI training course.

3.5.1 ICATT country experiences

The overall goal of the ICATT project is to contribute to the effective and efficient implementation of the IMCI strategy. Intensified support has been provided to Tanzania, Peru, and Indonesia. Initially the application of ICATT has been in different settings using various training approaches. [19] India has started national adaptation of ICATT.

4. CHALLENGES FOR E-LEARNING IN INDIA

In Western countries, online training programmes are increasingly recognized as adjuncts to classroom teaching, providing ongoing education to keep one updated and abreast with the latest. In addition to advantages of flexible schedules and being conducive to constructive learning with discussions and problem solving, students also have the advantage of being mentored by experienced faculty from distant places. Keeping engagement sustained over weeks can be achieved by sending SMS or e-mails by the local mentor, periodic online MCQ examination which covers most of the important contents learnt, quiz every three to four weeks, live interactions and providing additional resources to read.

Disadvantages include lack of face-to-face interaction, lack of hands-on activities, poor internet connectivity, non-user-friendly interfaces and "digital illiteracy". [20]

Current technology barriers are bound to go away with time. As the young minds get more literate with the use of computers and internet, they demand eco-friendly paperless learning. This would be possible only with out-of-box thinking by policymakers and translation of continuing education credits as a mandatory accreditation criterion for healthcare professionals. [21]

5. WAY FORWARD

India has witnessed the launch of several programmes with newborn health content such as- IMNCI, HBNC and NSSK. Training of health care providers has been an integral part of all these programmes. There is also a demand to organize refresher courses periodically to update the knowledge and skills, and to improve pre-service education. Several educational initiatives both regular (face to face) and distance learning courses that have been developed in the last decade. These courses/programmes utilize regular, distance, online, and satellite modes of teaching. E-learning on newborn health is in an exciting phase with very rewarding early uptake. It has a great potential and future.

Recommendations

- Use tele-education to fast-track training (initial /refresher) programmes.
- Mainstream e-learning programmes into pre-service and in-service education/training programmes on newborn health.
- Some kind of incentive should be built in (like promotions) who enrol themselves in such courses and those who clear these with good grades.
- A pool of national and state level trainers should be created to take forward the agenda of improving clinical and managerial skills in the country.

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GLOSSARY OF DEFINITIONS

Neonatal Mortality Rate: Death of neonates from birth to 28 days of age, per 1,000 live births in a given year.

Early Neonatal Mortality Rate: Death of neonates from birth to seven days per 1000 live births in a given year.

Late Neonatal Mortality Rate: Death of neonates from the eighth day after birth to 28 completed days per 1000 live births in a given year.

Post Neonatal Mortality Rate: Death occurring in children after 28 days till 364 completed days of age, per 1000 live births in a given year.

Infant Mortality Rate: Death occurring in children before they reach the age of one year, per 1000 live births in a given year.

Under five Mortality Rate: Probability of a child born in a specified year dying before reaching the age of five if subject to current age-specific mortality rates, per 1000 live births in a given year.

Maternal Mortality Ratio: The number of maternal deaths per 100,000 live births, where maternal death includes death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.

Perinatal Mortality Rate: Deaths occurring after 28 completed weeks of gestation (still births) and up to seven completed days (early neonatal deaths) after birth, per 1000 total births in a given year.

Stillbirth Rate: Death of foetus after 28 completed weeks of pregnancy, or the birth of a dead foetus which weighs over 1,000 gm or is more than 35 cm in body length, per 1000 total births in a given year.

Total Fertility Rate: The average number of children a woman would have during her reproductive years (15-49 years) bearing the children at the same rates as the women now in each age group.

Crude Birth Rate: Number of births per1000 estimated mid-year population in one year, in a given place.

Crude Death Rate: Number of deaths (from all causes) per 1000 estimated mid-year population in one year, in a given place.

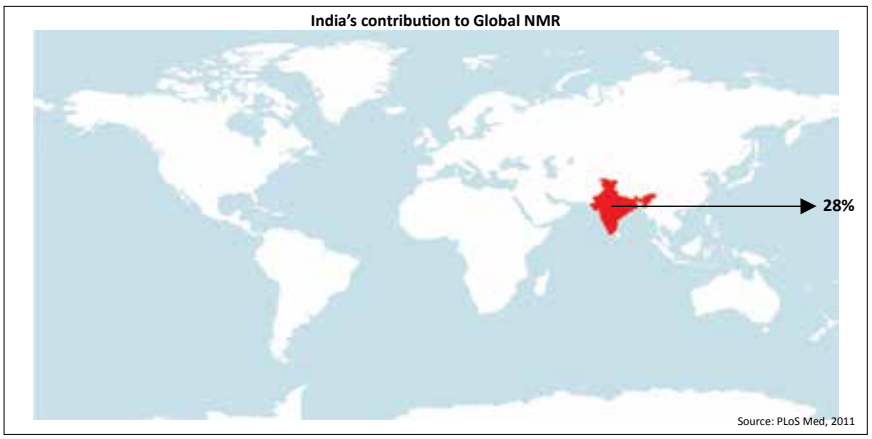
Sex Ratio: Number of females per 1000 males.

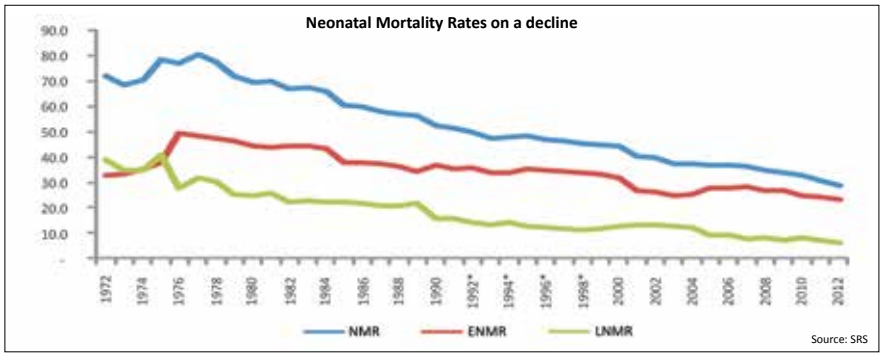
Life Expectancy Rate: At a given age, is the expected number of years which a person of that age may expect to live, according to the mortality pattern prevalent in that country.

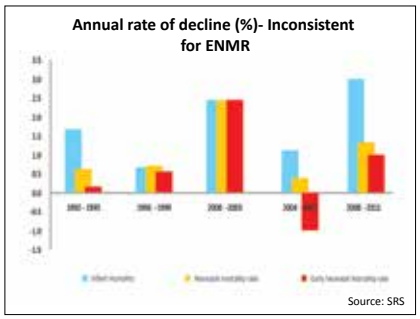
FACTSHEETS

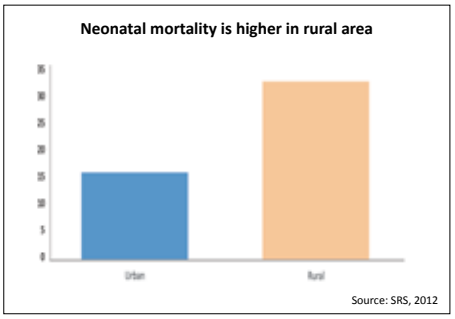
India

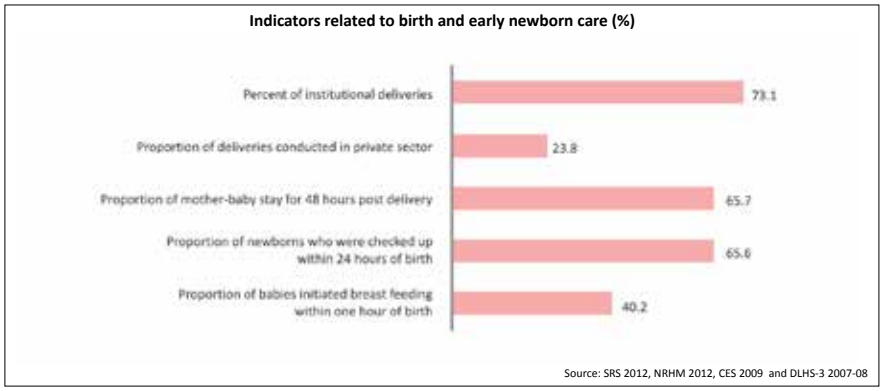
Neonatal health indicators		
		India
Neonatal Mortality Rate [1]		29
Early Neonatal Mortality Rate [1]		23
Late Neonatal Mortality Rate [1]		6
Health indicators		
Post Neonatal Mortality Rate [1]		13
Infant Mortality Rate [1]	Total	42
	Male	41
	Female	44
Under Five Mortality Rate [1]		52
Maternal Mortality Ratio [2]		178
Perinatal Mortality Rate [1]		28
Stillbirth Rate [1]		5
Total Fertility Rate [1]		2.4
Crude Birth Rate [1]		21.6
Crude Death Rate [1]		7
Sex Ratio [3]		940
Life Expectancy [3]	Male	62.6
	Female	64.2
Health system indicators		
Average number of villages seen by an ANM [4]		3
Average rural population covered by an ANM [4]		4013
Proportion of subcentres functioning without ANMs [4]		3.2
Number of PHCs functioning as per IPHS norms [4]		3635
Average number of VHSNCs constituted per village [5]		0.79
Average number of VHNDs held per village per year [6]		11.25
Number of facilities generating and using work plan of MCTS [5]		55566
Programme implementation at a glance		
No. of districts implementing IMNCI [7]		505
No. of SNCUs established [7]		418
No. of NBSUs established [7]		1554
No. of NBCCs established [7]		13167
Administrative structure		
Rural Population (in lakhs) [3]		8330.88
Number of districts [3]		640
Number of CHCs [4]		4833
Number of PHCs [4]		24049
Number of subcentres [4]		148366
Number of Subdivisions/Talukas [3]		5564
Number of Blocks [5]		6437
Number of Villages [3]		640867

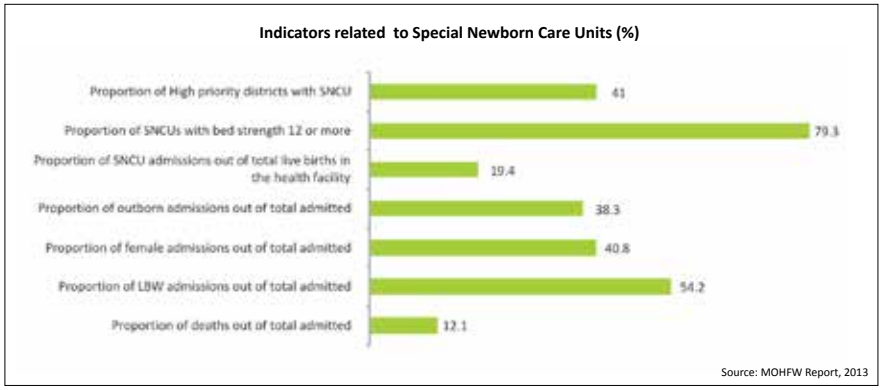












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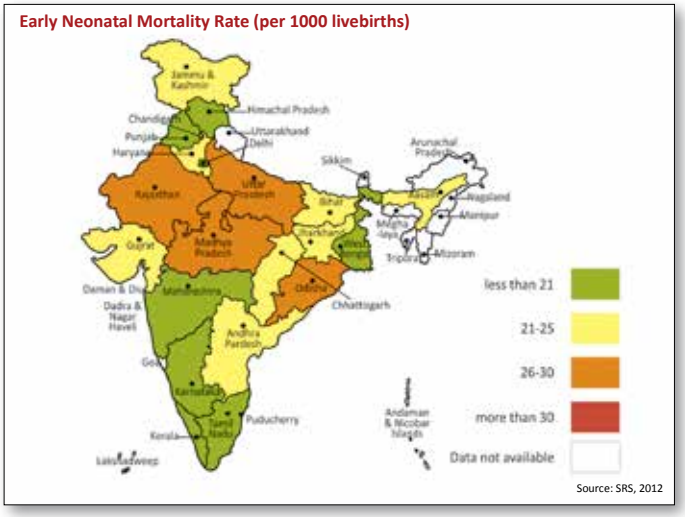
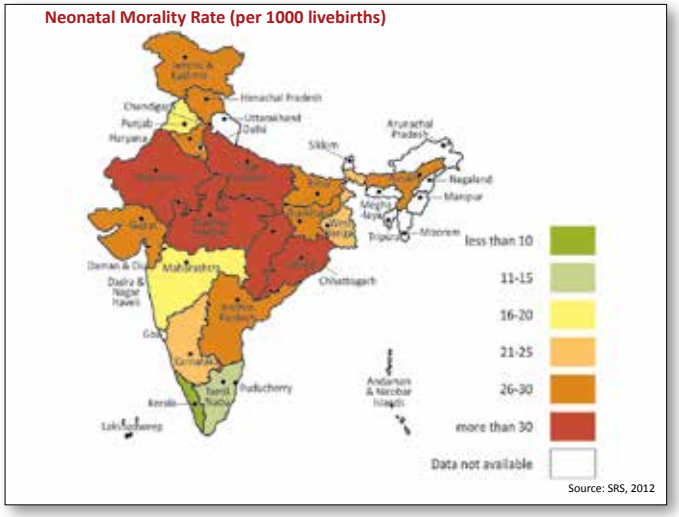
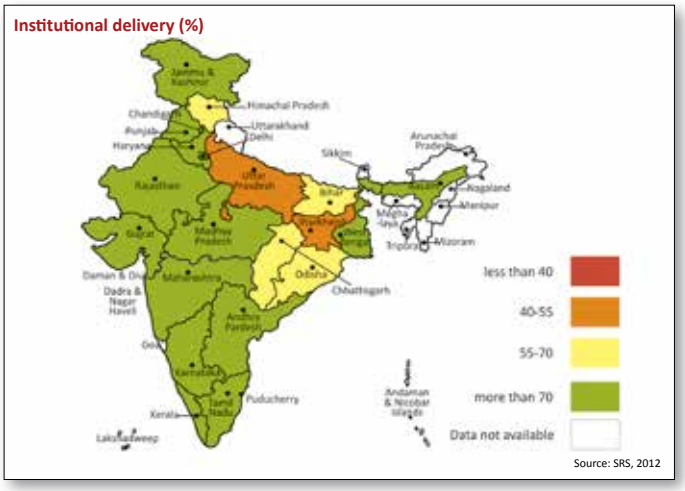
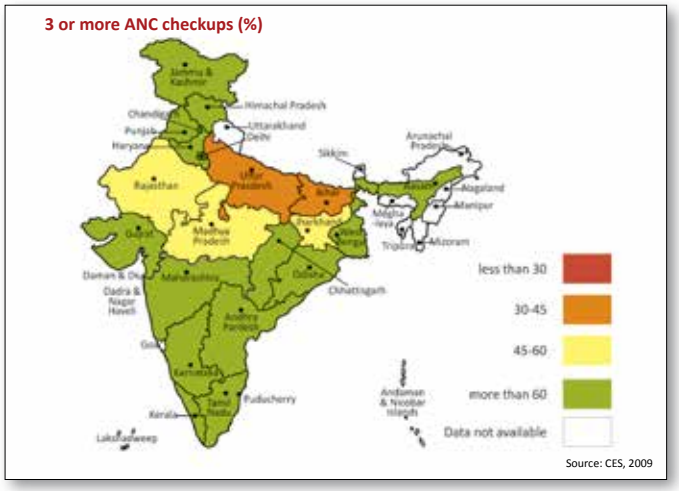
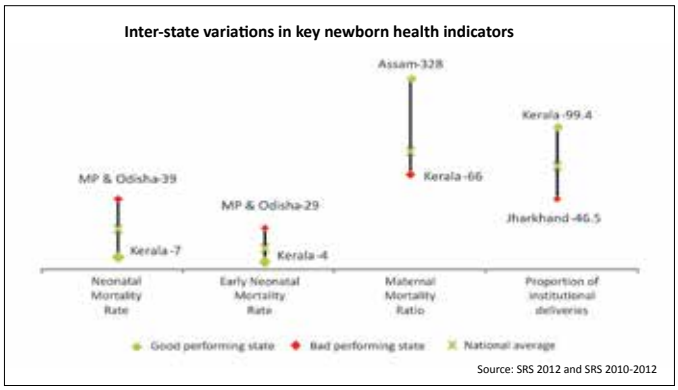










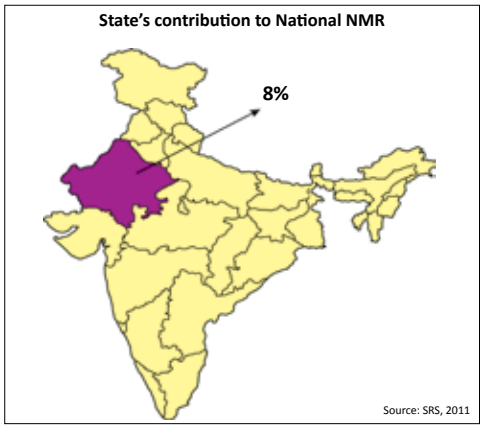
States with highest NMR (SRS, 2012)	
1. Madhya Pradesh	39
2. Odisha	39
3. Uttar Pradesh	37
4. Rajasthan	35
5. Chhattisgarh	31

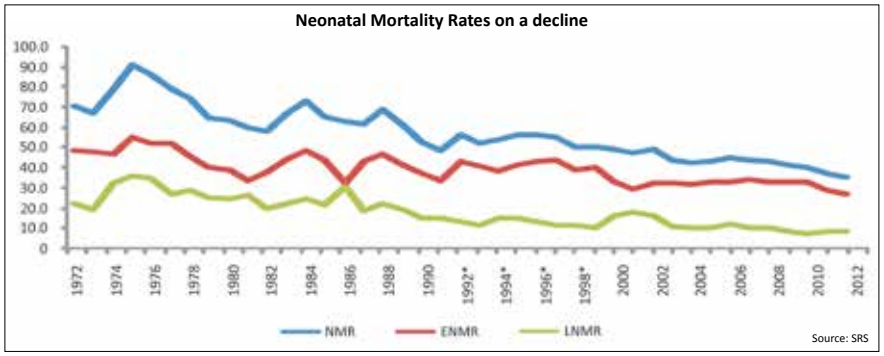
Country Highlights

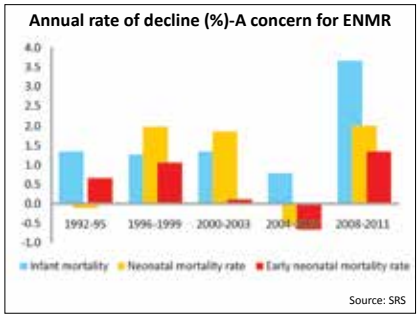
Strengths	Going forward
1. Appreciable decline in NMR	1. Efforts are needed to reduce ENMR
2. Good coverage of facility based care	2. Address the issues of quality in service delivery
3. Rising trends of institutional deliveries	3. Achieve equitable coverage of health care services across the states
	4. Establish a mechanism to overcome the paucity of urban data

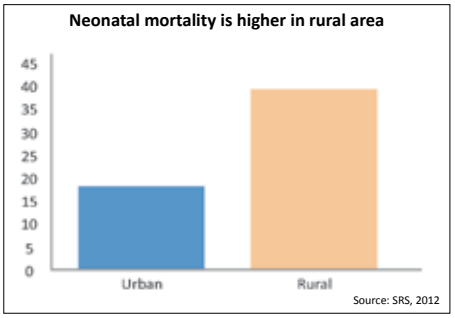
Rajasthan

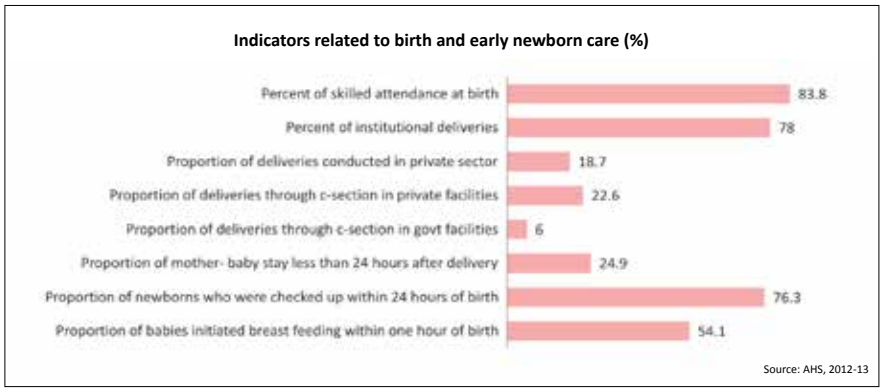
Neonatal health indicators		Raj	India
Neonatal Mortality Rate [1]		35	29
Early Neonatal Mortality Rate [1]		27	23
Late Neonatal Mortality Rate [1]		8	6
Health indicators			
Post Neonatal Mortality Rate [1]		14	13
Infant Mortality Rate [1]	Total	49	42
	Male	47	41
	Female	51	44
Under Five Mortality Rate [1]		59	52
Maternal Mortality Ratio [2]		318	178
Perinatal Mortality Rate [1]		33	28
Stillbirth Rate [1]		6	5
Total Fertility Rate [1]		2.9	2.4
Crude Birth Rate [1]		25.9	21.6
Crude Death Rate [1]		6.6	7
Sex Ratio [3]		926	940
Life Expectancy [3]	Male	61.5	62.6
	Female	62.3	64.2
Prevalence of Low Birth Weight [4]		36.3	
Health system indicators			
Average number of villages seen by an ANM [5]		3	4
Average rural population covered by an ANM [5]		2922	4013
Proportion of subcentres functioning without ANMs [5]		3.3	3.2
Number of PHCs functioning as per IPHS norms [5]		387	3635
Average number of VHSNCs constituted per village [6]		0.97	0.79
Average number of VHNDs held per village per year [7]		14.6	11.25
Number of facilities generating and using work plan of MCTS [6]		0	55566
Programme implementation at a glance			
No. of districts implementing IMNCI [8]		33	505
HBNC training status [9]-Round 1(%)		36	
No. of SNCUs established [8]		36	418
No. of NBSUs established [8]		103	1554
No. of NBCCs established [8]		1003	13167
Administrative structure			
Rural Population (in lakhs) [3]		515.4	8330.88
Number of districts [3]		33	640
Number of CHCs [5]		382	4833
Number of PHCs [5]		1528	24049
Number of subcentres [5]		11487	148366
Number of Subdivisions / Talukas [3]		241	5564
Number of Blocks [6]		237	6437
Number of Villages [3]		44672	640867

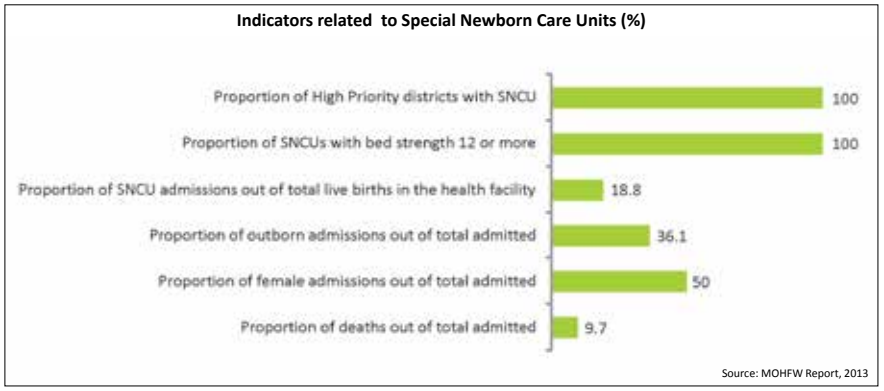












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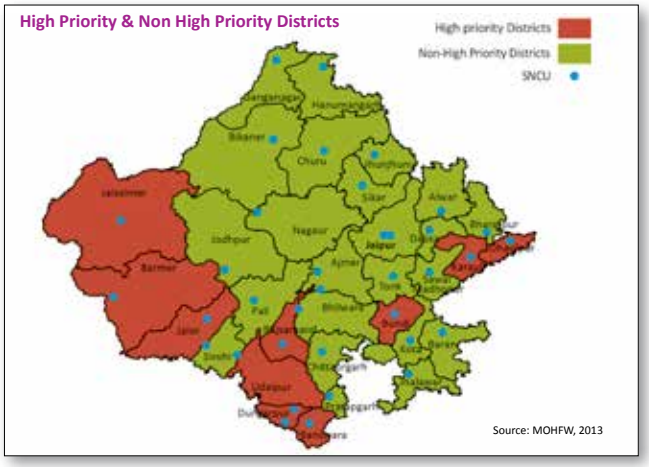
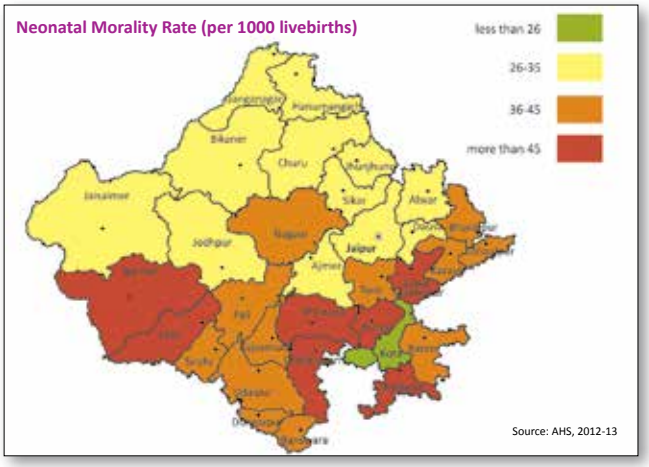
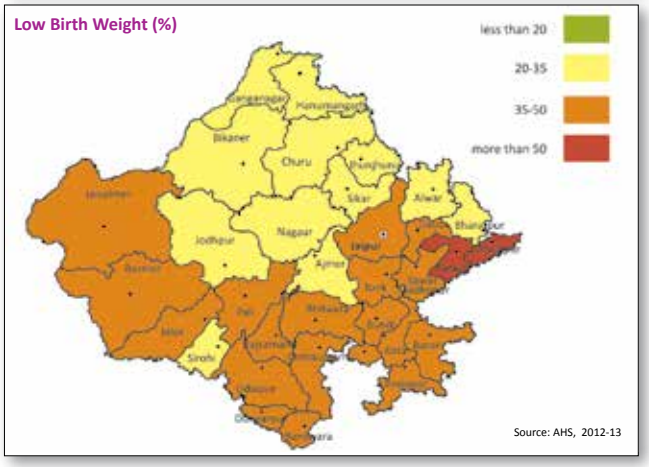
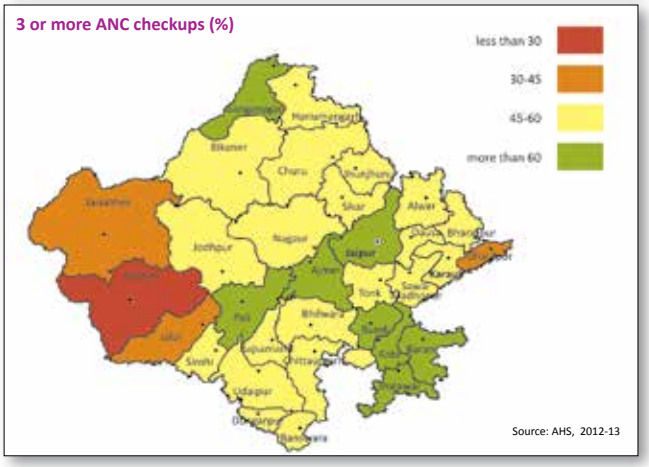
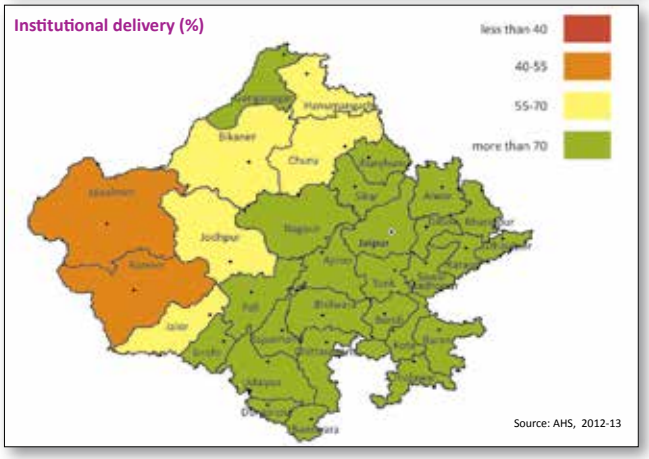
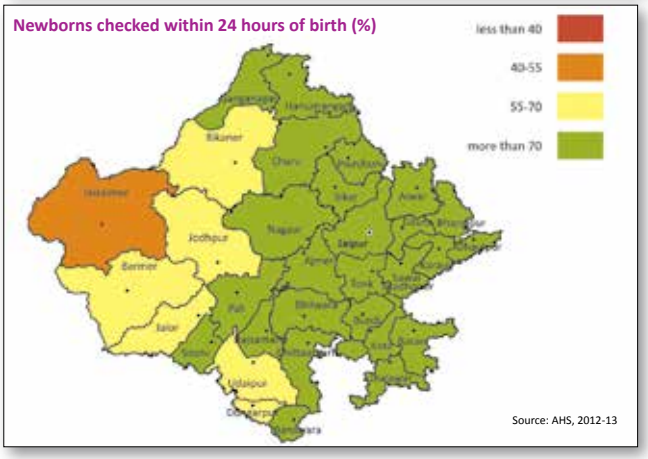


