

**Scaling the Maternal and Neonatal Survival Initiatives (MANSI) program in low resource settings**

by

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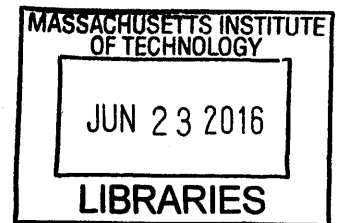
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## ABSTRACT

The Maternal Mortality Ratio (MMR) and Infant Mortality Rate (IMR) are very high in parts of rural India when compared to other developing and developed countries. To address these high rates the World Health Organization (WHO) set up Millennium Development Goals (MDG) for each country to reach by 2015. These goals prompted many national and international organizations to focus on programs to reduce IMR and MMR in the recent years.

The Maternal and Newborn Survival Initiative (MANSI) is a successful field-tested approach for addressing widespread and persistent problems with high MMR and IMR. Implemented in the Seraikela area of Jharkhand state in India, it has achieved a 32.7% reduction in neonatal mortality, 26.5% reduction in IMR and 50% increase in hospital births. The MANSI program was implemented in 2009 by a public and private partnership (PPP) between American India Foundation (AIF), Tata Steel Rural Development Society (TSRDS), Society for Education, Action and Research in Community Health (SEARCH) and the Government's Department of Health & Family Welfare in the Seraikela area 38 km from the headquarters of Tata Steel. If this program could be replicated or scaled in other similar resource-constrained areas, the MMR and IMR in those areas could be reduced as well.

However, the MANSI program was developed with a unique PPP pilot program in an area where TSRDS has other programs to improve the quality of life of the residents and thereby enjoys the community's trust and support. This thesis investigates whether this program can be replicated or scaled elsewhere, within or outside the TSRDS area of influence, where it is desperately needed as either the same pilot program implemented in Seraikela or a modified one.

Analysis of the MANSI system and process demonstrates that this program can be scaled or replicated if the implementers choose partners with similar goals, follow the MANSI system architecture, adapt the system design to local traditional practices and establish trust and accountability with the local citizens. Further, maternal and child health policy implementations by the local government will facilitate the improvement of IMR and MMR.

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## CHAPTER 1: INTRODUCTION

IMR (measured per 1000 live births) and MMR (the ratio of the number of maternal deaths during a given time period per 100,000 live births during the same time-period) are widely considered as key indicators of health services, nutrition, poverty and education levels in a country or region. India, despite being one of the fastest growing economies, still lags behind the global IMR and MMR levels.

The World Economic Forum ranks India, as among the lowest in gender equality in health and survival in 2014, 141 in a list of 142 countries, only above Armenia (“Global Gender Gap Report 2014 - Reports - World Economic Forum,” n.d.). India accounts for the largest number of maternal deaths in the world, an estimated 70,000 deaths of new mothers in each year. Of these, almost half are caused by hemorrhage or excessive bleeding (30%) and sepsis or infection (16%), which can be reduced through effective obstetric primary care facilities (“Mother and child: Survival not guaranteed - The Times of India,” n.d.). Despite the Janani Suraksha Yojana (JSY) program, a scheme started by the Indian government to boost institutional deliveries, just 47% of the deliveries are in hospitals or other healthcare facilities. More than half still take place at home, of which only about 5% are assisted by skilled health personnel. Impediments to health care are directly attributable to the low status of women in society. There is inadequate female knowledge or autonomy to maintain good health and reproductive control. Marriage of young girls and nonuse of contraception further cause gender-specific health vulnerabilities like maternal morbidity and mortality. India has a low life expectancy (66 years in India vs. 78.8 years in the US), high maternal mortality ratios (~190 per 100,000 in India vs. ~28 per 100,000 in the US) and high infant mortality rates (46 per 1,000 in India vs. 7 per 1,000 in the US) in 2014 (World Health Organization, 2013).

Many Maternal and Child Health (MCH) programs aimed at improving IMR and MMR have been implemented globally. Chapter Two of this thesis discusses the MCH programs published in recent years to compare and contrast them and to understand their successes and shortcomings. Chapter Three starts out with details about the specific region where the MANSI program was implemented by describing the characteristic traditional birthing and maternal practices in the Seraikela Kharsawan district, the history and setup of the Sahiya program of community health workers, and the features of the MANSI program. Chapter Four analyzes the MANSI program in detail from a public health and a systems perspective to understand how all

the different parts in the system architecture, design and management functioned together. Chapter Five discusses the long-term sustainability, scalability and replicability of the program including a system dynamics model for demonstrating the resources needed for viability. The last chapter summarizes the findings, and makes systems and policy recommendations for scaling or replicating the MCH program.

## CHAPTER 2: LITERATURE REVIEW

The WHO as well as countries track IMR and MMR regularly to measure how well programs are being adopted. Studies of preventive and curative services have found that the use of health services is related to the availability, quality and cost of services, as well as social structure including women's autonomy, health beliefs, and personal characteristics of the users (Srivastava, Mahmood, Mishra, & Shrotriya, 2014). This chapter discusses some of the MCH programs conducted by the government, corporate and nonprofit organizations around the world and their outcomes.

### Reducing IMR and MMR in countries around the world

The infant mortality rate is a count of deaths of infants under one year of age per 1000 live births in one year. The majority of all infant or neonate (child under 28 days of age) deaths, about 75%, occur in the first week of life. The main causes of neonate deaths are low birth weight, infections, asphyxia, and birth trauma and take place in countries where access to health care is low. Up to two-thirds of newborn deaths can be prevented if skilled health workers perform effective health measures at birth and during the first week of life. While the IMR in most countries and regions has been decreasing over the last 25 years as seen in Figure 1 below, the rate in the South East Asia region as a whole is 34 (per 1000 live births) compared to the IMR in the Americas which is 12.5 and in Europe which is 9.8 in 2015. The IMR in India in 2015 is 27.7 (World Health Organization, 2013), more than double that of Europe or the Americas and about 18 points higher in rural areas as in urban ones.

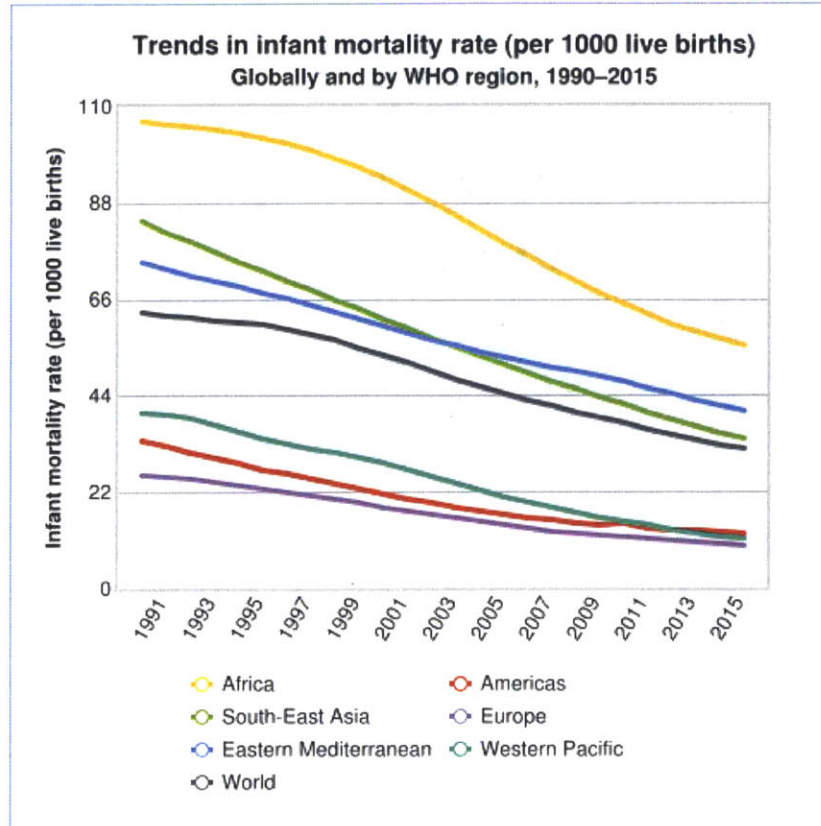


Figure 1: Trends in Infant Mortality Rate (Global Health Observatory, n.d.)

Maternal mortality ratios have also been decreasing around the world as shown in Figure 2 below. The MMR in India was 190 (per 100,000 live births) in 2013 down from 560 in 1990. Almost all (99%) of maternal deaths occur in developing countries where the MMR is 230 reflecting the inequities in access to health services and highlighting the gaps between the rich and poor. Most of the maternal deaths are due to lack of access to skilled routine and emergency care and are caused by hemorrhage, pre-eclampsia, infection, obstructed labor, delay in seeking care for a complication, delay in reaching a health care facility and delay in obtaining the essential care at the health facility (World Health Organisation, 2013). Maternal cases that result in deaths in the poorer states of rural India, where healthcare access is low, are more likely to seek consultation among the community whereas maternal cases that result in deaths in the richer states are more likely to travel to or already be at a healthcare facility.

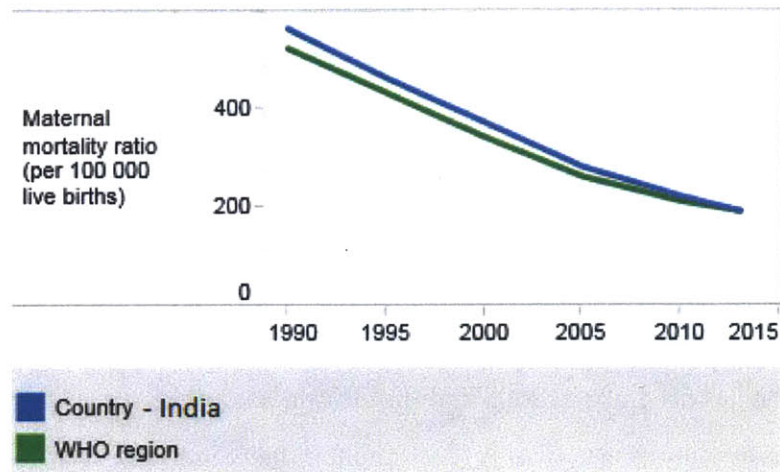


Figure 2: Trends in Maternal Mortality Ratio in India vs. WHO region of South-East Asia, (“ind.pdf,” n.d.)

The WHO Millennium Development Goals (MDG) 4 and 5 specifically target reducing infant mortality and improving maternal health respectively and established goals for each country to reach by 2015. The target for MDG 4 was to reduce under five mortality rate by two thirds from 1990 to 2015. Since 55% of the under five deaths in India are among newborn infants, this thesis focusses on improving neonatal outcomes. The target for MDG 5a was to reduce the MMR by three quarters from the 1990 rate by 2015. For India, since the MMR in 1990 was 560 (per 100,000 live births), the target for 2015 is 140. The data from 2013 shows the MMR is at 190 and not likely to meet the MDG 5a target by 2015. The WHO also published home based prevention strategies for reducing IMR through visits by a skilled health worker to promote exclusive breastfeeding, keeping the infant warm, and hygienic umbilical cord and skin care, identifying health problems and high risk infants, and encouraging early vaccinations. With the WHO’s MDG goals and strategies in mind, organizations dedicated to Maternal and Child Health (MCH) have implemented different programs to reduce MMR and IMR around the globe.

Literature on MCH programs in many parts of the world were reviewed for this thesis. The outcomes and lessons learned from USA, Sub-Saharan Africa, Pakistan, India, Nepal, Vietnam and Australia are listed here. USA and Australia have low rates of IMR and MMR within the WHO guidelines whereas all the other countries listed above have been tasked with achieving MDG 4 and 5 by 2015. In the US, the MMR went up in the years 1990-2013 from 10 to 18 due to the pregnant women being overweight, increased complications of being over 35 years old and

chronic health conditions due to diabetes and hypertension (Maron, 2015). Sub-Saharan African countries have persistently high levels of MMR and IMR due to a range of biological and social determinants like the HIV/AIDS epidemic and civil war (Sartorius, Sartorius, Chirwa, & Fonn, 2011) and are not expected to achieve MDG 4 and 5. A MCH program in the upper east region of Ghana has been relatively successful and found that community engagement has been the single most important factor in scaling up the Community Health Planning and Service program (Awoonor-Williams et al., 2013). The government of Pakistan created the Maternal, Newborn and Child Health (MNCH) program in 2005 and introduced a new cadre of community health workers called community midwives (CMW) recognizing that community participation is necessary for achieving health service sustainability as a means of cost effectiveness and as a community empowerment tool. The program is performing sub-optimally due to limited community participation, less integration between the MNCH program and the government health facilities, unclear roles of the community-based workers, and political interference. Hence Pakistan is unlikely to meet MDG 4 and 5 (“WHO EMRO | Community participation eludes Pakistan’s maternal, newborn and child health programme | Volume 20, issue 1 | EMHJ volume 20, 2014,” n.d.). A MCH study in India found that geographic regions that were underprivileged in wealth or female literacy were also likely to be disadvantaged in terms of infant and child survival irrespective of the state to which they belong (Singh, Pathak, Chauhan, & Pan, 2011). Government and NGO programs in Nepal worked towards fertility declines, societal changes and enhancing both supply and demand for maternal care and have reduced the IMR and MMR so that the country is on track to meeting the WHO goals (“IRIN Asia | Analysis: Nepal’s maternal mortality decline paradox | Nepal | Gender Issues | Health & Nutrition,” n.d.). Vietnam is on track to reaching its MDG 4 and 5 targets by implementing the Health Care Fund in 2003 to increase access to healthcare for the poor and implementing 56 different interventions to improve outcomes (Axelson, Gerdtham, Ekman, Hoa, & Alfvén, 2012). In Australia the MCH program focused on maternal and child health of migrant women and concluded that culturally competent interventions were needed to address health and lifestyle needs of the migrant women. (Renzaho & Oldroyd, 2014). Each region and country has unique challenges in reducing IMR and MMR and therefore focusses on appropriate MCH interventions. This makes it difficult to compare programs across countries.

## Reducing IMR and MMR in India

In 2004 the IMR in rural India was 24 points behind the urban rate. To improve this and other health indicators in rural India, the central government formed the National Rural Health Mission (NRHM) in 2005. NRHM aims to improve the daily living conditions and tackle the inequitable distribution of power, money, and resources by strengthening the health system through a three-pronged strategy by promoting Fair Financing for Greater Equity, Decentralized Planning to Enable States to Address Local Priorities, and promoting gender equity by Increasing Women's Access to Health Services (Prasad, Chakraborty, Yadav, & Bhatia, 2013). The NRHM introduced Accredited Social Health Activist (ASHA) workers in 2005 to improve utilization of healthcare services at the peripheral level. For every 1000 rural population, one volunteer ASHA was selected and trained in MCH management among other health interventions. Despite the training given to ASHAs, gaps still exist in their knowledge regarding various aspects of child health morbidity (Shrivastava & Shrivastava, 2012). All of the ASHAs belonged to the local community and acted as an effective link people in the delivery of health services and awareness. It was found that approximately 50% of the ASHA workers were below the age of 25 years, contrary to the fact that as per guidelines, ASHAs should be in the 25-45 years age group. Also, 67 (45.9%) of the ASHAs were educated below a secondary school level despite the requirement that ASHAs be educated to at least an 8th class standard. This could be because of low levels of literacy in the local area and a non-availability of educated women. There are also gaps in supervision and support of the ASHAs resulting in low coverage of Maternal, Neonatal and Child Health (MNCH) services and care received especially for complicated cases (Modi et al., 2015). In order to achieve the required level of reduction in maternal and infant mortality, a scheme called Janani Suraksha Yojana (JSY) or Safe Motherhood Scheme was launched in 2005 by the Indian government. Under JSY, each eligible woman is tracked from the time of her pregnancy and care is provided to her on a continuous basis. Every pregnant woman registered under the scheme receives at least three ante-natal check-ups including tetanus toxoid injections and IFA (iron, folic acid) tablets during the course of her pregnancy. During these interactions, she is encouraged by the health personnel to deliver in a health institution. One of the poorer states in India, Jharkhand, is the only state registering a decline in institutional births between the last two rounds of District Level Household Survey (DLHS-2 in 2002 and DHLS-3 in 2007). It also has some of the highest maternal mortality figures along with high proportions of tribal

populations, undernutrition and chronic poverty. The Government of Jharkhand initiated the Mukhya Mantri Janani Shishu Swasthya Abhiyan (MMJSSA) program, a derivative of the JSY, in 2006. Under the scheme, a cash assistance of ₹1400 is given to all pregnant women who give birth in public health facilities and at accredited private institutions, and ₹500 for all births at home (Arora et al., 2011). NRHM also incorporated Home Based Neonatal Care (HBNC) pioneered by the Society for Education, Action and Research in Community Health (SEARCH) into the ASHA training in 2007. The Auxiliary Nurse Midwife (ANM) program in India started in 1960. For every 5000 population an ANM was appointed to conduct pre and ante-natal checkups, family planning services and prescribe folic acid and calcium tablets for the pregnant woman, and immunization for babies. There was a lack of monitoring of ASHA's home visits by ANMs (Sinha et al.). In 1975, Anganwadi workers (AWW) were appointed to be responsible for child nutrition, growth and weight and nutrition and health education for pregnant women (Fotso, Higgins-Steele, & Mohanty, 2015). In 2007, NRHM started the Village Health and Nutrition day (VHND) to deliver healthcare services at the village level. However, there is a significant lack of awareness and practice among the blocks in a district (Saxena, Kumar, Kumari, Nath, & Pal, 2015). The most recent Annual Health Survey (AHS) from 2010-11 unfortunately still shows a high MMR at 278 and IMR at 45 for rural areas and 26 for urban.

CARE is a Non-Governmental Organization (NGO) that has been running MCH programs for over 60 years in India. Their focus has been empowerment of women and girls in poor and marginalized communities leading to improvement in their lives and livelihood. The CARE organization partner with local government or NGO organizations who know the cultural, political and social context to promote essential newborn care and immunization, reduce malnutrition, prevent infant and maternal deaths and protect those affected by or susceptible to HIV/ AIDS and TB. They have been involved since 2010 in a capacity building of Self Help Groups (SHGs) and Village Health and Nutrition Committees (VHSNCs) program and the Community Health Care Management Initiative (CHCMI) program, towards mobilization of community people in accessing health services, especially maternal and child health. Even though 88% of the groups conduct meetings on a monthly basis, only 6% of the SHGs discuss health issues in the meetings ("NGO in India - Women & Girls Health, Education, Empowerment | CARE India," n.d.).



The United States Agency for International Development (USAID) recently concluded a five-year Maternal and Child Health Integrated Program (MCHIP) from 2009 through 2014 instrumental in the establishment of five National Nodal Centers of Excellence for nursing and midwifery education across the country. MCHIP initiated postpartum family planning services in 117 facilities, provided essential newborn care to 21,030 newborns, and immunized 20 million children with the final dose of diphtheria, pertussis, and tetanus (DPT-3), which is a vital gauge of how well countries are providing immunization coverage for their children. During its first three years MCHIP India worked with a number of national programs to: (1) revitalize family planning, (2) reform and strengthen pre-service education for nurses and midwives working through the India Nursing Council; (3) strengthen routine immunization services and support national disease control efforts by working with the Universal Immunization Program, and (4) strengthen the national Navjaat Shishu Suraksha Karyakram (National Newborn Care and Resuscitation Initiative, or NSSK) program to develop a package of interventions to improve MCH in government health facilities.

The Bill and Melinda Gates (BMG) foundation funds MCH programs exclusively in the states of Bihar and Uttar Pradesh. In 2010 BMG and the Government of Bihar (GoB), one of India's largest and poorest states, partnered to create the Ananya program which supports many interventions including MCH. The MCH program is called Integrated Family Health Initiative (IFHI) and is being implemented as a partnership with the CARE organization. IFHI's objective is to support the GoB in increasing the universal coverage and quality of life from conception to the child's second birthday by implementing interventions to improve the health and survival of women, newborns and children during the first 1,000 days of life ("Bihar Project Summary\_2014 - FINAL\_Project\_Summary\_IFHI.pdf," n.d.). The interventions include front line workers working together to meet team based goals and objectives. Teams that reached their annual targets get certificates awarded and signed by the district magistrate. Teams that reached their quarterly targets were given non-monetary incentives like clothes or kitchen stoves. The Manthan project also funded by the BMG foundation supplied mSakhi a mobile phone based multimedia job aid to ASHA's to help overcome significant operational challenges in conducting routine MNCH activities and keeping their skills updated (Pradesh, Asha, Project, & Play, 2013).

The data available for IMR and MMR numbers in India vary depending on the organization's methods of collecting it and the area surveyed. A number of official surveys by the Indian Government have been taken to assess the effect of health programs. The DLHS, AHS and NHFS (National Family Health Survey) have been conducted every few years to study fertility, mortality, maternal and child health, family welfare and many process indicators by urban/rural residence. The last of these surveys, AHS, was conducted in the years 2010-2011. The next official survey, NHFS, is scheduled for 2014-2015 and the report will give an update to the success of the health interventions in recent years.

While the MCH programs in India have made great progress in the last few years greatly reducing the IMR and MMR there are many improvements that can be made. To improve IMR and MMR in India health awareness and demand, and education and re-training of health workers, needs to be improved. The NRHM programs can be better monitored and supported so that the existing schemes have a greater utilization. Community based programs with public recognition for successes, and more accessible, sustainable and low cost solutions need to be implemented throughout the country in both urban and rural areas. Involvement of the men in the community in MCH programs could help improve the efficacy. Focus on interstate and intrastate migrants as they are transitory and difficult to keep track of can be developed. Another indicator to monitor is the skewed female and child sex ratio which is spreading from urban into rural areas. Every effort needs to be made to include people living in remote terrains as well as marginalized members of society in the MCH programs. Factors that affect MMR namely malaria, HIV/AIDS, TB or hemorrhage need to be addressed at a community level. Many MCH program utilization issues can be alleviated as mobile technology becomes more ubiquitous in all parts of India and therefore needs to be incorporated into the MCH programs. Finally we need an MCH program which is scalable and replicable in other parts of the world, with high IMR and MMR, while catering to the individual cultures of each community.

The next chapter is devoted to describing the Maternal and Neonatal Survival Initiatives (MANSI) program implemented as a Public Private Partnership (PPP) with the Government of Jharkhand, SEARCH, America India Foundation (AIF) and Tata Steel Rural Development Society (TSRDS) in the Seraikela region of Jharkhand state in India.

### CHAPTER 3: DESCRIPTION OF THE MANSI PROGRAM

This chapter begins with a background about Seraikela district, the local cultural practices that engendered high IMR and MMR, the local government healthcare facilities and the role played by the Sahiyas before moving on to details of the implementation of the Maternal and Neonatal Survival Initiatives (MANSI) program. The description of the MANSI pilot program, implemented in the Seraikela block of Jharkhand state in India is comprehensive as the program has not been published before.

#### Seraikela Kharsawan District block

The governing structure in India is set up so that the country is divided into states which are subdivided into divisions that are further divided into blocks. Blocks are made up of villages where 10-12 villages together are governed by a Panchayat made up of elected representative which is the cornerstone of a local self-government organization. The Seraikela block is part of the Seraikela Kharsawan district (Kolhan division) as seen in the map in

Figure 3 below and has a culturally diverse population of 83,000 consisting of half tribal and half non-tribal residents speaking many languages including Hindi, Bengali, Santali, Ho and Oriya. The block is made up of 14 panchayats. The residents are poor and lagging in education, health, and infrastructure. In the last DHLS-3 in 2007-2008, before MANSI started, the MMR was 245 and IMR was 60 in Kolhan division.

