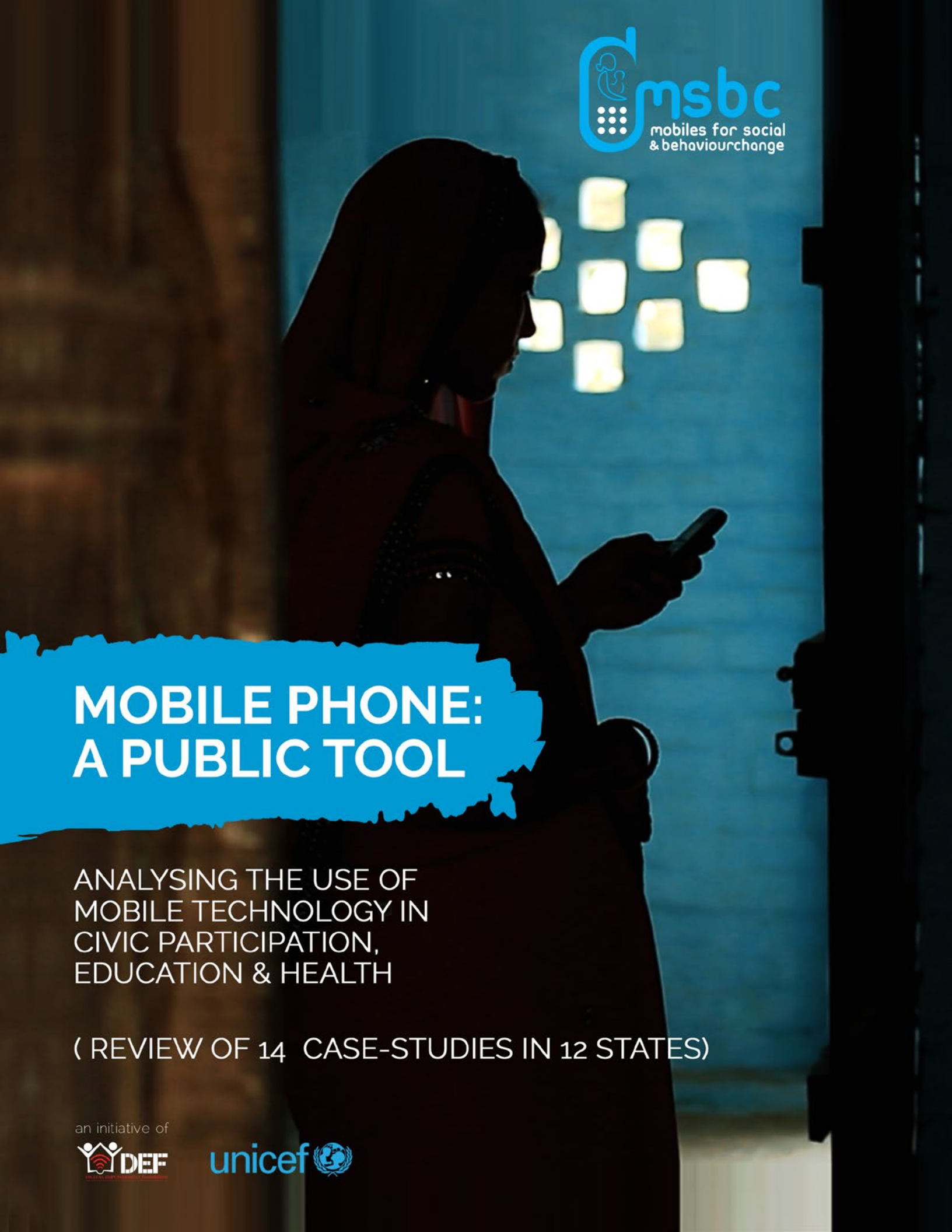

msbc
mobiles for social & behaviourchange

MOBILE PHONE: A PUBLIC TOOL

ANALYSING THE USE OF MOBILE TECHNOLOGY IN CIVIC PARTICIPATION, EDUCATION & HEALTH

(REVIEW OF 14 CASE-STUDIES IN 12 STATES)

an initiative of

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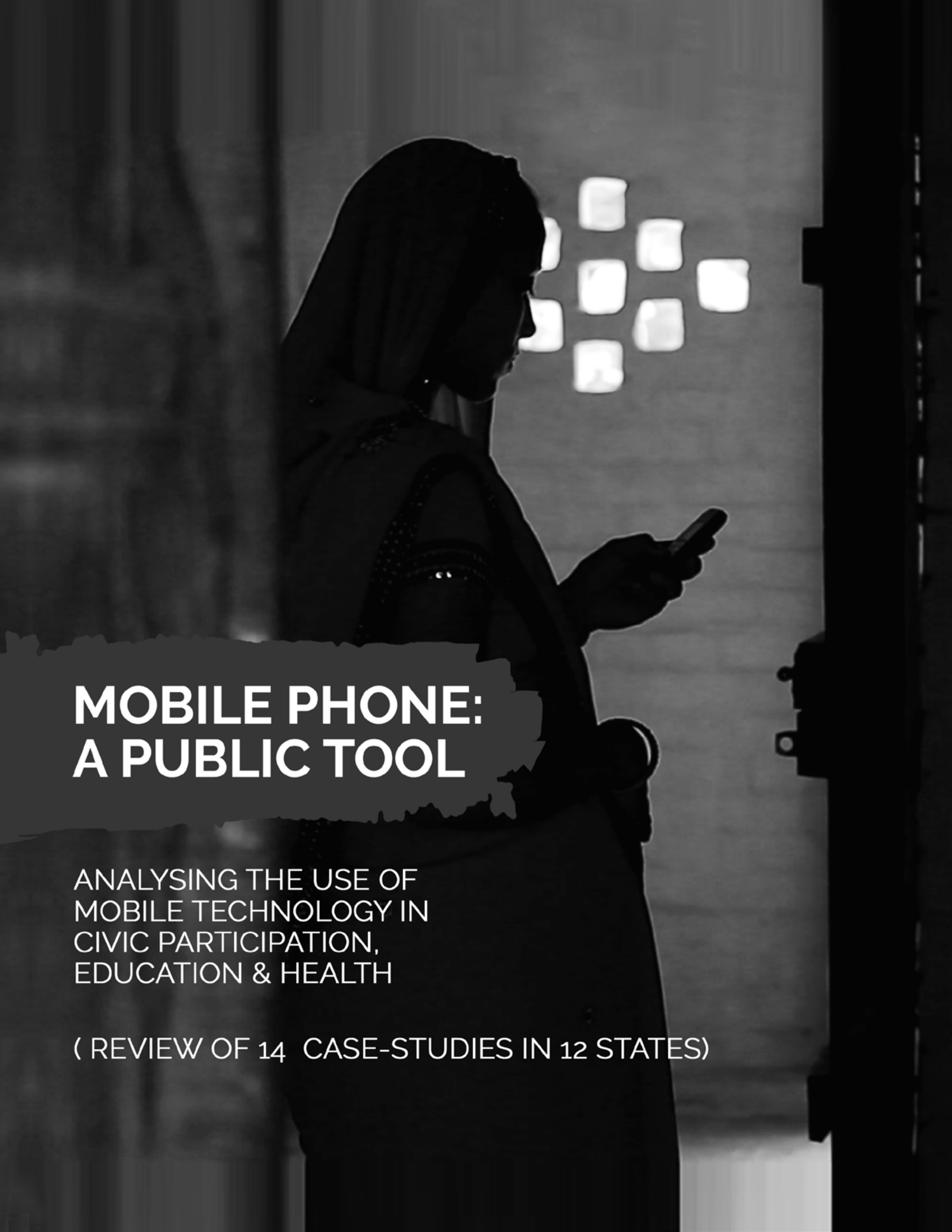

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(REVIEW OF 14 CASE-STUDIES IN 12 STATES)

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Acknowledgment

The rapid growth of mobile telephony has significantly changed the traditional way of communication. As an affordable and accessible means of communication, even rural communities have realised the potential of mobile telephony to create economic opportunities and strengthen their social networks. Mobile phones, by virtue of their role as carriers and conduits of information, ought to lessen the information asymmetries in markets, thereby making rural and undeveloped markets more efficient. It is no longer just an audio communication tool, but enables access to information anywhere and anytime. It offers means for collecting information and sensing behaviour as well as for presenting recommendations.

According to an IAMAI-KPMG report[1], India will have 236 million mobile Internet users by 2016, and is expecting that mobile Internet user base will reach 314 million by 2017. Used as a publishing and communication tool, it enables million around the world to communicate instantly, gives the common citizen a voice among an audience of millions and serves as a huge multimedia library of information. There are increasing numbers of mobile-based projects, and the government, bi-lateral agencies, private sector players, and the civil society continue to invest in mobile-based practices that can provide local solutions in local context and problem areas.

Given UNICEF's focus on sustainable and effective communications for development thrust involving the isolated and vulnerable groups, mobile application-based services are likely to prove valuable in achieving programming goals. Apart from connectivity and access for the deprived groups and communities, mobile phones provide cost effective interventions, enable to overcome bottlenecks to access and deliver services, and allow communities to maximise the impact of available resources.

Keeping this in mind, Digital Empowerment Foundation (DEF) and UNICEF India initiated a project, 'Mobiles for Social and Behaviour Change (MSBC)', to dive into the depth of various projects where mobiles are being effectively used by frontline workers in areas of health, education, nutrition, child protection, and monitoring and training of frontline workers. The project aims to study concerns around MSBC and create a formidable platform to provide knowledge on diverse MSBC implemented projects and help in developing partnerships between state governments and MSBC players.
One of the prime objectives of this MSBC project is to conduct primary and secondary research of mobile-based practices. The research report analyses 14 projects broadly into three categories – civic participation, education and health. The report has been kept on track and been seen through to completion with support from my colleagues Saleema Razvi; Syed S Kazi and Ritu Srivastava who led the DEF research team; researchers Buddhadeb Halder, Raina Aggarwal, Monorisha Mukhopadhay,

Rajat Kumar, Pawas Suren, Eshita Mukherjee; and data collectors Bijo P. Abhraham and Rahul Kumar Choudhary. We also acknowledge UNICEF India led by Mario Mosquera and supported by Alka Malhotra for invaluable and timely suggestions and feedback during the progress of the research report. Their understanding, encouragement and attention provided good and smooth basis for study tenure. We also extend our gratitude to project stakeholders and their staff members for the support that they provided throughout the study. The staff members for every project have been very cooperative and provided the inputs that enabled to complete this work. We expand our thanks to the respondents who extended their immense help by providing the required information, which in turn helped in achieving the objective of this study.

This report has been made, designed and printed with much care and focus. However, we request readers to excuse and forgive any error or mistake that may have been introduced unintentionally.

Wishing you a thought-provoking reading!

UNICEF India

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Digital Empowerment Foundation

Osama Manzar
Director
Digital Empowerment Foundation

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Glossary

Accredited Social Health Activist (ASHA)	Accredited social health activists (ASHAs) is community health workers instituted by the government of India's Ministry of Health and Family Welfare (MoHFW) as part of the National Rural Health Mission (NRHM)ASHA is the first port of call for any health related demands of deprived sections of the population, especially women, children, old aged, sick and disabled people. She is the link between the community and the health care provider.
Auxiliary Nurse Midwives (ANMs)	An auxiliary nurse midwife is defined as someone who assists in the provision of maternal and newborn health care, particularly during childbirth but also in the prenatal and postpartum periods. They possess some of the midwifery competencies but are not fully qualified as midwives.
Child line India Foundation	It is a non-government organization (NGO) in India that operates a telephone helpline called Childline, for children in distress. It was India's first 24-hour, toll free, phone outreach service for children
Health Management Information System (HMIS)	The health management information system (HMIS) is an instrument which could be used to improve patient satisfaction with health services by tracking certain dimensions of service quality.
Freedom Fone	A database-driven software application that allows people to access information through voice calls made on land, mobile, and the internet.
Infant Mortality Rate (IMR)	The infant mortality rate (IMR) is the number of deaths of infants under one year old per 1,000 live births. This rate is often used as an indicator of the level of health in a country.
LCD Projector	It is a type of video projector for displaying video, images or computer data on a screen or other flat surface. It is a modern equivalent of the slide projector overhead projector.
Maternal Mortality Rate	The Maternal mortality rate (MMR) is the annual number of female deaths per 100,000 live births from any cause related to or aggravated by pregnancy or its management (excluding accidental or incidental causes).
Mother-Child Tracking System (MCTS)	Mother-Child Tracking System (MCTS) is a generic system which aims to provide information of different health services received at the individual level, by monitoring all the encounters that an individual undergoes in his/her health program. This system aims to help the service provider (health worker or Doctor) by categorizing various health services the individual person has to get (with due date) and missed services. It also provides for effective monitoring of different health services drilling down to the individual patient information.
Mid-Upper Arm Circumference (MUAC)	The mid-upper arm circumference is the circumference of the upper arm at that same midpoint, measured with a non-stretchable tape measure.

Open Source Software	It is a computer software with its source code made available with a license in which the copyright holder provides the rights to study, change, and distribute the software to anyone and for any purpose
SD card	It is a non-volatile memory card format developed by the SD Card Association (SDA) for use in portable devices.
SMS	A text messaging service component of phone, web, or mobile communication systems, using standardized communications protocols that allow the exchange of short text messages between fixed line or mobile phone devices.
Website	A set of related web pages served from a single web domain with relevant content by an individual, institution, or organization. All publicly accessible websites collectively constitute the World Wide Web.
Web box	Web box is a product that Vodafone offers which allows using television to access the Internet. It is a convenient, plug-n-play keyboard with a built-in 3G modem and memory card that simply plugs in to the television, turning television in to a computer screen

Abbreviations

ANC	Ante-Natal Care
ANMs	Auxiliary Nurse Midwives
ASHA	Accredited Social Health Activist
BPL	Below Poverty Line
BSNL	Bharat Sanchar Nigam Limited
CDPO	Child Development Project Officer
CEO	Chief Executive Officer
CF	Community Facilitator
CINI	Child in Need Institute
CRS	Catholic Relief Services
DEF	Digital Empowerment Foundation
DPO	Development Project Officer
DeitY	Department of Electronics & Information Technology
FLW	Front Line Worker
GIS	Geographic Information System
GPR	General Purpose Revenue
GPS	Global Positioning System
GPS	Global Positioning System
HBV	Hepatitis B Virus
HBNC	Home-Based Newborn Care
HTML	Hyper Text Markup Language
IAP	Integrated Action Plan
ICDS	Integrated Child Development Services
ICT	Information and Communications Technology
IFA	Iron-Folic Acid
IMEI	International Mobile Equipment Identity
IMR	Infant Mortality rate
IT	Information Technology
IVR	Interactive Voice Response
LOTB	Learn Out of the Box
MCTS	Mother-Child Tracking System
MIS	Management Information Systems

MMR	Maternal Mortality Rate
MNCH	Maternal, Newborn and Child Health
MP	Madhya Pradesh
MPHW	Multi-Purpose Health Workers
MUAC	Mid-Upper Arm Circumference
M4M	Mobile For Mothers
NGO	Non- Government Organisation
NIC	National Informatics Centre
NRC	Nutrition Rehabilitation Centre
NREGA Act	National Rural Employment Guarantee Act
NRHM	National Rural Health Mission
OBC	Other Backward Classes
OPV	Oral Polio Vaccine
PHC	Primary Health Centre
PLG	Peer Leader Group
PMRDF	Prime Minister's Rural Development Fellow
PNC	Post-Natal Care
ReMiND	Reducing Maternal and Newborn Deaths
RTE Act	Right To Education Act
RTI	Reproductive Tract Infection
SC	Schedule Caste
SD Card	Secure Digital Card
SIM	Subscriber Identity Module
SMS	Short Message Service
ST	Schedule Tribes
STI	Sexually Transmitted Infection
SWOT	Strengths Weaknesses Opportunities and Threats
TAT	Turn Around Time
TRAI	Telecom Regulatory Authority of India
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
USAID	United States Agency for International Development
WCD	Women and Child Development
WHO	World Health Organization

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Executive Summary

After her first miscarriage, Srimati Devi of Agiaona village in Manjhanpur block of Kaushambi District, Uttar Pradesh, sought help of witchcraft for the second pregnancy. Unfortunately, the second pregnancy also ended in a miscarriage before the end of the first trimester. When Srimati became pregnant the third time, her local area ASHA worker Manju Tripathi, who was using mobile phone-based job aid to support counselling for pregnant women, visited Srimati. Manju broke several myths and misconceptions Srimati and her family had regarding pregnancies, and told her to follow healthy practices during her pregnancy. Thanks to her counselling and care, Srimati gave birth to a healthy baby, and both mother and baby are healthy today. ASHA worker Manju proudly shares, "…the mobile phone is helping us to bring this change at a rapid pace…..".

Another girl, Asuda, a resident of Cheora Village, West Bengal, wanted to enjoy the splendours of life but destiny had other plans for her. She was taken away to Kolkata to work as a domestic help. A mobile-based application, GPower, took a pivotal role in tracking the girl who was successfully rescued. At present, she is happily enrolled in a local school.

These are just two examples of the 'power' of mobiles in the present age. Today, Communication for Development (C4D) acts as a bridge in minimising the gaps and improving access and services for people in rural areas of developing countries. C4D involves understanding people, their beliefs and values, the social and cultural norms that shape their lives. It involves engaging communities and listening to adults and children as they identify problems, propose solutions and act upon them. Communication for Development is seen as a two-way process for sharing ideas and knowledge using a range of communication tools and approaches that empower individuals and communities to take actions to improve their lives.

C4D has been recognised as a tool for social change by UNICEF that has a strong track record of amplifying the voices of children and communities by harnessing the power of communication to promote child survival, development, protection and participation. According to the World Congress on Communication for Development in 2006, C4D is also about seeking change at different levels including listening, building trust, sharing knowledge and skills, building policies, debating and learning for sustained and meaningful change. It encompasses access to and exchange of information, dialogue, creation of knowledge and open access to knowledge, development communication, strategic communication, participatory communication, expressive culture, media, information and communications infrastructure and technologies. C4D recognises that communication processes often reflect power relations and aims to address this by enabling people's capacities to understand, negotiate and take part in decision-making that affects their lives.

C4D tools, particularly mobile phones, are playing an important role as they are readily available in remote rural areas, helping common people access different services. In the last couple of years, mobile has become more than just a telephone and has achieved highest penetration in India. According to

the International Telecommunication Union, more than 40 per cent of adults use their mobile phones for browsing the Internet, checking e-mails or exchanging instant messages. Based on the previous progress in mobile penetration rate, the Broadband Commission estimated that mobile penetration rate would be 100 per cent by 2017. It means that in the post-2017 period, mobile phone would be the most effective tool for governments to connect with 100 per cent of their citizens. According to the Telecom Regulatory Authority of India, the last count of mobile penetration, as per May 2015, in India was 975.78 million. Today, it's crossed a billion. Unfortunately, this does not mean that a billion Indians are connected through mobile phone. In fact, there are only 500-600 million unique users of a billion SIMs in India. Additionally, 72 per cent of women in India don't have access to mobiles phones, according to a report titled 'Connected Women' published by GSMA, to even make or receive calls. Having said that, there has been a growth in mobile phone users among women, courtesy raised awareness. Besides, a rapid growth of mobile phone usage among women in India highlights the fact that mobile usage is not only empowering women, but also having a positive social and behavioural impact in the society. Women have always played a centrifugal role in development, and the mobile tools are further helping them empower themselves and their communities.

Keeping this in mind, UNICEF India and Delhi-based NGO Digital Empowerment Foundation (DEF) initiated a project called 'Mobiles for Social and Behaviour Change' to understand in what parts of India mobiles phones are being used in areas of civic participation, education and health; and how the use of mobile is contributing for social and behavioural changes. After an extensive fieldwork, covering 12 states of India and interviewing 2,835 respondents, the research report answered these and many more questions.

