

An App and Program That Saves Lives and Is As Cost Effective As Vaccines

EXECUTIVE SUMMARY

Uttar Pradesh, one of the largest and most populous states in India, where even basic health care for mothers and children is often inaccessible, has some of the highest numbers of maternal and child deaths. In Kaushambi District, where this program operates, mothers and infants die at a rate more than double the national average.

In 2011, Catholic Relief Services (CRS) began working in Kaushambi District with the local team of Accredited Social Health Activists. Better known as ASHAs, India's government health system introduced this cadre of female community health workers to generate demand for health services, and to serve as a platform for information and a link to the formal health system. Through the Reducing Maternal and Newborn Deaths (ReMiND) program, CRS introduced a mobile health (mHealth) application using the CommCare platform developed by Dimagi Inc., a social enterprise company. ASHAs use the application on smartphones to improve their performance, and thereby increase use of health services by women.

In 2015, the United States Agency for International Development (USAID) funded an independent team from the Post Graduate Institute for Medical Education and Research in Chandigarh, led by Dr. Shankar Prinja, to analyze the cost effectiveness of the program. The study evaluated how effective and efficient the ReMiND program is in saving women's and children's lives.

Analyzing the costs of the program since its inception in 2011, the study concluded that the interventions introduced by ReMiND in Uttar Pradesh were **extremely cost effective** and recommended exploring opportunities to increase the project's scale. The study found that **the ReMiND mHealth intervention is as cost effective as Vitamin A and zinc fortification, measles immunization, pneumonia case management and oral rehydration therapy**. Within India, the intervention was as cost effective as vaccination against measles and Hepatitis B. It is **more cost effective than vaccines against cholera, typhoid and rotavirus**. The study projected that implementing the program for 10 years across Uttar Pradesh would **prevent 16,918 maternal deaths and 119,646 neonatal deaths**. Articles with findings from the study are being published in peer-reviewed journals.

ABOUT REMIND

In 2011, CRS launched ReMiND in partnership with Vatsalya, a local nongovernment organization, and with Sarathi Development Foundation, a key implementing partner. Together, they began implementing the program in one block of Lucknow District.

The ReMiND program aims to strengthen the work of ASHAs, women trained to support maternal and child health within communities. ASHAs serve as a crucial link between the community and formal health system in Uttar Pradesh. ASHAs have been in place since 2007 as part of the state government's National Health Mission. Each ASHA serves a population of approximately 1,000.

In 2012, ReMiND began piloting and supporting the scale up of an ASHA mobile health application, developed by Dimagi Inc. In 2014, ReMiND introduced a complementary application to support ASHA supervisors in two districts. The aim of this intervention is to improve the way ASHAs work, and thereby improve maternal and child health in remote and vulnerable communities of Uttar Pradesh. Within Kaushambi District alone, ReMiND reached a population of 368,276 each year, including approximately 8,666 pregnant women and 7,636 infants under the age of 1.

The intervention's success is notable.

ASHA productivity improved significantly, most notably among low-performing ASHAs. In fact, low-performing ASHAs decreased from 62 to 19 percent of the workforce. Among beneficiaries, there was an increase in their awareness of pregnancy danger signs and delivery danger signs, especially among less educated women. Women were also 12 percent more likely to receive the recommended three antenatal visits, and consumption of iron-folic acid supplements increased by 13 percent. The quality of care provided by health facilities also improved, with women receiving a greater number of care components related to pregnancy, such as blood pressure checks and ultrasound.

To better understand this innovative approach and its success, USAID commissioned a study of the project's cost effectiveness to further gauge its impact and scalability through the government. This independent analysis assessed the cost per life saved and illness averted, as compared to routine services without the use of the mHealth application and accompanying project.



MATERNAL AND NEWBORN HEALTH IN INDIA

India continues to bear much of the world's burden of preventable child death. Each year, 1.4 million children under the age of 5 die preventable deaths in India. This accounts for 22 percent of all children who die worldwide before reaching the age of 5. Uttar Pradesh is one of the largest states in India, containing one-fifth of its population. It also bears some of the worst maternal and child health indicators, both in India and globally. Kaushambi District is a priority district, with high rates of maternal and child mortality.

Maternal Mortality in India: By the Numbers		
	Infant Mortality (per 1,000 live births)	Maternal Mortality (per 100,000 live births)
India	41	178
Uttar Pradesh	64	258
Kaushambi	80	283

Reference: Ministry of Health and Family Welfare Government of India, (2015): India National Family Health Survey (NFHS-4) 2014-15 Key Findings.

What is mHealth?

Mobile health, or mHealth, describes an intervention that uses mobile communication technology to achieve health goals. Common examples of mHealth include using mobile phones to disseminate health information, collect information or manage health systems.

mHealth in Action: The ReMiND Intervention

CRS joined forces with Dimagi, Inc., an American software social enterprise that develops technologies to improve service delivery in underserved communities. The program was designed to reduce maternal and infant mortality by using an innovative mHealth application to improve the quality of ASHAs' counseling, data collection and beneficiary prioritization. These improved community-level services are intended to generate more demand for antenatal care services and improve knowledge about risks during and after pregnancy, thereby increasing timely care, especially for complications during pregnancy, delivery and the neonatal period (see Figure 1).