# Map of India, Jharkhand districts, and MANSI Zones

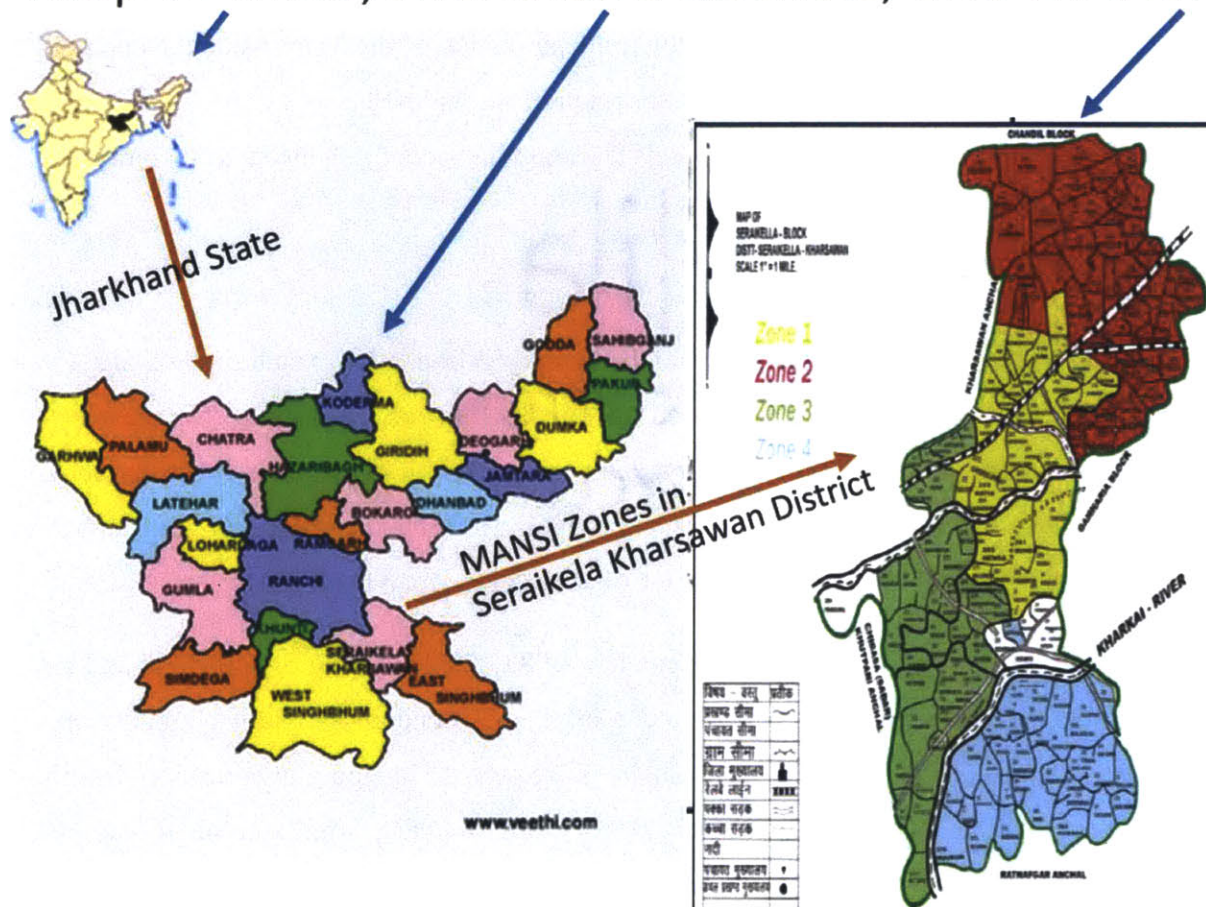


Figure 3: Map showing India, Jharkhand districts and MANSI Zones

## Local cultural health practices

The local culture is diverse adopting different types of healthcare practices that needed to be overcome in order to improve MMR and IMR. The primary need in some of the households is food and healthcare is much lower on their priorities after their secondary needs to take care of their animals, and to devote time to local traditions, worship and festivals. According to local traditions, in some households, the pregnancy is not disclosed until the woman is visibly showing in the 5-6 month and the awareness of antenatal care is low. Sometimes the pregnant woman is not allowed outside the home for fear of the evil eye falling on her. In some homes, a pregnant woman is not allowed to eat much or take supplements (iron or folic acid tablets) as the belief is

that the baby will grow too big to be born naturally or the woman will grow so overweight as to squeeze the baby inside. Some communities believe that breaking an egg will cause a miscarriage so pregnant women are not allowed to eat eggs. These intake restrictions often lead to severe anemia in the pregnant woman. By tradition, the birth is conducted at home usually in the cattle shed which is not hygienic. The young mother is not given any food to eat for 3-5 days after the birth of the baby which makes her weak and susceptible to infections. The newborn is usually bathed immediately and kept uncovered which disposes the child to pneumonia. The umbilical cord is cut with the nearest available sickle which exposes both the mother and baby to sepsis. The newborn baby is usually given honey or goat's milk but not breast fed thereby increasing its mortality risk especially if it is a low birth weight baby. The young women in the village are normally dominated by their mother-in-law and do not have a say in their day-to-day activities. Education and peer pressure is typically needed to help the family break from traditional practices and embrace healthier options.

#### Local government health facilities

The nearest government health facility is usually a local health subcenter which supports up to 5,000 area residents (2-3 villages) whereas a Primary Healthcare Center (PHC) supports 25,000 to 30,000 area residents (consisting of one panchayat made up of 10-12 villages). Most villagers do not have a means of transportation, though some have bicycles if their work takes them to other villages, so bringing a sick person to the local subcenter or PHC is difficult. The local subcenter runs in the daytime and can support a delivery during the day but if the delivery is after hours the pregnant woman is sent to the nearest 24x7 PHC. The ASHA and JSY programs by the government, described in an earlier chapter provide financial incentives to both the pregnant woman and the Sahiya if the delivery is at the hospital. The JSY program also supports the Mamata Vahan (Ambulance) to take the pregnant woman to the hospital for delivery or any other complications. Every panchayat has a provision for two vehicles so if one is in use then the other one is in standby. However 80% of births took place at home in 2007-2008. The Mamata Vahan program worked well for a time but the program is insufficiently funded which causes delays in getting the pregnant woman or sick child to the nearest government health facility. In many cases, the families of the local community seem unaware of the healthcare facilities available to them, from the government, at no cost. Another factor that plays into the high mortality rates is the lack of trust and accountability between the rural and poorer population and

the public health services. If the new mother or baby is not doing well at the PHC, they are often referred to another healthcare facility in order to keep the mortality rates of the particular PHC low. New mothers would like respect and care at the healthcare facility and these are often lacking in the government run facilities. Medicines offered at the public healthcare clinics are frequently not effective. In order to improve access to health services, within the low resource constraints, a community based program was started by the government.

#### Sahiya Program

Since the rural communities do not have access, trust or awareness to 24x7 healthcare it is essential to have someone in the community for the mother to reach out to in early identification and treatment of any sort of problem in a newborn. The government of Jharkhand started the Sahiya program in 2006 to improve access to healthcare for the community and trained Sahiyas on various MCH modules. The population of each village is less than 2000 and one Sahiya (same as ASHA described in chapter 2) is appointed per 1000 people. Selection of Sahiyas was done by the panchayat based on the interest of the woman wanting to be a Sahiya and her education level. After the training, Sahiyas collected information about the number of pregnant women in their assigned area, counselled the pregnant women about attending their three antenatal checkups and taking their daily supplements, and advised the pregnant women about delivering in the hospital. The data collected by the Sahiya was transmitted to the local government District Program Coordinator (DPC). Outside each Sahiya's house is a panel similar to the one below in Figure 4 below announcing her status as a Sahiya and listing her mobile phone number as well as the number of the Mamata Vahan (Ambulance). A new Sahiya Saathi program was started in 2011 by the Jharkhand government. One Sahiya Saathi was chosen out of her peers, based on performance, to manage 1-15 other Sahiyas as well as continue to be the Sahiya for her village.



Figure 4: Picture of the Sahiya's and Ambulance phone number

After the government training, the Sahiyas didn't have much trust or support in the community or from the government and continued being dominated by their mother-in-law or the local ANMs. The Sahiyas did not have a means of treating high risk cases and were taught to encourage them to go to the nearest healthcare facility. While the Sahiyas were trained to be the first line access for the rural village community's MCH needs, their effectiveness needed to be improved with better training, support, empowerment, monitoring and consistent high quality supplies in order to achieve better MMR and IMR outcomes.

#### Partnerships in the MANSI program

Tata Steel Rural Development Society (TSRDS), started in 1979 and located in Jamshedpur, is a division of Tata Steel implementing corporate social responsibility (CSR) programs in the areas around the company's mines and collieries to improve the quality of life of the residents in the area. As the chief of CSR at Tata Steel, Biren Bhuta, put it "What is good for the society is good for the business" ("Collated Interviews," n.d.). TSRDS works on projects that a) have impact b) be scalable and replicable; work with like-minded partners c) affirmative action - the benefits reach out to the most disadvantaged and poor and the ones who cannot reach out themselves d) incorporates social innovation e) involves the Tata steel employee ecosystem as a whole and f) improves communication. About 80% of the residents of the Seraikela district have been

beneficiaries of TSRDS programs in agriculture, capacity building, cultural awareness and education and the Tata Steel brand name is well known. There are other non-profit organizations in the area implementing social programs. However TSRDS has been consistently providing high quality and a wide range of social responsibility programs over long periods of time so the community has built a positive image of their services. The social barriers to acceptance for any new programs is relatively lower for TSRDS than any other NGO or corporation in the area. In partners, TSRDS looks for multilateral agencies that can bring in funds and expertise and complement TSRDS's strengths.

The American India Foundation (AIF) is a philanthropic organization, founded in the U.S.A in 2001, and dedicated to building a lasting bridge between the U.S.A and India by disrupting poverty and catalyzing social and economic change in India. They have implemented programs in education, livelihoods, public health, leadership and gender focus for the socially and economically vulnerable people of India. AIF looks for implementing partners with existing infrastructure and social programs on the ground and awareness of the local political and socio-economic alignments. The organization considered funding a program in the empowered action group states of India (Bihar, Jharkhand, Uttar Pradesh, Uttarakhand, Madhya Pradesh, Chhattisgarh, Orissa, Rajasthan and Assam) which have the highest IMR and MMR. AIF was also looking for private partners with ethics and commitment to assist the government in implementing a program. As Charu Johri, director of Public Health at AIF put it "The PPP model with a globally renowned technical program was a goal" ("Collated Interviews," n.d.). A Public Private Partnership (PPP) model with a strong implementation and a renowned technical partner would be ideal to AIF.

In 2009 the partners AIF and TSRDS, with a common vision and objectives, allied to start an MCH program in one block in Seraikela district. The IMR and MMR were high and TSRDS planned to construct a Greenfield plant in the area so both parties were interested in implementing a MCH program here. The community based program was named Maternal and Neonatal Survival Initiative (MANSI) and was designed to be a monitoring based program rather than a charity based one. As a first step, the program started 30 mobile clinics in the Seraikela block providing free MCH clinical services including diagnostic tests and medicines while also increasing awareness of the MANSI program. SEARCH had experience implementing HBNC at



a community and research level and was brought in as a technical partner. The three partners agreed on the deliverables for the MANSI program using evidence based SEARCH technology which had shown impact in Gadchiroli. They worked with the fourth partner, the Government of Jharkhand, to get approvals for the different MANSI activities. The government was skeptical of the MANSI program at first and it took many months to get approval and support. The partners formed a PPP to harness the expertise and efficiencies from the NGO and private sector to improve MCH services traditionally delivered by the public sector.

#### MANSI program

The MANSI program involves training, empowering, supporting and monitoring the Sahiyas to be able to perform their MCH duties with efficacy and confidence thereby improving MMR and IMR outcomes in the rural areas. A Maternal and Neonatal Health Mobilizer (MNHM), from the area who knew the local language and customs, was appointed for a cluster of 15-20 villages to train, support and monitor the Sahiyas. The block was divided into four zones as shown in Figure 3 above and a Zonal Coordinator (ZC) was setup to manage every five MNHM's in a zone. A Field Coordinator (FC) managed the Seraikela field office as well served as a liaison between the ZC and the TSRDS and AIF program managers. The MANSI staff interacted with the government health authorities at different levels, to inform or get approval, depending on the activities planned. The MANSI pilot program catered to a population of 83,000 with 167 villages and 196 Sahiyas and had 24 people on board to manage the area (19 MNHMs + 4 ZCs + 1 FC). The program organizational structure can be seen in Figure 5 below. The Sahiyas are all female, the MNHMs were 80% female and 20% male, while the ZCs were mostly male and the FC and program managers were male. Since the MNHMs have to travel around a lot from village to village, the MANSI program had difficulty in getting female MNHMs. The MNHMs interacted with the Sahiyas and pregnant women on a regular basis so there were early society concerns, since the MNHMs were male, which went away as trust in the MANSI program grew. The MNHMs were given a bicycle to travel to visit the field office, Sahiyas or high risk babies. The ZCs were also HBNC trainers, usually master trainers, and were given motorcycles because they had a larger area to cover as they supervised 5-6 MNHMs. The one female ZC was given a motorized scooter. The program did not provide cell phones to the staff and they instead got cell phone minutes. Since the MANSI program was a pilot program, there was a lot of micro

management to make sure that the plan was executed all the way at the village level.

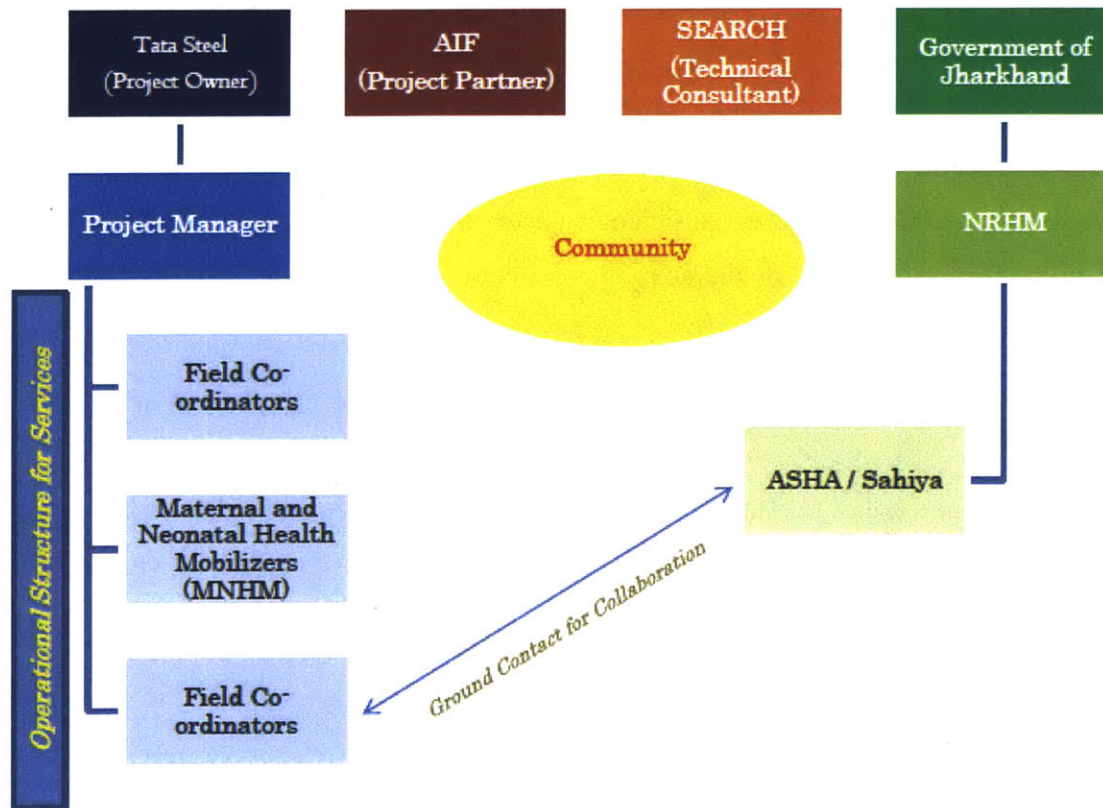


Figure 5: MANSI organizational structure(Initiative & Lives, n.d.)

In order to design the appropriate training, capacity building, demand generation, behavior changes, supply management and advocacy levels in the MANSI program first a knowledge and skill assessment was completed for the community and each Sahiya. The community health facilities were assessed in terms of availability of healthcare providers and equipment. The quality and availability of supplies was evaluated. The community was assessed on their Knowledge, Attitude, and Practices (KAP) to understand their perception and current practices regarding mother and child care and finally a VRS (Vital Rate Survey) was conducted to record population levels. The Sahiyas skills and knowledge was evaluated. These assessments help the MANSI organization understand issues in the community namely cultural stigmas, barriers to adoption, discrimination, access related issues and what the community feels about government services

A number of community meetings were held to increase awareness of the MANSI program, demand for better health services in the area and disseminate information to the community. The community meetings were focused on the community as a whole and not only on the women and attended by the Mukhia (head of the village), Panchayat members, Village Health Sanitation and Nutrition Committee members, ANMs, AWWs, Sahiya and villagers. Meetings were also set up with existing village Self Help Groups (SHG) to understand what kind of health issues the villagers had, where they could go to get health services and what facilities were available. At the meetings, Sahiya informed the community about what they learned at the MANSI training and in what situations people should seek their support and assistance. If there was a recent case in which the Sahiya's intervention was valuable the case was discussed at the community meetings to give importance to the Sahiya's success, improve her status and demand for her assistance and encourage appropriate behavioral changes needed to improve MMR and IMR. A local form of theatre (natak) and dance (Chhau dance) were used as a means to educate the villagers and improve health related awareness.

As part of the Sahiya training, they were given a kit, as seen in Figure 6 below, with supplies for monitoring, and first-line diagnosing and treating of HBNC cases. The items in the kit recommended by SEARCH were different than those being supplied by the government to the Sahiyas so the MANSI program staff needed permission from the government health officials for the updated items. Since the quality and reliability of the government supply chain were not consistent, and realizing that the kits were essential to the success of the Sahiyas/program, the MANSI organization decided on supplying and managing the inventory needed for the kits in the pilot program. The Sahiyas and MNHMs communicate kit inventory levels up the chain to the FCs. A procurement manager worked in Jamshedpur while the FC managed levels of inventory in the Seraikela area together making sure there was a buffer of at least a month's worth of stock.



Figure 6: Sahiya and kit

The MANSI training for Sahiyas aimed at improving their capacity in managing high risk mothers and babies. Training started in 2011 and consisted of six rounds of training in HBNC methods over a period of a few months. With MANSI training a Sahiya could provide early identification of a baby at risk, diagnose, provide first line of treatment as per the SEARCH protocol, and refer the case to the nearest healthcare facility. After each round of training, a meeting was organized with the community to share and inform them of the new skills that the Sahiya had learned. Since the Sahiya essentially works for the community, the community learned to seek their help and respect them.

From the beginning of the MANSI program there were different levels of advocacy performed by the MANSI staff. At the early stages of the program the more rigorous SEARCH based form

of HBNC, than what the Sahiyas were already trained on, needed to be advocated to the government officials, community and Sahiyas. As the program got underway the Sahiya's services needed to be advocated to the local health clinicians as well as to the community. If a pregnant woman or child were not given timely and appropriate services at the local healthcare facility the MANSI organization advocated on their behalf. If there were reports of requests for bribes these instances were taken up with the government officials.

If the family of the pregnant woman was not supportive about her following the nutrition and checkup schedule setup by the Sahiya, then both of the Sahiya and the MNHM/Sahiya Saathi make a combined visit to counsel the pregnant woman. While it is really the pregnant woman who has to make the decision about getting health services family pressures keep her from making the right decisions sometimes. If counseling the pregnant woman does not work then the Sahiya approaches a village elder or an ANM and all of them counsel the family.

Most of the communication between the Sahiyas and the community, government or MANSI staff is done over cell phone. The Sahiyas do not get a cell phone from the government financed village health fund and instead get cell phone minutes but the money is not consistent over the year and sometimes they have to put in their own money to buy cell phone minutes.

The MANSI organization focused on providing quality in all aspects of training, operations, supplies and support. The partners AIF, TSRDS and SEARCH coordinated with each other to ensure quality in the training and implementation. SEARCH made random visits to villages throughout the program and provided an objective report on the delivery of services by the MANSI organization. The report analyzed the current level of HBNC services and included areas where improvements were needed and SEARCH followed up with the MANSI implementation team on whether improvements were being made. This continual objective analyzing, reporting and follow up played a key role in ensuring the high quality and success of the program.

As the Sahiya's effectiveness, experience and confidence increased so also has her status in the village. The doctors at the local subcenter and Primary Healthcare center also became more accepting of the cases that are referred to the hospital by the Sahiya. The Sahiyas are sometimes called "Doctor Didi" (Doctor big sister) in their village giving them a new found respect in the community. Sahiyas are evaluated regularly by the MANSI staff as well as have a rating register

(feedback forum) for the community to write comments in. The Sahiya is especially happy and proud to show her rating register where the different people she has helped in the community have written their appreciative comments. One of the Sahiyas interviewed for this thesis expressed that saving lives made her feel good about herself. The only cash incentive the Sahiya gets is provided by the JSY for a hospital birth and home visits for a newborn. In order to reward the Sahiyas, the MANSI program conducts a Sahiya Sammelan (meeting) annually to publically encourage and reward positive contributions to the community by the Sahiyas with non-monetary gifts of clothes and kitchen items. Sahiyas are chosen to talk about their successful cases and given recognition in front of their peers and district officials including the district commissioner.

The next chapter analyzes the MANSI program from a system perspective looks at all the different aspects of the system from the data collection and training to the organizational hierarchy and logistics.

## Chapter 4: System Analysis of the MANSI program

In this chapter the MANSI system is examined from a public health point of view in terms of discussing data collection, technical guidelines, and protocol and training, however the focus of the chapter is the system analysis from a system architecture and design point of view looking at many aspects that add value to the investigation (stakeholder needs, power and interest maps, system problem statement, system structural view, stakeholders complex network, organizational hierarchy, logistics, effectiveness of Sahiyas, basis for the PPP model and reasons for success).

### Methodology

Both empirical methods and theoretical methods are used in this thesis. Interviews, observations and statistics formed the basis of the empirical methods. I made two trips to rural India in the last year to interview MANSI stakeholders and medical officers at PHCs and observe healthcare facilities. The 22 interviews of stakeholders in the MANSI organization and 13 interviews with doctors at PHC's formed the basis of the description of the problem in chapter 3. The theoretical methods used are network diagrams and systems dynamics modeling which are derived from the tools learned at MIT classes. The observation and modeling methods work together to understand the system through induction and deduction thus leading to deeper insights.

In order to analyze the system here are all the steps I considered. First all the information and scientific knowledge available on the problem in question is gathered (Hordijk, 2014). Second the goals of the stakeholders, both of the people and the institutions, are determined. Third the different alternative ways of achieving those goals and where appropriate design or invent new options are looked at. Fourth the problem in light of the knowledge accumulated is reconsidered. Fifth the impacts of the various possible courses of action are estimated and the organizational structures that are required to implement the proposals. Sixth the alternatives by making a detailed assessment of possible impacts and consequences are evaluated. Seventh the results of the study in a framework that facilitates choice by the stakeholders are presented.

The rest of this chapter analyses the operational and systems framework of the MANSI organization from a public health and a systems lens.

### Data Collection

Data are collected from the Sahiyas for monitoring and trending purposes. The Sahiyas are given a few different registers to track the residents namely the Eligible Couple, Pregnant Women,

High Risk Case, Sahiya Rating and the Ante Natal Care (ANC) register as shown in Figure 7 below. They also work with the pregnant women to fill out the Pregnancy form and the HBNC form. The Sahiyas compile their daily updates into the different registers and send the MNHMs weekly or monthly data about their respective areas. The MNHM's then compile a Monthly Progress Report (MPR) which is reviewed by the Zonal and Field coordinators and then sent to the Program Managers of AIF and TSRDS and the Management Information System (MIS) officer. The MPR per MNHM is about 13 pages long with 129 indicators as seen in



Appendix A and includes checks and balances. The MIS officer compiles the MPR's of the 19 MNHMs into an excel spreadsheet. High risk cases are tracked for a few months with regular visits from the Sahiya, MNHM and other MANSI staff. Trends are analyzed from this data which helps to monitor the project on a monthly basis.