The main aim of the project has been to understand how mobiles can be used as a communication tool by frontline workers, mothers, pregnant women and community members for their benefit and the benefit of their community. The project was initiated with three prime objectives: firstly, to have state consultations that could bring in local MSBC interventions for deliberation and allow the state governments to forge partnerships with local MSBC projects to scale up at wider level; secondly, to study 14 mobile-based practices in the areas of their usage, usability and accessibility both for referential and advocacy purpose; and lastly, to develop a directory of such mobile-based practices across the country for referential purpose.

Key Findings: Key findings of the research on using mobiles in civic participation, education and health are given below:

Civic Participation: Through the study of CGNetSwara, Mobile Vaani and GPower in the category of Civic Participation, it has been found that these projects have been facilitating participation of citizens within the community to help improve conditions of individuals in the community and further shape their future. More than 75 per cent of the respondents believe that their issues have been

voiced through CGNetSwara and 50 per cent believe it has improved public service delivery. The staff members of CGNetSwara suggested that awareness and advocacy about government related schemes, publication of recorded data in the IVR system, increase in field staff's wages, and improved availability of mobile phones with staff can further increase the efficiency of the initiative.

Education: Among Bridge IT, GIS@Schools and LOTB, the results of Bridge IT were particularly promising. After the introduction of Bridge IT, 90 per cent of teachers interviewed felt that they were able to answer questions more effectively. About 77 per cent of teachers felt students' participation in the classroom had increased. About 60 per cent of the students felt that BridgeIT facilitates easier explanations of the concepts taught. Over 61 per cent of students said they were more interested in attending classes when the application was deployed. Almost 59 per cent of the students enjoy learning the subjects with the help of the application. This was highlighted again when 84 per cent of teachers claimed the information presented in the application was logical and understandable.

Health: Under health, Arogyashreni, Active Tracker, Hamari Ladli, eMamta, Mobile Kunji, Mobile for Mothers, ReMind and Vatsalya Mandla were studied. The relevance of the Hamari Ladli project was highlighted when it emerged that 95 per cent of community respondents were aware that sex-determination occurs in India and 99.3 per cent of community respondents stated that they knew of the methods of sex- determination and female foeticide. In the case of ReMiND, the data revealed that the counselling sessions had a great impact on the women as 95 per cent of them had decided to go for safe institutional delivery and none of them wanted to have a baby delivered at home. About 70 per cent were even ready to use contraceptives to maintain gap between children.

The detailed research report, with analysis of each of the 14 mobile-based initaitives, presents a review of literature, and advocates for universal access to information. The research found mixed responses, and the pattern of impacts of mobile use for social and behavioural changes was probably due to the lack of proper access and awareness, which prevent users from enjoying the optimum benefits of such type of initiatives. The challenges for access to information are discussed and alternatives are suggested.

1. Introduction

Mobiles are the heart of the new digital ecosystem. It is driving new innovations and development in areas of digital content, m-Commerce, m-Health, m-Education and many more mobile-based services. It has redefined users' experiences by creating new business opportunities, providing information-based services, and initiating new ways to track various governance services. The benefits of mobile services is not only limited to developed countries but innovative mobile solutions are also helping out underdeveloped, underserved and poverty-affected regions with the opportunity to overcome socio-economic challenges, particularly in the areas of health, education, agriculture and disaster management.

Among BRICS countries, India, Brazil and China are leading in the world's mobile phone revolution. Mobile-first apps and content in these countries would surely snowball into massive enterprises. In 2009, India's mobile teledensity was 43.48 while that of China was 55.97[2] . In 2015, the mobile phone subscribers reached 975.78 million as of May 2015 — second to China. The mobile Internet traffic makes up 65 per cent of total Internet usage in India. According to global telecom industry GSMA, the growth of mobiles services will contribute 8.2 per cent towards national GDP by 2020. Further looking at mobile subscriptions in urban regions, it is 559 million while rural mobile subscription is limited to 417 million. On the consumer side, increase in smartphone penetration and increasing demand for Internet-based services such as chat, social media, video and music through the mobile medium has also accelerated growth in mobile Internet usage. Increase in the penetration of smartphones is not only restricted to providing communication services but it also contributes towards increasing the quality of life, providing education, aiding financial inclusion, supporting law enforcement, managing disaster and increasing social awareness. This growth underscores the transformation of the mobile phone into a social object; fostering social and behavioural changes and empowering underserved groups such as women and people living below the poverty line.

It is quite clear "mobile" inherent characteristics such as voice and peer-to-peer SMS bring better development outcomes. With an objective of achieving sustainable and effective communication solutions for development, UNICEF has used mobile phone as a communication tool to deliver services and providing training support to frontline health workers. Understanding the essence of mobiles as a communication tool, UNICEF India and DEF in 2013 initiated a project, 'Mobiles for Social and

Behaviour Change' to understand how mobile phones have been used by communities in their daily lives for various purposes. The first phase of the project was launched in 2013 with a two-day consultation on 'Mobile Phone as a Tool for Social & Behaviour Change' at New Delhi. Twelve initiatives were invited for the consultation to explore the concept of 'Mobile as a communication tool for development'.

The recommendation of the first phase is to conduct deeper research to understand these projects and create more concrete partnerships between project stakeholders and the state government so that each state could adopt and implement MSBC project at higher scale.

On the basis of this recommendation, UNICEF India and DEF extended their partnership for MSBC Phase II in 2014. This meant going a step further into the issues around MSBC and creating a formidable platform to provide knowledge on diverse MSBC implemented projects. The prime objectives of Phase II was to – (1) organise state-level consultations that could bring in local MSBC projects for deliberation and allow the state governments to forge partnership with local MSBC projects to scale up at wider level, (2) conduct deeper research on MSBC projects on their usage of mobiles for social and behavioural change (SBC) in India, both for referential value and for advocacy purpose; (3) develop a directory of MSBC projects — beyond their participation at the five state consultations — that can be used for referential purpose and advocacy.

In continuation to Phase II, UNICEF India and DEF organised the five multi-stakeholder consultations in five states – Madhya Pradesh, Uttar Pradesh, Andhra Pradesh, Tamil Nadu and Assam. Over 50 projects explored the concept of mobiles for social and behavioural development at the state consultations. Out of these 50 initiatives, 14 were selected for further primary research to understand how these initiatives are using mobiles as a communication tool for improving frontline workers lives. The 14 identified projects were divided into three broad categories – health, education and civic participation. The research analytical report, 'Mobiles for Social & Behaviour Change' further analysed the 14 selected projects in four prime parameters – reliability, efficiency, effectiveness and sustainability.

The objective of the research report is to understand how these initiatives are using mobiles for disseminating information; monitoring and tracking; providing training support; mobilizing communities; network outreach and strengthening interpersonal communications with community members.

The research report addresses communication challenges, scope and opportunities to use and deploy mobile technology and platform in communication processes and to scale up existing practices in partnerships and so on. As an outcome, the research report will be used as a referential point to further understand how mobiles can only be used as a communication tool in terms of disseminating information; tracking and monitoring of services, and providing training support services to frontline workers. The report will be distributed to respective stakeholders including government; mobile stakeholders, practitioners, civil society groups and academicians.

2. Overview: Reach, access, usability of mobile phones

India is the world's second largest telecommunication market with more than 975 million mobile subscribers as of May 2015. Over 236 million users will be accessing Internet using their mobile phones by 2016. According to an IAMAI-KPMG report, 'India on the Go: Mobile Internet Vision 2017[3]', nearly 128 million mobile Internet users belong to the urban population of India while 45 million users reside in rural parts of the country. The growth of mobile in rural India is slow but it is steadily growing due to rise in mobile Internet penetration in rural regions. Till 2014, the Active Internet User (AIU) base was 6.7 per cent in rural India of the overall rural population of 905 million and accounted for 61 million users.

According to TRAI June 2015 report, Uttar Pradesh ranks first in the states with highest mobile penetration in rural areas. In Uttar Pradesh, 86.63 per cent households have mobile handsets. Uttarakhand is closely following Uttar Pradesh with 86.60 per cent mobile users. Chhattisgarh finds its place in the bottom of mobile penetration. Only 28.47 per cent households in Chhattisgarh own the device.

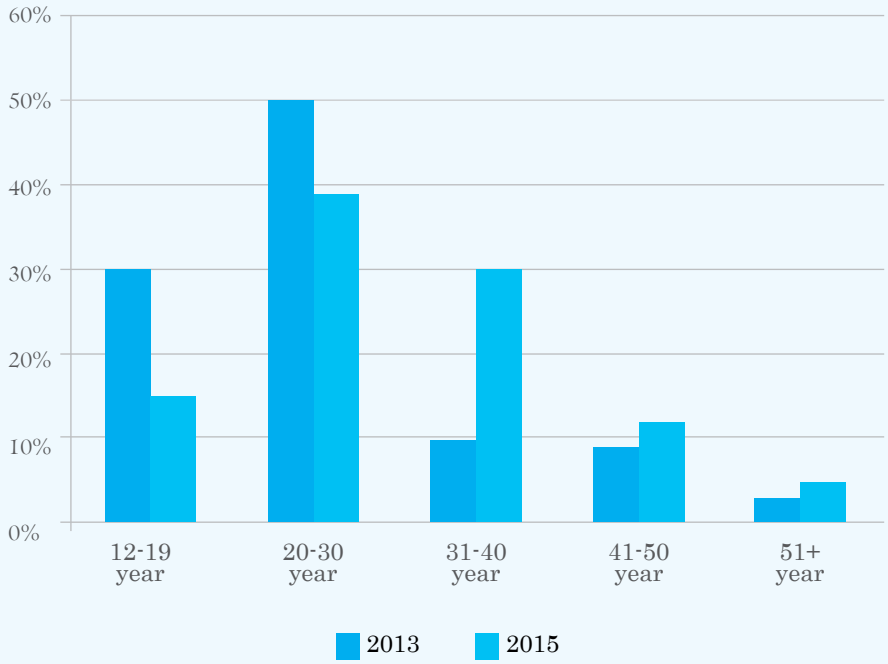
About 19 per cent of mobile connections are using mobile broadband which means they access 4 MBPs. Further looking at 2G and 3G user base in India, the 3G user base is rapidly growing at a CAGR of 61.3 per cent by 2017. Rural India is still seeing growth in 2G technologies while 3G and 4G technologies will continue to be a phenomenon of urban India for the next few years. Approximately 50 per cent of AIU in rural areas use mobile phones, common service centres (CSC) and cyber cafes as Internet access points while 38 per cent of the AIU use mobile phone as the main access point.

Low cost smartphone has made India the third largest smartphone market in the world. The number of smartphone users is expected to reach 369 million by the year 2018. India has become the second largest mobile handset manufacturing country in the world. The reason behind the growth smartphone is also because of augmentation of affordable and Internet-enabled handsets supporting vernacular content and engagement of domestic handset manufacturers in developing such low-cost models.

The mobile phone manufacturing companies in India can be classified into two groups. The top five manufacturing companies hold 75 per cent share of the mobile phones that are sold. The small manufacturing companies of mobile phones, which belong to B-grade, level all other manufacturing companies that are sold in some specific and restrictive zones.

According to a study conducted by Ericsson consumer lab, 'Changing Mobile Broadband Landscape 2015', India has the largest young population – median age of 26 years and — as a result, the Indian youth market remains the largest market for smartphone and mobile Internet users. Secondly, people aged between 31 and 40 years have shown highest spike in mobile broadband users *(Figure 1).* The report also identifies 34 per cent women in urban India accessing Internet on their smartphones in comparison to 2013.

Figure 1: Age-wise change in distribution of smartphone mobile Internet users



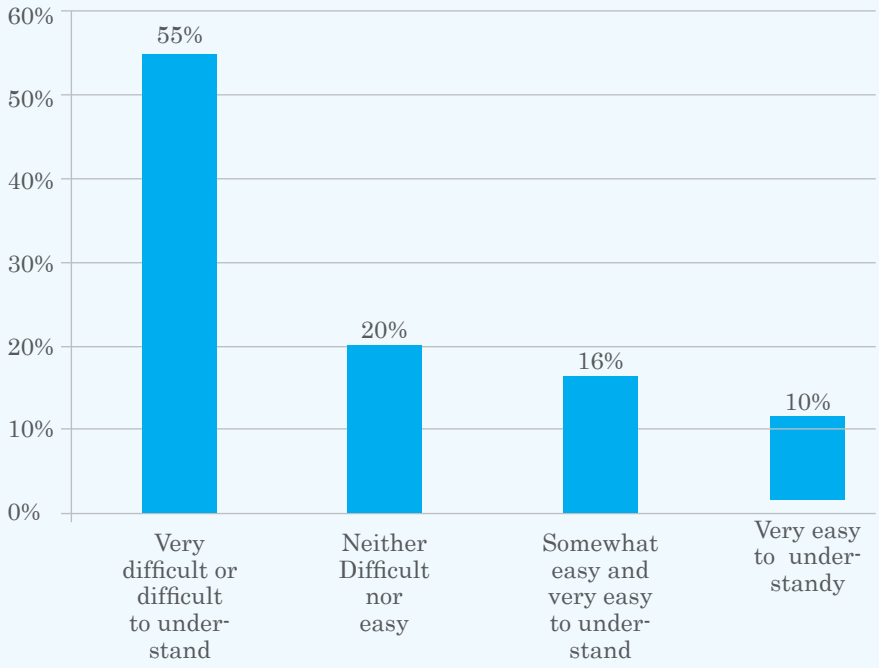
Source: Ericsson consumer lab report

In terms of mobile users among frontline health workers, the study identified that 100 per cent health workers working under mSakhi project have mobile phones while 82 per cent have smartphones and 68 per cent can access the Internet on their mobiles.

Similarly, frontline health workers associated with Mobile for Mother (M4M) project have mobile phones while 63 per cent have featured phones with radio feature, 27 per cent have basic phones and 10 per cent have smartphones. Unlike mSakhi and M4M, 71 per cent frontline health workers under ReMiND project have featured phones and 28 per cent have touchscreen smartphones. However, 68 per cent do not have access to the Internet on their mobiles.

Considering mobile broadband usage patterns among users, the report identified that consumer base is adopting mobile broadband and using wide variety of services beyond chat and messages. While selecting data plans, users select the tariff that best suits their needs. About 55 per cent of urban mobile Internet users do not understand their data plan options and the details confuse them. Only 12 per cent of urban mobile Internet users visit their operators' website to recharge, pay bills or use their services *(Figure 2).*

Figure 2: User understanding of data plan options



In terms of usage of mobile broadband, around 15 per cent of mobile data traffic came from social networking. Approximately 50 per cent of data traffic has been accounted for streaming videos in 2015, which is expected to grow upto 70 per cent by 2021. Online messaging, listening to music and navigation are some of the most common activities among users. About 67 per cent of male and female Facebook users, respectively, access the social networking site through their smartphones. In terms of using feature phones for accessing Facebook, 13 per cent male users and 13 per cent female user access Facebook through feature phones.

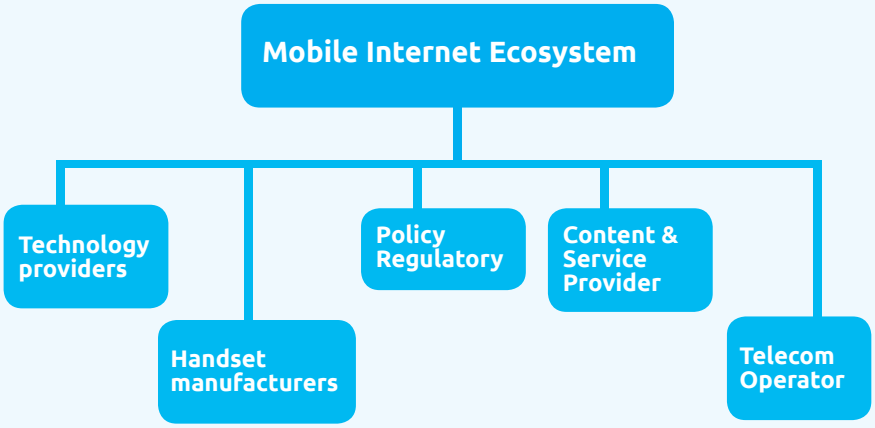
The diverse user base is adopting mobile broadband beyond the usage of chat and messaging services. These days, users have different motivations while using mobile broadband services. Personalised services are viewed positively and are demanded by users more.

3. The mobile ecosystem & its social impact

The mobile ecosystem consists of mobile manufacturers, technology providers, content and service providers, and telecom operators delivering various services *(Figure 3)*. It is like a value chain connected to each other.

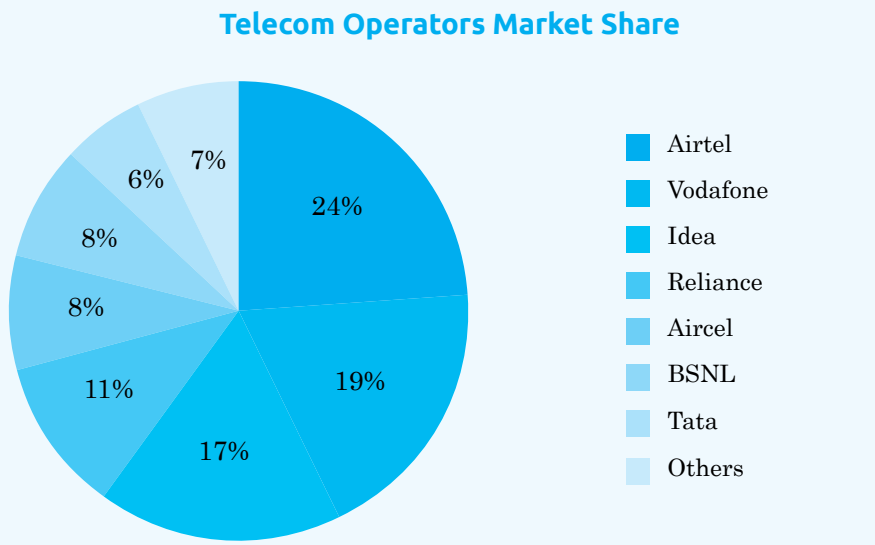
There are over 13 telecom operators in India and most of them are Internet service providers. Mobile service providers owned 8.25 per cent of the total market share in June 2015. Airtel is the most popular among Indian consumers with 24 per cent market share, followed by Vodafone and Idea with 19 per cent and 17 per cent market share, respectively.

Figure 3: Mobile internet ecosystem



India is a primarily prepaid-intensive telecom market with a monthly churn rate of 4 to 5 per cent. As postpaid with bundle of services do not attract low-end customers, it is limited to high-end consumers. This also reflects a challenge in the adoption of bundled plans but also fuels the grey market for high-end handsets *(Figure 4)*.