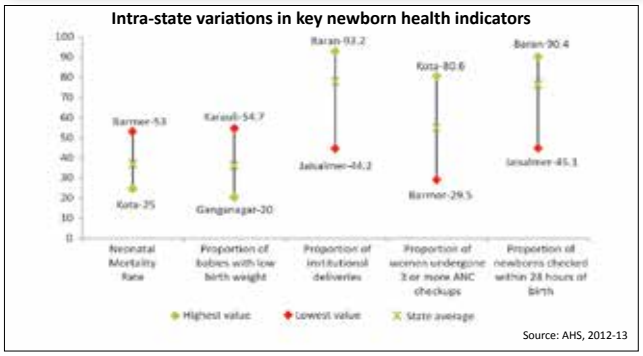












Districts with highest NMR (AHS, 2012-13)	
1. Barmer	53
2. Jalor	52
3. Sawai Madhopur	48
4. Chittaurgarh & Bundi	47
5. Jhalawar & Bhilwara	46

State Highlights

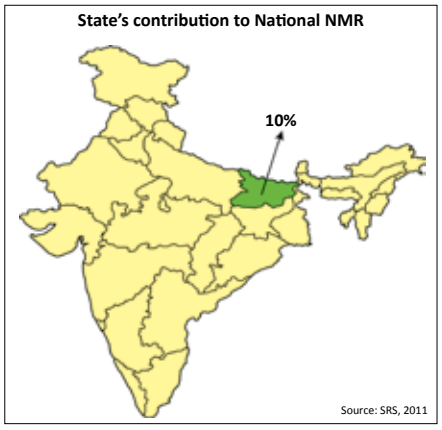
Strengths	Going forward
1. IMNCI is being implemented in every district	1. Address stagnant ENMR
2. 75% of subcentres have 2 ANMs	2. Achieve equitable coverage of health care service indicators across districts
3. Every high priority district has SNCU	3. Improve the coverage of newborn care indicators in remote districts

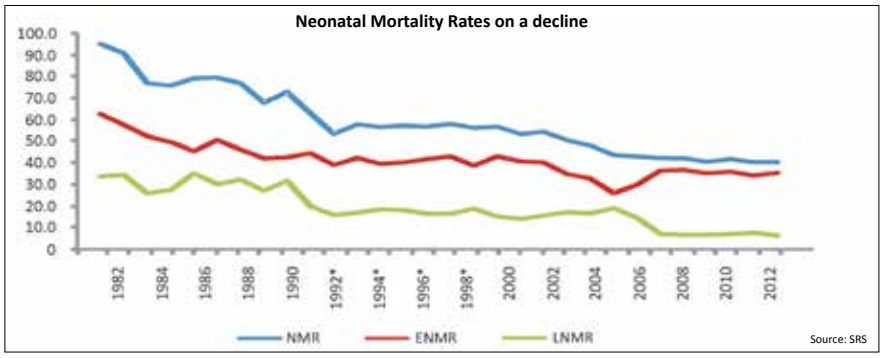
Bihar

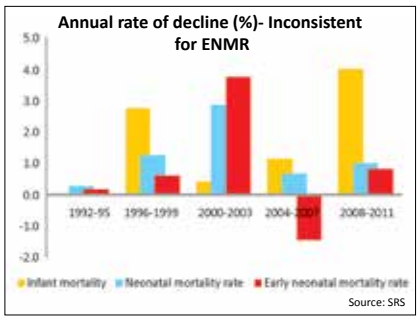
Neonatal health indicators		Bihar	India
Neonatal Mortality Rate [1]		28	29
Early Neonatal Mortality Rate [1]		23	23
Late Neonatal Mortality Rate [1]		5	6
Health indicators			
Post Neonatal Mortality Rate [1]		15	13
Infant Mortality Rate [1]	Total	43	42
	Male	42	41
	Female	45	44
Under Five Mortality Rate [1]		57	52
Maternal Mortality Ratio [2]		219	178
Perinatal Mortality Rate [1]		25	28
Stillbirth Rate [1]		1	5
Total Fertility Rate [1]		3.5	2.4
Crude Birth Rate [1]		27.7	21.6
Crude Death Rate [1]		6.6	7
Sex Ratio [3]		916	940
Life Expectancy [3]	Male	62.2	62.6
	Female	60.4	64.2
Prevalenc of Low Birth Weight [4]		21.9	
Health system indicators			
Average number of villages seen by an ANM [5]		3	4
Average rural population covered by an ANM [5]		5434	4013
Proportion of subcentres functioning without ANMs [5]		4.2	3.2
Number of PHCs functioning as per IPHS norms [5]		NA	3635
Average number of VHSNCs constituted per village [6]		0.18	0.79
Average number of VHNDs held per village per year [7]		14.7	11.25
Number of facilities generating and using work plan of MCTS [6]		167	55566
Programme implementation at a glance			
No. of districts implementing IMNCI [8]		38	505
HBNC training status [9]-Round 1(%)		78	
Round 2(%)		28	
No. of SNCUs established [8]		9	418
No. of NBSUs established [8]		7	1554
No. of NBCCs established [8]		484	13167
Administrative structure			
Rural Population (in lakhs) [3]		920.75	8330.88
Number of districts [3]		38	640
Number of CHCs [5]		70	4833
Number of PHCs [5]		1863	24049
Number of subcentres [5]		9696	148366
Number of Subdivisions / Talukas [3]		101	5564
Number of Blocks [6]		534	6437
Number of Villages [3]		44874	640867

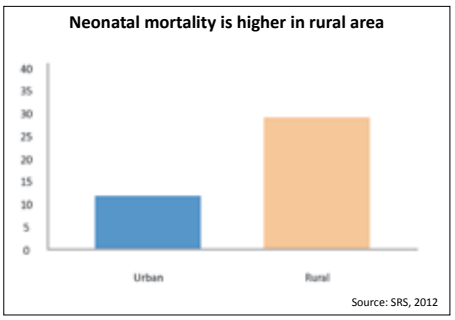
References

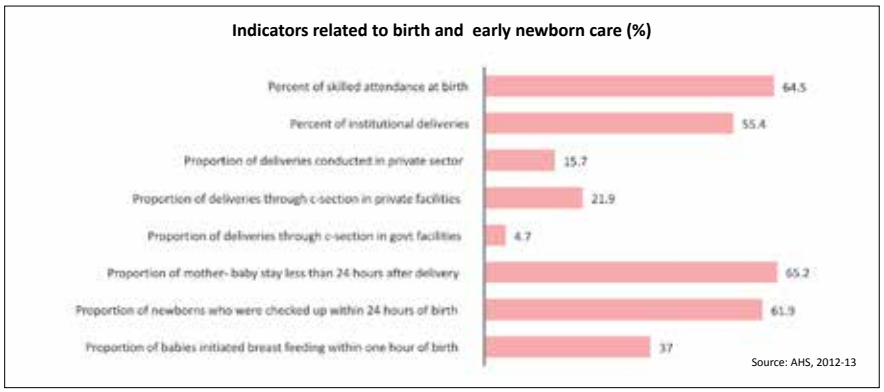
1. Sample Registration System, 2012
2. Office of Registrar General of India , 2010-12
3. Census of India, 2011
4. Annual Health Survey, 2012-13
5. Rural Health Statistics, 2012
6. National Rural Health Mission Report, 2012
7. National Rural Health Mission Report, 2011-12
8. Child Health Programmes at a Glance, 2013
9. National Health System Resource Centre, 2013

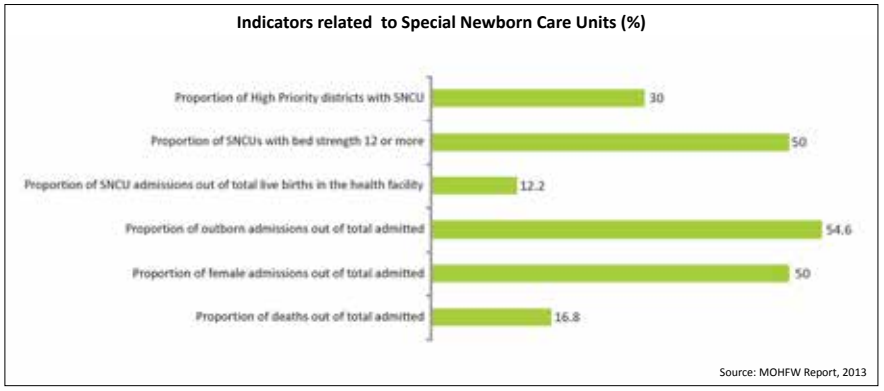


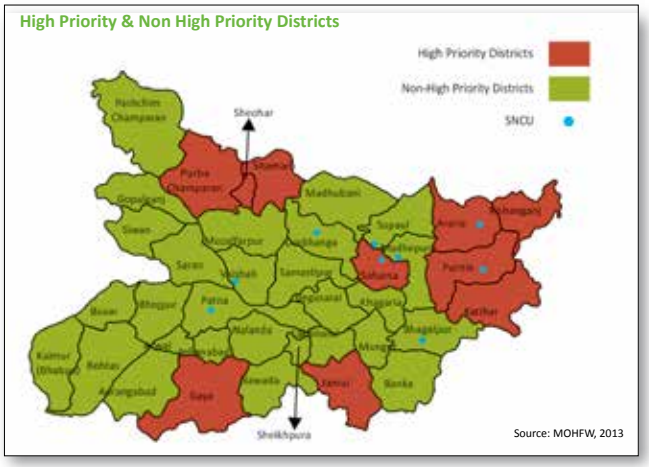


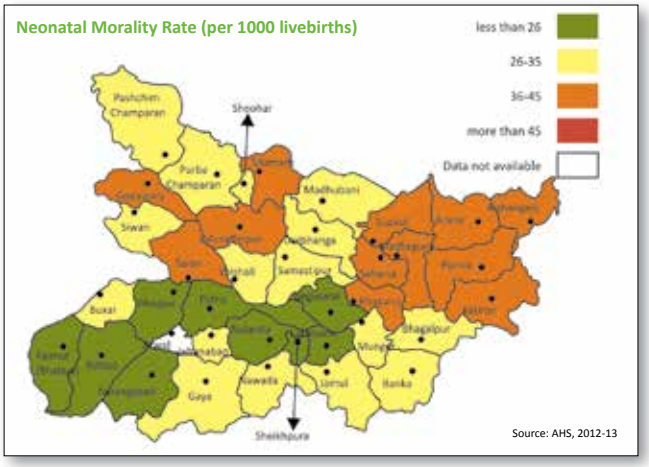


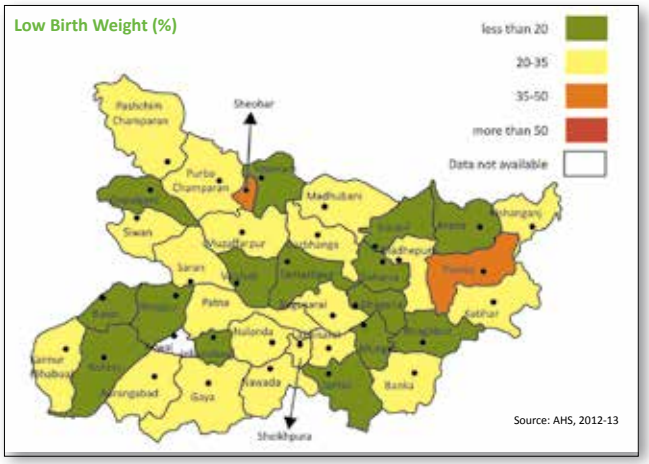


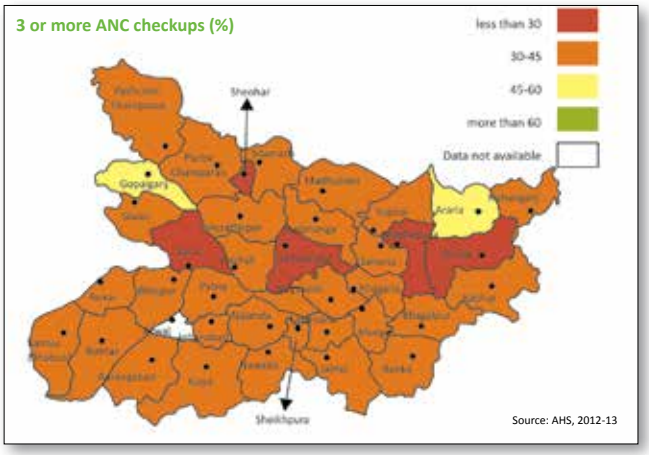


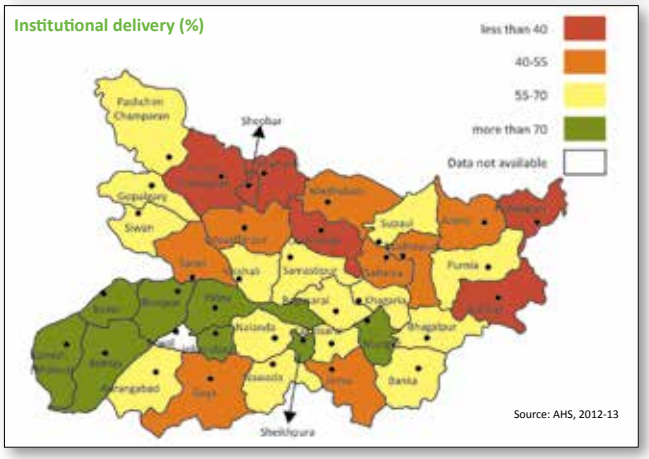


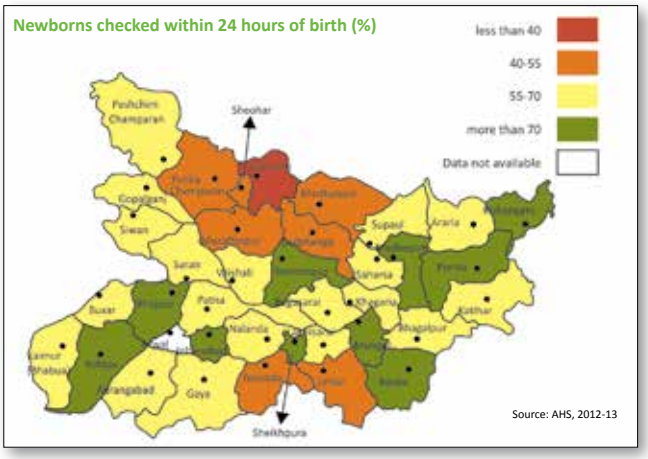


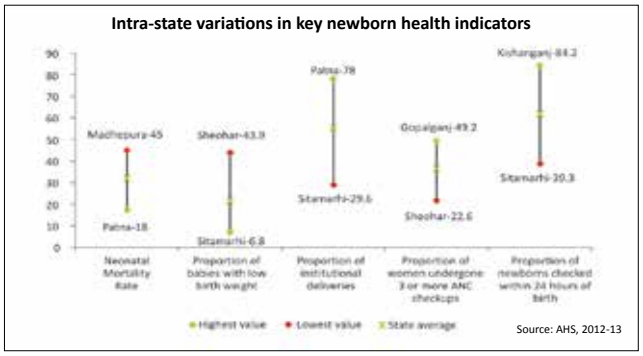












Districts with highest NMR (AHS, 2012-13)	
1. Madhepura	45
2. Kishanganj & Khagaria	44
3. Supaul	42
4. Araria	41
5. Purnia	40

State Highlights

Strengths	Going forward
1. IMNCI implementation in every district	1. Address stagnant ENMR
2. Good coverage of NBCCs	2. Achieve equity in health service coverage
3. Good coverage of postnatal checkup	3. Establish more number of SNCU and NBSU in the districts

Madhya Pradesh

Neonatal health indicators		MP	India
Neonatal Mortality Rate [1]		39	29
Early Neonatal Mortality Rate [1]		29	23
Late Neonatal Mortality Rate [1]		10	6
Health indicators			
Post Neonatal Mortality Rate [1]		17	13
Infant Mortality Rate [1]	Total	56	42
	Male	54	41
	Female	59	44
Under Five Mortality Rate [1]		73	52
Maternal Mortality Ratio [2]		230	178
Perinatal Mortality Rate [1]		35	28
Stillbirth Rate [1]		6	5
Total Fertility Rate [1]		2.9	2.4
Crude Birth Rate [1]		26.6	21.6
Crude Death Rate [1]		8.1	7
Sex Ratio [3]		930	940
Life Expectancy [3]	Male	58.1	62.6
	Female	57.9	64.2
Prevalence of Low Birth Weight [4]		26.5	
Health system indicators			
Average number of villages seen by an ANM [5]		5	4
Average rural population covered by an ANM [5]		5149	4013
Proportion of subcentres functioning without ANMs [5]		1.1	3.2
Number of PHCs functioning as per IPHS norms [5]		0	3635
Average number of VHSNCs constituted per village [6]		0.84	0.79
Average number of VHNDs held per village per year [7]		13	11.25
Number of facilities generating and using work plan of MCTS [6]		1730	55566
Programme implementation at a glance			
No. of districts implementing IMNCI [8]		18	505
HBNC training status [9] - Round 1 (%)		74	
Round 2 (%)		28	
No. of SNCUs established [8]		39	418
No. of NBSUs established [8]		41	1554
No. of NBCCs established [8]		845	13167
Administrative structure			
Rural Population (in lakhs) [3]		525.38	8330.88
Number of districts [3]		50	640
Number of CHCs [5]		333	4833
Number of PHCs [5]		1156	24049
Number of subcentres [5]		8869	148366
Number of Subdivisions/Talukas [3]		259	5564
Number of Blocks [6]		313	6437
Number of Villages [3]		54903	640867

References

1. Sample Registration System, 2012
2. Office of Registrar General of India , 2010-12
3. Census of India, 2011
4. Annual Health Survey, 2012-13
5. Rural Health Statistics, 2012
6. National Rural Health Mission Report, 2012
7. National Rural Health Mission Report, 2011-12
8. Child Health Programmes at a Glance, 2013
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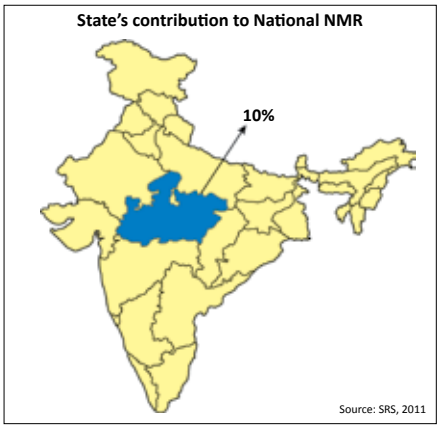
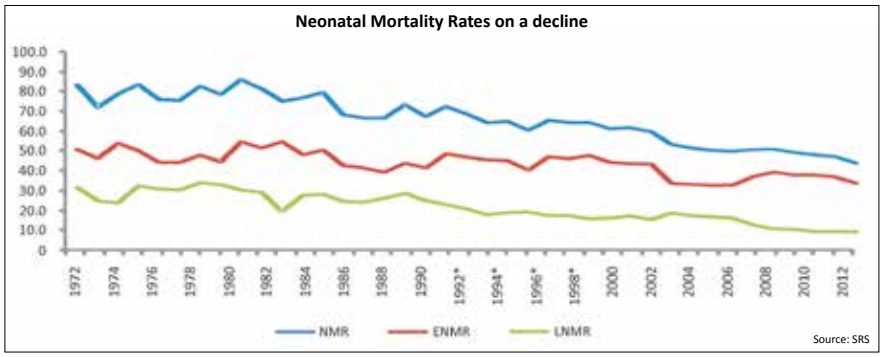
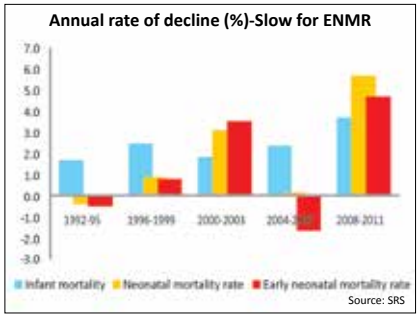
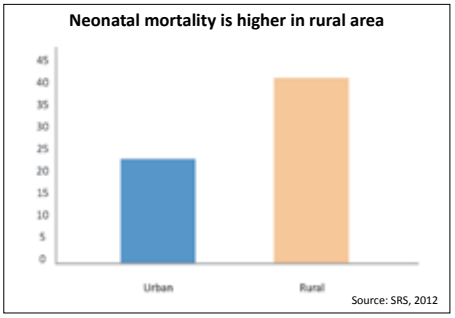
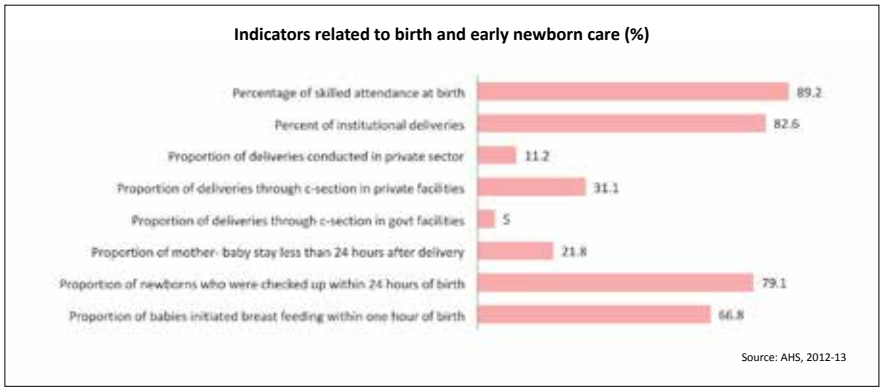
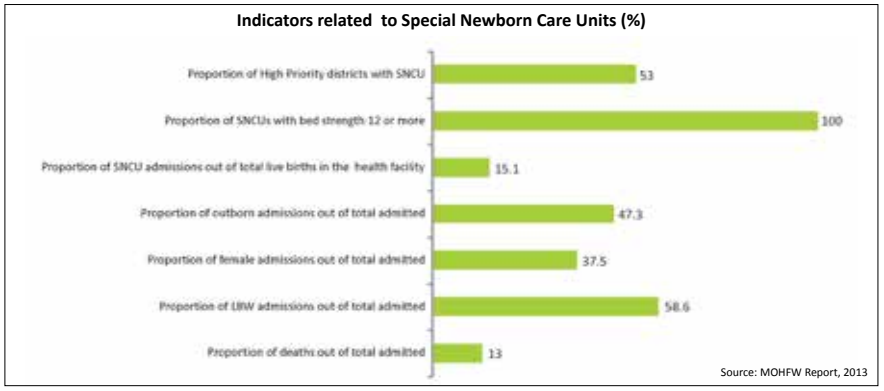