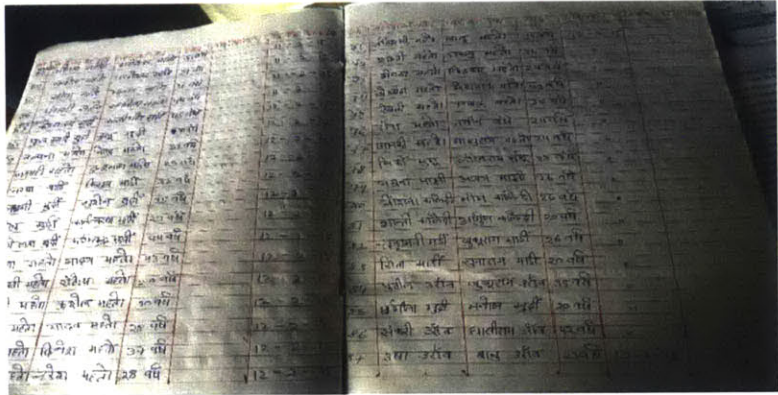


Figure 7: Register for keeping track of pregnant women (MANSI org.)

After 2014 the Sahiya Saathi now collects the data from the registers of the Sahiyas and compiles it into a report. This report is sent to the government DPC as well as the MANSI MNHMs for review and approval. The flow of data from the community to the MANSI staff is shown below in Figure 8 below. The data are collected, reviewed and analyzed manually in most of the steps except the last step when Microsoft Excel is used for trend analysis. All the data collected and reports generated are shared with all the partners including SEARCH and the Government of Jharkhand health authorities. There are no unique identifiers for each mother and child so it is challenging to track them over a period of many years.

# Management Information System Flow of reporting

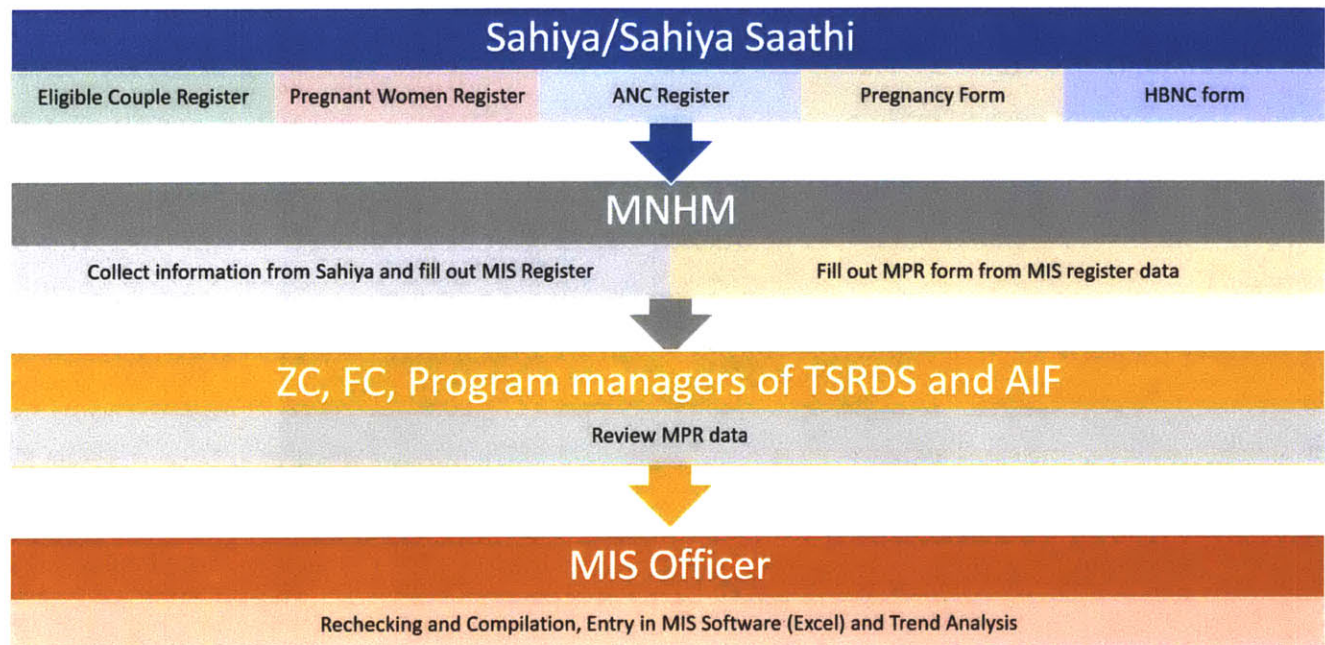


Figure 8: Flow of reporting of data

In 2015, 80% of deliveries are in the hospital and only 20% deliveries are at home. However when the Mamata Vahan is not working then the percent of deliveries at home goes up a bit to 30%.

Vital Rate Survey (VRS) data is a household survey taken annually since 2011 by a third party organization hired by MANSI in lieu of availability of NHLS and DHLS data. The MNHM data, based on Sahiyas registers, is considered secondary data while the VRS data is primary data. The VRS data helps to monitor the project on a yearly basis.

While MMR has been reducing in the Seraikela block the total population needed (since MMR is based on 100,000 population) does not exist to report these numbers. In 2011, when VRS data was first collected, there were a total of 11 maternal deaths, in 2012 this number reduced to 6 and in 2013 the number is 5 (VRS data for 2014 is not yet available). The data showed that maternal

deaths were mostly caused by prolonged bleeding and severe anemia. The IMR numbers from 2011-2013 in

Table 1 below show that the rate is reducing each year and is down by 33% from 2007 when the IMR was 60 and down 26.5% in the years 2011-2013 alone.

### Project MANSI

Indicator	Vital Rates by Year		
	Year 2011	Year 2012	Year 2013
Crude Birth Rate (CBR)	23.5	21.2	20.9
Still Birth Rate (SBR)	23.5	19.6	20.7
Early Neonatal (0-7 days) Mortality Rate (ENMR)	32.7	25.2	23.4
Late Neonatal ( 8 - 28 days)Mortality Rate (LNMR)	8.0	8.0	3.99
Neonatal Mortality Rate (NMR)	40.7	33.2	27.4
<b>Infant Mortality Rate (IMR)</b>	<b>53.6</b>	<b>50.4</b>	<b>39.4</b>
Child Mortality Rate (CMR)	67.5	64.1	49.6

Table 1: Birth and Mortality rates for the MANSI program (MANSI org.)

Technical guidelines, Protocols, Training

SEARCH has number of HBNC training modules which are very elaborate and user friendly, built from their experience and testing in Gadchiroli, and take 42 days of training for the Master trainers to learn the material. The MANSI training for the Sahiyas consisted of 6 three day residential training workshops and covered all the aspects of HBNC as per the technical protocol and guidelines of SEARCH. The Sahiyas were also taught about how to update their registers and keep good records as well as good communication techniques. As a Sahiya, Babita Mahato, put it “The government training was not very good, they showed us a register but we didn’t learn to use it until the MANSI program” (“Collated Interviews,” n.d.). The training modules of the Sahiya training workshops are in Appendix B.

For the first round of MANSI training, Sahiyas were uninterested, skeptical and mistrustful of traveling to Jamshedpur for a three day residential training. In addition their family members did not want to send them due to concerns about who will take care of the house and children and

cook while the women were away. The families wanted to know if it was safe to travel to a city like Jamshedpur and asked what the women were learning at the training that they had not already learned from the government training. The trip to the city was all expenses paid by the MANSI program and each woman was paid daily in lieu of missed wages. The training was high quality learning through drama, games, role playing and practicing. The Sahiya was taught basic techniques like washing her hands thoroughly with soap all the way to elbow and air drying them before touching the baby. She learned that a bloated stomach or a sunken chest are signs that the child is not well and needs to see a doctor and also checked the baby for eruptions and rashes. After the first training which was interesting and novel where the Sahiyas learned in depth knowledge about physiological and pathological reasons for illness and how to use the kit to prevent it, to teach mothers good health practices, diagnose signs of distress in mother and child, and take the temperature and weight of the baby, there weren't any dropouts in the subsequent trainings.

The Sahiya were trained to follow up with the mother for 42 days after birth with 6 visits for hospital births and 7 visits (2nd, 3rd, 7th, 14th, 28th, 42nd day) for home births. For high risk babies the Sahiya is taught to visit 13 times in 42 days. According to the current JSY program she does not get paid for the additional visits. The Sahiya records the number of visits in the HBNC form.

This training with other Sahiyas was eye opening to the women and they appreciated the quality and in depth information they learned. The 196 Sahiyas were trained to use each and every aspect of the Sahiya kit. After each training they were sent back to the village to put their learnings into use. After training in 2011, the Sahiyas became much more effective. In addition to the kit, each Sahiya has a training book to teach the pregnant mother about care and prevention of different causes of illness, as well as registers to record details of the pregnant women's prenatal checkups, deliveries and high risk cases. The Sahiya also has a register for the beneficiaries to rate her services and give her feedback. Since the initial training, the effectiveness, status and confidence of the Sahiyas has grown over time.

There are rare cases when a Sahiya is not working well or wants to leave the position. In these situations MANSI staff work with the community and DPC to either improve performance through re-training, a buddy system with another Sahiya or replace the Sahiya.

How does MANSI compare to WHO's safe childbirth checklist and to the Indian Public Health Standard (IPHS)??

The WHO published a safe childbirth checklist (WHO, 2014) as part of its drive towards achieving the MDG 4 and 5a goals. The checklist focuses on the supplies and procedures needed during the childbirth process. In the MANSI program, mothers are encouraged to deliver the baby in the hospital so the WHO safe childbirth checklist is not directly applicable to the Sahiyas or the MANSI organization as a whole. The hospitals at which the childbirth takes place would benefit from using the WHO safe childbirth checklist if they are not using it already.

The IPHS publishes guidelines for healthcare subcenters ("Indian Public Health Standards for Sub-Centres 2012," n.d.) and primary healthcare centers regarding numbers and roles and responsibilities of staffing, supplies, layout of subcenter, and reporting. While the Sahiya role is not defined in the IPHS guidelines, some of the tasks listed, for example post-natal visits to new mothers, are carried out by the Sahiyas. So the IPHS does apply to Sahiyas and the MANSI organization in an indirect manner.

#### Financial Analysis

There are conflicting theories in public health of whether it is beneficial or detrimental for users of programs to pay a nominal fee. Some suggest that user fees could increase financial resources and regulate demand while others state that no user fees would increase access to healthcare for the poor. In the MANSI model the pregnant woman and child did not pay for services or medicines. The Sahiyas also did not pay for training or replenishing of their kit supplies. The funds for designing and implementing the MANSI program came from both AIF and TSRDS coffers.

Many MCH programs do not publish their financial information so it is difficult to compare programs from a cost per mother and child basis. While data are available from researchers and policymakers on numerous aspects of the health and well-being of women and children in the US less is known about the costs for MCH services (Kenney, Kogan, Toomer, & Van Dyck, 2012). Typical costs of treating a high risk neonate in a private hospital setting are high. One study, in the US, estimated it cost about \$27,000 to treat each high risk neonatal baby ("Total costs of treatment for babies with neonatal abstinence syndrome on the rise," n.d.). Another study estimated the cost per preterm baby in a state hospital in Istanbul to be about \$4,187 (Cömert et al., 2012). When HBNC was first published by SEARCH in 2005, the cost per mother-newborn

was determined to be as low as \$6 (Bang, Bang, & Reddy, 2005). The MANSI costs per mother and child came out to be \$25 (“The MANSI Way | American India Foundation,” n.d.) which is comparable to the SEARCH study in 2005 and many orders of magnitude lesser than the study in Istanbul or the US.

In order to complete a Cost-Benefit analysis of the MANSI system, we need to understand the impact of the program on the Seraikela society as a whole and the indirect and direct benefits to the stakeholders. The benefits to the main stakeholder in the program, the mother and child, are a healthy birth and survival of the childbirth process. The value of life in India is estimated to be about Rs. 2.2 lakhs (Rs. 220,000 = \$3400) (“Value of life only Rs 2.2 lakh in India - Indian Express,” n.d.). Indirect benefits to the mother due to the MANSI program are priceless and include a higher status in the household. The benefits to the Sahiya are also higher status and respect from the community, ability to learn and save lives, and empowerment as a mother and child health care representative authority in the village. The benefits to the community are their access to 24x7 MCH healthcare in the village and ability to influence the government healthcare facilities as demand for them grows. It is not possible to put a monetary value on these indirect benefits.

#### Cost-Benefit Analysis

The Sahiya program was started in 2006 and helped in improving outcomes of IMR and MMR. The MANSI program started later in 2009-2010 further improved rates and during this time the population of the area steadily increased. The benefit to cost ratio per life for the society in Seraikela (population 83,000) who achieved a 33% reduction from 2007 to 2013 and 26.5% in 2011-2013 alone in mortality rate turns out to be very high at  $\$3400/\$25 = 136$ . Table 2 below shows the estimated total number of lives saved as the population in the area increased and the IMR reduced from 2007 to 2013.

Year	Population	IMR (per 1000 live births)	Total Number of infant deaths	Saved infant lives due to MANSI program
2007	77,000	60	4,620	
2008	78,000	59	4,602	
2009	79,000	58	4,582	
2010	80,000	57	4,482	
2011	81,000	54	4,374	162
2012	82,000	50	4,100	400
2013	83,000	39	3,237	1245

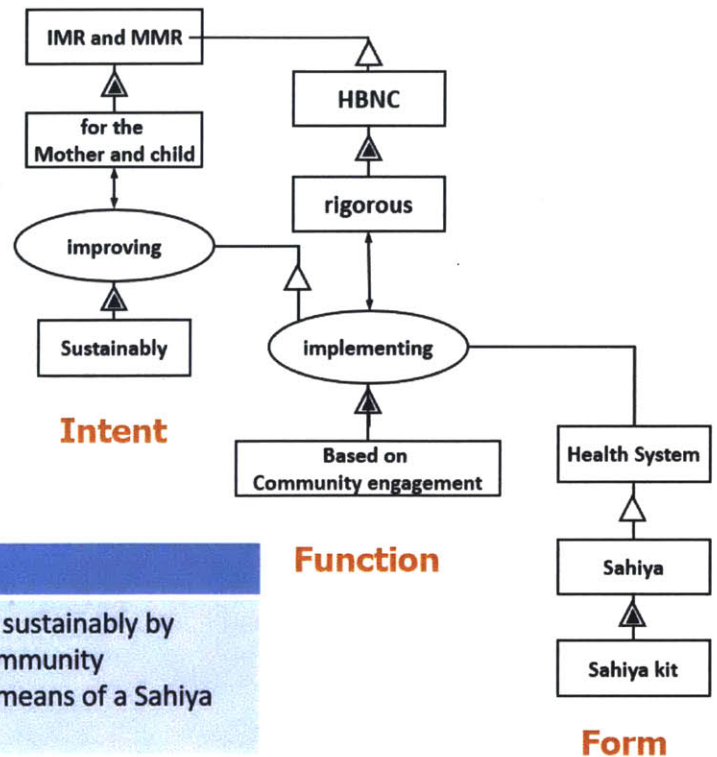
Table 2: Estimated infant lives saved per year due to MANSI program

### System Analysis

In order to understand the architecture of the MANSI system, we examine the basic System Problem Statement, understand the MANSI intent, what they wanted to achieve and for whom, the function of the system and how it was going to be implemented as well as the form and tools through which the intent was going to be realized. As shown in Figure 9 below, the intent was ‘To sustainably improve the MMR and IMR for the mother and child’. The overall goal of the program was to improve the MCH so that it is sustainable and dependent only on existing government resources in the long run. The system problem statement can be written as ‘To improve MMR and IMR for the mother and child sustainably by implementing a rigorous type of HBNC based on community engagement through the existing health system by means of a Sahiya and Sahiya kit’.

# MANSI - System Problem Statement

- To improve IMR and MMR
  - for the mother and child
  - sustainably
- By implementing
  - a rigorous type of HBNC
  - based on community engagement
- Using a Sahiya
  - Sahiya kit



**System Problem Statement**  
 To improve MMR and IMR for the mother and child sustainably by implementing a rigorous type of HBNC based on community engagement through the existing health system by means of a Sahiya and Sahiya kit.

Figure 9: System Problem Statement

From the description of the MANSI pilot program in the previous chapter, we can see that the program was designed to meet the intent for the most part, implemented with the function of following the rigorous HBNC protocols from SEARCH and using the form and tools of the existing health system, Sahiya and Sahiya kit as a means of achieving the intent. This architecture required rigorous onsite training, mentoring and monitoring of the Sahiyas. Community engagement in the MCH program was critical to ensure its success. The program improved IMR and MMR through community engagement and was sustainable in some ways as there was no cash incentives given to mother and child, Sahiya or the community from MANSI. However since the program required supply of kits, support and monitoring of Sahiyas by MNHM's, the system is not sustainable without MANSI presence.

The structural view of the system describes the abstract configuration or arrangements of the different elements and their internal relationships necessary to satisfy the constraints for



intensive HBNC and monitoring in the MANSI system (Crawley et al., 2004). A System structural view in Figure 10 below shows us all the interactions between the different parts of the system. We see that the pilot program was high touch and required many regular interactions between the people in the system. Each different partner interacted with the Sahiya and mother and baby sometimes or regularly even though TSRDS was the implementing partner in the MANSI program. The many number of interactions in the system signal micromanagement possibly due to lack of accountability, creates duplicate work and can be confusing. Many of the interactions are one way denoting monitoring type of interactions. The high touch approach to managing the program is not practical or sustainable in the long run as it requires many resources to conduct the overlapping interactions between different parts of the system.

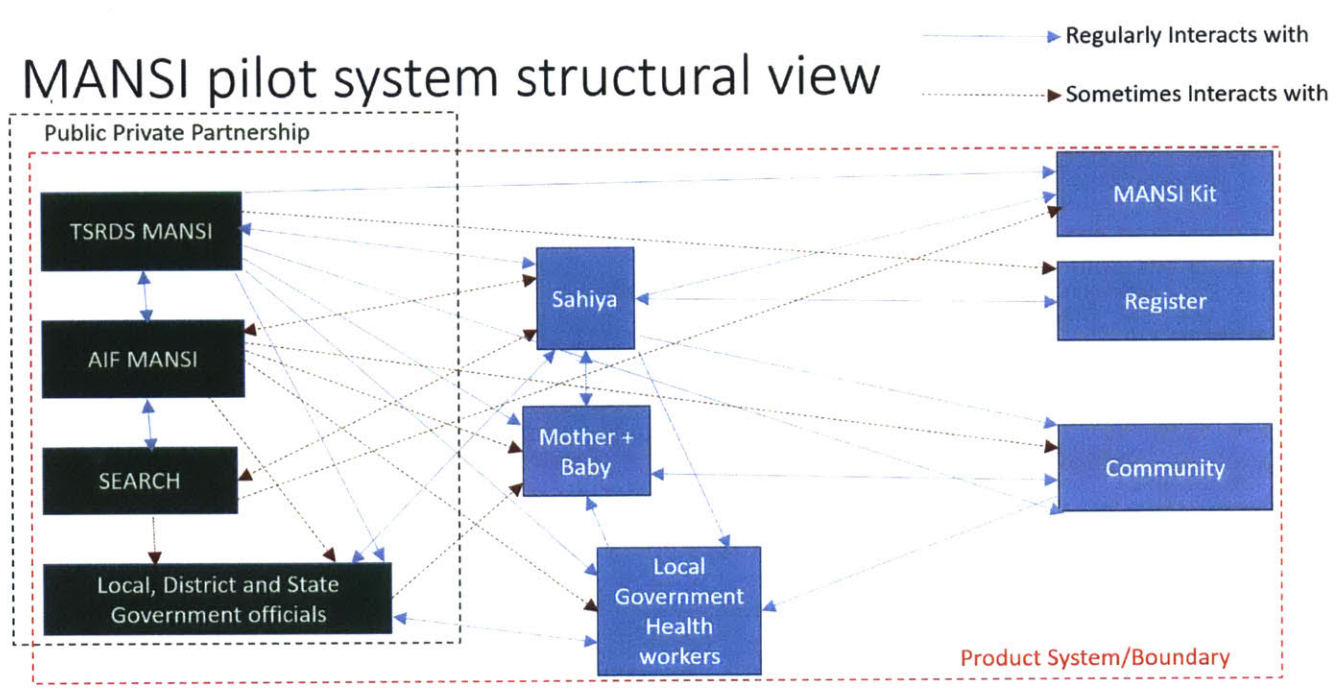


Figure 10: MANSI system structural view

In order to understand the design of the MANSI organization, it is important to evaluate the significance of the Stakeholders and their needs within the system. The system boundaries are set around the direct stakeholders in the program namely the mother and child, Sahiya and PPP as shown in Figure 11 below. Indirect stakeholders are the ones that have an interest in the outcomes but are not involved in the day-to-day operations of the program namely the

community and the WHO. The Naxalites (members of a communist guerilla group) in the area have strong ties to the community and while they have not interfered in the MANSI operations, since it is connected to improving health outcomes, they have control of the resources and can create unanticipated shutdowns if desired. They are an indirect and problem stakeholder in the MANSI system.

## Stakeholders and their needs

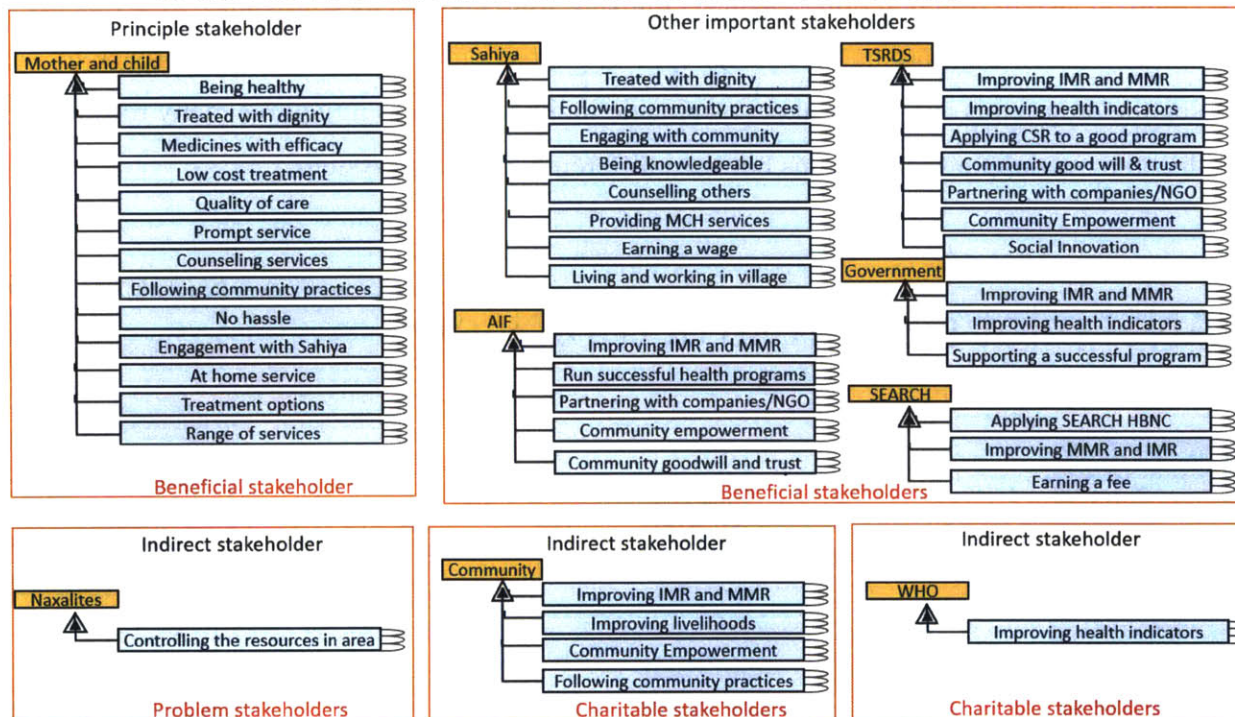


Figure 11: Stakeholders and their needs

The MANSI program was designed to meet all the needs of the principal stakeholder, the mother and child, through the Sahiya. By training and supporting the Sahiya, organizing community meetings, advocating on behalf of the mother and child and Sahiya as well as providing free, good quality and consistent supplies the needs of the other important stakeholders were achieved as well. The needs of the partners in the PPP are similar to each other and is the basis for a strong and mutually aligned partnership. The needs of the principal stakeholder align well with the needs of the other important stakeholders.