FIGURE 1. THEORY OF CHANGE



The ASHA counseling app uses Dimagi Inc.'s CommCare platform to solve the performance and management issues faced by ASHAs and their supervisors, providing a way to access and share reproductive health information, and to collect key health data from pregnant women across the continuum of care.

The ASHA Counseling App in Action

- The process begins with a checklist of key health-promoting practices that ASHAs review with pregnant women to see which are being practiced and which are not.
- Once the checklist is complete, the app suggests three counseling topics relevant to each pregnant woman (according to her stage of pregnancy and current health behaviors). The ASHA selects the topics and presents them.
- ASHAs collect information, registering newly pregnant women and recommending further action for them.
- The app shares information through an encrypted cloud-based server so program managers can use the information for decision making and supervision.

WHAT IS COST EFFECTIVENESS ANALYSIS?

Cost effectiveness analysis evaluates the costs of a program and uses this analysis to calculate the cost per benefit gained from a program, such as the cost per life saved.

METHODOLOGY

Research Objective

This study measured ReMiND program costs to prevent each maternal and infant death, and how much it cost to prevent a life affected by disability. The impact of the program was evaluated by comparison to routine health services that do not use the mHealth intervention.

Measures

Cost effectiveness analysis involves a measurement of both costs and impacts.

Costs	Impacts
Implementation costs, and costs associated to changes in service utilization.	Maternal deaths prevented
	Neonatal deaths prevented
	Life Years Gained
	Disability Affected Life Years avoided

ANALYSIS

Breaking Down Each Cost

Researchers analyzed costs from the perspectives of both the health system and of society. Health system costs involve what is spent to implement the intervention—from its development, to the costs of providing more health care services to pregnant women and children as a result of improved use of services due to the intervention. Societal costs incurred are a result of changes in how health care services are used. These may come in the form of out-of-pocket payments by the patients, or the cost of transportation or wages lost in order to access the services. Researchers estimated costs from programmatic costs and pre-existing health center budgets.

KEY FINDINGS

How Much Will ReMiND Change Health Care Costs?

Less would be spent on curative care with the mHealth app intervention compared to the existing system, which does not use the intervention. This is a result of a reduction in illness during pregnancy or after child birth, and of an increase in preventive interventions used by pregnant women instructed by better-performing ASHAs.

Improved Health Consequences of the ReMiND App

As a result of the ReMiND mHealth intervention, researchers determined health improvements across pregnant women, new mothers and infants in the entire state of Uttar Pradesh, as compared to the control scenario, in which no intervention was used. They determined the following:

- A reduction of 16,918 maternal and 119,646 neonatal deaths during the 10 year period
- A 7.6 percent reduction in maternal illness during pregnancy
- 4.3 percent fewer cases of neonatal illness
- An increase in 2,209,837 life years would be accrued across the program's beneficiaries: women in their child bearing years, and their children across Uttar Pradesh, through the 10 year period
- A reduction of 3,971,317 DALYs within the same population and time period

Cost Effectiveness

The researchers found the ReMiND mHealth app intervention to be very cost effective. The intervention incurs an incremental cost of \$96, or 6078 Indian rupees, per DALY averted. The cost is \$2,792, or 176,752 Indian rupees, per death averted.

The World Health Organization considers interventions in low and middle income countries to be “very cost effective” if they have an incremental cost per DALY averted that is less than the per capita GDP. Interventions that are three times the GDP per capita are considered “cost effective.” These parameters are crucial to support the scale up of effective programs when working with local authorities.

Implications for Maternal and Child Health in India

mHealth is a relatively new concept that is only now picking up steam as evidence builds showing its impact and effectiveness. Studies like this one will help other governments to replicate its use and impact.

Valuing the Consequences of the Intervention

To measure the impact of the health interventions, the independent study team modeled the effect of increased use of health care services on the reduction of illnesses or complications, both during pregnancy and after child birth. This resulted in two important indicators for this study: the prevention of deaths, and the avoidance of disability that accompanies complications at birth for both mothers and children. These improvements in health, and reductions in maternal and infant deaths, prevent premature mortality and years lived with disability. In economic terms, this is referred to as Years of Life Lost (YLL) and Disability Adjusted Life Years (DALYs).