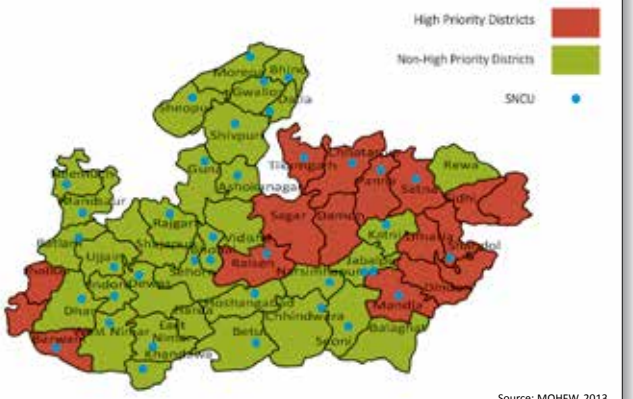






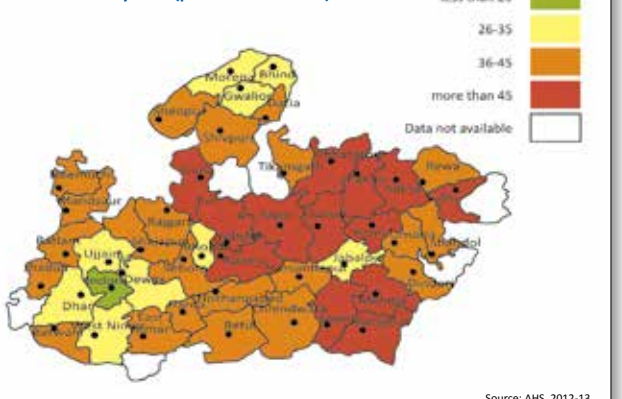


High Priority & Non High Priority Districts



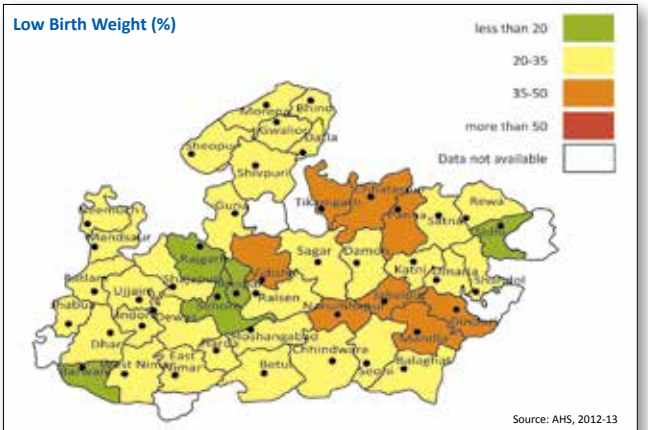
Source: MOHFW, 2013

Neonatal Morality Rate (per 1000 livebirths)



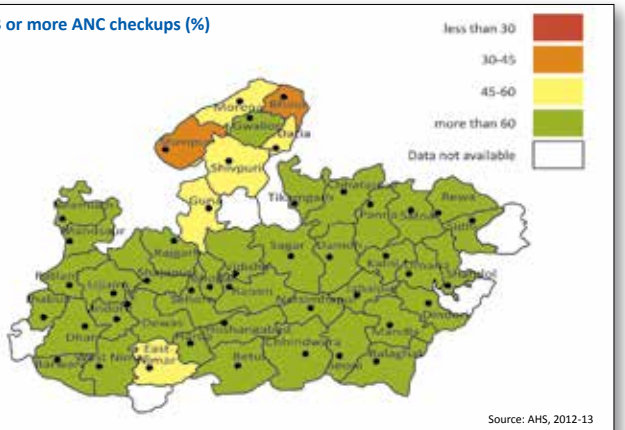
Source: AHS, 2012-13

Low Birth Weight (%)



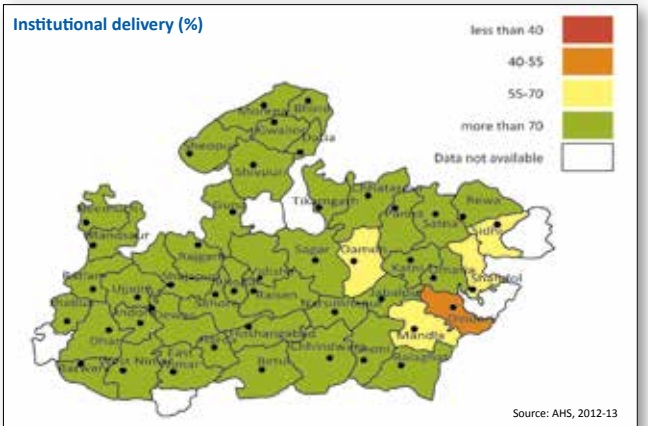
Source: AHS, 2012-13

3 or more ANC checkups (%)



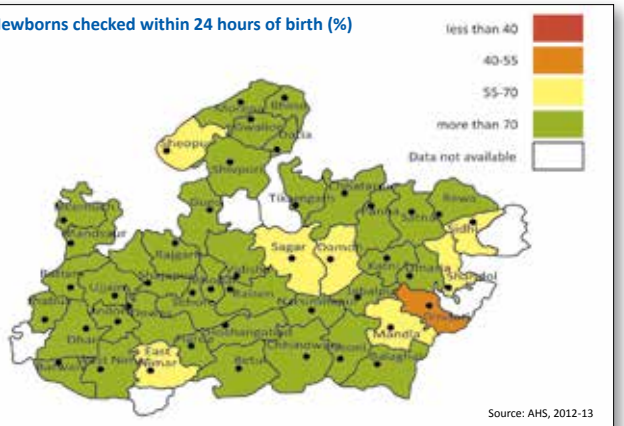
Source: AHS, 2012-13

Institutional delivery (%)



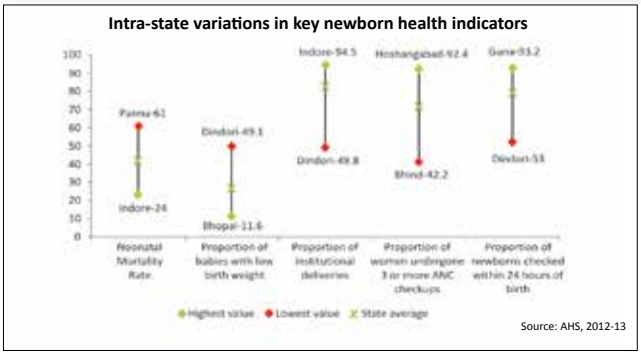
Source: AHS, 2012-13

Newborns checked within 24 hours of birth (%)



Source: AHS, 2012-13

Intra-state variations in key newborn health indicators



Source: AHS, 2012-13

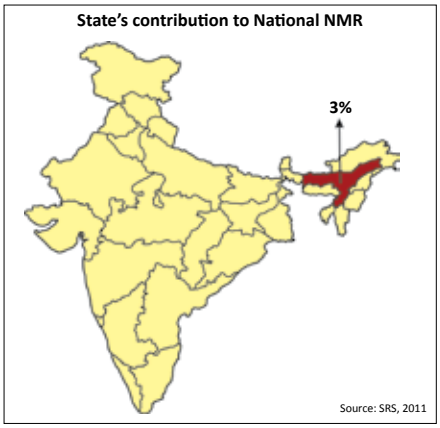
Districts with highest NMR (AHS, 2012-13)	
1. Panna	61
2. Satna & Sagar	57
3. Damoh	53
4. Sidhi	51
5. Vidisha & Raisen	48

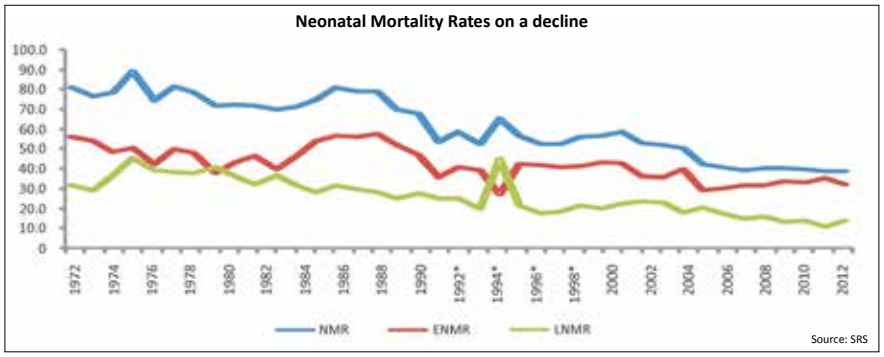
State Highlights

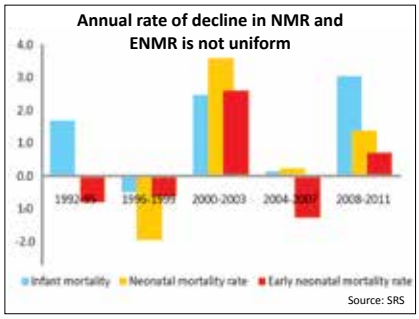
Strengths	Going forward
1. Coverage of SNCU is good	1. Improve the coverage of NBSUs
2. Established online network to track the babies for follow up	2. Efforts are needed to increase post delivery stay in hospitals in comparison to the rise in institutional deliveries
3. Frequency of VHNDs held per year is satisfactory	3. Address the gender based differentials in health care seeking

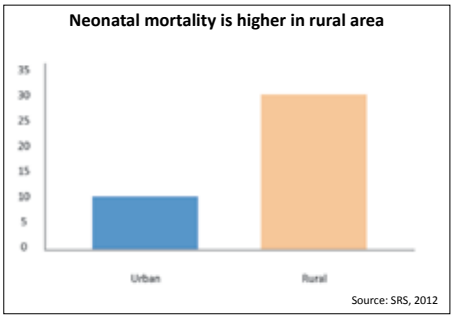
Assam

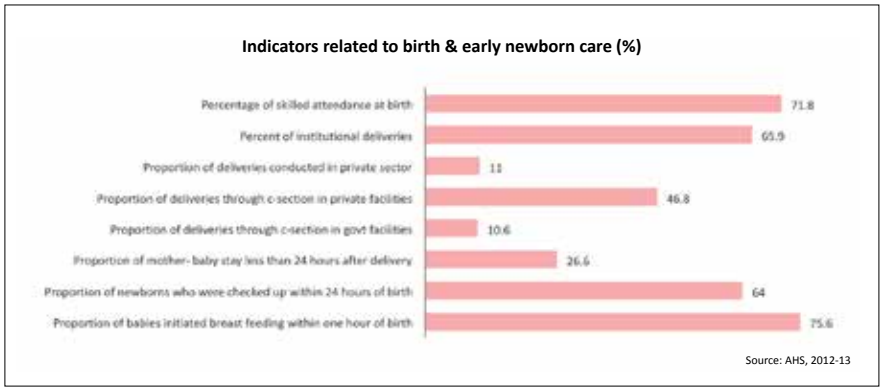
Neonatal health indicators		Assam	India
Neonatal Mortality Rate [1]		29	29
Early Neonatal Mortality Rate [1]		23	23
Late Neonatal Mortality Rate [1]		6	6
Health indicators			
Post Neonatal Mortality Rate [1]		26	13
Infant Mortality Rate [1]	Total	55	42
	Male	54	41
	Female	57	44
Under Five Mortality Rate [1]		75	52
Maternal Mortality Ratio [2]		328	178
Perinatal Mortality Rate [1]		31	28
Stillbirth Rate [1]		8	5
Total Fertility Rate [1]		2.4	2.4
Crude Birth Rate [1]		22.5	21.6
Crude Death Rate [1]		7.9	7
Sex Ratio [3]		954	940
Life Expectancy [3]	Male	58.6	62.6
	Female	59.3	64.2
Prevalence of Low Birth Weight [4]		23.3	
Health system indicators			
Average number of villages seen by an ANM [5]		3	4
Average rural population covered by an ANM [5]		3070	4013
Proportion of subcentres functioning without ANMs [5]		0	3.2
Number of PHCs functioning as per IPHS norms [5]		NA	3635
Average number of VHSNCs constituted per village [6]		1.05	0.79
Average number of VHNDs held per village per year [7]		10.7	11.25
Number of facilities generating and using work plan of MCTS [6]		0	55566
Programme implementation at a glance			
No. of districts implementing IMNCI [8]		23	505
HBNC training status [9] - Round 1 (%)		99	
No. of SNCUs established [8]		16	418
No. of NBSUs established [8]		138	1554
No. of NBCCs established [8]		692	13167
Administrative structure			
Rural Population (in lakhs) [3]		267.81	8330.88
Number of districts [3]		27	640
Number of CHCs [5]		109	4833
Number of PHCs [5]		975	24049
Number of subcentres [5]		4604	148366
Number of Subdivisions/Talukas [3]		155	5564
Number of Blocks [6]		219	6437
Number of Villages [3]		26395	640867

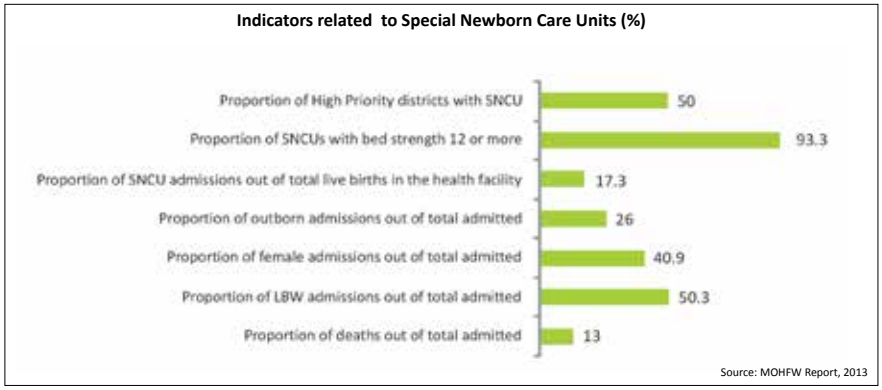












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2. Office of Registrar General of India , 2010-12
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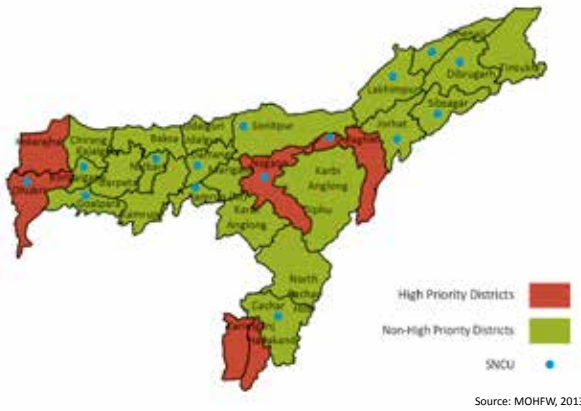
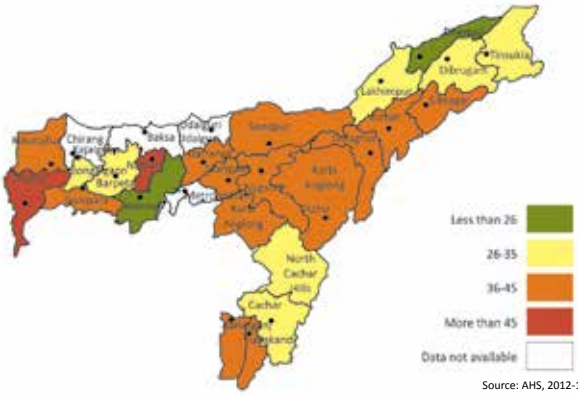
High Priority & Non High Priority Districts



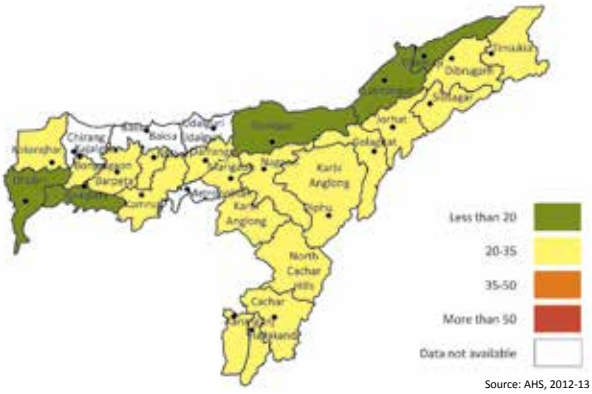
Source: MOHFW, 2013

Neonatal Morality Rate (per 1000 livebirths)



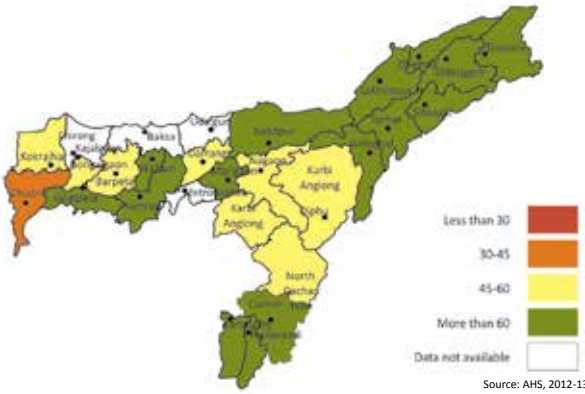
Source: AHS, 2012-13

Low Birth Weight (%)



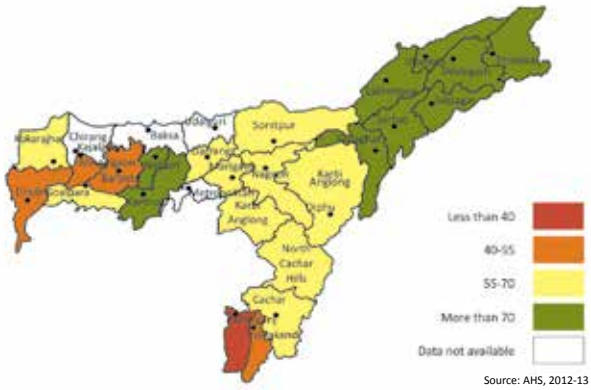
Source: AHS, 2012-13

3 or more ANC checkups (%)



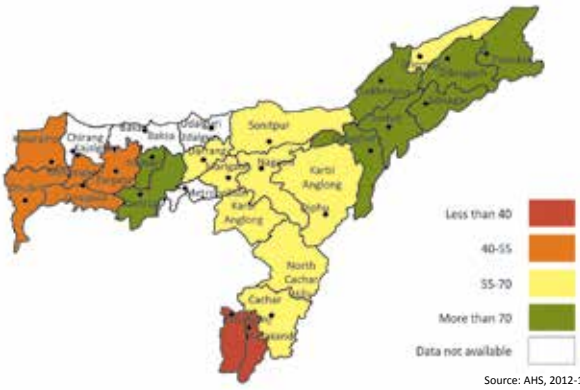
Source: AHS, 2012-13

Institutional delivery (%)



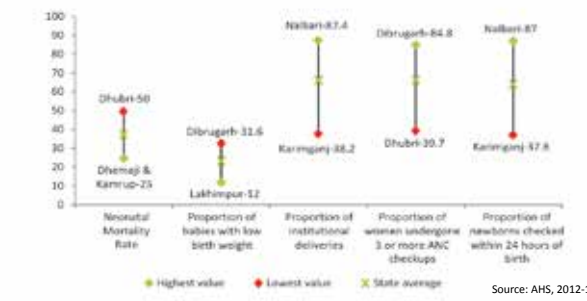
Source: AHS, 2012-13

Newborns checked within 24 hours of birth (%)



Source: AHS, 2012-13

Intra-state variations in key newborn health indicators



Source: AHS, 2012-13

Districts with highest NMR (AHS, 2012-13)	
1. Dhubri	50
2. Nalbari	46
3. Karimganj	44
4. Golaghat, Kokrajarh & Sonitpur	43
5. Marigaon	41

State Highlights

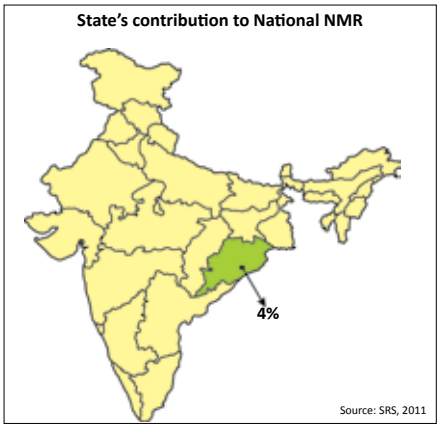
Strengths	Going forward
1. Marked improvement in skilled attendance at birth	1. Efforts are needed to control the increasing trend of ENMR
2. Every subcentre has at least one ANM	2. Establish SNCUs in all high focus districts
3. Sex ratio more than the national average	3. Improve the post delivery stay in hospital with regards to high institutional delivery rate

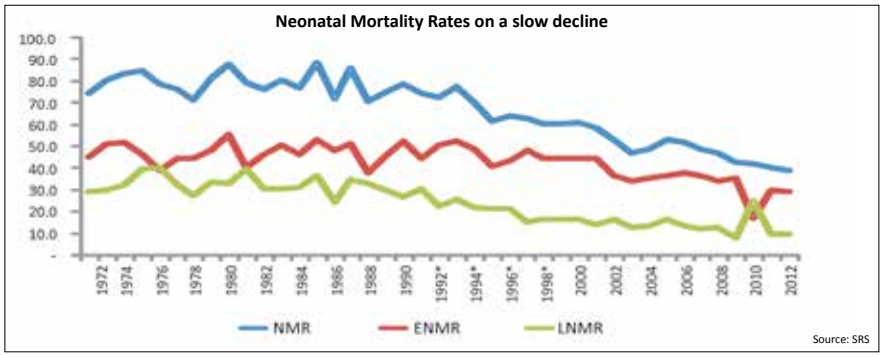
Odisha

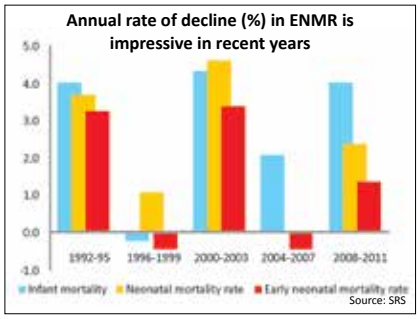
Neonatal health indicators		Odisha	India
Neonatal Mortality Rate [1]		39	29
Early Neonatal Mortality Rate [1]		29	23
Late Neonatal Mortality Rate [1]		10	6
Health indicators			
Post Neonatal Mortality Rate [1]		14	13
Infant Mortality Rate [1]	Total	2.1	42
	Male	8.5	41
	Female	8.5	44
Under Five Mortality Rate [1]		235	52
Maternal Mortality Ratio [2]		68	178
Perinatal Mortality Rate [1]		53	28
Stillbirth Rate [1]		52	5
Total Fertility Rate [1]		54	2.4
Crude Birth Rate [1]		37	21.6
Crude Death Rate [1]		8	7
Sex Ratio [3]		978	940
Life Expectancy [3]	Male	59.5	62.6
	Female	59.6	64.2
Prevalence of Low Birth Weight [4]		21.6	
Health system indicators			
Average number of villages seen by an ANM [5]		6	4
Average rural population covered by an ANM [5]		4257	4013
Proportion of subcentres functioning without ANMs [5]		7.2	3.2
Number of PHCs functioning as per IPHS norms [5]		13	3635
Average number of VHSNCs constituted per village [6]		0.88	0.79
Average number of VHNDs held per village per year [7]		7.6	11.25
Number of facilities generating and using work plan of MCTS per village [6]		6720	55566
Programme implementation at a glance			
No. of districts implementing IMNCI [8]		20	505
HBNC training status [9] - Round 1 (%)		79	
Round 2 (%)		51	
Round 3 (%)		11	
No. of SNCUs established [8]		21	418
No. of NBSUs established [8]		28	1554
No. of NBCCs established [8]		514	13167
Administrative structure			
Rural Population (in lakhs) [3]		349.51	8330.88
Number of districts [3]		30	640
Number of CHCs [5]		377	4833
Number of PHCs [5]		1226	24049
Number of subcentres [5]		6688	148366
Number of Subdivisions/Talukas [3]		485	5564
Number of Blocks [6]		314	6437
Number of Villages [3]		51313	640867

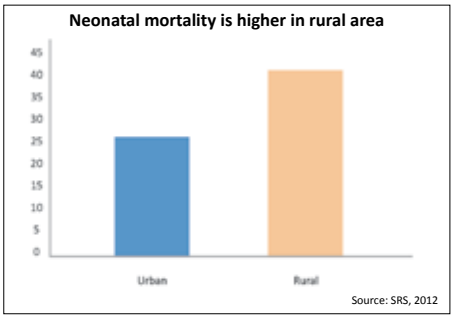
References

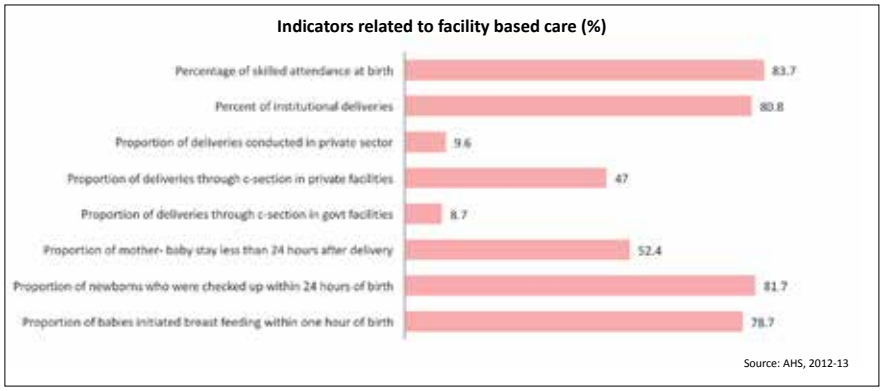
1. Sample Registration System, 2012
2. Office of Registrar General of India , 2010-12
3. Census of India, 2011
4. Annual Health Survey, 2012-13
5. Rural Health Statistics, 2012
6. National Rural Health Mission Report, 2012
7. National Rural Health Mission Report, 2011-12
8. Child Health Programmes at a Glance, 2013
9. National Health System Resource Centre, 2013