While most of the stakeholders are beneficial or charitable to the program, some of them could be problem stakeholders and need to be managed accordingly. The problem stakeholders are those that are on the periphery of the system, powerful and are indirectly benefitting but can create problems if are not appeased. In order to manage the stakeholders better we need to understand where their power, influence and interests are focused.

From Figure 12 below we learn that the principal stakeholder, the mother and child, is in the low interest and power category and therefore the MANSI program was designed to train the Sahiya to include visual aids to educate the mother and child in MCH as well as regular visits to her home to incentivize her. Through the JSY program the mother is also incentivized to deliver the baby in the hospital to help improve outcomes. Regular community meetings were needed to increase interest and demand for MCH. Advocacy on behalf of the mother and child and community when they encounter problems from other stakeholders increases their empowerment and was a key factor in the MANS program design. The aim of the program is to moves these stakeholders to the top right hand box

## Stakeholder Quadrant showing Power and Influence on Y-Axis and Interest on the X-Axis

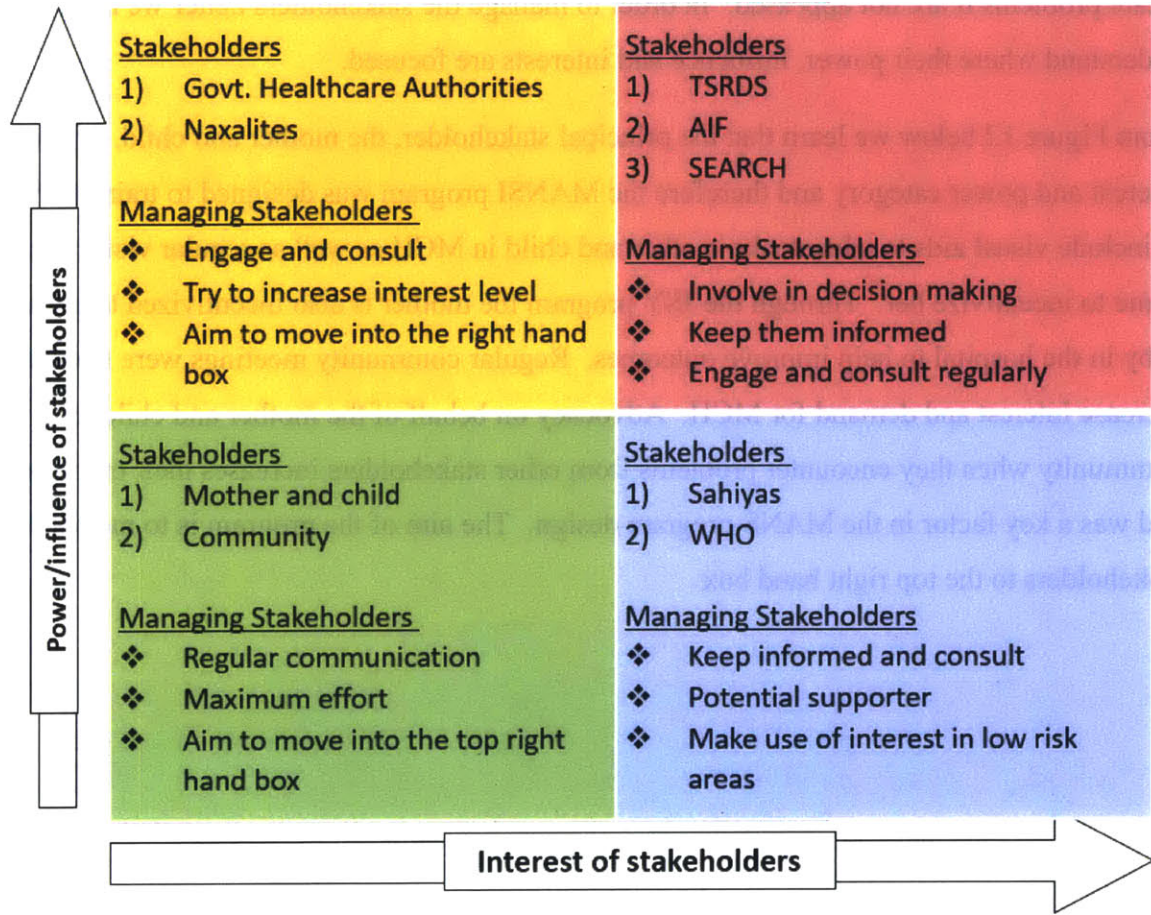


Figure 12: Power and Influence vs. Interest of Stakeholders

The Sahiyas are in the high interest but low power category which means the MANSI program needed to support, monitor, improve their confidence levels, encourage them to speak out and empower them so that the other stakeholders learned to trust and believe in them. The WHO is also in this category as they have high interest in IMR and MMR and provide MDG's for the government to target, however they do not have the direct power to improve public health programs.

The government healthcare authorities and the Naxalites in the area have high power and influence but lower interest in enabling the success of the program. These stakeholders need to be managed very carefully and encouraged to move into the high interest category.

The partners in the PPP - TSRDS, AIF and SEARCH are in the high interest and high power quadrant as they are fully vested in making sure the program is successful in its goals of lowering IMR and MMR. Since the government of Jharkhand is a partner in this PPP, it would be better for the MANSI program for it to be more interested and moved to the right hand box.

#### Logistics and Planning

Implementation of the design and architecture of the program rested on planning and coordination of the various activities in the program. Activities are planned for the organization at the beginning of the year and the stakeholders outside and inside the MANSI organization are included in the planning. Figure 13 below shows the organizational hierarchy within the MANSI organization. Planning and communication between the PPP are conducted through regular meetings, phone calls and e-mails. Planning and communication within the MANSI organization is done through face to face meetings or via phone calls. Many of the levels within the MANSI organization do not have access to computers or smart phones so they travel to the Seraikela or Jamshedpur office for meetings or talk over the phone. TSRDS being the implementation partner in the PPP has the responsibility in making sure that the activities that are planned do occur. The program manager of MANSI organizes and hand holds the activities to make sure they are successfully completed.

# MANSI Management Hierarchy

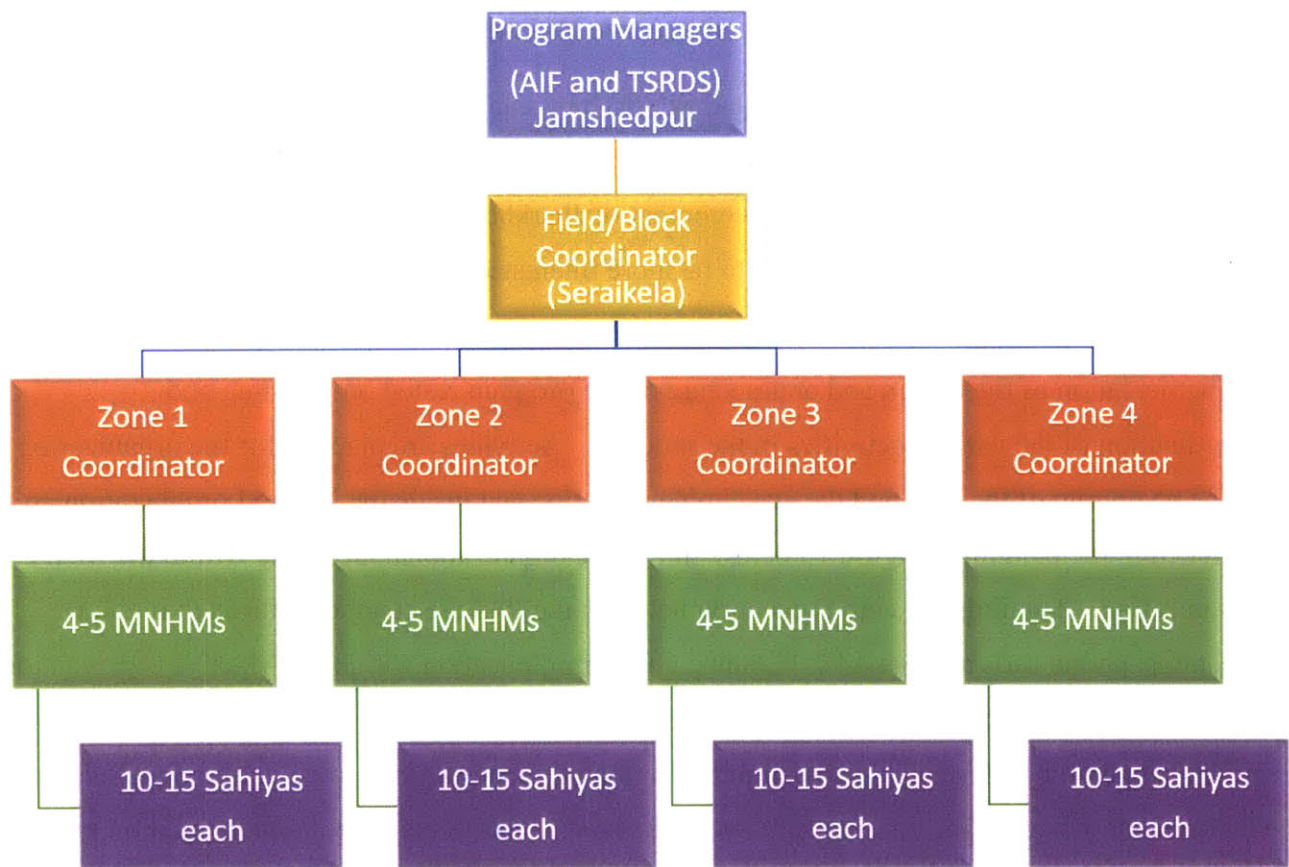


Figure 13: MANSI management hierarchy

A major task of the logistics for the MANSI program was to make sure the various items in the Sahiya kit were stocked with quality and consistency. A procurement officer at MANSI headquarters in Jamshedpur along with the FC in Seraikela managed the inventory and made sure there was a buffer of a month of stock. The Sahiya kit, see Figure 14 below, was made up of the following items:

- ❖ Flip chart for nutrition and health education
- ❖ Weighing scale
- ❖ Thermometer
- ❖ Eye ointment



A Network and Control Structure Mapping of information, finance and supplies in

Figure 15 below shows the complex flow between the stakeholders. It shows us how the different parties networked in order to make this program a success. The MANSI organization was monitored closely by all the partners. The Sahiya was the recipient of training, goods and services and money and was also monitored closely by the different stakeholders. The program relied heavily on the community to generate demand for quality MCH services and medicines at the government healthcare facilities.

## Network and Control Structure Mapping of information, finance and supplies

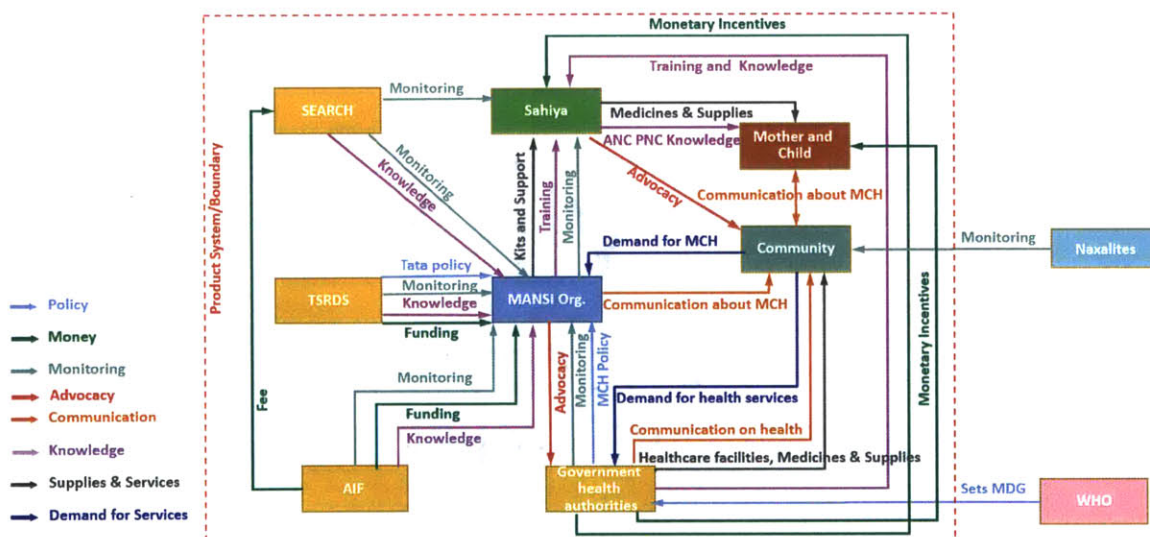


Figure 15: Stakeholders complex network of flows

If the system architecture, design and implementation are done well there are anticipated and unanticipated consequences in the system called emergence. Emergence occurs when the set of interrelated elements of the system perform a functionality that is greater than the sum of the parts. System structure usually enables emergence, however it mainly occurs from the function and interaction in the system. Anticipated emergence in the MANSI system can be seen as the demand generation of healthcare services in the community is built up by community meetings,



Sahiya trainings, successful advocacy and empowerment of the community. Unanticipated and beneficial emergence can be seen in the improvement of status of women in the community starting with the Sahiya and the pregnant women. Both these type of emergence are positive to the success of the MANSI system. However there can be unanticipated or anticipated negative emergence in the system if the architecture, design and implementation are not done well.

Emergence can be predicted a priori by precedent, experimentation or modeling. The MANSI system was designed to enable emergence since the functional aspect (implementing a rigorous type of HBNC based on community engagement) was tried and tested by SEARCH in Gadchiroli. However since the function was applied to a different part of India with different social and cultural norms, human reasoning is needed to predict emergence as experimentation and modeling are not easy where community and culture are involved.

Is a society based solution better than a tech based solution?

In a rural society where access to technology is not always available, there is a lack of infrastructure to deliver timely healthcare, traditional practices directly or indirectly cause higher mortality and trust between the society and public-sector healthcare clinics is not high, a community based healthcare solution is more effective than a technology based solution. As the implementation of a community based program improves knowledge in pregnancy and childbirth practices and the mortality rates, a technology based program to track adherence would be appropriate.

Effectiveness of the Sahiya

Improving the effectiveness of the Sahiya was key part of the architecture and design of the program as well and planning and logistics. Training Workshops (TW) were an integral portion of improving the Sahiyas effectiveness. The Sahiyas were graded after each TW and showed measurable improvements as seen in Table 3 below. We can see that the percentage of Sahiyas that got more than 65% right answers in the TW improved from 23% to 63% from the beginning to the end of the TWs. The table also shows us that the percentage of Sahiyas who scored below 40% of right answers reduced from 44% to 6% during the trainings.

**Summary of Grading of Sahiya from TW 1 – TW 6:**

Category	Percentage of Marks	TW1		TW 2		TW 3		TW 4		TW 5		TW 6	
		No. of Sahiyya	% of Sahiyya	No. of Sahiyya	% of Sahiyya	No. of Sahiyya	% of Sahiyya	No. of Sahiyya	% of Sahiyya	No. of Sahiyya	% of Sahiyya	No. of Sahiyya	% of Sahiyya
		n = 196		n = 184		n = 184		n = 180		n = 169		n = 177	
<b>A</b>	<b>65 % and above</b>	46	23	55	30	82	45	36	20	138	82	112	63
<b>B</b>	<b>40 % to 64 %</b>	64	33	53	29	83	45	96	53	26	15	55	31
<b>C</b>	<b>Below 40 %</b>	86	44	76	41	19	10	48	27	5	3	10	6

Table 3: Sahiya grading after each workshop (MANSI org.)

In the early days of the MCH programs in Jharkhand most pregnant women did not disclose their pregnancy in keeping with the social norms about hiding the condition until it showed in the 5<sup>th</sup> - 6<sup>th</sup> month. The number of pregnant women that registered increased by 382% as the effectiveness of the Sahiya also increased as see in Table 4 below thus improving IMR and MMR outcomes.

<b>Project MANSI - No of Pregnant women registered within 1st trimester</b>	
<b>Year</b>	<b>No. of Women in 1st trimester</b>
Year 2012	207
Year 2013	394
Year 2014	792

Table 4: Number of Pregnant women registering for ANC (MANSI org.)

The effectiveness of the Sahiya to manage high risk cases and engage with the community increased over time garnering respect and cooperation from the other stakeholders. As the Sahiya's effectiveness increased, the stakeholders realized that every high risk case need not be referred to the hospital and could be taken care of at home with the resources available to the family through the Sahiya. In a rural setting where every member of the household is busy with agricultural or other tasks and earning the daily wage is of paramount importance the ability to take care of a high risk pregnant woman or baby at home is a respite. As shown in Table 5 below the number of cases managed by the Sahiyas also improved about three fold over time.

Period- July'12-Dec'14

Case Management and Referrals	Yr'12 Total	Yr'13 Total	Yr'14 Total	Total
No of <i>High Risk neonates</i> identified	21	56	93	170
No of babies had <i>breathing problem at birth in home deliveries</i>	2	4	5	11
No of <i>Hypothermia</i> case identified	8	13	20	41
No of babies had <i>breast feeding problem</i>	13	34	37	84
No of babies diagnosed with Sepsis	4	16	25	45
No of <i>Sepsis</i> case treated with <i>Cotrimoxazole</i>	0	5	7	12
No of <i>Sepsis</i> case referred and got treatment from hospital	3	11	18	32
No of <i>Pneumonia</i> cases in neonates diagnosed with <i>chest indrawing</i>	0	3	16	19
No of such cases treated with <i>Cotrimoxazole</i>	0	2	5	7
No of <i>Pneumonia</i> cases identified in age group (more than 28 days and under 5 years)	1	11	91	103
No of such cases treated with <i>Cotrimoxazole</i> and treatment in Hospital	1	8	77	86
No of case identified with <i>pus in the cord</i>	8	44	154	206
No of case identified with <i>pus in the eyes</i>	5	49	92	146
No of cases identified with diarrhoea and sent to hospital	0	46	261	307

Table 5: Sahiya Case Management (MANSI org.)

While the Sahiya' effectiveness improved over time there were a few areas that still need improvement. The Sahiyas have a union but it is not very organized so when they do not get paid they come to the MANSI organization for advocacy with the district officials. The ANMs and AWWs are unionized and go on strike from time to time to get their problems resolved and subsequently have more bargaining power with the government. The Sahiyas do not have injectable medicines and are dependent on the ANMs when injectables are needed by a sick baby which can create hurdles if the ANM lives far away from the village or is not cooperative. In the case of a death a verbal autopsy is done to record the events leading up to it so that the Sahiya

and community can learn from the experience and the hard lesson. Some caste differences between the Sahiya and the family of the pregnant woman required bathing after every visit. If the family of the high risk case required multiple visits in a day then the respective parties learned to take multiple baths a day in order to perform their duties and keep their traditions at the same time. Sahiyas have not needed to pay bribes but some of the high risk cases have needed to do it to get the required attention of the local healthcare practitioners. The MANSI program investigated malaria and post-partum hemorrhage interventions which would have made the Sahiya more effective in reducing MMR however the government of Jharkhand was not comfortable about putting these drugs in the hands of the Sahiyas and so they had to be dropped from the program. In some villages there are religious issues between Hindus and Muslims and they found it difficult to go to each other houses for HBNC. In the initial phase this issue came up but the MANSI organization insisted that the work has to be done and it didn't come up after that. Some of the areas there weren't any young women so the Sahiya is over 50 years old and her eyes are so weak she cannot see the weighing scale numbers. If the pregnant woman goes back to her mother's house for the delivery, the Sahiyas sometimes lose track of the mother and baby. These are some of the challenges that the Sahiya needed to overcome in order to improve her effectiveness.

Figure 16 below estimates how the effectiveness of the Sahiya has changed over the years since the Sahiya program started in 2007. As the figure shows that before the MANSI program, the Sahiyas were slowly becoming effective through the initial government run training and experience with MCH. However only after the MANSI training in 2011 did their effectiveness rise rapidly because of comprehensive training, support, reliable supplies and advocacy.

## Effectiveness of Sahiya over time

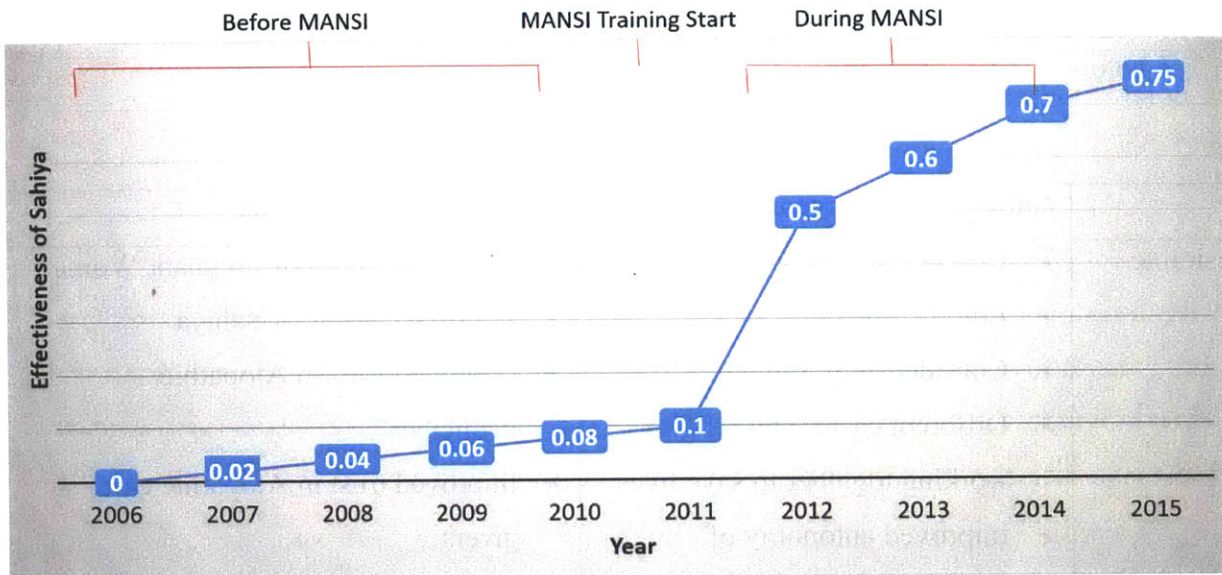


Figure 16: Effectiveness of Sahiya over time

### What the PPP was based on

An important feature of MANSI has been the PPP between a private company, a research organization, a NGO and the government. Each has had its own strengths which made this program successful. Some of the features of the PPP are below:

- ❖ Partnership based on cultural fit, mutual trust and respect
- ❖ Common ethical values
- ❖ Good governance structures and clear ownership
- ❖ Mutually complimentary skills
- ❖ Long-term focus on planning
- ❖ Local acceptance
- ❖ Due diligence on partners
- ❖ Shared and celebrated success
- ❖ Open to third party evaluation
- ❖ Continuous learning

### Rate the MANSI program on a scale of 1 to 5

The MANSI program can be rated 4.5 out of 5 because of the following:

- 1) The architecture and design deliver the primary function well by focusing on training, supporting and advocating for the Sahiyas. The decrease in MMR and IMR is impressive
- 2) A Matrix of Emergent Functions of the architecture can be described as follows in Table 6 below:

	Anticipated Emergence	Unanticipated Emergence
Desirable	<ul style="list-style-type: none"> <li>➤ Community Engagement</li> <li>➤ Empowerment of Sahiya</li> <li>➤ Confidence of Sahiya</li> <li>➤ Different castes and religions working together to save lives</li> <li>➤ Improved autonomy of villagers in managing their health</li> </ul>	<ul style="list-style-type: none"> <li>➤ Improved Status of Pregnant Women</li> <li>➤ Improved Status of Sahiya</li> <li>➤ Improved trust in Alopathic medicines</li> <li>➤ Improved trust in Alopathic care givers</li> <li>➤ Improved trust in the government health system</li> </ul>
Undesirable	<ul style="list-style-type: none"> <li>➤ Community dependance on the MANSI program is not sustainable over a long period of time</li> </ul>	

Table 6: Emergence in the MANSI system

- 3) The cost-benefit analysis shows that the benefit to cost ratio is very high for each life saved
- 4) The current setup does not have a good technological backbone which is a hindrance to scaling
- 5) The community dependence on the MANSI program for advocacy and supplies is going to be difficult to overcome when these tasks are handed over to the government

Reasons for the success of the pilot program

The pilot program of MANSI was a huge success in delivering on the architecture, design, implementation, planning, logistics and PPP and was able to achieve a reduction of 26.5% in the years 2011-2013 in IMR due to the following reasons:

- ❖ The objective (system problem statement) of the program was very well and clearly articulated which drove all aspects of the program.
- ❖ Logistics and planning made sure that supplies were high quality, regular and consistent supplies
- ❖ Sahiyas are embedded in the village and since she knows the community well it makes a big difference and creates an ownership.
- ❖ Full time AIF representative in Jamshedpur helped to design, implement and monitor (random visits to villages were conducted by AIF representative) the program and bridge communication between MANSI and AIF.
- ❖ The organization's ability to connect with the right government official for every different approval. In order to convince some of the government officials of the merits of the rigorous SEARCH based HBNC protocols, they were flown to Gadchiroli to see the impact and implementation of the SEARCH program first hand.
- ❖ The DPC and SPC (DPC reports to SPC), who are consultants and not government employees at the NRHM, were very supportive.
- ❖ The organization's ability to understand and garner support from the community. From the mobile clinic the program received community goodwill because the pregnant mothers appreciated the doctor taking the time to examine them, putting the stethoscope on the stomach and sometimes allowing the mother to hear the fetal sounds before birth.
- ❖ The organization's ability to include community health leaders into the fold. The Sahiyas work with the ANMs or traditional birth attendants (TBA) since they do not conduct deliveries. So the MANSI organization needed to incorporate the TBAs and update their training and make sure they make less mistakes. The organization also included Rural Medical Practitioners (RMP), very important to the villagers because they are accessible, into the training wherever possible.
- ❖ The organization's ability to understand the cultural differences within the community and manage the stakeholders accordingly. The Sahiyas from tribal groups found it more difficult to communicate with the MANSI organization than the non-tribal Sahiyas as the tribal women are docile and introverted and therefore needed more hand holding.
- ❖ The organization's ability to allow innovation by the Sahiyas. There was a twin birth in a village home and the babies were in a double sac uterus which is an anatomical

abnormality. One sac delivered and the other sac did not. The Sahiya realized something is wrong because the placenta was not getting delivered. Nobody instructed the Sahiyas as the MANSI staff were not present. The Sahiya realized that an incision is needed into the other uterine sac and was able to deliver the other baby successfully.