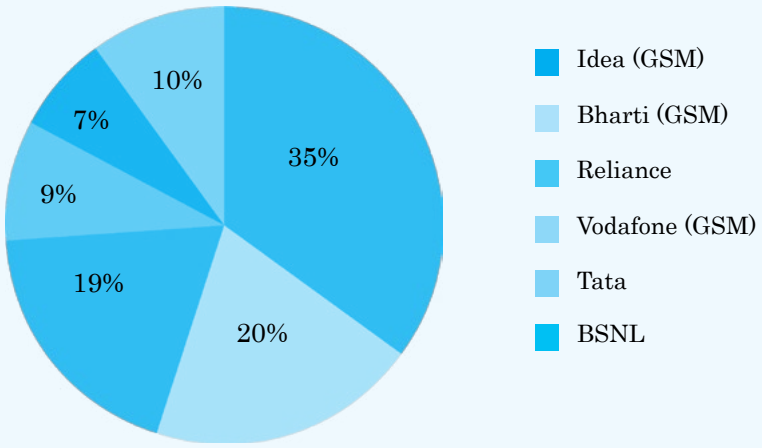
Figure 4: Telecom operator market share



Source : TRAI Report 2014

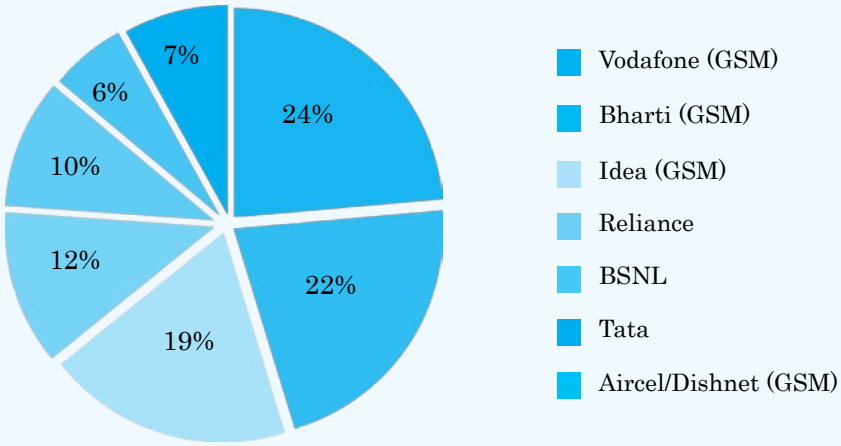
Further, looking at mobile subscriber base in five states – Madhya Pradesh; Uttar Pradesh, Tamil Nadu; Andhra Pradesh and Assam – it is clear that Airtel holds the highest number of subscriber in all five states with 20 per cent; 22 per cent; 19 per cent, 32 per cent and 24 per cent, respectively. Other telecom operators — Vodafone, Aircel and Idea — are the other closely following major telecom players *(Figure 5, 6, 7, 8, & 9)*

Figure 5: Madhya Pradesh telecom operator users' base



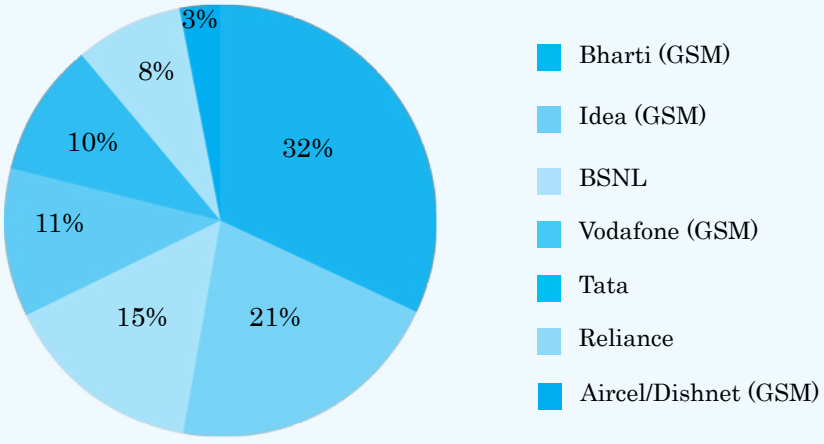
Source: TRAI, Dec. 2014

Figure 6: Uttar Pradesh mobile subscriber base



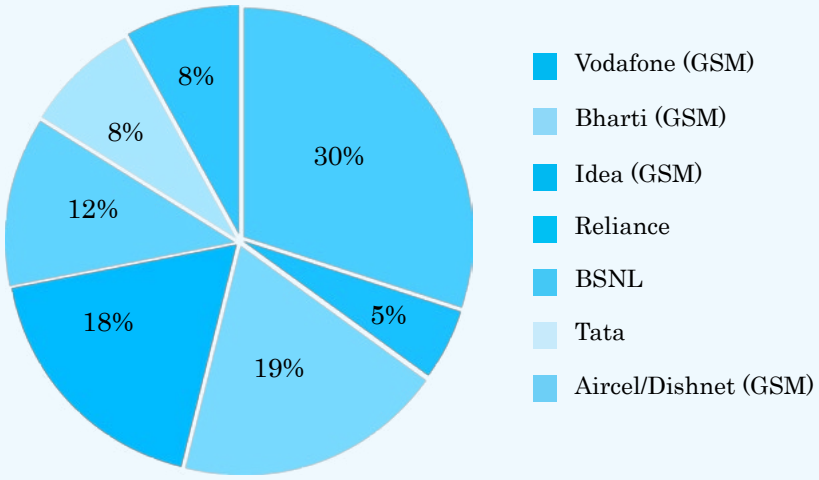
Source: TRAI, Dec. 2014

Figure 7: Andhra Pradesh mobile subscriber base



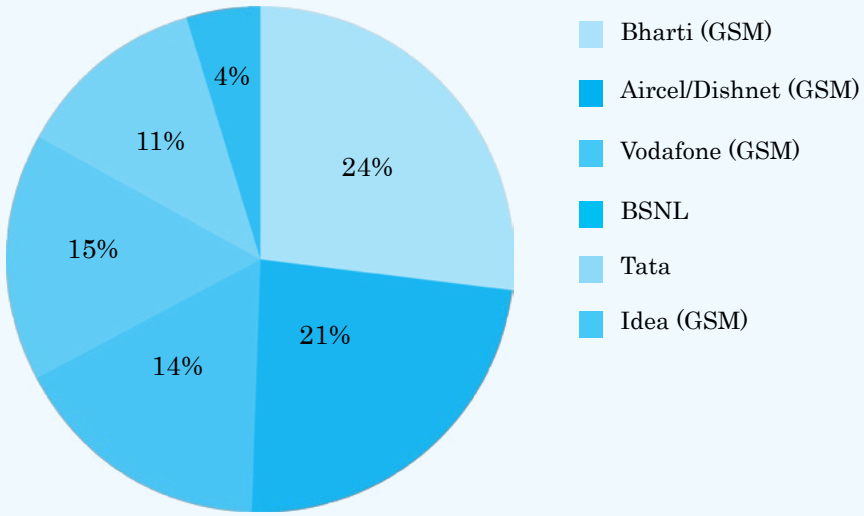
Source: TRAI, Dec. 2014

Figure 8: Tamil Nadu mobile subscriber base



Source: TRAI, Dec. 2014

Figure 9: Assam mobile subscriber base



Source: TRAI, Dec. 2014

The mVAS services in India were introduced in SMS form for providing astrology, entertainment and sports alerts, besides caller tunes. These services did not require high bandwidth or any smartphone. Evolution of smartphones has now transformed the way of providing and using mVAS services and also revolutionised the consumption of such services. It is now more in the form of utility services 3 mobile payments, education and health care alerts, among other — which require mobile Internet. The mVAS services are classified in the following ways: *(Table 1).*

Table 1 : mVAS services classification

	m-Education	m-Entertainment	m-Finance	m-Health
Basic	Examination Alerts, Basic Language Learning Services	Caller Tunes, Bollywood and Cricket News	Payment Alerts, Reminder Services, Stock Quotes	Health and Fitness Tips
Enriched	Distance Education and Tutoring Services	Online Video, Gaming and Social Networking Services	Transaction Services – Money Transfers, Payment Services	Tele-Triage, Appointment Scheduling and Reminder Services
Transformational	Collaborative and Interactive Learning Services	NextGeneration Interactive Entertainment, Social Network and Gaming Services	Innovative Financial Services – Mobile Wallet	Remote Monitoring and Diagnostic Services

According to an IAMAI and Wipro report titled 'Beyond the Tip of Iceberg[4], 97 per cent users ever-used education basic services while 87 per cent likely used these services. Similarly, 98 per cent users have ever used basic health services and 97 per cent users basic finance services *(Figure 10).*

Figure 10: Basic services

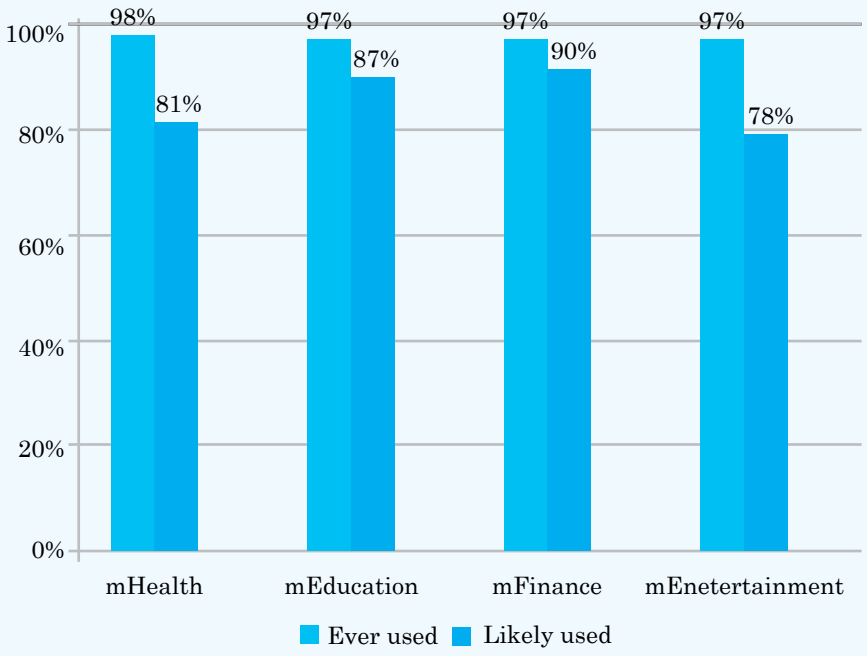
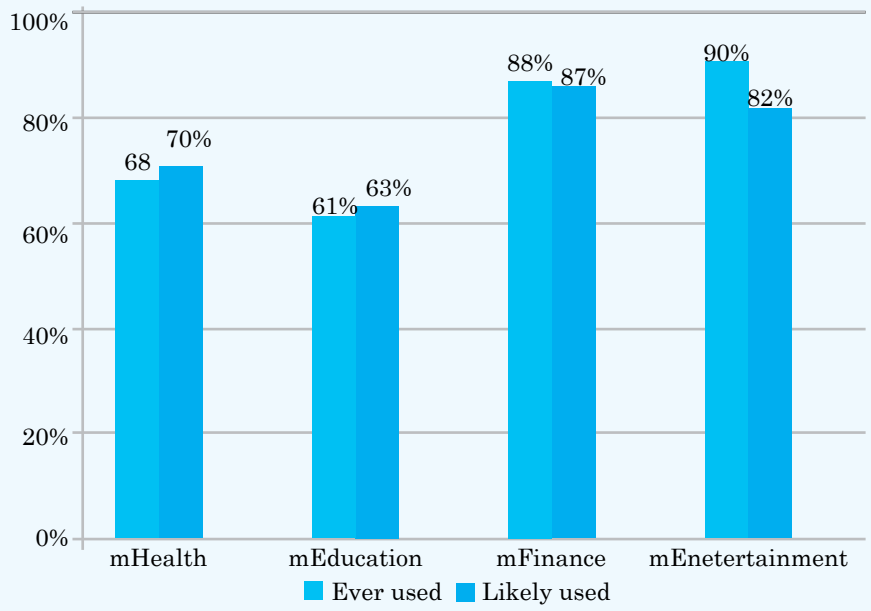
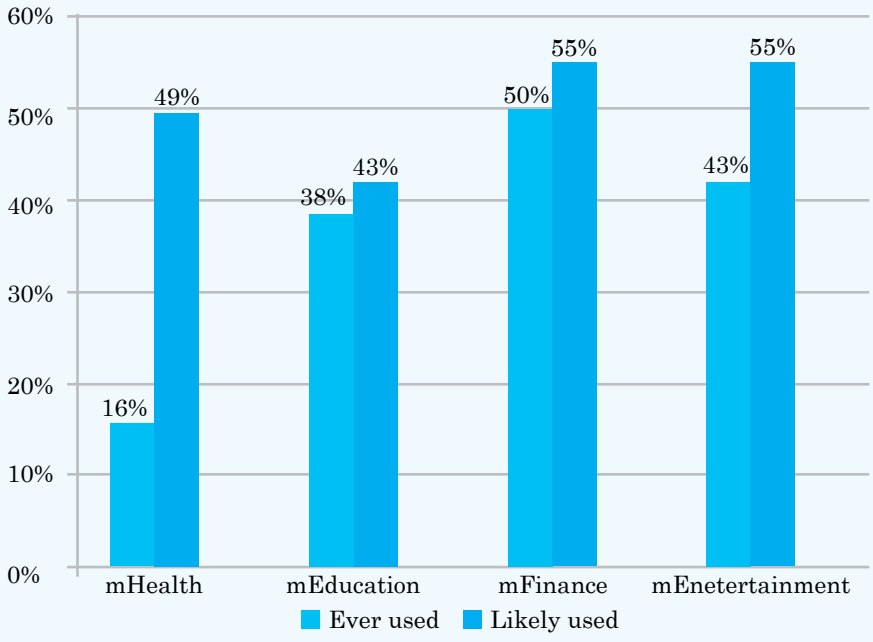


Figure 11: Enriched services



In terms of enriched services, entertainment is the highest contributor with 90 per cent users stating that they ever used these services while 82 per cent users likely used these services followed by 88 per cent used enriched finance services and 87 per cent users likely used finance services *(Figure 11).*

Figure 12: Transformation services



This clearly shows that m-Entertainment services continue to be the largest contributor to mVAS revenues. The m-Entertainment market mainly consists of caller tunes, subscription-based alerts such as sports related, SMS-based contest. Presently, SMS-based education services such as examination alerts; IVR and tutor-on-call solutions are more popular. Most health care services are based on information

dissemination with consultative services. These consultative services include remote diagnostic, remote monitoring of chronic diseases, and phone-based maternal care or neo-natal services. Other financial services such as mobile wallet, mobile remittance and mobile-based business correspondence services are noted services *(Figure 12)*.

4. Literature review

The explosive growth of mobile technologies across the world has reinforced information communication technology's (ICT's) strategic importance in human development[5]. Mobile helps provide access to digital communications for billions of people. In different parts of the world, a number of e-Governance projects have been implemented to help achieve different social goals in participation, education, health and other socio-political sectors[6].

This research study was conducted to understand the impact of mobiles in different sectors such as civic participation, education, and health in present Indian societies.

4.1 Civic Participation

Mobile phones have become an important tool for empowering citizens in the last decade. They also help in creating a stronger democracy through citizen participation and insight into state affairs, thereby influencing political decisions and making local governments accountable. In East African countries like Kenya, Rwanda, Tanzania, Uganda, these processes have already been implemented[7]. Mobile applications have been used in a huge way to improve governance either independently or as a complimenting strategy as ICT (computer and Internet) as a tool for good governance facilitates openness and transparency. But the question arises of how important is the role of mobiles as an interface between government and citizens. Community empowerment through mobiles is another dimension of mPower (mobile power). The advantages of using mobiles can be grouped under the broad heads of accessibility, interaction, low cost efficient interface and lack of other alternatives in a low infrastructure set up. Apart from the regular services like instant communication, texting and sending voice messages, mobile can be used magnificently in bridging the digital divide between rural and urban areas in terms of connectivity and infrastructure. m-Governance can be used extensively in the sectors of health, education and various financial services with the help of 3G or 4G technologies[8]. It is a part of a wider phenomenon of mobile enabled practices to initiate development impact. These services dodge the need for traditional physical networks for communications and collaboration. m-Governance has the potential to help make public information and governance services available "anytime and anywhere" to citizens and officials. Mobile services are cheaper as well as accessible in most rural areas in India and/or Asian countries[9]. m-Governance is particularly suited for the developing world where Internet access rates are low but mobile phone usage is growing rapidly in both urban and rural areas. Globally, the number of mobile phones has exceeded the number of fixed/wired phones. This is also the case in many individual nations, including 49 middle-income and 36 low-income countries[10]. This list includes India.

But experiences from developed countries cannot be transported directly to developing countries as there are various issues that hinder the successful adoption of e-Governance and, subsequently, m-Governance is useful in the developing countries. This is primarily

useful as Internet penetration is low in these countries. Hue & Melissa explained that, in Indonesia, mobile platforms provide the same opportunity of Internet and computers but comparatively at a lower price[11]. In India, the potential of use of mobile devices has also been explored in certain areas where last mile connectivity becomes an issue for simple data inputs of critical importance for decision making in government departments[12].

In Palestine and in some countries in Africa and the Middle East, 'JobMatch'[13] connects thousands of job seekers and employers through a simple, easy-to-use SMS format. By providing users real-time information on their mobile phones, "JobMatch levels the playing field of access to jobs and employees, helping break cycles of poverty and unemployment[14]."

In Bangladesh, 2,00,000 sugarcane farmers across the country are benefiting[15] from e-Purjee[16] service; General Diary now can be filed online at all 41 police stations under the Dhaka Metropolitan Police[17] ; vulnerable groups in Sirajgonj and Cox's Bazaar were alerted about disasters via SMS; over 1,30,000 students applied for admission to Shahjalal and Jagannath universities using SMS[18], and 22 universities were expected to adopt similar systems by mid-2011[19] .

In terms of women empowerment, Manzar rightly identified, "They are also a clear indication that the access to information and devices or tools that could bring communication and information in the hands of women scares many men.[20]"

4.2 Education

It has been identified in the literature on m-Learning that mobile phones could lead to a variety of benefits in the educational sector. The impacts of mobile phones on educational outcomes that are identified in the m-Learning literature can be classified into two broad categories. On one hand, mobiles impact educational outcomes by improving access to education while maintaining the quality of education delivered. On the other hand, mobiles impact educational outcomes by facilitating alternative learning processes and instructional methods collectively known as new learning. In theory, m-Learning increases access for those who are mobile or cannot physically attend learning institutions – those who would not otherwise be able to follow courses in a traditional educational setting due to the constraints of work, household activities, or other competing demands on their time. m-Learning, as Visser and West suggest, can also increase access in those situations where cost represents a significant barrier to learning[21,22]. For those in rural or remote areas, where environmental and infrastructure challenges hinder other learning modalities, particularly e-Learning, m-Learning presents great opportunities.

With regards to cost, the benefit of increased access afforded by m-Learning is particularly relevant in a developing country context. Many developing countries are completely bypassing investments in costly, fixed telephone infrastructure for the installation of mobile phone networks[23,24,25,26]. Thus, m-Learning provides a potential way forward for the expansion of education programmes to larger segments of the population rather than via the eLearning model that has been adopted in much of the developed world. M-Learning allows a method of educational delivery that could be more cost-effective than e-Learning

methods, not to mention that the ubiquity of mobile phones means that many people are already familiar with mobile phone applications,[27,28].

m-Learning, the literature suggests, broadens the availability of quality education materials through decreased cost and increased flexibility while also enhancing the efficiency and effectiveness of education administration and policy. Others suggest that the benefits of mobile phones are not merely limited to increased access to educational services. M-Learning, they indicate, can also facilitate changes in the character of learning modalities that, in turn, impact educational outcomes. In this regard, m-Learning represents more than a mere extension of traditional forms of education; m-Learning facilitates alternative learning processes and instructional methods that the theories of new learning identify as effective for learning.

Donner in 'Research Approaches to Mobile Use in the Developing World: A Review of the Literature' reviewed 200 recent studies of mobile phone use in the developing world. He categorises his research into three common themes, with one of them being Mobile Impact on Education. Donner argues that the mobile's portability, simplicity, and affordability makes it a natural fit for education initiatives in places where personal computer and Internet connectivity may be scarce[29]. Kumar et al argued that mobile devices like cell phones are a perfect vehicle for making educational opportunities accessible to rural children in places and times that are more convenient than formal schooling[30]. They conducted a 26-week study to investigate the extent to which rural children would voluntarily make use of mobile devices like cell phones to access educational content. Their results show a reasonable level of academic learning and motivation. Koole emphasises that there is a tremendous scope for learning with mobile devices and establishes a framework to assist practitioners in designing activities appropriate for mobile learning[31].

