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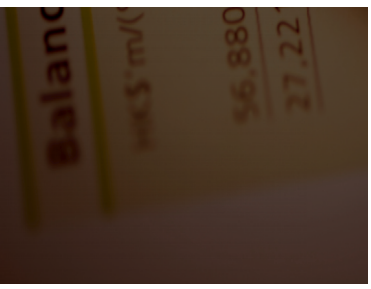
Global Public Health Policies

Case Studies from India on Planning and Implementation

K.V. Ramani



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Case Studies from India on Planning and Implementation

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BUSINESS EXPERT PRESS

Global Public Health Policies: Case Studies from India on Planning and Implementation

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Dedicated to….

To All Public Health Professionals

Abstract

As per the World Health Organization (WHO), public health refers to all organized measures (whether public or private) to prevent diseases, promote health, and prolong life among the population as a whole. Unfortunately, public health continues to remain neglected in many developing countries due to poor management capacity for effective and efficient delivery of public health services.

This book starts with an overall view of public health issues at the global, national and sub-national levels. Challenges faced in the management of global public health programs are illustrated through mini-case studies on Adolescent health, HIV/AIDS, Diarrhoea control, and TB control programs. Live case studies from India towards achieving Millennium Development Goals (MDGs) on maternal health, child health, urban health, and polio eradication highlight the managerial challenges on planning and implementing global public health policies in developing countries.

Evidence-based strategic planning, micro-level operational planning, closely monitored implementation, and a well-designed surveillance system are critical for the success of global public health policies in developing countries.

Keywords

Public health policies, Strategic Planning, Operational Planning, Implementation, Surveillance, MDGs.

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Preface

Public health is not very well understood in many developing countries. The governments in many developing countries are spending more for treating people who have fallen ill, instead of preventing people from falling ill. As per the World Health Organization (WHO), public health refers to all organized measures (whether public or private) to prevent disease, promote health, and prolong life among the population as a whole.

Health and socioeconomic development are so closely intertwined that it is impossible to achieve one without the other. Public health should get more attention in developing countries so as to achieve sustainable socioeconomic development. The Millennium Development Goals (MDGs) declared in the UN Millennium Conference in New York in the year 2000 underlined the commitment by all the member countries to address public health issues, such as health, education, poverty, gender equity, environment sustainability, and global partnership for development.

My interest in writing this book arose from my teaching, research, and consulting experience in the field of health care management at the Indian Institute of Management, Ahmedabad (IIMA) India. I have been teaching "Public Health Management" as an elective course in our Postgraduate Program in Management, and taking a few sessions on this topic in the Executive Education Programs in health care management at IIMA. The participants of our executive education programs gave me an insight into the management challenges they face in planning and implementing public health programs. The students from our postgraduate program alerted me on the need to generate more awareness among the youth on the socioeconomic benefits of disease prevention and lead a healthy social life. My consulting experiences highlighted the urgency to augment management capacity to plan and deliver public health services effectively and efficiently.

This book on "Global Public Health Policies: Case Studies from India on Planning and Implementation" is divided into two parts. Part-I focuses on concepts in the management of public health programs, while Part-II discusses real-life case studies from India.

Part I Public Health Management: A Perspective

Chapter 1 introduces the concepts of public health and mentions a number of public health issues on a wide range of topics. Various illustrations highlight the relevance and seriousness of public health issues. The role of politics in public health laws and some controversial public health issues are also brought out.

Chapter 2 discusses a few important management challenges in delivering public health services. The chapter starts with an introduction to public health economics to highlight the neglect of public health in developing countries. We then present a framework to assess the management capacity of a health system to deliver services. Other topics discussed include community health care needs assessment, health communication for awareness generation, and behavioral change, logistics management challenges in service delivery, and so on.

Chapter 3 on public health programs focusses on the management topics, namely, policy development, planning, and implementation. The mini case study on UNAIDS policies for HIV/AIDS programs highlights the role of policy development process. The mini case study on Adolescent Health brings out the challenges in the UNFPA strategic planning for delivering an integrated set of services across many sectors. The mini case study on the WHO program DOTS for TB control illustrates the need for a detailed operational planning for successful service delivery. The mini case study on the ORS program of Bangladesh for diarrheal disease control underlines the importance of surveillance in managing public health programs.

Part II Case Studies

In this part, we present four case studies from India on the planning and implementation of global public health issues: Urban Health, Maternal Health, Child Health, and Polio Eradication.

Chapter 4 describes a case study on urban health. Urbanization is an important demographic shift worldwide, marking a nation's march from an agricultural based economy to an industrialized and service-based economy. By 2050, over 70% of the world's population would be living

in cities. Urbanization is one of the leading global trends of the 21st century that has a significant impact on health. The case studies A, B, and C describe the process of satisfactorily addressing the health needs of urban poor in Ahmedabad City, India.

Chapter 5 discusses maternal health. The fifth Millennium Development Goal (MDG 5) adopted by all the member countries at the UN Millennium Development Conference held in New York in 2000 asked for reducing maternal mortality by three-fourths between 1990 and 2015. Case (A) highlights the global burden of maternal mortality, estimated at 289,000 maternal deaths in 2012 (one death every 2 minutes) and analyses the progress of the member countries in their march toward meeting MDG 5. Case (B) discusses the steps taken by the Government of India to achieve MDG 5. What could be reasons for the failure of India to achieve MDG 5? What should be the future policy to further reduce maternal mortality in India and other developing countries?

Chapter 6 discusses child health. The fourth Millennium Development Goal (MDG 4) adopted by all the member countries in the UN Millennium Development Conference, asked all member countries to reduce U5 child deaths (U5: children under 5 years of age) by two-thirds between 1990 and 2015. Case (A) looks at the global burden of U5 mortality estimated at 6.6 million deaths in 2013. Case (B) analyses the steps taken by the Government of India to meet MDG 4. What could be the reasons for India's failure to achieve MDG 4? What should be the future policy to further reduce U5 mortality in India and other developing countries?

Chapter 7 discusses a case study on polio eradication. Polio is a highly infectious disease that has no cure and therefore has to be eradicated. Vaccines against poliovirus were available since 1954, and yet 125countries were polio endemic in 1988, paralyzing 1,000 children every day. The case describes the success of India in eradicating polio in 2014. India's success demonstrates the management challenges in planning and implementing a global public health policy successfully.

We hope that the four case studies discussed in this book would provide a framework for planning and implementation of public health policies in developing countries. Evidence-based strategic planning, micro-level operational planning, closely monitored implementation, and a well-designed surveillance system are critical for the success of any public health program.

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Prof. Jeffrey A Edwards, North Carolina A&T State University, for reviewing the manuscript and giving very useful suggestions for improvements,

My wife Hema and sons Abhinay and Akshay for their constant support and encouragement in writing this book.

CHAPTER 1

Public Health: An Introduction

1.1 Introduction

Most of us think of health only when we fall sick. All of us know that prevention is better than cure, but how many of us take adequate measures to prevent from falling sick? We assume that our hands are clean when we sit down to eat. We assume that our feet are clean when we go to bed. We assume that the water we drink is safe. We assume that the food we get in restaurants is safe. In general, we assume our life is safe unless something unusual happens in our community like the outbreak of dengue, chikungunya, or the outbreak of Ebola[1] in Guinea, Sierra Leone, Liberia, and Nigeria in 2014.

Health issues affecting any community, instead of health issues of individuals, are addressed under the broad category "Public Health". Before we get into any discussion on public health, let us first understand the comprehensive definition of health.

What is Health?

Health, as per the World Health Organization (WHO) definition,[2] is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.

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[1]According to the WHO, Ebola outbreaks have a case fatality rate of up to 90%. The virus is transmitted to people from wild animals and it spreads in the human population through human-to-human transmission. Source: Ebola Virus Disease; http://www.who.int/mediacentre/factsheets/fs103/en/, accessed on October 3, 2014.

[2]Preamble to the Constitution of the WHO as adopted by the International Health Conference, New York, June 19–22, 1946; signed on July 22, 1946 by the representatives of

What is Public Health?

The first comprehensive definition of public health, though difficult to comprehend, was probably given by Charles-Edward A Winslow.[3] According to Charles-Edward A Winslow, a theoretician and leader of American Public Health during the first half of the 20th century, public health is the science and art of preventing disease, prolonging life, and promoting physical health and efficiency through organized community efforts for the sanitation of the environment, the control of community infection, the education of the individual in principles of personal hygiene, the organization of medical and nursing services for the early diagnosis and preventive treatment of disease, and the development of social machinery which will ensure every individual in the community a standard of living that is adequate for the maintenance of health.

An easy-to-understand definition by WHO[4] is that public health refers to all organized measures (whether public or private) to prevent disease, promote health, and prolong life among the population as a whole. Its activities aim to provide conditions in which people can be healthy and focus on entire populations, not on individual patients or diseases. In short, public health focuses on community health needs and not individual health needs.

Public health issues range from global concerns to local community specific needs. Global public health issues include climate change, maternal health, child health, malnourishment, HIV/AIDS, and so on. At the national level, public health issues include tobacco use, abortion laws, population stabilization, mental illness, and so on. At a sub-national level, public health issues include the legalization of the use of marijuana in the

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61 States (Official Records of the World Health Organization, no. 2, p. 100) and entered into force on April 7, 1948. This Definition has not been amended since 1948.

[3]Charles-Edward Amory Winslow (February 4, 1877–January 8, 1957) was an American bacteriologist and public health expert, who was, according to the *Encyclopedia of Public Health*, "a seminal figure in public health, not only in his own country, the United States, but in the wider Western world." He founded the Yale School of Public health and the Yale school of Nursing.

[4]Source: Public Health; http://www.who.int/trade/glossary/story076/en/, accessed on March 23, 2014.

states of Colorado and Washington, United States, in 2014 and the outbreak of cholera in Soho district, London in 1854.

1.2 Public Health versus Medicine

- Public health addresses the health needs of a community, while medicine addresses the health needs of an individual.
- Public health measures prevent a community from falling ill; medicine treats individuals after they fall ill.
- Public health focuses on disease prevention and health promotion. Medicine focuses on disease diagnosis and treatment.
- Community is the patient for public health. Individual is the patient for medical care.
- Public health benefits are difficult to quantify since public health measures focus on disease prevention. Medicine focuses on cure, and it is easier to compare the cost of treatment with the benefits of getting back to work.

1.3 Public Health versus Individual Rights

Public health laws are binding on the community, even if a few individuals in the community might have some reservations. Mandatory wearing of seat belts while driving a car, smoking bans in indoor public places, and immunization of children before they attend school are some of the public health laws that are questioned by some individuals.

Community needs get priority over individual rights on all public health issues. Violation of any law and therefore public health law is punishable. In this context, we present below the case of Jacobson vs Massachusetts.

An Illustration: Jacobson vs Massachusetts

In the beginning of the 20th century, smallpox was a frequent visitor to the state of Massachusetts in United States. In 1901, the state reported

773 cases of smallpox and 97 deaths, followed by 2,314 cases and 284 deaths in 1902. The state of Massachusetts declared smallpox outbreak in 1902. The Cambridge Board of Health, pursuant to a state statute, mandated vaccination against smallpox to all residents, who had not been vaccinated since March 1897. Even though the medical community had by then scientifically established the efficacy of vaccination, the public was not fully convinced of the benefits of vaccination versus general skepticism about medicine. The Reverend Henning Jacobson and a few others resisted the mandatory vaccination against smallpox, and were fined $ 5 by the Board of Health. Jacobson took the matter all the way to the Supreme Court and lost his case. Public health laws, once enacted, take precedence over individual rights and liberty.

Source: Parmet, W., Goodman, R. A., Farber, A. 2005. Individual rights vs. public health – 100 years after Jacobson vs. Massachusetts. *New England Journal of Medicine*, volume 352, pp. 652–654.

1.4 Public Health and Politics

Public health issues invite political interference, since enacting any public health law calls for a series of public discussions and debates on several platforms. The case of Global Warming is an excellent case study on political interference.

An Illustration: Kyoto Protocol on Global Warming

Weather and climate change play a significant role in people's health. Warmer average temperatures leading to hotter days would increase the number of heat-related illnesses and death. Furthermore, the WHO report (2003) on Climate Change concluded that "changes in infectious disease transmission patterns are a likely major consequence of climate change."

The Kyoto Protocol adopted in Kyoto, Japan, on December 11, 1997, is an international agreement linked to the United Nations Framework Convention on Climate Change (UNFCCC). The UNFCCC is an

environmental treaty with the goal of preventing dangerous anthropogenic (i.e., human induced) interference of the climate system. The protocol recognizes that developed countries are primarily responsible for the high levels of greenhouse gases and therefore sets binding obligations on industrialized countries to reduce emissions of greenhouse gases.

The first commitment period applied to emission control between 2008 and 2012 has ended; 37 industrialized countries and the European Union signed the protocol; United States did not. The George W. Bush administration, since taking office in January 2001, has consistently sought to undermine the scientific evidence provide by the U.S. National Academy of Sciences (NAS). NAS report clearly stated that "Greenhouse gases are accumulating in earth's atmosphere as a result of human activities, causing surface air temperatures and subsurface ocean temperatures to rise." The Bush administration even went to the extent of removing an entire section on climate change from the Environmental Protection Agency's report.

The second commitment period that applies to emission control for the period 2013–2020 is under discussion at the time of writing this book.

Sources: WHO in collaboration with UNEP and WMO. 2003. *Climate Change and Human Health - Risks and Responses. Summary*; http://www.who.int/globalchange/publications/cchhsummary/en/, accessed on Jan 10, 2015

Manipulation of Global Warming Science; Union of Concerned Scientist, USA; Centre for Science and Democracy; Promoting Scientific Integrity; http://www.ucsusa.org/our-work/center-science-and-democracy/promoting-scientific-integrity/manipulation-of-global.html#.VU3-CI6qqko, accessed on June 10, 2014

Kyoto Protocol; From Wikipedia, the free Encyclopedia, http://en.wikipedia.org/wiki/Kyoto_Protocol; accessed on June 10, 2014

United Nations, Framework Convention on Climate Change, Kyoto Protocol; http://unfccc.int/kyoto_protocol/items/2830.php, accessed on June 10, 2014.

Politics in public health is as old as public health itself. An excellent illustration is given below relating to scientific evidence on cholera epidemic presented by Dr John Snow, but ignored by the Soho district health authorities in England.

An Illustration: Cholera Epidemic and Dr. John Snow

When cholera broke out in England in 1831, it was thought to be caused by "miasma," or bad smell in the air. The "miasma" assumption received support from local leaders such as Edwin Chadwick and Florence Nightingale and was therefore never disputed. However, Dr. John Snow, a surgeon (actually an anesthesiologist), doubted the "miasma" assumption, carried out his own experiments, and published a paper arguing that cholera was spread through contaminated water.

Cholera struck again in England in 1854, in Soho district, Central London. Dr. John Snow, who lived near Soho district, used this opportunity to investigate the quality of water supply to Soho district. He isolated one particular water pump in Broad Street, the area which reported many deaths, by mapping all the public wells and cholera deaths in and around Soho and conclusively proved through microscopic examination, that cholera was spread through contaminated water. He forced the local administration to remove that particular water pump, and cholera cases started declining.

In spite of providing conclusive proof for cholera epidemic, the local health authority refused to accept Dr. John Snow's theory and continued their faith in the "miasma" assumption. Dr. John Snow died in 1858, not fortunate to see the triumph of his ideas. The hideous state of the River Thames finally forced the politicians to act on dealing with London's polluted source of water.

Sources: Broad Street Pump Outbreak; UCLA, Department of Epidemiology, School of Public Health; http://www.ph.ucla.edu/epi/snow/broadstreetpump.html, accessed on June 12, 2014

Mapping the 1854 London Cholera Outbreak; http://www.udel.edu/johnmack/frec682/cholera/, accessed on July 21, 2014

Cholera, The Thames; http://www.choleraandthethames.co.uk/, accessed on June 12, 2014

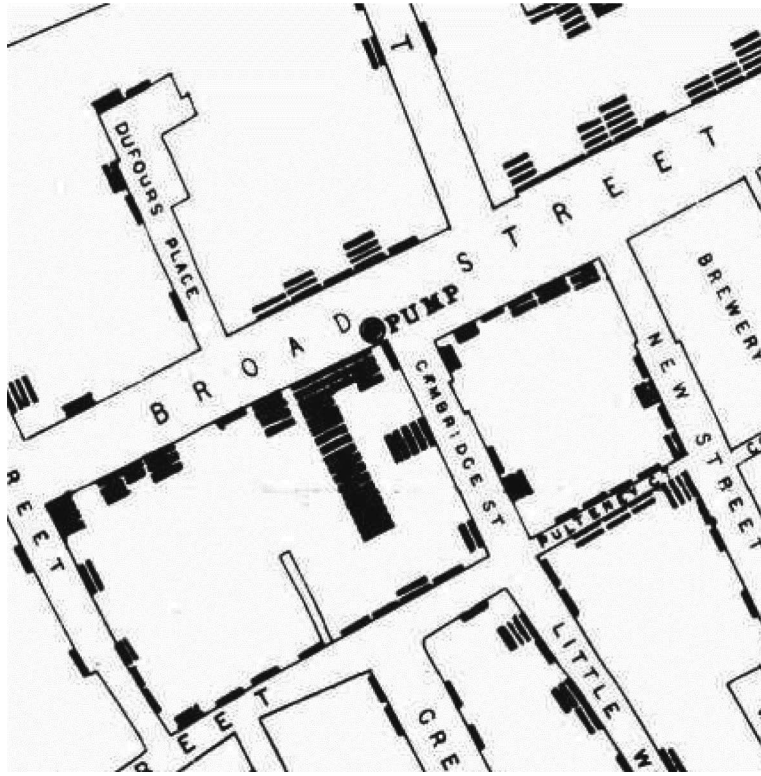

Figure 1.1 Dr John Snow's map of the 1984 London Cholera outbreak; Number of cholera deaths marked as black bars stacked perpendicular to the streets.

The above illustration highlights the challenges in policy development. It is necessary to have political skill in addition to providing evidence-based technical/medical recommendations. In public health, it is not uncommon for politicians to conveniently ignore scientific evidence.

1.5 Public Health Laws

Public health issues are raised at all levels by affected communities, and are discussed and debated extensively over a long period of time. Public health issues thereby assume political color leading to enacting new laws or making amendments to the existing laws.

Many public health issues require technical inputs to make and/or amend public health laws. For example, public health issues relating to maternal health and abortion require inputs from medical experts, while issues relating to biomedical waste management require inputs from medical and environmental experts. In such cases, the government appoints an expert committee to give scientific inputs and recommendations to the legislators for enacting public health laws.

A few examples would probably highlight this aspect of public health. We start with a case on amendments to the prevailing abortion law in Ireland.

An Illustration: Abortion Law in Ireland

As per the original abortion law in Ireland, known as the Pearson Act, 1861[1], termination of pregnancy (when there is no immediate physiological threat to mother's life) is a criminal offense punishable by imprisonment.

Savita Halappanavar, a 31-year-old citizen of India, working in Ireland as a dentist, was admitted in the University Hospital Galway on October 21, 2012. She was suffering from a miscarriage when she was some 17 weeks pregnant, and her repeated requests for abortion were denied by the medical staff at the hospital, citing the prevailing abortion law, Ireland being a catholic country. A week later, on October 28, 2012, Savita Halappanavar died in the hospital. The cause of death was septic shock, *E. coli* in her bloodstream and a miscarriage at 17 weeks of pregnancy.

Savita's death, a week after her admission to the University Hospital in Galway, focused international attention on the Republic of Ireland's abortion laws. Continued and relentless public pressure led the Irish government to change its abortion law from being illegal to legal termination under medical advice (section 7, Ireland).

On the basis of the recommendations of a government-appointed expert group, the Ireland President Michael D. Higgins signed into law the Protection of Life During Pregnancy Act 2013, on 30 July 2013. This law makes abortion legal under medical advice.

Sources: Criminal Justice in Ireland, edited by Paul O' Mahony; First published in 2002 by the Institute of Public Administration, Dublin; http://books.google.co.in/books/about/Criminal_Justice_in_Ireland.html?id=zx422jZOYfkC&redir_esc=y, accessed on July 20, 2014

Death of Savita Halappanavar; From Wikipedia, the free Encyclopedia, http://en.wikipedia.org/wiki/Death_of_Savita_Halappanavar, accessed on July 20, 2014

Harrison, S. 2013. How Savita Halappanavar's death called attention to Irish abortion law. BBC NI Dublin correspondent; http://www.bbc.com/news/world-europe-22204377, accessed on July 20, 2014

Enacting public health laws takes a fair amount of time and effort. Once enacted, public health laws are binding on the community.

Unfortunately, there are many instances where public health laws are not followed strictly. For example, the Government of India passed the "Registration of Births and Deaths Act" in 1969, but about 5-million births, accounting for 20% of all births annually, are not registered in India. Another case is The Prohibition of Child Marriage Act, 2006, which defines 18 years of age as the legal age for girls to get married; yet 50% of the girls in India get married before reaching the legal age of 18 years.[5] The consequences of violating public health laws such as not registering births and deaths, conducting early marriages, and so on adversely affect the planning and delivery of public health services, especially maternal and child health services. For eample, children born to adolescent mothers are more prone to morbidity and mortality than children born to adult mothers.

A somewhat controversial public health law that has achieved only partial success is the Government of India's Prenatal Diagnostic Testing (PNDT) Act of 1994 to stop female feticide.

An Illustration: PNDT Act in India

Prenatal Diagnostic Techniques (PNDT) Act 1994 is a federal legislation enacted by the Parliament of India to stop female feticides and arrest the declining sex ratio in India.

[5]National Family Health Survey, India; NFHS-3 publications – reports, http://www.rchiips.org/nfhs/report.shtml, accessed on July 21, 2014

The sex ratio in the 0–6 age group in India, as per the decennial Indian census, showed an alarming trend: 102.4 males per 100 females in 1961 to 104 in 1981 (Census 2011 puts the national figure at 109.4, with the state of Haryana as high as 114).

There was a tendency for families to produce children until a male child was born. Sex-selective abortion by medical professionals became a "million dollar" industry in the 1980s. Sex selection is any act of identifying the sex of the fetus and elimination of the fetus if it is of the unwanted sex. Social discrimination against women and a preference for sons raised several issues. The initiative to ban sex determination test was initiated through a campaign in 1986 that included women's groups and health activists. The government appointed an expert committee for technical inputs.

The PNDT Act, 1994 banned prenatal sex determination. Subsequently, the PNDT Act and Rules have been amended; the amendments have come into operation with effect from February 14, 2003, known as Pre-Conception and Prenatal Diagnostic Techniques (PCPNDT) Act.

Source: Pre-Conception & Prenatal Diagnostic Techniques Act. 1994; http://www.ncpcr.gov.in/view_file.php?fid=434, accessed on October 12, 2014.

Ameding public health laws are equally, if not more, challenging. Consider the case of Article 377 of the Indian Penal Code described below.

An Illustration: Indian Penal Code Article 377

Section 377 of the Indian Penal Code dating back to 1861, introduced during the British rule of India, criminalises sexual activities "against the order of nature," arguably including homosexual acts. The LGBT (Lesbians, Gay, Bisexual, and Transgenders) community feels discriminated and continues to live in fear. (Health, as defined by WHO, is a state of complete physical, mental. and social well-being and not merely the absence of disease or infirmity.)

This section was declared unconstitutional with respect to sex between consenting adults by the High Court of Delhi on July 2, 2009. That judgment was overturned by the Supreme Court of India on December 11, 2013, with the Court holding that amending or repealing Section 377 should be a matter left to Parliament, not the judiciary.

This debate is therefore ongoing.

Source: Section 377 of the Indian Penal Code; From Wikipedia, the free encyclopedia, http://en.wikipedia.org/wiki/Section_377_of_the_Indian_Penal_Code, accessed on April 8, 2014

1.6 Public Health Controversies

Public health issues could get controversial. As an example, take the recent developments on "Marijuana Tourism" in the United States.

The use, possession, sale, cultivation, and transportation of cannabis (marijuana) in the United States are illegal under the U.S. federal law. Cannabis is listed as a Schedule-I substance under the Controlled Substances Act of 1970,[6] which means that the substance has been decided by the federal government to have both high abuse potential and no established, safe medical use.

The federal government has allowed the states to pass laws to decriminalize cannabis for medical use or recreational purposes, provided they ensure that a regulation system is in place. As of 2015, 20 states had enacted laws allowing marijuana for medical use. Two states, Colorado and Washington, had also legalized the recreational use of cannabis following the approval of state referenda in the 2012 elections while similar ballot measures were defeated in the states of Oregon and California.

An Illustration: Marijuana Tourism

Colorado State welcomed the New Year 2014 by legalizing the sale of marijuana on January 1, 2014, and has reported considerable revenue from marijuana taxes and fees. Colorado has recorded a 100% compliance rate,

[6]Source: http://en.wikipedia.org/wiki/Legality_of_cannabis_by_U.S._state

but has already seen some negative impact of marijuana sales. Marijuana-infused foods have become very popular. The New York Times columnist Maureen David has detailed her hallucinatory episode after eating a pot-laced chocolate bar. A college student from Wyoming jumped to death from a Denver hotel balcony after eating a marijuana cookie.

There seems to be a disconnect between what scientific studies show on the adverse impact of marijuana on health and the acceptance of these findings by the public. Some scientific studies have reported that marijuana use is significantly linked with addiction, heart and lung complications, mental illness, car crashes, IQ loss, poor academic performance, poor job performance, and so on.

Many states in the United States are keenly watching the Colorado model. Washington State joined the exclusive club on July 8, 2014. What would be the public health consequences of marijuana tourism?

Sources: Hughes, T. 2014. With legal marijuana, Washington joins an exclusive club. *USA Today*. Retrieved from http://www.usatoday.com/story/news/nation/2014/07/07/colorado-washington-recreational-marijuana/12270261, accessed on January 26, 2015

Smart Approaches to Marijuana. 2014. *Marijuana & Public Health. Health Issues at a Glance*. Retrieved from https://learnaboutsam.org/public-health/, accessed on January 26, 2015

There is an ongoing debate in the United States: Which is more harmful to society, marijuana or marijuana law? In the last 30 years, about 10-million Americans have been arrested on marijuana charges, many serving up to 30 years for simple possession of marijuana.[7]

Euthanasia is another public health controversy. There is a lot of debate in the media on euthanasia. Political parties, communities, and the courts are actively involved. Euthanasia is a deliberate intervention undertaken to end one's life so as to relieve the person from suffering. Death by euthanasia raises moral, ethical, and legal issues of ending one's life.

Euthanasia laws are different in different countries. We give below an illustration of the Euthanasia law in India.

[7]Rosenthal, E. D., Kubby, S. 2003. *Why Marijuana Should be Legal*. New York: Running Press.

An Illustration: Euthanasia: Aruna Shanbaug

Aruna Shanbaug, while working as a junior nurse in the KEM Hospital, Mumbai, India was sexually assaulted by an attendant in 1973, and went into a coma. Since then, Aruna has been living in a vegetative state. A plea for euthanasia was filed by her friend in 2009 after Aruna had been in a vegetative state for 36 years. This plea was turned down by the Supreme Court of India after getting a report on her medical condition from the hospital. At the same time, the Court concluded that Aruna met "most of the criteria of being in a permanent vegetative state" and laid out guidelines for passive euthanasia. According to these guidelines, passive euthanasia involves the withdrawing of treatment or food that would allow the patient to live:

Causing the death of a person, who is in a permanent vegetative state with no chance of recovery, by withdrawing artificial life-support, is only an "omission (of support to life)" and "not an act of killing".

Aruna continued to be in KEM hospital in a vegetative state, being looked after by the nursing staff. Unfortunately, she passed away on May 18, 2015.

Sources: http://en.wikipedia.org/wiki/Aruna_Shanbaug_case

Supreme Court of India: Aruna Ramchandra Shanbaug vs. Union of India & Ors on March 7, 2011.

Bench: Markandey Katju, Gyan Sudha Misra, Accessed on August 14, 2104

Passive euthanasia refers to the act of letting a terminally ill patient who is in a vegetative state to "die with dignity" by stopping an ongoing medical treatment with the specific intent of ending the patient's life. An example of this is removing a coma patient from life support.[8]

Active euthanasia refers to the act of taking specific steps toward ending the patient's life. An example of this is lethal injection.

Euthanasia is NOT assisted suicide. Euthanasia is a deliberate inter-

[8]The two key inputs needed to sustain life in the terminally ill are ventilator support to help respiration and medicines to maintain blood pressure. The intensity of both is either reduced or withdrawn to allow life to ebb away. Doctors say giving this practice a legal framework is important to ensure death with dignity: http://www.indiankanoon.org/doc/235821/, accessed on September 17, 2014.

vention to end one's life. Assisted suicide is to provide information to another person on the means of ending life for him/her to choose that method to end his/her life (commit suicide).

1.7 Public Health Hazards

Let us understand the economic burden of Tobacco. Tobacco is public health hazard No. 1. Tobacco contains more than 19 known cancer-causing chemicals, called "tar." Tobacco is an addictive substance because it contains the chemical nicotine. Tobacco is harmful to health, yet the global tobacco industry continues to grow. The globalisation of tobacco marketing, trade, research, and industry influence pose a major threat to public health worldwide. It is well known that tobacco consumption is a major risk factor for noncommunicable diseases, namely, cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes. Yet, the tobacco industry continues to grow, citing the employment opportunities it provides to an estimated 100-million workers worldwide.

Tobacco use is the number-one cause of preventable death in the United States. The landmark 2009 law "The Family Smoking Prevention and Tobacco Control Act," which granted the Food and Drug Administration the authority to regulate the manufacturing, marketing, and sale of tobacco products, is a bold decision by the U.S. government to address the enormous public health problem posed by tobacco use.

An Illustration: Judgment by a Florida State Jury: United States

Tobacco Firm Asked to Pay Whopping $23 Billion to Cancer Victim's Wife

World | Agence France-Presse | **Updated: July 20, 2014 21:38 IST**
Associated Press

Florida: A Florida state jury has ordered the RJ Reynolds Tobacco Company to pay $23.6 billion in punitive damages to the wife of a long-time smoker who died of lung cancer, attorneys said. Friday's

verdict, seen as one of the largest for a single plaintiff in Florida history, also awarded more than $16 million in compensatory damages to the estate of Michael Johnson Sr.

During the 4-week trial, lawyers for Johnson's widow Cynthia Robinson argued that RJ Reynolds was negligent in informing consumers of the dangers of consuming tobacco and thus led to Johnson contracting lung cancer from smoking cigarettes. They said Johnson had become "addicted" to cigarettes and failed multiple attempts to quit smoking. The Escambia County jury returned its verdict after some 15 hours of deliberations. RJ Reynolds took a calculated risk by manufacturing cigarettes and selling them to consumers without properly informing them of the hazards," Robinson's lawyer Willie Gary said in a statement.

"As a result of their negligence, my client's husband suffered from lung cancer and eventually lost his life. We hope that this verdict will send a message to RJ Reynolds and other big tobacco companies that will force them to stop putting the lives of innocent people in jeopardy." RJ Reynolds plans to appeal the court decision and verdict, according to the Vice President and Assistant General Counsel J. Jeffery Raborn (RJ Reynolds Tobacco Company vows to fight $23.6 Billion in damages). He charged that the landmark award was "far beyond the realm of reasonableness and fairness" in a statement. RJ Reynolds is "confident that the court will follow the law and not allow this runaway verdict to stand," Raborn added, calling the damages "grossly excessive and impermissible under state and constitutional law."

Below, we describe a case study to highlight the economic burden of tobacco in India.

An Illustration: Economic Burden of Tobacco, India

Tobacco industry is targeting the low- and middle-income countries who account for almost 75% to 80% of global consumption. If the current consumption trends continue, it is estimated that approximately 1 billion people will die from tobacco use during the 21st century.

India is the third largest producer (after China and United States) and the fourth largest consumer of tobacco in the world. The Indian tobacco industry employs around 25 million people. As per a recent report of the Ministry of Health and Family Welfare, Government of India, the total economic burden attributable to tobacco in the year 2011 was estimated at ` 1,045 billion, or equivalently U.S. $ 22.4 billion, of which:

Direct material cost of treating tobacco-related diseases	= Rs. 168 Billion
Indirect morbidity costs	= Rs. 147 Billion
Indirect mortality costs of premature death	= Rs. 730 Billion

The estimated economic burden of tobacco at Rs. 1,045 billion accounted for almost 1.16% of the Gross Domestic Product (GDP), which was 12% more than the combined state and central government expenditures on health in 2011–12. The total central excise revenue from all tobacco products amounted to only 16% of the economic costs of tobacco.

There is a need to frame a comprehensive tobacco policy, tobacco taxation policy, enhancing public awareness about the dangers of tobacco consumption and the implementation of the WHO framework on Tobacco Control and Tobacco Control Laws.

Is the tobacco industry violating its obligations on corporate social responsibility?

Sources: Ministry of Health and Family Welfare, Government of India. 2014. Economic burden of tobacco-related diseases in India. Retrieved from http://www.searo.who.int/india/topics/tobacco/economic_burden_of_tobacco_related_diseases_in_india_executive_summary.pdf, accessed on January 31, 2014

1.8 Core Functions of Public health

The core functions of public health are:

- Assessment Function
- Policy and Plan Development function, and
- Assurance function

The assessment function sets the agenda for policy development. The process of developing a public policy requires producing evidence-based recommendations and political skill to get the public health policy accepted by the target community. Recall the failure of Dr John Snow in getting public support for his evidence-based theory on the cholera outbreak in London. We have also seen how the George W. Bush administration consistently sought to undermine the scientific evidence provided by the U.S. NAS on greenhouse gases.

The "Policy and Plan Development" function enables policy formulation and developing a plan to achieve policy goals and objectives. For example, evidence on the declining sex ratio in India led to a policy by the Government of India to ban Prenatal Sex Determination to stop female feticide. International pressure following the death of Savita Halappanavar in Ireland led the government to change the earlier policy on abortion and made abortions legal under medical advice with effect from July 2013.

The assurance function focuses on Implementation, Monitoring, and Control/interventions. The Family Smoking Prevention and Tobacco Control Act in United States granted the Food and Drug Administration to regulate the manufacturing, marketing, and sales of tobacco products to address enormous public health problems by tobacco use. Similarly, the PNDT act passed by the Government of India to ban female feticides gave powers to the government health officers to take severe legal actions against the offenders.

1.9 Conclusion

In this chapter, we have brought to your attention, an illustrative list of public health issues from various countries. We have highlighted individual rights, political issues, controversial issues, and health hazards. As discussed, public health laws, like any other laws, keep getting modified so as to address the growing needs of various communities. We therefore request the readers to follow public health debates in the media to be in touch with the subject.

CHAPTER 2

Public Health: Management Challenges

2.1 Public Health Economics

Some may argue that health care is an obligation of any government. While health is a political priority in many developed countries, it is not so in many developing countries. One of the indicators of assessing the political commitment of any government is its share in the country's total health expenditure.

Below, we provide a comparison of government health expenditure by developed nations (the OECD[1] group of developed economies, as an illustration) and the developing nations (the BRICS[2] group of emerging economies, as an illustration).

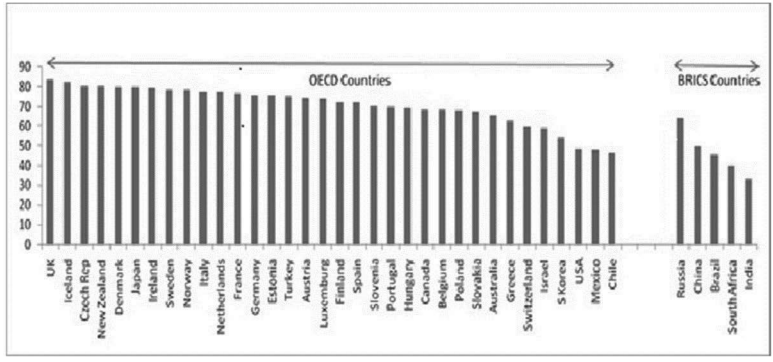

Figure 2.1 Government's Share of the Total Health Expenditure: 2012

Source: The World Bank website: http://www.worldbank.org/

[1]Organization of Economic Cooperation and Development (OECD) consists of 34 economically developed countries. This group accounts for almost 70% to 75% of the global GDP.