- ❖ The organization's ability to be inclusive of community members. If an adult in the village asks for any of the medicines or Oral Rehydration Solution meant for the pregnant mother and child, the Sahiya is told to give it to them
- ❖ The organization's ability to adapt to the local needs and align with partners. The mobile clinics stopped duplicating the work of the government healthcare facilities in TT injections and immunizations to better align with government programs and changed their visit schedule from fortnightly to monthly
- ❖ The organization's ability to adapt to organizational needs. When logistics and organizational delays were being caused by the block office being in Jamshedpur, it was moved to Seraikela to be closer to the ground implementation.
- ❖ The organization's ability to advocate on behalf of the community and Sahiya. If a doctor at the subcenter or PHC did not accept a referral by a Sahiya, the doctor is met with and the issue resolved. The MANSI program advocated with the government to allow the Sahiya to be able to prescribe an antibiotic to the mother or child if there are signs of an infection.
- ❖ The psychological preparedness for delivery for the pregnant woman and family was done well by the Sahiyas as well as developing the attitude of delivering in the hospital
- ❖ The organization's focus on behavior changes in the community. According to tradition, mud was put on the umbilical cord area to make it heal and so behavior changes were needed to improve IMR outcomes
- ❖ The organization's focus on Community building. The regular community meetings with village elders, Sahiyas, community health workers, SHG and villagers helped to build the community around the common goal of improving IMR and MMR.
- ❖ The organization's focus on follow up. The Sahiya follows up with the mother for 42 days after birth (6 visits for hospital birth and 7 visits for home birth, 13 visits in 42 days for high risk babies). Continuous monitoring and supervision with regular follow up of the different stakeholders of the system.



- ❖ Building capacity and empowering the Sahiya so that she has the power to call an ambulance and refer the mother to the hospital if there are any signs of distress as well as for the onset of delivery.
- ❖ Developing the trust of the Sahiya's family so they do not question who she is talking to and where she is going.
- ❖ Analytics support from SEARCH from a research point of view provided an objective view from an experienced and critical partner demanded high quality.
- ❖ Random visits to villages to check on Sahiya and MNHM ensured that the people in the program were honest about implementing the activities they were tasked with.
- ❖ Improving the status of the pregnant woman. As a Sahiya Saathi, Saraswati Mahato, put it "In the beginning when we had to go a few times to the home of a pregnant woman we saw that the in-laws didn't pay that much attention to her. We had to tell them that she needs to go to the Anganwadi, take her TT injections and iron tablets to prepare for delivery. Now if we go once and on her own accord she shows up for her next checkup. If we go to the house, the family members are very cordial and invite us to sit down and talk to them" ("Collated Interviews," n.d.).
- ❖ The majority of population is either Schedules Tribes or other backward castes (Scheduled castes or Backward castes) and there are no upper castes, among the residents, so the caste dynamics is not that evident as in other states in India.
- ❖ Naxalites have not been very active in the Seraikela block in this time frame and so there has been no interference from them in the MANSI pilot project.
- ❖ Confidentiality among the Sahiyas or between Sahiya and the villagers is not an issue as maternal and neonatal health does not require confidentiality.
- ❖ The economic situation of the villagers is about the same so there were no hierarchies caused by differing socio-economic status.
- ❖ The expectations for TSRDS is high and when the local government hospitals were not able to accept a high risk case the case was admitted to the high end Tata hospital.

Many of the successes were due to the focus on the various stakeholders including ability to manage them and adapting to their changing needs.

The next chapter analyzes the organization in terms of scaling and replicating it in another setting with different partners and stakeholders but the same system problem statement.

## CHAPTER 5: ANALYSIS OF THE MANSI SYSTEM IN TERMS OF SCALING AND REPLICATING

The system analysis of the MANSI pilot program in the previous chapter provides an understanding of the architecture, design, implementation and management. This chapter discusses the same aspects of the system in the context of scaling and replication along with the long-term implications of the current design. The system analyses tools used in Chapter 4 are revisited to examine how the pilot system will respond to scaling and replicating and what modifications need to be done to make it a viable system in a different context. A system dynamics model aids us in appreciating the optimum number of Sahiyas in the system as a function of key parameters. To understand the long-term performance of a system we examine the “ilities” as they are closely connected to benefit and value as is the absence of emergencies.

Importance of Lifecycle Properties “Iilities” over Time:

The “ilities” of the system are the developmental, operational and support attributes a system must address specifically Quality, Durability, Safety, Security, Reliability, Resilience, Flexibility, Adaptability, Robustness, Usability, Maintainability, Evolvability, Recyclability, Interoperability, Sustainability, Extensibility, Portability/Replicability and Scalability. Each of these system properties can determine the longevity of the system. Here is how the MANSI pilot system performed in the “ilities”

- ❖ **Quality:** The regular monitoring of the stakeholders by the other stakeholders ensured that processes were being followed and the continued integrity of the data collected. The analytical support and monitoring visits from the SEARCH team who had experience in implementation and research of HBNC played a critical role in keeping quality of the MANSI pilot program high.
- ❖ **Durability:** The learnings of Sahiyas on HBNC methods and their ability to be the first line access for healthcare needs can withstand pressures and endure over time. However for the Sahiyas to be effective they need dependable supplies and community support.
- ❖ **Safety:** In a project that hinges on community engagement and trust, the safety of the Sahiyas and MANSI staff was very important. There were no safety issues for the Sahiyas or staff during this pilot program.

- ❖ **Security:** This ility is meant for people, supplies and data in the system. The pilot program was carried out in an areas free of communal or civil unrest so the people in the system were safe. Since the system depended on community engagement and Sahiya distribution of supplies unauthorized use of the supplies is minimum. Also maternal and child health is not confidential or controversial thus limiting any adverse use of data collected by Sahiyas.
- ❖ **Reliability:** The MANSI system ran reliably for more than three years but was based on the continuous availability of supplies procured and resources managed by the MANSI organization.
- ❖ **Resilience:** The high touch program with emphasis on support from the MANSI organization was able to withstand any negative situations by continuous advocacy to maintain a high level of quality and resilience.
- ❖ **Flexibility:** Sahiyas and MANSI staff were trained to use a rigorous form of HBNC methods and tools. However there was some amount of flexibility for innovation and finding new pathways to removing obstacles in family settings or in health related protocols.
- ❖ **Adaptability:** The system adapted to structural changes needed like a shift of the block office from Jamshedpur to Seraikela. The MANSI organization adapted local traditional forms of entertainment like Chau dance and natak to teach the community about MCH and improve demand generation for health facilities. The system also adapted to policy changes from the government authorities. Any cultural tensions brought about by different religious, traditional or caste based differences were overcome by the stakeholders. In the long-term, for any changes in the MCH protocol, the Sahiyas will have to be retrained and community meetings will have to be conducted to improve the demand.
- ❖ **Robustness:** This system was able to withstand any errors made by the stakeholders and be a successful pilot program.
- ❖ **Usability:** The MANSI training and support system enabled the Sahiyas and community to effectively use the tools to improve IMR and MMR

- ❖ **Maintainability:** The maintainability of the high touch pilot system is not too difficult as long as AIF and TSRDS continue to fund, monitor and manage it and the PPP model works effectively.
- ❖ **Evolvability:** As long as the system is able to learn from successes of the Sahiyas and that knowledge and lessons learned are shared with the community, the system will be able to evolve.
- ❖ **Recyclability:** The Sahiya kit is reusable by not recyclable.
- ❖ **Interoperability:** The Sahiyas and MANSI staff performed great in their assigned areas where they had built up trust and personal relationships with the community. While it would be possible to move MANSI staff to another area, it would not be a good idea to change the allocated area of a Sahiya.
- ❖ **Sustainability:** The high touch MANSI pilot program is not sustainable over a long period of time as it depends on funds, resources and supplies from the MANSI organization. If the government of Jharkhand took over these operations the program would be sustainable from a monetary point of view however special effort would need to be made to monitor the availability of supplies and accountability of the stakeholders in the system.
- ❖ **Extensibility:** More villages and Sahiyas can be added to the MANSI pilot program and operations can be extended if the system boundaries were increased and extra resources added.
- ❖ **Portability/Replicability:** A big part of the success of this program was the history of TSRDS's effective social programs in the area which created trust and low barriers of entry for this program. For the program to be ported or replicated in another area the acceptance of the partners in a PPP need to be considered and the community and cultural needs need to be evaluated before implementation. In this chapter other key structural, management, training and logistical considerations for porting or replicating this program are evaluated.
- ❖ **Scalability:** The MANSI pilot program would require large infusion of funds in order to scale up a high touch program. Later in this chapter we discuss key structural, management, training and logistical considerations for scaling this program.

While these key system characteristics facilitated the MANSI system success and play an important role in the long-term performance, the high touch approach to monitoring and management and the program's funding and supervision of the delivery of supplies could limit the scalability of the system. In order to understand the resources needed to scale or replicate the MANSI system, a system dynamics model was built and the system simulated.

#### System Dynamics Model

A system is an interconnected set of elements that are put together rationally in order to achieve something. The behavior of a system usually cannot be known just by understanding the elements of which the system is made (Meadows, 2008) as they react with each other in dynamic ways. System Dynamics (SD) modeling allows us to see how the different elements of a system behave in a dynamic fashion if one or many are changing.

Scaling or replicating the MANSI model can be complex as there is complexity in finding the best solution out of a large number of possibilities. Social systems contain both self-reinforcing (positive) and self-correcting (negative) feedback loops. Every action in the system alters the environment and may trigger side effects that may or may not be anticipated. Time delays in the feedback channels of a system mean the long-term response to an intervention is often different from its short term response. Cases of policy resistance can occur due to the dynamic complexity and counterintuitive behavior arising from the interactions of the various parts of the complex system (Sterman, 2006). System thinking involves the ability to see how actions reshape the environment. A SD model of the MANSI system assists to understand the feedback loops within the system and plan the optimum number of Sahiyas and associated resources needed for scaling or replicating. (Thank you James P. Houghton in the SD department at MIT Sloan for helping put together this model.)

The main reason for developing the SD model of the Sahiya interactions in the MANSI program was to quantify two key variables in scaling and replication namely 1) Total number of Sahiyas and 2) Hours per Sahiya per week. Being able to understand the optimum number of Sahiyas for the system to be effective will help the design and implementation of training, support, and logistics. The following is a simplified model of the system with a few feedback loops highlighted and variables explained. As expected the dynamic SD model shows the interaction

between the variables as the key variable “Total number of Sahiyas” is varied at values 100, 150, 196 and 250 during the simulation.

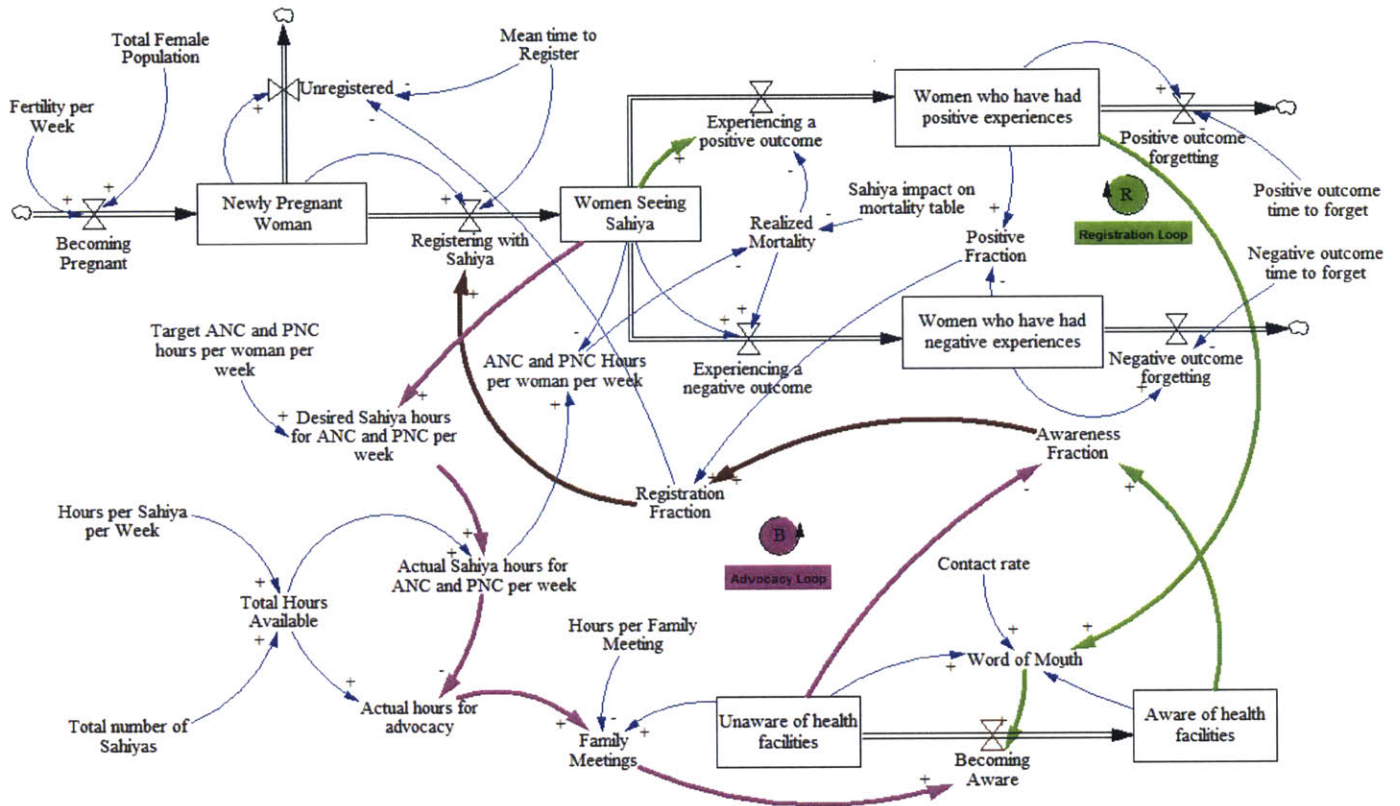


Figure 17: System Dynamics Model of the Sahiya Interactions

The Sahiya based SD model in Figure 17 above has a number of assumptions as more research needs to be done to gather data for a detailed model. However, this basic model is ideal to understand the relationship between the number of Sahiyas and IMR and MMR. The exogenous variables in the system can be varied during the simulation and are described below:

- ❖ **Total Female Population** – This variable denotes the total number of females in the population within the system. The units of this variable are women. In this model the Total Female Population was set at 50% of the total population of 100,000. This is an assumption as the ratio of females to males varies in different parts of India and for the most part is less than 50%.

- ❖ **Fertility per Week** – This is the rate of pregnancies per woman per week. Typically the fertility rate is about 10% of the Total Female Population for the entire year (“Collated Interviews,” n.d.). The units of this variable are per week and the variable is set to 0.1/52.
- ❖ **Number of Sahiyas** – This variable is the number of Sahiyas for the entire population in the system (100,000). The value was set at 196 at the beginning of the simulation since the Seraikela block of 83,000 total population had 196 Sahiyas. According to the NRHM, the optimum number of Sahiyas is one per 1000 population (Sharma, Webster, & Bhattacharyya, 2014) in rural area. The unit of this variable is Sahiya. In order to get a comparison of system behavior, this variable is set at 100, 150, 196 and 250 during the simulation.
- ❖ **Hours per Sahiya per Week** – The variable denotes the number of hours that the Sahiya is able to devote to her Sahiya work per week. The units for the variable are hours per Sahiya and the variable was set to 20. This number of hours is an assumption taking into account the fact that the Sahiya most probably has other household and agricultural chores that need to be taken care of.
- ❖ **Mean time to Register** – This is the time in weeks that it takes for a pregnant woman to register with the Sahiya for ANC from the time of conception. This number has gone down as the effectiveness of the Sahiya has gone up and can be seen in Table 4. For the purposes of this simulation the value of this variable was set to 6 weeks.
- ❖ **Contact rate** – This number is the number of times a week that a woman or family with a positive experience of working with a Sahiya is likely to meet with other members of the community who are unaware of health facilities in the area and positively influence their perception of health facilities in the area. The units of this variable are people per week per woman. In this model, this variable is assumed to be three people per week per woman with a positive experience. The contact rate directly influences the word of mouth and registration loops in this system. If the MANSI system is implemented in a hilly or difficult to reach terrain, the contact rate is going to be lower than if the area is a highly populous area.
- ❖ **Target Ante Natal Care (ANC) and Post Natal Care (PNC) hours per woman per week** – the variable denotes the number of hours that the Sahiya interacts per pregnant



woman for ANC and PNC per week. This variable directly influences the IMR and MMR of the region. A normal pregnancy lasts about 36 weeks and PNC is usually for 6 weeks after that. Over the 42 weeks of ANC and PNC the Sahiya meets the pregnant woman once a month for ANC and then 7 times during the 6 weeks of PNC so this variable is calculated to be  $9 \text{ (for ANC)} + 7 \text{ (for PNC)} / 42 \text{ (weeks)} = 0.38 \text{ hours/woman}$ .

- ❖ **Positive outcome time to forget** – This value is the time it takes for the woman and her family to forget the positive outcome of the pregnancy. During this period of time the woman and family are more likely to reinforce the positive word of mouth loop and make other women and families aware of the Sahiya and health facilities in the area. The units are set at weeks. In this model, the number is assumed to be 50 weeks. This number is an assumption as more research needs to be done to determine the actual number.
- ❖ **Negative outcome time to forget** - This value is the time it takes for the woman and her family to forget a negative outcome of pregnancy. The units are set at weeks. In this model, the number is assumed to be double of the variable Positive outcome time to forget and set to 100 weeks. This number is an assumption as more research needs to be done to determine the actual number.
- ❖ **Hours per Family Meeting** – This variable denotes the number of hours per family that the Sahiya needs for advocating ANC and PNC methods. This number includes community meetings as well. Since these meetings are spread over 42 weeks per pregnant woman, the variable is set to 0.25 hour per week per family. This number is an assumption as more research needs to be done to determine the actual number.
- ❖ **Sahiya impact on mortality rate** – The variable is a graph of the Sahiya impact on mortality rate as the number of hours of ANC and PNC rises per pregnant woman and the effectiveness of the Sahiya grows. There is an optimum value for this variable since the Sahiya impact is higher at the beginning of the pregnancy when the Sahiya can train and counsel the woman to take supplements and ANC checkups. The Sahiya impact is also high at the time of birth and immediately after when she is training the mother to take good nutrition, breastfeed and keep the baby in a clean environment.

There are a number of reinforcing and balancing loops in this system. A couple of them are highlighted, namely Advocacy and Registration loops, for further investigation. The stock and flow variables highlighted in brown occur in both the Advocacy and the Registration loop. The

Awareness Fraction shown below in Figure 18 occurs in both the Advocacy and registration loops and shows a classic positive and reinforcing feedback loop behavior. This variable denotes the awareness of the Sahiyas and health facilities and the value rises exponentially over time as more women have positive experiences and spread the awareness by word of mouth. When the number of Sahiyas in the system is 100, the Awareness Fraction rises slower than when the number of Sahiyas is at 150, 196 or 250. We can see that the slope of the curve is higher when the number of Sahiyas is higher however when the number of Sahiyas is 150, 196 or 250 the system reaches steady state around the same time of 5-6 weeks. When more realistic delays are introduced into this system, the time axis should shift out, however the behavior of the variable should not change. Please note the limitations of the system and improvements needed as discussed later in this chapter. While the system does not need 250 Sahiyas at a total population of 100,000, this graph can aid system designers in choosing the optimum number of Sahiyas needed. In this system the optimum number of Sahiyas is 150.

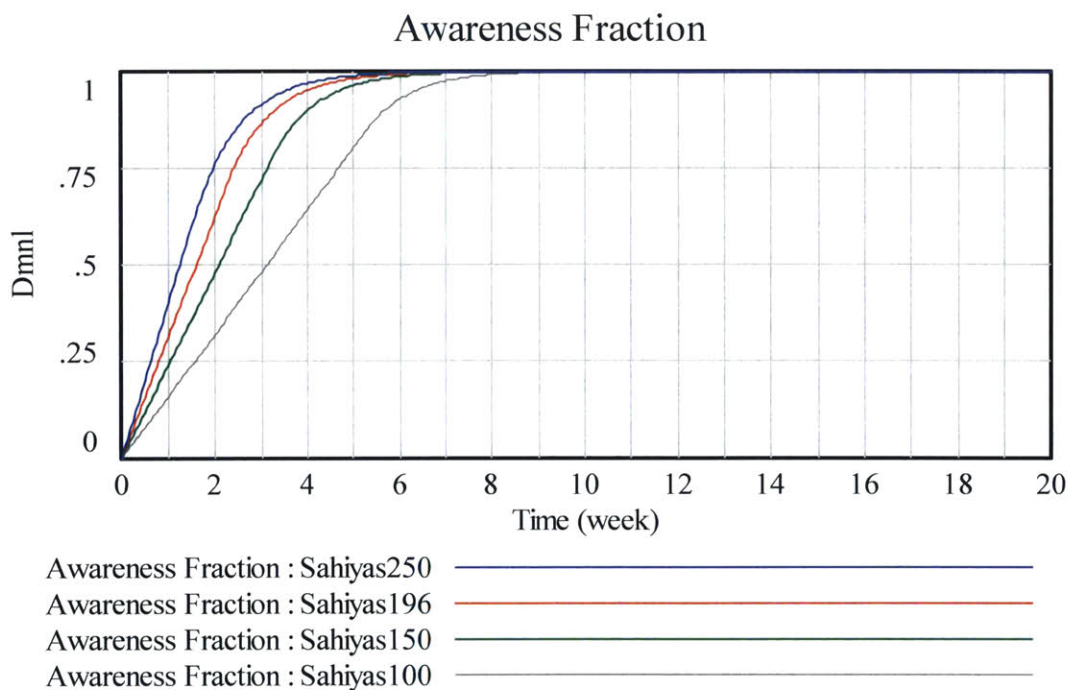


Figure 18: Awareness Fraction over Time

The Advocacy Loop, highlighted in pink color in Figure 19 below, is a balancing loop as the Actual Sahiya hours for ANC and PNC per week and Awareness Fraction of the health facilities grows and the Unawareness of health facilities goes down, the need for Advocacy goes down until hours allocated on Family Meetings for advocacy hits zero as shown in Figure 20 below.