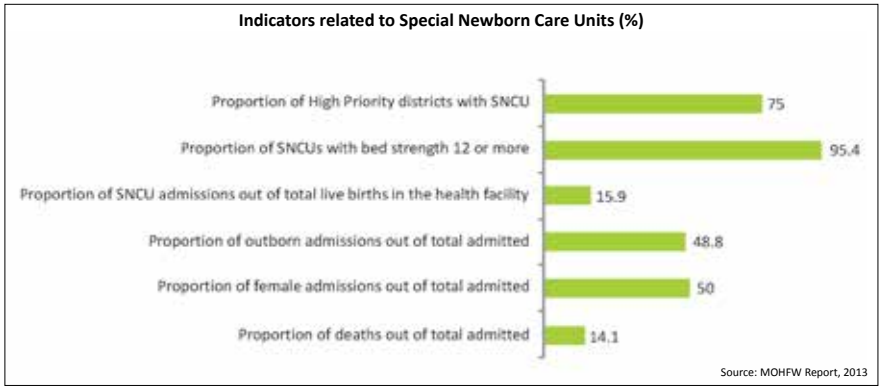




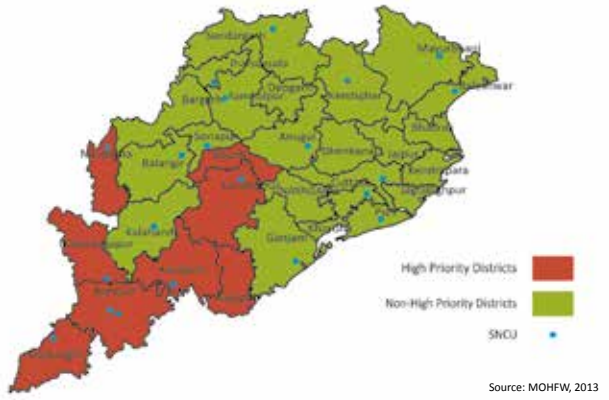






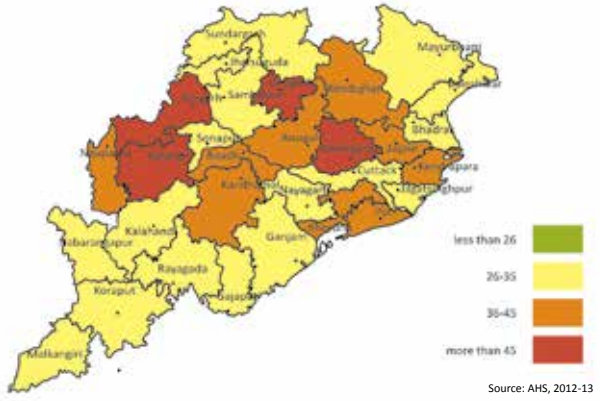


High Priority & Non High Priority Districts



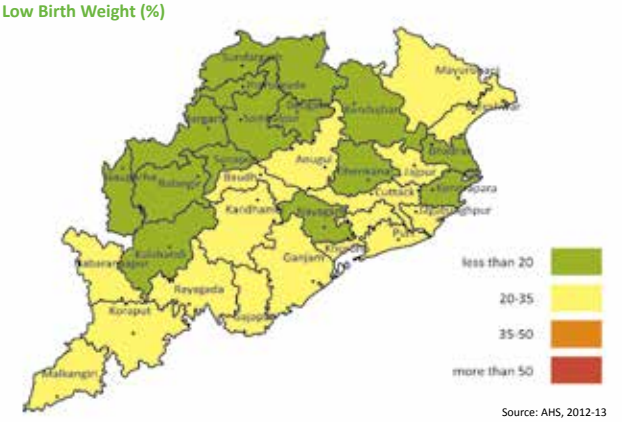
Source: MOHFW, 2013

Neonatal Morality Rate (per 1000 livebirths)



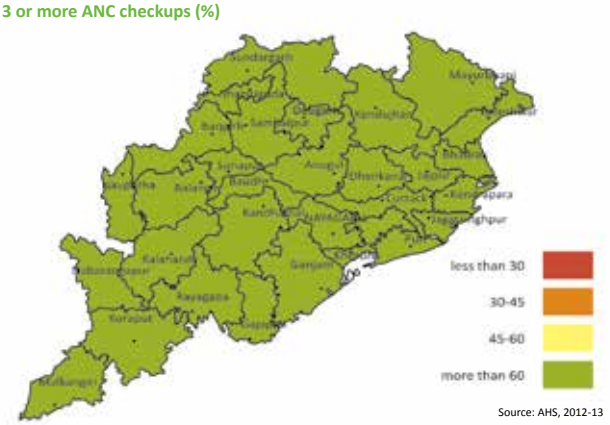
Source: AHS, 2012-13

Low Birth Weight (%)



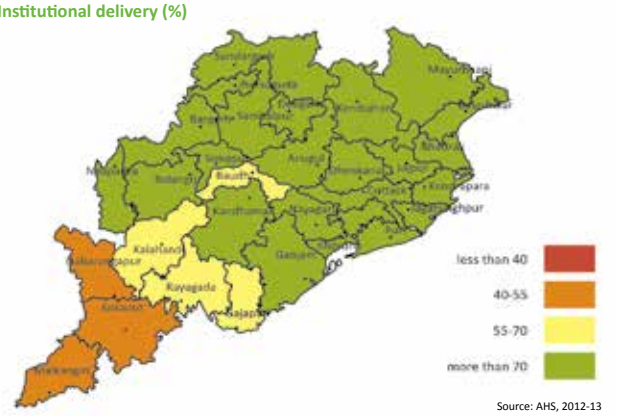
Source: AHS, 2012-13

3 or more ANC checkups (%)



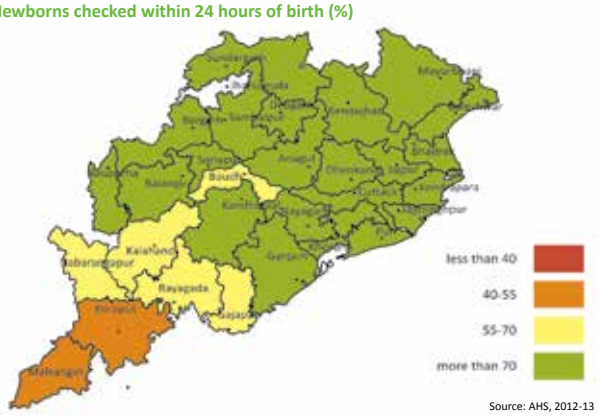
Source: AHS, 2012-13

Institutional delivery (%)



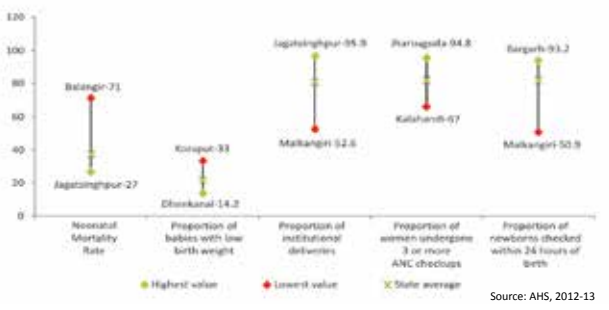
Source: AHS, 2012-13

Newborns checked within 24 hours of birth (%)



Source: AHS, 2012-13

Intra-state variations in key newborn health indicators



Source: AHS, 2012-13

Districts with highest NMR (AHS, 2012-13)	
1. Balangir	71
2. Dhennkanal, Debgarh & Bargarh	46
3. Baudh	45
4. Khordha & Kendrapara	43
5. Puri & Kendujhar	41

State Highlights

Strengths	Going forward
1. Progress of HBNC training is good	1. Improve the coverage with NBSU
2. Coverage with SNCU is good	2. Pay attention to the indicator of proportion of mother-baby stay less then 24 hours after delivery
3. Rate of institutional delivery is good	3. Efforts are needed to increase the number of PHCs functioning as per IPHS norms

Jharkhand

Neonatal health indicators		JH	India
Neonatal Mortality Rate [1]		27	29
Early Neonatal Mortality Rate [1]		23	23
Late Neonatal Mortality Rate [1]		4	6
Health indicators			
Post Neonatal Mortality Rate [1]		10	13
Infant Mortality Rate [1]	Total	38	42
	Male	36	41
	Female	39	44
Under Five Mortality Rate [1]		50	52
Maternal Mortality Ratio [2]		219	178
Perinatal Mortality Rate [1]		23	28
Stillbirth Rate [1]		1	5
Total Fertility Rate [1]		2.8	2.4
Crude Birth Rate [1]		24.7	21.6
Crude Death Rate [1]		6.8	7
Sex Ratio [3]		947	940
Life Expectancy [3]	Male	NA	62.6
	Female	NA	64.2
Prevalence of Low Birth Weight [4]		28.1	
Health system indicators			
Average number of villages seen by an ANM [5]		5	4
Average rural population covered by an ANM [5]		3808	4013
Proportion of subcentres functioning without ANMs [5]		1.7	3.2
Number of PHCs functioning as per IPHS norms [5]		0	3635
Average number of VHSNCs constituted per village [6]		0.93	0.79
Average number of VHNDs held per village per year [7]		11.8	11.25
Number of facilities generating and using work plan of MCTS per village [6]		45	55566
Programme implementation at a glance			
No. of districts implementing IMNCI [8]		24	505
HBNC training status [9] - Round 1 (%)		90	
Round 2 (%)		83	
Round 3 (%)		20	
No. of SNCUs established [8]		2	418
No. of NBSUs established [8]		7	1554
No. of NBCCs established [8]		203	13167
Administrative structure			
Rural Population (in lakhs) [3]		250.37	8330.88
Number of districts [3]		24	640
Number of CHCs [5]		188	4833
Number of PHCs [5]		330	24049
Number of subcentres [5]		3958	148366
Number of Subdivisions/Talukas [3]		210	5564
Number of Blocks [6]		251	6437
Number of Villages [3]		32394	640867

References

1. Sample Registration System, 2012
2. Office of Registrar General of India , 2010-12
3. Census of India, 2011
4. Annual Health Survey, 2012-13
5. Rural Health Statistics, 2012
6. National Rural Health Mission Report, 2012
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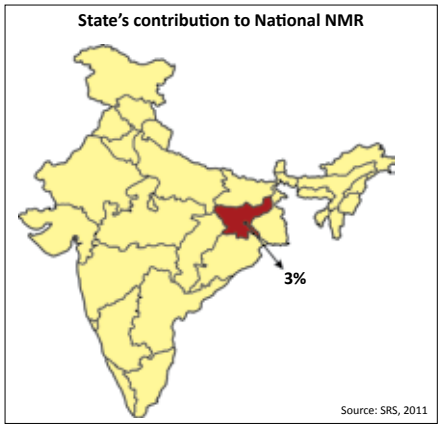
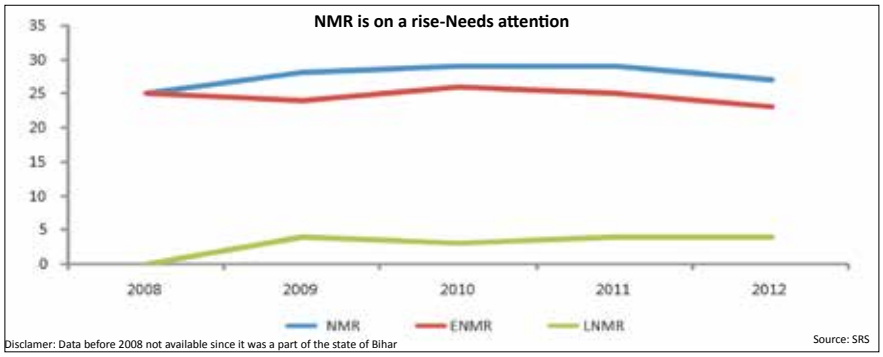
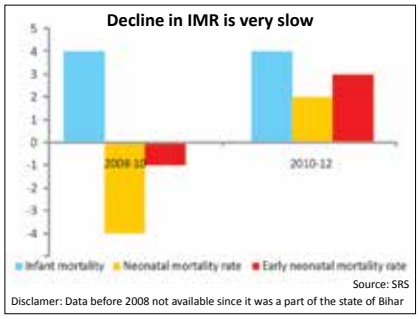
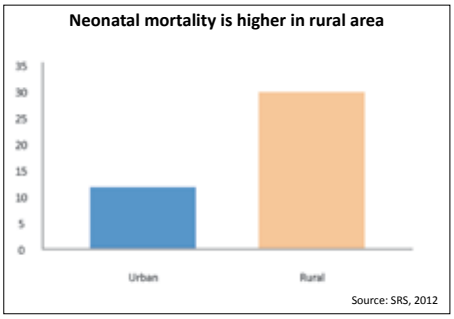
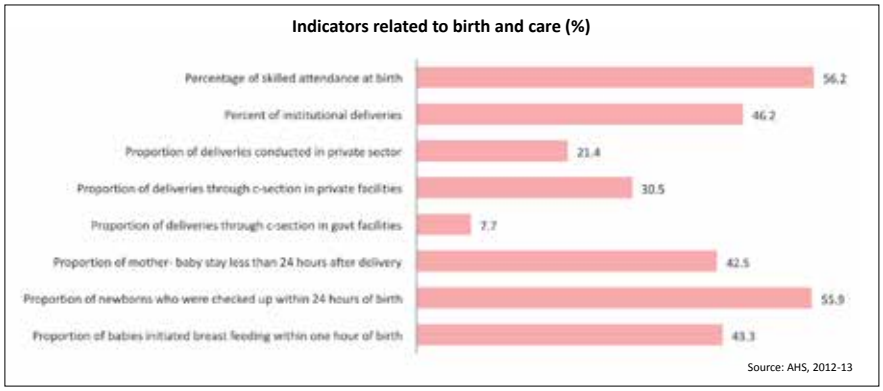
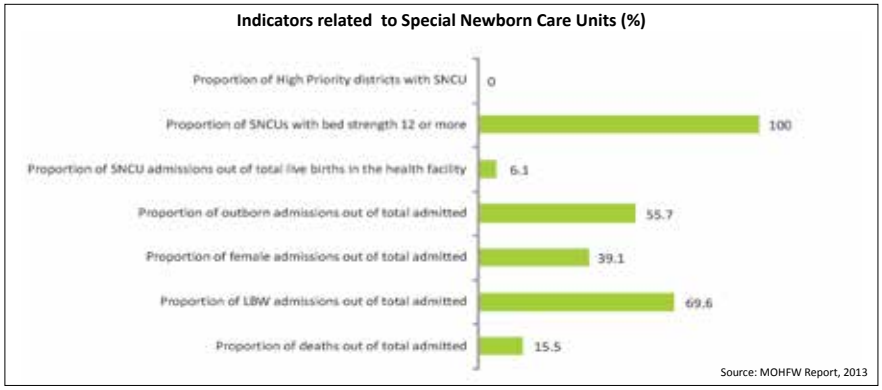


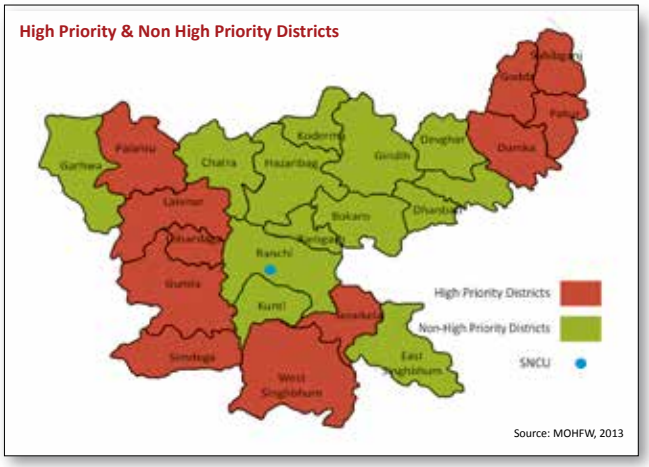


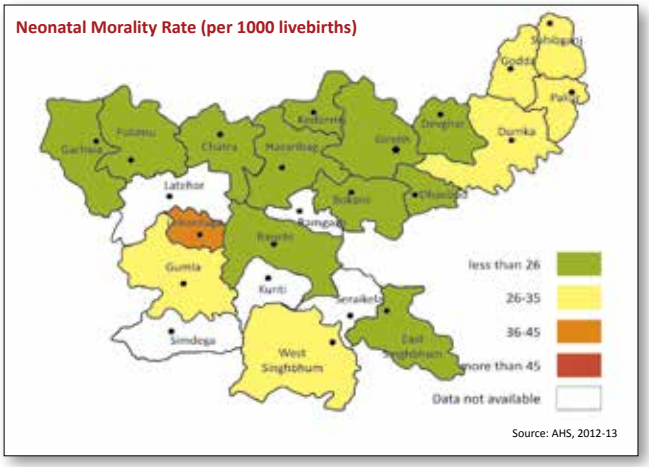


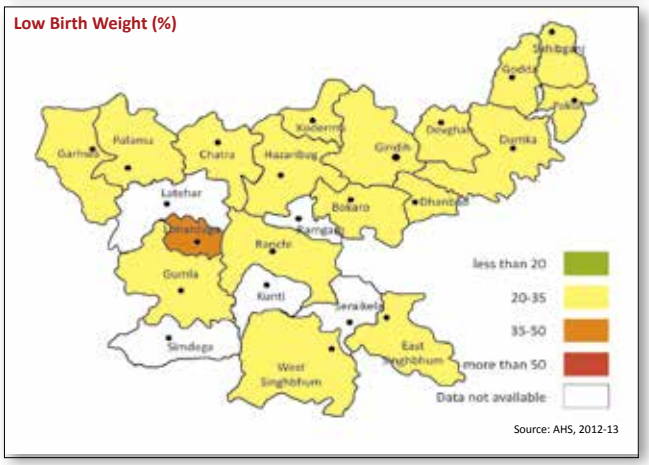


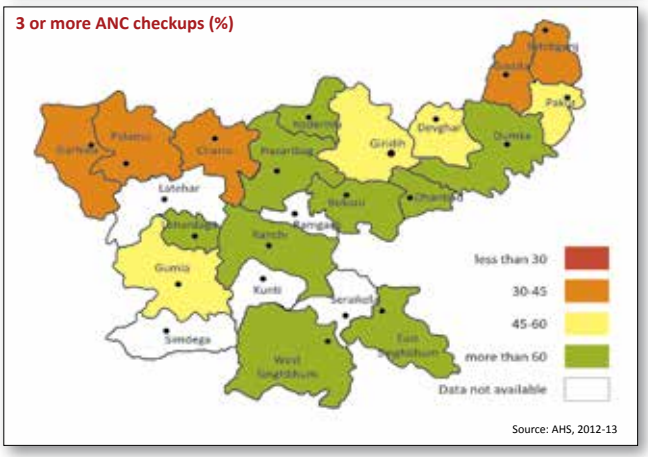


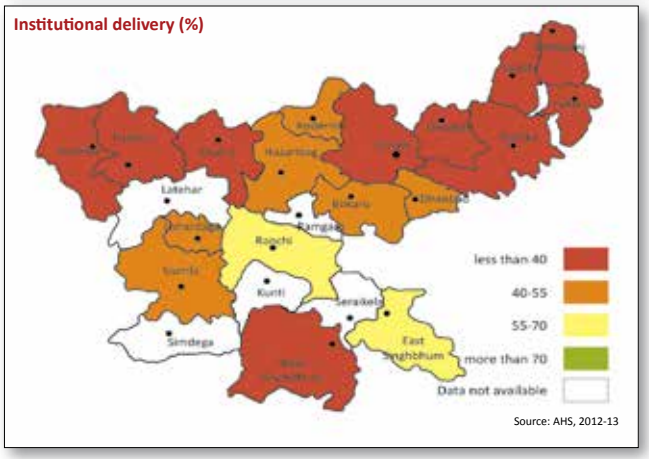


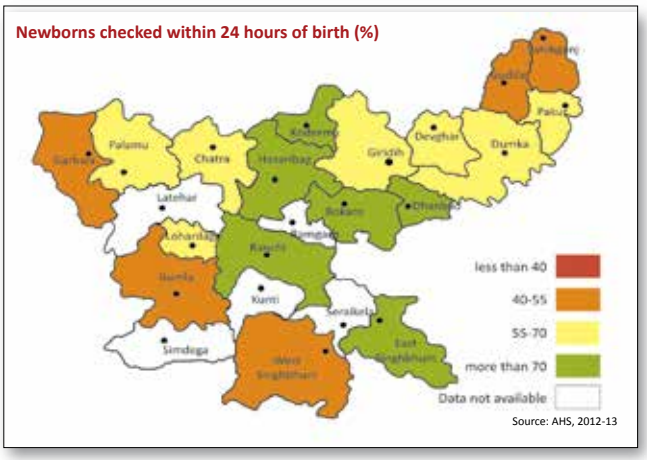


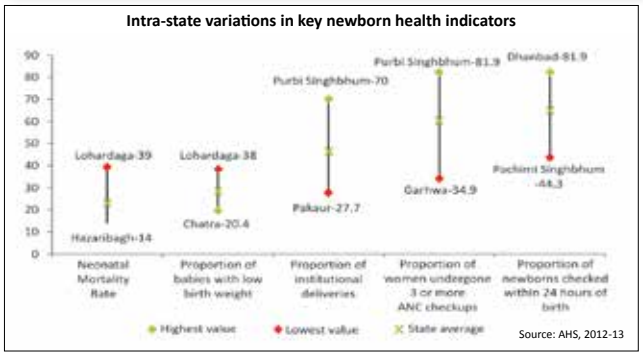












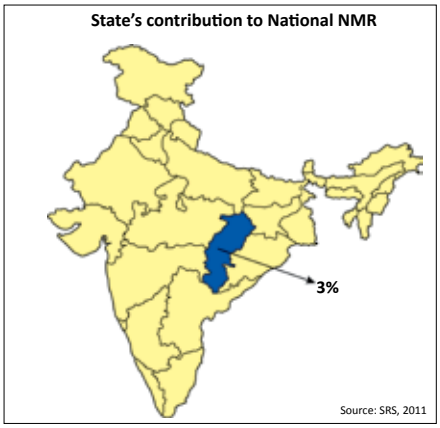
Districts with highest NMR (AHS, 2012-13)	
1. Lohardaga	39
2. Pashchimi Singhbhum	35
3. Gumla	34
4. Dumka	33
5. Sahibganj & Pakaur	30

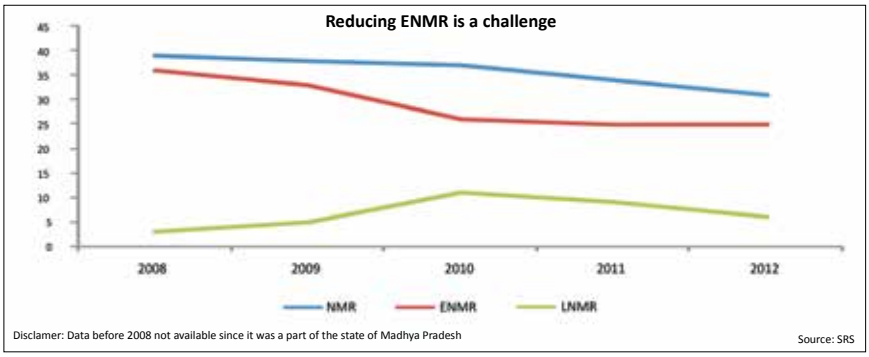
State Highlights

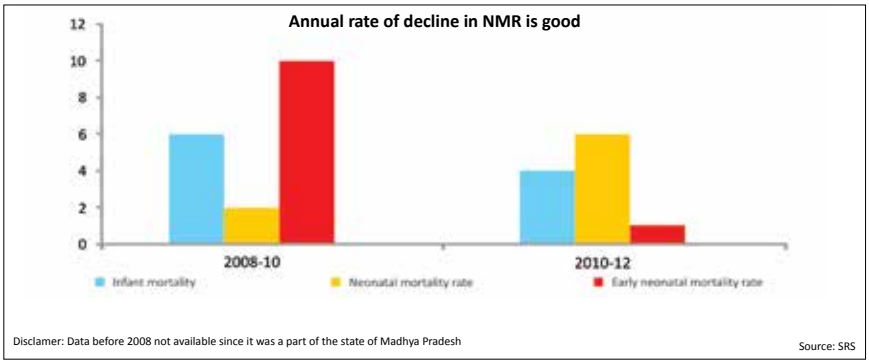
Strengths	Going forward
1. IMNCI is being implemented in every district	1. Improve the coverage of facility based newborn care
2. Progress of HBNC training is good	2. Improve the coverage of skilled birth attendance
3. VHSNC is constituted in almost every village	3. Address the concern of rising trends of NMR and ENMR in recent years

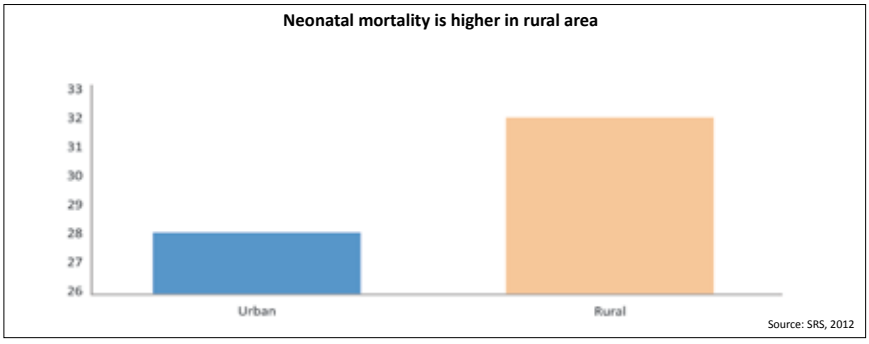
Chattisgarh

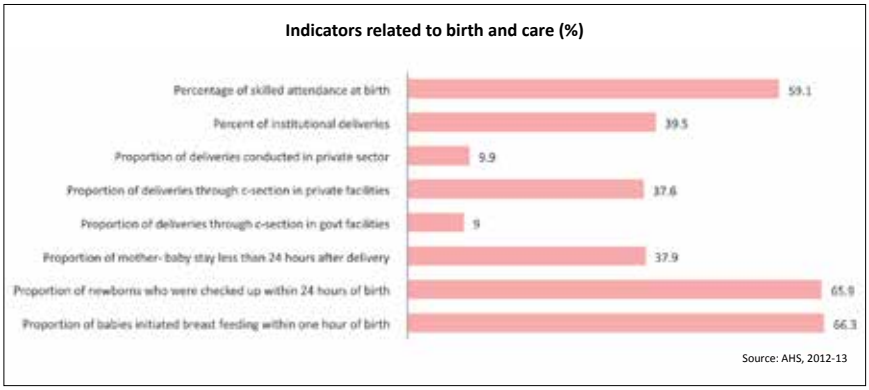
Neonatal health indicators		CHG	India
Neonatal Mortality Rate [1]		31	29
Early Neonatal Mortality Rate [1]		25	23
Late Neonatal Mortality Rate [1]		6	6
Health indicators			
Post Neonatal Mortality Rate [1]		16	13
Infant Mortality Rate [1]	Total	47	42
	Male	46	41
	Female	47	44
Under Five Mortality Rate [1]		55	52
Maternal Mortality Ratio [2]		230	178
Perinatal Mortality Rate [1]		36	28
Stillbirth Rate [1]		11	5
Total Fertility Rate [1]		2.7	2.4
Crude Birth Rate [1]		24.5	21.6
Crude Death Rate [1]		7.9	7
Sex Ratio [3]		991	940
Life Expectancy [3]	Male	NA	62.6
	Female	NA	64.2
Prevalence of Low Birth Weight [4]		13.2	
Health system indicators			
Average number of villages seen by an ANM [5]		4	4
Average rural population covered by an ANM [5]		3585	4013
Proportion of subcentres functioning without ANMs [5]		9.6	3.2
Number of PHCs functioning as per IPHS norms [5]		26	3635
Average number of VHSNCs constituted per village [6]		0.96	0.79
Average number of VHNDs held per village per year [7]		12.8	11.25
Number of facilities generating and using work plan of MCTS per village [6]		5606	55566
Programme implementation at a glance			
No. of districts implementing IMNCI [8]		18	505
HBNC training status[9]-Module 14 & 15(%)		91	
Module 16 (%)		91	
No. of SNCUs established [8]		3	418
No. of NBSUs established [8]		10	1554
No. of NBCCs established [8]		75	13167
Administrative structure			
Rural Population (in lakhs) [3]		196.04	8330.88
Number of districts [3]		18	640
Number of CHCs [5]		149	4833
Number of PHCs [5]		755	24049
Number of subcentres [5]		5111	148366
Number of Subdivisions/Talukas [3]		97	5564
Number of Blocks [6]		237	6437
Number of Villages [3]		20126	640867