[2]BRICS represents a group of five developing economies, namely, Brazil, Russia, India, China, and South Africa. This group accounts for almost 15% to 20% of the global GDP.

It can be seen from Figure 2.1 that the share of health spending by the governments in the OCED group of developed countries is in the range of 60% to 75%, while the governments in the BRICS group of developing economies spend much less on health. Government of India's share at 30% of the country's total spending on health is the least among the BRICS group of developing countries. India ranks 171 among the 191 World Health Organization (WHO) countries on government health spending. The Indian health sector is dominated by the presence of the private health sector.

Public Health Expenditure[3] is the term commonly used in the literature to denote government expenditure on health. Health expenditure by any government includes the expenditure on public health (prevention of diseases and promotion of healthy life) as well as the expenditure on tertiary medical care. In many developing countries, the government expenditure on tertiary care is very high, leaving very little finance (usually 10% to 20 % of total government funds) for public health (prevention of diseases and promoting good health). Countries where the government share of health spend is high, tend to have good health system performance indicators. The World Health Report on Health Systems[4] brings out the gap on the overall health system performance between developed nations and developing nations.

As per the WHO report on Macroeconomics and Health,[5] critical challenges faced by the health system in developing countries are:

(i) Scaling up of financial resources and
(ii) Overcoming the nonfinancial barriers

in the delivery of public health services.

The above observations raise important questions on the management capacity of the health system to deliver good quality services, by

[3]Please note that the term "Public health expenditure" is used in the literature to denote government health expenditure. It includes government expenditure on both public health (prevention of diseases and promoting healthy life) and curative care.
[4]World Health Organization. 2000. *The World Health Report – Health Systems: Improving Performance*. Retrieved from http://www.who.int/whr/2000/en/
[5]Sachs, J. 2001. *Macroeconomics and Health: Investing in Health for Economic Development.* Report of the Commission on Macroeconomics and Health, World Health Organization.

overcoming the nonfinancial barriers. This is the topic of discussion in the next section on the management capacity of health systems.

2.2 Health System Management Capacity

The management capacity of a health system is the capacity of the health system to plan and deliver health care services effectively and efficiently.

Effective delivery indicates the ability of the health system to deliver high-quality services as per requirement. It should bring about desired outcomes and make a significant difference to people's lives in the ways envisaged in the policy.

Efficient delivery indicates the ability of the health system to deliver effective services with minimum cost through optimal utilization of health system resources. Please note the emphasis on effective service delivery for achieving efficiency.

The management challenges therefore include:

- **Policy Development:** Capacity to develop an evidence-based policy process that indicates a clear understanding of the magnitude, nature, and complexity of managing service delivery.
- **Strategic Planning:** Capacity to identify a strategic plan based on the strengths and weaknesses of the health system to assess the resource requirements for service delivery; resources include (i) financial resources, (ii) human resources, (iii) materials, and (iv) medical equipment and devices.
- **Operational Planning:** Capacity to generate a detailed operational plan to take the strategic plan for implementation. The operational plan should ensure steps taken to overcome the nonfinancial barriers in service delivery.
- **Implementation:** Capacity to implement the operational plan for serviced delivery. Care should be taken to ensure effective and efficient service delivery.
- **Monitoring and interventions (surveillance):** Capacity to establish a good monitoring/surveillance system to trigger interventions as and when necessary. Please realize that monitoring without interventions is a waste of resources.

An assessment of the management capacity of a health system should therefore assess the following attributes of the health system for policy development, planning, implementing, and monitoring[6] the delivery of effective and efficient health services as per the national health policy.

(i) Policy, goals, and objectives: Is there a clear statement of the National health policy goals and objectives? An evidence-based policy would assess the government's understanding of the challenges in managing the service delivery to achieve policy goals.

(ii) Planning and Implementation: How well do the existing systems for resource planning, implementation, and monitoring facilitate the delivery of health care services? This would assess the government's preparedness to overcome the nonfinancial barriers (see Section 2.1) in managing the service delivery.

(iii) Organizational structure: How well does the organizational structure support management decision making for effective and efficient service delivery? An organizational structure (also known as organogram) displays the reporting relationship, responsibility, and accountability of the health program managers and thereby supports management decision making at policy, planning, and implementation levels.

(iv) Health delivery structure: An assessment of the structure of the health care delivery system would identify the strengths and weaknesses of the system, and thereby assess the managerial assistance required from external stakeholders for service delivery. Reliance on Public Private Partnership to augment internal resources is a common approach adopted by the health system managers in many developing countries.

2.3 Management Challenges

The management challenges include:

- Community needs assessment to plan resource requirements

[6]Ramani K. V., Mavalankar, D. 2009. Management capacity assessment for national health programs: a study of RCH program in India. *Journal of Health Organization and Management,* volume 23, no. 1, pp. 133–142.

- Public health communication to market public health services
- Managing service delivery by overcoming the nonfinancial barriers
- Surveillance/monitoring and interventions to monitor resource consumption to achieve policy goals.

2.3.1 Community Needs Assessment

Any manager should have an assessment of the demand for his/her products and services and a profile of his/her customers (KYC: Know Your Customers) to initiate the process of planning for resources to meet the demand. Similarly, public health managers need an assessment of the community needs for their services and a socioeconomic profile of the community they wish to serve.

Community needs assessment for public health services is different from the needs assessment for medical services. For medical care, patients visit health facilities when they fall sick. These are individual demands placed on the health care delivery system, based on individual needs. On the other hand, demand for public health services focus on community needs and not individual needs. Distinguishing between individual needs and the wider needs of a community is important in the planning and provisioning of public health services.

Community Needs assessment ⟶ Planning for service delivery

Community needs assessment is usually done through a survey of sample households in the community. It is equally necessary to seek inputs from other stakeholders also, such as community leaders, private health care providers, elected representatives of the community, and so on. As an illustration, we show below in Figure 2.2, the community needs assessment for improving urban health services in a large city in India (See the case study on urban health, Chapter 4 for details).

Community needs assessment for certain public health services could be difficult; for example, assessment of the needs of people with mental illness in a community or the needs of people living with HIV/AIDS. On the other hand, community demand for improved maternal and child health services may not sound a difficult task. But the logistics in

locating the houses where maternal and child health services are needed could be daunting, since many developing countries do not maintain complete birth and death registers.

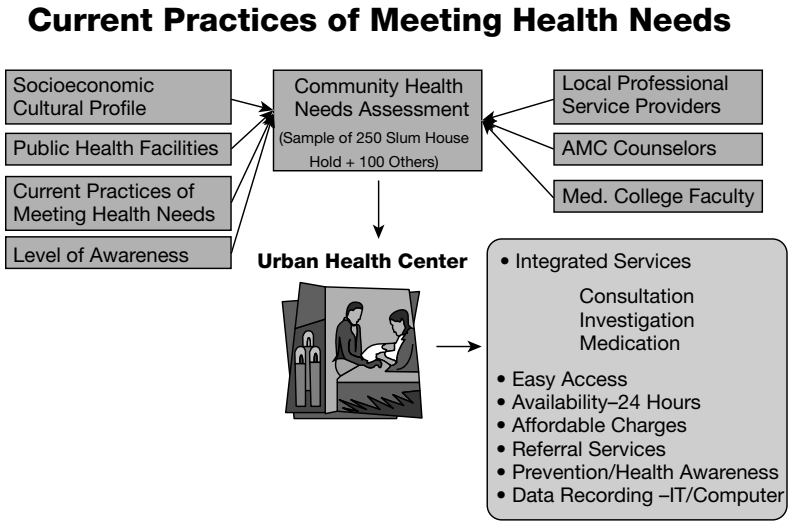

Figure 2.2 The above figure summarises the responses from different stakeholders on the health needs of the Vasna community in Ahmedabad, Municipal Corporation (AMC). We conducted a sample survey of slum households in Vasna, and the private health facilities they visited frequently. We also held meetings with a select group of (i) healthcare service provides in AMC (ii) AMC counsellors, and (iii) AMC medical college faculty members working on urban health projects to seek their independent inputs. Subsequently, we shared these findings with the AMC Commissioner and his officers from the AMC health department.

2.3.2 Public Health Communication

Health communication plays an important role in creating awareness in the community and influencing their health-seeking behavior. An understanding of the sociocultural and demographic characteristics of the target population (KYC: Know Your Customers) is necessary to design effective communication strategies to effectively reach out to the community. An excellent example of a successful health communication strategy is the strategy adopted by the Government of India to invite popular Bollywood actors and Cricket players for polio eradication campaigns (For more details, see Chapter 7).

Public health communication should address the basic objectives of public health, namely, prevention of diseases and promotion of a healthy life style.

Disease prevention efforts are classified under three categories:

(i) Primary Prevention: Primary prevention efforts focus on prevention measures before the onset of any disease. Immunization is a good example of primary prevention. If a sufficient number of people in a community are immunized (herd immunity) against vaccine-preventable diseases (VPD), the chances of occurrence of those diseases in the community would be very negligible.

(ii) Secondary Prevention: Secondary prevention efforts focus on reducing the severity and thereby the consequences of the disease or injury through early detection and treatment, especially for those who are leading high-risk lives. Early detection of HIV could lead to a better quality of life.

(iii) Tertiary Prevention: Tertiary prevention efforts focus on disease management once the disease has progressed beyond secondary prevention. The goal is to give treatment, rehabilitation, and palliative care. Mental health counseling for rape victims is a good example of tertiary prevention.

Public health communication should be aimed at awareness generation/creation and behavior change. Information, Education, and Communication (IEC) and Behavior Change Communication (BCC) activities play very crucial roles in creating/generating awareness of public health services, and influencing the community to change their behavior. An effective health communication strategy for awareness and behavior change is critical for the success of any public health service.

Awareness generation alone is not enough; behavior change is the ultimate goal. Many IEC program managers tend to claim success in generating awareness, but fail to achieve behavioral change. Reasons include faulty design of IEC program, methodology used to measure/estimate IEC program success, ineffective delivery of IEC/BCC program, and so on. A few examples are given below from the Indian Health Sector to highlight such issues:

(i) Child health: India's 3rd National Family Health Survey[7] (NFHS) shows that more than 70% of mothers were aware of dehydration symptoms in their children. Unfortunately, only 30% of the mothers administered Oral Rehydration Solution (ORS) as a preventive measure against severe dehydration. Death from diarrheal diseases still account for 15-20% of all child deaths. Do you expect the mothers not to act, if they were aware of dehydration symptoms in their children?

(ii) Population Stabilization: It is well documented that the Family Planning Program of the Government of India has not achieved desired success. Female sterilization still accounts for a vast majority of family planning methods, as men and women resist behavioral changes. Is this due to lack of awareness or only resistance to behavior change?

IEC activities should be designed on an understanding of the social, economic, cultural, and demographic profile of the community, since the determinants of health are likely to be different across segments (communities) of populations. BCC programs should encompass a broad range of activities that focus on the individual, community, and environmental influence on behavior. Personal choices, beliefs, and the social and physical environments surrounding the individuals can shape their behavior. Any IEC/BCC activity on social behavior is likely to be very controversial, since many health conditions are caused by risk behaviors.

BCC is a tool to change the behavior of those indulging in high-risk behavior to a risk-reducing behavior. BCC components must evolve constantly to meet the changing needs of target populations. As per Family

[7]**National Family Health Survey (NFHS)** is a large-scale, multi-round survey under the Ministry of Health and Family Welfare, Government of India, and is conducted by the International Institute for Population Sciences (IIPS), Mumbai. NFHS is funded by the United States Agency for International Development (USAID) with supplementary support from United Nations Children's Fund (UNICEF). The First National Family Health Survey (NFHS-1) was conducted in 1992–93, NFHS-II was conducted in 1998–99, NFHS-III in 2005–2006, and NFHS-IV (2014–15) started toward the end of 2014.

Health International (FHI)[8], "BCC is an interactive process with communities to develop tailored messages and approaches using a variety of communication channels to develop positive behavior, promote and sustain individual, community, and societal behavior change, and maintain appropriate behaviors." The role of BCC, according to FHI, is to:

- Increase knowledge
- Stimulate community dialogue
- Promote essential attitude change
- Reduce stigma and discrimination
- Create a demand for information and services
- Advocate for effective approaches to the epidemic
- Promote services for prevention, care, and support
- Improve skills and sense of self-efficacy

A Framework for BCC Design in HIV/AIDS

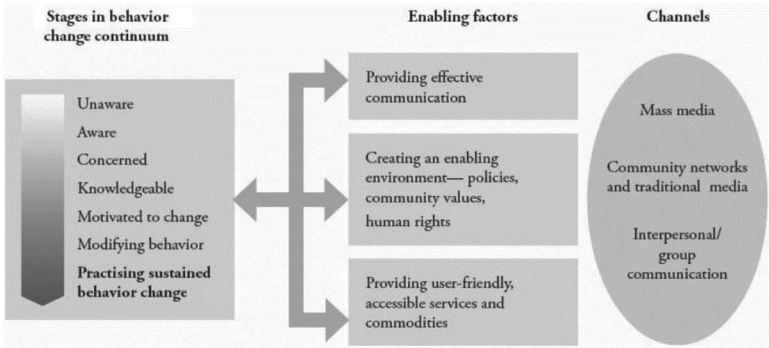

Figure: 2.3 Conceptual framework for BCC in HIV/AIDS programs, as an illustration.

Source: National IEC/BCC strategic framework for HIV/AIDS Program, NACO, India 2004

Creating awareness and managing the transition from awareness generation to behavioral change are very challenging. Public health communications are essentially interventionist in nature, demanding behavioral change by raising awareness.

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[8]Family Health International Institute for HIV/AIDS. September 2002. *Behavior Change Communication for HIV/AIDS: A Strategic Framework*. Arlington: Family Health International.

2.3.3 Managing service delivery

Public health managers face several challenges in service delivery. Let us take the example of complete immunization.

Complete immunization of children against VPD is a public health service in any country. Complete immunization aims at vaccinating 80% to 85% of children to attain "herd immunity." It is believed that if a significant percentage of a population or community ("herd") is vaccinated against vaccine-preventable infectious diseases, the chances of any outbreak of those infectious diseases in the community are very low.

As per UNICEF data,[9] about 22 million infants worldwide have not received the three recommended doses of diphtheria, tetanus, and pertussis containing vaccine (DTP3), and a single dose of measles-containing vaccine, in the year 2013. As a result, infant mortality from the above diseases continues to be high; many deaths could have been prevented from immunization. As per WHO,[10] an estimated 145,700 measles deaths occurred globally in 2013; about 400 deaths every day or 16 deaths every hour.

Effective and efficient delivery of immunization services requires an assessment of the demand for services. Creating awareness about the benefits of immunization against VPD, and motivating the parents to get their children vaccinated are important modules of health communication. Parents should know where and when services are available and the schedule of immunization. This would provide an assessment of the demand for each vaccine. Poor registration of births and deaths in developing countries makes it very difficult to plan effective service delivery.

Cold chain management is one of the most important planning activities in any immunization program.[11] Cold chain refers to the storage and transportation of equipment that keep the vaccines within a low temperature range (2–8 degrees centigrade) from the manufacturing

[9]Source:http://data.unicef.org/child-health/immunization, accessed on October 3, 2014

[10]Measles, Fact sheet N°286, Reviewed February 2015; http://www.who.int/mediacentre/factsheets/fs286/en/, accessed on October 23, 2014

[11]National Cold Chain Assessment, India, July 2008. UNICEF; http://www.unicef.org/india/National_Cold_Chain_Assessment_India_July_2008.pdf, accessed on October 27, 2014.

unit to the immunization sites in a village, so as to ensure potency of the vaccines. In general, vaccine stability and potency are both temperature-dependant.[12]

In order to understand the magnitude, complexity, and nature of management challenges, let us look at the Universal Immunization Program (UIP) of the Government of India (Table 2.1).

Table 2.1 UIP Immunization Schedule

		Time of Birth	6 wk	10 wk	14 wk	9 mo
Primary Vaccination	BCG	X				
	OPV	X	X	X	X	
	DTP		X	X	X	
	Hepatitis B		X	X	X	
	Measles					X
Booster Doses						
	DTP + OPV	18~24 mo				
	DT	5 yr				
	Tetanus Toxoid	10 yr, 16 yr				
	Vitamin A	9, 18, 24, 30, 36 mo				
Tetanus Toxoid (PW): 1st dose as early as possible during pregnancy after 1st trimester						
BCG: Bacillus Calmette-Guérin (vaccine against TB); OPV: Oral Polio Vaccine (vaccine against Polio); DTP: Diphtheria, Tetanus and Pertussis (vaccine against whooping cough).						

Source: UIP, Dept of Family Welfare, MoHFW, GoI

India's immunization program is one of the largest in the world in terms of vaccines used, number of beneficiaries, number of immunization sessions organized, the geographical spread, and the diversity of areas covered. With 25 million childbirths every year, India spends more than US $ 500 million on its national immunization program. Figure 2.4 shows the cold storage logistics system in India.

[12]Murhekar, M. V., Dutta, S., Kapoor, A. N., et al. 2013. Frequent exposure to suboptimal temperatures in cold-chain system in India: results of temperature monitoring in 10 states. *Bulletin of the World Health Organization*, volume 91, pp. 906-913. Retrieved from http://www.who.int/bulletin/volumes/91/12/13-119974/en

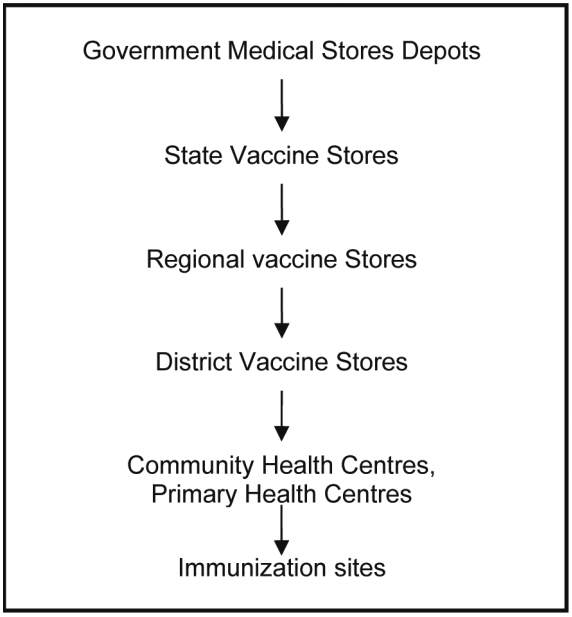

Figure 2.4 The Vaccine Cold Storage Logistics System in India

The Ministry of Health and Family Welfare, Government of India, receives vaccines from the vaccine manufacturers in its primary vaccine stores, called Government Medical Stores Depots (GMSD) located at Karnal (near Delhi), Mumbai, Chennai, and Kolkata.[13] Vaccines are then transported to state vaccine stores, and through the divisional and district vaccine stores, it reaches the last storage point of CHC[14] (Community Health Center) or PHC[15] (Primary Health Center). Vaccines have to be stored at temperatures ranging from +2 to + 8 degrees centigrade, except Polio vaccines, which require storage in the temperature

[13]Murhekar, M. V., Dutta, S., Kapoor, A. N., et al. 2013. Frequent exposure to suboptimal temperatures in cold-chain system in India: results of temperature monitoring in 10 states. *Bulletin of the World Health Organization*, volume 91, pp. 906–913. Retrieved from http://www.who.int/bulletin/volumes/91/12/13-119974/en

[14]In India, a Community Health Center (CHC) serves a population of about 100,000. CHCs have 20 to 30 beds and offer outpatient and inpatient services in internal medicine, general surgery, orthopedics, gynecology, and pediatrics.

[15]In India, a Primary Health Center (PHC) serves a population of about 30,000. PHCs have 4 to 6 beds and provide primary health care services with a focus on maternal and child health.

range -25 to -15 degrees centigrade. Further transportation from CHC/PHC to the immunization sites is done by vaccine carriers who are contracted by the district health department. On immunization days, these vaccine carriers carry vaccines in special cold boxes to the immunization sites in the morning and bring back the unused vaccines to the vaccine stores in the evening. Usually, the Anganwadi centers[16] are used as immunization sites in India.

The magnitude and complexity of cold chain management is unbelievable, given that India has about 5,000 CHCs, 25,000 PHCs, and 1.4 million Anganwadi centers.

The immunization status in India in 2013 as per the UNICEF Coverage Evaluation Survey[17] is given below. It is unfortunate that full immunization has reached only 61% of all children in India, even as late as 2013, as can be seen from Table 2.2.

Table 2.2 Immunization Status in India: 2013

Immunization	Percentage Covered (%)
BCG	86.9
OPV3	70.4
DTP 3	71.5
Measles	74.1
HEP B3	58.9
Fully immunized	61.0
HEP B3: Hepatitis B, the number 3 stands for 3 doses. Similarly DTP 3 means 3 doses.	

Source: Coverage Evaluation Survey, 2009, Ministry of Health and Family Welfare, GoI

[16]*Anganwadi* is a government-sponsored child care and mother care center in India. It caters to children in the 0 to 6 age group. The word means "courtyard shelter." An estimated 1.4 million Anganwadi (or mini-Anganwadi) centers are operational in India under the Ministry of Women and Child development.

[17]National Fact Sheet. Coverage Evaluation Survey. 2009. Ministry of Health and Family Welfare, Government of India; http://www.unicef.org/india/National_Fact_Sheet_CES_2009.pdf, accessed on October 7, 2014

Monitoring (and control) is an important activity in any immunization program. A well-designed monitoring program would (i) facilitate[18] complete immunization with active follow-up of the dropouts, (ii) ensure that vaccines and injection equipment are delivered in correct quantity and on time, (iii) trigger timely interventions to address postimmunization adverse events, and (iv) build confidence in the community.

Lack of management capacity (poor organizational structure, lack of planning, shortage of staff at all levels, complexities of cold chain management, and weak monitoring) is often cited as the reason for underachievement of the goals of the Government of India's Universal Immunization program.[19]

2.3.4 Monitoring and Control, Surveillance

Monitoring of the implementation process involves an analysis of resource utilization *vis-à-vis* the target for achieving the policy goals, and making interventions as and when necessary. Unfortunately, this is a weak link in many public health programs, since many governments undertake periodic evaluation instead of continuous monitoring of public health programs. Program/project monitoring provides a continuous assessment of an ongoing program/project and triggers interventions as and when needed. Program/project evaluation, on the other hand, is an audit function where analysis of program/project progress is done at predefined intervals of time such as every 6 months or yearly, and allows interventions only at the end of each interval of the audit process. Monitoring is a management requirement, while evaluation is a statutory obligation.

Surveillance:[20] "Public health surveillance is the continuous and systematic collection, analysis, and interpretation of health-related data for

[18]World Health Organization. *Training for Mid-Level Managers (MLM). Monitoring the Immunization System*. Retrieved from http://www.who.int/immunization/documents/MLM_module5.pdf

[19]Mavalankar, D., Ramani K.V., et al. 2011. *Universal Immunization Program in India*. Study commissioned by the Government of India, Indian institute of Management, Ahmedabad, India.

[20]Public Health Surveillance; http://www.who.int/topics/public_health_surveillance/en/, accessed on November 3, 2014.

planning, implementation, and evaluation of public health practice. Surveillance can (i) serve as an early warning system for public health emergencies, (ii) document the impact of an intervention or track the progress toward the stated goals, and (iii) monitor and clarify the epidemiology of health problems, to allow priorities to be set and to inform public health policies and strategies";

Surveillance marked a strategic shift in India's polio eradication efforts. "The setting up of a surveillance system proved to be the most important milestone in the journey of polio eradication in India as it formed the backbone of the eradication drive by helping identify areas and populations that were at risk and the type of poliovirus circulating in different areas besides measuring progress," Dr Nata Menabde, WHO Representative to India.[21]

2.4 Conclusion

We end this section by summarizing in Figure 2.5 the relationship between the core functions of public health (discussed earlier in Chapter 1) and management decisions.

The "assessment" function of public health sets the agenda for policy development, the "policy and plan development" function enables policy formulation and developing a plan to translate the policy goals into deliverables, while the "assurance" function focuses on implementation, monitoring, and control/interventions.

To summarize, public health management focuses on effective delivery of public health services through optimal utilization of resources. As mentioned in the WHO report,[22] scaling up of financial resources and overcoming the nonfinancial barriers in the delivery of public health services are the critical management challenges faced by developing nations. Poor infrastructure planning, unsatisfactory training of health staff at all levels, inadequate organizational structure, and lack of human resources are often mentioned as the reasons for underachievement of the policy goal in developing countries.

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[21]Surveillance, at the Heart of India's Polio Success Story; http://www.searo.who.int/india/topics/poliomyelitis/surveillance/en/, accessed on November 3, 2014.

[22]Sachs, J. 2001. *Macroeconomics and Health: Investing in Health for Economic Development*. Report of the Commission on Macroeconomics and Health, World Health Organization.

Management is all about planning (strategic planning and operational planning) and implementation of project activities to ensure effective and efficient utilization of resources in achieving the policy goals.

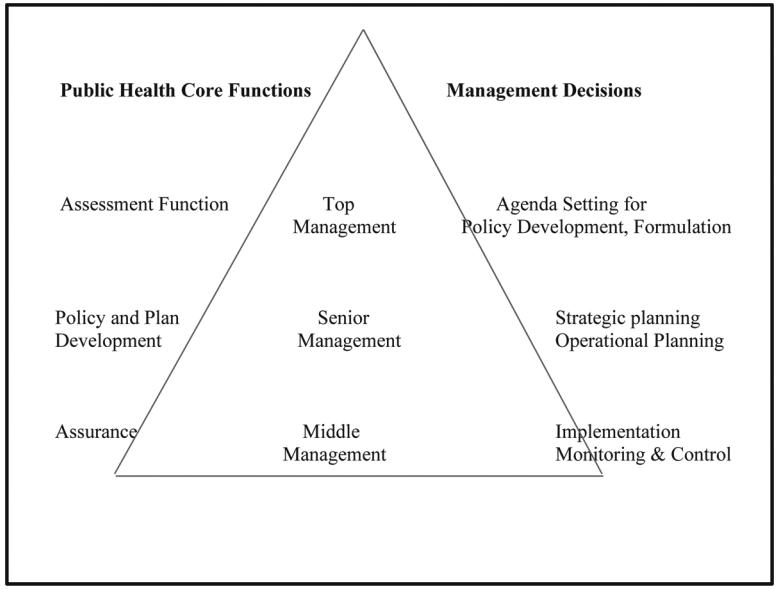

Figure 2.5 Core Functions of Public Health and Management Decisions

CHAPTER 3

Public Health Programs: Policy Development, Planning, and Implementation

In this chapter, we give a few examples of public health programs to explain the role of policy development, strategic planning, operational planning, and implementation in managing public health programs.

3.1 Policy Development

Mini case: United Nations Program on HIV/AIDS (UNAIDS) policy on HIV/AIDS Programs

The UNAIDS Gap Report 2013 pointed out that 19 million of the 35 million people living with HIV globally in 2012 are not aware that they are HIV positive.[1]

The UNAIDS report on the global AIDS epidemic 2013 pointed out that gender inequalities and HIV-related stigma and discrimination persist as major obstacles to an effective HIV response in all parts of the world.[2]

Phase 1: The first two decades of HIV/AIDS (1980–1999): In 1981, the U.S. Center for Disease Control reported an unusual virus in a group

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[1]The Gap Report, UNAIDS; http://www.unaids.org/en/media/unaids/contentassets/documents/unaidspublication/2014/UNAIDS_Gap_report_en.pdf, accessed on July 21, 2014

[2]Global Report: UNAIDS Report on the Global AIDS Epidemic 2013; http://www.unaids.org/sites/default/files/media_asset/UNAIDS_Global_Report_2013_en_1.pdf, accessed on July 22, 2014.

of homosexuals. By 1983, it became clear that both homosexuals and heterosexuals carry this virus. In 1986, the International Committee on Taxonomy of Viruses named the virus HIV.[3] In February 1987, the World Health Organization (WHO) launched *The Global Program on AIDS* to raise awareness and formulate evidence-based policies to fight this infectious disease. The policy focused on HIV prevention through effective health communication to generate awareness, influence behavioral changes, and champion the rights of those living with HIV.

By 1995, an estimated 3 million people had died from AIDS, 18 million people were living with HIV, and 3.3 million new infections were reported. UNAIDS[4] was born on January 1, 1996 to address the enormous challenges from the HIV/AIDS epidemic. This epidemic raised widespread social and economic consequences in many walks of life. Countries with a large number of people living with HIV/AIDS faced serious challenges—productivity declined, tax revenues dropped, while pressures on health services increased. Stigma and discrimination practices led to loss of employment for people living with HIV/AIDS, and denying of school admissions for their children.

Phase 2: MDG and beyond: The millennium summit in 2000 declared specific targets for addressing the HIV issues. The Millennium Development Goal MDG 6 on HIV/AIDS was as follows:

Target 6A: Have halted by 2015 and begun to reverse the spread of HIV/AIDS

Target 6B: Achieve by 2010, universal access to treatment for HIV/AIDS for all those who need it.

The United Nations Political Declaration: The 2011 UN Political Declaration on HIV/AIDS set forth a series of ambitious targets to

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[3]HIV stands for Human Immunodeficiency Virus. It weakens the immune system by destroying important cells that fight disease and infection. HIV lives in body fluids such as blood, semen, breast milk, and vaginal fluids. It is transmitted mostly through sexual intercourse. Tuberculosis (TB) and sexually transmitted diseases (STD) are opportunistic infections of HIV; infections that take advantage of weakness in the immune defenses are called "opportunistic."

[4]UNAIDS. 2008. The First 10 Years; http://data.unaids.org/pub/report/2008/jc1579_first_10_years_en.pdf, accessed on July 22, 2014.

be achieved by 2015, based on the progress made thus far in meeting the MDG 6 goals. Table 3.1 lists these targets and shows the progress made.

Table 3.1 UNAIDS targets and Status report

No.	2011 UN Political Declaration Targets	Status as Per UNAIDS Report 2013[5]
1	Reduce Sexual Transmission of HIV by 50% by 2015	Target achieved among adults and adolescents in some countries
2	Halve the transmission of HIV among people who inject drugs by 2015	Not much progress
3	Eliminate HIV infections among children and reduce maternal deaths	The world has the potential to reach at least 90% of HIV pregnant women with Anti-retroviral Therapy (ART) interventions by 2015
4	Reach 15 million people living with HIV with lifesaving ART by 2015	The world is within reach of providing ART to 15 million people by 2015
5	Halve the tuberculosis (TB) deaths among people living with HIV by 2015	The world is within reach of achieving the 2015 target.
6	Close the global AIDS resource gap	AIDS expenditures remain short of the global target of US$ 22–24 billion in annual financial resources
7	Eliminate gender inequalities and gender-based abuse and violence and increase the capacity of women and girls to protect themselves from HIV	Gender inequalities and harmful gender norms continue to contribute to HIV-related vulnerability
8	Eliminate HIV-related stigma, discrimination, punitive laws and practices	HIV-related stigma and discrimination persist as major obstacles to an effective HIV response in all parts of the world
9	Eliminate HIV-related restrictions on entry, stay, and residence	A few countries, territories, or areas have eliminated restrictions; discriminatory laws still practiced in many countries
10	Strengthen HIV integration	90% countries recognize integration as a core HIV priority, greater efforts are needed.

[5]Source: Global Report: UNAIDS Report on the Global AIDS Epidemic 2013; http://www.unaids.org/sites/default/files/media_asset/UNAIDS_Global_Report_2013_en_1.pdf, accessed on July 22, 2014.

As per the UNAIDS Global report, the most recent statistics pointed toward an estimated 35 million people living with the HIV virus,[6] 2.1 million new infected cases, and 1.5 million AIDS deaths in the year 2013. Between 1995 and 2013, the number of people living with HIV/AIDS almost doubled from 18 million to 35 million. But the number of new infections reduced by almost 40% during the same period from 3.3 million to 2.1 million new infections.

Unfortunately, IEC/BCC programs failed to address gender inequality, stigma, and discrimination issues facing the key populations. Key populations include any group which, because of stigma or discrimination, could not access health care; women and girls, men having sex with men, people who injected drugs, migrant workers, prisoners, and others—who were disproportionately affected by AIDS, tuberculosis (TB), and Malaria.

Examples of governmental discrimination:[7]

- In 2014, Uganda passed a bill to once again enforce anti-homosexuality legislation.
- The Ugandan Armed Forces reject recruitment of persons who test positive for HIV on the basis that their bodies will be too weak. However, they will not dismiss current employees who test positive.
- The Chinese government enforces a compulsory HIV test for anyone applying for a study/work visa longer than 6 months.
- The UK legal system can prosecute individuals who pass the virus to somebody else, even if they did so without intent.

[6]UNAIDS report 2013 lists nine countries in the world with more than 1 million HIV cases. These countries, namely, South Africa, Nigeria, India, Kenya, Mozambique, Tanzania, Uganda, United States, and Zimbabwe account for 50% of HIV cases globally. South Africa, Nigeria, and India account for almost one-third the total number of HIV cases globally.

[7]HIV & AIDS Stigma and Discrimination; http://www.avert.org/hiv-aids-stigma-and-discrimination.htm, accessed on August 12, 2014.

UNAIDS Policy to reduce stigma and discrimination:[8]

In 2012, UNAIDS policy to reduce stigma and discrimination recommended that every national HIV response should include key programs to reduce stigma and discrimination and increase access to justice, and thereby act as enablers to the success of HIV prevention and treatment programs. To ensure the inclusion of these programs in national responses, UNAIDS recommended the programs be included in the National Strategic Plans for HIV and incorporated as essential activities in the operational plans.

3.2 Strategic Planning:

Mini Case: United Nations Fund for Population Activities (UNFPA) Strategies for Adolescent Health Programs

The WHO defines adolescence as the period of life which spans 10 to 19 years of age. The age group of 10 to 14 years is considered as "early adolescence," while that of 15 to 19 years is considered "late adolescence." The WHO document on Adolescent Friendly Health Services (AFHS)[9] stated that adolescents were at risk of early and unwanted pregnancy, of sexually transmitted infections including HIV/AIDS, and were vulnerable to dangers of tobacco use, alcohol, and other drugs.

Adolescents go through a phase in which tremendous physical, psychological, and social changes occur. Many developing countries are getting increasingly concerned about the growing number of adolescents who did not complete secondary education and therefore did not have any meaningful employment. People who were not in contact with the education system or the labor market could not develop skills to lead a healthy and productive life.

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[8]Key Programs to Reduce Stigma and Discrimination and Increase Access to Justice in National HIV Responses, UNAIDS 2012. http://www.unaids.org/sites/default/files/en/media/unaids/contentassets/documents/document/2012/Key_Human_Rights_Programmes_en_May2012.pdf, accessed on November 9, 2014.