Valk et. al. examined the extent to which the use of mobile phones helped to improve educational outcomes in two specific ways: (1) in improving access to education, and (2) in promoting new learning[32]. They reviewed the evidence of the role of mobile phone-facilitated m-Learning in contributing to improved educational outcomes in the developing countries of Asia by exploring the results of six m-Learning pilot projects that took place in the Philippines, Mongolia, Thailand, India, and Bangladesh. They concluded that the analysis of these projects indicates that while there is important evidence in the developing world that mobile phones impact educational outcomes by facilitating increased access, much less evidence exists to show how mobiles impact educational outcomes by promoting new learning.

Mobile phones theoretically make learner-centred learning possible by enabling students to customise the transfer of and access to information in order to build on their skills and knowledge and to meet their own educational goals[33]. M-Learning, thus, exerts a democratising effect on the learning experience as learners take a greater responsibility for the learning process instead of being passively fed information by an instructor. While in traditional models of education, the goal is the transfer of knowledge from teacher to student, m-Learning empowers students to actively participate in the learning process to make it a process of construction and not mere instruction[34].

As a facilitator of new learning, m-Learning goes beyond an emphasis on the possession of information to enabling learners to find, identify, manipulate, and evaluate existing information[35]. Mobiles can also supposedly facilitate knowledge-centred learning by providing efficient and inventive methods by which students can learn with understanding – meaning that they deepen their understanding of a specific subject matter rather than merely memorising large amounts of information – and then use this knowledge as a basis for new learning through integration and interconnection. Mobile devices make possible assessment-centred learning as well by enabling the provision of continual feedback throughout the learning process, presenting learners with diagnosis and formative guidance as to what might be improved or what might be learned next. Moreover, in providing prompt feedback, m-Learning maintains the appeal of learning and provides a motivating factor that can at times be lacking in traditional modes of education[36].

Mobiles, therefore, should impact educational outcomes by altering the character of education and learning because the nature of mobile technology converges with and facilitates new learning. The new learning is personalised, learner-centred, situated, collaborative, ubiquitous, and lifelong. Likewise, mobile technology is increasingly personal, user-centred, mobile, networked, ubiquitous, and durable[37]. The literature indicates that the benefits afforded by this convergence should exert a positive impact on educational outcomes.

According to UNICEF (2009), every year, approximately 3,50,000 women die worldwide as a direct result of pregnancy and childbirth, and for each woman who dies approximately 20 others suffer from pregnancy-related consequences[38]. Additionally, three million babies die every year before they are a month old and a similar numbers are stillborn[39]. About 40 per cent of women in developing countries do not have a skilled birth attendant during childbirth, and less than 40 per cent of women and infants receive a postnatal visit[40].

4.3 Health

Mobile Health, or m-Health addresses the use of mobile and wireless technologies for providing health services and information. m-Health interventions are based on improving the health services; and are directed towards the recipients of health services that include sending information or reminders to improve the recipient's health. The aim of mobile technology in health sector is to increase the knowledge level of family members of different health issues and promote behaviour change in health-related practices. Various mobile applications with open-sourced solutions along with locally available and culturally acceptable technology have been designed at the national and international level to overcome the health challenges and achieve Millennium Development Goals (MDGs).

After the drought in 2008, UNICEF used a mobile SMS-based service to provide health care service to citizens in Ethiopia. This SMS-based service called RapidSMS[41] can represent a feasible low-tech response to different challenging conditions in Ethiopia. "RapidSMS was designed to be a simple supply chain management tool, which automatically integrates inventory information sent by SMS into a central database in real time.[42]"

'MedAfrica[43]*'* mobile application is a mobile-based medical services content platform that seeks to create health awareness among citizens from the comfort of their mobile phones. This extraordinary mobile system seeks to increase interactions and purposeful engagements between health practitioners and common people of their services.

The *Mobile Alliance for Maternal Action*[44] (MAMA) programme, which is currently being implemented in Bangladesh and South Africa, uses technology to improve health and nutrition outcomes among pregnant women, new mothers and their infants in resource-poor settings. MAMA delivers vital and culturally-sensitive health messages to expectant and new mothers via mobile phones. The messages reflect the most up-to-date, evidence-based global standards and relate to behaviours that are proven to affect health outcomes such as attendance at antenatal care, nutrition, vaccination, cord care and use of insecticide-treated bed nets.

The *Mobile Technology for Community Health*[45] (MOTECH) initiative aims to determine how to use mobile phones to increase the quantity and quality of prenatal and neonatal care in rural Ghana, with a goal of improving health outcomes for mothers and their new-borns. The ICT approach includes mobile applications targeted at both health consumers and health providers.

The *Mobile Midwife*[46] service enables pregnant women and their families to receive messages via SMS or IVR, a technology that allows a human caller to interact with a computer through the use of voice and tones based on keypad selections. The Nurses' Application helps community nurses and other community health workers record and track the care being delivered to women and new-borns using low-cost GSM mobile phones.

Pathfinder International, in collaboration with Dimagi, USAID, and the Haitian Ministry, has trained more than 300 community health workers (CHWs) under the mSante mHealth Project[47]. This mobile application focuses on case management, health service delivery, referrals for tracking patients between home and the health facility, and features modules focused on interventions targeted at family planning and maternal and child health.

The APHIAplus project has worked with Dimagi in Kenya to monitor and track the health of pregnant mothers, orphans and vulnerable children. CHWs are better able to monitor maternal and new-born health indicators, keep women informed of their expected delivery date and signs of complications, and help them prepare for delivery. The application also contributes to an increased number of facility-based deliveries as a result of due date reminders.

Better Health for Afghan Mothers and Children[48] (BHAMC) project in the Herat Province of Afghanistan used a community-based maternal care strategy (Home-Based Life Saving Skills - HBLSS) to improve preventive care, home care, and care seeking practices among pregnant women.

Chipatala cha pa Foni [49] (CCPF) means Health Centre by Phone is a hotline and voice/text-based tips and reminder service that provides women and guardians of young children in rural and underserved

areas with access to information, medical advice and referrals on reproductive, maternal, new-born, and child health (RMNCH) issues. It aims to increase knowledge and improve health-seeking behaviour among pregnant women, guardians of young children and women of child-bearing age. Village Reach developed and implemented the service for Concern Worldwide's Innovations for Maternal, New-born, and Child Health (Innovations) initiative in Balaka District in Malawi.

Sistem Informasi Jejaring Rujukan Maternal & Neonatal[50] (SIJARIEMAS) enables midwives to refer mothers and new-borns in emergency situations to hospitals, and then support follow up visits and education after mothers return home.

In terms of m-Governance for health services, the World Bank has identified that "the health sector remains both complex and challenging" and "the most relevant challenges to the greater uptake of mobile-based health service are- (a) insufficient financial resources, (b) lack of sustainable business models, (c) privacy and security concerns, (d) limited evidence, (e) difficult coordination of stakeholders and (f) interoperability issues.[51] "

The analysis by the UN System Task Team and the lessons learnt from the MDGs implementation highlight the importance of various enablers, and 'participation', 'governance' and 'technology' are most important among all enablers[52]. Different 'development enablers' identified by the UN report 'Realising the Future We Want for All' — such as 'participation', 'good governance practices', 'women's empowerment', 'access to quality health care', 'quality education' and 'access to technology and knowledge' — could be used to reduce the gap in the society. The United Nations Development Programme (UNDP) also recognised that citizens are able to engage more easily and effectively with governing processes through new mobile and online tools[53].

The review of literature and some real-world examples that we gave just now are somehow directly or indirectly linked to using mobiles in education, in health and in empowerment.

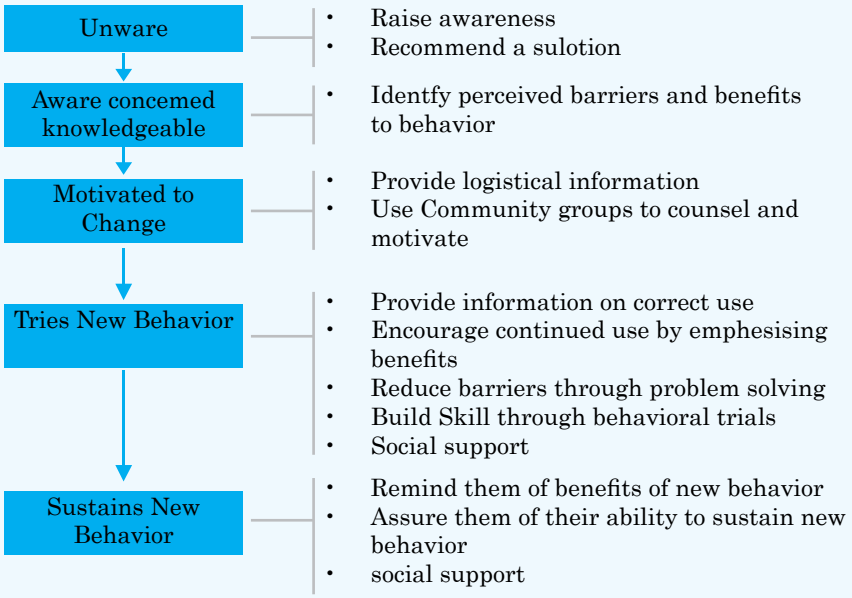
Thus, mobiles play a decisive role in social and behavioural change. They are capable of raising awareness levels among citizens, contributing to training and capacity building, and helping in advocacy at the grassroots level. Mobiles also help improve access and "connectivity for individuals and communities, which in turn may provide access to critical transformational information"[54].

While significant positive changes have happened in some economically least-developed and developing countries that have been identified in this section, the Indian scenario is also significant. Thousands of mobile applications have been developed in last couple of years. Thus, through this research study, we have evaluated how some mobile applications contributed and are continuing to contribute towards social and behavioural changes in India *(Figure 13).*

There are a number of socio-ecological models for the purposes of understanding an individual's behaviour. Environmental Psychology emerged as a sufficiently differentiated academic field in the 1950s with

the intention of exploring the interface between human behaviour and the socio-physical environment (Stokols & Altman, 1987). Kurt Lewin contributed the most towards the development of the field by proposing that behaviour is a function of the person, the environment and the interactions between the two (B = ∫(P.E)). He also propagated a multi-method approach in which qualitative and quantitative methods are used; in particular, the full cycle model; to complement and validate each other in the analysis of an individual's behaviour (Bechtel & Churchman, 2002).

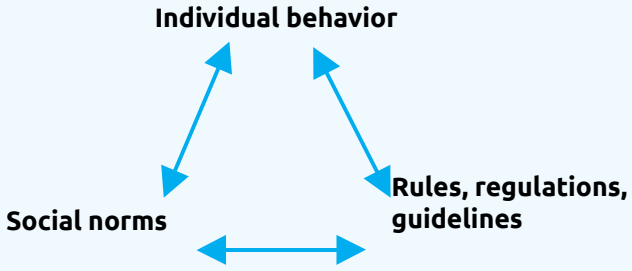
Figure 13: Social and Behavioural Change Communication



Source: The World Bank, 1996

For the purposes of this manuscript, the Social Ecological Model (SEM) presented by McLeroy, and his colleagues (McLeroy, Bibeau, Steckler, & Glanz, 1988) is considered. This model introduces two key concepts to the understanding of behaviour; (1) Behaviour affects and is affected by multiple levels of influence and (2) Individual behaviours shapes and is shaped by the social environment. It uses a reciprocal causation model that demonstrates the relationships between individual behaviour, social norms and rules, regulation and guidelines.

Figure 14: Reciprocal Causation Model



The multiple levels posited by McLeroy et al. in the SEM range from the Macro (Public Policy & Community), the Meso (Organisational) and finally the Micro (Interpersonal & Intrapersonal) *(Table 2).*

Table 2: SEM Levels of Influence

Level of Influence	Description
Public policy (Federal, State, Local)	Policies and laws that regulate or support healthy practices/actions
Community (Social Networks)	Community norms (community regulations)
Organisational (Socio-cultural organisations)	Rules, regulation, policies, structures constraining or promote behaviours
Interpersonal (Friends, Family & Peers)	Interpersonal processes and groups providing identity and support
Intrapersonal	Individual characteristics that influence behaviour: Knowledge, skills, self-efficacy

Source: Adapted from (Winch, 2012)

SEM postulates that individuals interact with the interpersonal factors of influence the most, therefore leading them to be termed as most significant and influential in shaping the behaviour of a person. It also stresses the strong relationship that the interpersonal level has with the organisation level of the model. However, Mehtälä et al., 2014, while conducting a review of over 23 child health-focused intervention studies, found that there exists mixed reviews on the exact level of influence that the interpersonal level has on an individual. Based on the findings of Mehtälä et al., 2014, it is safe to reason that any intervention targeting the policy and community levels of influence tend to be of very large scale, are highly visible and impact a large number of people.

It is essential that those models be used appropriately: not as templates for behaviour change policies but as tools to be used in the design of interventions. In all instances, implementation organisations should use models as aids to thinking, and not seek to impose them on the public uncritically through interventions.

As we studied 14 different case studies across India, we identified how existing 'Behaviour and Change Models' are linked with our Mobile for Social and Behavioural Change (MSBC) case studies.

4.4 Behaviour and Change Models and MSBC Case Studies

Behaviour and change models are conceptualised and defined by various disciplines. These models have varying stances on the importance of the individual vs. external factors as the loci for behavioural change. These varying models also seek to isolate the key controlling factors, causes or processes of behaviour. Theories of change aim to influence the individuals' behaviour through coercive and non-coercive means. Most behavioural models originate from the annals of social psychology,

sociology and anthropology. These disciplines focus their attention on research concepts and instruments aimed at promoting sustainable development, as well as the social and psychological drivers and barriers to sustainable behaviour. Due to these efforts, there exists a large body of theories and case studies on which to base the design of targeted interventions aiming to initiate some form of behavioural change.

By contrast, theories of change show how behaviours change over time, and can be influenced. While behavioural theory is diagnostic and designed to explain the determinant factors underlying behaviour, change theory is more pragmatic and developed in order to support interventions for changing current behaviours or encouraging the adoption of new behaviours. While the two bodies of theory have distinct purposes, they are highly complementary; understanding both is essential in order to develop effective interventions.

The research report aims to shed light upon those models which approach behaviour and change as an intersection of factors at varying levels of scale; from the micro to the meso and finally to the macro level.

The models of behaviour and theories of change discussed contain diverse and, sometimes, conflicting concepts to understand an individual's behaviour and modify it. However, these cross-cutting concepts intersect to provide us with valuable insights to identify, inform and influence actors in any behavioural activity ecosystem. While models cannot account for all the complexities of behaviour and determine how people behave, they can help identify some of the factors that influence those outcomes.

In his review of various models of behaviour and theories of change, Jackson (2005), identifies two major purposes of behavioural change: (1) Heuristic - Models serve to help us understand the factors influencing behaviour and how they interrelate; (2) Empirical - To quantify the relationships between the factors to allow us to predict the behavioural outcomes.

Table 3: Mapping of Models & Theories to Projects

S. No	Project Name	Models of Behaviour and Theories of Change applies
1	CGNetSwara	Reasoned Action Model, Fogg Behavioural Model
2	Mobile Vaani	Reasoned Action Model, Fogg Behavioural Model
3	GPower	Diffusion of Innovation, Social Cognitive Theory
4	BridgeIT	4E Model, Diffusion of Model
5	GIS@School	Social Ecological Model, 4E Model, MINDSPACE
6	Learn Out of The Box	4E Model, Diffusion of Innovation
7	Arogyashreni	Reasoned Action Model, 4E Model, Fogg Behavioural Model
8	eMamta	Social Ecological Model, 4E Model, Reasoned Action Model
9	Hamari Ladli	Social Ecological Model, Trans-theoretical Model

S. No	Project Name	Models of Behaviour and Theories of Change applies
10	Mobiles for Mothers	Diffusion of Innovation, Social Cognitive Theory
11	mSakhi	Diffusion of Innovation, Social Cognitive Theory
12	ReMiND	Diffusion of Innovation, Social Cognitive Theory
13	Vatsalya Mandla	Social Ecological Model, Fogg Behavioural Model,
14	Mobile Kunji	Social Ecological Model, 4E Model

It is essential that those models are used appropriately not as templates for behaviour change policies but as tools to be used in the design of interventions. In all instances, implementation organisations should use models as aids to thinking and not seek to impose them on the public uncritically through interventions.

None of the selected projects use a single model of behaviour or theory of change exclusively within their methodology. However, they employ elements of these models within the larger framework. The various projects mapped to the models of behaviours or theories of change are presented in Table 1. It is essential that models are used appropriately —not as templates for behaviour change policies but as tools to be used in the design of interventions. In all instances, implementation organisations should use models as aids to thinking and not seek to impose them on the public uncritically through interventions.

5. Overall research goals and objectives

The goal of the research is to understand the scope and magnitude of mobile use besides learning how mobiles are emerging as viable tools, devices and platforms to meet vital development and governance objectives through desired social and behavioral changes (SBC). Along with this goal, the overall objective of the research was to find how mobiles have been acting as a communication tool using various mobile-based models through empirical and primary research, and also secondary research with multi-stakeholder involvement in the research and data gathering process.

To accomplish the main goal and the overall objective, the Mobile for Social and Behavioural Change (MSBC) research project has identified different challenges and opportunities in using mobiles for social and behavioural changes in the context of mobile-based models; scope to scale up existing tools and so on. The following objectives have helped DEF reach the main goals.

1. To find out how mobile phones can be used as a communication model by using various mobile-based interventions
2. To understand whether the mobile-based models are reliable
3. To understand whether the mobile based models are effective
4. To investigate whether these models are efficient
5. To explore whether these models are sustainable

These above mentioned objectives have been measured from different perspectives like relevance, effectiveness, efficiency and sustainability to help identify the actual outcome of the mobile as a communication tool for social and behavioural change.

6. Research methodology

6.1 Research Objectives

Based on the previously mentioned background, the following key questions have guided this research titled 'Mobile for Social and Behavioural Change (MSBC)':

1. To understand how mobile phones can be used for disseminating information; monitoring and tracking; providing training support; mobilising communities; building a network and strengthening interpersonal communications with community members.
2. To understand communication challenges, scope and opportunity to use and deploy mobile technology and platform in communication processes, and to scale up existing practices in partnerships and so on.
3. To understand the scope and magnitude of mobiles as viable tools, devices and platforms to meet vital developmental approaches of health, education and civic participation.
4. To understand how mobiles can only be used as a communication tool in terms of disseminating information; tracking and monitoring of services, and providing training support services to frontline workers.
5. To find the actual outcome of the mobile as a communication tool on social and behavioural change through empirical and primary research and also secondary research with multi-stakeholder involvement in the research and data gathering process

6.2 Research Approach

Mixed method approach is being considered as the most appropriate approach to be used in studies that "call for real-life contextual understanding, multi-level perspectives, and cultural influences"[55]. Thus, we used both qualitative and quantitative approaches for this research project.

6.2.1 MSBC Consultations: Identification of Case Studies

As part of the project, UNICEF India and DEF organised five state-level consultations in Madhya Pradesh, Uttar Pradesh, Andhra Pradesh, Tamil Nadu and Assam. Over 50 projects explored the concept of mobiles for social and behaviour development in these state consultations. The objective of organising the different MSBC consultations was to involve all stakeholders at state level to catalyse partnerships, help scale up the MSBC initiatives at the state level, find partnerships for relevant organisations, and provide government visibility on various options for adopting and implementing MSBC-related solutions for state government and its citizens. Out of these 50 initiatives, 14 were selected on the basis of their geographical spread and usage in three categories – information dissemination, monitoring and tracking, and support to frontline workers. These 14 mobile-based interventions are divided into the following categories *(Table 4)*.