Disability Adjusted Life Years

DALYs are a measure of the overall burden of disease and morbidity on a population that is commonly used in public health. They are used to calculate YLL from premature death, years lived with disease or years lived with disability. The weighted figure combines measures for:

- Life expectancy
- Value of life at different ages
- Value of future time
- Disability weights*
- The value of avoiding future disability

* A disability weight is a weight factor that reflects the severity of the disease on a scale from 0 (perfect health) to 1 (equivalent to death). (Source: World Health Organization)

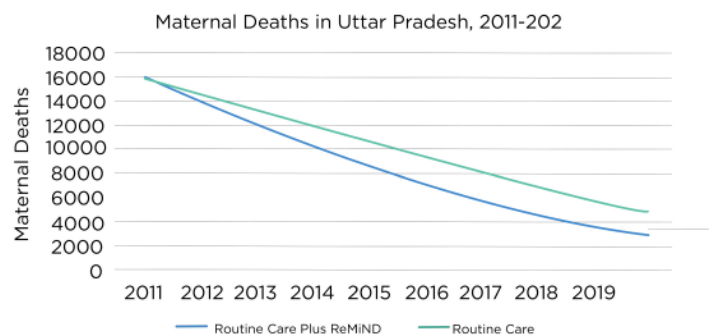
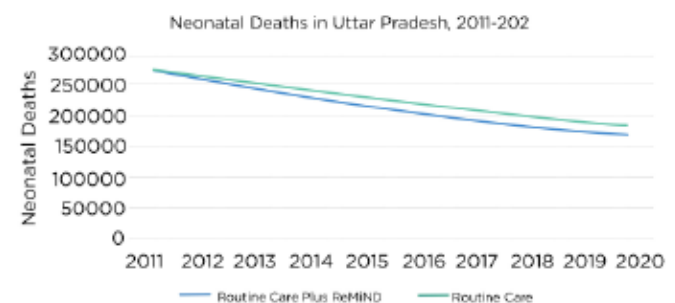


Figure 2. Reductions in Maternal (a) and Neonatal Deaths (b) from 2011-2020.



What Do These Numbers Mean?

Researchers compared the findings of this study to a number of key public health interventions, for which the cost effectiveness has been estimated. **The study found that ReMiND interventions are as cost effective as Vitamin A and zinc fortification, measles immunization, pneumonia case management and oral rehydration therapy. Within India, the intervention is as cost effective as vaccination against measles and Hepatitis B. It is even more cost effective than vaccines against cholera, typhoid and rotavirus.**

THROUGH THE EYES OF AN ASHA: MEET SUNITA

“Women go through much suffering in their life. They don’t know the proper foods to eat, or when to go to checkups during their pregnancy. In Kaushambi, families say that pregnant women should work harder so their delivery happens sooner. They don’t even know that they should rest. Together, this is causing one of the greatest problems affecting women’s health.

I have been involved in community service since I was a student. I’m happiest when I am helping others. As an ASHA, I support 220 households in my area and make 4 to 5 home visits per day. And since joining the ReMiND project, my work has become more focused on maternal and child health, and I have learned so much more about this important topic.



Jennifer Hardy/CRS

This maternal and child health application has been such an improvement to the way I do my work. You need a medium to tell people. When I show pictures and videos, my clients understand information much better. Mere verbal information does not have credibility or authority. For example, only four out of 10 women I serve would show up at vaccination sessions before the app. Since I started using it, all the women from the village come to get their children vaccinated. They don’t even need to be reminded.

The app is also great for convincing women they should deliver their babies outside their home, in health centers. Before, they were skeptical and I was not well equipped to change their behavior. Since I started using this app, they understand more deeply about this issue. Now the mother is safe, her child is safe and she will have a safe delivery.

When I started working as an ASHA, I didn’t have much knowledge or the tools to help communicate what I did know. Since I joined the ReMiND project, I am able to do so much more. One day, I envision that all the women in my village will have all the information they need.”

Sunita Prajapati has been an ASHA in India’s most populous state of Uttar Pradesh for the last 8 years.

ABOUT CRS

Catholic Relief Services (CRS) is the official international humanitarian agency of the Catholic community in the United States. CRS saves, protects and transforms lives in more than 100 countries, serving more than 121 million people, without regard to race, religion or nationality. CRS’ relief and development work is accomplished through programs of emergency response, HIV, health, agriculture, education, microfinance and peacebuilding.

CRS in India

In 1946, CRS first arrived in India to help people affected by World War II. In response to natural disasters, hunger and other needs in India, CRS expanded its work with local partners, including long-time collaboration with Mother Teresa’s Missionaries of Charity. CRS has worked with local partners across India to improve food security, help families recover from disasters, improve health conditions and protect vulnerable children.

CRS continues to work with partners in India to address issues of poverty, access to resources and living conditions among vulnerable and marginalized groups. Currently, CRS in India collaborates with more than 30 local partners to work with vulnerable and marginalized populations, strengthening agriculture livelihoods, improving health systems and service delivery, supporting communities to prepare for and recover from disasters, and reducing trafficking and sexual and gender-based violence. CRS is supported by both private contributions and funding from institutional donors.

CRS in India: By the Numbers

- Since 1946, CRS has worked in 20 states and two union territories in India. CRS’ current development programs are in seven states and support emergency programs in other states as needed.
- In 2016, CRS reached more than 1 million beneficiaries in India.
- Currently, CRS implements 24 programs in India.



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