[9]World Health Organisation. 2002. *Adolescent friendly health services: an agenda for change.* Geneva: World Health Organisation. Retrieved from WHO/FCH/CAH/02.14, accessed on June 2, 2014

Today's adolescents constitute tomorrow's workforce. They could contribute significantly to economic and social development, if their needs are addressed satisfactorily. Otherwise, they could become vulnerable to human rights abuses, particularly in the areas of sexuality, marriage, and childbearing. An uneducated and unskilled adolescent population would be a drain on the national economy. An analysis of the global burden of disease showed that the total number of incident disability adjusted life years (DALY, is a measure of the productivity loss due to morbidity) worldwide is 230 million years in the age group of 10 to 24 years (adolescents and youth), or equivalently 15.5% of total DALYs.[10]

The International Conference on Population and Development (ICPD) in Cairo in September 1994 organized by the United Nations set the agenda for all the 179 member countries to start the process of developing an evidence-based strategy to address the adolescent health issues. It called for action "to encourage children, adolescents and youth, particularly young women, to continue their education in order to equip them for a better life, to increase their human potential, to help prevent early marriages and high-risk child-bearing and to reduce the associated mortality and morbidity" (A/CONF.171/13: Report of the ICPD (94/10/18) (385k), paragraph 6.7[c]). On the reproductive health needs of adolescents, the ICPD agreed on two distinctive objectives: "(a) to address adolescent sexual and reproductive health issues, including unwanted pregnancy, unsafe abortion, and STIs,[11] including HIV/AIDS, through the promotion of responsible and healthy reproductive and sexual behaviour, and (b) to substantially reduce all adolescent pregnancies" (paragraph 7.44). More specifically, it called for countries and the international community to "...protect and promote the right of adolescents to reproductive health education, information and care and greatly reduce the number of adolescent pregnancies" (paragraph 7.46).

The ICPD Beyond 2014 Global Report[12] gave an update of the progress, gaps, challenges, and emerging issues in relation to the ICPD

[10]Gore, F. M., Bloem, P. J., Patton, G. C., et al. 2011. Global burden of disease in young people aged 10-24 years: A systematic analysis. *Lancet*, volume 377, no. 9783, pp. 2093–2102.

[11]STIs stand for Sexually Transmitted Infections.

[12]Framework of actions for the follow-up to the Programme of Action of the International Conference on Population and Development beyond 2014; http://icpdbeyond2014.org/uploads/browser/files/global_review_report_for_uploading_2.pdf, accessed on October 29, 2014.

Program of Action, based on data from member states, alongside inputs from civil society and comprehensive academic research. It highlighted the need to safeguard the rights of young people, invest in their quality education, offer decent employment opportunities, provide effective livelihood skills, and ensure access to sexual and reproductive health and comprehensive sexuality education in order to strengthen young people's individual resilience and create the conditions under which they could achieve their full potential.

Provision of "adolescent-friendly health services" called for services that were accessible, equitable, acceptable, effective, and efficient.[13] Investments in adolescent reproductive and sexual health would reduce maternal and infant mortality rates, incidence of teenage pregnancy, unmet contraceptive needs, incidence of STIs and HIV cases.

UNFPA's contribution to the advancement of adolescents and youth is anchored in five strategic pillars:[14]

- Enable evidence-based advocacy for comprehensive policy and program development, investment, and implementation
- Promote comprehensive sexuality education
- Build capacity for sexual and reproductive health service delivery (including HIV prevention, treatment, and care)
- Take bold initiatives to reach marginalized and disadvantaged adolescents and youth, especially girls
- Promote youth leadership and participation

What was therefore needed was an integrated set of programs that addressed the "whole person" and paid close attention both to the context in which young people lived and to the relevant international standards. Many developing countries found it difficult to translate the above

[13]Adolescent Reproductive and Sexual Health in India: The Need to Focus; http://www.journalyoungmed.com/articles/1/1/adolescent-reproductive.html, accessed on September 5, 2014.

[14]Towards Realizing the Full Potential of Adolescents and Youth; http://www.unfpa.org/resources/unfpa-strategy-adolescents-and-youth, accessed on September 5, 2014.

strategic plan into delivery of adolescent-friendly health services. One of the reasons often mentioned was that no single government department could be identified to play the nodal role to work together across sectors for delivering the complete set of adolescent health services.

3.3 Operational Planning

Mini Case: The WHO Program DOTS for TB Control

TB is an infectious disease, spread from person to person through air, mostly through coughing and sneezing by people who have TB in their lungs or throat. TB is completely curable within 6 to 8 months. When TB patients are not treated properly and completely, some of them develop resistance to anti-TB drugs later in life and may develop multidrug resistant TB (MDR-TB) or extensively drug-resistant TB (XDR-TB).

The WHO declared TB as a global public health emergency in 1993 and initiated the Global TB Control Strategy DOTS program (Directly Observed Treatment-Short Course). The DOTS program aimed at detecting at least 70% of the existing cases of sputum smear–positive cases, and curing at least 85% of these newly detected cases.

The DOTS program has met with a fair amount of success globally in the last 5 to 10 years. The annual global number of new TB cases came down since 2006 and fell 2.2% between 2010 and 2011. In 2011, there were an estimated 8.7 million new cases, of which about 13% involved people living with HIV. Mortality due to tuberculosis fell 41% since 1990 and was trending to globally reach a 50% reduction by 2015. Incidence rates were also falling in all WHO's six regions, except possibly in the African region. Globally, treatment success rates had sustained at or above 85%, which was the WHO target.

The operational plan of the DOTS program called for addressing the following issues:

(i) Political and administrative commitment,
(ii) Good quality diagnosis,
(iii) Supervised treatment,
(iv) Uninterrupted supply of good quality drugs, and
(v) Systematic surveillance and accountability.

Political and administrative commitment is always necessary for any public health program to achieve its goals. Availability of adequate funds and competent human resources for TB care in economically poor countries were major challenges.

Good quality diagnosis called for setting up a wide network of properly equipped laboratories with trained personnel in sputum smear microscopy, and a fully functioning national reference laboratory.

Supervised treatment was essential to take the drugs regularly and complete the treatment, thus achieving cure and preventing the development of drug resistance. Supervision also ensured adherence on the part both of the providers (in giving proper care and support) and the patients (in taking regular treatment).

An uninterrupted supply of good quality drugs for supervised treatment required a well-designed logistics management system in place, so as to plan, procure, distribute, maintain adequate stocks of drugs, and legislation related to drug regulation.

Implementation of the DOTS program has been a major challenge in many developing countries. In the year 2012, about 8.6 million people developed TB and 1.5 million died from the disease, including 320, from HIV-positive people.[1] Approximately 80% of the TB burden was concentrated in 22 high burden countries; India and China together accounted for 44% and the African region another 24% of TB cases in the world (Table 3.2).

Table 3.2 Estimates of TB Burden

S No.	Country	Population	Prevalence Best Estimate	Incidence Best Estimate	Mortality Best Estimate	HIV + Mortality Best Estimate	HIV + Best Estimate
1	China	1,377,065	1,400	1,000	44.0	12	7.3
2	India	1,236,687	2,800	2,200	270.0	42	130.0
3	Indonesia	246,864	730	460	67.0	2.1	7.5
4	Brazil	198,656	120	92	4.9	2.5	16.0
5	Pakistan	179,160	670	410	62.0	1.2	3.8
6	Nigeria	168,834	270	180	27.0	19	46.0

S No.	Country	Population	Prevalence Best Estimate	Incidence Best Estimate	Mortality Best Estimate	HIV + Mortality Best Estimate	HIV + Best Estimate
7	Bangladesh	154,695	670	350	70.0	< 0.1	0.2
8	Russian Fed	143,170	170	130	19.0	1.8	9.3
Sub Total		3,705,131	6830	4822	564	81	220
Global Total		**7,053,684**	**12,000**	**8,600**	**940**	**320**	**1100**

Source: Global Tuberculosis Report. 2013; http://www.stoptb.org/assets/images/countries /GTBCR2013_burden.jpg, accessed on December 14, 2014

Establishing a reliable monitoring and evaluation system with regular communication between the central and peripheral levels of the health system was vital. This required standardized recording of individual patient data, for compilation, analysis, and estimation of indicators to estimate the success of the DOTS program. Indicators could be used at the facility level to monitor treatment outcomes, at the district level to identify local problems as and when they arose, at the provincial or national level to ensure consistently high-quality TB control across geographical areas, and nationally and internationally to evaluate the performance of each country.

TB remains a leading killer globally even today. Increase in the number of MDR-TB cases over the last few years raises serious issues on the operational planning of the TB control program.

3.4 Implementation, Monitoring, and Control

Mini Case: The ORS Program for Diarrheal Disease Control

Bangladesh (formerly known as East Pakistan) was born in 1971 following the India–Pakistan war. By 2012, Bangladesh had a population of 150 million spread over 144,000 square kilometers. The low-lying country is vulnerable to flooding and cyclones and it stands to be badly affected by predicted rises in sea levels. Though economically poor, Bangladesh has succeeded in reducing its population growth and improving its education and health care system.

The Oral Rehydration Solution (ORS) Program was a strategic initiative taken by the Bangladesh Government. ORS was the outcome of a major clinical research carried out in the 1960s in East Pakistan (subsequently renamed Bangladesh after the India–Pakistan War in 1971) at the Cholera Research Institute (subsequently renamed as the International Centre for Diarrheal Diseases Research, Bangladesh: ICDDR, B). In the late 1960s, Richard Cash of Harvard School of Public Health and Mushtaque Chowdhury of Rockefeller Foundation established the efficacy of ORS to address dehydration.

In 1978 the British medical journal *The Lancet* called the ORS "potentially the most important medical advance of the 20th century." UNICEF and WHO recommend ORS irrespective of cause or age group affected. In 2004 the WHO/UNICEF revised their clinical management of childhood diarrhea by adding zinc supplement.

UNICEF declared 1979 as the "Year of the Child," and the Government of Bangladesh took a strategic decision to promote ORS as an effective approach to prevent children dying from dehydration and diarrheal diseases.[15] BRAC (earlier known as Bangladesh Rural Advancement Committee) which had a staff of approximately 100,000 trained community health promotion workers joined the Government's efforts to design dissemination and education programs to take the message of ORS to mothers at home. ORS was simple to make, and the BRAC team went from house to house teaching mothers how to prepare ORS. BRAC inspectors made surprise home visits to check if the ORS was prepared as per norms. The community quickly accepted homemade

[15]Diarrhea is a symptom of an infection in the intestinal tract, caused by a host of bacterial, viral, and parasitic organisms, most of which are spread by feces-contaminated water. Infection is more common when there is a shortage of adequate sanitation and hygiene and safe water for drinking, cooking, and cleaning. Diarrhea is both preventable and treatable. The most severe threat posed by diarrhea is dehydration, which means loss of essential fluids and salt together with some electrolytes through liquid stools, vomit, sweat, urine, and breathing. Dehydration occurs when these losses are not replaced. Malnutrition is a leading cause of diarrhea and dehydration. Severe dehydration could lead to death. Most deaths from diarrhea occur among children less than 2 years of age, living in South Asia and sub-Saharan Africa. It is therefore essential to give the diarrheal child extra drinks to replace the liquid being lost.

ORS as evidenced by its impact in treating dehydration. However, over a period of time, concerns were expressed about the efficacy of home-made ORS and doubts about the hygienic conditions in rural households for making ORS. The Bangladesh Government moved over to standard prepackaged ORS sachets. This provided the impetus for scaling up the production and distribution of ORS. The formulation of ORS in prepackaged form has undergone some changes over the years. Today, the price of ORS sachets is only around US$ 0.06 and this inexpensive treatment is readily available at shops and clinics across the country.

As per UNICEF estimates, from 2000 to 2013, the total annual number of deaths from diarrhea among children under 5 years decreased by more than 50%—from over 1.2 million to fewer than 0.6 million. Lives of many more children could be saved through the widespread use of a simple solution of oral rehydration salts (ORS) and zinc supplementation.

Bangladesh achieved unparalleled success in diarrheal disease control. Good implementation, monitoring, and control were the hallmarks of the ORS program in Bangladesh. In the process, Bangladesh achieved the MDG on Child health. Unfortunately, the acceptance of the ORS program has been very poor in developing countries. The stagnant low ORS coverage over the years indicated a widespread failure to deliver one of the most cost-effective and lifesaving child-survival interventions.

3.5 Public–Private Partnership

Many governments in developing countries rely on public–private partnerships (PPP) to assist the government in delivering public health services. It is therefore very important to clearly understand what is meant by a public private partnership.

Governments in many developing countries acknowledge that they are facing difficulties in their attempt to deliver basic public goods. They rely on contracting out to nongovernmental organizations (NGOs) and to not-for-profit organizations as a strategy to meet the needs of underserved

populations.[16] Communities often recognize NGOs and not-for-profit private sector providers to be more responsive to their needs and preferences in terms of services availability, suitable timings, geographical access, and so on. The NGOs and not-for-profit private sector have always played a significant role in the delivery of public services in developing countries.

PPP is an approach under which services are delivered by the private sector, both nonprofit and for-profit organizations, while the responsibilities for providing the resources rest with the government. This kind of a partnership refers to the sharing of resources needed to work together toward a common goal while respecting one another's identity. All forms of PPP, ranging from simple service and management contracts to increasingly complex performance-based management contracts involve a partnership between the government and the private sector. However, they differ in their allocation of risks and responsibilities. Though PPP is widely acknowledged as a possible solution to deliver public goods, there are significant challenges to establish public and private sector partnerships. The most important challenge is improving information availability and reliability about the private sector service providers, especially if the private sector is unregulated, as is the case in India.

It is important to consider the degree of enforceability of PPP agreements. A Memorandum of Understanding (MoU), which is the most common arrangement, has no legal framework. On the other hand, a contract is a binding commitment—"enforceable" in the legal sense. A contract usually contains provisions for penalties and the means of enforcing them (Walsh, 1995)[17]. It means that non-fulfillment of the clauses by one of the parties can lead to penalties, and ultimately the parties can invoke the commitments before the legal courts. For illustration, the

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[16]Government of India. 2004. *Report of the PPP Subgroup on Social Sector: Public Private Partnership, Planning Commission*. Government of India, New Delhi. Retrieved from http://www.planningcommission.nic.in/reports/genrep/rep_ppp.pdf, accessed on October 12, 2014

[17]Walsh, K. 1995. *Public Services and Market Mechanisms: Competition, Contracting, and the New Public Management*. Basingstoke: Macmillan.

PPP agreement[18] for improved urban primary health care services in Ahmedabad city, India, is a contractual arrangement (see Chapter 4). One of the "penalty clauses" empowers the private sector to buy essential medicines from the open market and get the expenses reimbursed by the government, if the stock out of any essential medicine extends beyond 24 hours.

Government has the fundamental responsibility to set the rules of engagement. PPP should not be reduced to a mere management tool to cut health costs of the public sector. Continuous monitoring and periodical evaluations are the cornerstones of a successful PPP. With or without PPP, governments have an obligation to provide public goods to its people.

3.6 Conclusion

The illustration of the UNAIDS policy for HIV/AIDS programs demonstrated the reliance on an evidence-based policy development process. The UNFPA strategic plan for adolescent health services brought out the need for a high level of sustained coordination between several government departments for delivering an integrated package of services. The WHO program DOTS for TB control highlighted the need for well-planned logistics management in the operational planning of any public health program. The illustration of the successful ORS program in Bangladesh showed the importance of implementation, monitoring, and control activities. Since public health program delivery requires enormous amount of resources, many governments prefer a PPP for resource sharing in service delivery.

[18]Patel, A., Ramani, K. V., Mavalankar, D. V., et al. 2007. *Implementing a Public Private Partnership Model for Managing Urban Health in Ahmedabad*. IIM Ahmedabad, W.P. No. 2007-09-03.

CHAPTER 4

Urban Health

4.1 An Introduction

Urbanization is an important demographic shift worldwide, marking a nation's march from an agriculture-based economy to an industrialized and service-based economy. According to the World Health Organization (WHO),[1] the urban population in 2014 accounted for 54% of the total global population, and is estimated to be around 70% by 2050. Much of the urban growth is expected to take place in developing countries, particularly in Asia and Africa. By 2050, India is projected to add 404 million urban dwellers, China 292 million, and Nigeria 212 million.[2] The Government of India identified urban health as a priority area under the Tenth Five Year Plan (2002–2007),[3] and sent circulars to the 10 largest cities in India inviting proposals to improve urban health services with special attention to the urban poor. Urbanization is one of the leading global trends of the 21st century that has a significant impact on health.

Our case study on urban health (cases A, B, and C) focuses on the planning and implementation of the Government of India policy for improved urban health service delivery. We describe the successful implementation of an urban health center for primary health care services in Ahmedabad city, Gujarat state, India. In the year 2004, Ahmedabad, the sixth largest city in India, had a population of 3.5 million with the slum population accounting for almost 42%.

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[1]Urban Population Growth; http://www.who.int/gho/urban_health/situation_trends/urban_population_growth_text/en/, accessed on November 21, 2014

[2]2014 Revision of the World Urbanization Prospects; http://www.un.org/en/development/desa/publications/2014-revision-world-urbanization-prospects.html, accessed on November 21, 2014

[3]The Planning Commission of India. 2002. 10th Five Year Plan 2002-2007; http://planningcommission.nic.in/plans/planrel/fiveyr/default.html, accessed on November 21, 2014

4.2 Case Study: Urban Health (A)

The Municipal Commissioner, Ahmedabad Municipal Corporation, was reading a government circular on urban health, when Professor Kayvee of the Indian Institute of Management, Ahmedabad (IIMA), met him in his office in January 2004. The government circular highlighted the need to improve health care service delivery to the urban poor with a special focus on the urban slum population. Following discussions with Professor Kayvee, the municipal commissioner was convinced of the need to develop a model urban health center in Ahmedabad city as per government norms. The methodology used for the proposed health center could be used to construct more urban health centers in Ahmedabad as well as other urban cities in the state of Gujarat.

Urbanization: Urbanization is an important demographic shift worldwide, marking a nation's march from an agriculture-based economy to an industrialized and service-based economy. One hundred years ago, urban population accounted for just 20% of the global population. Currently, urban population accounts for 51% of the global population. Most of the increase in urban population is taking place in the developing nations. By 2050, over 70% of the world's population would be living in cities. Urbanization is one of the leading global trends of the 21st century that has a significant impact on health. The factors influencing urban health include urban civic facilities, urban governance, population characteristics, communicable and noncommunicable diseases due to urban lifestyle, social and economic development, health management, and food security[4] (Exhibit 4.1).

Urban health in India: As per the World Bank estimate, urban population in India is estimated to be around 32% of the total population (Exhibit 4.2). Most Indian cities/towns are witnessing unplanned development and growth, resulting in poor quality of basic services such as food, shelter, and water.

Urban health caught the attention of the Government of India (GoI) in 2002 after the National Census revealed that during 1990–2000, the national population had grown by 2%, city population by 3%, megacity

[4]World Health Organization. 2015. Urban Health; http://www.who.int/topics/urban_health/en/

population by 4%, and slum population by 5%—referred to as the 2-3-4-5 syndrome. The continued neglect of urban health issues for more than 50 years since independence led the private sector to become a dominant player in the urban health care delivery system in India, raising serious concerns on the quality and equity of service delivery.

The GoI identified urban health as a priority area under the Tenth Five Year Plan (2002–2007),[5] and accepted the guidelines for urban health planning proposed by a high level committee.[6] The World Bank Report[7] on the health of the urban poor raised three basic questions: (i) major health problems of the urban poor, (ii) public–private partnership (PPP), and (iii) operational factors critical for improved access to health services.

Ahmedabad city, Gujarat, India

In the year 2004, Ahmedabad,[8] the financial capital of Gujarat and the sixth largest city in India, had a population of 3.5 million, with the slum population accounting for almost 42%.

The Ahmedabad Municipal Corporation (AMC) had 43 municipal election wards. These 43 wards elected a total of 129 councillors, who in turn elected a mayor. The mayor was the chairman of the AMC Board, which took all policy decisions. The municipal commissioner, a civil servant from the Indian Administrative Service, was responsible for executing all decisions taken by the AMC Board.

AMC attached considerable significance to health care (Exhibit 4.3). Public health facilities in Ahmedabad included 4 large multispeciality hospitals, 5 nursing homes for secondary health care, and 43 urban

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[5]The Planning Commission of India. 2002. 10th Five Year Plan 2002-2007; http://planningcommission.nic.in/plans/planrel/fiveyr/default.html, accessed on October 2, 2014

[6]Singh, A.D., Taneja, S., Agarwal, S. 2004. *Technical Assistance to the Government of India for Urban Health Planning and National Guidelines* (Activity Report 135). EHP, Environmental Health Project: USAID. accessed on October 6, 2014

[7]The World Bank. (July 2002). *Health of the Poor in Urban India. Report of the Consultation*. New Delhi, India: The World Bank.

[8]In the year 2008, several areas adjoining the Ahmedabad city were merged with the Ahmedabad Municipal Corporation. Ahmedabad became the fourth largest city in India following Bombay, Delhi, and Bangalore.

health centers (UHC) for primary health care needs. In addition to AMC health facilities, Ahmedabad had a large multispeciality hospital run by the state government, and a general hospital run by the Employee State Insurance Corporation (ESIC) under the Ministry of Labor, Government of India.[9] The city also had a wide range of private health care facilities offering outpatient and inpatient health care services.

Vasna ward in the western part of the city (Exhibit 4.4) had a population of 90,000 people, with 40% living in slums. It had no public health facility. The Vasna ward UHC was located in a rented building in the adjoining Paldi ward. Most of the Vasna slum residents had to walk 2 to 3 kms to reach their UHC in Paldi ward, or 5 kms to reach the nearest municipal hospital. As a result, the Vasna UHC attracted no more than five to six patients a day; many Vasna residents depended on private doctors for their primary care needs due to availability and easy access to private health clinics, though expensive. Vasna residents had been requesting AMC to provide an urban health center in their own ward for primary health care services.

Service delivery at UHC: Health care service delivery in any UHC under AMC was done under a PPP. AMC provided staff and medicines as per norms. A local nongovernmental organization (NGO) (active in the ward) provided "link workers" (also known as community health workers) who provided a link between the slum community in their ward and the UHC, while a "mother NGO" managed the UHC service delivery.

The Vasna UHC was managed by a mother NGO called Akhand Jyot (AJ), which received a certain fee from AMC for its services, including monthly rental charges since the UHC was operating from rented (Non-AMC owned) premises. AMC provided the resources for health care delivery (one doctor, two nurses, one pharmacist, and a regular supply of medicines and drugs). The link workers from SAATH, a local NGO, who received a fixed honorarium from AMC, collected data about the health care needs of the slum community.

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[9]Employees' State Insurance Corporation of India provides socioeconomic protection to the employees earning less than Rs 15,000 per month (and their families) working in factories and establishments having 10 or more employees.

AJ faced several difficulties in managing the UHC such as staff absenteeism, shortage of medicines and drugs, and delayed payment from AMC for managing the UHC. For example, when the UHC doctor was away (on official work or on leave), the doctor from a neighboring UHC was made available on a part-time basis. Such an arrangement affected the working of both the UHCs, since a UHC is practically nonfunctional without a doctor.

The proposal for a model UHC: The municipal commissioner asked Professor Kayvee for a formal proposal for the proposed model UHC to serve the Vasna slum population. The GoI norms on urban health required a UHC in each AMC ward within 1-km distance from the slum areas and required it to provide primary health care services free (no service charges) as per community needs. The municipal commissioner was also looking forward to replicate the model in other AMC wards or even in other cities in Gujarat. He gave Professor Kayvee a copy of the AMC annual statistics for the last 2 years.

Following his meeting with the municipal commissioner, Professor Kayvee returned to IIMA and discussed the proposal writing with his research team.

Exhibit 4.1: Urban health

Urban poverty is a multidimensional phenomenon. It is associated with poor quality of life, deprivation, vulnerability, complex social relationships, malnutrition, and low human resource development, all leading to poor urban health statistics.

Unplanned urban growth raises serious health issues (i) water-borne diseases such as diarrhea, cholera, (ii) urban lifestyle diseases such as diabetes, heart diseases, renal diseases, high cholesterol, and obesity, (iii) occupational health hazards, respiratory diseases, and mental illnesses. Creating sustainable urban environments has thus assumed critical importance.

Migration is another major concern of urbanization. While cities may offer employment opportunities for a living, the migrant laborers often get excluded from the local population for public facilities such as education, health, water, sanitation, drainage, and so on. Another

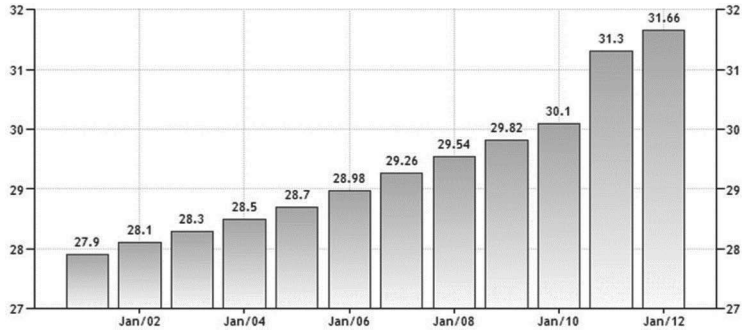
threat from migration is the transmission of communicable diseases such as HIV/AIDS and TB.

Urban health governance would play a very critical role to ensure availability and access to good-quality health care services. Urban governance should also address the need for inter-sectoral convergence and cooperation between various local urban governing bodies and non-health sectors such as environment, infrastructure, and sanitation.

The dominance of private sector in large cities raises serious issues on the equity and quality of services. PPP is often seen as a viable option to improve health care services in cities.

Urban population, unlike rural population, is highly heterogeneous. Health data is usually aggregated to provide an average of all urban residents, rich and poor. It therefore masks the health conditions of the urban poor who are almost always overlooked. The informal or often illegal status of low-income urban settlements contributes to the fact that public health authorities often do not have the means or the mandate to collect data on urban poor population. As a result, policy makers at the local, national, and international levels do not have enough information on the health conditions of the urban poor.

Exhibit 4.2: Urban Population in India (% total population)



Source: Trading Economics. 2015. *Urban Population (% of total) in India*. Retrieved from http://www.tradingeconomics.com/india/urban-population-percent-of-total-wb-data.html, accessed on October 1, 2014

Exhibit 4.3: Ahmedabad Municipal Corporation: 2004–05

General Information	
AMC population	35,15,361
AMC area (sq km)	190.84
Population density	18,420
Literacy	83.16
Male literacy	89.26
Female literacy	76.36
Total dwelling units	7,00,000
Slums (Including Chawls)	
Number of slums	1000
Dwelling units in slums	2,00,000
Population in slums	8,00,000
Number of chawls[10]	1500
Dwelling units in chawls	1,50,000
Population in chawls	7,00,000
Pop. in Slums & chawls	15,00,000

AMC Health Facilities			
Dispensaries			23
Hospitals			3
Maternity homes			8
Urban health centers			37
Eye hospital			1
Infectious diseases hospital			1

State Government Health Facilities			
Civil hospital			1
Cancer hospital			1
Kidney hospital			1
Heart hospital			1

Central Government Health Facilities			
ESI General hospital			1
ESI Chest hospital			1
ESI dispensaries			42
ESI: Employee State Insurance			

Source: Annual Statistics, Ahmedabad Municipal Corporation 2004–05

[10]A chawl in South Asia is a large four- to five-storeyed building divided into many separate tenements, offering cheap, basic accommodation to poor people, mostly laborers living alone.

Exhibit 4.4: Ahmedabad Municipal Corporation (2004)

Source: Ahmedabad Municipal Corporation; Town Planning Department, 2004–05

4.3 Case Study: Urban Health (B)

The IIMA proposal accepted by the AMC board focused on addressing the requirements of the major stakeholders, namely, the Vasna slum community, Government of India (GoI), and AMC. An assessment of the Vasna community's health care needs was required to help AMC plan the resource requirements to meet their needs. The GoI norms on service quality had to be honored by AMC for improved urban health care service delivery. The AMC commissioner desired that the proposed urban health center for Vasna served as a model for other towns and cities.

On August 19, 2005, the IIMA team gave a presentation to the AMC commissioner on "Vasna community health care needs assessment." The

commissioner had invited his officers from the health department, faculty members from the department of community medicine at the AMC-NHL medical college, members of the AMC health committee, and the Vasna ward councillor (elected representative of Vasna ward) for their feedback on the IIMA study thus far.

The IIMA Proposal: The IIMA proposal suggested that the proposed study be divided into three phases as follows:

Phase I: Community health care needs assessment;
This was required to plan resources for service delivery as demanded by the community.

Phase II: Identify a suitable location for the proposed UHC; it should meet
- health care needs of the community,
- GoI norms on service level, and
- AMC commissioner's requirement that the Vasna UHC should serve as a model UHC for other cities.

Phase III: Build the UHC on a Public–Private Partnership (PPP) arrangement for effective and efficient service delivery.

Phase I: Community Health Care Needs Assessment:

Distinguishing between individual needs for medical care and the wider health care needs of a community is important in the planning and provisioning of public health services. For medical care, patients visit health facilities when they fall sick. Medical care demands are therefore based on individual needs. On the other hand, demand for public health services focuses on community needs and not on individual needs, and therefore delivering public health services requires higher levels of resource planning.

Community needs assessment ⟶ Planning for service delivery

Primary data collection was necessary to estimate the demand for health services, with a special focus on the Vasna urban poor, as health statistics of the urban poor were not maintained separately by AMC.

Therefore, primary data collection for assessing the community needs and their health care–seeking habits focused on the urban poor in Vasna ward. It was not easy to identify the urban poor. Majority of the slum dwellers were poor, while urban poor could also be found elsewhere.

Primary data collection focused on the following components (Exhibit 4.5).

- Household survey to assess the health care needs and their health care–seeking behavior,
- Health care facilities survey to profile the private health sector delivery system,
- Consultation with key informants.

Household Survey:

Survey Design: It is well known in the public health literature that social and economic characteristics of a community are important determinants of their health care needs and health care–seeking behavior. The survey design for our household survey relied on the design of the National Family Health Survey (NFHS)[11] of the GoI. NFHS reports highlighted the importance of socioeconomic indicators such as mother's level of literacy,

[11]The National Family Health Survey (NFHS) is a large-scale, multi-round survey conducted in a representative sample of households throughout India. The Ministry of Health and Family Welfare (MOHFW), Government of India, designated International Institute for Population Sciences (IIPS) as the nodal agency responsible for providing coordination and technical guidance for the NFHS. NFHS was funded by the United States Agency for International Development (USAID) with supplementary support from United Nations Children's Fund (UNICEF). IIPS collaborated with a number of Field Organizations (FO) for survey implementation. Each FO was responsible for conducting survey activities in one or more states covered by the NFHS. Technical assistance for the NFHS was provided by ORC Macro and the East-West Center. The First National Family Health Survey (NFHS-1) was conducted in 1992–93. The Second National Family Health Survey (NFHS-2) was conducted in 1998–99. The Third National Family Health Survey (NFHS-3) was carried out in 2005–2006. The fourth NFHS is currently underway. NFHS surveys provide information to the Ministry of Health and Family Welfare and other agencies for policy and planning public health programs. (Source: NFHS website; http://www.rchiips.org/nfhs/)

family economic status, rural/urban residential status, and the availability of basic public health services (water, sanitation, etc.) in health care assessment. Economic status was estimated across a number of household characteristics such as nature of occupation, household electrification, drinking water source, toilet facility, number of household members living together, and so on.

Survey sample: The illegal status of urban slums meant the public health authorities did not have the means or the mandate to collect data on urban poor, especially the urban slum population. As a result, AMC did not have reliable information on the health conditions of the urban poor. Sample survey, therefore, focused on the urban poor population.

Pilot Survey: On the basis of feedback from a pilot survey of our household questionnaire, the survey design was revised and made easier to administer to the largely uneducated slum population.

Main Survey: The sample size included 35 to 40 households each from a few large slums and 30 to 40 households each from a few small slums in Vasna. By selecting large slums as well as clusters of small slums from various parts of Vasna ward, a "representative sample" of 200 to 250 slum households was obtained. Additionally, 100 other poor households living in small tenements, away from the slums, were also sampled. For data collection, IIMA relied on SAATH, the local NGO that had been working in Vasna ward on several development activities and was therefore known to the locals.

Survey Findings: The Vasna poor population had an overall literacy rate of 73%, male literacy was 89%, and female literacy was only 59%. Sex ratio was 874 females per 1,000 males. Almost two-thirds of the slum population was in the working age group (15–60 years), 50% worked in the unorganized sector, while 33% were unemployed. About 65% of the slum population lived on less than $2 a day, an indication of extreme poverty. Most of the income was used for the basic needs of food and shelter, leaving very little money for education and health needs. Poor household income was cited as the main reason for almost 50% of the women being anemic and 60% of children being malnourished.

Public health facilities were poor. Even though 91% of the slums had electricity as a result of an initiative taken by SAATH for an ongoing slum electrification project, other basic public health infrastructure

services were very poor; only 44% households had water supply, drainage, and toilet facilities.

Health care needs of the Vasna community centered on maternal health, childhood illnesses, immunization services, common cold, and malaria. Since the current location of their UHC in an adjoining ward did not offer easy access, the Vasna slum population relied on the private sector to meet their health care needs. The survey showed that 60% of the slum population covered a distance of less than 1 km, and 40% covered a distance of 1 to 2 kms to reach their preferred private health facility. Faith in the doctors and proximity to health facilities were the main reasons for the slum population to seek health care services from the private sector.

The private sector doctors offered consultation and medication services, for which they charged $ US 1 per illness episode. For serious ailments, the doctors referred the patients to a private clinical laboratory for investigations (blood test, urine test, etc.). Private clinical laboratory charges for investigation services were too high for the slum community. The municipal hospital that offered free investigation services was 5 kms away. As a result, many slum residents did not go for any clinical investigation for outpatient (OPD) care. For inpatient care, many (53%) preferred public health facilities, since they could not afford private hospital charges.

The community demanded that the proposed UHC should offer consultation, medication, and investigation services under one roof and be open 24X7. Round-the-clock service delivery and investigation services in UHCs were new demands for providing outpatient services. They demanded referral services at UHC, so that serious cases could be referred to higher level health facilities. The community also wanted the AMC to organize IEC/BCC programs[12] to create awareness for disease prevention and lead a healthy lifestyle.

Health Care Facilities Survey: The objective of the health facility survey was to profile the private health sector on the availability, quality, and nature of health care services to the Vasna population. The survey

[12]Information, Education, and Communication (IEC) programs to generate awareness, and Behavioral Change Communication (BCC) programs to influence health-seeking behavior.

questionnaire focused on collecting data on all resources in private health facilities and their utilization, such as:

- Human resources (doctors, nurses, paramedical staff)
- Specialty services offered (general practitioner, orthopedic surgeon, etc.)
- Number of beds (indoor services)
- Number of patients served (indoor and outpatient)
- Laboratory and radiology investigations ordered/advised

Vasna had a large number of small, medium, and large private health facilities. The unregulated private health sector did not require the private health care providers to register their facility with the government health department, unless the facility provided inpatient care with at least 50 beds. Therefore, understanding the private health care delivery system in AMC was very challenging. The IIMA team needed help from AMC to trace the private health care facilities in Vasna. The commissioner offered to give the IIMA team a copy of the town-planning map[13] of Vasna ward.

With assistance from the AMC property tax[14] collectors, around 100 to 120 private health care service providers were located on the town-planning map, which covered approximately 60 to 70 outpatient clinics and 40 to 50 nursing homes and hospitals. The outpatient clinics offered consultation and medication services, but referred their patients to private laboratories for pathology and radiology services. Availability of doctors in the private OPD clinics averaged around 2 hours in the morning and 3 hours in the evening. For inpatient care, the private sector offered about 650 beds, ranging from small five-bedded nursing homes to a large super specialty hospital with 200 beds.

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[13] A town-planning map provides a framework for urban development in the context of urban spatial, economic, and social activities. It displays the location of all existing and proposed residential buildings, slums, commercial complexes, recreation areas, public facilities like schools and hospitals, rivers, major roads, minor roads, railway tracks, etc. on a map to scale.

[14] Property tax is the annual amount paid by a land owner to the local government or the municipal corporation of his/her area. Tax rates were computed based on the land area and its use (residential, commercial, etc.).