Table 4: Mobile-based intervention, their categories and geographical spread

S.No	Mobile-based model	Category	Geographical spread
1	CGNetSwara	Information dissemination	Chhattisgarh, Madhya Pradesh
2	Mobile Vaani	Information dissemination	Bihar, Jharkhand
3	GPower	Monitoring & tracking	West Bengal

S.No	Mobile-based model	Category	Geographical spread
4	BridgeIT	Information dissemination	Harayana, Tamil Nadu & Andhra Pradesh
5	GIS@School	Monitoring & tracking	Madhya Pradesh
6	Learn Out of The Box	Information dissemination	Assam
7	Arogyashreni	Monitoring & tracking	Karnataka
8	eMamta	Monitoring & tracking	Gujarat
9	Hamari Ladli	Monitoring & tracking	Madhya Pradesh
10	Mobiles for Mothers	Information dissemination	Jharkhand
11	mSakhi	Support to frontline workers	Uttar Pradesh
12	Mobile Kunji	Support to frontline workers	Bihar
13	ReMiND	Support to frontline workers	Uttar Pradesh
14	Vatsalya Plus	Monitoring & tracking	Madhya Pradesh

These models were selected for further primary research to understand how these initiatives are using mobiles as a communication tool for enhancing community participation and interaction between frontline workers and communities. The MSBC consultations also provided base reference and helped us identify 103 caselets that were compiled in the form of a national-level compendium.

6.3 Research Methods

In the research, both quantitative and qualitative methods were employed to assess *relevance, effectiveness, efficiency and sustainability* of different mobile applications. In the study, several research tools and methods such as structured questionnaires, semi-structured questionnaires, individual interviews and focus group discussions were used to understand different needs of end users and the ability of different mobile applications to meet their needs. Both the quantitative and qualitative methods helped understand the sustainability of different mobile applications.

6.4 Data Collection

The research methodology for this proposed study included both primary and secondary data. All qualitative and quantitative primary data was captured with the help of a digital tool called 'Online Data Kit (ODK) Collect' and also on paper. Different survey forms were developed for Android-based tablets or mobile phones *(Figure 15)*.

Fig 15. Survey form in 'ODK Collect'

6.4.1 Secondary Data

For secondary data collection, existing research reports provided by project stakeholders; and publications and news articles available online and offline were used.

6.4.2 Primary Data

A number of primary survey questionnaires were designed for multi-level stakeholders — such as frontline workers (multi-purpose health workers, ASHA; ANM, and teachers); end-users, parents/family members, students and volunteers; government officials; technical partners, app developers — to capture data on outcomes in the following areas:

- Potential benefits of the model
- Background and context of the development of the model
- Technical process of the model
- Gaps and challenges within the system
- Usability analysis of the model
- Factors that influence usability
- Outcome (measuring reliability, effectiveness, efficiency and sustainability of mobile-based interventions)

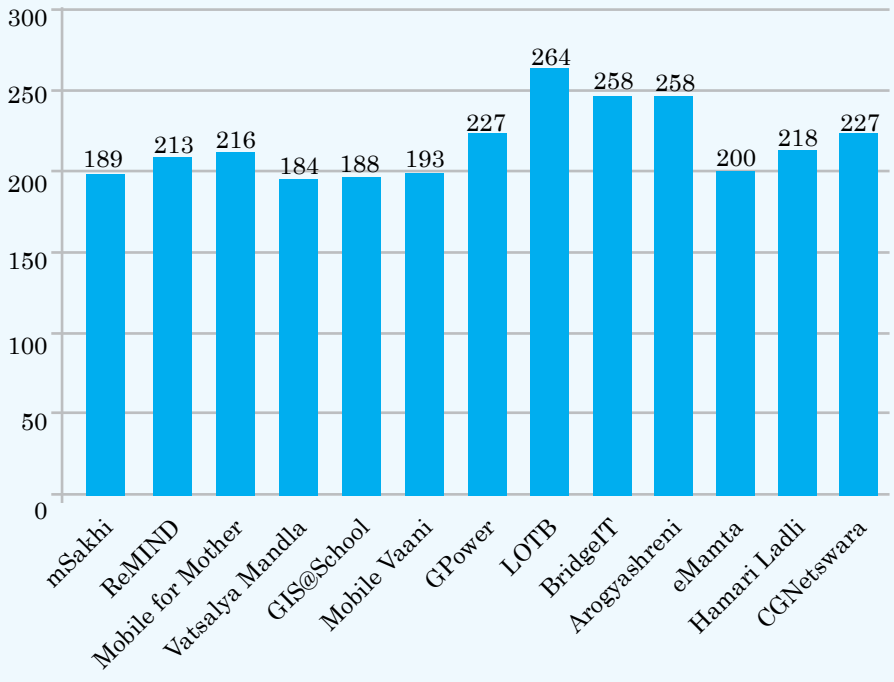
6.5 Sampling

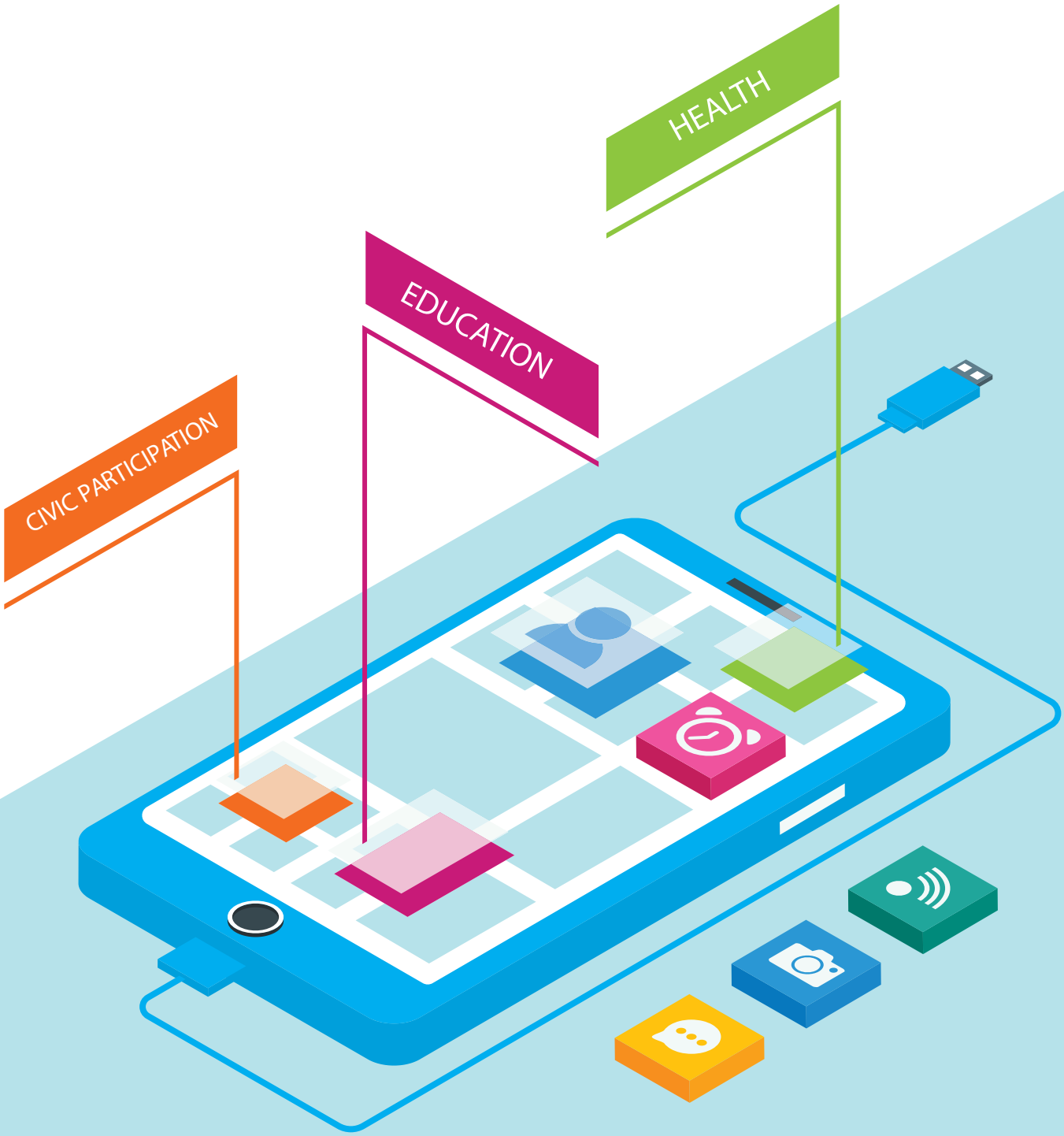
As mentioned earlier, the research study was conducted in 12 Indian states. Based on socio-economic, geographical and accessibility factors, exact research locations were identified. Several sets of questionnaires (for tool developers; users; parents/family members; teachers; and charity workers, government officials) for data collection were developed. The following graphic shows the distribution of sample size *(Figure 16)*.

6.5.1 Sample Size:

The total sample size for this 'Mobile for Social and Behavioural Change' research study was 2,835 at 95 per cent confidence level and 6 per cent margin of error in the primary survey.

Figure 16: Distribution of sample size




HEALTH
EDUCATION
CIVIC PARTICIPATION

Civic participation

'Civic participation' can be a powerful, transformative force for both political and socio-economic development',[56,57]. Civic participation plays an important role in helping establish and maintain government accountability by organising and demanding government transparency. For civic participation to engage meaningfully with governing institutions, political parties and the government must offer real opportunities to deliberate and influence citizen.

In the past decade, mobile phones have become synonymous with united voice of the people and democracy. This is possible through extended participation of citizens in state affairs, decision making and holding government officials accountable[58]. The mobile phone is also playing a critical role in citizen's participation so that they can exercise their rights. Mobile phone is gradually bringing market information, financial services, and health services to remote areas, and is transforming people's lives in unprecedented ways. With mobiles, not only does the citizen get information on public expenditures and budgetary process but the government also gets appropriate information and feedback on the implementation of schemes. They can enhance public participation and government accountability by maximising the ability of citizens to participate (increase overall participation through reduced costs of participation) and by making the process more effective and more inclusive.

Given the contributory values of participation, several initiatives have been undertaken around the world to widen the people's participation. For example, Freedom Fone platform is used in Zimbabwe by NGO Kubatana to disseminate and receive information from across the country. People leave emergency reports and also listen to breaking news[59]. In India, according to the KPMG-FICCI[60] media and entertainment industry report 2015, the total number of mobile phone Internet users in urban India has increased from 44 million (June 2012) to 128 million (December 2014) whereas the same for the rural section has increased from four million (June 2012) to 45 million (December 2014)[61]. Mobile has completely changed the way the governance is looked at in the country. Mobile Seva/ Mobile Governance is one of those frameworks where government services are provided through several gateways like IVRS, SMS, location-based services, etc., for delivery of integrated services to the citizens[62].

The proliferation of mobile phones in the last decade in developing economies can be used as a remarkable tool to combat non-egalitarian forces against the historically marginalised groups like girls and women[63]. They often face serious discrimination in terms of access to information and comprehensive knowledge. On the same line, violence against women is a significant problem. The large mo-

bile phone user base can be streamlined to share information, collect data, and provide emergency support. The easiness of new mobile platforms with a simple phone with SMS facility has been adopted widely across countries like South Africa, Mexico and India. It is used mainly for tracking violence, crime, monitoring, mobilising and networking among geographically dispersed population (UNDP, 2012)[64]. Mobile phones can be used as an effective tool to reduce violence.

Mobile phones can promote gender equity by giving women an opportunity to address their grievances. For example, women in some regions of Democratic Republic of Congo send text messages to towns where there is functioning judiciary with a hope that their voices will be heard. In the same country, Watchlist on Children and Armed Conflict initiated a pilot project using cellular phones and Internet technology to monitor and report on child rights violations[65]. Similarly, mobile phones are empowering women in many other ways like women micro entrepreneurs such as beauticians and tiffin-wallas in Mumbai) are creating a wider customer base. This new platform enables the women to unfurl their own wings, which traditionally was a male domain.

There are other non-profit organisations like Gram Vaani and CGNetSwara that use the IVRS platform to give voice to the most down trodden people of the society. Such platforms allow people to ask their questions related to development of the area, thereby increasing transparency and accountability of the government.

This, in a way, has empowered people and enshrined the ideals of democracy. This study comprises three projects in the civic participation sector — CGNetSwara, GPower and Mobile Vaani.

7.1 CGNet Swara

7.1.1 Introduction

CGNetSwara started in 2004 as only a mailing list (or listserv) initially to discuss people's issues related to Chhattisgarh. The voice component (Swara) was added in 2010. It's a voice-based interface, catering to the needs of tribes in discussing issues that are important to them[66]. In the absence of news content in local tribal languages in television, newspapers and radio, where Internet penetration is less than 0.5 per cent, CGNetSwara has adopted voice-based platform for recording and listening to information over the phone, and has since spread to other Central Gondwana states of the country[67].

Rewa in Madhya Pradesh, a small state in central India, consists of primarily indigenous people or adivasis (tribals), who are among the most poor and socio-economically disadvantaged in all of India. Due to these reasons the media reach in such sections is very minimal[68]. Shortage of trained journalists in rural areas and communication gap has aggravated the matter. There are no established news sources in tribal languages like Kurukh or Gondi, each of which have over two million speakers[69]. CGNetSwara is governed by a relatively simple technology. A Linux server utilises Asterisk (an open-source telephony platform) in combination with LoudBlog[70] (an open-source audio blogging platform) to provide the key functionality. The logic of the IVR system is written in python and is available as a free, open-source download[71].

As of November 2015, CGNetSwara receives about 1,000 phone calls per day. Most callers only listen to reports. Over the last year, there has been an average of six reports published per day and 11 impact reports per month. Since its inception in 2010, there have been a total of 8,300 published reports and 376 impact reports. Thus, only a small fraction (about 5 per cent) of the total reports result in a verified resolution; however, not every report is a grievance (13) and the voluntary reports of resolution are not necessarily complete. Grievances reported on CGNetSwara often affect a large number of people. In the 95 impact posts that reported the number of people directly benefitted, the average number was 61, with a median of 25 and a maximum of 850[72].

Objectives

- To measure the relevance of the project in terms of enabling the participants (tribal communities) to report and discuss issues of local interest, it also analyses if it provides an alternative media outlet for tribal communities who lack access to any mainstream media outlet.
- To study the effectiveness of the project by analysing participation of citizens in posting and listening to content– especially knowledge about entitlement, whether it strengthened the district administrative machinery and local governance by dissemination of regional, national and international news.
- To assess the efficiency of the project by analysing the project, its operating costs and user friendliness.
- To understand the sustainability component of the project by identifying challenges in the project implementation, delivery, management and maintenance.

7.1.2 Research Methodology

A triangulated research methodology was followed for this assessment. The questionnaire was designed to collect information from four major stakeholders namely community users, community non-users, government officials and CGNetSwara team members. The data was

collected from Rewa district of Madhya Pradesh where CGNetSwara is implemented. The total sample size for the survey was 227. The data obtained is classified under four main heads — relevance, effectiveness, efficiency and sustainability.

For secondary research, the following sources were used:

- Reports available online and offline (depending on accessibility)
- Data and reports with CGNetSwara

7.1.3 Research Outcome

7.1.3.1 Demographics of the Respondents

a) Community users: Among the users, 5.7 per cent of the respondents were aged less than 20 years of age, 10.3 per cent were aged 20-24 years, 8 per cent were aged 25-29 years, followed by 14.9 per cent aged 30-34 while 12.6 per cent were aged 40-44 years, while 25.3 per cent were over 50 years old. In terms of educational qualification, 51.7 per cent respondents were literate, 28.7 per cent had studied till higher secondary, 10.3 per cent had received primary education, 5.7 per cent had studied up to middle school and only 6.9 per cent were graduates.

Table 5-: Demographic Profile of the Respondents

		Community Users	Non-users	Team	Government officials
Gender	Female	43.7	42.0	20.0	0.0
	Male	56.3	58.0	80.0	100.0
Age distribution (in years)	<20	5.7	3.4	0.0	0.0
	20-24	10.3	6.7	0.0	9.1
	25-29	8.0	9.2	0.0	0.0
	30-34	14.9	20.2	20.0	18.2
	35-39	14.9	8.4	0.0	18.2
	40-44	12.6	15.1	20.0	18.2
	45-49	8.0	6.7	40.0	9.1
	>50	25.3	30.3	20.0	45.5
Educational level	Illiterate	48.3	56.3		11
	Primary	10.3	15.1		
	Middle School	5.7	5.9		
	High School	28.7	16.8	50.0	
	Graduate and above	6.9	5.9	50.0	
Total		87	119	10	
State/Blocks/ Districts/ Panchayat		8 blocks/1 district			

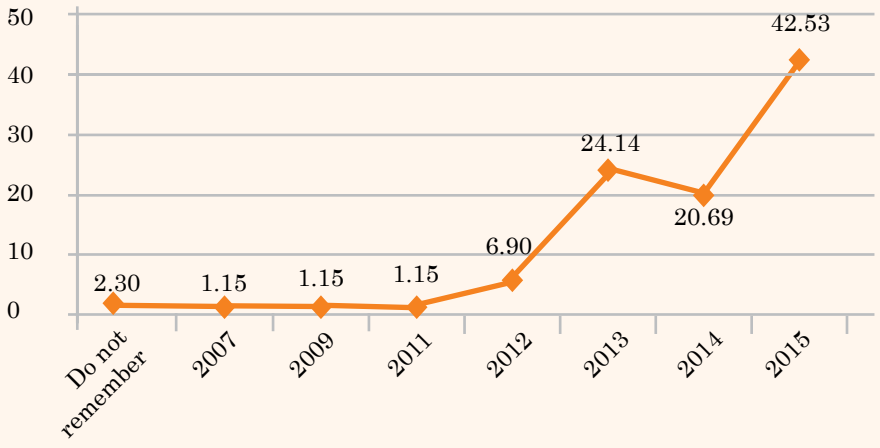
b) Community non-users: Among the non-users, majority of the community (20.2 per cent) were aged 30 - 34 years followed by 3.4 per cent aged less than 20 years, 6.7 per cent were aged 20 - 24 years, followed and 30.3 per cent aged above 50 years. In terms of the educational qualification, 56.3 per cent of the respondents were illiterate, 15.1 per cent had received primary education, 5.9 per cent went to middle school and another 5.9 per cent were graduates or held higher degrees *(Table 5)*.

7.1.3.2 Relevance

The relevance analyses if it provides an alternative media outlet for tribal communities who lack access to any mainstream media outlet and if it is meeting its objective of facilitating the participants to voice their grievances on various issues.

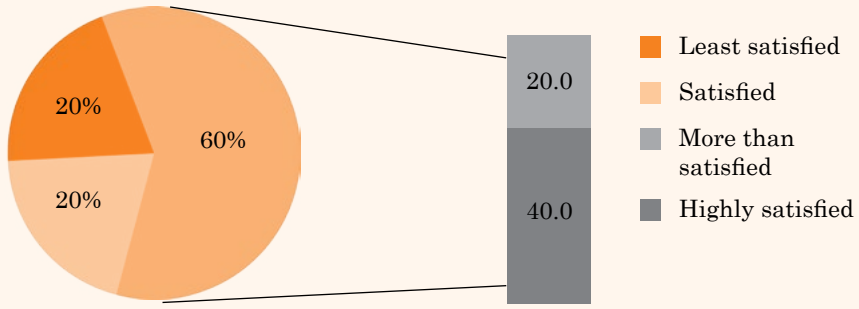
a) Views of the community users: In order to ascertain the spread of CGNetSwara, community stakeholders were asked when they made their first call to the portal. Forty six per cent of the responders had made their first call in 2015. Twenty four per cent had called in 2013. It was also noticed that the number of callers to CGNetSwara had declined in 2014 to 23 per cent *(Figure 17)*. The next evident question was what made them call — to report an issue, to listen to news or other's complaints or both. In terms of CGNetSwara giving them opportunity to voice their issue; 54 per cent among the community users had used it to report issues and 27 per cent had used it for both, to listen to and report issues.

Figure 17: Callers calling CGNetSwara for the first time over the years



Seventy six per cent of the respondents stated that CGNetSwara does help them voice their issues, while 24 per cent did not feel the same.