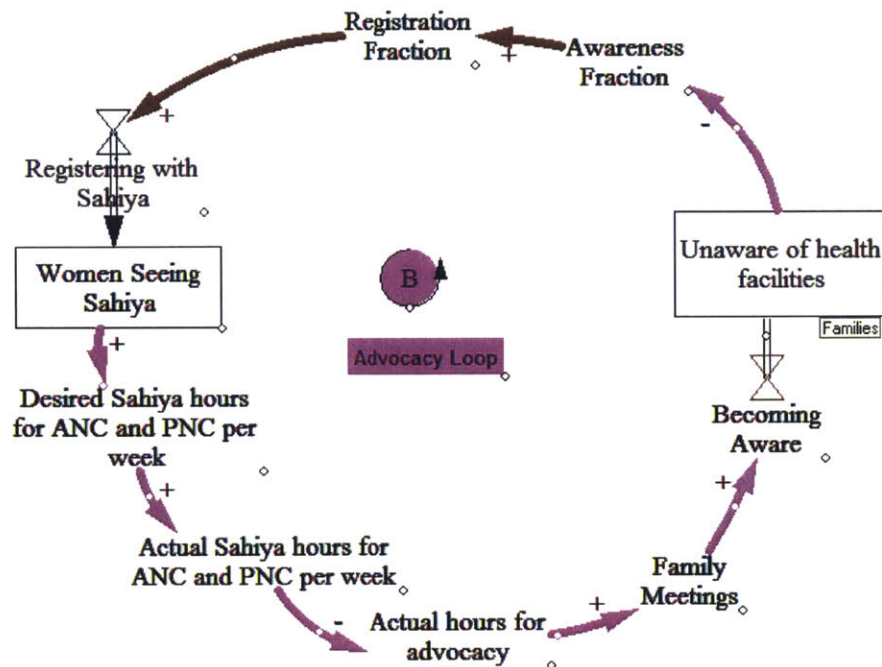


Figure 19: Advocacy Loop is a Balancing Loop

This balancing loop makes sense as the number of Sahiya hours are finite and her time is valuable in reducing mortality through ANC and PNC with the pregnant woman and not on family meetings for advocacy so as awareness rises the Sahiya's time is spent more on ANC and PNC and not on advocacy.

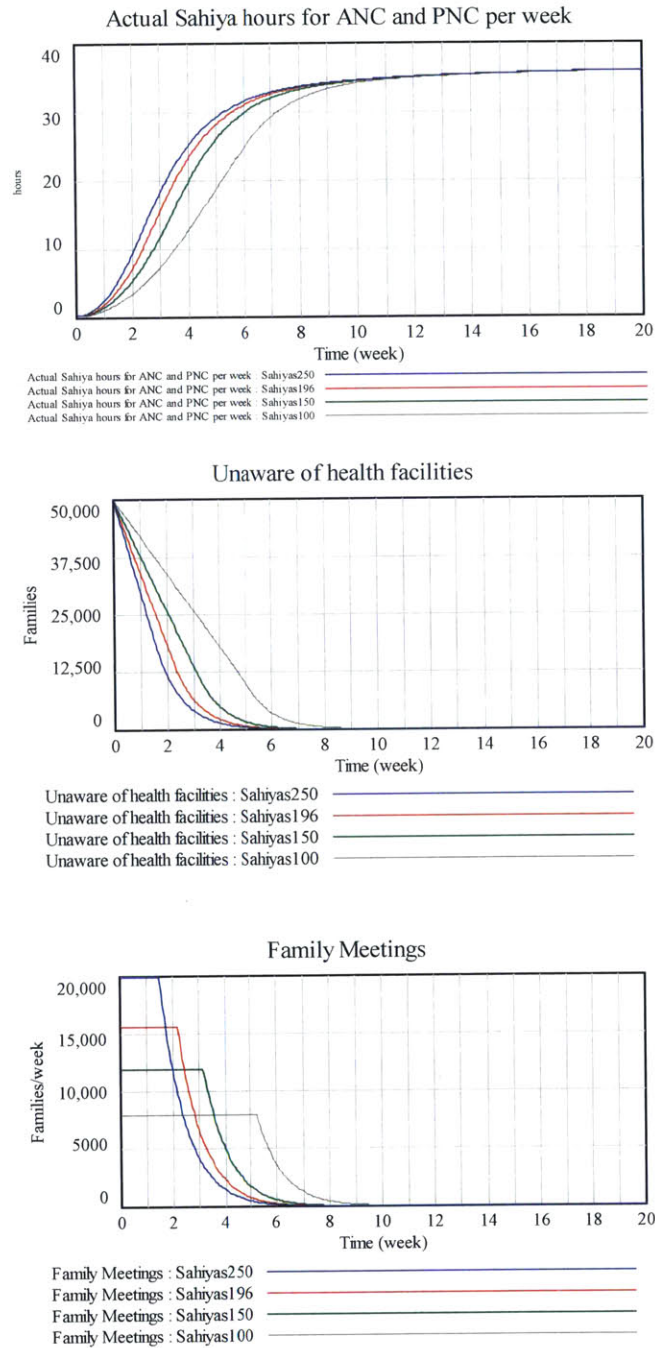


Figure 20: Variables in Advocacy Loop exponentially rise or fall over time

We can see from the variables in Figure 20 above that the optimum number of Sahiyas in this system is 150. The system variables in the advocacy loop do not gain as much with an increase from 150 to 196 or 150 to 250 as the gain from 100 to 150 Sahiyas. Please note that the time scale will be more accurate when realistic delays are included in this system. Each

sociotechnical system will have its own delays for knowledge about the health facilities to spread through the community and more research needs to be done to understand and quantify them.

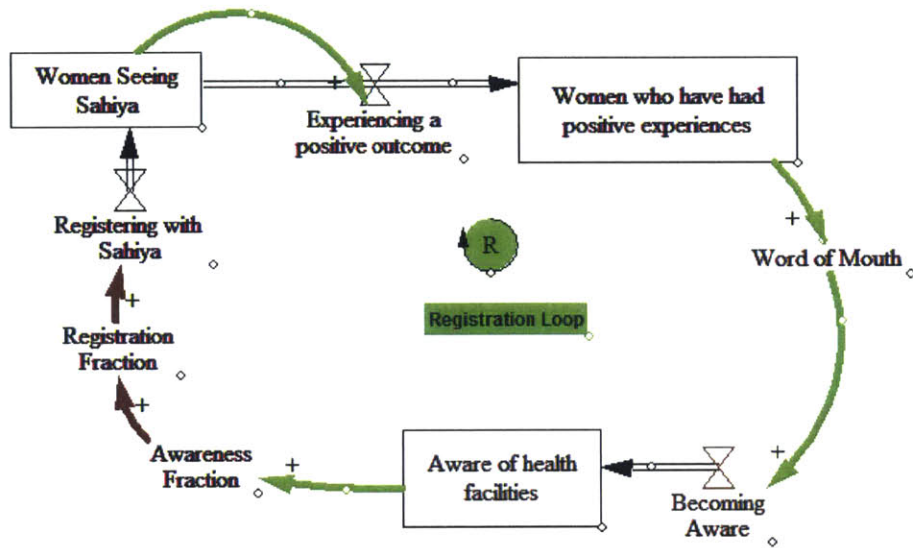
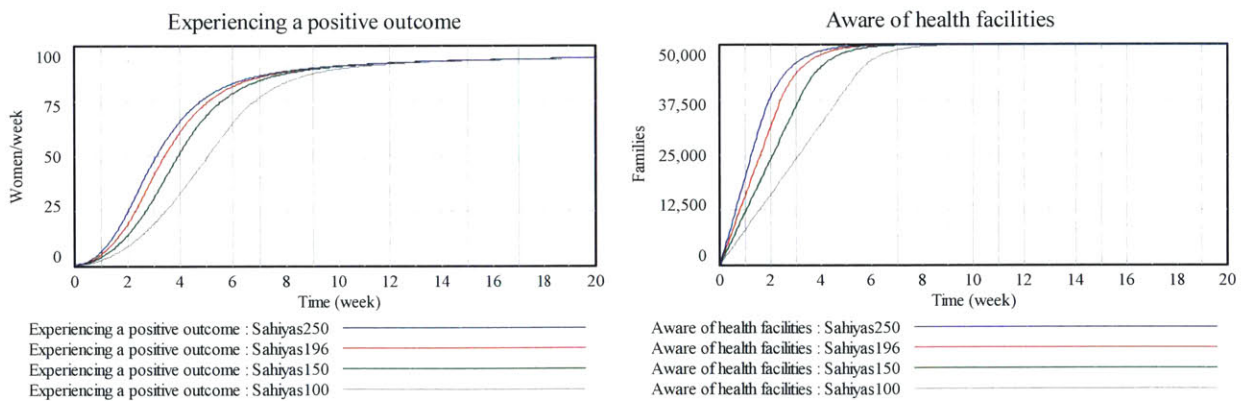


Figure 21: Registration Loop is a Reinforcing Loop

The Registration Loop in green color in Figure 21 above is a reinforcing loop. As each of the variables in this group go up they reinforce the next variable to go up exponentially as well. The response of some of the variables to the different number of Sahiyas in the system is show in Figure 22 below.



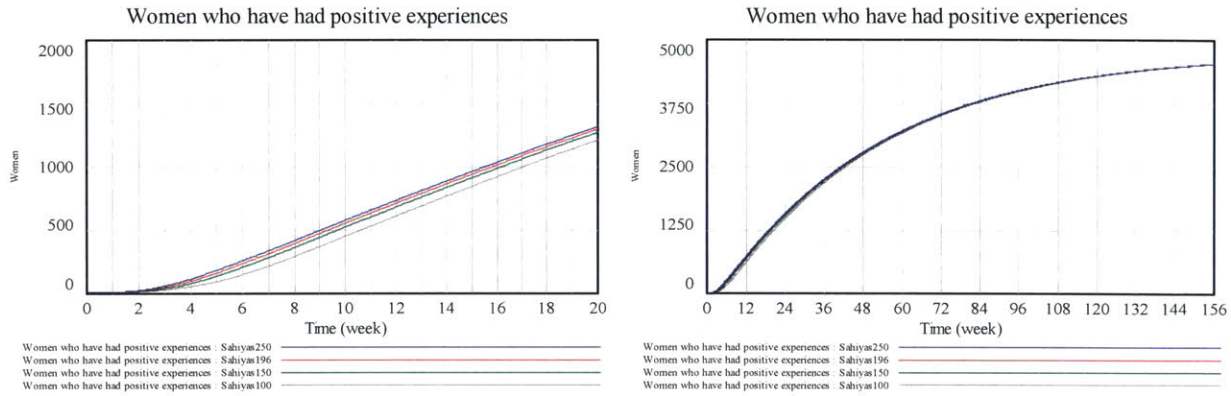


Figure 22: Variables in the Registration reinforcing loop

The values of the variables in Figure 22 above namely Experiencing a positive outcome, Aware of health facilities and Women who have had positive experiences, rise exponentially at rates determined by the Number of Sahiyas in the system. Again we see that 150 Sahiyas in the system is more optimum than 100, 196 or 250 as the time when the system reaches equilibrium is about the same when the number of Sahiyas is 150, 196 or 200. The gain that the system gets in slope and equilibrium time when increasing the number of Sahiyas from 100 to 150 is more than the gain from 150 to 250. The value of the variable Women who have had positive experiences continues to rise until it reaches equilibrium in 156 weeks (three years) as IMR and MMR improve. With more realistic delays added into this system the time scale may change.

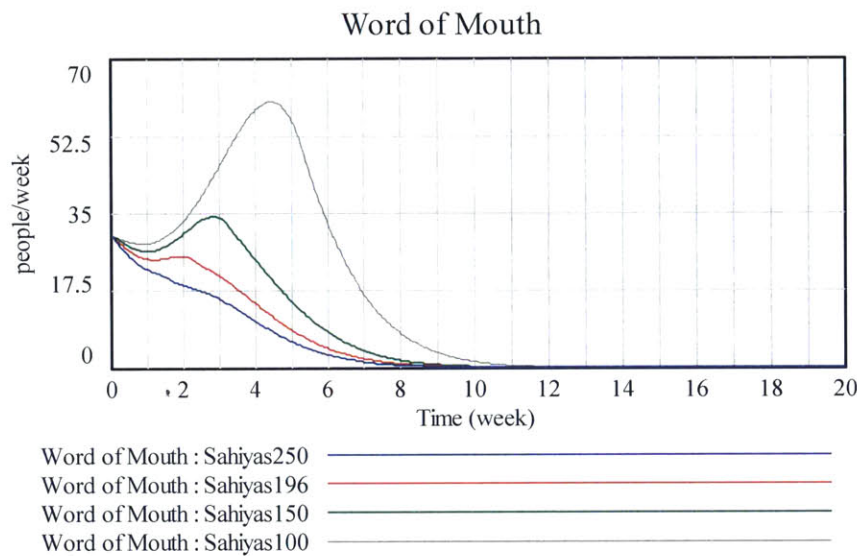


Figure 23: Word of Mouth

The Word of Mouth variable in Figure 23 above shows interesting characteristics when there are variances in the number of Sahiyas in the model. When the number of Sahiyas is 100 this variable oscillates by exponentially rising and then dampening. In this situation, Word of Mouth is rising faster as the number of hours devoted to advocacy is higher and the number of hours allocated to ANC and PNC is lower. As the number of families Unaware of the health facilities reduces and the Awareness rises, the value of this variable also comes down. We do not see oscillations of this magnitude when the number of Sahiyas is larger as the difference in the amount of time they allocate to Advocacy as compared to ANC and PNC is not that high.

Some of the limitations of this model are the assumptions of the values of the exogenous variables used because of the lack of research data. In order to improve the Sahiya model, a sensitivity analysis needs to be done for each of these exogenous variables in order to determine the reaction of the system to fluctuations in their values. Another important factor that needs to be added into this SD model is a good estimation of the delay in the sociotechnical system for information to be spread through word of mouth and influence the registration of more pregnant women. Also more research needs to go into creating a decision making strategy needs to be added to model the Sahiya decision when her hours is devoted between advocacy and ANC or PNC meetings with the pregnant woman. The effect of the women with negative experiences

needs to be considered in more detail. Cultural and social factors that limit the acceptance of the program and the effectiveness of the Sahiya need to be examined and added to the model. The system boundaries need to include the PPP, availability of supplies and training for the system to be more realistic. A SD model is very beneficial in designing the number of resources needed for a viable system. Other aspects to scaling and replicability are discussed next.

### Scalability and Replicability

As the interactions of large scale systems with the natural environment becomes increasingly more important, there is a greater need to look at the institutional and organizations constraints at the project, enterprise and societal level. Sociotechnical thinking is essential in improving our odds of favorable outcomes as the these factors of the program need to be well aligned with each other

The system is said to be complex when the number of components and the number of relationship among the components are large and difficult to understand. The MANSI system had a few levels of hierarchy and could be complicated because of the government bureaucracy and social complexity in the system, however the system as a whole was not very complex at the pilot level. However as the system is scaled or replicated the complexity will grow. In the MANSI system the existing legacy constraint of providing supplies will need to be addressed. The pilot program configuration of manually collecting data from the Sahiyas will need to be updated. A careful Lifecycle Analysis (LCA) in development, deployment and operations especially flexibility and degree of sustainability over time will need to be done.

In the system analysis section of the previous chapter we examined the System Problem Statement as ‘To improve MMR and IMR for the mother and child sustainably by implementing a rigorous type of HBNC based on community engagement through the existing health system by means of a Sahiya and Sahiya kit’. In a scaled or replicated version of this system we would want to keep the system problem statement and the basic architecture the same. However the design and management of the system needs to be updated to meet the needs of a larger population with greater diversity and therefore a more complex system.

A review of the system structural view in Figure 10 shows us that the high touch approach of all the stakeholders interacting with all the other stakeholders is confusing, creating duplicate work



and requiring additional resources. The high touch approach is not viable in a more complex scaled system as it requires a large number of resources. However it may be needed to replicate this system in another location if resources are available and the high touch approach is required to satisfy the stakeholder needs. For both scaling and replicating the system part of the core design needs to incorporate accountability as a part of the system. By adding accountability into the system the number of interactions, the need for micromanagement and duplicate monitoring activities greatly reduces. A more viable system structural view for scaling and replicability would look like the one in Figure 24 below.

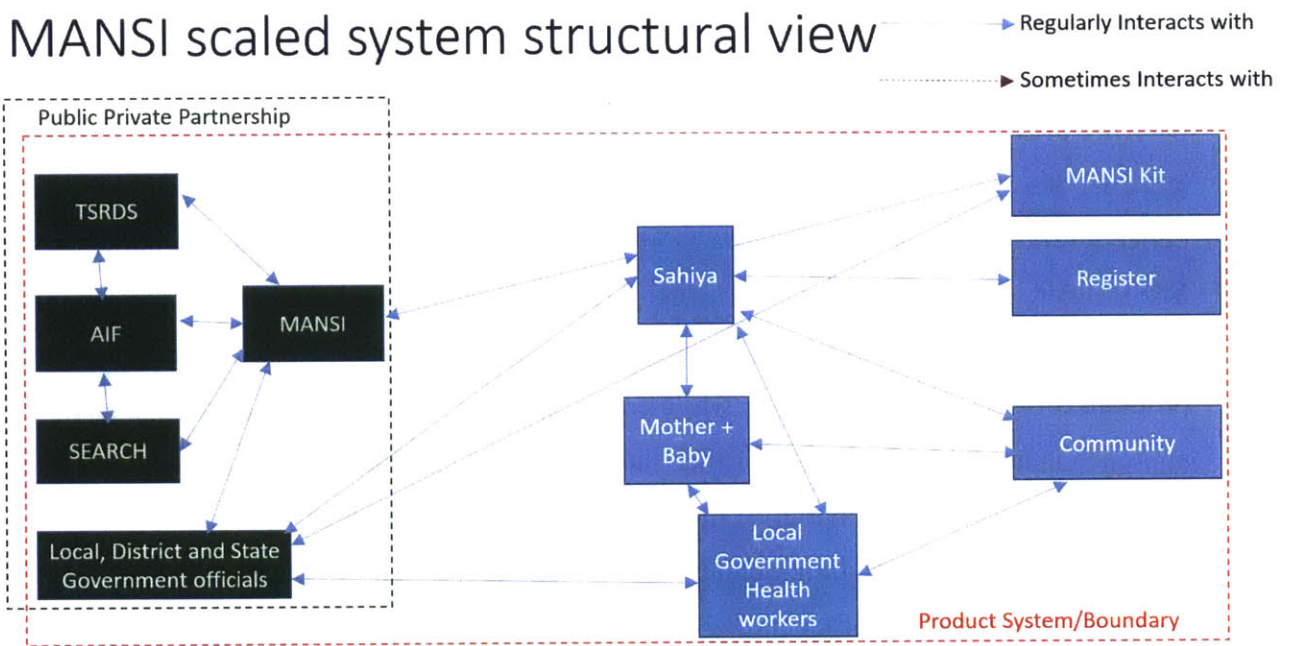


Figure 24: Scaled System Structural view

As seen in Figure 24 above the number of interactions in the system which is directly proportional to the number of resources needed in the system is greatly reduced between stakeholders. The PPP interacts with the MANSI organization and each other. The MANSI organization handles all the communication with the Sahiyas, mother and child and the community. This makes the communication and management more streamlined and clear to all parties. As accountability is increased and micromanagement is decreased between the stakeholders and the interactions between stakeholders become two way and more collaborative the system will perform better in the long run compared to having many one way monitoring type of interactions. The demand generation activities to raise awareness of health facilities and

Sahiya services need to incorporate accountability of the stakeholders for the system to be scaled or replicated.

The MANSI pilot program was designed to meet all the needs of the principal stakeholder, the mother and child, through the Sahiya using a rigorous form of HBNC. In order to scale and replicate the program, the stakeholder needs of each region in the system would require to be examined. In addition to the survey about cultural practices regarding child birth, and existing Sahiya skill set it is important to understand the strengths and weakness of each of the stakeholders. If a PPP model is going to set up, the power and interest of all the partners need to be evaluated. A PPP model works best when all the partners are in the high power and high interest quadrant and have similar needs and goals.

Data are the backbone of an organization and special emphasis needs to be placed on collection and analysis of the data in a scaled and replicated system. We saw in Figure 8 that the data collection flowed from Sahiya to the MNHM to the ZC, FC, Program manager and then to the MIS officer. In a simpler and high touch pilot system this flow of data made sense and there were many checks and balances along the way to ensure the integrity of the data. For this program to scale and be replicable while continuing to collect good quality data, a technological approach is more viable. However there are downsides to using technology in a remote area where the users may or may not be literate and have experience with a mobile device and infrastructure for electronic mobile technology may or may not be consistently available. While pros and cons of the use of technology need to be evaluated, data collection and analysis will be more seamless if technology is used to collect, transmit, store and analyze the data. If a technological approach to data collection is used then plans need to be made for training users and maintaining the devices across the system. In addition backup plans will need to be made in case of infrastructure failures that prevent the use of the mobile devices.

In a scale up or replication scenario, ideally the public sector partner would manage the logistics of training the Sahiyas, increasing demand for health services in the community and supplying the needed items in the Sahiya kit. This scenario enables trust between the community and the government health services and encourages both stakeholders to be accountable for their outcomes. The MANSI organization with all their experience and lessons learned from the pilot

program would be able to step in and support the public sector to set up and manage the infrastructure needed to make the MCH program a success.

## Scaled Network and Control Structure Mapping of information, finance and supplies

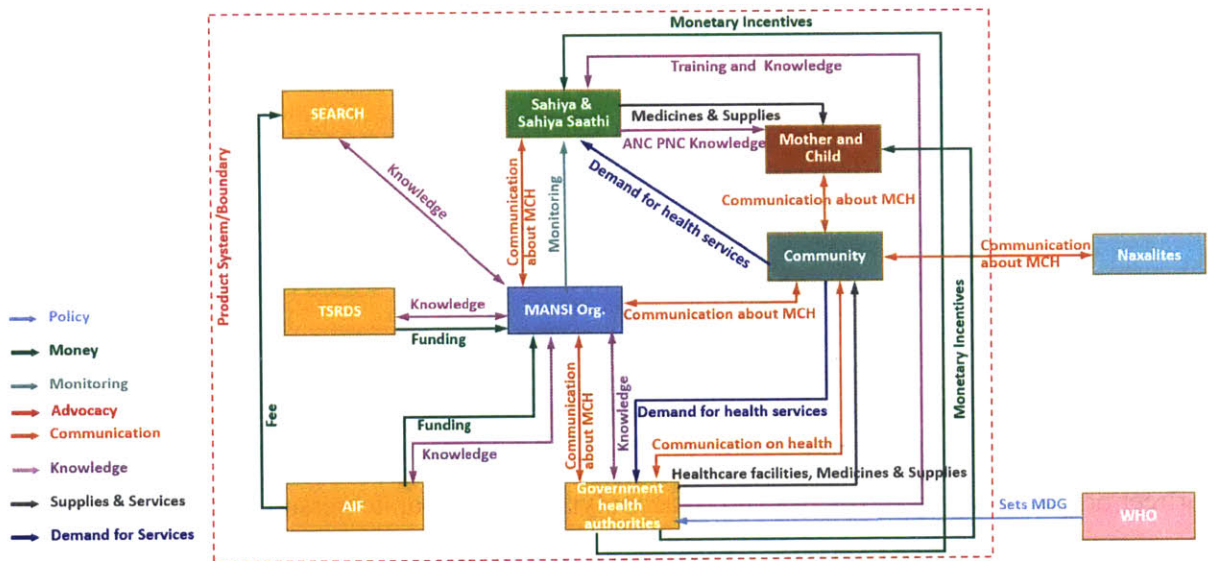


Figure 25: Stakeholders complex network of flows for scaling

In Figure 25 above we see a simpler design with less monitoring and more knowledge sharing and communication between the stakeholders compared to that of Figure 15. This is possible when there is trust and accountability in the system which enables collaboration and long-term sustainability. The scale up version of this design needs to be less complex in order to be more easily implementable as the incorporation of a larger population and diverse cultural beliefs into the program will automatically drive the system towards complexity. If the communication on health is done right by the government health authorities with the community, both community and government health authorities ideally would take responsibility of their role in MMR and IMR outcomes thus generating a higher demand for health services and lowering the level of advocacy that the Sahiya needs to perform. Also problem stakeholders, similar to the Naxalites in this situation, need to be brought into the communication about MCH so they become part of

the beneficial stakeholders. Knowledge about the design and management of the program needs to be shared among the PPP so that they learn from both successes and failures.