Consultation with Key Informants: The IIMA team met key informants/stakeholders in the wards including health care providers, elected ward councillors, and community leaders so as to understand their perception of health services. These consultations were done separately for each type of stakeholder as well as jointly with all stakeholders. The team also had extensive discussions with faculty members from the department of Community Medicine, NHL Medical College, who were working on urban health projects. The consultation with key stakeholders revealed their interest in improving urban health care services, many recommending a PPP arrangement.

The presentation of the community health needs assessment concluded with a summary of the survey findings as shown in Exhibit 4.6. The Vasna residents needed an urban health center located in Vasna, easily accessible, functional, and open for longer hours with consultation, medication, and investigation facilities, all under the same roof. Most of their primary health care needs centered around common cold and fever, malaria, maternal health, and child health. They also demanded strengthening the disease prevention and health promotion activities by AMC.

The IIMA team then took questions from the audience. Questions were raised on claims made on a "representative sample" of slum households, survey design, conducting the survey, and so on. The commissioner wanted to know the methodology followed by the IIMA team to estimate the service level offered by the private sector (It was mentioned that 60% of the slum population had to cover less than 1 km to reach their health facility and 40% of the population traveled 1–2 km).

Following the conclusion of the seminar, the IIMA team started Phase II of the proposal to develop a research methodology to identify a suitable location for the proposed UHC satisfying the requirements of all the stakeholders: Vasna community, Government of India, and the AMC Commissioner.

In a follow-up meeting with Professor Kayvee of IIMA, the commissioner offered land in the Vasna Municipal School compound and asked the IIMA team whether the proposed UHC could be located there.

Exhibit 4.5: A Conceptual framework for Urban Health Needs Assessment

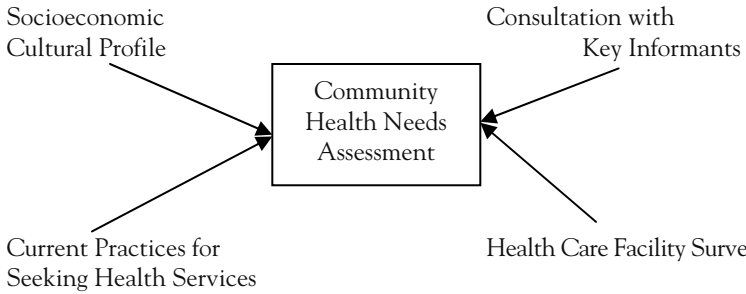
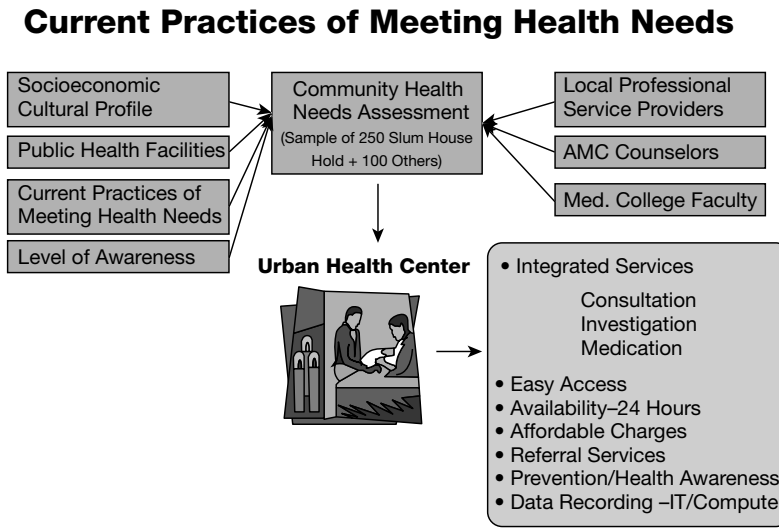


Exhibit 4.6 The above figure summarises the responses from different stakeholders on the health needs of the Vasna community in Ahmedabad, Municipal Corporation (AMC). We conducted a sample survey of slum households in Vasna, and the private health facilities they visited frequently. We also held meetings with a select group of (i) healthcare service provides in AMC (ii) AMC counsellors, and (iii) AMC medical college faculty members working on urban health projects to seek their independent inputs. Subsequently, we shared these findings with the AMC Commissioner and his officers from the AMC health department.



4.4 Case Study: Urban Health (C)

On March 3, 2006, the IIMA team gave a presentation to the AMC Municipal Commissioner on an ideal location for the proposed UHC based on Geographical Information System (GIS) methodology. The chosen location was in the land leased out to the Gujarat Cancer Society **(GCS)** in the southwest part of Vasna. The location satisfied all the requirements of the community health care, Government of India (GoI) norms on access to health facility, and the Commissioner's suggestion that the proposed UHC serve as a model for other towns and cities. This presentation was also attended by the AMC health department staff and the representatives from the GCS.

The IIMA project Phase II: In Phase I of the IIMA study on the community health care needs assessment for Vasna, the survey findings suggested that the proposed UHC be located in Vasna for easy access; provide consultation, investigation, and medication services at affordable charges; should be functional 24X7; and provide referral services to handle serious cases. Phase-II of the IIMA project focused on identifying a good location for the proposed UHC to meet the needs of all stakeholders, namely, the Vasna community, Government of India,[15] and the AMC. The IIMA team chose to rely on the GIS[16] methodology to identify the best location for the proposed UHC.

The GIS methodology: The GIS methodology involved the following steps.

Step 1: Create a GIS map: The IIMA team created a GIS map of Vasna by digitizing the town-planning map, with slum locations, health facilities, roads, railway lines, buildings, and so on; see Exhibit 4.7 for the GIS map. In this map, slums were represented by circles; bigger circles indicated larger slum populations. This map also showed the location of Vasna ward UHC in the adjacent Paldi ward.

Step 2: Estimate service level for the current location of Vasna UHC. The GIS-based analysis revealed that the existing Vasna UHC

[15]The Government of India recommended that an urban health center for a population of 100,000 be located within 0.5 to 1 km of walking distances from the slum area, and provide health care services demanded by the urban poor.

[16]A geographical information system (GIS) is a computer-based data management system to capture, store, check, and display spatial information in the form of a map. GIS is the most effective tool to analyze geographical data to answer basic locational questions. For example, GIS could be used to locate any object in a geographical area, such as hospitals, fire stations, airport, etc.; help navigation between any two points; and determine the distance between any two objects.

located in the adjacent Paldi ward served about 18% of the Vasna slum population within 1 to 2 km distance, 61% of Vasna slum population within 2 to 3 km distance, and the remaining 21% had to cover more than 3 kms, as shown in Exhibit 4.8. The above service level did not meet the GoI norms.

It was therefore necessary to identify a location within Vasna for easy access.

Step 3: The Commissioner's suggestion: The commissioner had offered land in the Vasna Municipal School compound for the proposed UHC. The IIMA team estimated the service level if the proposed UHCs were to be located in the school compound.[17] The UHC in Vasna school compound would cover only 3% of the Vasna slum population within 0 to 0.5 km, 33% slum population within 0.5 to 1 km, while 64% of the slum population would have to cover a distance of 1 to 2 km to reach the UHC (Exhibit 4.9).

The GIS search to identify a better location continued to explore other parts of Vasna.

Step 4: Gujarat Cancer Society: Since most of the large slums were in the southwestern part of Vasna ward, the search for a new location led the team to the land which housed the Community Oncology Center. This center was operated by the GCS and provided cancer checkup services.

An analysis of service levels for the UHC location at the Oncology Cancer Center (Exhibit 4.10), showed that almost two-thirds of the Vasna slum population would be covered within 1 km of distance.

Additional benefits of establishing the proposed UHC in the GCS compound were many. The land which housed the Community Oncology Center was on a 99-year lease from AMC to the GCS. The Oncology Center had excellent infrastructure, highly qualified doctors, well-trained nurses, and excellent investigation facilities[18] for cancer checkups, offering both clinical laboratory services and imaging services. It also had an auditorium for health promotion and awareness activities, was well connected by public and private transport, and served the slum population in the adjoining ward Juhapura.

The IIMA team therefore recommended that the land leased out to the GCS by AMC be used for the proposed UHC. This location met

[17]Is it advisable to locate a health center in a school compound?

[18]Recall that Vasna residents demanded not just a standard primary care center with consultation and medication services; they wanted investigation services as well, under the same roof.

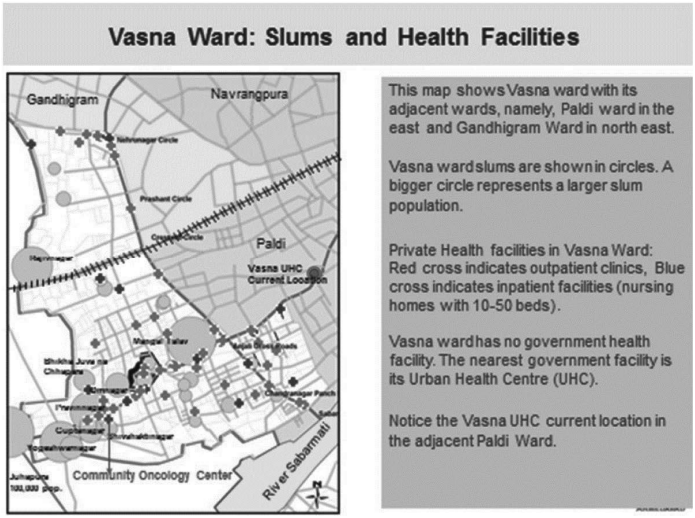
the Vasna community health care needs, GoI norms on easy access to the facility by the slum population, and the AMC suggestion for the scalability of the Vasna UHC model to other towns and cities, as the IIMA model was based on GIS methodology.

After the presentation, several questions were asked about the GIS methodology, its application to other wards in Ahmedabad city to locate similar health care facilities (Tier1), and higher level (Tier 2) health care centers, called maternity homes. The IIMA team thanked the representatives of the GCS for their agreement in principle to utilize their land for the proposed Vasna UHC, and their offer to extend the investigation services at the Oncology Center to the UHC patients at AMC rates.

The Municipal commissioner asked the IIMA team to give him a proposal to utilize the GCS land for building the Vasna UHC. This proposal had to be cleared by AMC, since the proposed location for Vasna UHC was in the AMC land leased out to the GCS. The IIMA team was also asked to suggest a model PPP arrangement to ensure good quality service delivery.

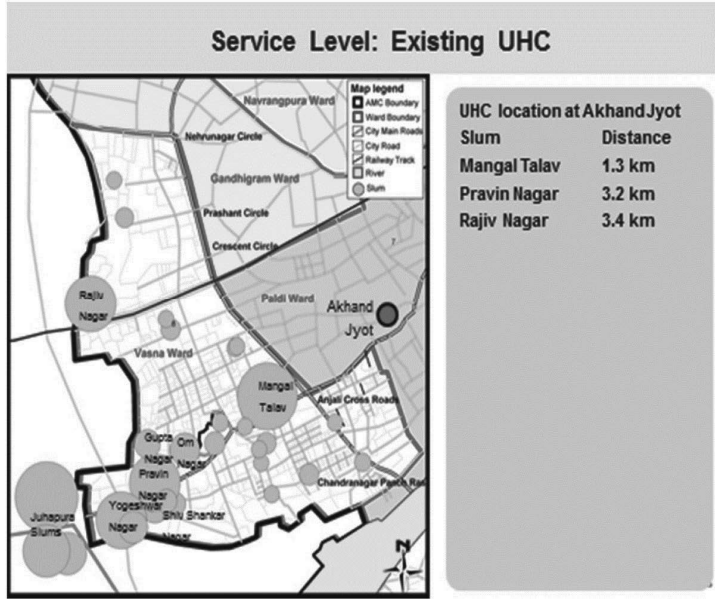
Based on a PPP model suggested by the IIMA team, Vasna UHC was set up in GCS land and inaugurated by the then Chief Minister of Gujrat, Shri Narendra Modi, on July 23, 2007. The new location of Vasna UHC attracts about 100 patients a day, and serves as a model UHC for Gujarat state.

Exhibit 4.7: Location of Slums and Health Facilities in Vasna Ward, Ahmedabad City, India



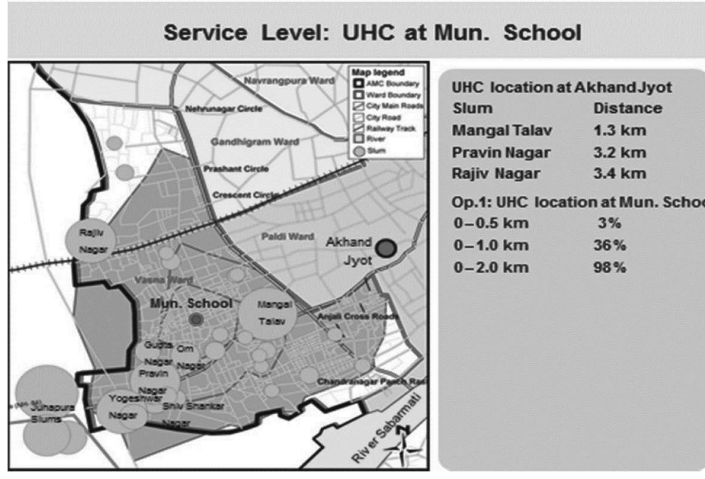
Source: Locating an Urban Health Centre using Geographic Information System Approach; Report submitted by IIMA to the Ahmedabad Municipal Corporation, 2007.

Exhibit 4.8: Service level Estimate: Vasna UHC in Paldi



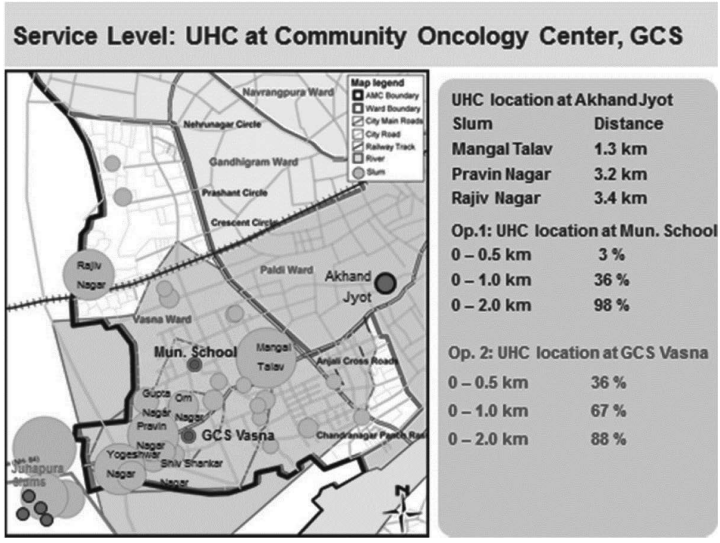
Source: "Locating an Urban Health Centre using Geographic Information System Approach"; Report submitted by IIMA to the Ahmedabad Municipal Corporation, 2007

Exhibit 4.9: Service Level estimate: Vasna Municipal School



Source: "Locating an Urban Health Centre using Geographic Information System Approach"; Report submitted by IIMA to the Ahmedabad Municipal Corporation, 2007

Exhibit 4.10: Service Level: Community Oncology Center, Gujarat Cancer Society



Source: "Locating an Urban Health Centre using Geographic Information System Approach"; Report submitted by IIMA to the Ahmedabad Municipal Corporation, 2007

CHAPTER 5

Maternal Health

5.1 An Introduction

The millennium development goals (MDGs) focused the efforts of the world community on achieving significant, measurable improvements in people's lives.[1] MDG targets were set for the year 2015 with respect to the base year 1990 in consultation with all the member countries of the United Nations, held in the Millennium Development Conference, September 2000. The conference adopted eight MDG goals; MDG 5 was on maternal health.

The millennium development goal MDG 5 on maternal health called for reducing maternal mortality ratio (MMR) by 75% between 1990 and 2015. MMR, defined as the number of maternal deaths per 100,000 live births, is a commonly used indicator of maternal health. In the year 1990, the number of global maternal deaths was as high as 525,000; one maternal death occurred every minute. By 2012, even though the number of maternal deaths came down by 50% (one death every 2 minutes), many countries were likely to miss the MDG target.

In this chapter, we discuss two case studies on maternal health. Case (A) highlights the global burden of maternal mortality. Developing countries accounted for almost 99% of all maternal deaths globally, with India alone accounting for 20% of all maternal deaths in 2012. Case (B) describes the steps taken by the Government of India to meet the MDG 5 target. India's MMR stood at 180 in 2012, short of the MDG target of 140 maternal deaths per 100,000 live births to be achieved by 2015. What could explain the reasons for India's failure to achieve MDG 5?

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[1]Millennium Development Goals; http://data.worldbank.org/about/millennium-development-goals, accessed on September 9, 2014

5.2 Case Study: Maternal Health (A)

"Women are not dying because of a disease we cannot treat. They are dying because societies have yet to make the decision that their lives are worth saving."

- Mahmoud Fathalla, President of the International Federation of Gynecology and Obstetrics (FIGO), World Congress, Copenhagen, 1997.

The Head of Maternal Division at the World Health Organization (WHO) headquarters was reviewing the status of the fifth Millennium Development Goal (MDG 5) on maternal health. The MDG 5 called for improvements in maternal health by reducing MMR by 75% between 1990 and 2015. As per the WHO estimates, the global MMR in 1990 was 380 maternal deaths per 100,000 live births. The MDG 5 target was therefore to achieve a global MMR of 95 maternal deaths per 100,000 live births by 2015. A recent review of the MDG 5 status highlighted the failure of many developing countries in achieving the target. One mother died every 2 minutes in 2013.The head of the Maternal Division at the WHO called a meeting to discuss the review report. She wanted to know which developing countries needed additional attention to reduce MMR further.

Maternal Health: As per WHO, maternal health is the health of women during pregnancy, childbirth, and the postpartum period. It encompasses the health care dimensions of family planning, preconception, prenatal (antenatal), intranatal, and postnatal care to reduce maternal morbidity and mortality (Exhibit 5.1). The health of a mother impacts the family and even the entire community. Her ability and access to receive necessary health care largely determines health outcomes for herself and her baby. While motherhood is often a positive and fulfilling experience, for too many women it is associated with suffering, ill-health, and even death.

Maternal mortality is an important indicator of the health system performance in any country. MMR, defined as the number of maternal deaths per 100,000 live births, is a commonly used indicator of maternal health. The WHO defines maternal death as the death of a woman while

pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes. Causes of maternal deaths are shown in Figure 5.1. Important facts on maternal health are given in Exhibit 5.2.

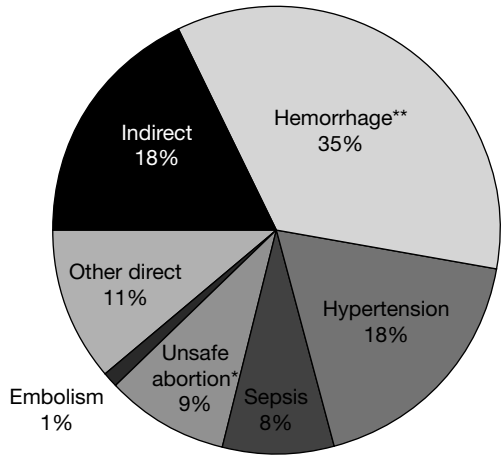

Figure 5.1 Global Causes of Maternal Deaths

Source: Countdown to 2015 Decade Report (2000-2010), World Health Organization (2010) http://www.countdown2015mnch.org/documents/2010Report/2010_Report_noprofiles.pdf accessed on December 9, 2014

Maternal deaths can be broadly classified into direct and indirect causes (Exhibit 5.3). Direct causes of maternal deaths are those resulting from obstetric complications of the pregnant state (i.e., pregnancy, delivery, and postpartum) such as hemorrhage, hypertension, and sepsis. Indirect causes of maternal deaths are those resulting from the existing health conditions during pregnancy or health problems developed during pregnancy (not due to obstetric causes), such as cardiac or HIV/AIDS. Research indicates[2] that around 80% of maternal deaths could be prevented with timely interventions such as adequate nutrition, improved hygiene practices, antenatal care, skilled birth attendance (SBA), emergency obstetric care (EmOC), and postnatal visits for both

[2]The Challenge of Improving Newborn and Maternal Health. Message from Ann M. Veneman, Executive Director of the United Nations Children's Fund (UNICEF). May 20, 2009.

mothers and newborns—delivered through a continuum of care linking households and communities to health systems.

SBA: A skilled birth attendant is an accredited health professional—such as a midwife, doctor, or nurse with special training in the skills needed to manage normal (uncomplicated) pregnancies, childbirth, and the immediate postnatal period, and in the identification, management, and referral of complications in women and newborns.[3]

EmOC: It has been internationally recognized that every pregnancy has a risk and that complications cannot be predicted. Evidence showed that at least 15% of all pregnant women developed complications during pregnancy and childbirth; requiring access to lifesaving quality obstetric services. For monitoring the readiness of the institutions in providing emergency obstetric care, UNICEF[4] developed guidelines for basic emergency obstetric care (BEmOC) and comprehensive emergency obstetric care (CEmOC) services. The BEmOC institutions provided the "six signal functions," which covered basic care for almost all complications. The CEmOC centers provided the six signal functions, and also additional services for blood transfusion and Cesarean sections (see Table 5.1).

Table 5.1 Signal Functions of Emergency Obstetric Care (EmOC)

No.	Basic EmOC	Comprehensive EmOC
1	Administer parenteral antibiotics	Administer parenteral antibiotics
2	Administer parenteral oxytocic drugs	Administer parenteral oxytocic drugs
3	Administer parenteral anticonvulsants	Administer parenteral anticonvulsants

[3]Making Pregnancy Safer: The Critical Role of the Skilled Attendant. A Joint Statement by WHO, ICM, and FIGO, 2004; http://www.who.int/maternal_child_adolescent/documents/9241591692/en/, accessed on Feb 25, 2015.

[4]UNICEF. 1997. Guidelines for Monitoring the Availability and Use of Obstetric Services; http://www.childinfo.org/files/maternal_mortality_finalgui.pdf, accessed on February 15, 2015

4	Perform manual removal of placenta	Perform manual removal of placenta
5	Perform removal of retained products	Perform removal of retained products
6	Perform assisted vaginal delivery	Perform assisted vaginal delivery
7		Perform surgery (Cesarean section)
8		Perform blood transfusion

Source: UNICEF (1997).Guidelines for monitoring the availability and use of obstetric services.

The MDG 5[5] on maternal health called for reducing MMR by 75% between 1990 and 2015. As per the WHO report,[6] the global MMR in 1990 was 380 maternal deaths per 100,000 live births, and the number of global maternal deaths was as high as 525,000. One maternal death occurred every minute in 1990.

Following the MDG declaration in 2000, the WHO member countries took up maternal health as a priority area for improving their public health delivery system. The WHO estimates on MMR from 1990 to 2013[7] are given in Exhibit 5.4. The global MMR came down to 210 maternal deaths per 100,000 live births and the number of maternal deaths came down to 289,000 by 2013 (one maternal death every 2 minutes). Developing countries still accounted for almost 99% of all maternal deaths globally.

The WHO team in the Maternal Health Division got down to analyzing the data in Exhibit 5.4 to identify the progress made by the

[5]The MDGs focused the efforts of the world community on achieving significant, measurable improvements in people's lives. Many of these commitments were drawn from the agreements and resolutions of world conferences and summits organized by the United Nations during the preceding decade. MDG targets were set for the year 2015 with respect to the base year 1990 in consultation with all the member countries of the United Nations (UN), held in the Millennium Development Conference, New York, September 2000. The conference adopted eight MDG goals; MDG 5 was on maternal health. Millennium Development Goals; http://data.worldbank.org/about/millennium-development-goals

[6]Trends in Maternal Mortality: 1990 to 2013. Estimates by WHO, UNICEF, UNFPA, The World Bank and the United Nations Population Division; http://www.who.int/reproductivehealth/publications/monitoring/maternal-mortality-2013/en/.

[7]ibid.

member countries toward achieving the MDG 5 target. Which countries would meet the MDG 5 target, and which countries would not? Which countries would miss the target narrowly? Which MDG regions (Exhibit 5.5) deserve special attention?

What steps would you recommend for future policy development and strategies to achieve better maternal health indicators in "poor performing" countries?

Exhibit 5.1: Maternal Health[8]

Maternal health is the health of women during pregnancy, childbirth, and the postpartum period. The health of a mother impacts the family and even the entire community. Her ability and access to receive necessary health care largely determines health outcomes for herself and her baby. While motherhood is often a positive and fulfilling experience, for too many women it is associated with suffering, ill-health, and even death.

Maternal Health encompasses the following health care dimensions:

Family planning:

> Family planning allows individuals and couples to anticipate and attain their desired number of children and the spacing and timing of their births. A woman's ability to space and limit her pregnancies has a direct impact on her health and well-being as well as on the outcome of each pregnancy.

Preconception:

> Preconceptional care of a female calls for a continuum of care through the stages of her growth and development, to the time of conception and pregnancy, so as to prepare the female for normal childbearing and delivery in future.

[8]WHO websites; http://www.who.int/topics/maternal_health/en/ and http://www.medbird.com/diseases/Intranatal_Care/Intranatal_Care.htm

Antenatal care:

Antenatal care is the care of the woman during pregnancy. The primary aim of antenatal care is to achieve at the end of a pregnancy a healthy mother and a healthy baby. Ideally this care should begin soon after conception and continue throughout pregnancy. The objectives of antenatal care are to (i) promote, protect, and maintain the health of the mother during pregnancy, (ii) detect "high risk" cases and give them special attention, (iii) foresee complications and prevent them, (iv) remove anxiety associated with delivery, and (v) reduce maternal and infant mortality and morbidity.

Intranatal care:

Intranatal care refers to the process of childbirth. Intranatal care is of extreme importance for every pregnancy. Such level of care lays emphasis on safe procedures and interventions.

Postpartum care:

Postpartum period (or postnatal period) is the period beginning immediately after the birth of a child and extending for about 6 weeks (42 days). The WHO describes the postnatal period as the most critical and yet the most neglected phase in the lives of mothers and babies; most deaths occur during the postnatal period.

Exhibit 5.2: Ten Facts on Maternal Health[9]

Fact 1

Almost 800 women die every day due to complications during pregnancy and childbirth.

About 289,000 women died worldwide in 2013 due to complications during pregnancy and childbirth. In developing countries, conditions

[9]10 Facts on Maternal Health; http://www.who.int/features/factfiles/maternal_health/maternal_health_facts/en/index9.html

related to pregnancy and childbirth constituted the second leading cause (after HIV/AIDS) of death among women of reproductive age.

Fact 2

There are four main killers.

The four main killers are: severe bleeding, infections, unsafe abortion, and hypertensive disorders (preeclampsia and eclampsia). Bleeding after delivery can kill even a healthy woman, if unattended, within 2 hours. Most of these deaths are preventable.

Fact 3

More than 135 million women give birth per year.

About 20 million of them experience pregnancy-related illness after childbirth. The list of morbidities is long and diverse, and includes fever, anemia, fistula, incontinence, infertility, and depression. Women who suffer from fistula are often stigmatized and ostracized by their husbands, families, and communities.

Fact 4

About 16 million girls aged between 15 and 19 give birth each year.

They account for more than 10% of all births. In the developing world, about 90% of the births to adolescents occur in marriage. In low- and middle-income countries, complications from pregnancy and childbirth are the leading cause of death among girls aged 15 to 19 years.

Fact 5

Maternal health mirrors the gap between the rich and the poor.

Less than 1% of maternal deaths occur in high-income countries. The MMR in developing countries is 230 per 100,000 births versus 16 per 100,000 in developed countries. Also, maternal mortality is higher in rural areas and among poorer and less-educated communities. Of the 800 women who die every day, 500 live in sub-Saharan Africa, 190 in Southern Asia, and 6 in high-income countries.

Fact 6

Most maternal deaths can be prevented.

Most of these deaths can be prevented through skilled care at childbirth and access to emergency obstetric care. In sub-Saharan Africa, where MMRs are the highest, less than 50% of women are attended by a trained midwife, nurse, or doctor during childbirth.

Fact 7

Many women don't see a skilled health professional enough during pregnancy.

Although a large proportion of women see skilled health personnel at least once during their pregnancy, only about half receive the recommended minimum of at least four visits during pregnancy. Women who do not receive the necessary checkups miss the opportunity to detect problems and receive appropriate care and treatment. This also includes immunization and prevention of mother-to-child transmission of HIV/AIDS.

Fact 8

About 22 million abortions continue to be performed unsafely each year.

Unsafe abortions result in the death of an estimated 47,000 women and more than 5 million complications. Almost every one of these deaths and complications could have been prevented through sexuality education, contraceptive use, and the provision of safe, legal induced abortion and care for complications of abortion.

Fact 9

Reducing the MMR has been slow.

One target of the MDGs is to reduce the MMR by three-quarters between 1990 and 2015. So far, progress has been slow. Since 1990, the global MMR has declined by only 2.6% annually instead of the 5.5% needed to achieve MDG 5, aimed at improving maternal health.

Fact 10

The lack of skilled care is the main obstacle to better health for mothers.

This is aggravated by a global shortage of qualified health workers.

Exhibit 5.3: Causes of Maternal Mortality[10]

The leading causes of maternal death are classified as direct or indirect. **Direct causes** are those related to obstetric complications of pregnancy, labor, and delivery, and the postpartum periods. Direct causes account for 80% of maternal death.* *Indirect causes** are those relating to preexisting medical conditions that may be aggravated by the physiologic demands of pregnancy. A brief overview of the leading causes of maternal death follows. Some causes of maternal mortality are the same in the developing and developed world; however, the prevalence is significantly lower in the developed world.

Direct Causes

Note: These cannot be predicted.

Hemorrhage (uncontrolled bleeding)

- This is the single most serious risk to maternal health.
- Blood loss during pregnancy, labor, or postpartum.
- Can rapidly lead to death without medical intervention.
- Can be treated with blood transfusions, oxytocics (drugs that induce uterine contractions to stop bleeding), and/or manual removal of the placenta.

Sepsis (infection)

- Related to poor hygiene and infection control during delivery or to the presence of untreated sexually transmitted infections during pregnancy.
- Can be prevented or managed with high standards for infection control, appropriate prenatal testing and treatment of maternal infection, and appropriate use of intravenous or intramuscular antibiotics during labor and postpartum period.

[10]http://healthandrights.ccnmtl.columbia.edu/reproductive_health/causes_maternal_mortality.html

Hypertensive Disorders

- Preeclampsia (also known as toxemia of pregnancy) is characterized by hypertension (high blood pressure), protein urea (protein in the urine), general edema (swelling), and sudden weight gain. If left untreated, it can lead to eclampsia.
- Eclampsia is characterized by kidney failure, seizures, and coma during pregnancy or postpartum. Can lead to maternal and/or infant death.
- Preeclampsia can be identified in the prenatal period by monitoring blood pressure, screening urine for protein, and through physical assessment.
- Treatment available during childbirth includes the use of sedative or anticonvulsant drugs.

Prolonged or Obstructed Labor

- Caused by cephalo pelvic disproportion (CPD), a disproportion between the size of the fetal head and the maternal pelvis; or by the position of the fetus at the time of delivery.
- Increased incidence among women with poor nutritional status.
- Use of assisted vaginal delivery methods such as forceps, vacuum extractor, or performing a Cesarean section can prevent adverse outcomes.
- CPD is the leading cause of obstetrical fistula.

Abortion

- In some parts of the world unsafe abortion accounts for one-third of maternal deaths.
- Approximately 67,000 cases of abortion-related deaths occur each year.
- Can be prevented by providing safe abortion, quality family-planning services, and competent postabortion care.

Indirect Causes

- Preexisting medical conditions such as anemia, malaria, hepatitis, heart disease, and HIV/AIDS can increase the risk of maternal death.
- Risk of adverse outcomes can be reduced through prenatal identification and treatment as well as the availability of appropriate B**EmOC** at the time of delivery.

Maternal Morbidity

For every maternal death there are approximately 30 times as many cases of pregnancy-related illness or disability. For example, obstetric fistula (an opening between the bladder and the vagina) is usually the result of obstructed labor. It causes incontinence (the inability to hold urine). Although fistulas are preventable with good obstetric care, they have tragic consequences for many women, who are often left abandoned and isolated.

Exhibit 5.4: WHO Estimates of Maternal Mortality Ratio (MMR): 1990–2013

No	Country name	MMR 1990	MMR 2013		No	Country name	MMR 1990	MMR 2013
1	Afghanistan	1,200	400		21	Bolivia (Plurinational State of)	510	200
2	Albania	31	21		22	Bosnia and Herzegovina	19	8
3	Algeria	160	89		23	Botswana	360	170
4	Andorra	–	–		24	Brazil	120	69
5	Angola	1,400	460		25	Brunei Darussalam	26	27
6	Antigua and Barbuda	–	–		26	Bulgaria	24	5
7	Argentina	71	69		27	Burkina Faso	770	400
8	Armenia	47	29		28	Burundi	1,300	740
9	Australia	7	6		29	Cabo Verde	230	53
10	Austria	10	4		30	Cambodia	1,200	170
11	Azerbaijan	60	26		31	Cameroon	720	590
12	Bahamas	43	37		32	Canada	6	11
13	Bahrain	21	22		33	Cape	–	–
14	Bangladesh	550	170		34	Central African Republic	1,200	880
15	Barbados	120	52		35	Chad	1,700	980
16	Belarus	37	1		36	Chile	55	22
17	Belgium	10	6		37	China	97	32
18	Belize	75	45		38	Colombia	100	83
19	Benin	600	340		39	Comoros	630	350
20	Bhutan	900	120		40	Congo	670	410

Source: Trends in Maternal Mortality: 1990–2013; Estimates by WHO, UNICEF, UNFPA, The World Bank, and the UN Populations Division.

Exhibit 5.4: WHO Estimates of Maternal Mortality Ratio (MMR): 1990–2013 (Contd.)

No	Country name	MMR 1990	MMR 2013		No	Country name	MMR 1990	MMR 2013
41	Cook Islands	–	–		61	Fiji	89	59
42	Costa Rica	38	38		62	Finland	6	4
43	Côte d'Ivoire	740	720		63	France	12	9
44	Croatia	8	13		64	Gabon	380	240
45	Cuba	63	80		65	Gambia	710	430
46	Cyprus	18	10		66	Georgia	50	41
47	Czech Republic	15	5		67	Germany	13	7
48	Democratic People's Rep of Korea	85	87		68	Ghana	760	380
49	Democratic Republic of the Congo	1,000	730		69	Greece	6	5
50	Denmark	9	5		70	Grenada	34	23
51	Djibouti	400	230		71	Guatemala	270	140
52	*Dominica*	–	–		72	Guinea	1,100	650
53	Dominican Republic	240	100		73	Guinea-Bissau	930	560
54	Ecuador	160	87		74	Guyana	210	250
55	Egypt	120	45		75	Haiti	670	380
56	El Salvador	110	69		76	Holy See	–	–
57	Equatorial Guinea	1,600	290		77	Honduras	290	120
58	Eritrea	1,700	380		78	Hungary	23	14
59	Estonia	48	11		79	Iceland	7	4
60	Ethiopia	1,400	420		80	India	560	190

Source: Trends in Maternal Mortality 1990–2013; Estimates by WHO, UNICEF, UNFPA, The World Bank, and The UN Populations Division

Exhibit 5.4: WHO Estimates of Maternal Mortality Ratio (MMR): 1990–2013 (Contd.)