Figure 18: Citizens participation in posting and sharing



b) Views of the CGNetSwara team: When the team was asked if the citizens were satisfied in participating and sharing their thoughts on the portal, the team said that 40 per cent of the people were highly satisfied while 20 per cent were least satisfied *(Figure 18)*. Though 60 per cent of the members feel that there were gaps in the system, which have to be looked into and rectified, all the team members were of the opinion that CGNetSwara does provide an alternative media to the citizens of Chhattisgarh. Ninety per cent of them feel that it gave the people a voice of their own which also reaches a larger audience.

c) View of the government officials: Ninety per cent of government officials interviewed had heard about CGNetSwara, and felt that the platform was bringing a positive change. In spite of Swara being in the experimental stage in the first two years, the impact that it had on the deprived communities had been heart rendering.

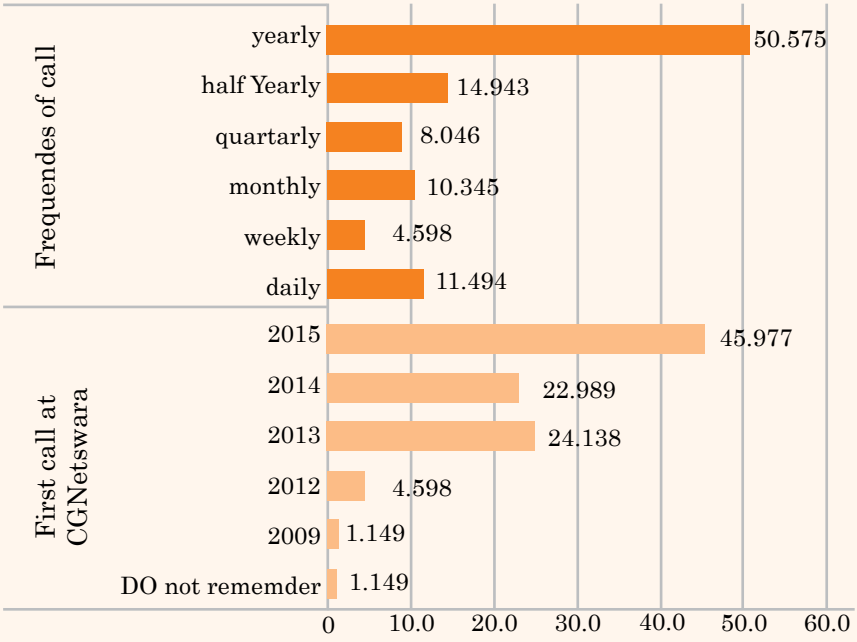
7.1.3.3 Effectiveness

The effectiveness of the project was assessed by analysing participation of stakeholders in posting and listening to content, experience of participants in using and accessing the news available, and knowledge and retention of disseminated impact stories.

On 8 January, 2011, a citizen journalist posted an interview with Pitbasu Bhoi, from Ambikapur, who was not paid his wages even after working 100 days under MGNREGA. A week later, another citizen journalist ran into Bhoi and discovered that his son had died due to the non-payment of wages. After two leading national dailies, Times of India and The Hindu, picked up the story from Swara and followed up, Bhoi was paid his due wage on 20 January, 2011.

d) Views of the community users: The assessment shows that over the years, the number of first-time callers to CGNetSwara in Chhattisgarh is increasing over time. Thirty two per cent of the callers were highly satisfied with what they heard on the call, 18 per cent were more than satisfied while 21 per cent were not at all satisfied with the content of the call. It was also seen that 49.4 per cent of the respondents were posting yearly on CGNetSwara *(Figure 19)*.

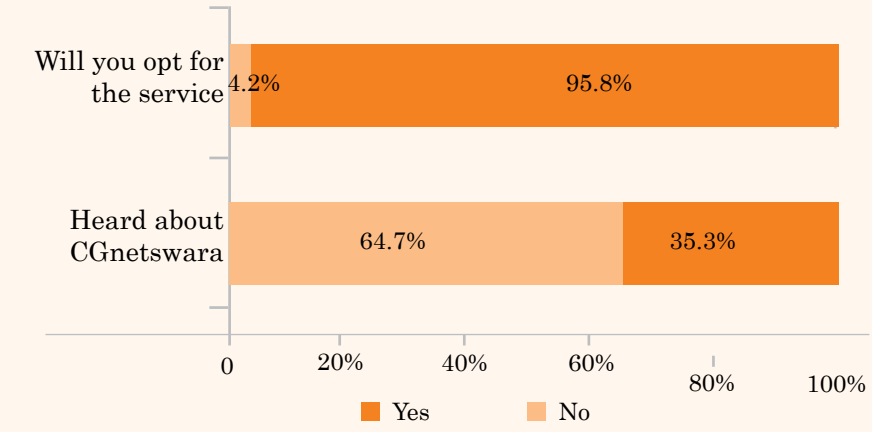
Figure 19: Comparative view of the first time callers and frequency of calls made to CGNetSwara



Fifty per cent of the respondents feel that their posts were broadcasted, and 43 per cent of them feel that it did bring the change that they wanted to see. Fifty five per cent of the community responders feel that public service has improved in the last five years after the introduction of CGNetSwara.

e) Views of the community non-users: Of the community non-users, 65 per cent had not heard about CGNetSwara before but 95 per cent of them feel that they will post on the portal now that they know of it *(Figure 20).*

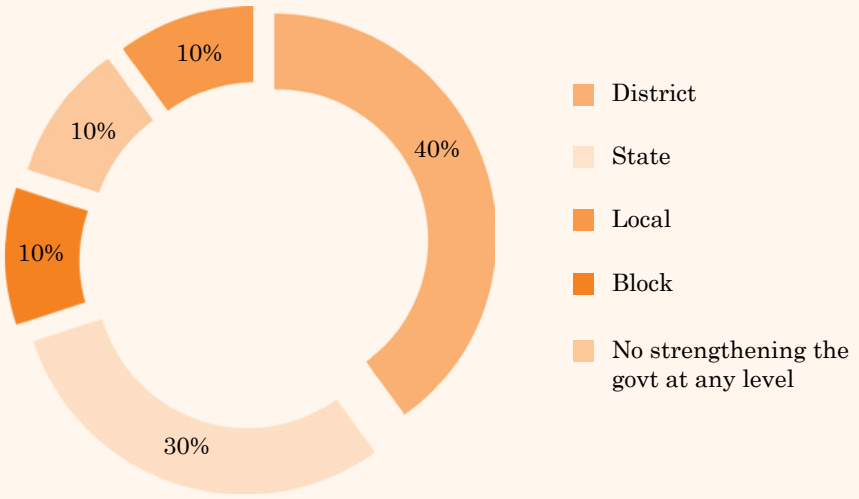
Figure 20: Comparative view of how many non-users have heard and may opt for the services later in life.



f) View of the team members: Ninety per cent of the team members feel that CGNetSwara has the ability to strengthen the government policies by connecting at the grassroots level.

The team feels that CGNetSwara can strength the government mostly at the district and state level (40 per cent and 30 per cent, respectively) and 10 per cent feels that it cannot strengthen the government at any level *(Figure 21).*

Figure 21: CGNetSwara's role of strengthening the government policies at various levels



7.1.3.4 Efficiency

Efficiency was assessed by analysing the cost, user friendliness for participants such as availability of phone lines for multiple users and the ability to search and browse older post via phone.

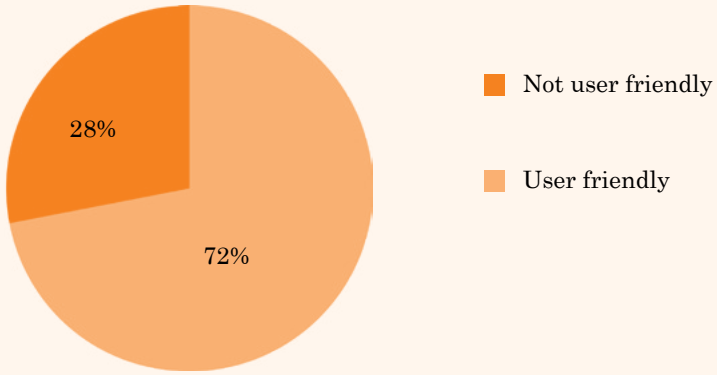
DB Corp, owner of the largest circulating newspaper in Chhattisgarh, acquired a coal mine in Dharamjaigarh in Chhattisgarh. Despite the rigged public hearing, local media ignored the story. However, following two reports on Swara about the public hearing, three national newspapers did elaborate stories, leading to the cancellation of the allotment of the coal mine.

a) Views of the community users: The users from the community were asked about the efficiency of CGNetSwara, 72 per cent of them said they felt that it is very user friendly *(Figure 22)*, 85 per cent feel that it gets connected easily and 72 per cent said that they got a call back after just one missed call while 22 per cent felt the need to givea second missed call to get a call back.

b) Views of the team members: Ninety per cent of the team members feel that multiple users can make calls at the same time on CGNetSwara. On efficiency-related questions like how user friendly is the interface, the team members unanimously replied that CGNetSwara has a very user-friendly interface. When asked what

can be done differently to increase efficiency of CGNetSwara, they suggested that more information should be given on government-related schemes, all the recorded data should be published, an increase in their wages and providing mobile phones to all team members so that they can connect with people regarding their complaints.

Figure 22: User friendliness of CGNetSwara

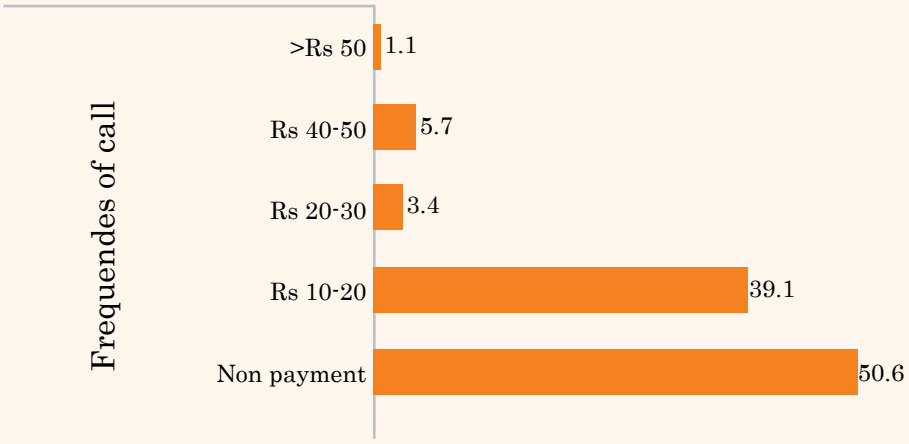


7.1.3.5 Sustainability

Sustainability of the project was assessed based on how the project would continue after external funding is withdrawn, the potential replication and scale-up of the identified good lessons learned and partnerships developed for replication or future sustainability.

a) Views of the users: When asked if the community members who are using CGNetSwara will continue to use the portal if is not free and they have to pay for it, 50 per cent of them said that they will not like to pay and use the service and 39.1 per cent would pay between ₹10 and 20 *(Figure 23)*. When asked the reason, most of them said that they will happily pay only if they are assured that the problem that they are calling for will be solved.

Figure 23: Willingness to pay by community users



Also, in the study, Founder Mr. Shubhrashu Chaudhury was interviewed telephonically and via e-mail to find out the operational cost and other technological costs involved in the project. It was found that the approximate total cost of the project was around INR 5,32,29,560 ($800,000)[73] in last six years, financed by various sources[74]. Lots of people, like Bill Thies[75], have worked pro-bono and have spent their personal money (not included in $800,000) for the project.

The net salary expenditure was around INR 3.5 lakhs per month ($52,602), rest was operational expenditure, mainly on training. The phone bill came to around INR 1 lakh per month ($1,503). Technological establishment cost was minimal as the server is a computer and some modems but investment on many equipment like modems, transmitters, etc. (most of the time imported) were incurred on very heavy costs. However, Internet cost was very low, around INR 10,000 per month.

7.1.4 Conclusion

The findings of the study are presented by SWOT analysis to get a pictorial representation of the project's weaknesses and strengths. This will enable to understand the area one needs to work on and the direction to move in.

Table 6: SWOT Analysis of CGNetSwara

Strengths	Weaknesses
• Empowered citizens • Increased accountability of the government • Voice to the people who are deprived of last mile connectivity	• Numbers of news broadcasted are limited • Salary of the team members is low

Opportunities	Threats
• Democratic community communication platform	• Lack of funds • Large scale illiteracy of the local people • Similar services are provided by CM helpline numbers

It can be concluded from this study that CGNetSwara has helped the population at the bottom to address local issues and express their grievances by greater people's participation. There is still a large section of the population who are not using the service. Low level of illiteracy can be countered with digital education, which is important in promoting e-Governance to achieve better accountability, increased transparency and improved governance.

In cost and benefit analysis, it is very evident that CGNetSwara is not a sustainable and replicable project unless medium wave or short wave radio is attached to it. Listening on mobile is very expensive and advertisements will only come with scale. This model needs all the three mediums of radio, Internet and mobile.

"CGNetSwara is an experiment. It is a first experiment of its kind. It was mainly focused on creating a foundation, a path which others could follow but it is still far from being a model which others can copy to make a sustainable and democratic community communication platform." - Shubhranshu Choudhary , Founder- CGNetSwara.

7.2 GPower

7.2.1 Introduction

GPower is a mobile phone-based application created jointly by Accenture and CINI (Child in Need Institute) in March 2014 for two districts of West Bengal with the intention to prevent early child marriages, child trafficking and dropouts among female children aged between 10 and 19 years.

Though the project emphasises on the above-mentioned issues for regular tracking, it also addresses issues related to the health (especially reproductive and sexual health) and nutrition.

The application has been primarily launched in these two districts because of the high incidence rate of child marriages and girl child trafficking seen in the past years. The application works in stages. The community facilitators of GPower are mainly staffs of CINI who are trained and provided with Android-based Samsung mobile phones with the GPower application installed on it. CINI employees who are known as frontline workers are each provided with a device. Their duty is to register the name of every girl in the village between the age of 10 and 19 with relevant demographic information.

This helps record the names, details and status of the target group (girls between 10 and 19 years of age) to provide door-to-door health services). This allows information on each of the girls to be kept up to date. With the help of GPower application's cloud-based technology, the data registered is transmitted to a centralised server and stakeholders at both ground and central level keep a regular track on all the registered girls. Predictive algorithms that use the demographic information measure the risk factor for each girl and alert the GPower team in case any child is in imminent danger, following which the team puts in its best possible efforts to save and help the girl by talking to her family or/and enlisting the help of police, human rights groups, anti-trafficking units, etc. The girls, who were found as most vulnerable after a baseline survey, are tracked on a monthly basis while the moderate or non-vulnerable girls are tracked on a half-yearly basis.

GPower has been implemented in 20 villages of two districts (10 villages from each district) of West Bengal. CINI has identified 998 girls as vulnerable; 184 girls from South 24 Paraganas and 114 from Murshidabad district are most vulnerable. CINI has saved (early marriage, school dropouts, victims of trafficking) 123 girls and enrolled them under the Kanyashree Scheme that helps them continue education and prevent child marriage. A total of 123 girls have been saved by CINI, and 112 of them are from South 24 Paraganas.. In the coming years, CINI aims to reach out to 7,000 girls across 100 villages in the same districts.

Objectives

- To study the relevance by measuring the ability of the application to identify (i) early child marriages, (ii) child trafficking and (iii) dropouts among girls of the target age [10-19 years].
- To measure the effectiveness to understand whether the app allows gathering latest whereabouts of each child among the target age group and whether GPower allows real-time data collection.
- To understand the efficiency of the project in terms of whether the GPower project mechanism has been appropriately resourced and is cost efficient, whether the app is time-efficient, whether the

community facilitators are efficient enough in implementing the project on regular basis, and if the project is efficient in meeting the needs of those girls who do not study in the target villages.

- To study the sustainability component by measuring the scalability and chances of sustainability; resourcing and operating cost for the project; the plan of continued operations after cessation of external funding, its potential replication and scale-up of the identified good lessons learned.

7.2.2 Research Methodology

The study was conducted at the block level in two districts of West Bengal where the project is operational. The total sample size for this study is 227.

Reliability
Data reliability for variable in Likert Scale is checked by means of Cronbach's Alpha which is found as Girls- GR= 0.890. The value is higher than 0.70 and, hence, it can be assumed that data is within the acceptable range.

7.2.3 Research Outcomes

7.2.3.1 Demographic Profile of Respondents

a) Girls: Out of 150 girls, 98 per cent were literate. Among the respondents, 29 per cent have received school education and 65 per cent had attended middle school *(Table 7).*

b) Parents: Among the parents, almost half (47 per cent) of them interviewed were illiterate and 23 per cent had just received primary education. This shows that the general level of education was very low and sensitizing the parents would be a challenge *(Table 7).*

Table 7: Demographic profile of the respondents

		Girls	Parents	CF/FLW	G.O	PLGs
Gender	Male Female	100.0	100.0	72.4 26.7	9 4	100.0
Age distribution	10-12 13-15 >15 20-24 25-29 30-34 >35	30.0 38.0 32.0	 10.0 13.3 10.0 66.7	 13.8 37.9 48.3	 100.0	
Educational level	Illiterate Primary Middle School	2.7 3.3 64.7	46.7 23.3 20.0	 10.3		

		Girls	Parents	CF/FLW	G.O	PLGs
	High School Graduate and above		10.0	41.4 48.3	30.8 69.2	
TOTAL			30	29	13	5
Geographical location		1 State/ Two Districts/Four Blocks				

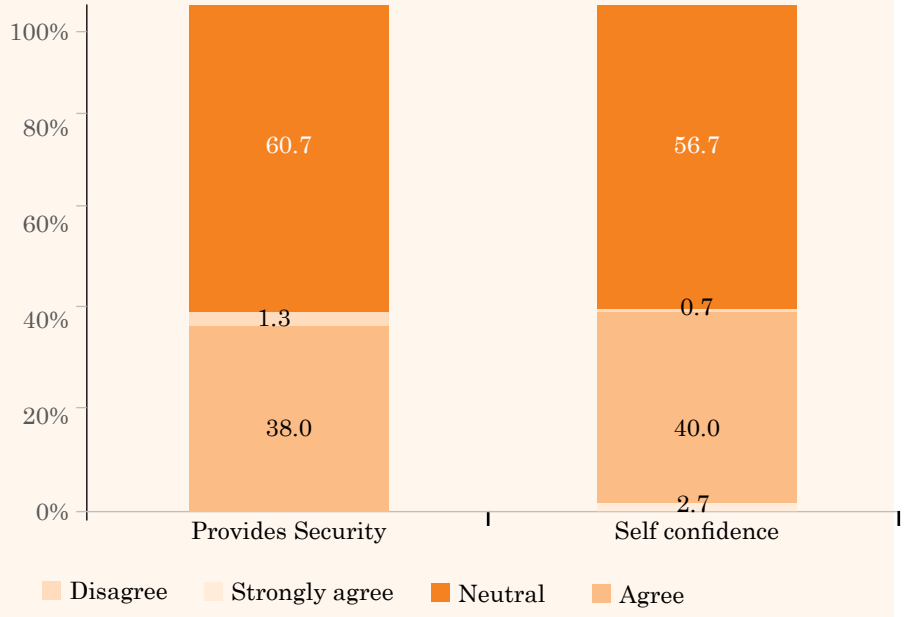
c) Frontline workers (FLWs)/Community Facilators/Govt Officials
Among the FLWs/community facilators (CF), 10 per cent had middle school education, 41 per cent had attended high school and 48 per cent had pursued graduation or higher education. Among the government officials interviewed, about 70 per cent were graduates or above *(Table 7).*

7.2.3.2 Relevance

a) Views of the girls: The girls were asked whether they knew that their names are registered with GPower. Of the 150 girls interviewed, 75 per cent stated that they were aware of being registered with the tracking device.