In order for the MANSI organization to play a support and consultant role to the government in the scaling program, the management hierarchy needs to incorporate supporting the Sahiya Saathis. Since monitoring and data analytics played a key role in the success of the pilot program, special emphasis needs to be put on this role in the scaled or replicated program. If a technological solution is chosen in the scaled up program the MIS officer's role in data collection and maintenance of the technology become very important. The updated management structure showed in Figure 26 below includes the Sahiya Saathis and the new roles for monitoring and data analytics and MIS officer at the same level as the Field Coordinator. The reason that these positions are at the same level is because in a scaled or replicated program the Monitoring, Data Analytics and Data Collection play key roles in the feedback loops that enable the success of the program. These roles are made separate from each other so as to keep the responsibilities of people and logistics on the FC, data collection and maintenance on the MIS officer and monitoring of quality and data analytics on a separate person and enable objectivity in addition to checks and balances of the incoming information.

# MANSI Management Hierarchy for Scaling

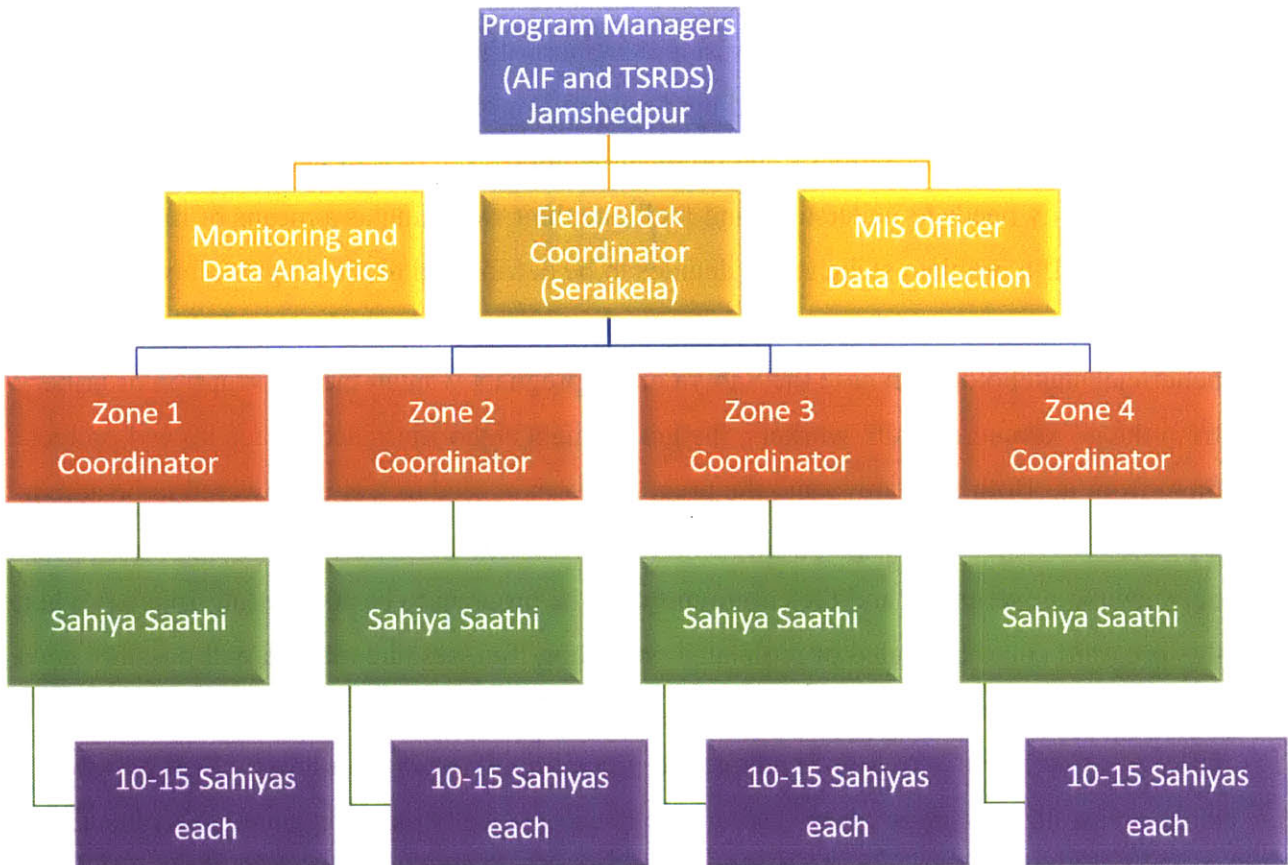


Figure 26: Scaled MANSI management hierarchy

Training needs of the personnel in the management hierarchy needs to be evaluated and conducted accordingly in order to continue to follow the rigorous and successful HBNC methods needed to improve MMR and IMR.

## Key tensions in a scaled or replicated model

As established in the last chapter, the effectiveness of Sahiya was a key part of the architecture and design of the program as well as planning and logistics. Here the monitoring and data analytics role plays an important part in making sure that the Sahiyas' effectiveness continues to rise through training, availability of supplies and effective communication with the community and the government. Since the Sahiyas depend on the ANM's for injectables, their relationships

need to be nurtured by the program. Culture, language, caste and religious differences between Sahiyas and the pregnant women they are working with can be strong in certain areas which can cause a problem. The scaled or replicated program needs to be designed to overcome these problems so that the Sahiya has the trust and support of the community no matter what her language, caste or religion may be. If the program is replicated in an area torn with civil or communal violence, the Sahiya's and pregnant women's safety is of paramount importance and the community needs to understand and facilitate their wellbeing as a means of improving IMR and MMR. If a problem stakeholder decides to be detrimental to the program, both community and government authorities need to work together to convert the problem stakeholder to a beneficial stakeholder. In case the Sahiya or the pregnant woman faces corruption or bribery from the government health workers, the government authorities need to step up and protect them from it. Both the Sahiya and the pregnant woman need to feel empowered to be able to report the corruption to the government authorities. Trust and accountability need to be fostered between the government and the community for the program to be successful. In areas where this program could be scaled or replicated prevailing illnesses like malaria will possibly need additions to the Sahiya kit and new training for the Sahiya. The government authorities need to make sure the HBNC program is adapted to prevailing illnesses to improve MMR and IMR in those areas. In new areas where the barriers of acceptance to the Sahiya are higher because of traditional patriarchal practices of young women being subdued and home bound more effort needs to be put in by the organization and the government health authorities to include the men of the community in the demand generation and training so they appreciate the important role their wives play in the community as Sahiyas and pregnant women. Some Sahiyas in the pilot program had to leave their role because of family pressures. Including the family in the HBNC training could reduce such situations.

To achieve long-term balance of a program, there is a need for a stable population with no accelerating growth and consistent geographic distribution, availability of renewable energy sources and steady consumption, ability to reuse and recycle everything, a world in equilibrium with no climate change accelerating unabated, no growing inequities, no mass starvation, and no depopulation and wars.

The next chapter discusses the conclusions and recommendations for success of a scaled or replicated program.

## CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

India did not meet the MDG 4 and 5a targets in reducing IMR and MMR by 2015 even though some successful programs were individually able to meet the goals in specific areas. A recent World Bank study finds that nearly half of the 155 countries lack adequate data to monitor the poor who are often invisible (“The UN MDG Report 2015,” n.d.). While the global under-five mortality rate has declined by more than half, dropping from 90 to 43 deaths per 1,000 live births between 1990 and 2015, there is work to be done to reach MDG 4 global target of less than 32 deaths per 1000 live births. In 2015, every day, 16,000 children under five continue to die mostly from preventable causes in sub-Saharan Africa, Oceania, and Southern and Central Asia. The global MMR reduced 45% from 1990 to 2013 but needs to go down another 50% in order to meet MDG 5 targets. There were an estimated 289,000 maternal deaths globally in 2013, equivalent to about 800 women dying each day concentrated in sub-Saharan Africa and Southern Asia also from mostly preventable causes. National and international organizations like the WHO and World Bank as well as NGO’s continue to focus on and fund the effort of reducing IMR and MMR. A low cost community based successful PPP operation, namely the MANSI program, can be effectively implemented in partnerships with the local government to reach the poorer and rural population in other parts of India and the world. The MANSI success suggests that we can expect a reduction of 32.7% reduction in neonatal mortality, 26.5% reduction in IMR and 50% increase in hospital births in a scaled and replicated area. Some of the complexities of implementing this program in another part of India, and system and policy recommendations for success are highlighted next.

### Complexities of implementing the program in India

Most of India is still a strong patriarchal society with inequities by gender, caste, literacy, religion or locality (“Social determinants of health in India: progress and inequities across stat...: BartonPlus,” n.d.). The social inequalities are a huge determinant to access of healthcare. The MANSI program works well because it makes basic healthcare available to rural women regardless of caste and religion. However caste and gender discrimination were not strong in the Seraikela area where the pilot program was implemented. In areas where the female is considered low status and caste plays a stronger role in the social fabric, these issues will have to be tackled through advocacy in order for a community based program to be successful.



Corruption in the public sector is high in India and there is a lack of trust and accountability which also is a factor to availability of healthcare (“Corruption ruins the doctor-patient relationship in India.: BartonPlus,” n.d.). The public and private sectors in many areas are also not inclined to work with each other in a PPP mode due to bureaucracy and politics. The PPP worked well for the MANSI program in the Seraikela area where Tata Steel had the trust of the local citizens and good relationships with the local government authorities to address and overcome corruption in delivery of healthcare as well as ensure accountability in the system. In areas of low accountability, high lack of trust and corruption these issues will have to be dealt with, possibly through social audit, to ensure a sustainable and successful program.

Consistent availability of training, supplies, monitoring and focus on community appear crucial and should alleviate failures that occurred in similar community health worker based programs in Pakistan. Recommendations for success from both a system and policy lens are discussed next.

#### System Recommendations for success

The main pillars of success of the MANSI program were training, monitoring, support (advocacy, supervision, incentives and community recognition) and reliable supplies. In order to replicate or scale the success in achieving a reduction in IMR and MMR by the MANSI pilot program

Table 7 below lists recommendations for each stakeholder during each phase of the program with its corresponding relative cost:

<b>Stakeholders/ Timeline</b>	<b>Planning Phase</b>	<b>Implementation- First Phase</b>	<b>Implementation- Middle Phase</b>	<b>Implementation- Final Phase</b>
<b>Mother and child</b>	Needs and Traditional practices Assessment \$	Register, Educate, set up ANC and PNC, Advocacy, Empowerment \$\$\$	Register, Educate, ANC and PNC, Advocacy, Empowerment \$\$	Register, Educate, set up ANC and PNC, Advocacy, Empowerment \$\$
<b>Sahiya</b>	Needs and Training Assessment	Training on rigorous HBNC	Refresher training, Support, supplies,	Refresher training, Support, supplies,

<b>Stakeholders/ Timeline</b>	<b>Planning Phase</b>	<b>Implementation- First Phase</b>	<b>Implementation- Middle Phase</b>	<b>Implementation- Final Phase</b>
	\$	methods, Empowerment \$\$	rewards and monitoring \$\$	rewards and monitoring \$\$
<b>Community</b>	Needs and Traditional practices Assessment \$	Demand generation, advocacy, training, build trust and accountability \$\$	Advocacy, training, empowerment, build trust and accountability \$\$	Advocacy, empowerment, build trust and accountability \$
<b>Government</b>	Needs, Infrastructure and Policy Assessment \$	Setting up and Implementing policy, training, infrastructure, and supplies. Building trust and accountability \$\$\$	Managing infrastructure, supplies, program management, demand generation, building trust and accountability \$\$	Managing infrastructure, technology, management, supplies, analytics, education, demand generation, building trust and accountability \$\$
<b>Non- Government Partners</b>	Needs, Resources and Partner Assessment \$	Setting up and Implementing technology, management, supplies, training, monitoring, support, analytics, demand generation,	Monitoring technology, management, supplies, training, support, analytics, demand generation, education. Building trust and accountability	Hand over to local government for long-term sustainability \$

Stakeholders/ Timeline	Planning Phase	Implementation- First Phase	Implementation- Middle Phase	Implementation- Final Phase
		education. Building trust and accountability \$\$\$	\$\$	
<b>Problem Stakeholders</b>	Needs, Power and Interest Assessment \$	Partners to manage these stakeholders \$	Partners to manage these stakeholders \$	Partners to manage these stakeholders \$

Table 7: Stakeholder tasks per phase

In order to improve the MANSI system, we recommend the following big picture topics to be incorporated in the system design and management:

**Building Community:**

- ❖ Include public sector and village health authorities in the Sahiya training.
- ❖ Integrate men and mother-in-laws in the new mother training.
- ❖ Build an ecosystem that includes support for better education and livelihood.
- ❖ Monthly community meetings can be used as a platform for the reinforcement of various aspects of child health.

**Boosting Empowerment:**

- ❖ Empower the women, families, and communities to speak up for their newborn babies and to challenge social norms that accept these deaths as inevitable.

**Continuity of Healthcare:**

- ❖ Monitor the child until 5 years of age.
- ❖ The government should regulate, qualify and integrate non-degree allopathic practitioners. (NDAPs) as part of the existing public health care system in India (May, Roth, & Panda, 2014).

- ❖ Increasing numbers of health worker and skills with attention to high-quality childbirth care for newborn babies as well as mothers and children (Mason et al., 2014).

#### **Applying Technology:**

- ❖ Utilize electronic medical records in partnership with Primary Healthcare Clinic to monitor mother and child over time.
- ❖ Use of audio visual aids for information and education in behavior change communication.

#### **Continuity of Sahiya Training:**

- ❖ In the future Sahiya training sessions, more emphasis should be given to high risk cases requiring prompt referral (Shrivastava & Shrivastava, 2012).

#### **Demand Generation:**

- ❖ To capture the imagination of the families, use songs to teach healthcare methods.
- ❖ Get film stars and cricketers involved as people hero worship them.
- ❖ Create comics and stories to improve health outcomes.

#### **Increasing Political involvement:**

- ❖ Increased political attention and leadership to address high mortality rates.
- ❖ Include local governance at the panchayat level.

#### **Improving Financing:**

- ❖ Focus on investment to better mortality outcomes as well as harmonization of funding (Akseer et al., 2015) between the PPP.
- ❖ Franchise model: The existing MANSI model could be franchised to other government or nonprofit groups to facilitate large scale replicability and scalability of the program to improve IMR and MMR and meet the WHO's MDG goals in different parts of the world. The MANSI organization has experience with running a successful pilot program and could play a support and consultant role in a scaled or replicated system in another area. In order for the program to be sustainable the public sector needs to step in and provide the supplies and infrastructure for the MCH program.

The next topic discusses the policy recommendations for success of a scaled or replicated MANSI program

#### Policy Recommendations for Success

Policies to be included in the scaling and replication of this program are improving community engagement and demand for better health services from the public sector, first line access to healthcare for the villagers through community health workers trained in MCH practices, focus on ante-natal and post-natal care to include good nutrition, hygienic practices, immunizations, aseptic techniques and regular checkups. Health systems need to be strengthened in the public sector to emphasize health workforce, information systems, pharmaceutical management, and infrastructure development (“The U.S. Government and Global Maternal & Child Health | The Henry J. Kaiser Family Foundation,” n.d.).

The following is a policy guide for implementing essential MCH interventions based on the existing WHO program recommendations (“A policy guide for implementing essential interventions for MCH,” n.d.) that will facilitate improved healthcare for the rural community. Some of these policies have been articulated by the NRHM and need to be implemented on a larger scale. The recommendations on policies, below in

Table 8 focuses on MCH as well as general policies for the wellbeing of the community.

<b>Policy Topic Area</b>	<b>Policy on:</b>	<b>Stakeholder</b>
Constitutional and Legal Entitlements	Universal Access to MCH healthcare	Government + PPP \$\$\$
Strategies, plans to guide MCH care	NRHM strategies and plans to include MCH	NRHM
Human rights approach to MCH	MCH programming to include human rights approach	Government + PPP \$
Allocation of financial resources	Sustainable financing for MCH	Government + PPP \$\$\$
Human Resources	Training, Certification, accreditation, deployment and retention of MCH workers	Government \$\$
Health Infrastructure	Essential MCH facilities	Government \$\$\$

<b>Policy Topic Area</b>	<b>Policy on:</b>	<b>Stakeholder</b>
Medicines and supplies	Essential MCH medical, supply and equipment list	Government + PPP \$
MCH Quality	Standards of quality of MCH care Supportive supervision of all MCH health workers Community participation Community mobilization and MCH education	Government + PPP + Community \$
Collection and use of data	Birth and death registration Health information systems for data storage and analytics Defining key MCH indicators Data review process	Government + PPP \$
Economic development	Reducing Inequalities	Government + PPP \$
Social Development	Adequate nutrition Quality education Social protection Gender Equality	Government + PPP \$
Environmental sustainability	Safe and affordable drinking water Adequate sanitation	Government \$\$
Peace and security	Freedom from violence and abuse	Government + PPP \$
Infrastructure for development	Communication technologies	Government + PPP \$
Obligation and duties	Standards of behavior Respect and fulfillment of human rights	Government + PPP + Community \$
Good governance	Voice and accountability Government effectiveness Control of corruption Rule of law	Government + PPP + Community \$\$

Table 8: Recommended Policies

This study recommends the MANSI program as an effective and successful program based on reduction in IMR and MMR, high benefit-to-cost ratio and the ability to save lives for the cost of \$25 per mother and child. The members of the MANSI organization are a good consultant on

scaling and replication of a PPP in another area of implementation. In this program the PPP facilitated the accountability and trust between the stakeholders and in many political situations/nation states a third party may be needed to implement the program and build the accountability and trust for the system to function at an optimum level. However the community engagement and demand for better health services needs to be a grassroots program with invested interest and energy from the villagers. With the right systems and policy in place, the MCH program ideally needs to be a government platform that is able to run without the aid of an NGO or third party.

APPENDIX A

**MANSI Project MIS**

**Monthly Report- Zone wise, Month**

<b>Sr No.</b>	<b>Indicators</b>	<b>Zon e -1</b>	<b>Zon e - 2</b>	<b>Zon e - 3</b>	<b>Zon e- 4</b>	<b>Total</b>
<b>A</b>	<b>Coverage</b>					
1	No of women in the list at the end of the month who are eligible to become pregnant					
2	No of Pregnant women in the list / register at the end of the month(last)					
3	No of Pregnant women in the list / register at end of month who are not resident of village ( out of A4+A2)					
4	No of Pregnant Women registered under HSC/ANM/AWW /ASHA/CHW this month					
5	No of Pregnant women registered within 1st trimester ( out of A4)					
6	No of pregnant women registered in this month under JSY ( out of A4)					
<b>B</b>	<b>Services</b>					
1	No of Pregnant women having completed 8 months					
2	No of pregnant women given TT1 (out of B1)					
3	No of pregnant women given TT 2 or Booster (out of B1 )					
4	No of pregnant women received 100 IFA tablet (out of B1)					
5	No of women received at least 3 ANC checkup (BP,Abdomen, weight) (out of B1)					
6	No of women with Hypertension ( BP > 140 / 90 ) (out of B5)					
7	No of Pregnant women tested for Hb (out of B5)					



8	No of Pregnant women having Hb less than 8 (tested cases) out of B7					
9	No of pregnancy case referred from MANSI during the month					
10	No of Post-Partum case referred from MANSI ( within 6 wks of delivery) during the month					
11	No of high risk pregnant mothers					
<b>C</b>	<b>Health education of pregnant women</b>					
1	Women who have completed 4-5 months of pregnancy					
2	No of women who have received health education once (out of C1)					
3	Women who have completed 6-7 months of pregnancy					
4	No of women who have received health education once (out of C3)					
5	No of women who have received health education twice (out of C3)					
6	Women who have completed 8-9 months					
7	No of women who have received health education once (out of C6)					
8	No of women who have received health education twice (out of C6)					
9	No of women who have received health education three times (out of C6)					
<b>D</b>	<b>Delivery</b>					
1	No of deliveries reported this month (D5+D12+D13+D14+D15+D16) + Previous left outs					
2	No of deliveries of women not resident of the village ( out of D1)					
3	No of deliveries in the village in this month (D5+D12+D13+D14+D15+D16)					

4	No of deliveries of women not resident of the village ( Out of D3)					
5	No of home deliveries in the village (out of D1)					
6	No of deliveries for which Sahiyya was present (out of D5)					
7	No of neonates for whom first examination by the Sahiyya could be done within 6 hours (out of D5)					
8	No of neonates who received breast feeding on the first hour (out of D5)					
9	No of neonates who received breast feeding within 1 to 24 hours (out of D5)					
10	No of neonates who received breast feeding after 24 hours (out of D5)					
11	No of deliveries in sub-centre (out of D3)					
12	No of deliveries in PHC (out of D3)					
13	No of deliveries in Dist Sadar Hospital (out of D3)					
14	No of deliveries in the Pvt Nursing Home (out of D3)					
15	No of deliveries at MGM medical college /TATA Main Hospital (out of D3)					
16	No of deliveries in SC/PHC/Sadar Hospital accompanied by Sahiya and was present in delivery room (out of D12 + D13 + D 14)					
<b>E</b>	<b>MMJSY</b>					
1	No of total deliveries in the list/register at the end of the month (cumulative)					
2	No of mothers who have received MMJSY incentive within 28 days (out of E1)					
3	No of mothers who have received MMJSY incentive after 28 days (out of E1)					
<b>F</b>	<b>Pregnancy Outcome</b>					

1	No of Live Birth					
2	Stilll Birth					
3	Number of abortions by the end of this month					
4	No of new born weighed at birth ( out of F1)					
5	No of New born weighed from 2.0 kg to less than 2.5 kg ( out of F1)					
6	No of New born weighed less than 2.0 kg ( out of F1)					
7	No of New born with preterm ( 8 months - 14 days) ( out of F1)					
8	No of neonatal deaths (within 28 days of delivery) ( out of F1)					
9	No of Maternal deaths ( intra and postpartum period) ( out of A2+A4)					
10	No of birth certificates issued by PRI within this month					
11	No of birth certificates issued by PRI till this month					
<b>G</b>	<b>Information on visits</b>					
1	No of home cared neonates with completed pregnancy and HBNC forms ( up to 42 days) in the month of report					
2	How many neonates did not receive scheduled visits in the current forms					
<b>H</b>	<b>Information regarding equipment's and supplies</b>					
1	No. of non-functional thermometers in this month					
2	No of man-days for which thermometers were non functional					
3	No of non-functional weighing scales in this month					
4	No of man-days for which weighing scales were non functional					
5	Stock of Paracetamol at the end of month					

6	Stock of Co-trimoxazole at the end of month					
7	Stock of eye ointment at the end of month					
8	Stock of Gentian Violet paint at the end of month					
9	Stock of Sterilized cotton at the end of month					
10	Stock of Spirit at the end of month					
11	Stock of Mucus extractor at the end of month					
12	Health Education flip chart in use in good condition					
13	Stock of Blankets for neonates at the end of month					
14	Stock of Warm sleeping bag for neonates at the end of month					
15	Trunk use for project purpose or not					
16	Stock pregnancy form					
17	Stock HBNC form					
<b>I</b>	<b>Visits by Supervisors</b>					
1	No of visits to Sahiyya during the month					
2	Total number of neonates in the village					
3	Number of neonates visited in the month( at least once) (out of K2)					
4	Total number of neonates in the village who completed 28 days					
5	No of High risk babies to be follow up in 2nd month					
<b>J</b>	<b>Case Management and Referrals</b>					
1	No of neonates given <i>Vitamin K in health institution</i> during this month					
2	No of <i>High Risk neonates</i> identified during this month					
3	No of babies had <i>breathing problem at birth in home deliveries</i> during this month					

3a	Use of <b>Mucus Extractor</b> only in home deliveries during this month					
4	No of <b>Hypothermia</b> case identified during this month					
5	No of babies had <b>breast feeding problem</b> during this month					
6	No of babies diagnosed with <b>Sepsis</b> during this month					
6a	No of cases in which <b>Guardian consent</b> obtained for Sepsis treatment.					
6b	No of <b>Sepsis case treated with Cotrimoxazole</b> during this month					
6c	No of <b>Sepsis case referred</b> and got treatment from (mention name) hospital during this month					
6d	No of Sepsis case in which treatment done during this month					
7	No of <b>Pneumonia cases in neonates diagnosed with chest indrawing</b> during this month					
7a	No of such cases treated with Cotrimoxazole during this month					
8	No of case identified with <b>pus in the cord</b> during this month					
9	No of case identified with <b>pus in the eyes</b> during this month					
10	No of cases identified with diarrhea and sent to hospital during this month					
11	No of babies for which second month form is filled during this month					
12	Total no of mother and newborn form submitted to ZC/FC this month					
<b>K</b>	MIS (for Child in age group 2 months till 5yrs of age)					

<b>Pneumonia</b>						
1	No. of cases diagnosed with Pneumonia/severe pneumonia					
2	No. of cases where Sahiyya was not able to diagnosed					
3	No. of such cases treated for Pneumonia with Cotrimoxazole					
4	No. of pneumonia cases in which dose of medicine was not completed					
5	No. of Cases cured					
6	Cases for which Sahiyya has filled form completely and correctly					
7	No. of cases in which Sahiyya did not make follow up visit after treatment					
8	No. of severe pneumonia cases treated with cotrimoxazole & referred					
9	No. of severe pneumonia cases in which dose of medicine was not completed					
10	No. of severe pneumonia cases recovered from illness after treatment					
11	No. of deaths due to Pneumonia/ severe pneumonia					
12	No. of pneumonia deaths in which the baby was not visited by the Sahaiyya					
<b>Diarrhoea</b>						
13	No. of children identified of Diarrhoea / mild dehydration					
14	No. of cases where Sahiyya was not able to diagnosed					
15	No. of children given ORS					
16	No. of children with Severe Diarrhea / Dysentery					
17	No. of such children treated and referred					

18	No. of child death due to severe diarrhoea / dysentery					
19	No. of case with mild, severe dehydration – Diarrhea and Dysentery cured					
20	No. of Sahiyyas not having medicine(ORS)					
	<b>Fever</b>					
21	No. of children assessed having fever					
22	No. of children given treatment with Paracetamol					
23	No. of child death due to fever					
24	No. of Sahiyya not having Paracetamol					
	<b>Malaria</b>					
25	No. of children diagnosed with malaria					
26	No. of children given treatment for malaria					
27	No. of children referred					
28	No. of child death due to malaria					
	<b>Anaemia</b>					
29	No. of Child identified having Anaemia					
30	No. of children given pediatric small IFA (100 tablets) / and Albendazole					
31	No. of Children with severe Anaemia referred					

APPENDIX B  
(Pregnancy, n.d.)