No	Country name	MMR 1990	MMR 2013		No	Country name	MMR 1990	MMR 2013
81	Indonesia	430	190		101	Liechtenstein	–	–
82	Iran (Islamic Republic of)	83	23		102	Lithuania	34	11
83	Iraq	110	67		103	Luxembourg	6	11
84	Ireland	6	9		104	Madagascar	740	440
85	Israel	12	2		105	Malawi	1,100	510
86	Italy	10	4		106	Malaysia	56	29
87	Jamaica	98	80		107	Maldives	430	31
88	Japan	14	6		108	Mali	1,100	550
89	Jordan	86	50		109	Malta	12	9
90	Kazakhstan	91	26		110	Marshall Islands	–	–
91	Kenya	490	400		111	Mauritania	630	320
92	Kiribati	250	130		112	Mauritius	70	73
93	Kuwait	12	14		113	Mexico	88	49
94	Kyrgyzstan	85	75		114	Micronesia (Federated States of)	170	96
95	Lao People's Demo. Rep	1,100	220		115	Monaco	–	–
96	Latvia	57	13		116	Mongolia	100	68
97	Lebanon	64	16		117	Montenegro	8	7
98	Lesotho	720	490		118	Morocco	310	120
99	Liberia	1,200	640		119	Mozambique	1,300	480
100	Libya	31	15		120	Myanmar	580	200

Source: Trends in Maternal Mortality: 1990–2013; Estimates by WHO, UNICEF, UNFPA, The World Bank, and The UN Populations Division

Exhibit 5.4: WHO Estimates of Maternal Mortality Ratio (MMR): 1990-2013 (Contd.)

No	Country name	MMR 1990	MMR 2013		No	Country name	MMR 1990	MMR 2013
121	Namibia	320	130		141	Qatar	11	6
122	Nauru	-	-		142	Republic of Korea	18	27
123	Nepal	790	190		143	Republic of Moldova	61	21
124	Netherlands	11	6		144	Romania	170	33
125	New Zealand	18	8		145	Russian Federation	74	24
126	Nicaragua	170	100		146	Rwanda	1,400	320
127	Niger	1,000	630		147	Saint Kitts and Nevis	-	-
128	Nigeria	1,200	560		148	Saint Lucia	60	34
129	Niue	-	-		149	Saint Vincent and the Grenadines	48	45
130	Norway	9	4		150	Samoa	150	58
131	Oman	48	11		151	San Marino	-	-
132	Pakistan	400	170		152	Sao Tome and Principe	410	210
133	Palau	-	-		153	Saudi Arabia	41	16
134	Panama	98	85		154	Senegal	530	320
135	Papua New Guinea	470	220		155	Serbia	18	16
136	Paraguay	130	110		156	Seychelles	-	-
137	Peru	250	89		157	Sierra Leone	2,300	1100
138	Philippines	110	120		158	Singapore	8	6
139	Poland	17	3		159	Slovakia	15	7
140	Portugal	15	8		160	Slovenia	11	7

Source: Trends in Maternal Mortality: 1990-2013; Estimates by WHO, UNICEF, UNFPA, The World Bank, and the UN Populations Division

Exhibit 5.4: WHO Estimates of Maternal Mortality Ratio: 1990-2013 (Contd.)

No	Country name	MMR 1990	MMR 2013		No	Country name	MMR 1990	MMR 2013
161	Solomon Islands	320	130		180	Trinidad and Tobago	89	84
162	Somalia	1,300	850		181	Tunisia	91	46
163	South Africa	150	140		182	Turkey	48	20
164	South Sudan	1,800	730		183	Turkmenistan	66	61
165	Spain	7	4		184	Tuvalu	~	~
166	Sri Lanka	49	29		185	Uganda	780	360
167	State of Palestine	~	~		186	Ukraine	49	23
168	Sudan	720	360		187	United Arab Emirates	16	8
169	Suriname	84	130		188	UK of Great Britain and Northern Ireland	10	8
170	Swaziland	550	310		189	United Republic of Tanzania	910	410
171	Sweden	6	4		190	United States of America	12	28
172	Switzerland	8	6		191	Uruguay	42	14
173	Syrian Arab Republic	130	49		192	Uzbekistan	66	36
174	Tajikistan	68	44		193	Vanuatu	170	86
175	Thailand	42	26		194	Venezuela (Bolivarian Rep of)	93	110
176	Yugoslav Rep Macedonia	15	7		195	Viet Nam	140	49
177	Timor-Leste	1,200	270		196	Yemen	460	270
178	Togo	660	450		197	Zambia	580	280
179	Tonga	71	120		198	Zimbabwe	520	470

Source: Trends in Maternal Mortality: 1990–2013; Estimates by WHO, UNICEF, UNFPA, The World Bank, and the UN Populations Division.

Exhibit 5.5: MDG Grouping: Developing and Developed Regions

Developing Regions

Northern Africa	Sub-Saharan Africa (Continued)	Southeast Asia	Oceania
Algeria	Mali	Brunei Darussalam	American Samoa
Egypt	Mauritania	Cambodia	Cook Islands
Libya	Mauritius	Indonesia	Fiji
Morocco	Mayotte	Lao Demo Rep	French Polynesia
Tunisia	Mozambique	Malaysia	Guam
Western Sahara	Namibia	Myanmar	Kiribati
Sub-Saharan Africa	Niger	Philippines	Marshall Islands
Angola	Nigeria	Singapore	Micronesia
Benin	Re'union	Thailand	Nauru
Botswana	Rwanda	Timor-Leste	Niue
Burkina Faso	San Tome & Principe	Viet Nam	New Caledonia
Burundi	Senegal	**East Asia**	North Maria Island
Cameroon	Seychelles	China	Palau
Cape Verde	Sierra Leone	Hong Kong	Papua New Gunea
Central Africa Rep	Somalia	Macau	Samoa

Chad	South Africa	Korea Demo People	Solomon Islands
Comoros	Sudan	Korea Rep of	Tokelau
Congo	Swaziland	Mongolia	Tonga
Cote d'Ivoire	Togo	**Western Asia**	Tuvalu
Demo Rep Congo	Uganda	Bahrain	Vanautu
Djibouti	United Republic of Tanzania	Cyprus	**Eurasia**
Equatorial Guinea	Zambia	Iraq	Armenia
Eritrea	Zimbabwe	Israel	Azerbaijan
Ethiopia	**Southern Asia**	Jordan	Belarus
Gabon	Afghanistan	Kuwait	Georgia
Gambia	Bangladesh	Lebanon	Kazakhstan
Ghana	Bhutan	Palestine	Kyrgyzstan
Guinea	India	Oman	Rep of Maldova
Guinea-Bissau	Iran	Qatar	Russian federation
Kenya	Maldives	Saudi Arabia	Tajikistan
Lesotho	Nepal	Syrian Arab Rep	Turkmenistan
Liberia	Pakistan	Turkey	Ukraine
Madagascar	Sri Lanka	United Arab Emirates	Uzbekistan
Malawi		Yemen	

Exhibit 5.5: MDG Groups: Developing and Developed Regions (Contd.)

Developing Regions (Contd) Latin America & Caribbean		Developed Regions	
Anguilla	Guyana	Albania	Japan
Antigua and Barbuda	Haiti	Andorra	Latvia
Argentina	Honduras	Australia	Liechtenstein
Aruba	Jamaica	Austria	Lithuania
Bahamas	Martinique	Belgium	Luxembourg
Barbados	Mexico	Bermuda	Malta
Belize	Montserrat	Bosnia &Herzegovina	Monaco
Bolivia	Netherlands Antilles	Bulgaria	Netherlands
Brazil	Nicaragua	Canada	New Zealand
British Virgin Islands	Panama	Channel Islands	Norway
Cayman Islands	Paraguay	Croatia	Poland
Chile	Peru	Czech Republic	Portugal
Columbia	Puerto Rico	Denmark	Romania
Costa Rica	St Kitts & Nevis	Estonia	San Marino
Cuba	Saint Lucia	Faeroe Islands	Serbia & Montenegro
Dominica	St Vincent Grenadine	Finland	Slovakia

Dominican Rep	Suriname	France	Slovenia
Ecuador	Trinidad & Tobago	Germany	Spain
El Salvador	Turks & Caicos Islands	Greece	Sweden
Falklands	Uruguay	Hungary	Switzerland
French Guiana	U.S. Virgin Islands	Iceland	Republic of Macedonia
Grenada		Ireland	Ukraine
Guadeloupe		Isle of Man	United Kingdom
Guatemala		Italy	United States

5.3 Case Study: Maternal Health (B)

"No country sends its soldiers to war to protect their country without seeing to it that they will return safely, and yet mankind for centuries has been sending women to battle to renew the human resource without protecting them."- Fred Sai, former president of the International Planned Parenthood Federation.

The WHO representative in India called his team to discuss the progress made by India in achieving the MDG 5 goal. India, being a signatory to the MDG declaration, was faced with the challenge of reducing its MMR from 560 maternal deaths per 100,000 live births in 1990 to 140 by 2015. As per the WHO estimates, India's MMR stood at 190 per 100,000 live births in 2013, and was likely to miss the MDG target of 2015. In a meeting with the Health Secretary to the Government of India, the WHO representative shared his concern over the lack of progress made by India toward achieving the MDG 5 goal. The health secretary to the Government of India decided to review India's maternal health policy.

Maternal Health in India

India is the second most populous country in the world with over 1.21 billion people as per 2011 census, with 70% of the population in rural areas. India has 17% of the world's population and 20% share of the world's poorest in 2013; poverty defined as less than $1.25 per day income on purchasing power parity. Health is not a political priority in India. The public health spending in India is only 1% of GDP, as opposed to an average of 10% to 12% of GDP for public health spending by the developed nations, and therefore the public health system in India is far from satisfactory. In spite of some progress in public health since independence in 1947 such as increased life expectancy and eradication of smallpox and polio, India's record on maternal and child health indicators continues to be poor. With an estimated 27 million childbirths every year, India accounts for more than 20% of the global burden of maternal mortality and the largest number of maternal deaths

for any country.[11] An estimated 80% of maternal deaths could be attributed to the direct causes arising from obstetric complications.

The year 1992 marked a paradigm shift on maternal health policy making in India. India launched the World Bank–funded National Child Survival and Safe Motherhood (CSSM 1992–1997) program, which focused on maternal health, unlike earlier programs that focused on family planning improvement. The International Conference on Population and Development (ICPD) conference in 1994 highlighted the need for an integrated approach by including adolescent health, gender issues, and reproductive tract infections in the delivery of maternal and child health services. On the basis of the above international evidence, India launched the first Reproductive and Child Health (RCH) Program in 1998. As per the Government of India estimates,[12] the RCH-I program (1998–2005) brought down MMR from 398 in 1997–1998[13] to 254 in 2004–2005.[14] The RCH-1 program was followed by the launch of the RCH-II program in 2005.

[11]Trends in Maternal Mortality: 1990 to 2013. Estimates by WHO, UNICEF, UNFPA, The World Bank and the United Nations Population Division; http://www.who.int/reproductivehealth/publications/monitoring/maternal-mortality-2013/en/

[12]The Government of India estimates for MMR may differ from the WHO estimates. One of the reasons is that the Civil Registration System in India is poor. India enacted the Registration of Birth and Death (RBD) Act in 1969, which made registration of births and deaths mandatory by law; yet 18% of all births and 33% all deaths remained unregistered in 2010. Along with the RBD act, the government also introduced the Medical Certification of Causes of Death (MCCD) as per the International Classification of causes of Death (ICD); yet maternal death audit is not done regularly at the national level.

[13]Maternal Mortality in India: 1997–2003, Trends, Causes and Risk Factors. Registrar General, India; http://www.health.mp.gov.in/Maternal_Mortality_in_India_1997-2003.pdf, accessed on February 23, 2015.

[14]Maternal &Child Mortality and Total Fertility Rates- Sample registration system (SRS). Office of Registrar General, India; http://censusindia.gov.in/vital_statistics/SRS_Bulletins/MMR_release_070711.pdf, accessed on Feb 23, 2015.

At the time of signing the MDG declaration in 2000, India's MMR stood at 390 as per the WHO estimate.[15] Even though MMR in India reduced to 190 by 2013, maternal deaths in India accounted for 20% of global maternal deaths. India was likely to miss the MDG 5 target.

National Rural Health Mission (NRHM) was India's strategic response to meet the MDGs. Recognizing the importance of health in the context of socioeconomic development, NRHM aimed at improving the basic health care delivery system in partnership with the states.[16] The mission adopted a synergistic approach by relating health to the determinants of good health such as nutrition, sanitation, hygiene, and safe drinking water. The government brought under NRHM, the RCH-II, National AIDS Control Program (NACP-III), and all other national vertical health programs such as tuberculosis (TB), malaria, and blindness control. NRHM focused on improving the availability of and access to quality health care, especially for those residing in rural areas, the poor, women, and children. By 2007, NRHM was fully implemented in all the states.

Following the international evidence on skilled birth attendants (SBA)[17] and emergency obstetric care (EmOC) services[18] to prevent ma-

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[15]Trends in Maternal Mortality: 1990 to 2013. Estimates by WHO, UNICEF, UNFPA, The World Bank and the United Nations Population Division; http://www.who.int/reproductivehealth/publications/monitoring/maternal-mortality-2013/en/

[16]Health is a state subject in India and the Government of India works in partnerships with the state governments to strengthen the health care delivery system through provision of physical infrastructure, HR, equipment, emergency transport, drugs, diagnostics, and other support. NRHM provided adequate flexibility for the states to identify their key concerns and to develop interventions that would address their specific problems.

[17]Making Pregnancy Safer, World Health Organization, December 5, 2000; http://apps.who.int/gb/archive/pdf_files/EB107/ee26.pdf

Deborah Maine. 1993. *Safe Motherhood Programs: Options and Issues*. http://www.amddprogram.org/v1/resources/SMProgOptionsandIssuesEN.pdf; The model identifies three groups of factors which may stop women from accessing the level of maternal health care they need, namely, delays in decisions to seek care, delays in reaching care, and delays in receiving adequate health care.

[18]Thaddeus, S., Maine, D. 1994. Too far to walk: maternal mortality in context. *Social Science Medicine*, volume 38, pp. 1091–1110.

ternal deaths, Government of India promoted "safe institutional deliveries" as an approach to meet the MDG challenges on maternal and child health. NRHM provided every village in the country with a trained Accredited Social Health Activist (ASHA), whose portfolio of activities focused on promoting institutional deliveries. The rural health infrastructure was significantly upgraded for promoting "safe institutional deliveries" by providing SBAs and EmOC services.

ASHAs were trained over a period of 23 days in five episodes, with a few weeks in between episodes for field experience. The role of ASHA included (i) identification of pregnant women as beneficiaries of the scheme and facilitate registration for antenatal care (ANC) services, (ii) assisting the pregnant women to obtain necessary certifications wherever necessary, (iii) providing/helping the women in receiving at least three ANC checkups including tetanus toxoid[19] injections and iron folic acid (IFA) tablets,[20] and (iv) accompanying the pregnant women to health facilities for institutional deliveries. The most recent estimates[21] put the number of ASHA workers at 890,000 by March 2014. A clear strategy was lacking for providing the necessary management support to ASHA so that she was not left alone in the village without having any linkage with the health system.

To provide SBAs, the Government of India trained staff nurses (SN), village health visitors (LHV), as well as auxiliary nurses & midwives (ANM) in skilled attendance at birth (Exhibit 5.6). As per the

[19]The Tetanus Toxoid vaccination of pregnant women was included in the WHO's Expanded Program on Immunization (EPI) as early as the mid-1970s. Studies showed that immunization of pregnant women with two doses of Tetanus Toxoid could significantly reduce mortality from neonatal tetanus. If the mothers had been vaccinated against tetanus, the infants acquired passive immunity and were thus protected. Neonatal tetanus usually occurred through infection of the unhealed umbilical stump, particularly when the stump was cut with a nonsterile instrument.

[20]Iron/Folic Acid or multiple micronutrient supplementations was recommended for pregnant women who suffer from iron deficiency anemia.

[21]Supporting mechanism for Asha. NRHM; http://nrhm.gov.in/communitisation/asha/asha-support-mechanism/supporting-mechanism.html, accessed on February 25, 2015.

most recent estimates,[22] there would be a shortfall of 25,000 SBAs to attain 90% skilled birth attendance by 2015.

To provide EmOC services, the government upgraded certain health facilities. Some primary health centers (PHCs) were upgraded as 24x7 PHCs to provide basic EmOC services (BEmOC). Some community health centers (CHCs) were upgraded as first referral units (FRUs) to provide comprehensive EmOC (CEmOC) services. Accordingly, all public health facilities were classified into three categories based on the level of service offered for institutional deliveries.[23]

> Level-1 (Basic services for normal delivery): PHCs were designated as Level-1 service providers. These facilities handled normal delivery; initial management & referral in case of complications.
>
> Level-2 (Basic EmOC services): Upgraded PHCs (called 24x7 PHCs) and CHCs were designated as Level-2 service providers. These facilities handled normal delivery, BEmOC, including signal functions and referral in case of complications requiring CEmOC.
>
> Level-3 (Comprehensive EmOC services): Upgraded CHCs, called FRUs, sub-divisional hospitals (SDH), and district hospitals (DH) were designated as Level-3 service providers. These facilities could handle normal delivery, CEmOC services including comprehensive signal functions, management of complications, C–section, and referral of complications to tertiary level care where required.

By 2013, the rural health infrastructure had an estimated 15,000 Level-1 facilities, 11,500 Level-2 facilities (9,000 upgraded PHCs and 2,500 CHCs) offering BEmOC services, and 4,250 Level-3 facilities (2,500 upgraded CHCs, 1,000 SDHs, and 750 DHs) offering CEmOC services.

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[22]Chandhiok, N., Joglekar, N., Shrotri, A., et al. Task-shifting challenges for provision of skilled birth attendance: a qualitative exploration. *International Health Advance*, volume 7, no. 3, pp. 195–203.

[23]Maternal and Newborn Health Toolkit, Ministry of Health and Family Welfare, Government of India, January 2013.

As per UNICEF report on Maternal and Newborn Health toolkit,[24] the WHO recommendations called for at least 10 maternity beds per 1,000 pregnant women with 80% bed occupancy and 3 days of stay. India's rural health care system needed 37,250 Level 1, 22,209 Level 2, and 2,482 Level 3 (not including SDHs and DHs) facilities, respectively.

In addition to upgrading the health infrastructure under NRHM, the Government of India announced a new scheme, Janani Suraksha Yojana (JSY), which offered monetary incentives to women who delivered in institutions. JSY, a safe motherhood intervention under NRHM, was one of the largest conditional cash transfer programs in the world.

Janani Suraksha Yojana

JSY was an important component under NRHM. The objective of JSY was to reduce maternal and neonatal mortality by promoting institutional delivery among the poor pregnant women. It was a 100% centrally sponsored scheme that integrated cash assistance with comprehensive medical care during pregnancy, childbirth, and postnatal care (PNC) to benefit pregnant women from poor families. JSY offered financial assistance to women opting for institutional delivery, either in a government health facility or a government-approved private health facility. ASHAs too were paid for promoting institutional deliveries. For financial assistance, the states were classified into low performance states (LPS)[25] and high performance states (HPS). Women from rural and urban areas of LPS were paid Rs. 1,400 and Rs. 1,000, respectively, for institutional deliveries, while the payments for women from HPS were Rs. 700 and Rs. 600, respectively. ASHAs were paid Rs. 600 in LPS and Rs. 200 in HPS.

JSY attracted a large number of beneficiaries; from a mere 700,000 in 2005–2006 to almost 10 million by 2010. Exhibit 5.7 shows the percentage of JSY beneficiaries in LPS and HPS since the introduction of the scheme in 2005. Institutional deliveries increased from 47% as re-

[24]Maternal and Newborn Health Toolkit, MoHFW, GoI, 2013; http://www.unicef.org/india/2._Maternal_Newborn_Health_Toolkit.pdf

[25]Low-Performing States (LPS): Uttar Pradesh, Uttaranchal, Bihar, Jharkhand, Madhya Pradesh, Chhattisgarh, Assam, Rajasthan, Orissa, and Jammu and Kashmir. All the remaining states are termed as High-Performing States (HPS).

ported in the DLHS-3[26] (2005–2006) to 73% as per the Coverage Evaluation Survey[27] (Exhibit 5.8) report of 2009.

The performance of JSY varied across states in India (see Exhibit 5.9). There are many reasons for different performances by the states. As mentioned earlier, health is a state government subject in India. Under NRHM, the central government provided 100% financial assistance to the states for upgrading its state health facilities and left the details of JSY program management (planning, implementation, monitoring, and control) to the states.

The management capacity of each state department of health varied considerably between the LPS and the HPS as well as within HPS. Besides management capacity, there were other differences between states. For example, states like Tamil Nadu and Gujarat promoted institutional deliveries far more aggressively by using their state funds to provide additional financial incentives for women and ASHAs over and above the incentives from the central government funds. As an illustration, see Exhibit 5.10 on the Chiranjeevi Scheme of the Government of Gujarat.

In a meeting called by the health secretary to the Government of India, concerns were expressed about the country's progress to achieve the MDG 5 target. He was disturbed by the fact that India's MMR stood at 190 maternal deaths per 100,000 live births by 2013, in spite of increased institutional deliveries. Globally, India had the highest number of maternal deaths estimated at 56,000 in the year 2013. When would India achieve the MDG target of 140 maternal deaths? What additional measures were needed to improve maternal health in India? He was aware that the health-seeking behavior of women from rural and urban areas was different, as per NFHS-III report[28] (Exhibit 5.11).

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[26]DLHS: District Level Household Survey-3; 2007-08, GoI

[27]Coverage Evaluation Survey, UNICEF and MoHFW, GoI, 2009

[28]National Family Health Survey (NFHS) is a large-scale, multi-round survey under the Ministry of Health and Family Welfare, Government of India and conducted by the International Institute for Population Sciences (IIPS), Mumbai. NFHS is funded by the United States Agency for International Development (USAID) with supplementary support from United Nations Children's Fund (UNICEF). The First National Family Health Survey (NFHS-1) was conducted in 1992-93, NFHS-II was

Exhibit 5.6: Skilled Birth Attendance[29]

Pregnancies could develop complications at any stage. Though most pregnancies result in normal birth, it is estimated that about 15% may develop complications, which cannot be predicted. Some of these may be life threatening for the mother and/or her baby. The presence of skilled attendants is therefore crucial for the early detection and also for appropriate and timely management of such complications.

The Government of India (GoI) considers an SBA to be a person who can handle common obstetric and neonatal emergencies and is able to timely detect and recognize when a situation reaches a point beyond his/her capability, and refers the woman/newborn to an appropriate facility without delay.

To be called an SBA, the health workers (auxiliary nurse midwives [ANMs], lady health visitors [LHVs] and SNs) must possess technical competence related to routine care provision including identification and immediate management of complications arising during pregnancy and childbirth. The presence of an SBA at every delivery, along with the availability of an effective referral system, can help reduce maternal morbidity and mortality to a considerable extent. Past experiences with traditional birth attendants (TBAs) have indicated that TBAs were not able to identify and manage complications during pregnancy and childbirth despite repeated trainings; therefore, GoI does not consider TBAs as SBAs.

What can be done to combat maternal deaths?

Most of the maternal deaths are linked with three types of delays that can result in an increase in maternal morbidity and mortality. They are:

Delay 1: Delay in recognizing the problem (lack of awareness of danger signs) and deciding to seek care (due to inaccessible health facility, lack of resources to pay for services/supplies and medicines).

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conducted in 1998-99, NFHS-III in 2005-2006, and NFHS-IV (2014-15) started toward the end of 2014.

[29]Guidelines for Antenatal Care and Skilled Attendance at Birth by ANMs/LHVs/SNs Maternal Health Division, Ministry of Health and Family Welfare, Government of India April 2010; http://nrhm.gov.in/nrhm-components/rmnch-a/maternal-health/guidelines.html, accessed on February 27, 2015.

Delay 2: Delay in reaching the health facility (due to unavailability of transport, lack of awareness of appropriate referral facility).
Delay 3: Delay in receiving treatment once a woman has arrived at the health facility (due to inadequately equipped health facility, lack of trained personnel, emergency medicines, blood, etc.).

Sensitizing the community and family for right decision at right time and timely referral through pre-identified transport can address the first two delays and would help women access the services available as and when required. Simultaneously, the health workers need to be technically competent and facility adequately equipped to provide services/care to the woman reaching the health facilities. This would help in ensuring the provision of skilled attendance to all women during pregnancy and childbirth.

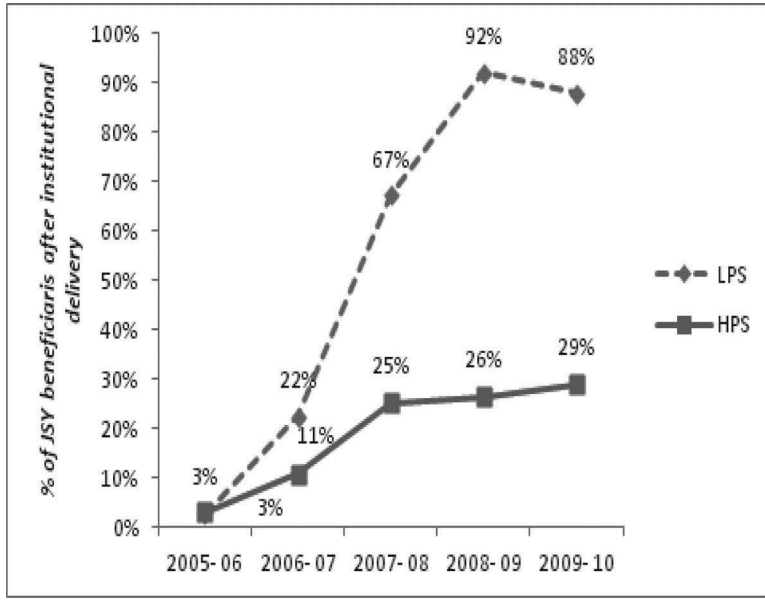
In short, SBAs provide comprehensive ANC and PNC; identifying complications in a timely manner and referring women with complications after basic management to higher health facilities for further management.

Another major step in this direction is the GoI policy initiative to empower the ANM, LHV, SN, and multipurpose health worker – female (MPHW-F) for undertaking certain lifesaving measures to make them competent. These measures are as follows:

- To undertake active management of third stage of labor (AMTSL).
- To use drugs for the prevention of postpartum hemorrhage (PPH).
- To use drugs in emergency situations to stabilize the patient prior to referral.
- To perform basic procedures in emergency situations.

Skilled Birth attendance is to be provided at domiciliary setting or at the level of the Sub-Centers (SCs), PHCs, or any other health care facility. Higher level health centers such as CHCs and DHs have obstetricians or doctors trained in obstetrics to provide emergency obstetric care services.

Exhibit 5.7: Percentages of JSY Beneficiaries in LPS and HPS



Source: NRHM (2012), RTIs filed by Accountability Initiative.[30]

Exhibit 5.8: Findings from Coverage Evaluation Survey

Indicators	Rural (%)	Urban (%)	Total (%)
Institutional delivery	68.0	85.6	72.9
Public facility	47.7	45.1	47.0
Private facility	20.3	40.5	25.9
SBA (institutions + home)	71.7	87.9	76.2
Mean time to reach the health facility (minutes)	39.2	24.3	31.8
Mean distance to reach the health facility (kms)	11.2	4.9	8.1

Source: UNICEF Coverage Evaluation Survey, 2009 [31]

[30]Dongre, A., Kapur, A. 2013. How is Janani Suraksha Yojana performing in backward districts of India? - Part 1. Retrieved from http://www.accountabilityindia.in/accountabilityblog/2589-how-janani-suraksha-yojana-performing-backward-districts-india-part-1

[31]UNICEF Coverage Evaluation Survey. 2009. http://fkilp.iimb.ernet.in/pdf/maternal_health_rc/background_readings/Surveys/UNICEF_Coverage_Evaluation_Survey.pdf, accessed February 20, 2015

Exhibit 5.9: Maternal Mortality Rate (MMR) in a Few States in India

States	MMR 2010-12	MMR 2007-09	MMR 2004-06	MMR 2001-03	MMR 1999-01	MMR 1997-98
Andhra Pradesh	110	134	154	195	220	197
Assam	328	390	480	490	398	568
Bihar/Jharkhand	219	261	312	371	400	531
Gujarat	122	148	160	172	202	
Haryana	146	153	186	162	176	136
Karnataka	144	178	213	228	266	245
Kerala	66	81	95	110	22149	150
Madhya Pradesh/Chhattisgarh	230	269	335	379	407	441
Maharashtra	87	104	130	149	169	166
Orissa	235	258	303	358	424	346
Punjab	155	172	192	178	177	280
Rajasthan	255	318	388	445	501	508
Tamil Nadu	90	97	111	134	167	131
Uttar Pradesh/Uttarakhand	292	359	440	517	539	606
West Bengal	117	145	141	194	218	303
Other	136	160	206			
INDIA	178	212	254	301	327	398

Source: Registrar General of India, Ministry of Home Affairs (SRS Estimates).

Exhibit 5.10: Chiranjeevi Scheme: A Strategic Initiative to Improve Maternal Health

The National Rural Health Mission (NRHM) of the Government of India provided adequate flexibility for the states to identify their key concerns and to develop interventions that would address their specific problems. Accordingly, the Government of Gujarat took a strategic initiative to improve maternal health by launching its own "Chiranjeevi Scheme," which means a scheme for long life to mothers and children, as a public–private partnership.[32]

The scheme was introduced on a pilot basis in 2005 in five worst-performing districts of Gujarat. This initiative was triggered by multiple factors; global evidence in the "three delay model" promoted by Deborah Maine,[33] evidence of Skilled Birth Assistance (SBA) in reducing maternal mortality, need for emergency obstetric care, and the national strategy for promoting institutional deliveries. Also, Gujarat state with a population of 55 million had only 7 to 8 obstetricians[34] (out of about an estimated 2,000 obstetricians) serving the rural population of 32 million. The Chiranjeevi Scheme (CY) promoted institutional deliveries in private health care facilities. Private obstetricians were empanelled in the scheme after a very rigorous selection process to ensure their health facilities offered an enabling environment for safe institutional deliveries. Under this scheme, private obstetricians provided skilled birth attendance and comprehensive emergency obstetric care services free of charge to the poor women. In return, the government paid each obstetrician an amount of US$ 4,600 for a package of 100 deliveries including normal and complicated cases. The package details were worked out based on a fixed rate of cesarean (7%)

[32]The Chiranjeevi Scheme of the Gujarat Government won several national and international awards for Innovations in the Health Sector.

[33]The model identifies three groups of factors that may stop women from accessing the level of maternal health care they need, namely, delays in decisions to seek care, delays in reaching care, and delays in receiving adequate health care.

[34]Singh, A., Mavalankar, D. V., Bhat, R. , et al. 2009. Providing skilled birth attendants and emergency obstetric care services to the poor through partnership with private sector obstetricians in Gujarat, India. *Bulletin World Health Organization*, volume 87, pp. 960–964.

and other complications as per international epidemiological estimates and local experience. The scheme was promoted via meetings with the community leaders, local obstetric and gynaecological society, and district health teams. In the very first year, 180 obstetricians joined the scheme. By the end of 2007, the scheme attracted about 100,000 women and thereby proved to be a win-win situation for the poor people, the private obstetricians, and the district health authorities.

CY was extended to all the districts in Gujarat state in 2008. About 53% of the poor women in the state benefited from the CY annually. The scheme provided financial protection to the beneficiaries against the cost of delivery and emergency obstetric care. Among the beneficiaries of the CY, reported maternal deaths were less than 10% of what would be expected in the population.[35] The CY experience offered a new strategy for managing maternal health programs through well-designed public–private partnership in developing countries.

[35]Mavalankar, D. V., Singh, A., Patel, S. R., et al. 2009. Saving mothers and newborns through an innovative partnership with private sector obstetricians: Chiranjeevi scheme of Gujarat state, India. *International Journal of Gynaecology and Obstetrics*, volume 107, pp. 271–276.

Exhibit 5.11: Health Care~Seeking Behavior of Women Based on Status of Residence (Urban/Rural)

		Residence			
	NFHS-3 (2005~06)	Urban	Rural	NFHS-2 (1998~99)	NFHS-1 (1992~93)
Marriage and Fertility					
1. Women aged 20~24 yr married by age 18 (%)	47.4	29.3	56.2	50.0	54.2
2. Men aged 25~29 yr married by age 21 (%)	32.3	18.1	40.3	NA	NA
3. Total fertility rate (children per woman)	2.7	2.1	3.0	2.9	3.4
4. Women aged 15~19 yr who were already mothers or pregnant at the time of the survey (%)	16.0	8.7	19.1	NA	NA
5. Median age at first birth for women aged 25~49 yr	19.8	20.9	19.3	19.3	19.4
6. Married women with two living children wanting no more children (%)[1]	84.6	89.7	81.6	72.4	59.7
6a. Two sons	89.9	92.1	88.6	82.7	71.5
6b. One son, one daughter	87.0	92.8	85.3	76.4	66.0
6c. Two daughters	61.4	74.7	54.4	47.0	36.9

(Continued)

		Residence			
	NFHS-3 (2005–06)	Urban	Rural	NFHS-2 (1998–99)	NFHS-1 (1992–93)
Family Planning (currently married women, age 15–49 yr) Current use					
7. Any method (%)	56.3	64.0	53.0	48.2	40.7
8. Any modern method (%)	48.5	55.8	45.3	42.8	36.5
8a. Female sterilization (%)	37.3	37.8	37.1	34.1	27.4
8b. Male sterilization (%)	1.0	1.1	1.0	1.9	3.5
8c. Intra Uterine Devices (IUD) (%)	1.7	3.2	1.1	1.6	1.9
8d. Pill (%)	3.1	3.8	2.8	2.1	1.2
8e. Condom (%)	5.2	9.8	3.2	3.1	2.4
Unmet need for family planning					
9. Total unmet need (%)	12.8	9.7	14.1	15.8	19.5
9a. For spacing (%)	6.2	4.5	6.9	8.3	11.0
9b. For limiting (%)	6.6	5.2	7.2	7.5	8.5

Maternity care (for births in the last 3 years)					
10. Mothers who had at least three antenatal care visits for their last birth (%)	50.7	73.8	42.8	44.2	43.9
11. Mothers who consumed IFA for 90 days or more when they were pregnant with their last child (%)	22.3	34.5	18.1	NA	NA
12. Births assisted by a doctor/nurse/LHV/ANM/other health personnel (%) [2]	48.8	75.3	39.9	42.4	33.0
13. Institutional births (%) [2]	40.8	69.4	31.1	33.6	26.1
14. Mothers who received post natal care from a doctor/nurse/LHV/ANM/other health personnel within 2 days of delivery for their last birth (%) [2]	36.8	60.8	28.5	NA	NA
Nutritional Status of Ever-Married Women (age 15-49)					
15. Women whose body mass index is below normal (%)	33.0	19.8	38.8	36.2	NA
16. Women who are overweight or obese (%)	14.8	28.9	8.6	10.6	NA
17. Ever-married women aged 15~49 yr who are anemic (%)	56.2	51.5	58.2	51.8	NA
18. Pregnant women aged 15~49 yr who are anemic (%)	57.9	54.6	59.0	49.7	NA

(Continued)

		Residence			
	NFHS-3 (2005-06)	Urban	Rural	NFHS-2 (1998-99)	NFHS-1 (1992-93)
Knowledge of HIV/AIDS among Ever-Married Adults (age15-49)					
19. Women who have heard of AIDS (%)	57.0	80.7	46.4	40.3	NA
20. Men who have heard of AIDS (%)	80.0	94.2	73.0	NA	NA
21. Women who know that consistent condom use can reduce the chances of getting HIV/AIDS (%)	34.7	56.3	25.1	NA	NA
22. Men who know that consistent condom use can reduce the chances of getting HIV/AIDS (%)	68.1	85.6	59.5	NA	NA
Women's Empowerment					
23. Currently married women who usually participate in household decisions (%)	36.7	45.0	33.0	NA	NA
24. Ever-married women who have ever experienced spousal violence (%)	37.2	30.4	40.2	NA	NA

CHAPTER 6

Child Health

6.1 An Introduction

The Millennium Development Goals (MDGs) focused the efforts of the world community on achieving significant, measurable improvements in people's lives.[1] MDG targets were set for the year 2015 with respect to the base year 1990 in consultation with all the member countries of the United Nations, held in the Millennium Development Conference, September 2000. The conference adopted eight MDG goals; MDG 4 was on child health.