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1. Sample Registration System, 2012
2. Office of Registrar General of India , 2010-12
3. Census of India, 2011
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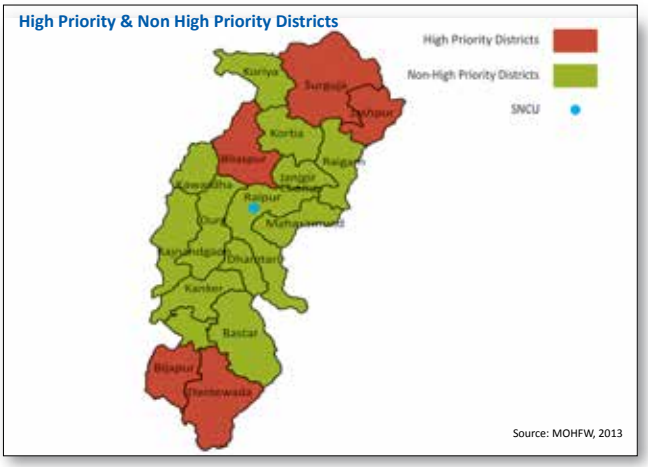
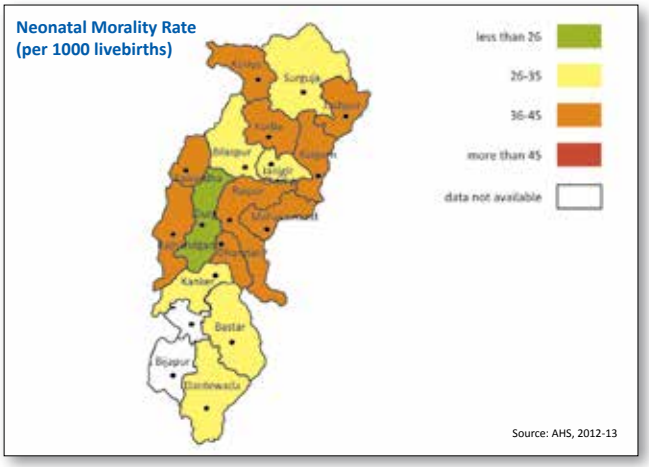
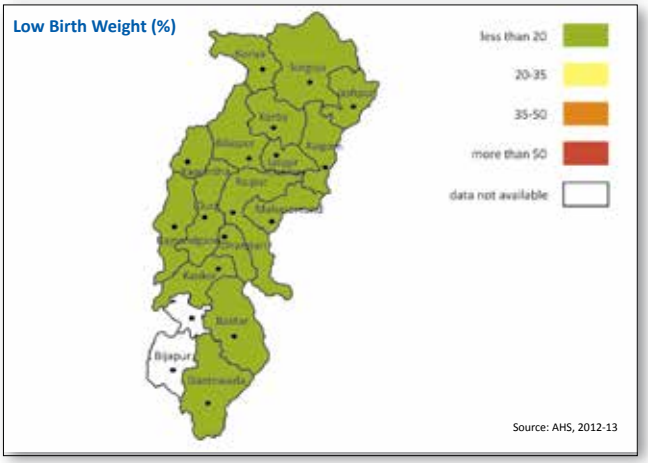
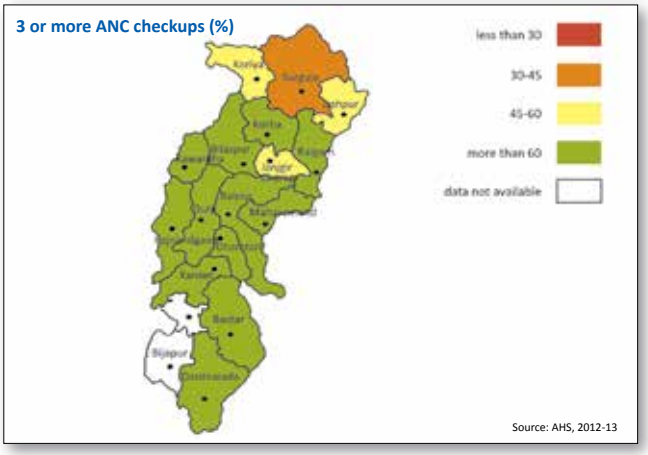
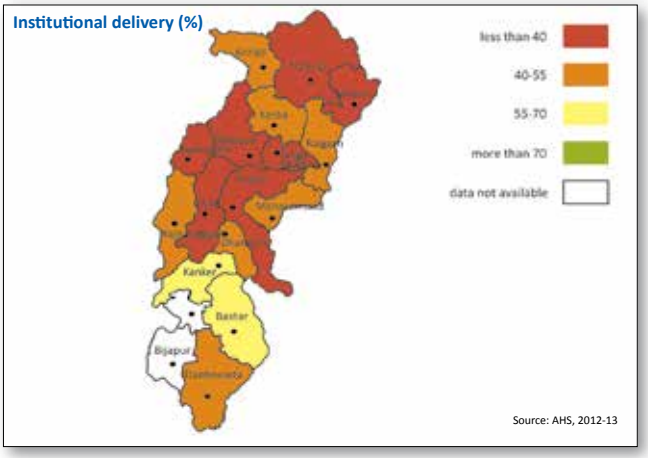
8. Child Health Programmes at a Glance, 2013
9. National Health System Resource Centre, 2013

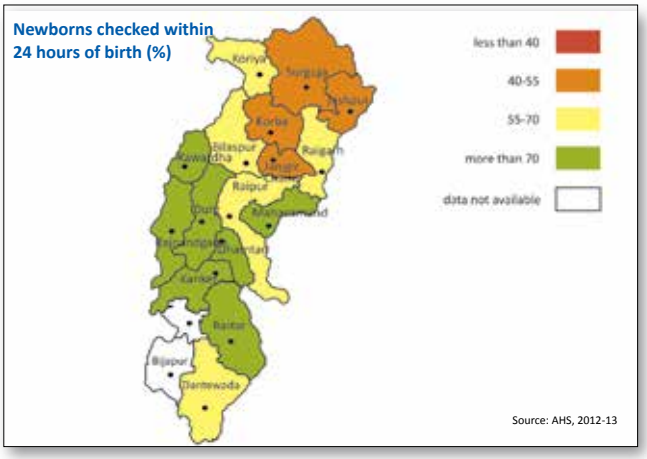


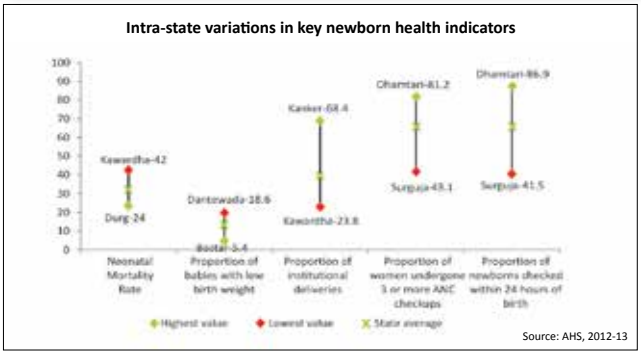












Districts with highest NMR (AHS, 2012-13)	
1. Kawardha	42
2. Raigarh	39
3. Korba, Mahasamund & Rajnandangaon	38
4. Dhamtari, Jashpur, Koria & Raipur	36
5. Janjgir Champa	32

State Highlights

Strengths	Going forward
1. IMNCI is being implemented in every district	1. Increase the rate of institutional delivery
2. Coverage of HBNC training is good	2. Address the paucity of data related to Special Newborn Care Units
3. Frequency of VHNDs held per year is more than the national average	3. Address the rise in LNMR, which is contributing to stagnant NMR

Uttar Pradesh

Neonatal health indicators

		UP	India
Neonatal Mortality Rate [1]		37	29
Early Neonatal Mortality Rate [1]		28	23
Late Neonatal Mortality Rate [1]		9	6

Health indicators

Post Neonatal Mortality Rate [1]		16	13
Infant Mortality Rate [1]	Total	53	42
	Male	52	41
	Female	55	44
Under Five Mortality Rate [1]		68	52
Maternal Mortality Ratio [2]		292	178
Perinatal Mortality Rate [1]		31	28
Stillbirth Rate [1]		3	5
Total Fertility Rate [1]		3.3	2.4
Crude Birth Rate [1]		27.4	21.6
Crude Death Rate [1]		7.7	7
Sex Ratio [3]		908	940
Life Expectancy [3]	Male	60.3	62.6
	Female	59.5	64.2
Prevalence of Low Birth Weight [4]		24.8	

Health system indicators

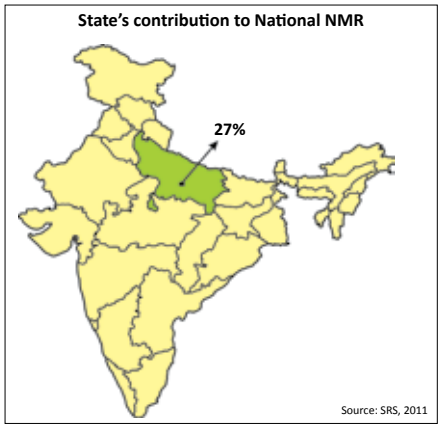
Average number of villages seen by an ANM [5]	5	4
Average rural population covered by an ANM [5]	NA	4013
Proportion of subcentres functioning without ANMs [5]	5.6	3.2
Number of PHCs functioning as per IPHS norms [5]	NA	3635
Average number of VHSNCs constituted per village [6]	0.5	0.79
Average number of VHNDs held per village per year [7]	7.8	11.25
Number of facilities generating and using work plan of MCTS per village [6]	0	55566

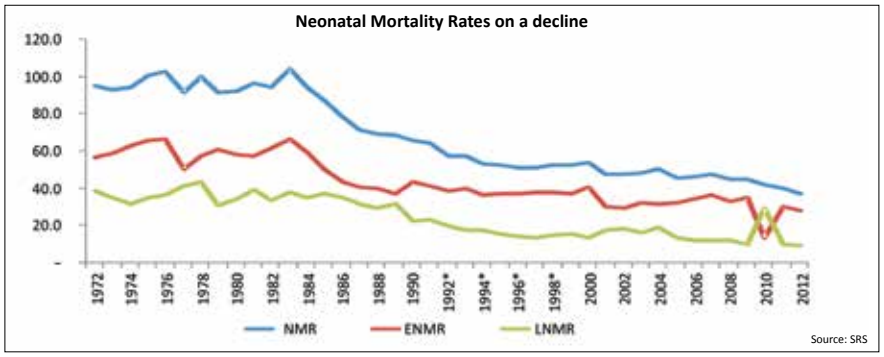
Programme implementation at a glance

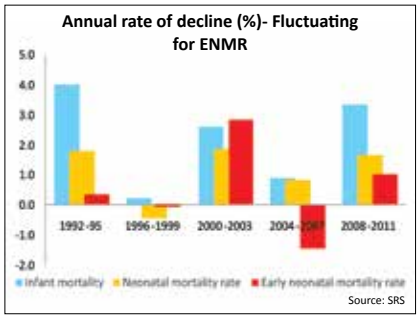
No. of districts implementing IMNCI [8]	71	505
HBNC training status [9] - Round 1 (%)	5	
No. of SNCUs established [8]	15	418
No. of NBSUs established [8]	92	1554
No. of NBCCs established [8]	1430	13167

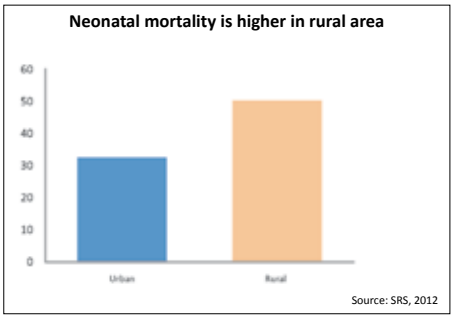
Administrative structure

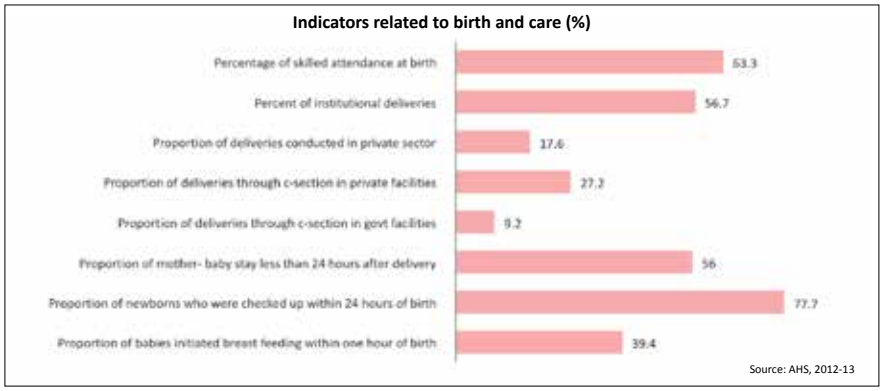
Rural Population (in lakhs) [3]	1551.11	8330.88
Number of districts [3]	71	640
Number of CHCs [5]	515	4833
Number of PHCs [5]	3692	24049
Number of subcentres [5]	20521	148366
Number of Subdivisions/Talukas [3]	300	5564
Number of Blocks [6]	820	6437
Number of Villages [3]	106704	640867

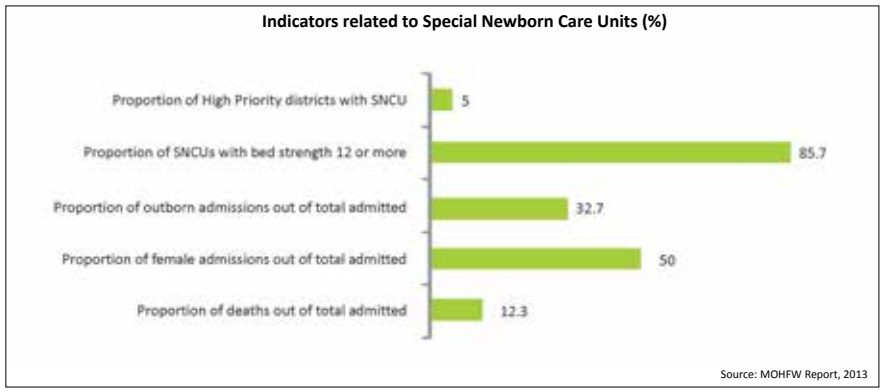












References

1. Sample Registration System, 2012
2. Office of Registrar General of India , 2010-12
3. Census of India, 2011
4. Annual Health Survey, 2012-13
5. Rural Health Statistics, 2012
6. National Rural Health Mission Report, 2012
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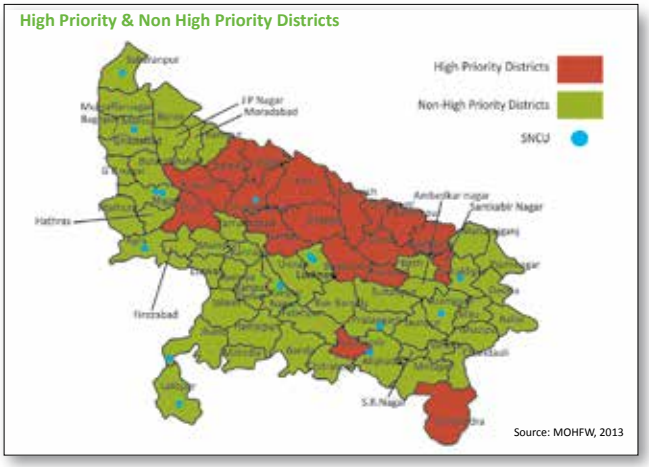
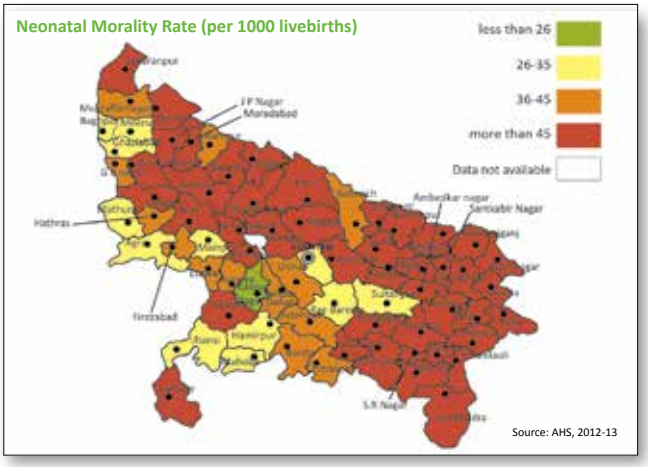
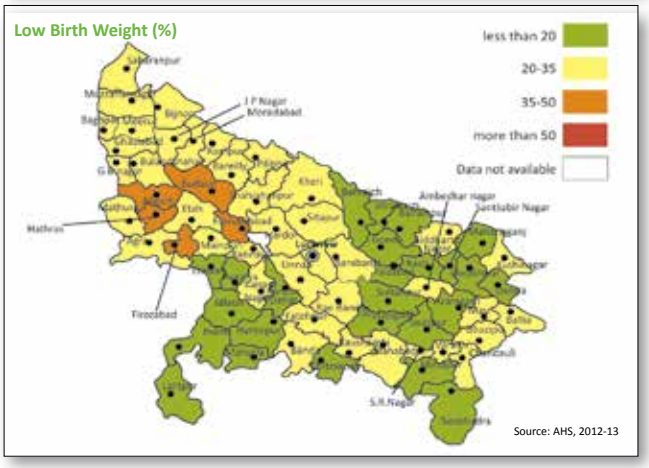
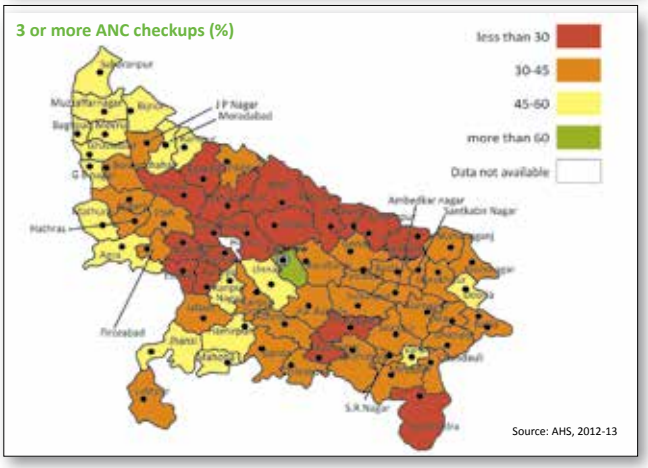
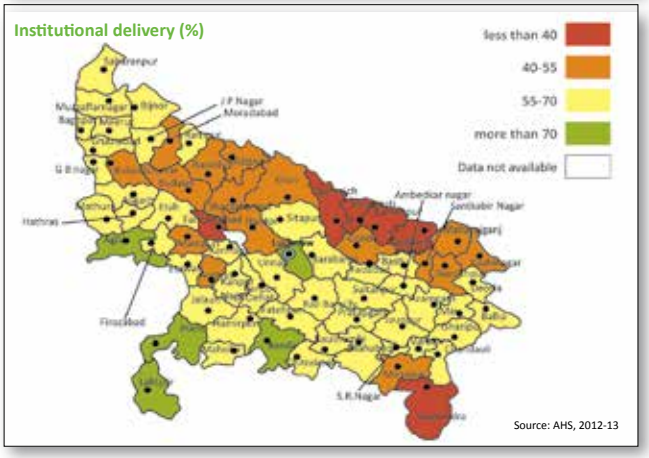
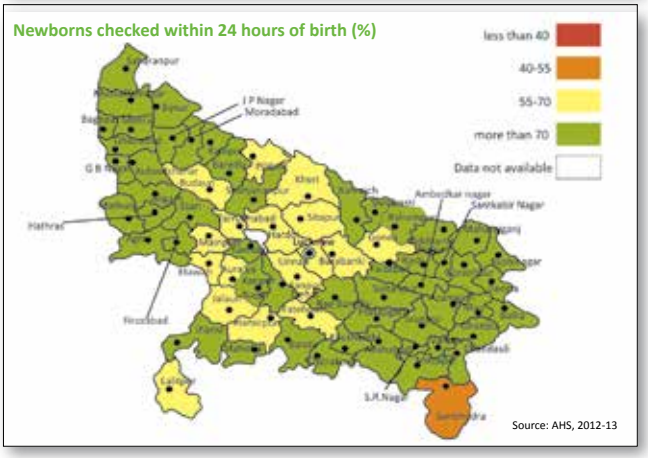


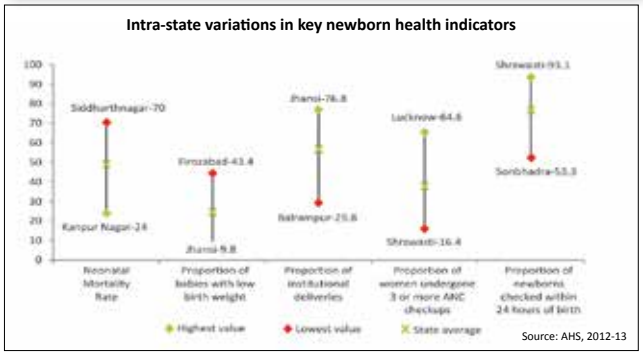












Districts with highest NMR (AHS, 2012-13)	
1. Siddharthnagar	70
2. Shrawasti	68
3. Faizabad & Budaun	65
4. Pratapgarh & Ghazipur	64
5. Maharajganj, Kushinagar & Kaushambi	61

State Highlights

Strengths	Going forward
1. Good coverage of NBCCs	1. Increase coverage of 3 or more ANC checkup across all the districts
2. All subcentres have 2 ANMs	2. Initiate the use of MCTS work plan
3. Majority of babies contacted within 24 hours of birth	3. Achieve equitable coverage of health care services across districts

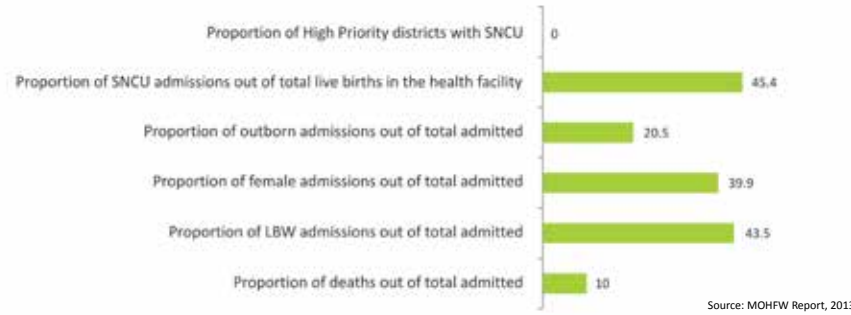
Uttarakhand

Neonatal health indicators		UK	India
Neonatal Mortality Rate [1]		NA	29
Early Neonatal Mortality Rate [1]		NA	23
Late Neonatal Mortality Rate [1]		NA	6
Health indicators			
Post Neonatal Mortality Rate [1]		NA	13
Infant Mortality Rate [1]	Total	34	42
	Male	33	41
	Female	35	44
Under Five Mortality Rate [1]		NA	52
Maternal Mortality Ratio [2]		292	178
Perinatal Mortality Rate [1]		NA	28
Stillbirth Rate [1]		NA	5
Total Fertility Rate [1]		NA	2.4
Crude Birth Rate [1]		18.9	21.6
Crude Death Rate [1]		6.2	7
Sex Ratio [3]		963	940
Life Expectancy [3]	Male	NA	62.6
	Female	NA	64.2
Prevalence of Low Birth Weight [4]		24.6	
Health system indicators			
Average number of villages seen by an ANM [5]		8	4
Average rural population covered by an ANM [5]		3485	4013
Proportion of subcentres functioning without ANMs [5]		4.7	3.2
Number of PHCs functioning as per IPHS norms [5]		66	3635
Average number of VHSNCs constituted per village [6]		0.92	0.79
Average number of VHNDs held per village per year [7]		3.8	11.25
Number of facilities generating and using work plan of MCTS per village [6]		95	55566
Programme implementation at a glance			
No. of districts implementing IMNCI [8]		6	505
HBNC training status[9]		NA	
No. of SNCUs established [8]		2	418
No. of NBSUs established [8]		6	1554
No. of NBCCs established [8]		75	13167
Administrative structure			
Rural Population (in lakhs) [3]		70.26	8330.88
Number of districts [3]		13	640
Number of CHCs [5]		59	4833
Number of PHCs [5]		257	24049
Number of subcentres [5]		1848	148366
Number of Subdivisions/Talukas [3]		49	5564
Number of Blocks [6]		95	6437
Number of Villages [3]		16793	640867