Of the girls who said that they were aware, 96 per cent stated that they came to know about it from frontline workers. When the girls were asked how appropriate was it in terms of security and increasing self-confidence, about 60 per cent said they had no opinion on the issues. Only 40 per cent girls agreed that GPower is appropriate in terms of giving security to them and instilling self-confidence within them.

Figure 24: Girls on personal security and self-confidence



b) Views of the parents: About 90 per cent of the parents were aware that their daughters were registered with GPower. Of 30 parents, 40 per cent said that they believed that GPower had increased the self-confidence within their daughters. GPower had helped in increasing the security of their girls and maintained cleanliness *(Figure 24).*

c) Views of CFs: Community facilitators were asked about their opinion on how is the app helpful. About 50 per cent said that they think GPower is very helpful in tracking girls and about same percentage of community facilitators feel that parents, peer groups and neighbours' attitude towards the initiative has been very supportive. About 67 per cent replied that they do not feel GPower intrudes into the privacy of the life of the girls. Two out of the six community facilitators interviewed also feel that GPower makes work of rescuing victims easy. GPower helps in mapping vulnerable girls and, thus, identifying victims. Apart from this, regular home visit are conducted and girls are rescued after family counselling. Community facilitators have other duties as well but almost five (out of six) said that they devote time for this purpose also.

d) Views of FLWs: Frontline workers were not clear as how the app is helpful in terms of ease of their work of rescuing victims. Of 22 respondents (FLW), 40 per cent agreed that attitude of the parents and peer group is supportive towards the initiative, and an overwhelming majority of 90 per cent does not feel that the app hinders the privacy of the girls. FLW felt that the app helps in rescuing the victims in large ways. According to the respondents, three child marriages were prevented in the area after the GPower app was introduced. This became possible as the app received a red alert based on the index of vulnerability. After the red alert, FLWs informed the Childline and necessary steps were taken to rescue the girls. None of the FLWs complained about the non-availability of time. Some said that they adjust within their daily schedule of other assigned work. Even among the PLG members, knowledge and clarity of the apps is not there though they had realised that the mindset of the parents had definitely changed. PLGs sensitised the parents and relatives of the girls in the target schools. A general feeling was that the app had helped in addressing the issues of child marriage and school dropout.

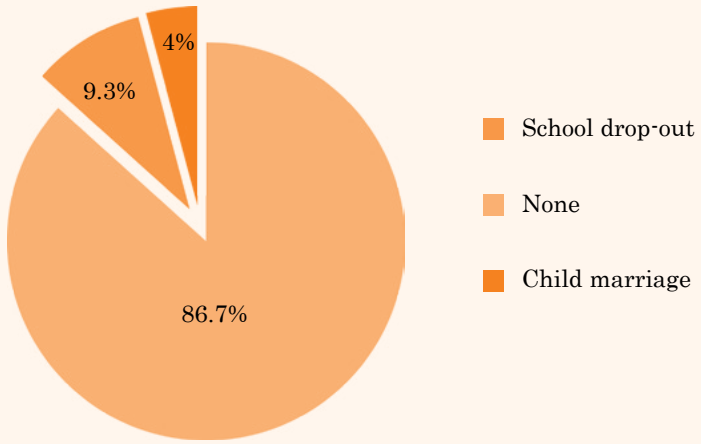
7.2.3.3 Effectiveness

e) Views of government officials: They felt that GPower application helped in collection of data related to early marriage, child trafficking and drop outs, and sending the same to government officials.

a) Views of the girls: Of the 150 girls, majority (87 per cent) were not victims of early marriage, school dropout or trafficking. However, the project implementing organisation claims, "In this project, girls who are prone to become victims of these issues in terms of their socio-cultural environment, are addressed for preventing their vulnerability. Hence, number of victims, who have already faced such situations will be less." There were none of the girls who were victims of trafficking. Non-negligible per cent (86.7 per cent) of girls were victims of early marriage and 9.3 per cent of girls were victims of school drop outs. Six girls (4 per cent) were found to be victims of early marriage. (Figure 25) Five of these six girls were rescued within the week, and one girl was taken where the GPower add was not used for tracking. Four out of six girls had been rescued. PLG and community facilitator initiated the process in 50 per cent of the cases.

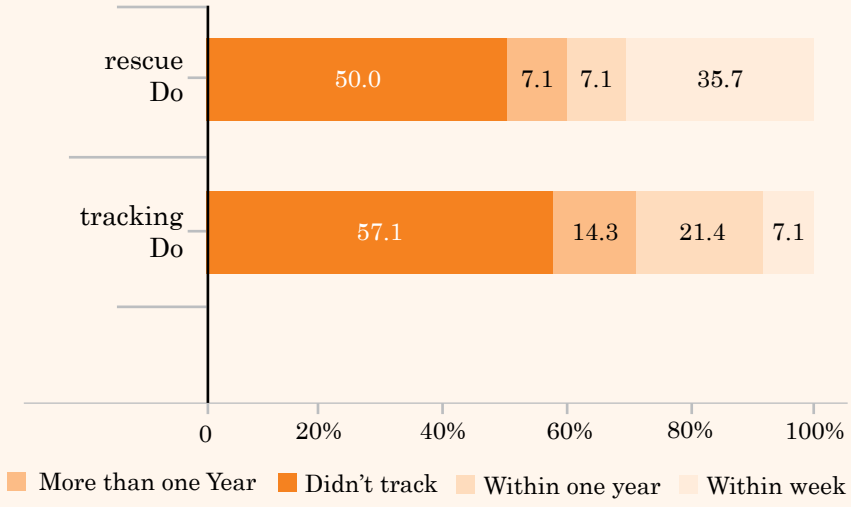
Out of 150 girls, 14 were victims of early marriage. About 50 per cent of the girls were not tracked and rescued *(Figure 26)*. Our study found out that the teachers and CFs played crucial role in bringing back the girls to school.

Figure 25: Type of vulnerability of girls



Girls who were never a victim of early marriage, drop out or trafficking were further asked whether they had heard about anyone who had been through the ordeal of three discussed issues. About 27.3 per cent of these girls informed that they had heard about such incidents. Among these girls, 72.7 per cent agreed that GPower had been very effective in saving girls who were either married early or had dropped out of school *(Figure 27)*.

Figure 26: Time taken to rescue and track the girl



b) Views of the CF: About 33 per cent of the CFs said that GPower helps in gathering latest whereabouts and tracking of each child among the target age groups. According to the CFs interviewed, GPower does allow real time-data collection sharing and monitoring. GPS locator helped

in tracking and updating the database. Apart from this, regular home visits and counseling were carried out. About 70 per cent of the CFs felt that GPower had helped in sensitization of the parents, Panchayat members and adolescent girls. The intervention to rescue and repatriate the girls was done through ChildLine, local administration and other network.

Figure 27: Agreement on the effectiveness of the GPower

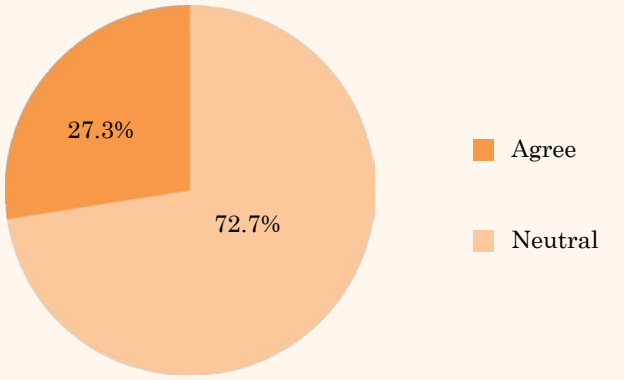
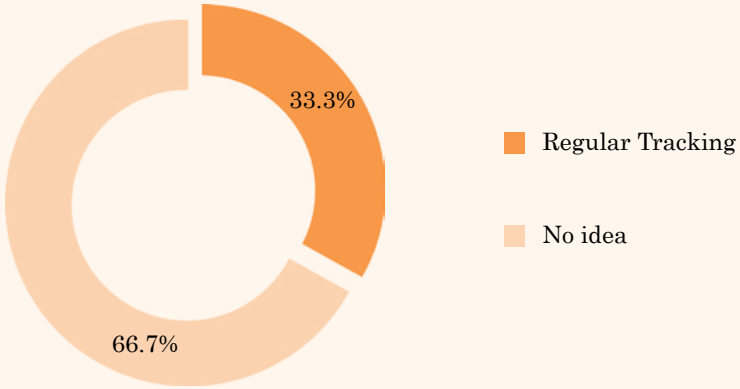


Figure 28: Use of GPower in collecting whereabouts about the girls



Girl saved from the nightmare!!

Asuda, resident of Cheora Village, was still an innocent girl who wanted to enjoy the splendors of life. But destiny had other plans for her. She was taken away by the ugly clutches to work as a domestic help in Kolkata. GPower took a pivotal role in tracking the girl. Her parents were counseled to fetch her back to the normal life. She has been successfully rescued and repatriated since then. At present she is happily enrolled in a local school. Here's wishing Asuda all the best in life!!

Views of the FLWs: Among the FLWs the knowledge of how GPower allows gathering latest news on the whereabouts of adolescent girls was bleak. About 30 per cent agreed that GPower had helped in sensitizing people and adolescent group but no one had idea about the intervention and repatriation of the victim. PLGs also informed that intervention and repatriation was done with the help of administration.

7.2.3.4 Efficiency

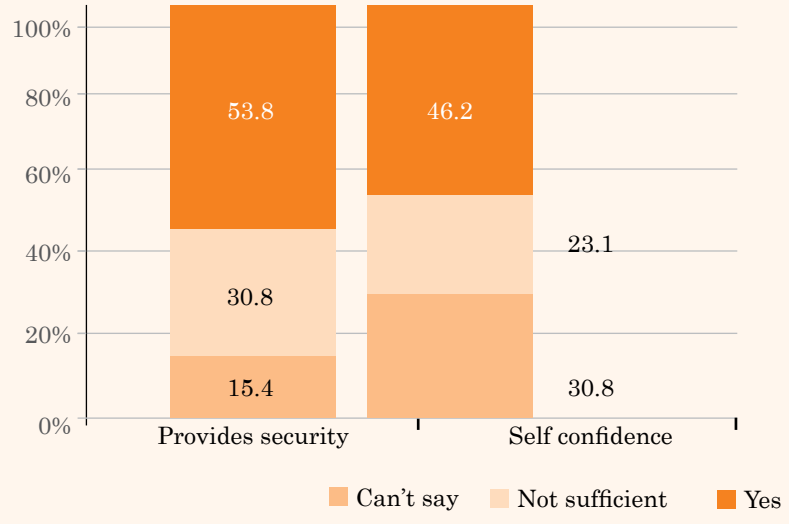
a) Views of the girls: Of the 150 girls, 75 per cent of the girls replied the community facilitators were tracking them each day, and 17 per cent said that they were been tracked weekly. On the question of how effectively government official work with the aid of GPower overwhelming majority gave answer in "neutral".

b) Views of the parents: They could not give a clear view as how GPower has helped government official in tracking and recuing their girls. About 40 per cent of the parents had opined that community facilitator had a great role in convincing them to repatriate their daughters. Even 50 per cent thought that GPower was taken a pivotal role in changing the mentality of their family members and the villagers.

c) Views of the CFs: Apart from one CF from South 24 Parganas, other CFs did not give a clear view of how App was efficient in collecting information and transmitting it to the central server. But 50 per cent of them felt that they were efficient enough in context of registering names and updating the details of targeted girls. CFs had doubts that how far can the project be implemented on regular basis or about the possibility of inclusion of girls who were not in targeted villages.

d) Views of the Government officials: About 54 per cent of the government official said that they thought GPower is time efficient in terms of collecting information and transmitting to the central server. But there were 30 per cent of them who thought that GPower alone would not be able to work efficiently. Aid from other stakeholders and government officials were essential. But 76 per cent agreed that community facilitators were efficient enough in registering the names and updating the details of the targeted girls. Also majority felt that the project can also be extended to target villages *(Figure 29).*

Figure 29: Efficiency of GPower and CF



7.2.3.5 Sustainability

About 67 per cent of the community facilitators interviewed believed that if the app was available in Bengali then the project would thrive better. But the resources — including manpower, budget, technical assistance — were not sufficient to meet the objectives of the project. This further led to the question of sustainability and most of them felt that it was at stake. Till date, GPower has not been able to make liaison with the government system. The other major obstruction they faced in the field was the restraint from parents and relatives of the girls (victims) due to the former's ignorance. But they also felt that project can be replicated elsewhere with baseline survey and other linkages.

Other stakeholders also expressed similar views, saying a multilingual support, especially in Bengali, would support the project to become more acceptable. A sense of non-sufficiency of the resources to meet the objectives of the project had emerged from other responses as well. The government officials also echoed the same feeling.

Overall, from the study it can be said that GPower is not appropriately resourced. The drawback of the projects that will hamper further scalability and sustainability are:

- The project was implemented through four tabs in 20 villages of two districts in West Bengal. It was noted that for over three months, no server had been provided by Accenture, the app developer. At present, the project is in a static state.
- Apart from this, there was also requirement for full-time staff at every village which was also cost motivated. As of now, all the CFs are working on voluntary basis; and take out some time from their other activities with CINI.
- Most of the community facilitators were not efficient enough in implementing the project, which is in form of a 'pilot project', struggling for its sustainability.
- The project was not efficient in meeting the needs of those girls who do not fall in the target area.

a) Project cost for one year

According to Dr. Indrani Bhattacharya, Assistant Director of the implementing organisation CINI, the approximate annual expenditure of running the project is:

Table 8: Annual cost for the GPower project

Project Head	Cost	
Technology(Server + developer)	₹ 6,20,000	($ 9,466)
Computer	₹ 4,40,000	($6,717)
Staff Cost	₹ 7,44,000	($11, 359)
Tablet	₹ 50,000	($763)
Internet+SIM card	₹ 62,000	($ 946)
Troubleshooting	₹ 3,60,000	($ 5,496)
Monitoring	₹ 48,000	($ 733)
Capacity building	₹ 40,000	($ 611)
Impact assessment and evidence building	₹ 1,20,000	($ 1,832)
Admin and management cost	₹ 1,08,000	($ 1,649)

** 1 dollar= Rs. 65.5(in 2015)*

7.2.4 Conclusion

A SWOT analysis of the project has been done to identify the strengths, weaknesses and challenges. This will further help in strengthening the project through result that will be beneficial for the stakeholders.

The project started as an integrated approach, with good intentions, on a pilot basis. It helps in real-time data collection and analysis to spot trends, and corrective measures are taken accordingly. During the field visit, it was found out that at present the project is stalled due to lack of funds and non-availability of partners. Apposite reasons for the discontinuation of the server support from the side of the app developer are not given. Our study has shown that the project is not cost effective in terms of provision of server, tab availability and human resources. It can be concluded that the project cannot run without external funding and its replication will be a tough challenge in the future.

Table 9: SWOT Analysis of GPower

Strengths	Weaknesses
• Provide real-time data • Assess risk of girls who are vulnerable to trafficking/early marriage/early school dropout • Red alert beeps based on vulnerability index • User friendly & ease of collecting data and updating	• Parents and relative lack awareness and often offer resistance during repatriation
Opportunities	**Threats**
• Network of staff of the implementing organisation at the grass root level • Political and bureaucratic contact reducing blockage to work and resistance from conflicting stakeholders	• Lack of funds

7.3 Mobile Vaani

7.3.1 Introduction

Mobile Vaani is working relentlessly to give a voice to poor rural population based on ideals of bestowing power to the common man. This mobile phone-based version was started in 2012 by Gram Vaani Community Media in Jharkhand with the support of local partners and has now spread to Bihar and Madhya Pradesh (MP) as well. Mobile Vaani uses cloud hosted technology for interactive voice response (IVR) systems, thereby empowering people to create and share content. There are four pillars to Mobile Vaani. First, the technology is based on IVR systems and is, thus, accessible over even basic phones with no Internet access as the entire interaction happens over a phone call. Second, the content aims to be community centric and community contributed. The project claims to disseminate as high as 90 per cent community-generated content of the total content. Thus, community mobilization and training component, where a network of field volunteers help spread the word about Mobile Vaani, helps demonstrate its features to new users. Fourth, the financial sustainability aspect gives companies, non-profits and mobile content providers a platform for advertising and market research. Government departments also use it for engagement, announcements, data collection and feedback.

Objectives

- To study the relevance of the project in terms of providing community media space and information on developmental (physical and health, infrastructure) and/or non-developmental issues (entertainment news, folk songs and advertisements); providing suitable platform to advertise, conduct market research, get feedback and mediate discussions; providing government departments a platform to engage with people, make announcements, collect data and feedback.
- To study the effectiveness of the project in terms of participation of community in posting and listening to content, and accessing the information and knowledge available; perception of Mobile Vaani by community, companies, non-profits, entrepreneurs, government officials.
- To understand the efficiency of the project in terms of time taken by professional and trained journalists to verify the authenticity of posts; economic and time efficiency of campaigns methods, survey design, data analysis and dissemination of findings; perception of increase in sales and customer engagement of companies and local entrepreneurs.
- To assess the sustainability of project in terms of project and operating costs; continuation after external funding is withdrawn; potential for replication and scale up of identified good lessons learned.

7.3.2 Research Methodology

To collect information from the field, questionnaires were prepared at five levels. Firstly, community survey instrument was designed to capture data on awareness about Mobile Vaani. At the second level, citizen journalists followed by government officials, local entrepreneurs and non-users were questioned. The data was collected from two key districts in Bihar where Mobile Vaani has been implemented – Jamui and Madhubani. The total sample size for the study was 193 respondents.

Reliability

Data reliability is checked for those variables where Likert scale is

used by means of Cronbach's Alpha. The results found is as follows – Community Relevance = 0.728, Team Relevance= 0.863, Team effectiveness = 0.913. All the values are lying above 0.70 and, therefore, it can be said that data is acceptable.

7.3.3 Research Outcomes

7.3.3.1 Demographic Profile of Respondents

From our study, it is reflected that there are 44 per cent respondents who have received high school education and 32 per cent have graduate degree. There are even 5 per cent respondents who have post-graduation degree.

Among the non-users majority, at least 43.1 per cent had high school education followed by 16.7 per cent who held graduate degrees and 4.2 per cent with post-graduate degrees. This indicated that there is an adequate level of education in the community. It is possible that with the right kind of guidance and awareness, the number of callers for Mobile Vaani can be increased *(Table 10).*

Table 10: Distribution of the respondents

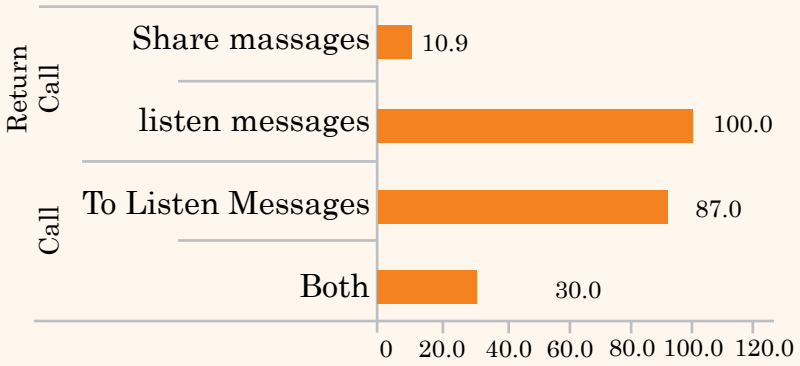
		Users	Non-users	Team	G. O	L. E
Gender	Female	18.5	6.9			
	Male	81.5	93.1	100.0	100.0	100.0
Age distribution (in yrs)	<20	35.9	34.7			
	20-24	6.5	5.6	11.1		
	25-29	14.1	6.9	5.6	25.0	14.3
	30-34	10.9	12.2	27.8		
	35-39	7.6	9.7	16.7		
	40-44	10.9	6.9	5.6	25.0	14.3
	45-49	7.6	5.5	16.7	25.0	14.3
	>50	6.5	16.7	16.7	25.0	57.1
Educational level	High School	43.5	43.1	-	-	-
	Graduation	31.5	16.7	-	-	-
	P.G.	5.4	4.2	-	-	-
	Others	19.6	36.1	-	-	-
Total		92	72	18	4	7
State/Block/ District/ Panchayat	1 State/Eight blocks/Two districts					

7.3.3.2 Relevance

In order to gauge the level of awareness, stakeholders were asked whether they had heard about Mobile Vaani. Among community users, 96 per cent said that they were aware of Mobile Vaani. However, only 28 per cent of the non-users said that they had heard about Mobile Vaani. All the local entrepreneurs and government officials interviewed were aware of the service.

a) Views of the users: From the previous discussions, it is evident that awareness about Mobile Vaani is high. About 25 per cent calls the service daily and 46 per cent calls weekly respectively. Most of the interviewees call Mobile Vaani to listen to messages, rest (13 per cent) call for both listening and sharing messages *(Figure 30).* On the other hand respondents believed that if Mobile Vaani calls back[76], 10.9 per cent of them would love to share messages and all agreed that they would love to listen to the messages.