The Millennium Development Goal MDG 4 called for reducing U5 Mortality Rate (U5: Children less than 5 years old) by a two-third between 1990 and 2015. U5MR is defined as the number of U5 deaths per 1,000 live births, and is a good indicator of child development. Even though U5 mortality came down from 13 million deaths in 1990 to 6.6 million deaths in 2102, many countries were likely to miss the MDG 4 target. India and Nigeria together accounted for one-third the total number of U5 deaths globally in 2012.

In this chapter, we discuss two case studies on child health. Case (A) highlights the global burden of U5 mortality. Case (B) brings out the lack of progress by India toward achieving MDG 4. India's U5MR stood at 56 in 2012, far short of the target of 45 deaths per 1,000 live births by 2015. What could explain the reasons for India's failure to achieve MDG 4?

[1]Millennium Development Goals; http://data.worldbank.org/about/millennium-development-goals, accessed on September 9, 2014

6.2 Case Study: Child Health (A)

"Child mortality is a sensitive indicator of a country's development and telling evidence of its priorities and values. Investing in the health of children and their mothers is not only human rights imperative, it is a sound economic decision and one of the surest ways for a country to set its course toward a better future.[2]"

The Executive Director, UNICEF, was reviewing the UNICEF 2014 report on the progress made by the World Health Organization (WHO) countries toward achieving the fourth Millennium Development Goal MDG 4. The MDG 4 called for reduction in U5 mortality (U5 represents children less than 5 years old) by a two-third between 1990 and 2015. The report mentioned 6.6 million children died in the year 2012. He realized that many countries were not likely to achieve MDG 4 and therefore called for a meeting to discuss the report in detail and evolve future strategies to improve child health.

Child Health

Investing in child health is an investment for socioeconomic development. "The early development of cognitive skills, emotional well-being, social competence, and sound physical and mental health builds a strong foundation for success well into the adult years. These abilities are critical prerequisites for economic productivity and responsible citizenship throughout life.[3]"

The most commonly used indicators of child health are the neonatal mortality rate (NMR), infant mortality rate (IMR), and U5 mortality rate (U5MR). NMR, IMR, and U5MR are defined as the number of neonatal deaths (death within 28 days of birth), infant deaths (death within the first year of life), and U5 deaths (death before the child reaches the age of 5 years) per 1,000 live births, respectively. U5MR is a better indicator of child health than NMR or IMR for several reasons. As per UNICEF, U5MR measured the end result of a development process: mother's health during pregnancy, skilled birth attendance, immunization against vaccine-

[2]UNICEF Report, The State of the world's Children, 2008; Child Survival.

[3]National Scientific Council on the Developing Child. 2007. *The Science of Early Childhood Development: Closing the Gap between What We Know and What We Do*. Cambridge: Harvard University; http://www.developingchild.net/pubs/persp/pdf/Science_Early_Childhood_Development.pdf, accessed on Feb 26, 2010.

preventable diseases, use of insecticide-treated mosquito nets (ITN) to prevent malaria, nutritional well-being to prevent many childhood illnesses and killer diseases such as pneumonia and diarrhea, availability of safe drinking water and basic sanitation, and the overall safety of child health environment.

The Fourth Millennium Development Goal (MDG4)[4] called for improvements in child health by reducing U5MR by a two-third between 1990 and 2015. As per UNICEF report,[5] U5MR in 1990 was 90 deaths per 1,000 live births, and therefore the MDG4 target was to achieve a global U5MR of 30 deaths per 1,000 live births by 2015.

Global causes of child death are shown in Figure 6.1. A note on the causes of child death is given in Exhibit 6.1.

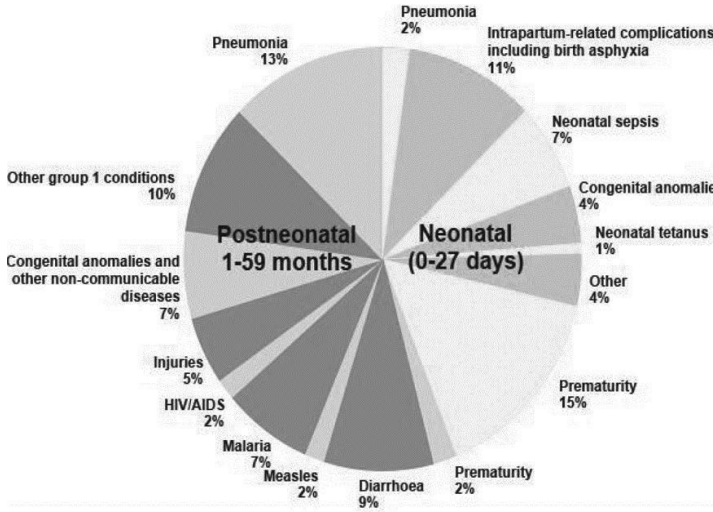


Figure 6.1 Global Causes of Deaths among Children Under 5 Years – 2013

[4]The Millennium Development Goals (MDGs) focused the efforts of the world community on achieving significant, measurable improvements in people's lives. Many of these commitments were drawn from the agreements and resolutions of world conferences and summits organized by the United Nations (UN) during the preceding decade. Accordingly, MDG targets were set for the year 2015 with respect to the base year 1990 in consultation with all the 189 member countries of the UN, held in the Millennium Development Conference, September 2000. All member countries of the UN, developing and developed nations, were given the same target to reduce their U5 deaths by a two-third between 1990 and 2015. Millennium Development Goals; http://data.worldbank.org/about/millennium-development-goals

[5]The State of the World's Children 2014 in Numbers: Every Child Counts; UNICEF, January 2014

Neonatal deaths

Neonatal deaths refer to death within 28 days of birth, and accounted for 44% of global U5 deaths. The major causes of neonatal death include preterm birth,[6] intrapartum-related complications,[7] infections,[8] and congenital anomalies.[9]

More than three-quarters of neonatal deaths from prematurity could be saved with frequent breast-feeding and antibiotics to treat newborn infections. Intranatal complications could be managed well by SBAs.[10] Neonatal infections were common in babies born at home without any medical help. Congenital anomalies could be reduced by satisfactorily addressing the nutritional requirements of pregnant women. Virtually all (99%) newborn deaths occurred in low- and middle-income countries, especially in Africa and South Asia, as can be seen in Figure 6.2.

Postneonatal U5 Deaths: Postneonatal U5 deaths refer to child death from the end of the neonatal period till the child becomes 5 years old. Malnutrition (see Exhibit 6.2 on the nutritional status of children) is the underlying contributing factor in about 45% of all child deaths, making children more vulnerable to serious diseases. Low immunization coverage against vaccine-preventable diseases such as tuberculosis (TB), measles, polio, diphtheria, tetanus, and pertussis (Exhibit 6.3), and poor

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[6]Prematurity or Preterm births: Extremely preterm (<28 weeks), very preterm (28 to < 32 weeks), moderate-to-late preterm (32 to 37 weeks); Preterm birth, WHO Fact sheet N°363; http://www.who.int/mediacentre/factsheets/fs363/en/

[7]Intrapartum-related complications refer to complications during childbirth including birth asphyxia. Birth asphyxia results from an inadequate intake of oxygen by the baby during the birth process—before, during, or just after birth.

[8]Neonatal infections include sepsis, pneumonia, meningitis, tetanus, diarrhea, etc. Preterm births are prone to neonatal infections as well as maternal infection.

[9]Congenital anomalies or birth defects can be defined as structural or functional anomalies which are present at the time of birth; Congenital anomalies; Fact sheet N°370; http://www.who.int/mediacentre/factsheets/fs370/en/

[10]SBA: A skilled birth attendant is an accredited health professional such as a midwife, doctor, or nurse with special training in the skills needed to manage normal (uncomplicated) pregnancies, childbirth, and the immediate postnatal period, and in the identification, management, and referral of complications in women and newborns. Making pregnancy safer: The Critical Role of the Skilled Attendant. A joint statement by WHO, ICM, and FIGO, 2004; http://www.who.int/maternal_child_adolescent/documents/9241591692/en/

Figure 6.2 The 10 Countries with the Greatest Number of Neonatal Deaths Per Year (2013)

Source: Healthy Newborn Network. Retrieved from http://www.healthynewbornnetwork.org/page/newborn-numbers, accessed on Aug 14, 2014

medical care to treat pneumonia, diarrhea, and malaria (Exhibit 6.4) also contribute significantly to U5 deaths. Good hygiene, clean drinking water, and use of ITNs could also save many lives.

As per the UNICEF report, progress toward MDG 4 was slow even if the U5 mortality came down from nearly 13 million children in 1990 to 6.6 million children by 2012. The progress of each country toward MDG 4 target, reproduced from the UNICEF report 2014, is given in Exhibit 6.5.

In a meeting called by the Executive Director (ED), his team shared the analysis of Exhibit 6.5 on the status of MDG4. A simple analysis on the percentage reduction in U5MR between 1990 and 2015 showed that 24 countries had already achieved by 2012 their MDG target for 2015 (Exhibit 6.6), while 9 countries were making sufficient progress to achieve the MDG target by 2015 (Exhibit 6.7). It was heartening to note that developing countries such as Bangladesh, Malawi, Nepal, and Liberia had already achieved their target, while Bhutan, Eritrea, Cambodia, and Niger would be achieving their target by 2015.[11]

[11]Bangladesh, Nepal, and Bhutan are in Southern Asia Region, Cambodia is in Southeastern Asia, Malawi and Eritrea are Eastern and South Africa region, Liberia and Niger are in Sub-Saharan Africa.

The ED was aware of the success of the oral rehydration solution (ORS) program in Bangladesh to control diarrheal deaths.[12] The ORS program was a success globally as well, as the total annual number of diarrheal deaths globally among U5 children decreased by more than 50%—from over 1.2 million in 2000 to fewer than 0.6 million by 2013, as per UNICEF 2014 estimates. Unfortunately, the stagnant low ORS coverage in developing countries (Table 6.1) indicated a widespread failure to deliver one of the most cost-effective and lifesaving child-survival interventions.

Table 6.1 Percentage of U5 Children with Diarrhea Receiving ORS

UNICEF Regional Average (2006–2011)	% Use of ORS
Sub-Saharan Africa	30
West and Central Africa	25
South Asia	33
East Asia and Pacific	41
Developing countries	34
Least developed countries	39
World average	36

Source: UNICEF, June 2012[13]

[12]Bangladesh achieved unparalleled success in diarrheal disease control as a result of a strategic decision taken by the Government of Bangladesh to promote ORS to prevent dehydration. The U5 mortality rate in Bangladesh came down from 144 deaths per 1,000 live births in 1990 to 41 in 2012, and IMR down from 100 deaths per 1,000 live births in 1990 to 33 in 2012. In the process, Bangladesh achieved MDG4 by 2012, 3 years before schedule.

ORS was simple to make, and the BRAC (formerly known as Bangladesh Rural Advancement Committee) team went from house to house teaching mothers how to prepare ORS, and also made surprise home inspections to check if the ORS was being prepared as per norms. Over a period of time, the Bangladesh Government moved over to standard pre-packaged ORS sachets. This provided the impetus for scaling up the production and distribution of ORS. ORS sachets, priced only around US$ 0.06, are readily available at shops and clinics across the country.

[13]Source: Pneumonia and diarrhea: Tackling the deadliest diseases for the world's poorest children. United Nations Children's Fund (UNICEF) June 2012; http://data.unicef.org/corecode/uploads/document6/uploaded_pdfs/corecode/Pneumonia_Diarrhoea_2012_35.pdf

The team also identified the 10 worst countries in their march toward MDG 4. These countries had recorded less than 25% reduction in U5 MR between 1990 and 2015 (Exhibit 6.8). The team then drew the attention of the ED to the fact that 17 countries (including Niger likely to achieve MDG 4 by 2015) had their U5 MR more than 100 deaths per 1,000 live births even in 2012 (Exhibit 6.9), higher than the U5 MR global average of 90 in the MDG base year 1990. Most of the countries with high U5 MR were in Sub-Saharan Africa (Please refer to Exhibit 5.5 on the classification of countries into MDG regions, Chapter 5).

The presentation concluded by displaying the five countries with the highest number of U5 mortality (Table 6.2); India and Nigeria together accounted for more than one-third the total number of U5 deaths globally in 2012.

The ED was a little bit disappointed that his team did not focus on neonatal deaths, since neonatal deaths accounted for 44% of all global deaths (Fig. 6.1 displayed earlier).

The team went back to the UNICEF 2014 Report and produced Tables 6.3 and 6.4 on the decline in NMR, IMR, U5MR, and MMR in the best and worst-performing countries.

Table 6.2 Countries with Highest U5 Mortality

Rank	Countries	U5 deaths in thousands	U5 MR 1990	U5 MR 2012	MDG 4 Target
1	India	1,414	126	56	42
2	Nigeria	827	213	124	71
3	Pakistan	409	138	86	46
4	Democratic Rep of Congo	391	171	146	57
5	China (*)	256	54	14	18

(*) China, even though the fifth largest country on U5 deaths, already achieved its MDG4 target of reducing U5MR.

Table 6.3 A Few Best-Performing Countries: Comparisons of MMR, NMR, IMR, and U5MR

Country	% Reduction NMR	% Reduction IMR	% Reduction U5 MR	% Reduction MMR
Maldives	90	87	88	93
Brazil	68	75	77	43
China	64	71	74	67
Bangladesh	56	67	72	69
Malawi	−189	68	71	54
Nepal	−411	66	70	76
Tanzania	52	62	67	55
Ethiopia	47	61	67	70

The listed countries are chosen at random from the list of 24 countries, so as to demonstrate different phenomena in different countries.

Table 6.4 10 Worst-Performing Countries: Comparison of Reduction in NMR, IMR, U5MR, and MMR

Country	% Reduction NMR	% Reduction IMR	% Reduction U5 MR	% Reduction MMR
Zimbabwe	−26	−12	−22	10
Lesotho	−1	−9	−18	32
Swaziland	−733	−4	−13	44
Botswana	−17	−8	−10	53
Congo	−8	5	4	39
DR Congo	8	11	15	27
Somalia	−127	15	17	35
Sol Islands	73	16	21	59
Mar Islanda	61	21	22	NA
Angola	17	21	23	67

A detailed break-up of the causes of neonatal deaths is given in Figure 6.3. Complications from preterm birth accounted for 35% of all neonatal deaths, followed by intrapartum-related complications and neonatal infections (sepsis, meningitis, tetanus, pneumonia, diarrhea) accounting for 24% and 23% of all neonatal deaths. Congenital anomalies accounted for 10% of neonatal deaths.

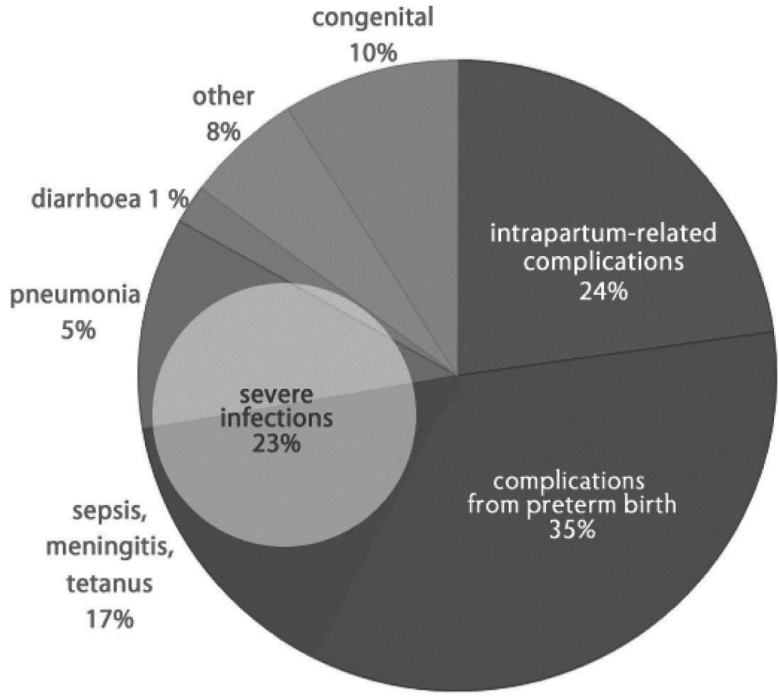

Figure 6.3 Causes of Newborn Deaths, Global Data for the Year 2013

The majority of all neonatal deaths (75%) occurred during the first week of life (early neonatal period), and between 25% and 45% occurred within the first 24 hours. Also, a large number of stillbirths occurred during labor, and a high proportion of maternal deaths occurred during or within a few hours of labor. Preventing early neonatal deaths therefore prevented many intrapartum stillbirths and maternal deaths, in addition to neonatal deaths.

The team presented the most recent statistics on the causes of neonatal deaths (Table 6.5), classified under early and late neonatal periods.

Even though many countries lagged behind in achieving the MDG 4 goal by 2015, the ED was keen to identify strategies to improve child health in the years to come. He had in front of him the UNICEF report on the Post-2015 development agenda.[14]The Post-15 agenda can be summarized as:

[14]A post-2015 World Fit for Children, UNICEF Key Asks on the Post-2015 Development Agenda, UNICEF. September 2013; http://www.unicef.org/post2015/files/Post_2015_Key_Asks_V01.pdf

Table 6.5 Global Cause-Specific Numbers of Neonatal Deaths in 2013

Cause	Early neonatal period (%)	Late neonatal period (%)	Total (%)
Preterm birth	40.8	21.2	35.7
Intrapartum complications	27.0	12.9	23.4
Congenital disorders	10.6	10.2	10.5
Sepsis	8.0	37.2	15.6
Pneumonia	4.8	5.2	4.9
Diarrhea	0.3	1.4	0.6
Tetanus	1.0	3.8	1.7
Others	7.3	8.1	7.5

Source: Bulletin of the WHO, 2015[15]

1. By 2035, reduce the national under-5 mortality rate to 20 or fewer deaths per 1,000 live births;
2. Eliminate all preventable maternal deaths;
3. By 2025, reduce stunting among children under 5 by 40% worldwide;
4. Universal coverage of basic health services, safe drinking water, and sanitation;
5. Successful completion by all children of quality education that fosters learning;
6. Protection of all girls and boys from all forms of violence, abuse, and exploitation;
7. Strengthened resilience of children, families, and communities to shocks and stresses relating to disasters, violence, conflicts, climate change, and epidemics.

[15]Oza, S., Lawn, J. E., Hogan, D. R., et al. 2015. Neonatal cause-of-death estimates for the early and late neonatal periods for 194 countries: 2000–2013. *Bulletin of the World Health Organization*, volume 93, pp. 19–28. Retrieved from http://www.who.int/bulletin/volumes/93/1/14-139790.pdf

Exhibit 6.1: 10 Facts on Child Health[16]

Fact 1: A child's risk of dying is highest in the first month of life

In the first month of life safe childbirth and effective neonatal care are essential. Preterm birth, birth asphyxia, and infections cause most newborn deaths. Once children have reached 1 month of age, and up until the age of 5 years, the main causes of loss of life are pneumonia, diarrhea, and malaria. Malnutrition contributes to almost one-half of all child deaths.

Fact 2: Nearly 3 million children died in 2011 within a month of their birth

Newborn life is fragile. Health risks to newborns are minimized by:

- quality care during pregnancy;
- safe delivery by an SBA;
- essential neonatal care after birth: immediate attention to breathing and warmth, hygienic cord and skin care, and exclusive breast-feeding.

Fact 3: Pneumonia is the largest single cause of death in children under 5 years of age

In 2011, it killed an estimated 1.2 million children under the age of 5 years, accounting for 17% of all deaths of children under 5 years old worldwide. Addressing the major risk factors for pneumonia through immunization, exclusive breast-feeding, reduction in household air pollution, and adequate nutrition is essential for prevention. Antibiotics and oxygen are vital treatment tools.

Fact 4: Diarrheal diseases are a leading cause of sickness and death among children in developing countries

Exclusive breast-feeding, proper sanitation and hygiene, and immunization help prevent diarrhea among young children. Treatment for sick children with ORS and zinc supplements is safe, cost-effective, and saves lives. The lives of more than 50 million children have been saved in the last 25 years as a result of ORS.

[16]10 Facts on Child Health; http://www.who.int/features/factfiles/child_health2/photo_story/en/

Fact 5: Every minute a child dies from malaria

It is one of the leading causes of death among children under 5. Sleeping under insecticide-treated nets prevents transmission and increases child survival. Early testing and treatment with effective antimalarial medication saves lives.

Fact 6: Over 90% of children with HIV are infected through mother-to-child transmission

This is preventable with the use of antiretrovirals, as well as safer delivery and feeding practices. An estimated 2 million children under 15 years of age are living with HIV, and every day more than 1,000 are newly infected. Without intervention, more than half of all HIV-infected children die before their second birthday. Early testing and treatment with antiretroviral therapy for all HIV-infected children greatly improves survival and quality of life.

Fact 7: In 2012, about 17 million children suffered from severe wasting

Almost half of the under-5 child deaths are associated with malnutrition. Severe acute malnutrition leaves children more vulnerable to serious illness and high probability of dying. Most children can be successfully treated at home with ready-to-use therapeutic foods (RUTF). Globally, in 2012, an estimated 162 million children below 5 years of age were stunted and 99 million were underweight.

Fact 8: Some 80% of the world's under-5 deaths in 2012 occurred in only 25 countries, and about half in only 5 countries

Under-5 deaths are increasingly concentrated in sub-Saharan Africa and Southern Asia. Child survival rates differ significantly around the world. Within countries, child mortality is higher in rural areas, and among poorer and less-educated families.

Fact 9: About two-thirds of child deaths are preventable

They are preventable through access to practical, low-cost interventions, and effective primary care up to 5 years of age. Child health is improving, but serious challenges remain to achieve global goals to reduce deaths. Stronger health systems are crucial for improving access to care and prevention.

Fact 10: Greater investment is key

Greater investment will help in reducing the under-5 mortality rate by two-thirds by 2015 (Millennium Development Goal 4). Public and private partners must come together to fill the gap to meet this ambitious, but achievable goal. The launch of the Commission on Information and Accountability and of the Global Strategy for Women's and Children's Health and several large bilateral donor pledges in recent months are important steps in the right direction.

Exhibit 6.2: Nutritional Status of Children: 2012

Countries and Areas	Low Birth Weight	Underweight Moderate and severe	Underweight Severe	Stunting Moderate & severe	Wasting Moderate and severe	Overweight
Sub-Saharan Africa	13	21	7	38	9	6
Middle East and North Africa	–	7	–	18	8	11
South Asia	28	32	15	38	16	4
East Asia and Pacific	6	5	4	12	4	5
Latin America & Caribbean	9	3	–	11	1	7
CEE/CIS	–	2	–	11	1	7
Least developed countries	13	23	7	37	19	5
World	15	15	9	25	8	7

Source: UNICEF Report 2014

Exhibit 6.3: Immunization Coverage (%) Against Vaccine-Preventable Diseases: 2012

Countries and Areas	BCG	DPT1	DPT3	Polio	Measles	HepB3	Hob3
Sub-Saharan Africa	81	80	71	76	72	70	64
Middle East and North Africa	93	94	89	90	88	90	55
South Asia	88	89	76	74	77	74	24
East Asia and Pacific	95	97	92	93	94	89	11
Latin America & Caribbean	96	96	93	93	95	92	91
CEE/CIS	96	95	94	95	95	91	71
Least developed countries	86	90	80	82	80	76	75
World	89	91	83	84	84	79	45

Source: UNICEF Report 2014

BCG % of live births who received vaccine against TB

DPT1 % of surviving infants who received their first dose of DPT

DPT3 % of surviving infants who received three doses of DPT

Polio % of surviving infants who received three doses of polio vaccine

MCV % of surviving children who received first dose of Measles vaccine

HepB % of surviving infants who received three doses of hepatitis B vaccine

Hib3 % of surviving infants who received three doses of Haemophilus influenza type B vaccine

Note: Even though immunization coverage has improved over the years, an estimated 21.8 million infants worldwide were not reached with routine immunization services in 2013, of whom nearly half live in three countries: India, Nigeria, and Pakistan.[17]

[17]Immunization coverage, Fact sheet N°378, Reviewed November 2014; http://www.who.int/mediacentre/factsheets/fs378/en/

Exhibit 6.4: Treatment Taken for Pneumonia, Diarrhea, and Malaria: 2012

Countries and Areas	Pneumonia Care Seeking for Children	Pneumonia % Treated Antibiotics	Diarrhea % Treated with ORS	Malaria % Treated	% Children Sleeping under ITN
Sub-Saharan Africa	46	39	31	37	36
Middle East and North Africa	70	63	35	–	–
South Asia	65	20	33	7	
East Asia and Pacific	60	45	44	1	–
Latin America & Caribbean	55	–	48	–	–
CEE/CIS	–	–	–	–	–
Least developed countries	49	41	41	3-	40
World	59	34	35	19	–

ITN: Insecticide-treated mosquito nets; Source: UNICEF Report 2014

Exhibit 6.5: Progress of WHO Countries Toward MDG4: Ref: The State of the World's Children 2014 in Numbers: Every Child Counts; UNICEF, January 2014

SL no	Country	U5MR 1990	U5MR 2012	% Reduction in U5MR in 2012		SL no	Country	U5MR 1990	U5MR 2012	% Reduction in U5MR in 2012
1	Afghanistan	176	99	44		16	Belarus	17	5	71
2	Albania	43	17	60		17	Belgium	10	4	60
3	Algeria	50	20	60		18	Belize	43	18	58
4	Andorra	8	3	63		19	Benin	181	90	50
5	Angola	213	164	23		20	Bhutan	131	45	66
6	Antigua and Barbuda	24	10	58		21	Bolivia	123	41	67
7	Argentina	28	14	50		22	Bosnia and Herzegovina	18	7	61
8	Armenia	49	16	67		23	Botswana	48	53	-10
9	Australia	9	5	44		24	Brazil	62	14	77
10	Austria	10	4	60		25	Brunei Darussalam	12	8	33
11	Azerbaijan	93	35	62		26	Bulgaria	22	12	45
12	Bahamas	23	17	26		27	Burkina Faso	202	102	50
13	Bahrain	23	10	57		28	Burundi	164	104	37
14	Bangladesh	144	41	72		29	Cabo Verde	62	22	65
15	Barbados	18	18	0		30	Cambodia	116	40	66

(Continued)

SL no	Country	U5MR 1990	U5MR 2012	% Reduction in U5MR in 2012		SL no	Country	U5MR 1990	U5MR 2012	% Reduction in U5MR in 2012
31	Cameroon	135	95	30		51	Djibouti	119	81	32
32	Canada	8	5	38		52	Dominica	17	13	24
33	Cape Verde					53	Dominican Republic	60	27	55
34	Central African Republic	171	129	25		54	Ecuador	56	23	59
35	Chad	209	150	28		55	Egypt	86	21	76
36	Chile	19	9	53		56	El Salvador	59	16	73
37	China	54	14	74		57	Equatorial Guinea	182	100	45
38	Colombia	35	18	49		58	Eritrea	**150**	**52**	65
39	Comoros	124	78	37		59	Estonia	20	4	80
40	Congo	100	96	4		60	Ethiopia	**204**	**68**	67
41	Cook Islands	25	11	56		61	Fiji	31	22	29
42	Costa Rica	17	10	41		62	Finland	7	3	57
43	Côte d'Ivoire	152	108	29		63	France	9	4	56
44	Croatia	13	5	62		64	Gabon	92	62	33
45	Cuba	13	6	54		65	Gambia	170	73	57
46	Cyprus	11	3	73		66	Georgia	35	20	43
47	Czech Republic	15	4	73		67	Germany	9	4	56
48	Democratic People's Republic of Korea	44	29	34		68	Ghana	128	72	44
49	Democratic Rep of the Congo	171	146	15		69	Greece	13	5	62
50	Denmark	9	4	56		70	Grenada	22	14	36

71	Guatemala	80	32	60		95	Lao People's Demo Rep	163	72	56
72	Guinea	241	101	58		96	Latvia	20	9	55
73	Guinea-Bissau	206	129	37		97	Lebanon	33	9	73
74	Guyana	60	35	42		98	Lesotho	85	100	-18
75	*Haiti*	144	76	47		99	Liberia	**248**	**75**	70
76	Holy See	–	–	–		100	Libya	43	15	65
77	Honduras	59	23	61		101	Liechtenstein	–	–	#VALUE!
78	Hungary	19	6	68		102	Lithuania	17	5	71
79	Iceland	6	2	67		103	Luxembourg	9	2	78
80	India	**126**	**56**	56		104	Madagascar	**159**	**58**	64
81	Indonesia	84	31	63		105	Malawi	244	71	71
82	Iran (Islamic Republic of)	56	18	68		106	Malaysia	17	9	47
83	Iraq	53	34	36		107	Maldives	94	11	88
84	Ireland	9	4	56		108	Mali	253	128	49
85	Israel	12	4	67		109	Malta	11	7	36
86	Italy	10	4	60		110	Marshall Islands	49	38	22
87	Jamaica	30	17	43		111	Mauritania	128	84	34
88	Japan	6	3	50		112	Mauritius	23	15	35
89	Jordan	37	19	49		113	Mexico	46	16	65
90	Kazakhstan	54	19	65		114	Micronesia	55	39	29
91	Kenya	98	73	26		115	Monaco	8	4	50
92	Kiribati	94	60	36		116	Mongolia	107	28	74
93	Kuwait	16	11	31		117	Montenegro	17	6	65
94	Kyrgyzstan	71	27	62		118	Morocco	80	31	61

(Continued)

SL no	Country	U5MR 1990	U5MR 2012	% Reduction in U5MR in 2012		SL no	Country	U5MR 1990	U5MR 2012	% Reduction in U5MR in 2012
119	Mozambique	233	90	61		141	Qatar	21	7	67
120	Myanmar	106	52	51		142	Republic of Korea	7	4	43
121	Namibia	73	39	47		143	Republic of Moldova	32	18	44
122	Nauru	58	37	36		144	Romania	38	12	68
123	Nepal	142	42	70		145	Russian Federation	26	10	62
124	Netherlands	8	4	50		146	Rwanda	**151**	**55**	64
125	New Zealand	11	6	45		147	Saint Kitts and Nevis	29	9	69
126	Nicaragua	66	24	64		148	Saint Lucia	22	18	18
127	Niger	**326**	**114**	65		149	St Vincent and Grenadines	25	23	8
128	Nigeria	213	124	42		150	Samoa	30	18	40
129	Niue	14	25	-79		151	San Marino	11	3	73
130	Norway	9	3	67		152	Sao Tome & Principe	104	53	49
131	Oman	39	12	69		153	Saudi Arabia	47	9	81
132	Pakistan	138	86	38		154	Senegal	142	60	58
133	Palau	34	21	38		155	Serbia	28	7	75
134	Panama	32	19	41		156	Seychelles	17	13	24
135	Papua New Guinea	89	63	29		157	Sierra Leone	257	182	29
136	Paraguay	46	22	52		158	Singapore	8	3	63
137	Peru	79	18	77		159	Slovakia	18	8	56
138	Philippines	59	30	49		160	Slovenia	10	3	70
139	Poland	17	5	71		161	Solomon Islands	39	31	21
140	Portugal	15	4	73		162	Somalia	177	147	17

163	South Africa	61	45	26		181	Tunisia	51	16	69
164	South Sudan	251	104	59		182	Turkey	74	14	81
165	Spain	11	5	55		183	Turkmenistan	90	53	41
166	Sri Lanka	21	10	52		184	Tuvalu	58	30	48
167	State of Palestine	43	23	47		185	Uganda	**178**	**69**	61
168	Sudan	128	73	43		186	Ukraine	20	11	45
169	Suriname	51	21	59		187	United Arab Emirates	17	8	53
170	Swaziland	71	80	-13		188	United Kingdom	9	5	44
171	Sweden	7	3	57		189	United Republic of Tanzania	**166**	**54**	67
172	Switzerland	8	4	50		190	United States	11	7	36
173	Syrian Arab Republic	38	15	61		191	Uruguay	23	7	70
174	Tajikistan	105	58	45		192	Uzbekistan	74	40	46
175	Thailand	38	13	66		193	Vanuatu	35	18	49
176	Former Yugoslav Rep Macedonia	37	7	81		194	Venezuela (Bolivarian Republic of)	30	15	50
177	Timor-Leste	**171**	**57**	67		195	Viet Nam	51	23	55
178	Togo	143	96	33		196	Yemen	125	60	52
179	Tonga	23	13	43		197	Zambia	192	89	54
180	Trinidad and Tobago	33	21	36						

Exhibit 6.6: Best Performers: Countries Who Had Already Achieved the MDG4 Target by 2012

Sl No.	Country	U5MR 1990	U5MR 2012	U5MR Target 2015	U5MR % Decline 1990–2012
1	Maldives	94	11	31	88
2	The former Yugoslav Rep Macedonia	37	7	12	81
3	Turkey	74	14	25	81
4	Saudi Arabia	47	9	16	81
5	Brazil	62	14	21	77
6	Peru	79	18	26	77
7	Egypt	86	21	29	76
8	China	54	14	18	74
9	Mongolia	107	28	36	74
10	El Salvador	59	16	20	73
11	Lebanon	33	9	11	73
12	Bangladesh	144	41	48	72
13	Malawi	244	71	81	71
14	Nepal	142	42	47	70
15	Liberia	248	75	83	70
16	Oman	39	12	13	69
17	Tunisia	51	16	17	69
18	Romania	38	12	13	68
19	Iran (Islamic Republic of)	56	18	19	68
20	United Republic of Tanzania	166	54	55	67
21	Armenia	49	16	16	67
22	Bolivia (Plurinational State of)	123	41	41	67
23	Timor-Leste	171	57	57	67
24	Ethiopia	204	68	68	67

Exhibit 6.7: Countries Making Sufficient Progress to Meet the MDG 4–2015 Target

No	Country	U5 1990	U5 2012	Target 2015	U5MR % Decline 1990–2012
1	Thailand	38	14	13	66
2	Bhutan	131	45	44	66
3	Cambodia	116	40	39	66
4	Eritrea	150	52	50	65
5	Mexico	46	16	15	65
6	Libya	43	15	14	65
7	Niger	326	114	109	65
8	Kazakhstan	54	19	18	65
9	Cabo Verde	62	22	21	65

Exhibit 6.8: 10 Worst-Performing Countries: U5 MR Reduction Less than 25%

SL No	Country	Region	U5 MR 1990	U5 MR 2012	% Reduction in U5MR 1990–2012
1	Zimbabwe	Sub-Saharan Africa	74	90	−22
2	Lesotho	Sub-Saharan Africa	85	100	−18
3	Swaziland	Sub-Saharan Africa	71	80	−13
4	Botswana	Sub-Saharan Africa	48	53	−10
5	Congo	Sub-Saharan Africa	100	96	4
6	Democratic Rep of Congo	Sub-Saharan Africa	171	146	15
7	Somalia	Sub-Saharan Africa	177	147	17
8	Solomon Islands	Oceania	39	31	21
9	Marshall Islands	East Asia and Pacific	49	38	22
10	Angola	Sub-Saharan Africa	213	164	23

Exhibit 6.9: Countries with U5MR More than 100 in 2012

SL No	Country	Region	U5 MR 1990	U5 MR 2012	% Reduction in U5 MR by 2012
1	Sierra Leone	Sub-Saharan Africa	257	182	29
2	Angola	Sub-Saharan Africa	213	164	23
3	Chad	Sub-Saharan Africa	209	150	28
4	Somalia	Sub-Saharan Africa	177	147	17
5	Democratic Rep Congo	Sub-Saharan Africa	171	146	15
6	Central African Rep	Sub-Saharan Africa	171	129	25
7	Guinea-Bissau	Sub-Saharan Africa	206	129	37
8	Mali	Sub-Saharan Africa	253	128	49
9	Nigeria	Sub-Saharan Africa	213	124	42
10	Niger	Sub-Saharan Africa	326	114	65
11	Côte d'Ivoire	Sub-Saharan Africa	152	108	29
12	Burundi	Sub-Saharan Africa	164	104	37
13	South Sudan	Sub-Saharan Africa	251	104	59
14	Burkina Faso	Sub-Saharan Africa	202	102	50
15	Guinea	Sub-Saharan Africa	241	101	58
16	Lesotho	Sub-Saharan Africa	85	100	−18
17	Equatorial Guinea	Sub-Saharan Africa	182	100	45

6.3 Case Study: Child Health (B)

"Much remains unknown about the root causes of unhealthy birth, growth, and development. Evidence suggests that the causes – whether based on malnutrition, infectious disease, social, economic or other factors – are interwoven, and that addressing them one at a time can solve only a small fraction of the problem. Furthermore, stunted growth and development can reduce human productivity and perpetuate poverty,"

—Bill and Melinda Gates Foundation.[18]

The Health Secretary to the Government of India called a meeting to address the slow progress of India's march toward achieving the MDG 4 target. He was glancing over the report presented to him by the UNICEF

[18]Bill & Melinda Gates Foundation and Indian Government Announce $500,000 Seed Grants. Bill and Melinda Gates Foundation; http://social.yourstory.com/2014/11/bill-melinda-gates-foundation-seed-grants/, accessed on January 4, 2015

director (India) on the poor performance by India compared to its neighboring countries. Bangladesh, Nepal, Bhutan, China, and Sri Lanka had either achieved the MDG 4 target already by 2012 or were on their way to achieving it by 2015. India had the highest number of U5 deaths globally, and about 4,000 U5 children died every day in the year 2013. India was likely to miss the MDG 4 target. The Health Secretary asked his Director (Child Health) to examine India's child health policy.