**Modules and sessions of ASHA/SAHAIYA training for HBNCC**

**Training Workshop 1**

Module 1: Introduction to Newborn Health and Care

Session 1: Welcoming ASHAs to Home Based Newborn and Child Care (HBNCC)

Session 2: Local customs and terminology about pregnancy childbirth and newborns

Session 3: Introduction to Home-Based Newborn Care

Module 2: Working in the Community and Home-visiting During Pregnancy

Session 1: Working in the community

Session 2: Talking with women in the community (practice)

Session 3: Preparing the ‘List of women who are eligible to become pregnant’

Session 4: Preparing the register to record the ‘List of women who are eligible to become pregnant’

Session 5: Determining the date of last menstrual period (LMP)

Session 6: Determining the expected date of delivery (EDD)

Session 7: Preparing the list of pregnant women

Session 8: Home visiting and use of the Pregnancy Form - Part 1

Session 9: Home visiting and use of the Pregnancy Form - Part 2

Session 10: Health problems during pregnancy and referral

Session 11: Counseling cards: Health education during antenatal visits

Session 12: Using visual aids in antenatal care

Session 13: Field practice and use of the Pregnancy Form

Session 14: How the ASHA relates to the Traditional Birth Attendant (TBA)

Session 15: Qualities of an ideal ASHA

**Training Workshop 1: Summary and Planning for work in the community**

**Training Workshop 2**

Module 3: Observing Labor and the Newborn at Birth

Session 1: Review of field experience after the Training Workshop 1 (Modules 1 and 2)



Session 2: Time recording by using digital wrist watch

Session 3: What happens during labor and birth?

Session 4: Maternal care: Introduction to obstetric emergencies

Session 5: Maternal Care: Readiness for Emergencies

Session 6: Labor and birth: Completing the Delivery Form: (items 1 to 8)

Session 7: Observing the baby at 30 seconds and 5 minutes and completing the Delivery Form: (items 9a to 13)

#### Module 4: First Examination of the Newborn

Session 1: Cleanliness and handwashing by the ASHA

Session 2: How to measure the newborn temperature

Session 3: Evaluation of newborn breathing

Session 4: How to weigh the newborn

Session 5: First Examination of the Newborn: Form Part I

Session 6: First Examination of the Newborn: Form Part II

#### Module 5: Making Home Visits to Newborns and Mothers

Session 1: Home visits and the Home Visit Form

Session 2: Field visit and fill in the Forms: First Examination of the Newborn and the Home Visit

Session 3: Case presentation: Evaluating the ability to fill in the Home Visit Form

Session 4: Care of the eyes, umbilical cord and skin

#### Module 6: Interpersonal Communication

Session 1: Introduction and components

Session 2: Asking questions

Session 3: Listening

Session 4: Sharing health information and advising on care

Session 5: Interpersonal communication: Assessment

### **Training Workshop 2: Summary and Planning for work in the community**

### **Training Workshop 3**

#### Module 7: Breastfeeding

Session 1: Review of field experience after Training Workshop 2 (Modules 3, 4, 5 and 6)

Session 2: Local breastfeeding customs and beliefs

Session 3: How breast milk is made

Session 4: Effective breastfeeding practices

Session 5: How to breastfeed: Latch-on and positioning

Session 6: Managing breastfeeding problems

Session 7: Helping with breastfeeding and expressing milk

Session 8: Providing breastfeeding support

Session 9: Counseling for breastfeeding

#### Module 8: Thermal Control

Session 1: Why keep the newborn warm?

Session 2: How to keep the newborn warm

Session 3: How to re-warm a cold baby

Session 4: Control of newborn temperature in hot weather and management of fever

#### Module 9: Management of Sick Child and Counseling for Immunization & Nutrition (IMCI)

##### Module 9A: Assess and Classify

Session 1: Common childhood problems and the case management process in a sick child

Session 2: Assessment and classification of the sick child: Assess and classify danger signs

Session 3: Assessment and classification of the sick child: Assess and classify cough or difficult breathing

Session 4: Assessment and classification of the sick child: Assess and classify diarrhea

Session 5: Assessment and classification of the sick child: Assess and classify fever

Session 6: Assessment and classification of the sick child: Check for malnutrition

Session 7: Assessment and classification of the sick child: Anemia, and checking immunization, vitamin A and iron status

Session 8: Assessment for classification

#### **Training Workshop 3: Summary and Planning for work in the community**

#### **Training Workshop 4**

#### Module 10: Injecting Vitamin K

Session 1: Review of field experiences after the Training Workshop 3 (Modules 7, 8, and 9)

Session 2: Vitamin K

Session 3: The syringe

Session 4: Giving an injection

Session 5: Safe injection practice and injection waste disposal

Session 6: Giving an injection: Practice and assessment

#### Module 11: High-Risk Assessment and the Management of Low Birth Weight/Preterm Babies

Session 1: Low birth weight/ preterm and its risks

Session 2: How to care for the LBW/ preterm newborn

Session 3: Explaining care of LBW infant to mothers

Session 4: High-risk babies

#### Module 12: Birth Asphyxia: Diagnosis and Early Management with Mucus Extractor

Session 1: How to identify an asphyxiated baby at birth

Session 2: Managing asphyxia - Step 1: Using the mucus extractor

Session 3: Assessment: Diagnosis and early management of birth asphyxia

#### Module 13: Neonatal Sepsis: Diagnosis and Management with cotrimoxazole

Session 1: Diagnosing neonatal sepsis

Session 2: Treating neonatal sepsis

Session 3: Management of newborns with chest in-drawing

Session 4: Filling in the forms

Session 5: Assessment: Case study

#### **Training Workshop 4: Summary and Planning for work in the community**

#### **Training Workshop 5**

#### Revision, Practice and Evaluation of Training Workshops 1 to 4

Session 1: Revise and evaluate the contents and skills from the training workshops 1 and 2

Session 2: Revise the contents and skills from the training workshops 3 and 4

Evaluation of ASHAs: Training Workshops 1 to 4

Session 1: Knowledge evaluation: Training Workshops 1 to 4

Session 2: Evaluate skill competencies learned during Training Workshops 1 to 4

### **Training Workshop 6**

#### Module 9: Management of Sick Child and Counseling for Immunization & Nutrition (IMCI)

##### Module 9B: Identifying treatment and giving treatment before referral

Session 1: Evaluation of participants and recapulation of previous training

Session 2: Identify treatment and give treatment / advice before referral

Session 3: Treat the child: Referral issues

Session 4: Treat the child: Treatment with medicines at home i) Treat pneumonia / dysentery with cotrimoxazole

Session 5: Treat the child: Treatment with medicines at home ii) Treat diarrhea with dehydration by using Oral Rehydration Salt (ORS) solution (Plan B)

Session 6: Treat the child: Treatment with medicines at home iii) Treat high fever and anemia

Session 7: Home care

#### Module 14: Birth Asphyxia: Diagnosis and Management

Session 1: Review of field experiences after the Training Workshop 5 (Revision, Evaluation and Module 9b)

Session 2: Revise diagnosis and first step in management of asphyxia

Session 3: Assessment: Diagnosis and management of birth asphyxia

#### Module 15: Neonatal Sepsis: Revision of Diagnosis and Management with antibiotic cotrimoxazole

Session 1: Revisiting diagnosis of neonatal sepsis and treating with cotrimoxazole

Session 2: Filling in the forms

Session 3: Assessment of sepsis management

#### Module 16: Final Steps in the Training for Newborn Care

Session 1: Review of field experience after Training Workshop 5

Session 2: Final assessment of ASHAs for the management of asphyxia and sepsis

Session 3: Referral of sick newborn and mother

Session 4: Review of mother-newborn records

Session 5: Organizing group health education

Session 6: Use of counseling cards on continued care of baby

Module 9: Management of Sick Child and Counseling for Immunization & Nutrition (IMCI)

Module 9C: Counseling and Follow-up

Session 1: Assessment of child's feeding and identification of feeding problems

Session 2: Feeding recommendations

Session 3: Counsel the mother on feeding

Session 4: Follow up

**Assessment of ASHAs**

At the completion of:

Module 9A: Assess and classify sick child

Module 9B: Identifying treatment and giving treatment before referral

Module 9C: Counseling and follow up

Training Workshop 6: Summary and Planning for work in the community

## BIBLIOGRAPHY

- A policy guide for implementing essential interventions for MCH. (n.d.). Retrieved November 10, 2015, from [http://www.who.int/pmnch/knowledge/publications/policy\\_compendium.pdf](http://www.who.int/pmnch/knowledge/publications/policy_compendium.pdf)
- Akseer, N., Lawn, J. E., Keenan, W., Konstantopoulos, A., Cooper, P., Ismail, Z., ... Bhutta, Z. A. (2015). Ending preventable newborn deaths in a generation. *International Journal of Gynecology & Obstetrics*, *131*, S43–S48. <http://doi.org/10.1016/j.ijgo.2015.03.017>
- Arora, N., Dasgupta, R., Singh, S., Rai, S., Das, M., & Devi, R. (2011). Determinants of utilization of services under MMJSSA scheme in Jharkhand 'Client Perspective': A qualitative study in a low performing state of India. *Indian Journal of Public Health*, *55*(4), 252. <http://doi.org/10.4103/0019-557X.92400>
- Awoonor-Williams, J. K., Sory, E. K., Nyongator, F. K., Phillips, J. F., Wang, C., & Schmitt, M. L. (2013). Lessons learned from scaling up a community-based health program in the Upper East Region of northern Ghana. *Global Health, Science and Practice*, *1*(1), 117–33. <http://doi.org/10.9745/GHSP-D-12-00012>
- Axelson, H., Gerdtham, U.-G., Ekman, B., Hoa, D. T., & Alfvén, T. (2012). Inequalities in reproductive, maternal, newborn and child health in Vietnam: a retrospective study of survey data for 1997–2006. *BMC Health Services Research*, *12*(1), 456. <http://doi.org/10.1186/1472-6963-12-456>
- Bang, A. T., Bang, R. A., & Reddy, H. M. (2005). Home-Based Neonatal Care: Summary and Applications of the Field Trial in Rural Gadchiroli, India (1993 to 2003). *Journal of Perinatology*, *25*(S1), S108–S122. <http://doi.org/10.1038/sj.jp.7211278>
- Bihar Project Summary\_2014 - FINAL\_Project\_Summary\_IFHI.pdf. (n.d.). Retrieved September 23, 2015, from [http://familyplanning.care2share.wikispaces.net/file/view/FINAL\\_Project\\_Summary\\_IFHI.pdf/540042360/FINAL\\_Project\\_Summary\\_IFHI.pdf](http://familyplanning.care2share.wikispaces.net/file/view/FINAL_Project_Summary_IFHI.pdf/540042360/FINAL_Project_Summary_IFHI.pdf)
- Collated Interviews. (n.d.).
- Cömert, S., Ağzıkuru, T., Akin, Y., Telatar, B., Tan, P. D., Ergen, S. G., & Dervişoğlu, P. (2012). The Cost Analysis of Preterm Infants from a NICU of a State Hospital in Istanbul. *Iranian Journal of Pediatrics*, *22*(2), 185–90. Retrieved from <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3446073&tool=pmcentrez&rendertype=abstract>
- Corruption ruins the doctor-patient relationship in India.: BartonPlus. (n.d.). Retrieved January 8, 2016, from <http://eds.b.ebscohost.com.libproxy.mit.edu/eds/pdfviewer/pdfviewer?sid=db3d627e-4b2d-4838-b4be-bf605429b40d%40sessionmgr111&vid=1&hid=120>
- Crawley, E., Weck, O. De, Eppinger, S., Magee, C., Moses, J., Seering, W., ... Whitney, D. (2004). the Influence of Architecture in Engineering Systems. Retrieved October 30, 2015, from <https://esd.mit.edu/symposium/pdfs/monograph/architecture-b.pdf>
- Fotso, J. C., Higgins-Steele, A., & Mohanty, S. (2015). Male engagement as a strategy to improve utilization and community-based delivery of maternal, newborn and child health services: evidence from an intervention in Odisha, India. *BMC Health Services Research*,

15(Suppl 1), S5. <http://doi.org/10.1186/1472-6963-15-S1-S5>

- Global Gender Gap Report 2014 - Reports - World Economic Forum. (n.d.). Retrieved November 25, 2015, from <http://reports.weforum.org/global-gender-gap-report-2014/part-1/the-global-gender-gap-index-results-in-2014/country-results/>
- Global Health Observatory. (n.d.). WHO | Infant mortality. *Infant Mortality*. Retrieved from [http://www.who.int/gho/urban\\_health/outcomes/infant\\_mortality\\_text/en/index.html](http://www.who.int/gho/urban_health/outcomes/infant_mortality_text/en/index.html)
- Hordijk, L. (2014). What is Systems Analysis. Retrieved October 20, 2015, from [http://www.iiasa.ac.at/web/home/about/whatisiiasa/whatisystemsanalysis/what\\_is\\_systems\\_analysis.html](http://www.iiasa.ac.at/web/home/about/whatisiiasa/whatisystemsanalysis/what_is_systems_analysis.html)
- ind.pdf. (n.d.). Retrieved September 19, 2015, from <http://www.who.int/gho/countries/ind.pdf?ua=1>
- Indian Public Health Standards for Sub-Centres 2012. (n.d.). Retrieved January 13, 2016, from <http://nrhm.gov.in/images/pdf/guidelines/iphs/iphs-revised-guidlines-2012/sub-centers.pdf>
- Initiative, T., & Lives, C. (n.d.). MANSI (Maternal and Newborn Survival Initiative), 1–14.
- IRIN Asia | Analysis: Nepal's maternal mortality decline paradox | Nepal | Gender Issues | Health & Nutrition. (n.d.). Retrieved September 22, 2015, from <http://www.irinnews.org/report/97667/analysis-nepal-s-maternal-mortality-decline-paradox>
- Kenney, M. K., Kogan, M. D., Toomer, S., & Van Dyck, P. C. (2012). Federal expenditures on maternal and child health in the United States. *Maternal and Child Health Journal*, 16(2), 271–287. <http://doi.org/10.1007/s10995-011-0745-5>
- Maron, D. F. (2015). Has Maternal Mortality Really Doubled in the U.S.? - Scientific American. Retrieved September 22, 2015, from <http://www.scientificamerican.com/article/has-maternal-mortality-really-doubled-in-the-u-s/>
- Mason, E., McDougall, L., Lawn, J. E., Gupta, A., Claeson, M., Pillay, Y., ... Chopra, M. (2014). From evidence to action to deliver a healthy start for the next generation. *Lancet (London, England)*, 384(9941), 455–67. [http://doi.org/10.1016/S0140-6736\(14\)60750-9](http://doi.org/10.1016/S0140-6736(14)60750-9)
- May, C., Roth, K., & Panda, P. (2014). Non-degree allopathic practitioners as first contact points for acute illness episodes: insights from a qualitative study in rural northern India. *BMC Health Services Research*, 14(1), 182. <http://doi.org/10.1186/1472-6963-14-182>
- Meadows, D. H. (2008). *Thinking in Systems*. <http://doi.org/10.1073/pnas.0703993104>
- Modi, D., Gopalan, R., Shah, S., Venkatraman, S., Desai, G., Desai, S., & Shah, P. (2015). Development and formative evaluation of an innovative mHealth intervention for improving coverage of community-based maternal, newborn and child health services in rural areas of India. *Global Health Action*, 8, 26769. <http://doi.org/10.3402/gha.v8.26769>
- Mother and child: Survival not guaranteed - The Times of India. (n.d.). Retrieved November 25, 2015, from <http://timesofindia.indiatimes.com/india/Mother-and-child-Survival-not-guaranteed-/articleshow/8796351.cms?referral=PM>
- NGO in India - Women & Girls Health, Education, Empowerment | CARE India. (n.d.). Retrieved September 22, 2015, from <http://www.careindia.org/>

- Pradesh, U., Asha, N., Project, T. M., & Play, G. (2013). An interactive mobile phone-based job aid for accredited social health activists (ASHAs), *3*(June), 60–61.
- Prasad, A. M., Chakraborty, G., Yadav, S. S., & Bhatia, S. (2013). Addressing the social determinants of health through health system strengthening and inter-sectoral convergence: the case of the Indian National Rural Health Mission. *Global Health Action*, *6*, 1–11. <http://doi.org/10.3402/gha.v6i0.20135>
- Pregnancy, H. D. (n.d.). Training Workshop 1 Training Workshop 2 Training Workshop 3, *1*, 2–7.
- Renzaho, A. M. N., & Oldroyd, J. C. (2014). Closing the Gap in Maternal and Child Health: A Qualitative Study Examining Health Needs of Migrant Mothers in Dandenong, Victoria, Australia. *Maternal and Child Health Journal*, *18*(6), 1391–1402. <http://doi.org/10.1007/s10995-013-1378-7>
- Sartorius, B. K., Sartorius, K., Chirwa, T. F., & Fonn, S. (2011). Infant mortality in South Africa - distribution, associations and policy implications, 2007: an ecological spatial analysis. *International Journal of Health Geographics*, *10*(1), 61. <http://doi.org/10.1186/1476-072X-10-61>
- Saxena, V., Kumar, P., Kumari, R., Nath, B., & Pal, R. (2015). Availability of Village Health and Nutrition Day services in Uttarakhand, India. *Journal of Family Medicine and Primary Care*, *4*(2), 251–256. <http://doi.org/10.4103/2249-4863.154667>
- Sharma, R., Webster, P., & Bhattacharyya, S. (2014). Factors affecting the performance of community health workers in India: a multi-stakeholder perspective. *Global Health Action*, *7*, 25352. <http://doi.org/10.3402/gha.v7.25352>
- Shrivastava, S. R., & Shrivastava, P. S. (2012). Evaluation of trained Accredited Social Health Activist (ASHA) workers regarding their knowledge, attitude and practices about child health. *Rural and Remote Health*, *12*(4), 2099. <http://doi.org/2099> [pii]
- Singh, A., Pathak, P. K., Chauhan, R. K., & Pan, W. (2011). Infant and child mortality in India in the last two decades: A geospatial analysis. *PLoS ONE*, *6*(11), e26856. <http://doi.org/10.1371/journal.pone.0026856>
- Sinha, L. N., Kaur, P., Gupta, R., Dalpath, S., Goyal, V., & Murhekar, M. Newborn care practices and home-based postnatal newborn care programme - Mewat, Haryana, India, 2013. *Western Pacific Surveillance and Response Journal : WPSAR*, *5*(3), 22–9. <http://doi.org/10.5365/WPSAR.2014.5.1.006>
- Social determinants of health in India: progress and inequities across stat...: BartonPlus. (n.d.). Retrieved January 8, 2016, from <http://eds.b.ebscohost.com.libproxy.mit.edu/eds/pdfviewer/pdfviewer?sid=47073053-a112-4a86-9766-2d75859e4777%40sessionmgr12&vid=3&hid=120>
- Srivastava, A., Mahmood, S., Mishra, P., & Shrotriya, V. (2014). Correlates of maternal health care utilization in Rohilkhand Region, India. *Annals of Medical and Health Sciences Research*, *4*(3), 417. <http://doi.org/10.4103/2141-9248.133471>
- Sterman, J. D. (2006). Learning from Evidence in a Complex World. *American Journal of Public*



*Health*, 96(3), 505–514. <http://doi.org/10.2105/AJPH.2005.066043>

The MANSI Way | American India Foundation. (n.d.). Retrieved April 13, 2015, from <http://aif.org/2013/06/the-mansi-way/>

The U.S. Government and Global Maternal & Child Health | The Henry J. Kaiser Family Foundation. (n.d.). Retrieved November 10, 2015, from <http://kff.org/global-health-policy/fact-sheet/the-u-s-government-and-global-maternal-and-child-health/>

The UN MDG Report 2015. (n.d.). Retrieved November 30, 2015, from [http://www.un.org/millenniumgoals/2015\\_MDG\\_Report/pdf/MDG 2015 rev \(July 1\).pdf](http://www.un.org/millenniumgoals/2015_MDG_Report/pdf/MDG%2015%20rev%20(July%201).pdf)

Total costs of treatment for babies with neonatal abstinence syndrome on the rise. (n.d.). Retrieved October 2, 2015, from <http://www.news-medical.net/news/20150520/Total-costs-of-treatment-for-babies-with-neonatal-abstinence-syndrome-on-the-rise.aspx>

WHO. (2014). Safe Childbirth Checklist. Retrieved October 19, 2015, from <http://www.who.int/patientsafety/implementation/checklists/childbirth/en/>

WHO EMRO | Community participation eludes Pakistan's maternal, newborn and child health programme | Volume 20, issue 1 | EMHJ volume 20, 2014. (n.d.). Retrieved September 20, 2015, from <http://www.emro.who.int/emhj-vol-20-2014/volume-20-issue-1/community-participation-eludes-pakistans-maternal-newborn-and-child-health-programme.html>

World Health Organisation. (2013). WHO | Maternal mortality. Retrieved from [http://www.who.int/gho/maternal\\_health/mortality/maternal\\_mortality\\_text/en/](http://www.who.int/gho/maternal_health/mortality/maternal_mortality_text/en/)

World Health Organization. (2013). Global Health Observatory Data Repository, 2013. Retrieved from <http://apps.who.int/gho/data/>