Indicators related to birth and early newborn care (%)

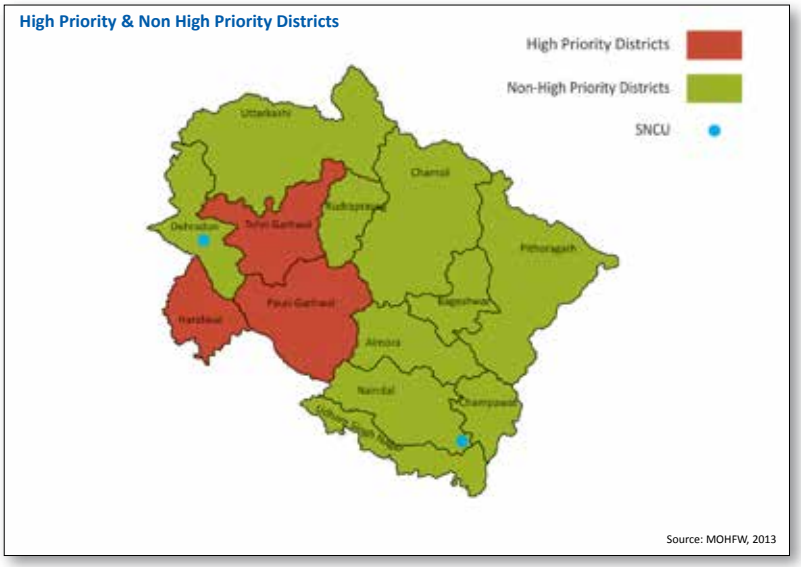
Source: AHS, 2012-13

Indicators related to Special Newborn Care Units (%)



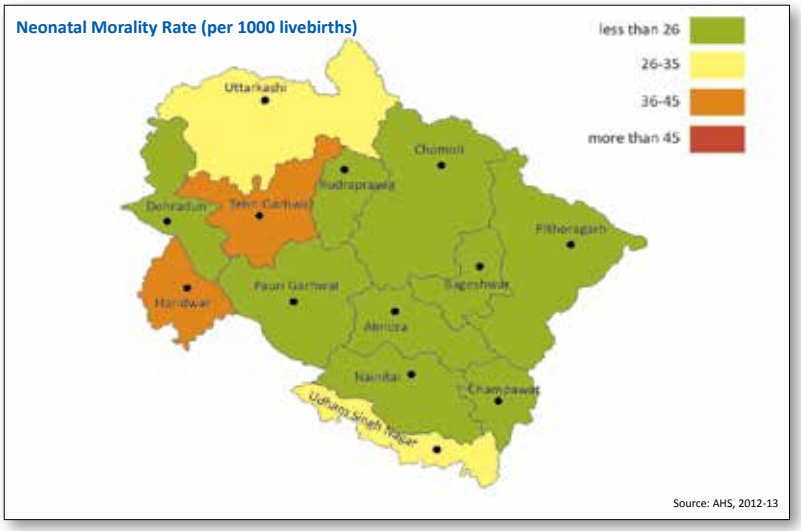
Source: MOHFW Report, 2013

High Priority & Non High Priority Districts



Source: MOHFW, 2013

Neonatal Morality Rate (per 1000 livebirths)



Source: AHS, 2012-13

References

1. Sample Registration System, 2012
2. Office of Registrar General of India , 2010-12
3. Census of India, 2011
4. Annual Health Survey, 2012-13
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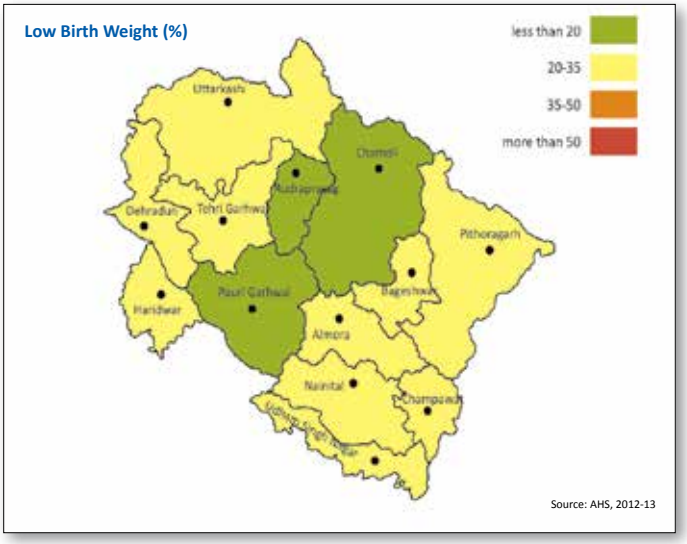
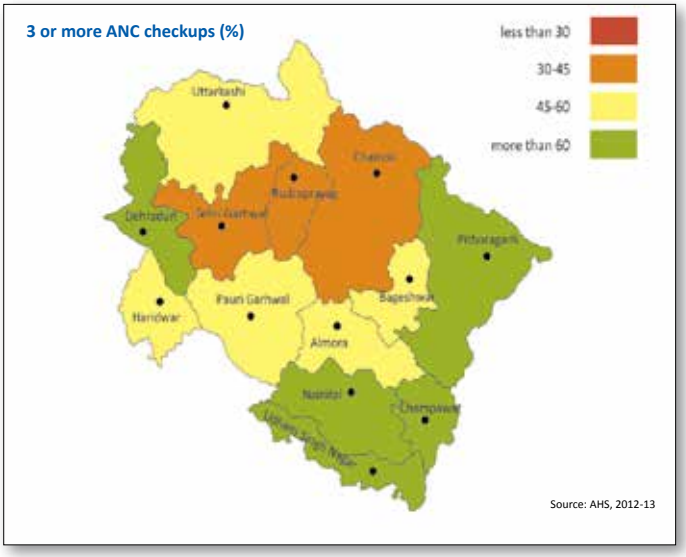
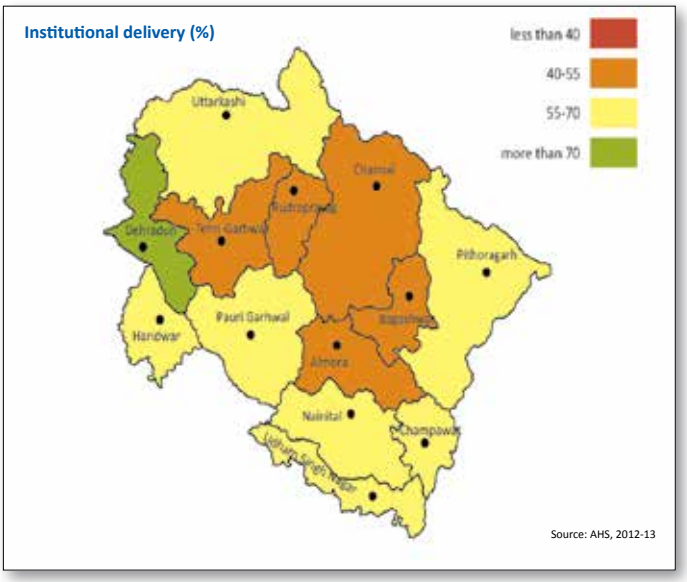
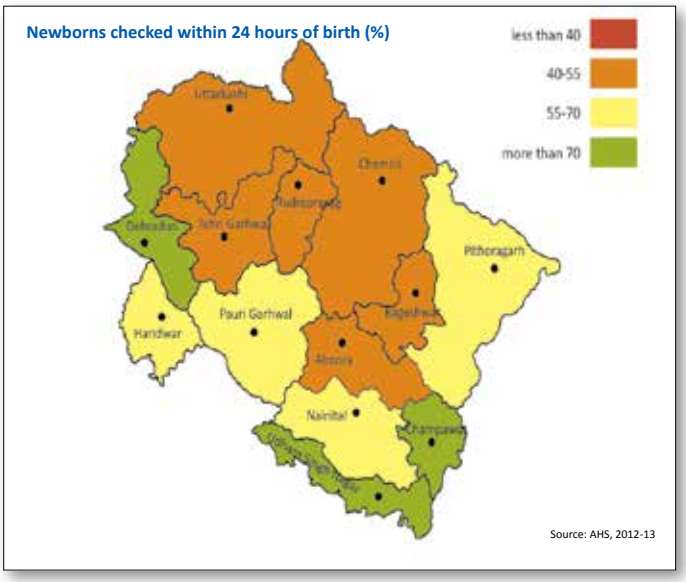
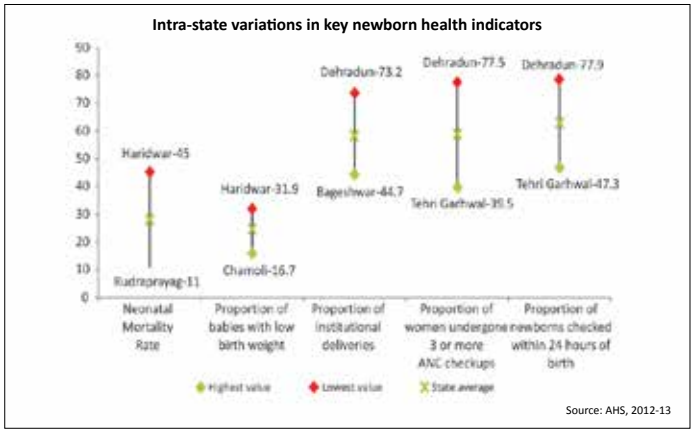










Districts with highest NMR (AHS, 2012-13)	
1. Haridwar	45
2. Tehri Garhwal	38

State Highlights

Strengths	Going forward
1. Most of the districts have NMR below the national average	1. Establish the SNCUs in high focus districts
2. Almost every village has the VHSNC constituted	2. Efforts needed to increase the number of PHCs functioning as per IPHS norms
3. Majority of the newborns were checked within 24 hours of birth	3. Improve the coverage of institutional delivery

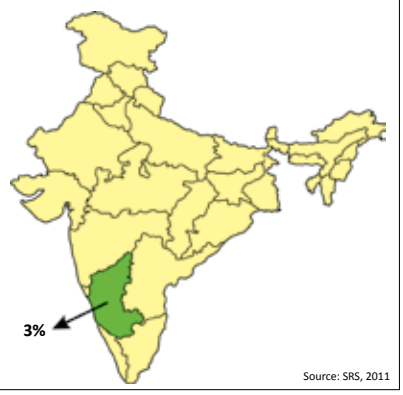
Karnataka

Neonatal health indicators		KN	India
Neonatal Mortality Rate [1]		23	29
Early Neonatal Mortality Rate [1]		20	23
Late Neonatal Mortality Rate [1]		3	6
Health indicators			
Post Neonatal Mortality Rate [1]		9	13
Infant Mortality Rate [1]	Total	32	42
	Male	30	41
	Female	34	44
Under Five Mortality Rate [1]		37	52
Maternal Mortality Ratio [2]		144	178
Perinatal Mortality Rate [1]		33	28
Stillbirth Rate [1]		14	5
Total Fertility Rate [1]		1.9	2.4
Crude Birth Rate [1]		18.5	21.6
Crude Death Rate [1]		7.1	7
Sex Ratio [3]		968	940
Life Expectancy [3]	Male	63.6	62.6
	Female	67.1	64.2
Health system indicators			
Average number of villages seen by an ANM [4]		3	4
Average rural population covered by an ANM [4]		3284	4013
Proportion of subcentres functioning without ANMs [4]		0	3.2
Number of PHCs functioning as per IPHS norms [4]		0	3635
Average number of VHSNCs constituted per village [5]		0.9	0.79
Average number of VHNDs held per village per year [6]		2.9	11.25
Number of facilities generating and using work plan of MCTS [5]		0	55566
Programme implementation at a glance			
No. of districts implementing IMNCI [7]		29	505
HBNC training status [8] - Round 1 (%)		91	
Round 2 (%)		91	
Round 3 (%)		71	
Round 4 (%)		71	
No. of SNCUs established [7]		33	418
No. of NBSUs established [7]		178	1554
No. of NBCCs established [7]		1390	13167
Administrative structure			
Rural Population (in lakhs) [3]		375.53	8330.88
Number of districts [3]		30	640
Number of CHCs [4]		180	4833
Number of PHCs [4]		2310	24049
Number of subcentres [4]		8871	148366
Number of Subdivisions/Talukas [3]		175	5564
Number of Blocks [5]		176	6437
Number of Villages [3]		29340	640867

References

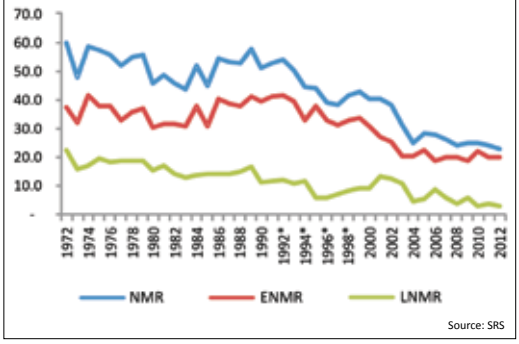
1. Sample Registration System, 2012
2. Office of Registrar General of India, 2010-12
3. Census of India, 2011
4. Rural Health Statistics, 2012
5. National Rural Health Mission Report, 2012
6. National Rural Health Mission Report, 2011-12
7. Child Health Programmes at a Glance, 2013
8. National Health System Resource Centre, 2013

State's contribution to National NMR



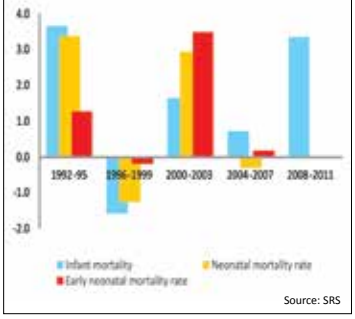
Source: SRS, 2011

Neonatal Mortality Rate on a decline



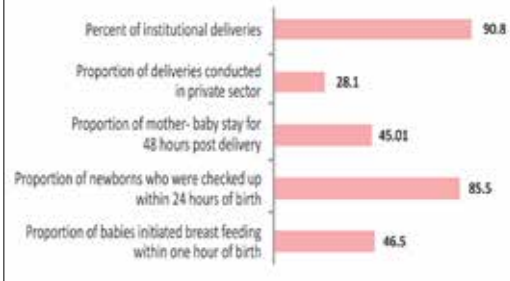
Source: SRS

Annual rate of decline (%)- Negligible for NMR and ENMR



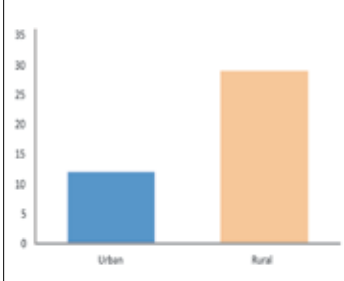
Source: SRS

Indicators related to birth and early newborn care (%)



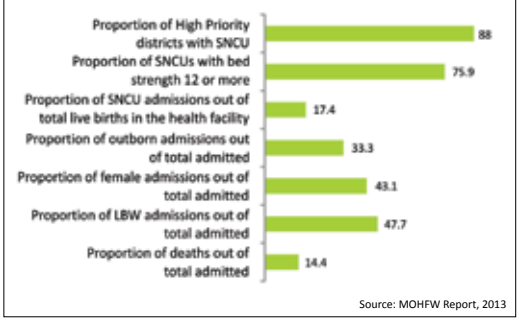
Source: SRS 2012, NRHM 2012, CES 2009 and DLHS-3 2007-08

Neonatal mortality is higher in rural area



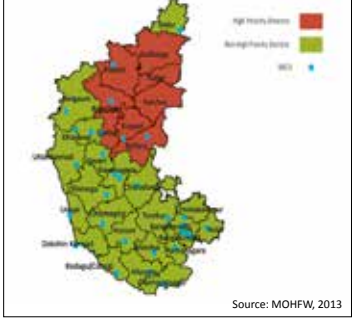
Source: SRS, 2012

Indicators related to Special Newborn Care Units (%)



Source: MOHFW Report, 2013

High Priority & Non High Priority Districts



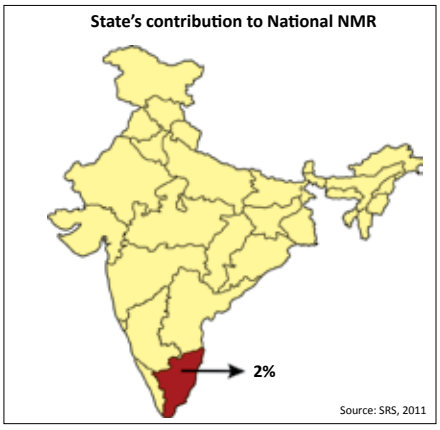
Source: MOHFW, 2013

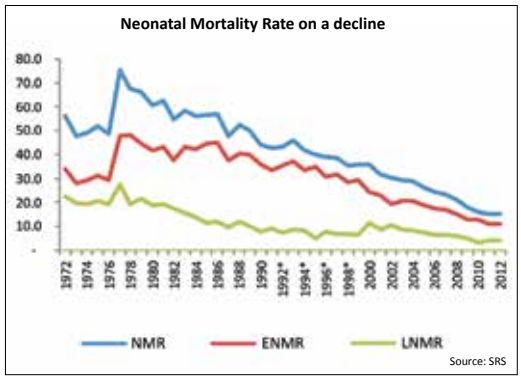
State Highlights

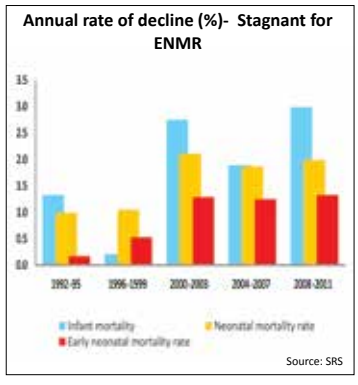
Strengths	Going forward
1. Good coverage with facility based newborn care	1. Accelerate efforts to reduce ENMR
2. Every subcentre has at least one ANM	2. Efforts are needed to make PHCs functional as per IPHS norms
3. Coverage with skilled attendance at birth is good	3. Improve the utilization of VHNDs in the community

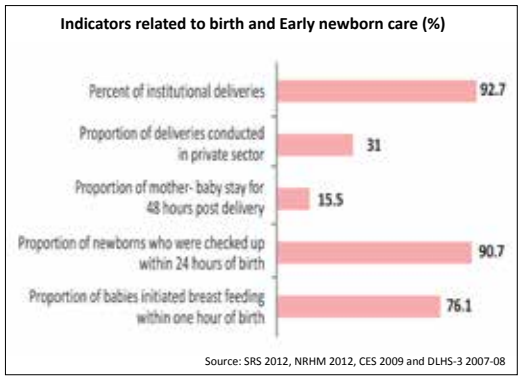
Tamil Nadu

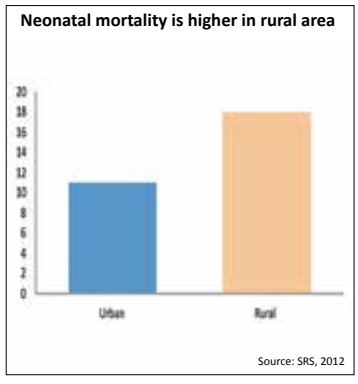
Neonatal health indicators		TN	India
Neonatal Mortality Rate [1]		15	29
Early Neonatal Mortality Rate [1]		11	23
Late Neonatal Mortality Rate [1]		4	6
Health indicators			
Post Neonatal Mortality Rate [1]		6	13
Infant Mortality Rate [1]	Total	21	42
	Male	21	41
	Female	22	44
Under Five Mortality Rate [1]		24	52
Maternal Mortality Ratio [2]		90	178
Perinatal Mortality Rate [1]		19	28
Stillbirth Rate [1]		8	5
Total Fertility Rate [1]		1.7	2.4
Crude Birth Rate [1]		15.7	21.6
Crude Death Rate [1]		7.4	7
Sex Ratio [3]		995	940
Life Expectancy [3]	Male	65	62.6
	Female	67.4	64.2
Health system indicators			
Average number of villages seen by an ANM [4]		2	4
Average rural population covered by an ANM [4]		4019	4013
Proportion of subcentres functioning without ANMs [4]		0	3.2
Number of PHCs functioning as per IPHS norms [4]		1154	3635
Average number of VHSNCs constituted per village [5]		0.9	0.79
Average number of VHNDs held per village per year [6]		11.7	11.25
Number of facilities generating and using work plan of MCTS [5]		10320	55566
Programme implementation at a glance			
No. of districts implementing IMNCI [7]		22	505
HBNC training status [8] - Round 1 (%)		30	
Round 2 (%)		19	
Round 3 (%)		3	
No. of SNCUs established [7]		47	418
No. of NBSUs established [7]		114	1554
No. of NBCCs established [7]		1530	13167
Administrative structure			
Rural Population (in lakhs) [3]		371.89	8330.88
Number of districts [3]		32	640
Number of CHCs [4]		385	4833
Number of PHCs [4]		1227	24049
Number of subcentres [4]		8706	148366
Number of Subdivisions/Talukas [3]		201	5564
Number of Blocks [5]		385	6437
Number of Villages [3]		15979	640867

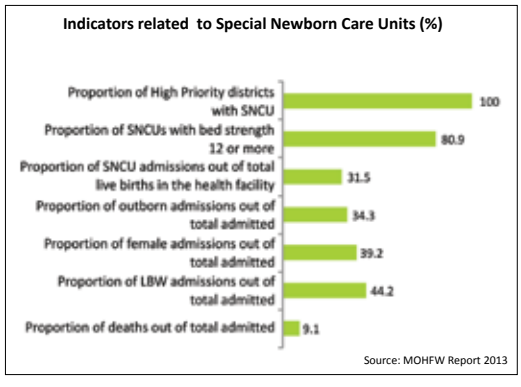


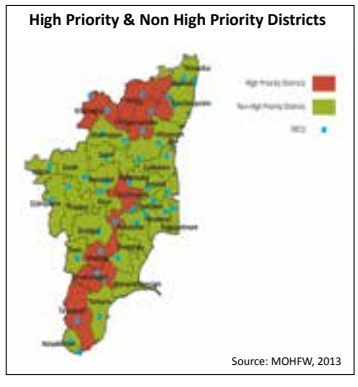












State Highlights

Strengths	Going forward
1. NMR is well below the national average	1. Address the rural-urban differential in NMR
2. Good coverage of facility based care	2. Increase the mother-baby stay for 48 hours post delivery
3. Majority of the facilities are using MCTS work plan	

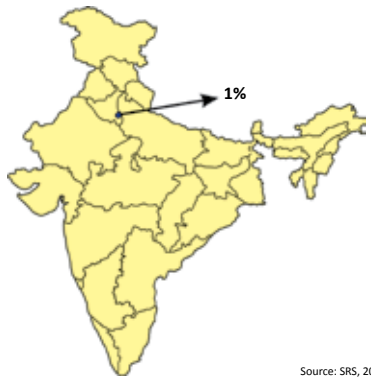
References

1. Sample Registration System, 2012
2. Office of Registrar General of India, 2010-12
3. Census of India, 2011
4. Rural Health Statistics, 2012
5. National Rural Health Mission Report, 2012
6. National Rural Health Mission Report, 2011-12
7. Child Health Programmes at a Glance, 2013
8. National Health System Resource Centre, 2013

Delhi

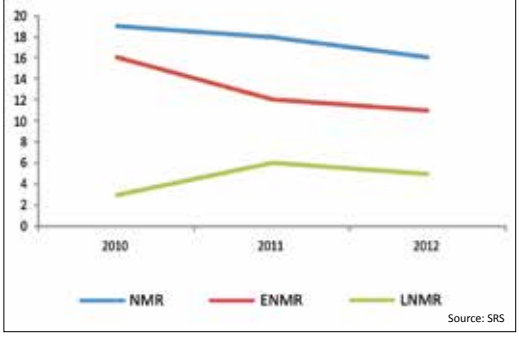
Neonatal health indicators		Delhi	India
Neonatal Mortality Rate [1]		16	29
Early Neonatal Mortality Rate [1]		11	23
Late Neonatal Mortality Rate [1]		5	6
Health indicators			
Post Neonatal Mortality Rate [1]		9	13
Infant Mortality Rate [1]	Total	25	42
	Male	24	41
	Female	26	44
Under Five Mortality Rate [1]		28	52
Maternal Mortality Ratio [2]		NA	178
Perinatal Mortality Rate [1]		16	28
Stillbirth Rate [1]		6	5
Total Fertility Rate [1]		1.8	2.4
Crude Birth Rate [1]		17.5	21.6
Crude Death Rate [1]		4.2	7
Sex Ratio [3]		866	940
Life Expectancy [3]	Male	NA	62.6
	Female	NA	64.2
Health system indicators			
Average number of villages seen by an ANM [4]		3	4
Average rural population covered by an ANM [4]		10227	4013
Proportion of subcentres functioning without ANMs [4]		4.9	3.2
Number of PHCs functioning as per IPHS norms [4]		1	3635
Average number of VHSNCs constituted per village [5]		2.9	0.79
Average number of VHNDs held per village per year [6]		31	11.25
Number of facilities generating and using work plan of MCTS [5]		429	55566
Programme implementation at a glance			
No. of districts implementing IMNCI [7]		9	505
HBNC training status [8] - Round 1 (%)		37	
Round 2 (%)		7	
No. of SNCUs established [7]		14	418
No. of NBSUs established [7]		8	1554
No. of NBCCs established [7]		66	13167
Administrative structure			
Rural Population (in lakhs) [3]		4.19	8330.88
Number of districts [3]		9	640
Number of CHCs [4]		0	4833
Number of PHCs [4]		5	24049
Number of subcentres [4]		41	148366
Number of Subdivisions/Talukas [3]		27	5564
Number of Blocks [5]		14	6437
Number of Villages [3]		112	640867