Child Health in India: India is the second most populous country in the world with 17% of the world's population and 20% share of the world's poorest in 2013; poverty is defined as less than $1.25 per day income on purchasing power parity. Almost 70% of the population lived in rural areas. In spite of some progress in public health since independence in 1947 such as increased life expectancy and eradication of smallpox and polio, the public health system in India is far from satisfactory. With an estimated 25 million child births every year,[19] India tops the list of countries with the highest number of maternal and child mortality.

As a signatory to the Millennium Development Conference, India was committed to reduce U5 MR by two-third between 1990 and 2015. India's U5 MR stood at 126 deaths per 1,000 live births in 1990 (the base year of MDG), and therefore the MDG commitment was to achieve an U5 MR of 42 by 2015. India's U5 MR stood at 92 in the year 2000[20] (the year when India signed the Millennium Development Declaration) and therefore India had essentially 15 years, 2000–2015, to reach the MDG 4 goal of 42 U5 MR by 2015.

The Government of India's strategic response to meet the MDGs was to launch the National Rural Health Mission (NRHM) in 2005. Recognizing the importance of health in the context of socioeconomic development, NRHM aimed at improving the basic health care delivery

[19]The Civil Registration System in India is very poor, even though the Registration of Birth and Death (RBD) Act was enacted in 1969, making the registration of births and deaths mandatory by law.

[20]Levels and Trends in Child Mortality Report 2013; Estimates Developed by the UN Inter-agency Group for Child Mortality Estimation. UNICEF, WHO, World Bank, and UN; http://www.unicef.org/media/files/2013_IGME_child_mortality_Report.pdf, accessed on December 15, 2014

system in partnership with the states.[21] The mission adopted a synergistic approach by relating health to the determinants of good health such as nutrition, sanitation, hygiene, and safe drinking water. The Reproductive and Child Health Program was designated as the flagship program under NRHM. NRHM promoted institutional deliveries as "safe deliveries" in order to reduce maternal and child mortality. An accredited social health activist (ASHA) was posted in each village, several nurses were trained to provide skilled birth attendance[22] (SBA), and many public health facilities were upgraded to offer emergency obstetric care (EmOC) services.[23]

In the year 2005 (the year NRHM was launched), estimates of the neonatal and child deaths in India[24] were as shown in Figure 6.4 based on a large study. The authors of the above study also claimed that major causes of neonatal and child deaths in India were not measured in the country then. There may be some truth in such a claim because of the poor civil registration system in India, even though the Registration of Births and Deaths (RBD) Law and the Law on Medical Certification of

[21]Health is a state subject in India, and the Government of India works in partnerships with the state governments to strengthen the health care delivery system through provision of physical infrastructure, HR, equipment, emergency transport, drugs, diagnostics, and other support. NRHM provided adequate flexibility for the states to identify their key concerns and to develop interventions that would address their specific problems.

[22]A skilled birth attendant (SBA) is a health professional with special training in the skills needed to manage normal (uncomplicated) pregnancies, childbirth, and the immediate postnatal period, and in the identification, management, and referral of complications in women and newborns.

[23]EmOC: It has been internationally recognized that every pregnancy has a risk and that complications cannot be predicted. Evidence has showed that at least 15% of all pregnant women developed complications during pregnancy and childbirth, requiring access to lifesaving quality obstetric services. For monitoring the readiness of the institutions in providing emergency obstetric care, UNICEF[23] developed guidelines for basic emergency obstetric care (BEmOC) and comprehensive emergency obstetric care (CEmOC) services.

[24]The Million Death Study Collaborators. 2010. Causes of neonatal and child mortality in india: a nationally representative mortality survey. *The Lancet*, volume 376, no. 9755, pp. 1853–1860. Retrieved from http://www.thelancet.com/journals/lancet/article/PIIS0140-6736%2810%2961461-4/abstract, accessed on January 15, 2015

Causes of Death (MCCD) as per the International Classification of causes of Death (ICD) were passed by the parliament in 1969. As per the Government of India report on Vital Statistics,[25] the level of registration of births increased from 56.2% in 2000 to 81.3% in 2009, while the level of registration of deaths increased from 48.7% in 2000 to 66.9% in 2009. The UNICEF report 2013[26] on birth registrations pointed out that India had 71 million unregistered U5 children and topped the list of countries with unregistered children.

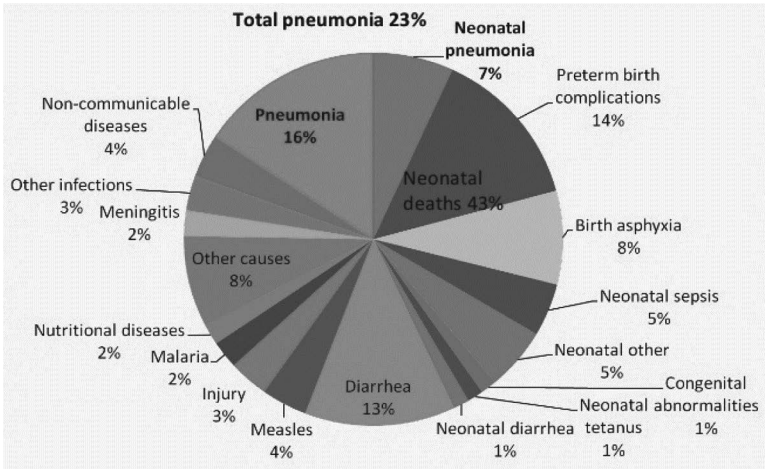

Figure 6.4 Causes of <5 Mortality in India, 2005

By 2012, India's NMR, IMR, and U5 MR had come down to 31, 44, and 56 deaths per 1,000 live births, respectively. The progress of India in reducing NMR, IMR, and U5 MR from 1990 to 2012 is summarized in Table 6.6.

[25]Vital Statistics of India Based on the Civil Registration System 2009; Office of the Registrar General, India. Vital Statistics Division, Ministry of Home Affairs, Government of India; http://www.censusindia.gov.in/2011-Documents/CRS_Report/CRS_Report_2009.pdf, accessed on February 2, 2015

[26]Every Child's Birth Right: Inequities and Trends in Birth Registration. UNICEF, December 2013; http://www.unicef.org/mena/MENA-Birth_Registration_report_low_res-01.pdf, accessed on January 8, 2015

Table 6.6 Some Important Indicators of Child Health in India

Maternal and Child Health Statistics	1990	2012
Neonatal mortality rate (NMR)	51	31
Infant mortality rate (IMR)	88	44
U5 mortality rate (U5 MR)	126	56
Neonatal deaths (in thousands)	1354	779
Infant deaths (in thousands)	2333	1097
U5 deaths	3325	1414
Maternal mortality ratio (MMR)	560	190

Source: UNICEF Report 2014

NMR accounted for 70% of IMR, and 55% of U5 MR. Reducing NMR was therefore necessary to reduce U5 MR and thereby meet the MDG 4 target.

By 2013, India had the highest number of neonatal deaths in the world (Table 6.7), accounting for almost 27% of global neonatal deaths.

Table 6.7 Countries with the Highest Neonatal Mortality

Rank	Country	Neonatal deaths
1	India	747,544
2	Nigeria	261,549
3	Pakistan	193,718
4	China	143,268
5	DR Congo	104,604
6	Ethiopia	84,437
7	Bangladesh	76,722
8	Indonesia	65,828
9	Angola	42,625
10	Kenya	39,596
Total		1,759,891

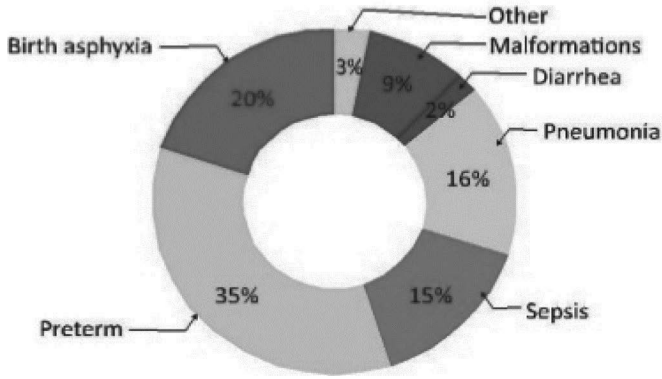

Figure 6.5 Causes of Neonatal Deaths in India

Preterm births, neonatal infections (sepsis, tetanus, diarrhea, and pneumonia), and intrapartum complications (including birth asphyxia[27]) accounted for most of the neonatal deaths. For countries like India with poor registration of births and deaths, 74% of neonatal deaths occurred during the early period and 26% in the late period based on previous work.[28]

Providing skilled care to mothers during pregnancy, as well as during and after birth, greatly contributed to child survival.[29] In other words, paying more attention to mother's heath during pregnancy and providing SBA for childbirth could significantly reduce neonatal deaths.

Preterm births: As per the report "Delivered Too Soon" on preterm births in India,[30] India had the highest number of preterm births globally, estimated at 3.5 million premature births. Preterm babies accounted for 35% of all neonatal deaths. The above report also mentioned that the most important interventions in this regard were birth spacing and treatment of maternal infections. Creating a high level of awareness on

[27]Birth asphyxia occurs when a baby doesn't receive enough oxygen before, during, or just after birth.

[28]Surviving the First Day: State of the World's Mothers 2013. Fairfield: Save the Children; 2013.

[29]Newborn Death and Illness; http://www.who.int/pmnch/media/press_materials/fs/fs_newborndealth_illness/en/, accessed on November 16, 2014

[30]IFPB Unveils 'Delivered Too Soon' Action Report on Pre-Term Births in India. 2013; http://www.pharmabiz.com/NewsDetails.aspx?aid=78779&sid=2, accessed on November 16, 2014

these preventive measures would be critical to control the death of premature babies. Three-quarters of such deaths could be saved with current, cost-effective interventions.[31]

Intrapartum complications: Birth asphyxia accounted for 20% of neonatal deaths in India. Many developing countries, including India, maintained poor record keeping of births and deaths, and hence estimates of death from intrapartum complications (except cases of birth asphyxia) are not very reliable. The possibility of reporting intrapartum neonatal deaths as stillbirths could not be ruled out either. Almost half the neonatal deaths occurred within the first 24 hours of births[32] due to intrapartum complications including birth asphyxia. The intrapartum period also contributed to 30% stillbirths and a high proportion of maternal deaths during or within a few hours of labor.[33]

Neonatal infections: In India, neonatal infections accounted for 33% of all neonatal deaths: sepsis (15%), pneumonia (16%), and diarrhea (2%). The relatively higher percentage of neonatal deaths from infections in India (compared with the global average of 23%) agreed with the observations[34] on neonatal infections in countries with poor birth and death registrations. Neonatal infections were mostly found in developing countries where home births, with no medical facilities, were still very common. Premature babies were more susceptible to infections. In developing countries, 42% of neonatal deaths from infections occurred in the first week of birth.[35] Early-onset neonatal infection, de-

[31]Preterm birth, Fact sheet N°363, WHO; http://www.who.int/mediacentre/factsheets/fs363/en/, accessed on November 17, 2014
Updated November 2014

[32]Blencowe, H., Cousens, S. 2013. Addressing the challenge of neonatal mortality. *Tropical Medicine and International Health*, volume 18, no. 3, pp. 303–312.

[33]World Health Organization. 2012. Trends in Maternal Mortality: 1990 to 2010. WHO, UNICEF, UNFPA and The World Bank estimates; http://whqlibdoc.who.int/publications/2012/9789241503631_eng.pdf, accessed on October 8, 2014

[34]Blencowe, H., Cousens, S. 2013. Addressing the challenge of neonatal mortality. *Medicine and International Health*, volume 18, no. 3, pp. 303–312. , accessed on November 21, 2014

[35]Thaver, Durrane, Zaidi, Anita K. M. 2009. Burden of neonatal infections in developing countries: a review of evidence from community-based studies. *The Pediatric Infectious Disease Journal, volume 28, no. 1, pp. S3–S9.* Retrieved from

fined as infection in the first 7 days of life, was associated with maternal infection.[36]

Understanding the timing and causes of neonatal deaths could provide evidence-based data to develop appropriate policies and targeting of resources. One example of success in the reduction of neonatal deaths has been due to tetanus, in large part due to the effectiveness of tetanus toxoid immunization (WHO 2000; Liu et al. 2012).

Birth Defects: More than 90% of all infants with a serious birth defect were born in low- and middle-income countries. India with 25 million childbirths every year accounted for the largest share of birth defects, amounting to about 1.7 million babies born with birth defects. The Global Health Report[37] mentioned that care and prevention of birth defects were feasible and cost-effective. Such care and prevention required comprehensive women's, maternal, newborn, and child health programs and provision of basic medical genetic services.

Congenital Anomalies: Congenital anomalies accounted for 9% of all neonatal deaths in India. Congenital anomalies may result in long-term disability, which may have significant impacts on individuals, families, health care systems, and societies.[38] Many congenital anomalies can be prevented. For example, vaccination, adequate intake of folic acid and iodine, and adequate antenatal care (ANC) are keys for prevention.

Major concerns on child health faced by developing countries are mentioned in Exhibit 6.10. The Director (Child Health) collected additional statistics on the following determinants of U5 MR, based on the concerns faced by the developing countries (Exhibit 6.10).

- Economic Indicators (Exhibit 6.11)

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http://journals.lww.com/pidj/Abstract/2009/01001/Burden_of_Neonatal_Infections_in_Developing.2.aspx, accessed on November 21, 2014

[36]Infection during newborn's first week of life associated with bacterial infection in the mother, Public Library of Science. August 20, 2013; http://www.sciencedaily.com/releases/2013/08/130820185652.htm, accessed on December 8, 2014

[37]March of Dimes. Global report on birth defects, the hidden toll of dying and disabled children; www.marchofdimes.org/materials/global-report-on-birth-defects-the-hidden-toll-of-dying-and-disabled-children-full-report.pdf, accessed on January 7, 2015

[38]Congenital anomalies; Fact sheet N°370, Updated January 2014; http://www.who.int/mediacentre/factsheets/fs370/en/, accessed on January 7, 2015

- Mother's health during pregnancy (Exhibit 6.12)
- Intranatal care/skilled birth attendance (Exhibit 6.13)
- Immunization against vaccine-preventable diseases (Exhibit 6.14)
- Treatment for serious illnesses (Exhibit 6.15)
- Nutritional levels (Exhibit 6.16)
- Availability of safe drinking water and basic sanitation (Exhibit 6.17)

The Director (Child Health) wanted to identify a future strategy to improve child health status in India. He was aware of the UNICEF post-2015 development agenda[39] to achieve an U5 MR of 20 or fewer deaths by 2035. He was also aware of the rural–urban differences on health care–seeking behavior of women in India for maternal and child health. His research staff produced data on health care–seeking behavior of women for maternal care (see Exhibit 5.11, Chapter 5) and for child care (Exhibit 6.18) from the National Family Health Surveys NFHS-III[40] on rural–urban differences for seeking health care.

Exhibit 6.10: Child Health: Major Concerns in Developing Countries[41]

Poor maintenance of birth and death registration records in many developing countries in South Asia and Africa is a major concern. Birth registration is an important step toward accessing essential services,

[39]A post-2015 World Fit for Children: UNICEF Key Asks on the Post-2015 Development Agenda, UNICEF. September 2013; http://www.unicef.org/post2015/files/Post_2015_Key_Asks_V01.pdf, accessed February 3, 2015

[40]National Family Health Survey (NFHS) is a large-scale, multi-round survey under the Ministry of Health and Family Welfare, Government of India, and conducted by the International Institute for Population Sciences (IIPS), Mumbai. NFHS is funded by the United States Agency for International Development (USAID) with supplementary support from United Nations Children's Fund (UNICEF). The First National Family Health Survey (NFHS-1) was conducted in 1992–93, NFHS-II was conducted in 1998–99, NFHS-III in 2005–2006, and started NFHS-IV (2014–15) toward the end of 2014.

[41]UNICEF Report 2014

such as immunization, nutritional supplements, and so on. Death registration is important to estimate the causes of death and prevent similar deaths in future.

Prior to birth, mothers could increase their children's chances of survival and good health by attending antenatal care consultations, being immunized against tetanus, and avoiding smoking and use of alcohol. At the time of birth, a baby's chance of survival increased significantly with delivery in a health facility in the presence of a skilled birth attendant. Safe childbirth and effective neonatal care are essential to prevent these deaths.

The UNICEF report 2014 pointed out that the world's poor children were 2.7 times less likely than the richest ones to have a skilled birth attendant at their birth; insufficient care during pregnancy led to 3 million neonatal deaths (children less than 1 month old) in 2012.

An estimated 400 million children lived in extreme poverty according to a World Bank Report.[42] Evidence suggests that almost half of children under age 5 years (48%) were chronically malnourished. The status of U5 malnourished[43] children globally in 2012[44] were 162 million stunted, 99 million underweight, 51 million wasting, and 17 million severe wasting. Underweight children whose growth was stunted and wasting were highly unlikely to reach their full educational and productive potential, especially if these conditions were present under the age of 2 years; therefore, malnourishment needs to be addressed before the child reached the age of 2 years.[45]

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[42]Report Finds 400 Million Children Living in Extreme Poverty, accessed on January 6, 2015 http://www.worldbank.org/en/news/press-release/2013/10/10/report-finds-400-million-children-living-extreme-poverty

[43]Stunting (a measure of height for age), wasting (a measure of weight for height), and underweight (a measure of weight for age) are characteristics of malnutrition in children.

[44]Joint UNICEF–WHO–The World Bank Child Malnutrition Database: Estimates for 2012 and Launch of Interactive Data Dashboards; , accessed on February 5, 2015 http://www.who.int/nutgrowthdb/jme_2012_summary_note_v2.pdf

[45]The Spectrum of Malnutrition; http://www.fao.org/docrep/015/i2490e/i2490e02b.pdf, accessed on February 2, 2015

Almost 60% to 65% of malnourished children were in South Asia and 30% to 35% in Africa. The prevalence of early childhood stunting and the number of people living in absolute poverty could be used as proxy indicators of poor development in under five children. Childhood illnesses such as pneumonia and diarrhea are attributed mainly to malnourishment.

An estimated 20 million infants (less than 1 year old) worldwide were still missing out on basic vaccines, especially diphtheria-tetanus-pertussis (DTP) and measles,[46] mostly in developing countries. As per WHO,[47] an estimated 145,700 measles deaths occurred globally in 2013; about 400 deaths every day or 16 deaths every hour. Poor record of birth and death registration in many developing countries would make it very difficult for any government to plan for child health service delivery.

Exhibit 6.11: Economic Indicators, 2012

GNI per capita US $		1,530
GNI at PPP $		3,840
Pop below international poverty line		33%
Public spending as a % GDP	Health	1%
	Education	3%
	Military	3%

Source: UNICEF, India Statistics, 2002.48

[46]Global Health Observatory (GHO) Data Immunization; http://www.who.int/gho/immunization/en/, accessed on December 28, 2014

[47]Measles, Fact sheet N°286, Updated November 2014; http://www.who.int/mediacentre/factsheets/fs286/en/, accessed on December 29, 2014

[48]UNICEF India Statistics; http://www.unicef.org/infobycountry/india_statistics.html#0, accessed on January 30, 2015

Exhibit 6.12: Mother's Heath During Pregnancy, 2012

Indicator	Rural	Urban	Total
Pregnancy Registration			
Pregnancy registered during last pregnancy	91.1	94.4	91.9
Government doctor	35.6	47.1	38.7
auxiliary nurses & midwives (ANM)	17.8	6.2	14.8
Anganwadi worker	18.9	6.5	14.9
ASHA	2.5	0.3	2.0
Private doctor	15.6	33.8	20.9
Others	0.7	0.5	0.6
Stage of Pregnancy at the Time of First ANC			
No antenatal checkup	11.7	4.2	9.6
First trimester	54.9	70.4	59.2
Second trimester	27.9	21.0	26.0
Third trimester	4.8	3.3	4.4
Don't remember	0.8	0.5	0.9
No. of Days IFA Tablets/Syrup Consumed			
≤ 30 d	18.9	14.1	17.6
31–90 d	25.1	25.2	25.1
≥ 100 d	27.6	39.7	31.0
None	28.4	21.0	26.3
TT Injection 2 +	85.9	89.4	86.9
Full ANC (At least 3 ANCs, 1 TT injection, 100 IFA tablets)	**22.8**	**36.1**	**26.5**

Source: UNICEF, India Statistics, 2002.

Exhibit 6.13: Intranatal Care, 2012

Indicator	Rural	Urban	Total
Institutional delivery (&)	68.0	85.6	72.9
Public facility	47.7	45.1	47.0
Private facility	20.3	40.5	25.9
Skilled north attendance (Home + Institutions)	71.7	87.9	76.2
For institutional deliveries			
Time taken to reach the facility			
<30 minutes	64.2	85.2	71.0
31–60 minutes	24.8	11.1	20.3
61–90 minutes	3.6	1.1	2.8
> 90 minutes	7.4	2.6	5.9
Average time taken (minutes)	39.2	24.3	31.8
Distance to the facility:			
≤1 km	11.4	30.0	17.5
2–5 km	27.8	37.7	31.0
6–10 km	19.	9.9	16.5
11–20 km	16.3	5.6	12.8
20–30 km	6.9	2.1	5.3
> 30 km	5.7	1.3	4.3
Do not know	12.2	13.4	12.6
Average distance (km)	11.2	4.9	8.1

Source: UNICEF, India Statistics, 2002.

Exhibit 6.14: Immunization Coverage, 2012

Immunization	Coverage (%)
BCG	87
DPT 1	88
DPT 3	72
Polio 3	70
Measles	74
HepB3	70
Hib3	–
Neo Natal Tetanus	87

Source: UNICEF, India Statistics, 2002.

Exhibit 6.15: Treatment for Serious Illnesses, 2012

Illness	Steps Taken	%
Pneumonia	Care seeking for suspected pneumonia	69
	Antibiotic treatment	13
Diarrhea	ORS treatment	26
Malaria	Antimalarial treatment for febrile children	8

Source: UNICEF, India Statistics, 2002.

Exhibit 6.16: Nutritional Levels , 2012

Malnourishment	Estimate (%)
Low birth weight	28
Underweight	43
Early initiation of breast-feeding	40.5
Exclusive breast-feeding < 6 mo	46.4
Introduction of solid, semi-solid, or soft food 6–8 mo	56.1
Breast-feeding at age 2 yr	76.8
Stunting	48
Wasting	20
Overweight	2
Vitamin A supplementation full coverage	59
Iodized salt consumption	71.1

Source: UNICEF, India Statistics, 2002.

Exhibit 6.17: Availability of Safe Drinking Water and Basic Sanitation, 2012

Indicator	Rural	Urban	Total
% Use of drinking water source	89	96	92
% use of improved sanitation facilities	24	60	35

Source: UNICEF, India Statistics, 2002.

Exhibit 6.18: Child Health Indicators vs. Status of Residence (Urban/Rural) from NFHS 3, 2012

		Residence			
	NFHS-3 (2005–06)	Urban	Rural	NFHS-2 (1998–99)	NFHS-1 (1992–93)
1. Infant mortality rate	57.0	41.5	62.2	67.6	78.5
2. Child mortality rate	18.4	21.0	32.3	29.3	33.4
3. Under 5 mortality rate	74.3	82.0	100.5	94.9	109.3
4. Children born with birth weight less than 2.5 kg (%)	21.5	19.3	23.3	NA	NA
5. Children born with birth size smaller than average (%)	14.8	13.2	15.4	NA	NA
6a. Children 12–23 months fully immunized (BCG, measles, and 3 doses each of polio/DPT) (%)	43.5	57.6	38.6	42.0	35.5
6b. Children 12–23 months who have received BCG (%)	78.1	86.9	75.1	71.6	62.2
6c. Children 12–23 months who have received 3 doses of polio vaccine (%)	78.2	83.1	76.5	62.8	53.6
6d. Children 12–23 months who have received 3 doses of DPT vaccine (%)	55.3	69.1	50.4	55.1	51.7

6e. Children 12–23 months who have received measles vaccine (%)	58.8	71.8	54.2	50.7	42.2
7. Children age 12–35 months who received a vitamin A dose in last 6 months (%)	24.9	26.8	24.2	NA	NA
8a. Children age 6–59 months who received a vitamin A dose in last 6 months (%)	18.1	19.5	17.5	NA	NA
8b. Children age 6–59 months who received iron supplements in last 7 days (%)	4.7	7.0	3.8	NA	NA
8c. Children age 6–59 months who received deworming medication in last 6 months (%)	11.9	13.3	11.5	NA	NA
9. Children living in households using adequately iodized salts (%)	47.5	67.9	40.	NA	NA
10. Children who had diarrhea in the last 2 weeks (%)	9.0	8.9	9.0	NA	NA
11. Children with diarrhea in the last 2 weeks who received ORS (%)	26.2	32.7	24.0	26.9	17.8
12. Children with diarrhea in the last 2 weeks taken to a health facility (%)	61.5	65.4	60.2	65.3	61.9
13. Children with acute respiratory infection or fever in the last 2 weeks taken to a health facility (%)	70.5	80.1	67.5	NA	NA
14. Children under 3 years breast-fed within 1 hour of birth (%)	23.4	28.9	21.5	16.0	9.5
15. Children age 0–5 months exclusively breastfed (%)	46.3	40.3	48.3	NA	NA

(Continued)

		Residence			
	NFHS-3 (2005–06)	Urban	Rural	NFHS-2 (1998–99)	NFHS-1 (1992–93)
16. Children age 6–9 months receiving solid or semi-solid food and breast milk (%)	55.8	62.1	53.8	NA	NA
17. Children under 3 years who are stunted (%)	44.9	37.4	47.2	51.0	NA
18. Children under 3 years who are wasted (%)	22.9	19.0	24.1	19.7	NA
19. Children under 3 years who are underweight (%)	40.4	30.1	43.7	42.7	51.5
20. Children stools are disposed safely (%)	21.1	47.2	11.4	NA	NA
21. Children of age 0–71 months receiving any serves from AWC	23.4	23.4	34.8	NA	NA
22. Children of age 0–71 months who received any immunization from AWC	13.9	13.9	21.1	NA	NA
23. Children of age 0-71 months going for early childhood care or preschool education to AWC regularly (%)	12.0	12.0	14.4	NA	NA
24. Children of age 6–35 months who are anemic (%)	78.9	72.2	80.9	74.2	NA

Source: NFHS-III Report, Government of India

NA: Not Available

CHAPTER 7

Polio Eradication

7.1 An Introduction

Polio (myelitis) is a highly infectious disease, which can cause irreversible paralysis and dystrophy (wasting) of the muscles, leading to severe disability. Anyone can contract the disease, but children under the age of 5 years are most vulnerable to polio attack. Polio is transmitted through the fecal–oral route. It has no cure and therefore has to be eradicated. Even though polio vaccines were available since 1954, 125 countries were polio endemic in the mid-1980s.

The 41st World Health Assembly in 1988 declared global polio eradication by 2000.[1] It marked the launch of the Global Polio Eradication Initiative (GPEI), spearheaded by national governments, World Health Organization (WHO), Rotary International, the U.S. Centers for Disease Control and Prevention (CDC), UNICEF, and supported by key partners including the Bill and Melinda Gates Foundation. As a result of excellent work by GEPI, only six countries remained polio endemic in 2003, namely, Afghanistan, Egypt, India, Niger, Nigeria, and Pakistan. The WHO declared India polio-free in 2014, leaving only three countries polio endemic: Afghanistan, Nigeria, and Pakistan at the beginning of 2015.

In this chapter, we discuss the case study of India's success in eradicating polio—the dreaded infectious disease. The success of the polio-eradication campaign can be attributed to excellent management of India's Pulse Polio Program through strategic planning, operational planning, implementation, and surveillance.

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[1]Poliomyelitis, Fact sheet N°114, Updated October 2014; http://www.who.int/mediacentre/factsheets/fs114/en/, accessed on August 23, 2014

7.2 Case Study: India Eradicates Polio

"The setting up of a surveillance system proved to be the most important milestone in the journey of polio eradication in India as it formed the backbone of the eradication drive by helping identify areas and populations that were at risk and the type of poliovirus circulating in different areas besides measuring progress," Dr Nata Menabde, WHO Representative to India.[2]

The Head of the Pulse Polio Program (India) had a meeting with the Health Secretary to the Government of India on the management challenges faced by his team to plan and implement the WHO strategy for polio eradication. The WHO strategy called for immunization of all children under the age of 5 years on a single day, twice a year, for as long as it takes to eradicate polio. The magnitude of the task was truly unimaginable, given that 27 million childbirths occurred in India every year; nearly 19 million births in rural areas. He asked his staff to work on an evidence-based strategic plan for mass immunization, a micro-level operational plan to take care of all the logistics arrangements, a closely monitored implementation plan, and a well-established surveillance system in place.

Polio: Immunization is one of the most cost-effective public health interventions to reduce infant mortality and morbidity. It is also a strategy to help reduce inequities in the delivery of primary health care services. An estimated 1.5 million children die every year globally from vaccine-preventable diseases (VPD).[3]

Polio (myelitis) is a highly infectious disease,[4] which can cause irreversible paralysis and dystrophy (wasting) of the muscles, leading to severe

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[2]Surveillance, at the Heart of India's Polio Success Story; http://www.searo.who.int/india/topics/poliomyelitis/surveillance/en/, accessed on August 8, 2014

[3]Immunization. Why are children dying? Unite for Children, UNICEF; http://www.unicef.org/immunization/index_why.html, accessed on September 19, 2014

[4]There are various ways of transmitting infectious diseases. Certain airborne diseases are spread through water droplets that are sprayed in the air when the infected person sneezes or coughs, such as TB, bronchitis, diphtheria, measles, etc. Certain diseases like HIV and gonorrhea are sexually transmitted diseases. Diseases spread by the fecal–oral route through contaminated food or water includes polio, diarrhea, cholera, etc. Vector-borne diseases include malaria, plague, tetanus, yellow fever, etc.

disability. Anyone can contract the disease, but children under the age of 5 years are most vulnerable to polio attack. Of those paralyzed, 5% to 10% percent die when their breathing muscles became immobilized.

Polio is transmitted through the fecal–oral route.[5] It has no cure and has to be eradicated.[6] Polio eradication is possible, since it can be transmitted only through humans, unlike some other diseases that have an animal reservoir.[7] There are three types of poliovirus: PV1, PV2, and PV3. PV1 is the most debilitating disease among the three, as it causes severe paralysis, often leading to death. PV2 usually causes meningitis and less severe paralysis. PV3 is associated with sporadic cases of polio attacks. Protection against any one type of poliovirus does not give immunity against the other two types.

Dr Jonas Salk invented the inactivated polio vaccine (IPV) in 1954 based on the success in mass field trials in the United States. In 1957, Dr Albert Sabin invented the oral polio vaccine (OPV). Monovalent oral polio vaccines (mOPV) were available for PV1, PV2, and PV3 by 1962. Trivalent OPV (tOPV),[8] which is effective against all three types of polio, became available in 1963. Even though polio vaccines became available in the mid-1960s, polio was endemic in 125 countries on 5

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[5]The fecal–oral route for transmission of infection occurs when infectious particles from feces are ingested through the mouth. Although the fecal–oral route disease transmission is classically associated with contamination of water by human or animal waste, there are some sexual and behavioral practices that can also expose individuals to these diseases. Transmission of infection by the fecal–oral route can also occur when people involved in food preparation fail to thoroughly wash their hands after going to the bathroom or when people do not wash their hands before eating. Swimming pools or water parks can also be possible locations for fecal–oral roué of transmission.

[6]Sutter, R. W., Maher, C. 2006. Mass vaccination campaigns for polio eradication: an essential strategy for success. *Current Topics in Microbiology and Immunology*, volume 304, pp. 195–220, http://www.ncbi.nlm.nih.gov/pubmed/16989271, accessed on July 7, 2014

[7]Some diseases like yellow fever have an animal reservoir in monkeys. This means, if a mosquito capable of spreading yellow fever bites an infected monkey, the mosquito can then give the disease to humans. Therefore, eradication of yellow fever cannot be guaranteed, even if the entire human population on the planet could somehow be vaccinated against yellow fever.

[8]tOPV (trivalent OPV) is most effective against PV2, and less effective against PV1 and PV3.

continents in the mid-1980s, paralyzing 350,000 children every year (1,000 children per day).[9]

The 41st World Health Assembly in 1988 declared global polio eradication by 2000.[10] It marked the launch of the Global Polio Eradication Initiative (GPEI), spearheaded by national governments, WHO, Rotary International, the U.S. Centers for Disease Control and Prevention (CDC), UNICEF, and supported by key partners including the Bill and Melinda Gates Foundation.

Exhibit 7.1 gives important milestones in polio eradication starting from 1954 to 2002. 1954 marked the invention of the polio vaccine by Dr Jonas Salk. By 2002, only 10 countries were polio endemic, a dramatic decline from 1980s when 125 countries were polio endemic. Efforts by the GEPI team led to a decline in the number of polio cases to 291 by 2012, a 99% decrease from 1988.[11]

Strategic Planning

India's fight against polio started in 1978 when it adopted the WHO program on Extended Program on Immunization (EPI) and included polio in the immunization schedule. Subsequently, the Government of India (GoI) adopted the WHO Universal Immunization Program (UIP) to achieve complete immunization against the six VPDs.[12] UIP was strategically put under the Prime Minister's Technology Mission in 1986 and was monitored under the 20-point program by the Prime Minister's office. The stated objectives of UIP were to rapidly increase immunization coverage, improve the quality of services, establish a reliable cold chain system to the health facility level, introduce a district-wise system for monitoring of performance, and achieve self-sufficiency in vaccine

[9]A History of Global Polio Eradication; http://www.unicef.org/immunization/files/the_history_of_polio.pdf, accessed on July 17, 2014

[10]Poliomyelitis, Fact sheet N°114, Updated October 2014; http://www.who.int/mediacentre/factsheets/fs114/en/, accessed on July 3, 2014

[11]Milestones in Global Polio Eradication; http://www.unicef.org/newsline/poliopkglmilestones.htm, accessed on September 25, 2014

[12]The six vaccine-preventable diseases in UIP are tuberculosis, diphtheria, pertussis, tetanus, polio, and measles.

production. By 1990, the program had been expanded to spread across the length and breadth of the country, but the UIP goal of complete immunization by 1990 was not achieved. The national average in 1992–93 was only 36% for complete immunization and 53% for polio vaccination; polio vaccination was particularly poor in the western states of Uttar Pradesh (34%) and Bihar (29%).[13]

Though the number of polio cases started declining, the rate of decline was very poor as can be seen from Figure 7.1.