State's contribution to National NMR



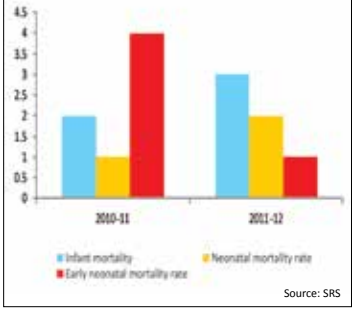
Source: SRS, 2011

Neonatal Mortality Rate on a decline



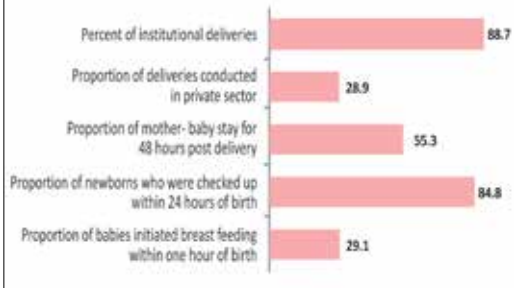
Source: SRS

Annual rate of decline (%) Slow for ENMR



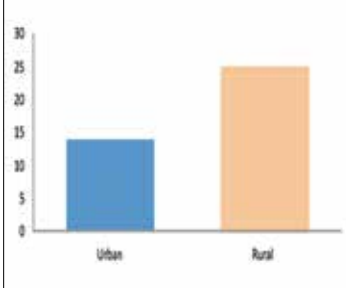
Source: SRS

Indicators related to birth and early newborn care (%)



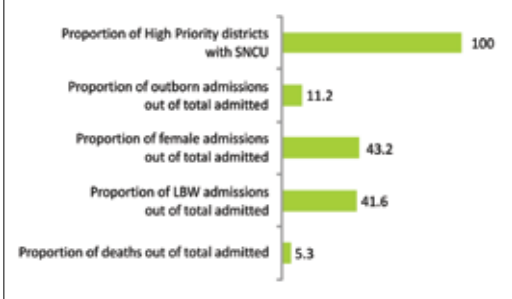
Source: SRS 2012, NRHM 2012, CES 2009 and DLHS-3 2007-08

Neonatal mortality is higher in rural area



Source: SRS, 2012

Indicators related to Special Newborn Care Units (%)



Source: MOHFW Report, 2013

High Priority & Non High Priority Districts

Source: MOHFW, 2013

References

1. Sample Registration System, 2012
2. Office of Registrar General of India, 2010-12
3. Census of India, 2011
4. Rural Health Statistics, 2012
5. National Rural Health Mission Report, 2012
6. National Rural Health Mission Report, 2011-12
7. Child Health Programmes at a Glance, 2013
8. National Health System Resource Centre, 2013

State Highlights

Strengths	Going forward
1. Good coverage of facility based care	1. Efforts are needed to make PHCs functional as per IPHS norms
2. Institutional delivery rate is good	2. Increase the mother-baby stay for 48 hours post delivery

Punjab

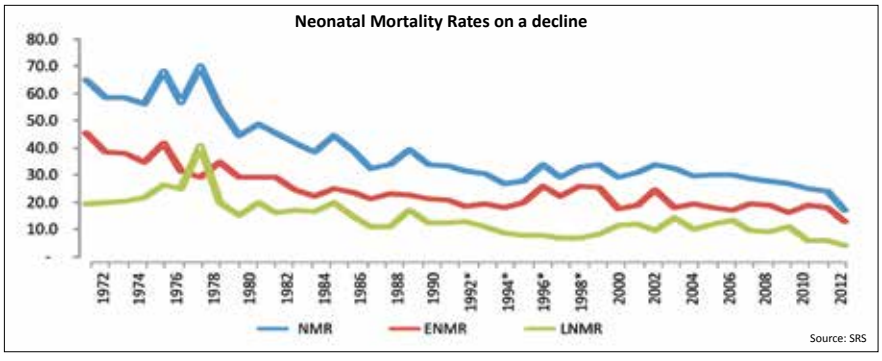
Neonatal health indicators	Punjab	India
Neonatal Mortality Rate [1]	17	29
Early Neonatal Mortality Rate [1]	13	23
Late Neonatal Mortality Rate [1]	4	6

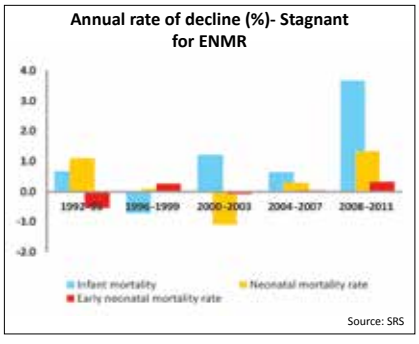
Health indicators			
Post Neonatal Mortality Rate [1]		11	13
Infant Mortality Rate [1]	Total	28	42
	Male	27	41
	Female	29	44
Under Five Mortality Rate [1]		34	52
Maternal Mortality Ratio [2]		155	178
Perinatal Mortality Rate [1]		20	28
Stillbirth Rate [1]		7	5
Total Fertility Rate [1]		1.7	2.4
Crude Birth Rate [1]		15.9	21.6
Crude Death Rate [1]		6.8	7
Sex Ratio [3]		893	940
Life Expectancy [3]	Male	68.4	62.6
	Female	70.4	64.2

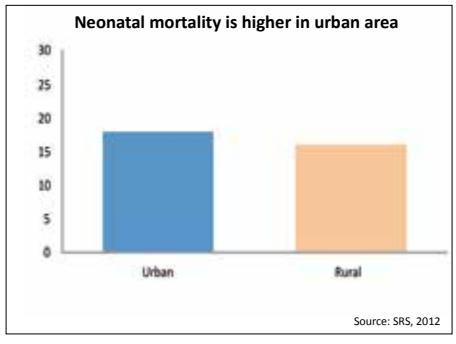
Health system indicators		
Average number of villages seen by an ANM [4]	3	4
Average rural population covered by an ANM [4]	4124	4013
Proportion of subcentres functioning without ANMs [4]	2.1	3.2
Number of PHCs functioning as per IPHS norms [4]	0	3635
Average number of VHSNCs constituted per village [5]	1.04	0.79
Average number of VHNDs held per village per year [6]	14	11.25
Number of facilities generating and using work plan of MCTS [5]	169	55566

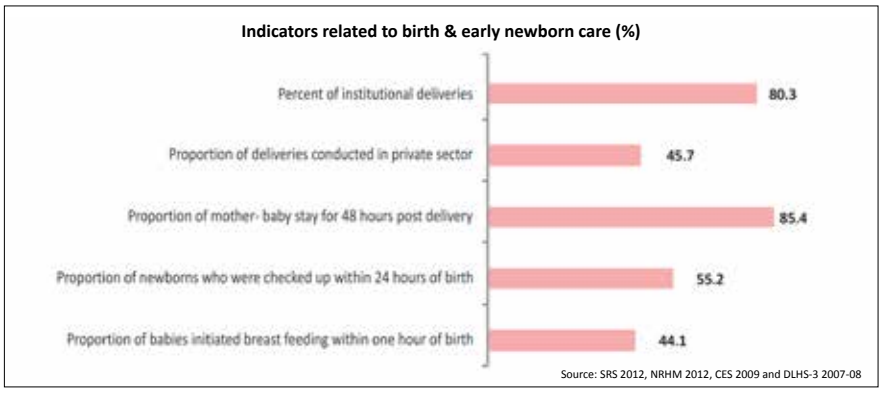
Programme implementation at a glance		
No. of districts implementing IMNCI [7]	12	505
HBNC training status [8] - Round 1 (%)	100	
Round 2 (%)	100	
No. of SNCUs established [7]	2	418
No. of NBSUs established [7]	0	1554
No. of NBCCs established [7]	172	13167

Administrative structure		
Rural Population (in lakhs) [3]	173.17	8330.88
Number of districts [3]	20	640
Number of CHCs [4]	132	4833
Number of PHCs [4]	449	24049
Number of subcentres [4]	2951	148366
Number of Subdivisions/Talukas [3]	77	5564
Number of Blocks [5]	141	6437
Number of Villages [3]	12581	640867









State Highlights

Strengths	Going forward
1. Marked improvement in skilled atttendance at birth	1. Address the stagnant ENMR
2. Frequency of VHNDs held per year is more than the national average	2. Efforts are needed to make PHCs functional as per IPHS norms
3. Proportion of mother-baby stay post delivery for 48 hours is good	3. Improve the coverage with SNCUs and NBSUs

References

1. Sample Registration System, 2012
2. Office of Registrar General of India, 2010-12
3. Census of India, 2011
4. Rural Health Statistics, 2012
5. National Rural Health Mission Report, 2012
6. National Rural Health Mission Report, 2011-12
7. Child Health Programmes at a Glance, 2013
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Gujarat

Neonatal health indicators		Gujarat	India
Neonatal Mortality Rate [1]		28	29
Early Neonatal Mortality Rate [1]		21	23
Late Neonatal Mortality Rate [1]		7	6

Health indicators			
Post Neonatal Mortality Rate [1]		10	13
Infant Mortality Rate [1]	Total	38	42
	Male	36	41
	Female	39	44
Under Five Mortality Rate [1]		48	52
Maternal Mortality Ratio [2]		122	178
Perinatal Mortality Rate [1]		28	28
Stillbirth Rate [1]		7	5
Total Fertility Rate [1]		2.3	2.4
Crude Birth Rate [1]		21.1	21.6
Crude Death Rate [1]		6.6	7
Sex Ratio [3]		918	940
Life Expectancy [3]	Male	69.2	62.6
	Female	72.5	64.2

Health system indicators		
Average number of villages seen by an ANM [4]	3	4
Average rural population covered by an ANM [4]	5391	4013
Proportion of subcentres functioning without ANMs [4]	10	3.2
Number of PHCs functioning as per IPHS norms [4]	NA	3635
Average number of VHSNCs constituted per village [5]	1	0.79
Average number of VHNDs held per village per year [6]	20.9	11.25
Number of facilities generating and using work plan of MCTS [5]	8431	55566

Programme implementation at a glance		
No. of districts implementing IMNCI [7]	26	505
HBNC training status [8] - Round 1 (%)	90	
Round 2 (%)	81	
Round 3 (%)	68	
Round 4 (%)	56	
No. of SNCUs established [7]	33	418
No. of NBSUs established [7]	153	1554
No. of NBCCs established [7]	470	13167

Administrative structure		
Rural Population (in lakhs) [3]	346.71	8330.88
Number of districts [3]	26	640
Number of CHCs [4]	318	4833
Number of PHCs [4]	1158	24049
Number of subcentres [4]	7274	148366
Number of Subdivisions/Talukas [3]	226	5564
Number of Blocks [5]	172	6437
Number of Villages [3]	18225	640867

References

1. Sample Registration System, 2012
2. Office of Registrar General of India, 2010-12
3. Census of India, 2011
4. Rural Health Statistics, 2012
5. National Rural Health Mission Report, 2012
6. National Rural Health Mission Report, 2011-12
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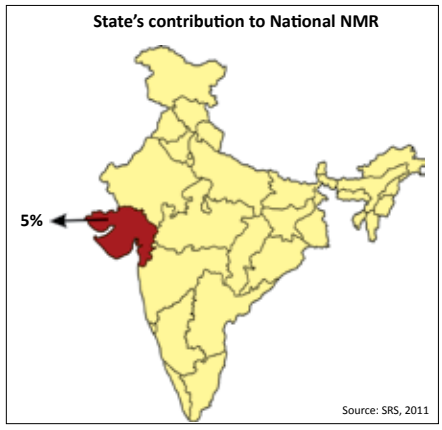

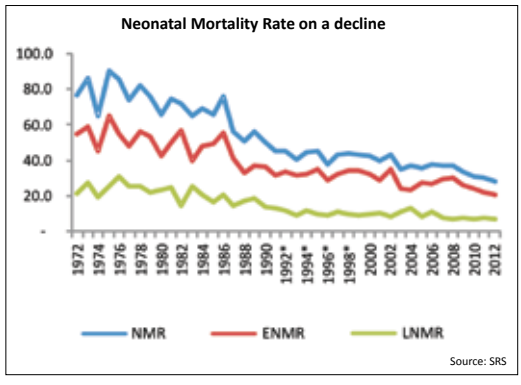

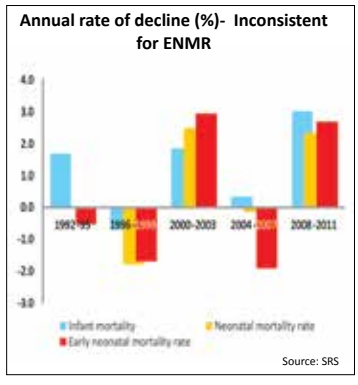

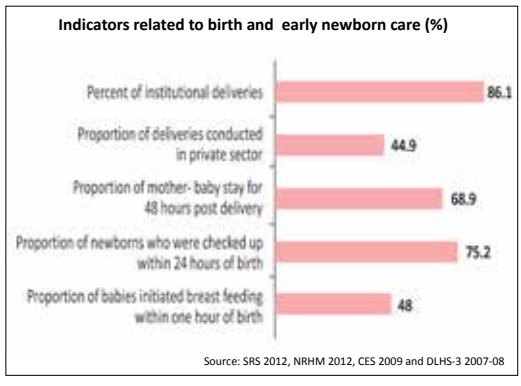

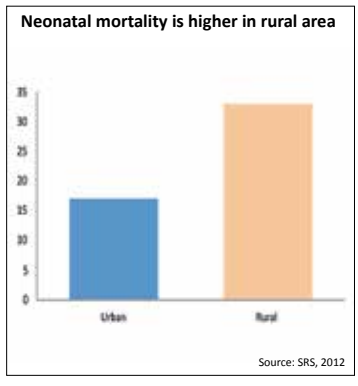

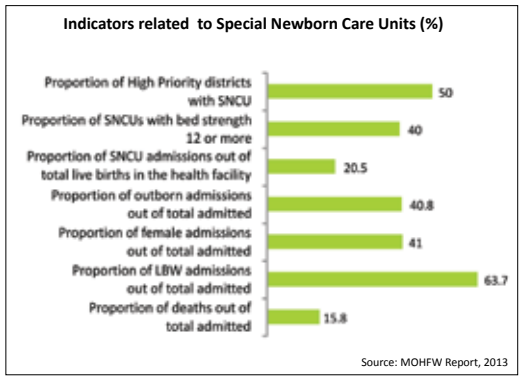

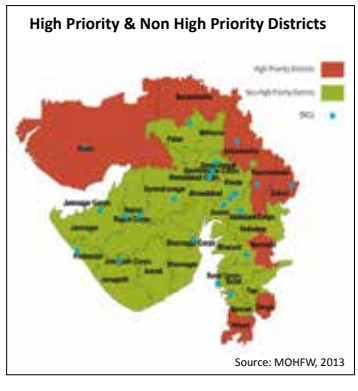

State Highlights

Strengths	Going forward
1. Institutional delivery rate is good	1. Efforts are needed to reduce NMR and ENMR
2. Good coverage of facility based care	2. Establish SNCUs in all high priority districts
3. Good coverage of postnatal checkup	3. Improve the coverage of SNCU related indicators

Haryana

Neonatal health indicators	HAR	India
Neonatal Mortality Rate [1]	28	29
Early Neonatal Mortality Rate [1]	21	23
Late Neonatal Mortality Rate [1]	7	6

Health indicators			
Post Neonatal Mortality Rate [1]		14	13
Infant Mortality Rate [1]	Total	42	42
	Male	41	41
	Female	44	44
Under Five Mortality Rate [1]		48	52
Maternal Mortality Ratio [2]		146	178
Perinatal Mortality Rate [1]		30	28
Stillbirth Rate [1]		9	5
Total Fertility Rate [1]		2.3	2.4
Crude Birth Rate [1]		21.6	21.6
Crude Death Rate [1]		6.4	7
Sex Ratio [3]		877	940
Life Expectancy [3]	Male	65.9	62.6
	Female	66.3	64.2

Health system indicators		
Average number of villages seen by an ANM [4]	1	4
Average rural population covered by an ANM [4]	3324	4013
Proportion of subcentres functioning without ANMs [4]	1	3.2
Number of PHCs functioning as per IPHS norms [4]	17	3635
Average number of VHSNCs constituted per village [5]	1	0.79
Average number of VHNDs held per village per year [6]	15	11.25
Number of facilities generating and using work plan of MCTS [5]	2632	55566

Programme implementation at a glance		
No. of districts implementing IMNCI [7]	21	505
HBNC training status [8] - Round 1 (%)	80	
Round 2 (%)	77	
No. of SNCUs established [7]	14	418
No. of NBSUs established [7]	66	1554
No. of NBCCs established [7]	318	13167

Administrative structure		
Rural Population (in lakhs) [3]	165.31	8330.88
Number of districts [3]	21	640
Number of CHCs [4]	109	4833
Number of PHCs [4]	447	24049
Number of subcentres [4]	2520	148366
Number of Subdivisions/Talukas [3]	67	5564
Number of Blocks [5]	119	6437
Number of Villages [3]	6841	640867

References

1. Sample Registration System, 2012
2. Office of Registrar General of India, 2010-12
3. Census of India, 2011
4. Rural Health Statistics, 2012
5. National Rural Health Mission Report, 2012
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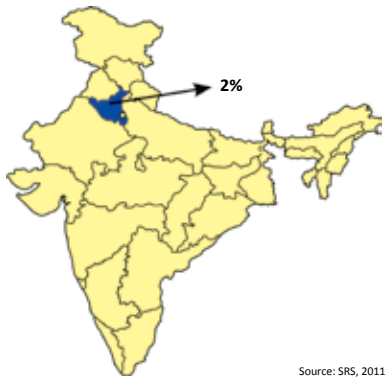
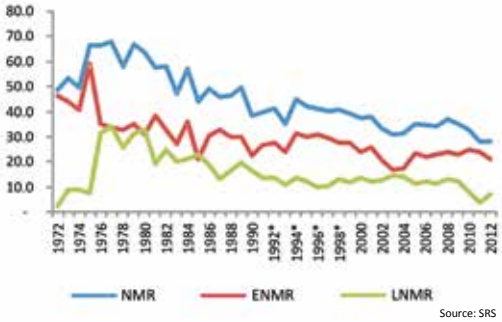
State's contribution to National NMR



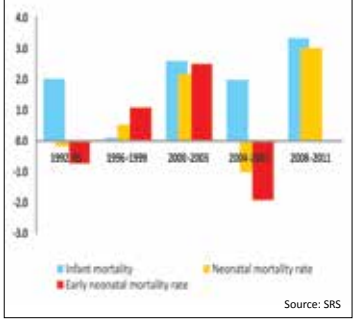
Source: SRS, 2011

Neonatal Mortality Rate on a decline



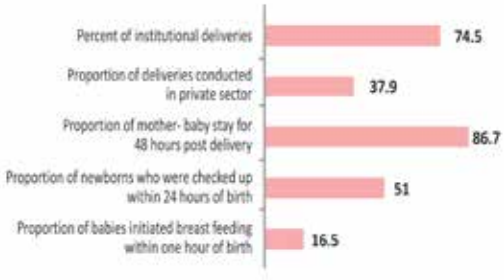
Source: SRS

Annual rate of decline (%)- Negligible for ENMR



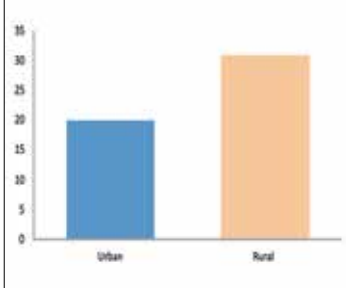
Source: SRS

Indicators related to birth and early newborn care (%)



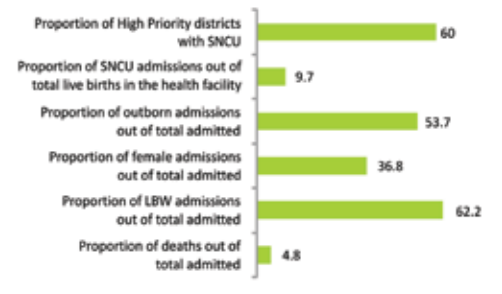
Source: SRS 2012, NRHM 2012, CES 2009 and DLHS-3 2007-08

Neonatal mortality is higher in rural area



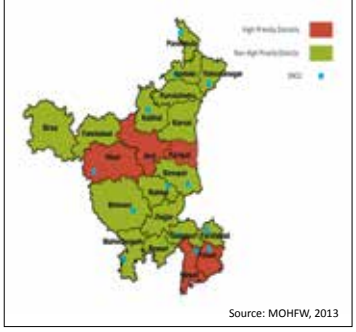
Source: SRS, 2012

Indicators related to Special Newborn Care Units (%)



Source: MOHFW Report, 2013

High Priority & Non High Priority Districts



Source: MOHFW, 2013

State Highlights

Strengths	Going forward
1. IMNCI is being implemented in every district	1. Address stagnant ENMR
2. Frequency of VHNDs held per year is more than the national average	2. Establish SNCUs in all high priority districts
3. Good coverage of mother-baby stay for 48 hours in hospital post delivery	3. Efforts are needed to increase the number of PHCs functioning as per IPHS norms

Kerala

Neonatal health indicators	Kerala	India
Neonatal Mortality Rate [1]	7	29
Early Neonatal Mortality Rate [1]	4	23
Late Neonatal Mortality Rate [1]	3	6

Health indicators		Kerala	India
Post Neonatal Mortality Rate [1]		5	13
Infant Mortality Rate [1]	Total	12	42
	Male	10	41
	Female	13	44
Under Five Mortality Rate [1]		13	52
Maternal Mortality Ratio [2]		66	178
Perinatal Mortality Rate [1]		10	28
Stillbirth Rate [1]		6	5
Total Fertility Rate [1]		1.8	2.4
Crude Birth Rate [1]		14.9	21.6
Crude Death Rate [1]		6.9	7
Sex Ratio [3]		1084	940
Life Expectancy [3]	Male	71.4	62.6
	Female	76.3	64.2

Health system indicators		
Average number of villages seen by an ANM [4]	0.2	4
Average rural population covered by an ANM [4]	4183	4013
Proportion of subcentres functioning without ANMs [4]	0	3.2
Number of PHCs functioning as per IPHS norms [4]	1	3635
Average number of VHSNCs constituted per village [5]	19.2	0.79
Average number of VHNDs held per village per year [6]	176.7	11.25
Number of facilities generating and using work plan of MCTS [5]	6468	55566

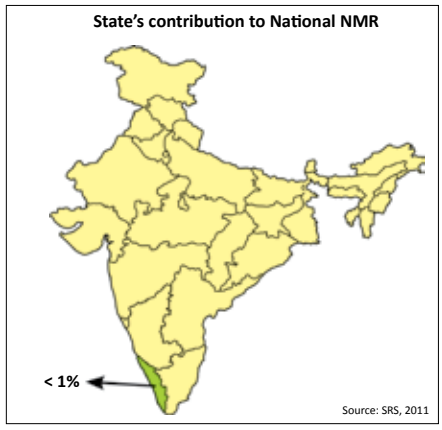
Programme implementation at a glance		
No. of districts implementing IMNCI [7]	0	505
No. of SNCUs established [7]	10	418
No. of NBSUs established [7]	49	1554
No. of NBCCs established [7]	112	13167

Administrative structure		
Rural Population (in lakhs) [3]	174.56	8330.88
Number of districts [3]	14	640
Number of CHCs [4]	217	4833
Number of PHCs [4]	809	24049
Number of subcentres [4]	4575	148366
Number of Subdivisions/Talukas [3]	63	5564
Number of Blocks [5]	152	6437
Number of Villages [3]	1018	640867

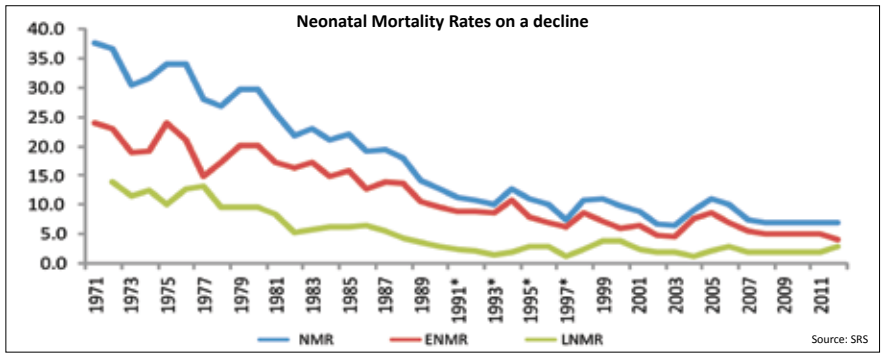
References

1. Sample Registration System, 2012
2. Office of Registrar General of India, 2010-12
3. Census of India, 2011
4. Rural Health Statistics, 2012
5. National Rural Health Mission Report, 2012
6. National Rural Health Mission Report, 2011-12
7. Child Health Programmes at a Glance, 2013

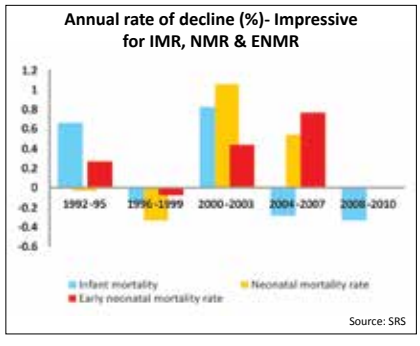
State's contribution to National NMR



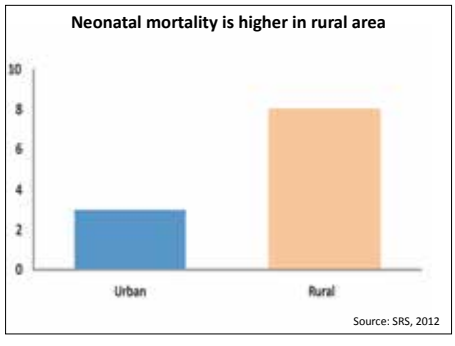
Neonatal Mortality Rates on a decline



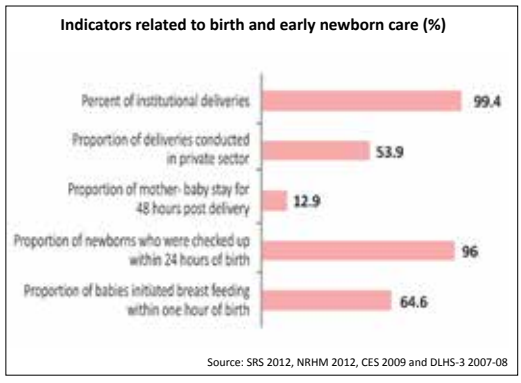
Annual rate of decline (%)- Impressive for IMR, NMR & ENMR