The number of polio cases in India stood at 3,142 in 1995.[14] India continued to remain in the WHO list of polio-endemic countries. This set the agenda for the Government of India to adopt the WHO model for polio eradication in the country. In 1995, the Government of India launched the Pulse Polio Immunization Program aimed at polio eradication by 2000.

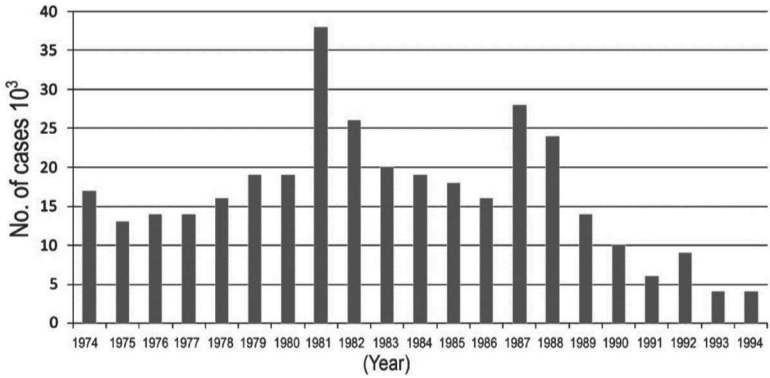

Figure 7.1 Total Number of Wild Poliovirus Cases in India from 1974 to 1994

Source: Jacob, J. T., Vashishtha, Vipin, M. 2013. Eradicating poliomyelitis: India's journey from hyper-endemic to polio-free status. *Indian Journal Medical Research*, volume 137, pp. 881–894; http://icmr.nic.in/ijmr/2013/may/centenary%20review%20article.pdf

[13]National Family Health Survey (NFHS-I); 1992-93

[14]Jacob, J. T., Vashishtha, Vipin, M. 2013. Eradicating poliomyelitis: India's journey from hyper-endemic to polio-free status. Centenary review Article, *Indian Journal of Medical Research*, volume 137, pp. 881–894.

Strategic planning for the pulse polio immunization program included two basic components, namely, (i) Immunization and (ii) Surveillance:[15]

Immunization:

(i) Routine immunization to ensure high immunization coverage of children in the first year of life with at least three doses of OPV,

(ii) Supplementary immunization in the form of mass campaigns to interrupt circulation of poliovirus by immunizing every child under 5 years with two doses of OPV, irrespective of previous immunization status. The WHO recommended a National Immunization Day (NID) as a strategy to fight the polio war. The NID strategy required each child under the age of 5 years to be administered OPV[16] against polio twice a year within a period of 4 to 6 weeks. The concept of an NID, backed with Sub-National Immunization Days (SNID) in hard-to-reach and high-risk areas were important components of this strategy.

(iii) Targeted mop-up-campaigns for door-to-door immunization of children in specific areas where poliovirus was suspected to be in circulation.

Surveillance:

Strategic planning also included the setting up of the National Polio Surveillance Project (NPSP), a joint project of WHO and GoI, with assistance from the GPEI in partnership with UNICEF, CDC, and Rotary International. The objectives of NPSP[17] were to:

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[15]"Public health surveillance is the continuous and systematic collection, analysis and interpretation of health related data for planning, implementation and evaluation of public health practice. Surveillance can (i) serve as an early warning system for public health emergencies, (ii) document the impact of an intervention or track the progress towards the stated goals, and (iii) monitor and clarify the epidemiology of health problems, to allow priorities to be set and to inform public health policies and strategies"; Public Health Surveillance; http://www.who.int/topics/public_health_surveillance/en/, accessed on August 30, 2014

[16]For polio-endemic countries, the WHO recommends OPV as it is easier to administer and inexpensive compared to IPV.

[17]National Polio Surveillance Project, World Health Organization; https://www.linkedin.com/company/national-polio-surveillance-project-world-health-organization, accessed on August 30, 2014

(i) Assist the government in planning and implementing polio immunization activities aimed at eliminating polio from India , and
(ii) In building and maintaining surveillance for acute flaccid paralysis (AFP)[18] and poliovirus until certification of polio eradication is achieved in the WHO South East Asia Region.

The NPSP has a central unit for providing guidance, support, coordination, monitoring, and data analysis of various activities related to surveillance of polio. The organization of NPSP is given in Exhibit 7.2. The field units of NPSP headed by Surveillance Medical Officers (SMOs) were deployed in all States and Union Territories, with primary responsibility for facilitating surveillance and immunization activities aimed at polio eradication.[19] NPSP stared active surveillance[20] in 1997.

This surveillance marked a strategic shift in India's polio eradication efforts.

The information from NPSP in turn led to the development of various strategies that helped to cover populations at risk. Of particular significance is the Social Mobilization Network of UNICEF, which was established to reach out to the underserved communities in the state of Uttar Pradesh (UP) in 2003 (Exhibit 7.3).

Operational Planning

The operational planning needed to take the strategic plan toward implementation was a daunting task. With 27 to 28 million childbirths in India every year, the operational planning had to conduct mass immunizations,

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[18]AFP is defined as sudden onset of weakness and floppiness in any part of the body in a child less than 15 years old or paralysis in a person of any age. AFP is a symptom of possible polio attack.

[19]Field Guide**:** Surveillance of Acute Flaccid Paralysis**.** Third edition September 2005, Child Health Division, Ministry of Health and Family Welfare, Government of India; http://www.searo.who.int/india/topics/poliomyelitis/Field_guide_for_Surveillance_of_Acute_Flaccid_Paralysis_3rd_edition.pdf?ua=1, accessed on September 10, 2014

[20]Active surveillance refers to the process whereby designated officers collect actual data from health facilities and individuals. In passive surveillance, health facilities send data and reports routinely, at specified intervals.

which amounted to immunizing 150 to 170 million children under 5 years[21] on each NID and 50 to 60 million children on each SNID.

A number of international organizations led by Rotary International, WHO, UNICEF, and the U.S. CDC assisted the Government of India in the operational plan for the Pulse Polio Campaign. State governments and many local NGOs also played a critical role in reaching out to the communities, far and near.

Activities in the operational plan included:

- Locating the children to be immunized
- Setting up of booths in all parts of the country
- Booth logistics management
- Cold chain management
- Creating awareness and influencing behavior changes in communities
- HR Management of all project staff
- Immunization on NIDs, SNIDs
- Identifying missing children from immunization process
- Surveillance

Locating children less than 5 years old: Micro Planning: Successful implementation of supplemental mass immunization activities required meticulous micro-planning to reach out to all under-5 (U5) children on each NID/SNID.

The micro-plans offered a logistical blueprint to guide the planning and implementation of vaccination campaigns.[22] This task involved locating the houses with U5 children. The village office[23] provided addresses of the houses where U5 children lived. However, often the information from the village offices was incomplete because of poor birth registration records maintained by them. Wherever possible, geographic information system (GIS) methodology was used for locating the houses on the village

[21]In some states like UP and Bihar where polio was endemic, children above 5 years old were also immunized as the birth registration system was very poor.

[22]Victoria Gammino. August 13th 2014. Polio Eradication, Microplanning and GIS; http://www.directionsmag.com/articles/polio-eradication-microplanning-and-gis/407747, accessed on August 13, 2014

[23]Village offices are called village *panchayats* in India.

map. Use of GIS technology also helped the team to estimate the travel time to reach the houses and the number of houses which could be covered in a day in a given village.

Micro-planning for high-risk areas and underserved populations called for additional efforts for social mobilization by involving community and religious leaders. A typical house-to-house micro plan is displayed in Exhibit 7.4.

Setting Up Polio Booths: Immunization booths were to be set up in easily accessible locations in all parts of the country, such as schools, bus stops, railway stations, public health centers, anganwadi centers,[24] and so on. All logistics arrangements were to be planned well ahead of NIDs and SNIDS, to carry out mass immunizations of all U5 children including newborn children who were brought to the booth.

Booth Logistics Management: This involved planning booth logistics management, which included ensuring availability of adequate OPV vials (with a provision for wastage factors) and vaccine vial monitors.[25] Planning the right staff mix, adequate steps to ensure vaccine storage in very low temperatures in the booths, proper administration of vaccines, and maintaining complete records of immunization were all very challenging.

Cold Chain Management: Planning cold chain management was one of the most important activities in any immunization program.[26] It involved establishing and maintaining cold chain facilities (walk-in cold rooms,

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[24]The word Anganwadi means "courtyard shelter" in Indian languages. They were started by the Indian Government in 1975 as part of the Integrated Child Development Services (ICDS) program under the Ministry of Women and Child Development. The main objective of Anganwadi centers is to combat child hunger and malnutrition. There is one Anganwadi Worker (AWW) per village. Intersectoral coordination is a key component for the success of Pulse Polio Campaigns.

[25]A vaccine vial monitor (VVM) is a thermochromic label put on vials containing vaccines that gives a visual indication of whether the vaccine has been kept at a temperature which preserves its potency. The labels were designed in response to the problem of delivering vaccines to developing countries where the cold chain is difficult to preserve, and where formerly vaccines were being rendered inactive and administered ineffectively due to their having been denatured by exposure to ambient temperature. http://en.wikipedia.org/wiki/Vaccine_vial_monitor, accessed on November 10, 2014

[26]Ref 1: National Cold Chain Assessment, India, July 2008, UNICEF; http://www.unicef.org/india/National_Cold_Chain_Assessment_India_July_2008.pdf, accessed on October 8, 2014

freezer rooms, deep freezers, ice-lined refrigerators, and cold boxes). This was extremely challenging since polio vaccines should be kept in a frozen state (–25°C to –15°C) in the entire cold chain except at the vaccination sites (unlike cold chain for other vaccines that should be kept at temperature of +2°C to +8°C), so as to ensure potency of the vaccines. In general, vaccine stability and potency are both temperature dependant.

The Ministry of Health and Family Welfare, GoI, received vaccines from the manufacturers in its primary vaccine stores, called Government Medical Stores Depots (GMSD) located at Karnal (near Delhi), Mumbai, Chennai, and Kolkata.[27] Vaccines were then transported to state vaccine stores and through divisional and district vaccine stores they reached the last storage point of community health center (CHC)[28] or primary health center (PHC).[29] Further transportation from CHC/PHC to the immunization sites was done by vaccine carriers contracted by the district health department. These vaccine carriers carried vaccines in special cold boxes.

Awareness Generation and Behavior Change: Planning to reach out to children was only half the story. Planning to create awareness among their parents and getting them to change their health-seeking behavior was very challenging.

Health communication played a significant role in the operational planning to reach out effectively to the parents of U5 children through their communities. Information, communication, and education (ICE) and behavior change communication (BCC) programs had to be designed and delivered as per the health-seeking behavior of each community based on their socioeconomic and cultural background.

Media played a very important role in the IEC and BCC programs. Media options for reaching out effectively to the communities included

[27]Ref: 2: WHO Bulletin. Frequent exposure to suboptimal temperatures in vaccine cold-chain system in India: Results of temperature monitoring in 10 states; http://www.who.int/bulletin/volumes/91/12/13-119974/en/, accessed on July 30, 2014

[28]In India a CHC serves a population of about 100,000. CHCs have 20–30 beds and offer outpatient and inpatient services in internal medicine, general surgery, orthopaedics, gynecology, and pediatrics.

[29]In India, a PHC serves a population of about 30,000. PHCs have 4–6 beds and provide primary health care services with a focus on maternal and child health.

radio, TV shows, street plays, posters and flyers, and so on. Radio proved to be a very reliable source to migrant and mobile populations.

Advocacy through many popular personalities was planned to make a big impact among the rural masses, which included invitations by UNICEF to famous film stars, namely, Amitabh Bachchan, Priyanka Chopra, and Aamir Khan to be ambassadors for the polio-eradication drive. Prominent cricket players Rahul Dravid and VVS Laxman from India held *"Bowl out Polio"* campaigns in the states they belonged to.[30]

Branding of POLIO IEC[31] was another task in operational planning to create awareness in communities. All IEC materials were displayed in bright yellow, pink, and blue colors throughout the country. This unique identity of polio materials was easy to recognize and thereby create awareness instantly.

HR Management: Planning for HR management activities included (i) Staff recruitment at various levels: managerial, supervisory, and field level, (ii) Training the staff adequately to deal with routine activities and challenges, and (iii) Posting vaccinators at polio booths and several public places such as railway stations, bus stands, religious gatherings, and so on. As the eradication of polio took many years, keeping the staff morale high was very challenging.

Identifying children who missed immunization: Locating children who missed immunization was an important activity. Elaborate plans were drawn for the Kosi River Project to reach out to the children in the difficult-to-access areas along the Kosi river basin following the floods in 2007–08 (Exhibit 7.5).

Surveillance: Setting up NPSP in 1995 as a joint collaboration between WHO and the Ministry of Health, GoI, was very critical for the success of the program. Over a period of time, NPSP set up about 40,000 health facilities across India[32] (in public and private sectors) for collection of stool samples, which were sent to one of the eight WHO

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[30]Bowling Out Polio through Cricket. 2004; http://www.thehindubusinessline.com/2004/04/07/stories/2004040702580500.htm, accessed on November 3, 2014

[31]India Polio Learning Exchange, Media and Advocacy; http://www.iple.in/category/index/media-advocacy-1, accessed October 9, 2014

[32]Surveillance at the Heart of India's Polio Success Story; http://www.searo.who.int/india/topics/poliomyelitis/surveillance/en, accessed on November 17, 2014

accredited laboratories for detailed investigations. These initiatives enabled NPSP for early detection of and appropriate interventions of polio suspected cases by:

- Finding and reporting children with suspected AFP
- Transporting stool samples to accredited laboratories for analysis
- Isolating the poliovirus in the laboratory
- Mapping the virus to determine the origin/location of the virus strain.

To summarize, operational planning activities included locating all U5 children, creating awareness and behavioral change in each community, establishing a complex and effective logistical cold chain infrastructure to take the vaccines to the remotest locations, vaccinating the children, and doing continuous surveillance.

Detailed and meticulous operational planning was the cornerstone of the pulse polio program success. As per the UNICEF report,[33] 2.3 million health workers vaccinated 175 million children on each NID; more than 500,000 vaccinators covered about 45 million children in each sub-National Immunization campaign; 9,125 community mobilizers visited more than 3 million families each month; and 900 million doses of OPV were used in 2011. About 956,000 posters, 840 TV programs, and 2,030 radio spots announced campaigns in West Bengal, Bihar, and UP. The Social Mobilization Network tracked 30,000 migrant families and helped vaccinate 1,814,266 children on the move in transit and border areas.

Implementation and Surveillance

Phase 1: 1995-2000: Polio booths were set up at all important locations for mass immunizations on NIDs. In 1995, the first year, NID succeeded in vaccinating 88 million children under the age of 3 years. From 1996, the coverage was extended to all children under the age of 5 years. High-prevalence states like UP and Bihar also observed SNIDs to

[33]India Polio Fact Sheet; http://www.polioeradication.org/Portals/0/Document/InfectedCountries/India/PolioIndiaFactSheet.pdf, accessed on October 3, 2014

cover difficult-to-reach areas. In 1997, NPSP started active surveillance, and 138 million children were immunized against polio on a single day.[34] Polio cases showed a decline in 1998; the detailed break up of polio cases in the 10 highest populated states in India is shown in Exhibit 7.6. With assistance from NPSP, PV2 virus stopped circulating in India. The last case of PV2 was in Aligarh, India in October 1999.[35] The trivalent OPV (tOPV) was very effective against PV2, but less against PV1 and PV3, and so PV1 and PV3 continued to be prevalent.

The goal of eradicating polio by 2000 was not achieved, as can be seen from Figure 7.2. The reasons were "failure to vaccinate," and "failure of vaccine." The Government of India again set the target year 2005 for polio eradication.

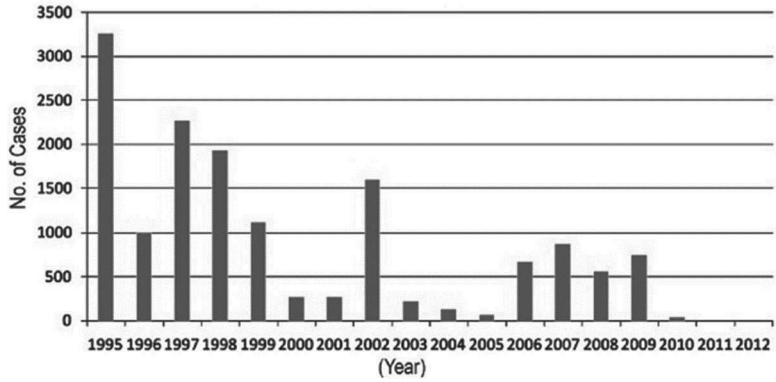

Figure 7.2 Poliovirus Cases: 1995–2012

Source: John, T. J., Vashishtha, V. M. 2013. Eradicating poliomyelitis: India's journey from hyperendemic to polio-free status. *Indian Journal of Medical Research*, volume 137, no. 5, pp. 881–894.

Phase 2: 2000–2005: Since 2000, the program started house-to-house visits in search of children who missed vaccination and vaccinated

[34]Polio-free certification of the World Health Organization South-East Asia Region. WHO South-East Asia Region is officially certified polio-free, http://www.searo.who.int/entity/campaigns/polio-certification/en/, accessed on July 21, 2014

[35]PV2 has been eradicated globally; the last case of PV2 was in Aligarh, India in October 1999. PV1 and PV3 are still prevalent in three countries as at the end of 2014; Pakistan, Afghanistan, and Nigeria.

Ref India Polio Fact Sheet, India Polio fact Sheet; http://www.polioeradication.org/Portals/0/Document/InfectedCountries/India/PolioIndiaFactSheet.pdf

them, in addition to vaccination in polio booths. In 2000, and 2001, India reported only 265 and 268 cases of PV1 and PV3, respectively.

Unfortunately, the year 2002 saw an outbreak, mostly 1,600 cases of PV1, with 1,363 (85%) in UP and Bihar alone. Most of the victims were from the Muslim community. This gave rise to the Social Mobilization Network of the UNICEF to reach out to the underserved communities in UP in 2003. Intensified efforts for polio surveillance activities by GoI and NPSP led to a decline in polio cases in 2004 and 2005. India missed the 2005 target also.

***Phase 3*: *2005-2014*:** The GoI extended the target deadline to 2012 for polio eradication. The Pulse polio program received another setback. Polio outbreak was reported in UP and Bihar in 2007 (800 cases) and 2008 (559 cases); Exhibit 7.7 gives the breakup of polio cases for each state. This led to the establishment of the Kosi River Bank project in Bihar where consistent efforts by the project team helped track the children who were missing or separated from their parents due to massive flooding of Kosi River, and immunized them.

India reported 742 cases in 2009, but only 42 cases in 2010, one case in 2011, and 0 cases since 2012. The last reported case of polio in India was in West Bengal on January 13, 2011.

Following 3 years of no polio case reported, India was finally declared polio-free by the WHO in 2014.[36] India achieved the "impossible" through very sincere and dedicated service by the pulse polio immunization program staff at all levels.

India's efforts in eradicating polio have received worldwide attention. According to the administrative officer of the WHO country office in India, "A group of Indian medical healthcare workers who played an important role in eradicating polio from hotspots such as UP, Bihar and West Bengal in India, has joined the fight against Ebola in Sierra Leone and Liberia. The group of 29 healthcare workers from a pool of 1500 who were flown to Ebola's Ground Zero from New Delhi in December 2014 were picked for their unparalleled surveillance and district operational level skills". *The Indian Express, January 22, 2015*.

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[36]India Declared Polio-free by WHO, CBS News; http://www.cbsnews.com /news/india-declared-polio-free-by-world-health-org/, accessed on July 21, 2014

Exhibit 7.1: Milestones in Global Polio Eradication[37]

2002

- Europe certified polio-free.
- Globally, only 10 countries are polio endemic at the beginning of 2002.
- A funding gap of US$ 275 million threatens the global polio-eradication goal.
- Rotary launches the Polio Eradication Fundraising Campaign with the goal of raising US $80 million through 2003.

2001

- Globally, 20 countries are polio-endemic at the beginning of 2001.
- Just 480 wild poliovirus cases are reported worldwide in 2001.

2000

- 2,979 wild poliovirus cases are reported worldwide—a 99% decrease from 1988.
- The WHO Western Pacific Region is certified polio-free on 29 October.
- Seventeen west and central African countries vaccinate 76 million children during unprecedented "synchronized" national immunization days (NIDs).
- Over 240,000 childhood deaths are averted through administration of Vitamin A during polio immunization days in over 50 countries.
- A poliovirus importation from Angola to the island nation of Cape Verde, polio-free for over a decade, resulted in 56 cases of paralysis, including 17 deaths.

1999

- The World Health Assembly unanimously endorses WHA resolution 52.22 to accelerate the activities of the Global Polio Eradication Initiative.
- A large polio outbreak strikes Angola, paralyzing more than 1,000 children and causing over 50 deaths.

[37]Milestones in Global Polio Eradication. UNICEF Press Center; Change the World with Children; http://www.unicef.org/newsline/poliopkglmilestones-printer.htm

- The first national immunization days in DR Congo and Sierra Leone—two conflict—affected and polio-endemic countries—are undertaken.

1998

- 134 million children are immunized against polio on a single day in India.
- National immunization days are conducted for the first time in Somalia and southern Sudan.

1997

- Mum Chanty, a 15-month-old girl paralyzed by polio, is found on 19 March in Cambodia—the last case of indigenous polio in the Western Pacific Region.
- A polio outbreak in India among a religious minority paralyzes 800 children.

1994

- The WHO Region of the Americas is the first Region to be certified polio-free, on 29 September.

1991

- The last case of polio in the Americas is detected in Junín, Peru in August— paralyzing a young boy, Luis Fermín Tenorio Cortez.

1990

- At the World Summit for Children, WHO, Rotary International, CDC, UNICEF, partner organizations, and many Heads of State reaffirm their commitment to the eradication of polio.
- A huge outbreak in China during 1989 and 1990 causes over 10,000 polio cases.

1988

- The World Health Assembly resolves to eradicate polio by the year 2000.
- An estimated 350,000 polio cases occur worldwide, in over 125 countries.
- Rotary International announces that its fundraising campaign has exceeded expectations, raising US$ 247 million for polio eradication, which today has grown to US $462 million.

1986

- Rotary International launches a campaign to raise US$ 120 million to fight polio, providing the impetus to begin the polio-eradication initiative.

1985

- Seeing the success of the first national immunization days (NIDs) against polio to supplement routine immunizations in Latin America, the Pan American Health Organization resolves to eradicate polio from the Americas.
- A 3-day cease-fire held during El Salvador's civil war represents the first "Days of Tranquillity"for polio immunization.
- Rotary International launches a global health campaign to aid international agencies in immunizing children in developing countries. PolioPlus is the first and largest internationally coordinated private-sector support of a public health initiative.

1980

- The World Health Assembly officially certifies the world free of smallpox—the first disease ever eradicated.
- An estimated 500,000 children are paralyzed by polio every year.

1960s

- Immunization campaigns in Cuba and in Eastern Europe demonstrate that wild poliovirus can be eliminated in large geographic areas using the oral polio vaccine (OPV). OPV rapidly becomes the vaccine of choice for most national immunization programs.

1957

- Dr Albert Sabin introduces the OPV, easier to administer and less costly than Salk's inactivated polio vaccine (IPV).

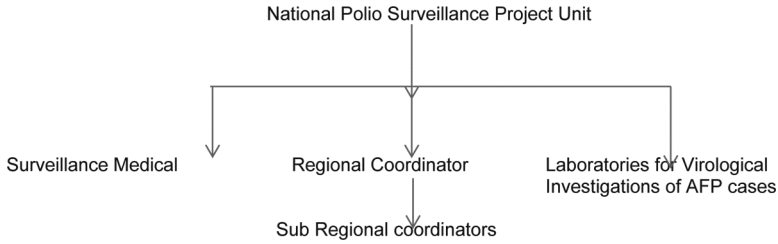
1955

- Salk's polio vaccine is approved for general use in the United States.

1954

- The first vaccine against polio, the IPV developed by Dr Jonas Salk, succeeds in mass field trials in the United States.

Exhibit 7.2: Organogram of National Polio Surveillance Program (NPSP)



Source: National Polio Surveillance Project, World Health Organization; https://www.linkedin.com/company/national-polio-surveillance-project-world-health-organization

Exhibit 7.3: The Underserved Strategy (Social Mobilization Network)

A Religious Leader: "I pray to God that there should not be any more polio in Moradabad" Hakeem Syed Masoom Ali Azad is the most senior Imam in Moradabad, Uttar Pradesh. Like many others in western UP he once worried that the polio vaccine would cause impotency and that it was prohibited according to Islam. He was persuaded otherwise by JMI and Aligarh Universities, and decided to make a public display, administering polio drops to his own nephews and grandchildren as a sign of faith. "I pray to God that there should not be any more polio in Moradabad," he said. The Shahar Imam has continued to make announcements in the largest mosque in Moradabad, vouching for the safety of OPV and encouraging everyone to vaccinate their children. g for the safety of OPV and encouraging everyone to vaccinate their children.

The Underserved Strategy had its genesis after a polio outbreak in Uttar Pradesh (UP) in 2002, when it was realized that although Muslims made up only 17% of the state's population, they represented 59% of the children being paralyzed by polio. Muslim communities in UP are some of the most underserved in India; they are often poor, marginalised, and excluded from basic health services. In the early 2000s, rumours had taken hold that oral polio vaccine (OPV) was "*haraam*" and was part of a Western campaign to sterilize Muslim

children. In 2002, a Muslim child was five times more likely than a non-Muslim child to have not received even one dose of OPV. It was a wake-up call. The challenge was to win the support of religious leaders and generate community ownership of the polio program.

Working with Muslim Universities: The Underserved Strategy began in 2003 and by late that year formal partnerships had been struck with respected national Islamic universities including Jamia Millia Islamia University and Aligarh Muslim University. The oral polio vaccine was tested by the medical college at Aligarh Muslim University and the university publically declared that it was safe. Jamia Millia Islamia University also produced the "green advocacy booklet," a collection of verses of the Koran promoting child health and *hadits* (sayings of the prophet Mohammed) in support of polio vaccination.

***Madrasas* & Mosques:** Partnerships were built with 500 Madrasas and Muslim institutions across North India. Religious leaders became an integral part of the polio program, taking personal responsibility for ensuring their congregations understood the importance of vaccinating children against polio. In high-risk areas of UP, around 85% of mosques made announcements for polio, advertising the date of "Polio Sunday" ahead of the campaign and again on the first morning of the round. Imams appeared on local television making public service announcements urging parents to vaccinate their children and provided written endorsements of the polio program. Imams often gave the first polio drops to a baby at their local fixed-site booth, as the ceremonial start to a polio immunization round.

Religious Gatherings: A major element of the Underserved Strategy was to ensure the message to vaccinate children against polio is front and center at major religious gatherings. At mass congregations around the time of *Eid*, for example, up to five million people were exposed to polio announcements, with large banners promoting vaccination hung prominently through the site. District Underserved Coordinators made sure that whenever there was a large religious gathering, polio vaccination was a part of it.

Migrants & Nomads: The Expanded Underserved Strategy subsequently covered other marginalised groups, such as migrants and nomads. Research has shown that the children of these groups were much less likely to have received enough doses of OPV to have adequate immunity to the virus. Migrant populations were tracked, and partnerships formed with the owners and managers of businesses that employed transient workers, such as at brick kilns and construction sites, to ensure that their sites were included in immunization micro plans, and toilets and adequate water supply provided.

Source: Underserved strategy; India Polio Learning Program; http://www.iple.in/category/index/underserved-strategy-1

Exhibit 7.4: Pulse Polio Immunization House-to-House Micro Plan

Block /PHC/Urban Area: Deoband; Medical Officer in Charge: Dr B S Sodhi, Supervisor Name: Poonam Rani, Round: April 2011

Team No.	Name of Team members	Desig nation		First day	Second Day	Third Day	Fourth Day	Fifth Day
			Area for Vaccination	Pathan Pura	Pathan Pura Gadariyan	Pathan Pura Reti Chowk	Pathan Pura Galikhumran	Pathan Pura Galikhumran
1	V1- Geeta	A/W	Description of Area (MATD/HRA/HRG-Nomads, Bricklin, Construction	HRA	HRA	HRA	HRA	HRA
			Name of the head of the owner of first house identification point	**Som Dutt Dheeman/**	**Munnawar Khan/**	**Faizul Hassan**	**Riyaz Hussain Hotel owner**	**Kaif S/O Ayyub**
			Landmark of the first day's work	From Somdutt's Dheeman's house toward Dr. Irshad, next to Lal Singh's house via Mursaleen's house from Gayyur Khan's; lane to Gulshan Cloth Merchant's lane till Drain	near Dagad Masjid toward Drain, Via Maroof's Floor \mill,In front of Indira Memorial crossing Gadariyan lane in Shanshuddin lane and Islam lane	/From Faizul Hassan toward Hussain Hotel, near Noor Mohammed's house adjacent to Khursheeda's lane, Dr. Sagar's lane toward ex chairman's house	Adjacent to Riyaz hotel's lane Nafis's house to Zaheer's house then from Hamid's house to Khumro's Mosque and then from Hotel's lane out to Mateen's house	From Ayub's house to Zaheer's shop toward Nafis's house then toward Milkman's lane coming out to main road then toward Municipal Councilor Khalid's house and ending at
			Name of the head of the owner of last house and identification	Amanullah Khan	Shujat Khan	Ziyaddin Ansari	Mateeen Councilor	Ikram S/O Mehboob

(Continued)

Team No.	Name of Team members	Desig nation		First day	Second Day	Third Day	Fourth Day	Fifth Day
			Area for Vaccination	Pathan Pura	Pathan Pura Gadariyan	Pathan Pura Reti Chowk	Pathan Pura Galikhumran	Pathan Pura Galikhumran
	V2- Tabsum	Lo- lsoh	Approximate no. of Houses	102	86	72	89	97
			name of the schools /Madrasa coming in Days work		Indira Memorial School	MFR School		
			Local Third Team member's name	Raisa	Nafisa	Jamila	Shakila	Shakila
			Local Influencer's name	Dr. Islam	Naeem	Arshad	Dilara	Hafiz Imran
			Name of place for afternoon meeting	Bhramchand Saini's Baithak	Bhramchand Saini's Baithak	Bhramchand Saini's Baithak	Bhramchand Saini's Baithak	Bhramchand Saini's Baithak
			CMC's Name (Agency)	Shabana	Shabana	Shabana	Shabana	Shabana
Information Related to Routine Immunization of the Area								
1	Name of PHC			PPC Deoband	PPC Deoband	PPC Deoband	PPC Deoband	PPC Deoband
2	Name of ANM			Poonam Rani	Poonam Rani	Neeraj	Meena	Meena
3	Session point-Address			Dr. Islam	Dr. Islam	Delhi Wale Doctor	Anwar's House	Anwar's House
4-	Session Day			Fourth Day Saturday	Fourth Day Saturday	Fourth Day Saturday	First Day Saturday	First Day Saturday
5-	Session-related ASHA's name			…….	…….	…….	…….	…….
6-	Session-related Mobilizer's name			Shameem	Shameem	Pramila	Kammo	Kammo
7-	Session-related Anganwadi's name							
8-	Name of Anganwadi's assistant							
9-	Name of Health Supervisor			Ramsakhi	Ramsakhi	Ramsakhi	Ramsakhi	Ramsakhi

Exhibit 7.5: Kosi River Project

The Kosi River was one of the country's last refuges for the poliovirus and played host to an extensive outbreak of polio.

"During 2007-08, massive floods of the Kosi River posed a daunting task for the health officials in charge of vaccination activities. The flash flood had swept away almost everything that fell in its course and caused massive population displacement. Since polio spreads rapidly through water-bodies, this sudden flood in a polio-endemic area was a major concern for the global authorities in charge of polio eradication to reach out to the children who were stranded and/or moved with their parents to other places in search of work."

Stranded children at the other side of a dilapidated bridge which was their only connection to the mainland

"The strains of the virus often moved back and forth between the endemic reservoirs of central Bihar and western Uttar Pradesh, thwarting the eradication effort. Targeted approaches were needed to reach every child in this and other hard to reach regions. To intensify the focus on the difficult to access areas along the river, the Kosi River Operational Plan was drawn up. A critical component for success was recruiting and deploying community mobilizers from the *mushari* (formerly 'untouchable') community. Satellite offices and overnight stay points were also established, to allow surveillance medical officers and campaign supervisors to spend a few nights close to activities, mapping, planning and supervising the programme from the round. A

grid was drawn up, identifying areas that were previously underserved to ensure inclusive programming. Extra community mobilizers were positioned in the areas that needed them most. With these additional resources and focus, children stopped being missed, and circulation of the poliovirus in this reservoir was interrupted."

Source: (1) Inpatient Optimists, Melinda Foundation, 2013; http://www.impatientoptimists.org/Posts/2013/01/Polio-Eradication-Indias-Pursuit-of-Perennial-Prevention (2) India's Story of Triumph over Polio; http://www.iple.in/files/ckuploads/files/Polio_Book.pdf

Exhibit 7.6: The 10 Highest Populated States in India and Polio Cases, 1998

	State/UT	Population in Millions 2000 census	Population in Millions 2010 census	No. of Districts	Polio Cases in 1998
1	Uttar Pradesh	166	200	75	881
2	Maharashtra	97	112	36	121
3	Bihar	83	104	38	158
4	West Bengal	80	91	19	26
5	Andhra Pradesh	76	85	23	96
6	Madhya Pradesh	61	73	51	107
7	Tamil Nadu	61	72	32	91
8	Rajasthan	57	69	33	62
9	Karnataka	53	61	30	71
10	Gujarat	51	60	33	163
	Sub Total	785	927	370	1,776
All India		**1,028**	**1,210**	**640**	**1,932**

Source: National Polio Surveillance Project, India. www.npspindia.org

Exhibit 7.7: Polio Cases in India: 2008

State	PV1	PV3	Total
UP	62	243	305
Bihar	3	230	233
Delhi	4	1	5
Maharashtra	0	2	2
Haryana	0	2	2
Orissa	1	1	2
Andhra Pradesh	0	1	1
Madhya Pradesh	0	1	1
Rajasthan	0	2	2
Assam	1	0	1
Punjab	2	0	2
West Bengal	1	1	2
Uttarakhand	1	0	1
Total	**75**	**484**	**559**

Source: Polio cases in India, 2008; Global Health Education Consortium (GHEC); Eradication and Control Programs: a look at Polio Tista Ghosh, MD MPH Assistant Clinical Professor University of Colorado March 2009, http://cugh.org/sites/default/files/content/resources/modules/To%20Post%20Both%20Faculty%20and%20Trainees/19_Eradication_And_Control_Programs_A_Look_At_Polio_FINAL.pdf, accessed on October 5, 2014

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K.V. Ramani

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Prof. K.V. Ramani obtained his PhD in operations research from Cornell University. He served the Indian Institute of Management, Ahmedabad from 1977 to 2014, and held various senior positions, including the Chairmanship of the Centre for Management of Health Services, which he helped set up in 2004. After retirement, he continues to serve IIMA as an adjunct professor. Prof. Ramani has also taught at Cornell University and Florida International University, as well as the National University of Singapore. He has also been a visiting research scholar at many other universities world-wide.

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