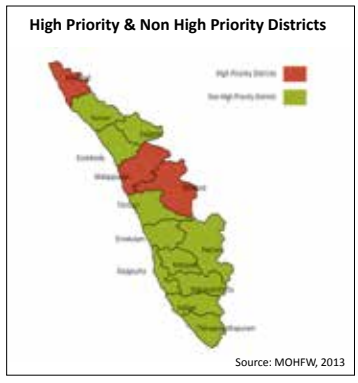
Neonatal mortality is higher in rural area



Indicators related to birth and early newborn care (%)



High Priority & Non High Priority Districts



State Highlights

Strengths	Going forward
1. Appreciable decline in NMR	1. Very few PHCs functioning as per IPHS norms
2. Good coverage of facility based care	2. Proportion of mother-baby stay post delivery for 48 hours is less
3. Coverage of institutional delivery and skilled attendance at birth are impressive	3. Half of the deliveries are being conducted in private hospitals

Andhra Pradesh

Neonatal health indicators		AP	India
Neonatal Mortality Rate [1]		27	29
Early Neonatal Mortality Rate [1]		22	23
Late Neonatal Mortality Rate [1]		5	6

Health indicators			
Post Neonatal Mortality Rate [1]		14	13
Infant Mortality Rate [1]	Total	41	42
	Male	40	41
	Female	43	44
Under Five Mortality Rate [1]		43	52
Maternal Mortality Ratio [2]		110	178
Perinatal Mortality Rate [1]		28	28
Stillbirth Rate [1]		6	5
Total Fertility Rate [1]		1.8	2.4
Crude Birth Rate [1]		17.5	21.6
Crude Death Rate [1]		7.4	7
Sex Ratio [3]		992	940
Life Expectancy [3]	Male	62.9	62.6
	Female	65.5	64.2

Health system indicators		
Average number of villages seen by an ANM [4]	1	4
Average rural population covered by an ANM [4]	2577	4013
Proportion of subcentres functioning without ANMs [4]	0	3.2
Number of PHCs functioning as per IPHS norms [4]	1624	3635
Average number of VHSNCs constituted per village [5]	0.8	0.79
Average number of VHNDs held per village per year [6]	27.4	11.25
Number of facilities generating and using work plan of MCTS [5]	83	55566

Programme implementation at a glance		
No. of districts implementing IMNCI [7]	13	505
HBNC training status [8] - Round 1 (%)	85	
Round 2 (%)	52	
No. of SNCUs established [7]	32	418
No. of NBSUs established [7]	156	1554
No. of NBCCs established [7]	1371	13167

Administrative structure		
Rural Population (in lakhs) [3]	563.12	8330.88
Number of districts [3]	23	640
Number of CHCs [4]	281	4833
Number of PHCs [4]	1624	24049
Number of subcentres [4]	12522	148366
Number of Subdivisions/Talukas [3]	78	5564
Number of Blocks [5]	1124	6437
Number of Villages [3]	27800	640867

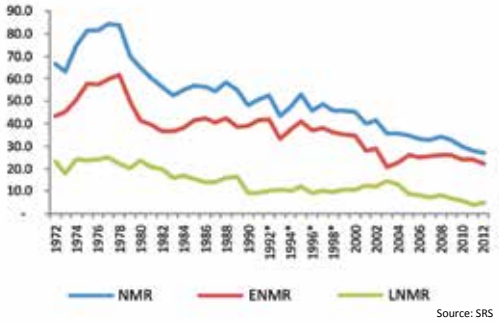
References

1. Sample Registration System, 2012
2. Office of Registrar General of India, 2010-12
3. Census of India, 2011
4. Rural Health Statistics, 2012
5. National Rural Health Mission Report, 2012
6. National Rural Health Mission Report, 2011-12
7. Child Health Programmes at a Glance, 2013
8. National Health System Resource Centre, 2013

State's contribution to National NMR

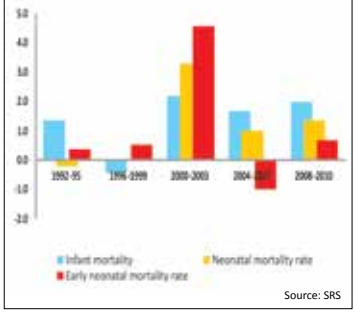
Source: SRS, 2011

Neonatal Mortality Rate on a decline



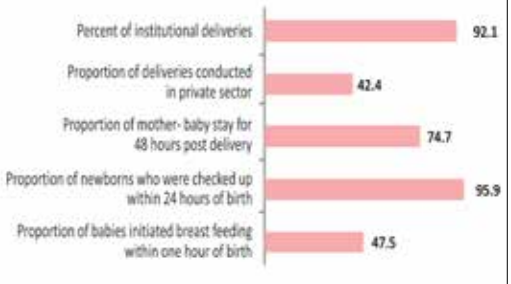
Source: SRS

Annual rate of decline (%)-Inconsistent for ENMR



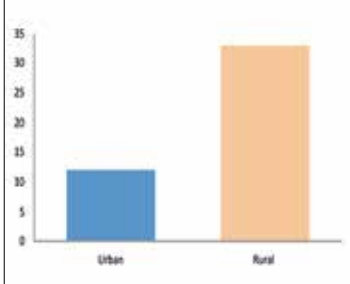
Source: SRS

Indicators related to birth and early newborn care (%)



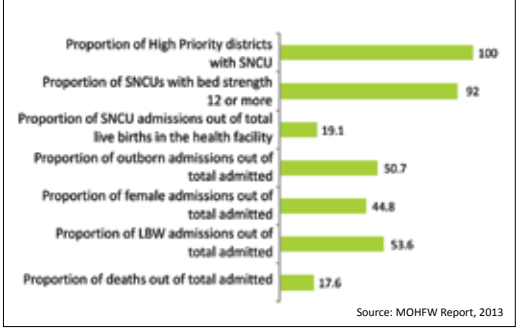
Source: SRS 2012, NRHM 2012, CES 2009 and DLHS-3 2007-08

Neonatal mortality is higher in rural area



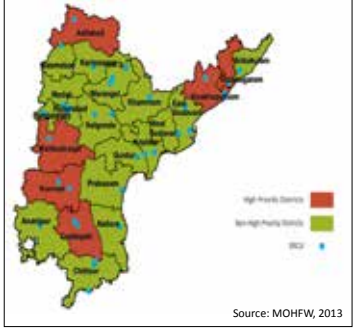
Source: SRS, 2012

Indicators related to Special Newborn Care Units (%)



Source: MOHFW Report, 2013

High Priority & Non High Priority Districts



Source: MOHFW, 2013

State Highlights

Strengths	Going forward
1. Good coverage of facility based care	1. Address inconsistent ENMR
2. Good coverage of institutional delivery and postnatal checkup	2. Address the high proportion of LBW admissions to SNCUs
3. Average number of VHNDs held per year is more than national average	3. Improve the coverage of institutional delivery in government health facilities

Himachal Pradesh

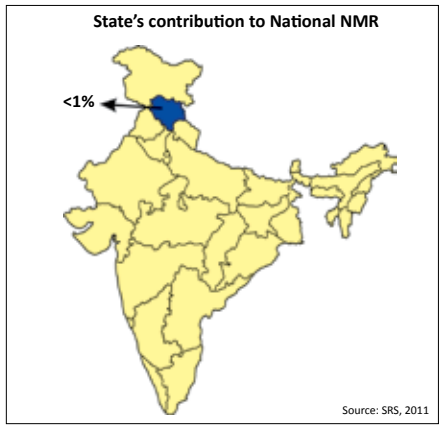
Neonatal health indicators		HP	India
Neonatal Mortality Rate [1]		26	29
Early Neonatal Mortality Rate [1]		20	23
Late Neonatal Mortality Rate [1]		6	6

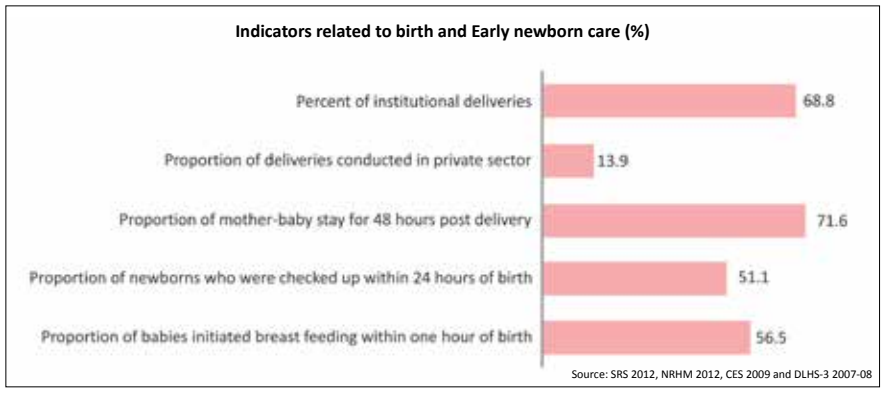
Health indicators			
Post Neonatal Mortality Rate [1]		10	13
Infant Mortality Rate [1]	Total	36	42
	Male	35	41
	Female	38	44
Under Five Mortality Rate [1]		43	52
Maternal Mortality Ratio [2]		NA	178
Perinatal Mortality Rate [1]		1.7	28
Stillbirth Rate [1]		16.2	5
Total Fertility Rate [1]		6.7	2.4
Crude Birth Rate [1]		31	21.6
Crude Death Rate [1]		12	7
Sex Ratio [3]		974	940
Life Expectancy [3]	Male	66.5	62.6
	Female	67.3	64.2

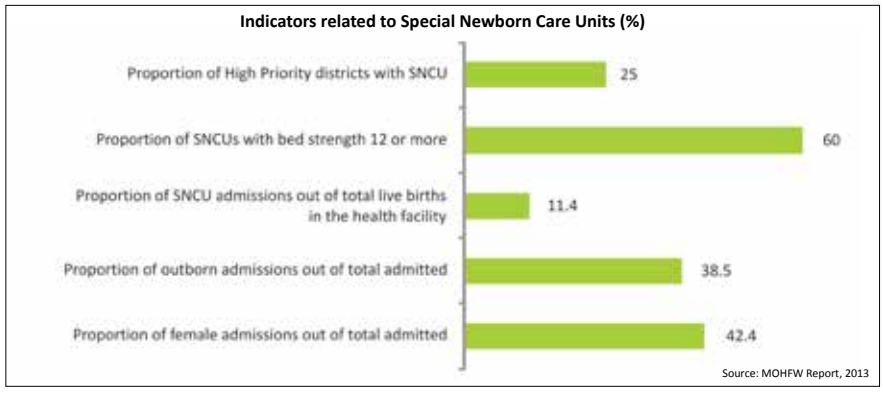
Health system indicators		
Average number of villages seen by an ANM [4]	11	4
Average rural population covered by an ANM [4]	3161	4013
Proportion of subcentres functioning without ANMs [4]	18	3.2
Number of PHCs functioning as per IPHS norms [4]	0	3635
Average number of VHSNCs constituted per village [5]	0.2	0.79
Average number of VHNDs held per village per year [6]	2.6	11.25
Number of facilities generating and using work plan of MCTS [5]	79	55566

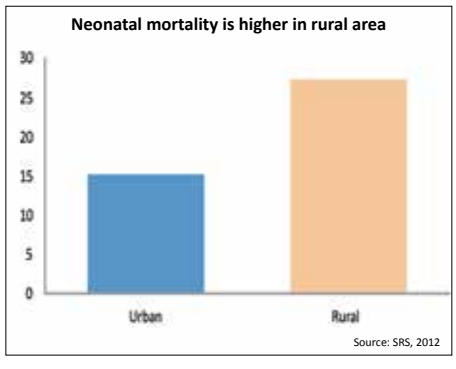
Programme implementation at a glance		
No. of districts implementing IMNCI [7]	3	505
No. of SNCUs established [7]	4	418
No. of NBSUs established [7]	0	1554
No. of NBCCs established [7]	56	13167

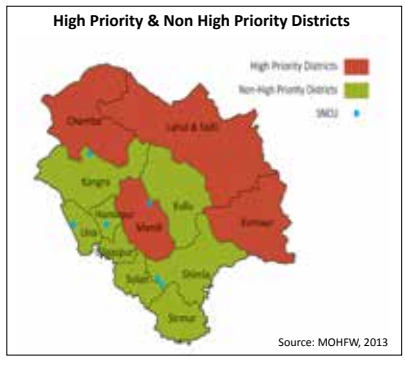
Administrative structure		
Rural Population (in lakhs) [3]	61.68	8330.88
Number of districts [3]	12	640
Number of CHCs [4]	76	4833
Number of PHCs [4]	472	24049
Number of subcentres [4]	2065	148366
Number of Subdivisions/Talukas [3]	109	5564
Number of Blocks [5]	77	6437
Number of Villages [3]	20690	640867











State Highlights

Strengths	Going forward
1. Good coverage of postnatal checkup	1. Improve the coverage of institutional delivery
2. Higher proportion of institutional deliveries conducted in government hospital	2. Improve facility based care
	3. Efforts are needed to make PHCs functional as per IPHS norms

References

1. Sample Registration System, 2012
2. Office of Registrar General of India, 2010-12
3. Census of India, 2011
4. Rural Health Statistics, 2012
5. National Rural Health Mission Report, 2012
6. National Rural Health Mission Report, 2011-12
7. Child Health Programmes at a Glance, 2013

Maharashtra

Neonatal health indicators	MH	India
Neonatal Mortality Rate [1]	18	29
Early Neonatal Mortality Rate [1]	14	23
Late Neonatal Mortality Rate [1]	4	6

Health indicators			
Post Neonatal Mortality Rate [1]		7	13
Infant Mortality Rate [1]	Total	25	42
	Male	24	41
	Female	26	44
Under Five Mortality Rate [1]		28	52
Maternal Mortality Ratio [2]		87	178
Perinatal Mortality Rate [1]		19	28
Stillbirth Rate [1]		6	5
Total Fertility Rate [1]		1.8	2.4
Crude Birth Rate [1]		16.6	21.6
Crude Death Rate [1]		6.3	7
Sex Ratio [3]		925	940
Life Expectancy [3]	Male	66	62.6
	Female	68.4	64.2

Health system indicators		
Average number of villages seen by an ANM [4]	2	4
Average rural population covered by an ANM [4]	2780	4013
Proportion of subcentres functioning without ANMs [4]	NA	3.2
Number of PHCs functioning as per IPHS norms [4]	242	3635
Average number of VHSNCs constituted per village [5]	0.9	0.79
Average number of VHNDs held per village per year [6]	17.2	11.25
Number of facilities generating and using work plan of MCTS [5]	9566	55566

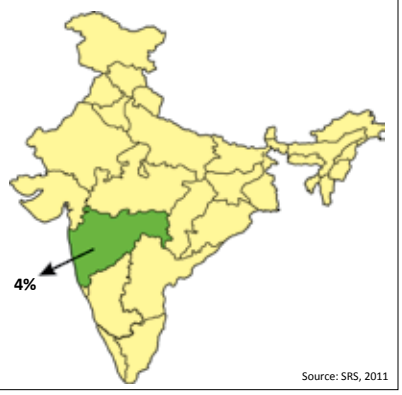
Programme implementation at a glance		
No. of districts implementing IMNCI [7]	33	505
HBNC training status [8] - Round 1 (%)	41	
Round 2 (%)	15	
Round 3 (%)	6	
No. of SNCUs established [7]	34	418
No. of NBSUs established [7]	177	1554
No. of NBCCs established [7]	1014	13167

Administrative structure		
Rural Population (in lakhs) [3]	615.45	8330.88
Number of districts [3]	35	640
Number of CHCs [4]	363	4833
Number of PHCs [4]	1811	24049
Number of subcentres [4]	10580	148366
Number of Subdivisions/Talukas [3]	353	5564
Number of Blocks [5]	0	6437
Number of Villages [3]	43663	640867

References

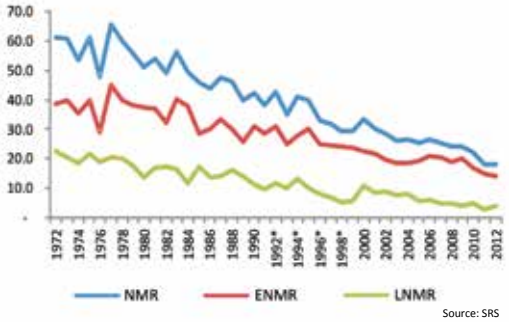
1. Sample Registration System, 2012
2. Office of Registrar General of India, 2010-12
3. Census of India, 2011
4. Rural Health Statistics, 2012
5. National Rural Health Mission Report, 2012
6. National Rural Health Mission Report, 2011-12
7. Child Health Programmes at a Glance, 2013
8. National Health System Resource Centre, 2013

State's contribution to National NMR



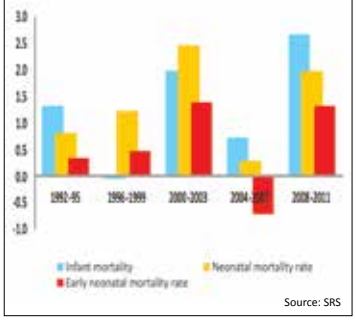
Source: SRS, 2011

Neonatal Mortality Rate on a decline



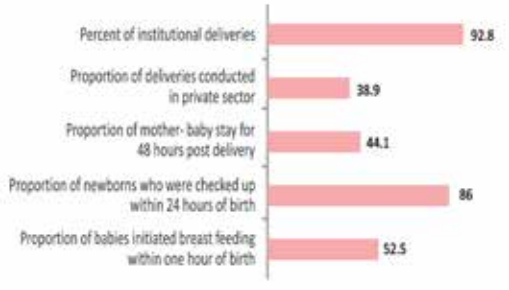
Source: SRS

Annual rate of decline (%)-Inconsistent for ENMR



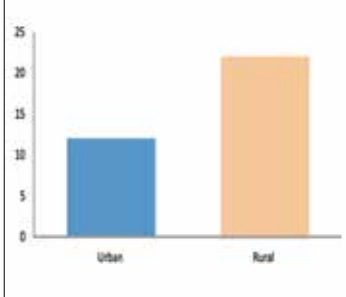
Source: SRS

Indicators related to birth and early newborn care (%)



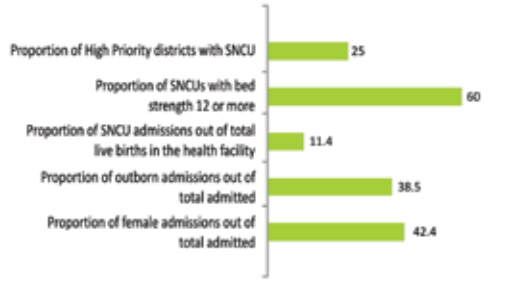
Source: SRS 2012, NRHM 2012, CES 2009 and DLHS-3 2007-08

Neonatal mortality is higher in rural area



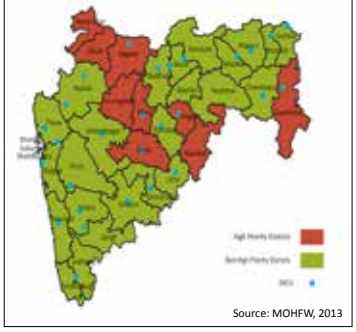
Source: SRS, 2012

Indicators related to Special Newborn Care Units (%)



Source: MOHFW Report, 2013

High Priority & Non High Priority Districts



Source: MOHFW, 2013

State Highlights

Strengths	Going forward
1. NMR is well below the national average	1. Address the inconsistent decline in ENMR
2. Good coverage of facility based care	2. Address the rural-urban differential in NMR
3. Majority of the facilities are using MCTS work plan	3. Improve the coverage of mother-baby stay for 48 hours post delivery

West Bengal

Neonatal health indicators		WB	India
Neonatal Mortality Rate [1]		22	29
Early Neonatal Mortality Rate [1]		17	23
Late Neonatal Mortality Rate [1]		5	6

Health indicators			
Post Neonatal Mortality Rate [1]		10	13
Infant Mortality Rate [1]	Total	32	42
	Male	31	41
	Female	33	44
Under Five Mortality Rate [1]		38	52
Maternal Mortality Ratio [2]		117	178
Perinatal Mortality Rate [1]		22	28
Stillbirth Rate [1]		5	5
Total Fertility Rate [1]		1.7	2.4
Crude Birth Rate [1]		16.1	21.6
Crude Death Rate [1]		6.3	7
Sex Ratio [3]		947	940
Life Expectancy [3]	Male	64.1	62.6
	Female	65.8	64.2

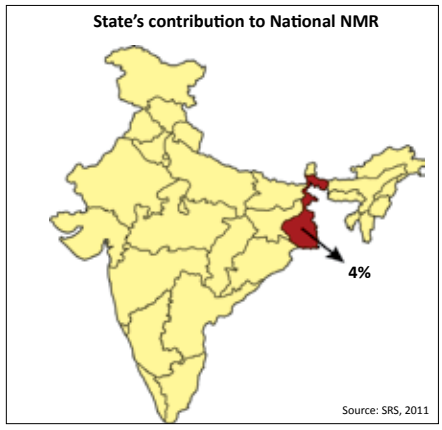
Health system indicators		
Average number of villages seen by an ANM [4]	3	4
Average rural population covered by an ANM [4]	4798	4013
Proportion of subcentres functioning without ANMs [4]	0	3.2
Number of PHCs functioning as per IPHS norms [4]	0	3635
Average number of VHSNCs constituted per village [5]	0.8	0.79
Average number of VHNDs held per village per year [6]	2.3	11.25
Number of facilities generating and using work plan of MCTS [5]	45	55566

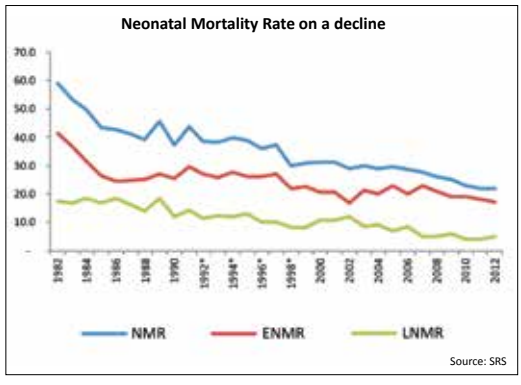
Programme implementation at a glance		
No. of districts implementing IMNCI [7]	10	505
HBNC training status [8] - Round 1 (%)	70	
Round 2 (%)	41	
Round 3 (%)	5	
No. of SNCUs established [7]	26	418
No. of NBSUs established [7]	125	1554
No. of NBCCs established [7]	560	13167

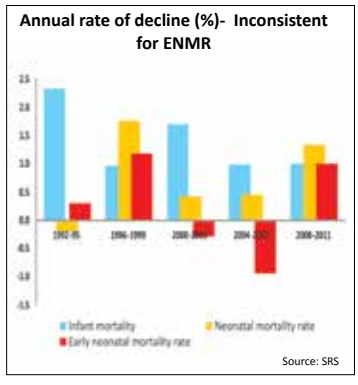
Administrative structure		
Rural Population (in lakhs) [3]	622.14	8330.88
Number of districts [3]	19	640
Number of CHCs [4]	348	4833
Number of PHCs [4]	909	24049
Number of subcentres [4]	10356	148366
Number of Subdivisions/Talukas [3]	66	5564
Number of Blocks [5]	341	6437
Number of Villages [3]	40203	640867

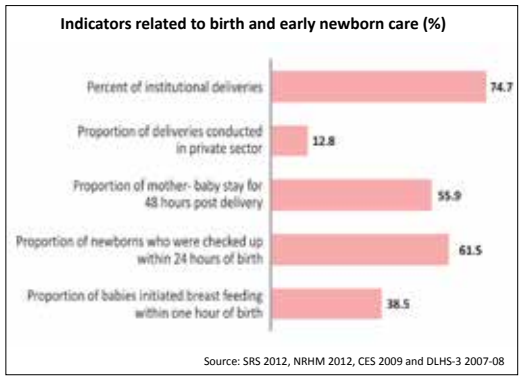
References

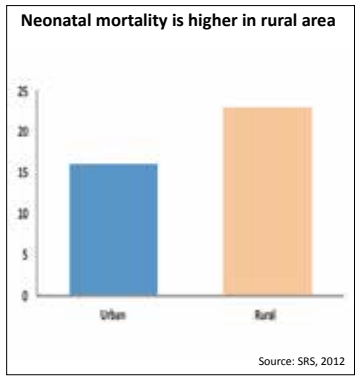
1. Sample Registration System, 2012
2. Office of Registrar General of India, 2010-12
3. Census of India, 2011
4. Rural Health Statistics, 2012
5. National Rural Health Mission Report, 2012
6. National Rural Health Mission Report, 2011-12
7. Child Health Programmes at a Glance, 2013
8. National Health System Resource Centre, 2013

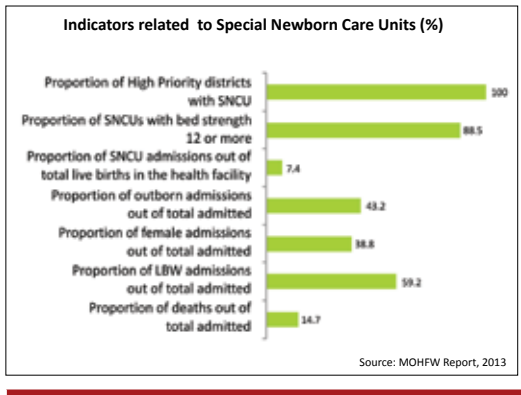


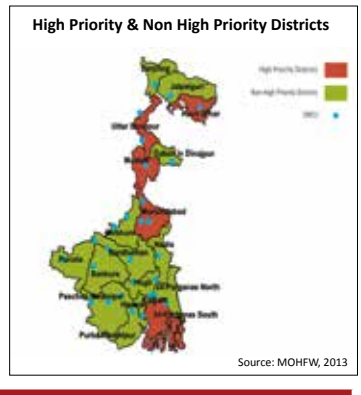












State Highlights

Strengths	Going forward
1. NMR is below the national average	1. Address the slow rate of decline in ENMR during recent years
2. Proportion of institutional deliveries conducted in government sector is good	2. Efforts are needed to make PHCs functional as per IPHS norms
3. Every subcentre has at least one ANM	3. Make facilities to use work plan of MCTS

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