Figure 30: Purpose of call and return call of the users



The respondents were asked whether Mobile Vaani is suitable for their needs in terms of developmental and non-developmental issues, sharing messages and different advertisements. Of the total respondents, 75 per cent said the app is suitable for developmental and non-developmental issues and 33 per cent are highly satisfied; 68 per cent said Mobile Vaani is suitable for sharing different messages and 36 per cent are highly satisfied; 63 per cent said that different advertisements available on the app are suitable to them and 36 per cent they are highly satisfied.

Further when asked on how Mobile Vaani was relevant in the individual space in terms of self-use, news of local interest or building community media space, a higher proportion of respondents gave a positive reply in terms of getting help in receiving news of local interest (51.1 per cent) and building a media space (56.5 per cent) for the community than causes that were particularly relevant to the individual (20.7 per cent) *(Figure 31)*

b) Views of the non-users: Among the non-users of Mobile Vaani, 72 per cent had not heard about Mobile Vaani. Among them, a negligible proportion of respondents said that issues related to ration card, electricity supply and water can be solved through Mobile Vaani, and about 96 per cent said that they would like to opt for it.

Figure 31 : Relevance of Mobile Vaani in personal space for users

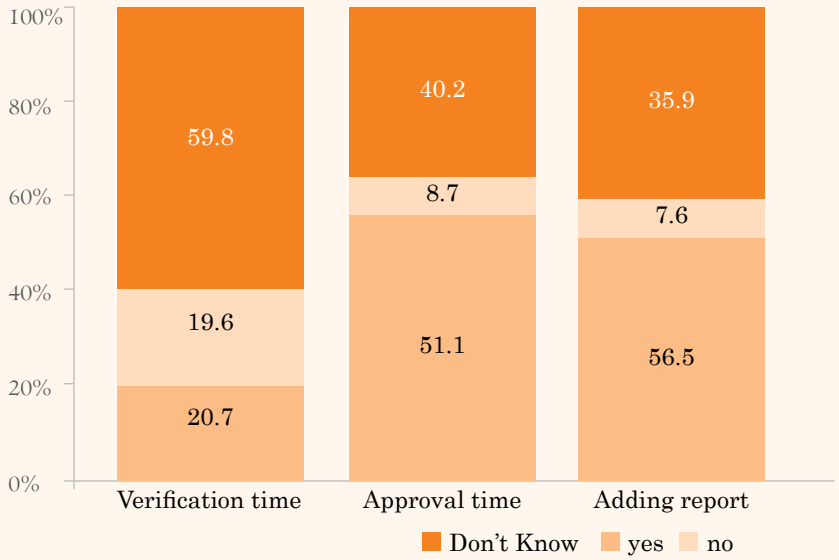
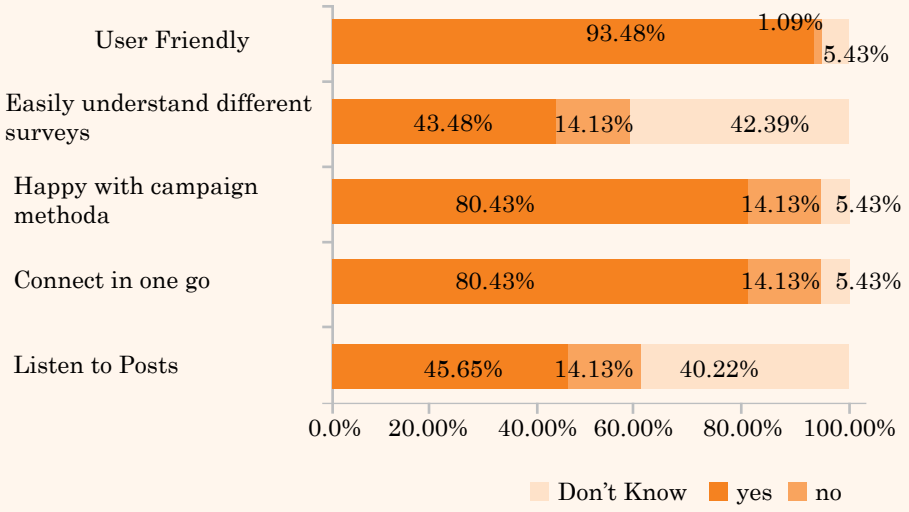


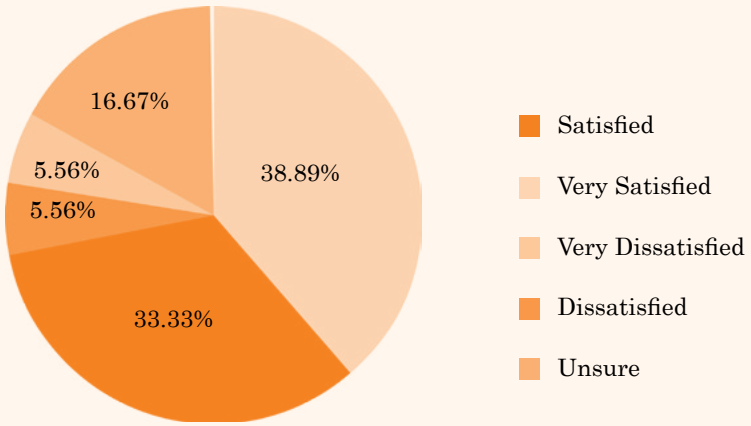
Figure 32: Issues covered in Mobile Vaani in other media for non-users



The respondents were asked on various issues like early marriage, domestic violence, maternal health, family planning, rural-urban migration, state of MNREGA, governance, child labour, open defecation and education, among others. Result shows that Mobile Vaani is a very useful source of information for all the above aspects. The three most important issues that were followed in Mobile Vaani are early marriage (92.5 per cent) and domestic violence (86 per cent), followed by child labour (80 per cent). More information was accessed through this app than any other source like television, radio, newspaper, seminar, SMS, phone call, poster or face to face *(Figure 32).*

c) Views of citizen journalists: A number of citizen journalists were interviewed about their opinion on how Mobile Vaani is suitable for ordinary citizens. It reflected in our study that Mobile Vaani is an effective way of addressing personal issues that ordinary people face in their day-to-day living. It is relevant as it spreads the news immediately, and the concerned government officials can resolve the difficulties.

Figure 33: Views of citizen journalists on participation of common people



When asked how the citizen journalists rate participation of common people, only 38.9 per cent of them said that they were satisfied with the outcome *(Figure 33)*. The team members felt that Mobile Vaani was most significant in case of child labour (89 per cent), followed by domestic violence (83 per cent) and maternal health (78 per cent).

d) Views of government officials: During the survey, government officials were also asked about their opinion on Mobile Vaani. Four people were interviewed and all of them gave a positive response for the service. The main opinion was that the voices were heard even in the absence of electricity. Two out of the four people had not listened to Mobile Vaani and none of them had addressed any grievance reported through Mobile Vaani. When asked about increasing accountability of the government departments, none could gave a clear opinion on the relevance and significance of Mobile Vaani. For example, one of them recognised the role of Mobile Vaani in areas where availability of electricity is often disturbed.

e) Views of local entrepreneurs: Local business entrepreneurs were also asked about their opinion on Mobile Vaani. About 58 per cent said that it was not helping them promote their products among local tribal population. The probable reasons given were lack of knowledge about the local community and desire for advertisements of their products but all of them acknowledged the positive effects of Mobile Vaani in the area. The main challenge that they face was to penetrate inside the close knit local population in their vicinity.

7.3.3.3 Effectiveness

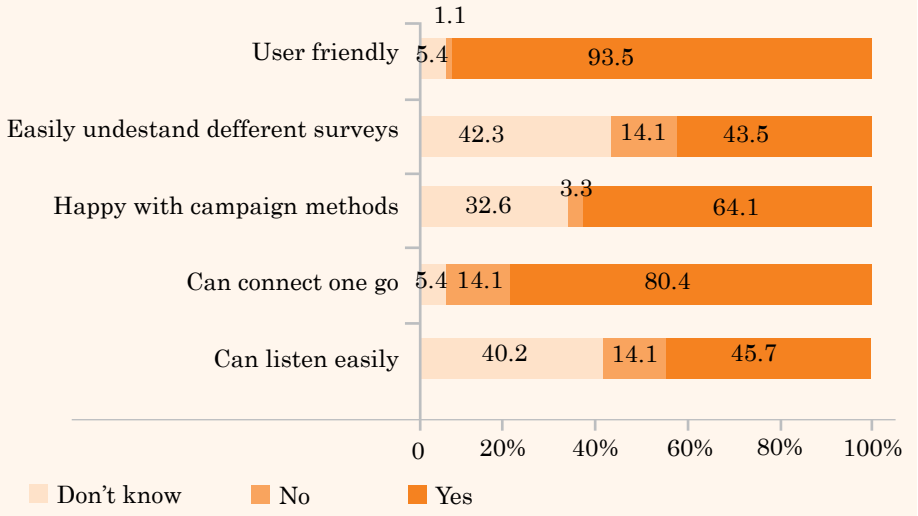
a) Views of community users: After community users were asked when they first heard about Mobile Vaani, our result showed that there had been a steady growth of listeners over the years (from 7.7 per cent in 2013 to 67 per cent in 2015).

b) Views of government officials: Out of the four interviewed, 50 per cent of the government officials said that Mobile Vaani had increased their accountability. Later, when asked about the ways Mobile Vaani had increased the accountability of the government officials the responses that were given on how it has increased accountability the responses were not satisfactory. They responded that they were new to the post and were not clear of the system. Some felt more improvisation had to be done to ensure a 100 per cent success rate which can be done by amassing the entire population into the fold of the service and through convergence of audio-video interface to increase transparency.

7.3.3.4 Efficiency

a) Views of the users: The users from the community were asked about the efficiency of Mobile Vaani in terms of how easily they can listen to posts, connect in one go if the service is user friendly and if they were happy with the campaign methods. About 45 per cent of the respondents replied that they could easily listen to the posts, 80 per cent conveyed that they were connected in one go, 64 per cent said they were happy with the campaign methods and 93 per cent thought it was user friendly. The major concern was that about half the respondents in every category (except user friendliness) said that they had no clue about the questions that had been asked.This shows that even if the respondents had heard and accessed the service, there remained a wide gap in the clarity of the process *(Figure 34).*

Figure 34: Views of users on efficiency of Mobile Vaani



b) Views of team members: About 83 per cent of the team members felt that the campaign had been able to change according to the needs of the users. Also, 89 per cent of the respondents thought that Mobile Vaani helped in strengthening the government system. Of these, about 55 per cent had opined that the change in governance had taken place at the state level (56 per cent) followed by those who said that transformation

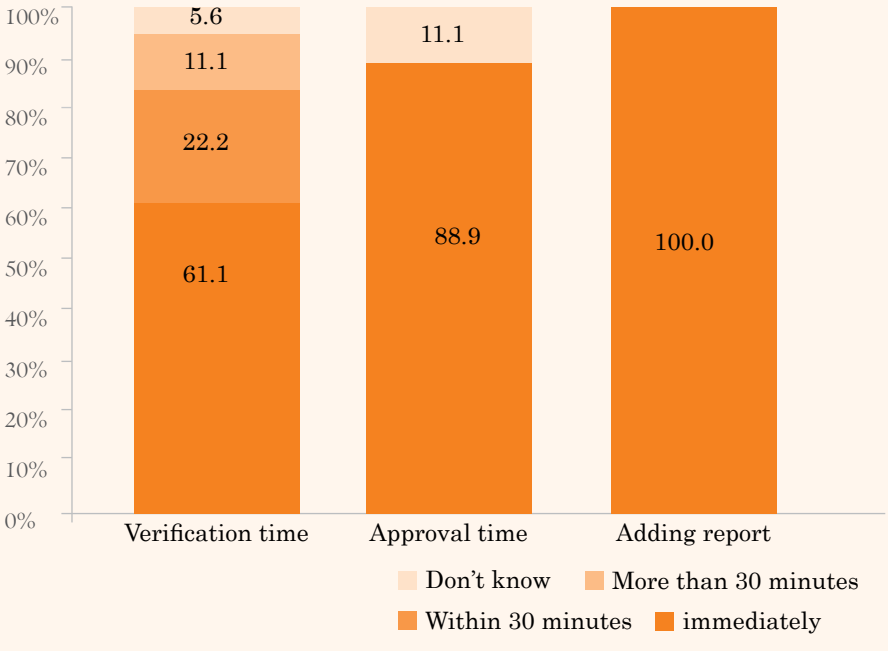
had happened at the district level (22 per cent). They were further asked about dissemination of information at various levels — local, state, national and international. About 50 per cent of the respondents felt that Mobile Vaani was relevant for sharing facts at the local, state and national level but 22 per cent of the respondents felt that only local information can be disseminated through the app.

The team members also shared their views on how Mobile Vaani provides enough space in educating people and spreading awareness in different social issues. The key issues most effectively addressed through this app were domestic violence (100 per cent) followed by maternal health (77.8 per cent), MNREGA (77.8 per cent), governance (77.8 per cent) and child labour (77.8 per cent).

Also, 89 per cent of team members believed that in the past three years that Mobile Vaani had been operational, public service delivery and access to information and knowledge had changed. The general feeling was that the local poor had received a voice because of the initiative and, in many cases, the government officials were forced to address their grievances, which were earlier ignored.

c) Views of the team members: On questions related to efficiency such as how friendly is the interface, the team members unanimously replied that Mobile Vaani is a user friendly interface. This is true because multiple users can make call at the same time, and users can even browse older posts via their phone. In almost 61 per cent of the cases, verification is done immediately while in 89 per cent of the cases, the field report is approved immediately. In case of adding a new report, all team members stated that adding of report is done immediately *(Figure 35)*.

Figure 35: Verification, approval and adding report by trained journalist

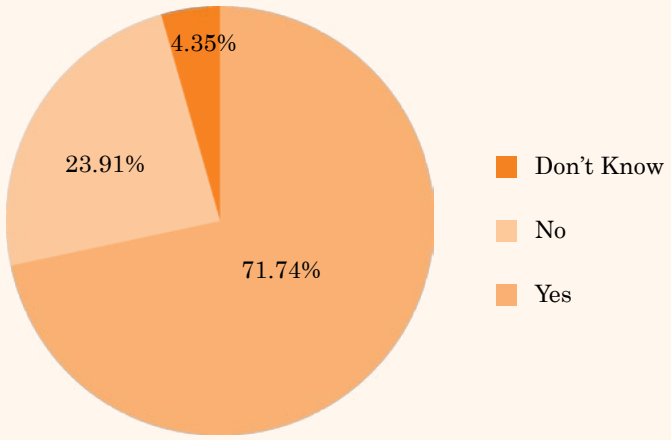


d) Views of local entrepreneurs: When asked whether Mobile Vaani helped in increasing the sale of product, most local entrepreneurs gave answers in negative. This is because there is an absence of advertisements of the products due to lack of funds or initiatives from government agencies.

7.3.3.5 Sustainability

Views of the users: When asked whether the community was interested to pay for calls in future, 72 per cent of them replied in positive *(Figure 36)*. This shows that there was willingness to use the service even if it is chargeable. More than half of the respondents (58 per cent) had said that they would like to pay as and when the calls are made. From our study, it is evident that people are less convenient with monthly or one-time payment options.

Figure 36: Interest of the users to pay for calls



View of team members: About 61 per cent of the respondents believed that if Mobile Vaani becomes chargeable, the participants will not be happy. This is primarily because the population involved belonged to a low income group. The team leaders believed that Mobile Vaani can be replicated in other places also as this is a useful tool for spreading news related to social issues concerning poor people. Moreover, it is primarily the free calls that were attracting the local community.

Views of local entrepreneurs: The local entrepreneurs opined that Mobile Vaani provided a platform where advertisements of services can be easily done, free news seemed obliging to the poor people, and many schemes and benefits can be instantly shared.

The project's monthly cost is discussed below:
According to the founder, Dr. Aaditeswar Seth, there are 1,00,000 monthly unique users presently, and total cost incurred is 8,50,000 ₹ per month. The per-user cost is 8.5 ₹ per month or 100 ₹ per year or $2 per user per year. This is approximately the user management cost to involve the users in socially relevant and informative discussions.

Table 11: Monthly cost incurred by Mobile Vaani

Project Head	Cost	Remarks
Staff training	INR 1,50,000 for 300 volunteers	This includes boarding and lodging
Server /troubleshooting cost	INR 35,000	This includes hardware cost which assumed depreciation over five years
Technical Support Staff	INR 50,000	
Salaries for trainers	INR 3,00,000	Includes trainers and technology mobilization staff
Travel expense	INR 1,50,000	
Stipend	INR 1,50,000	There are 300 volunteers

Source: Primary information given by Mobile Vaani; Exchange Rate: Rs 50= 1 $.

During the field visit, it was found that there were some challenges in the area. These challenges were recognised as follows:

- Citizen journalists were not happy with the meager stipend they were receiving and wanted their salary to increase.
- There was also a concern that Mobile Vaani can have an official set up in the local area so that the people can identify themselves with the project and reach out to Mobile Vaani staff in case of any trouble or query.

7.3.4 Conclusion

SWOT analysis of the project has been carried out to identify the strength, weaknesses and challenges. This will further help in strengthening the project through results that will be beneficial for the stakeholders.

Table 12: SWOT Analysis of Mobile Vaani

Strengths	Weakness
• A social media platform equivalent to Facebook/YouTube/Twitter for rural areas • Runs social campaign • Research studies • Advertisements by local entrepreneurs • Community generated content	• The content lacks appropriate regional, national and international news • Dissatisfaction of citizen journalists with remuneration received

Opportunities	Threats
• Developing linkages with various government departments and administrative officers • Provides partnership opportunities to other social sector and civil society organisations • Integration of video features	• Continuous generation of funds • Policy changes that may deter current methodologies adopted by Mobile Vaani

The evaluation study shows that Mobile Vaani has helped the poorer sections of the population to address local issues and register their grievances by greater people's participation. However, there is still a large section of the population who are not using the service.

Education is important in promoting e-Governance to achieve better accountability, increased transparency and improved governance. More people can be pulled into the network by giving them suitable guidance and increasing their awareness. Also, there remains a doubt about how far the local community will be able to use the services themselves without the help of team members. A large section of the respondents are also willing to use the service even if the calls are made chargeable but it is the beckoning of no-charge calls that is attracting the end-users who are primarily poor.

The project is successful in building partnerships at various levels and increasing the radius of the outreach community. For financial sustainability, multi-level partnerships with government, business houses and non-profits are recommended. In conclusion, it can be said that Mobile Vaani has become successful in becoming the voice of the ignored and unheard in the remotest corner of the country.

7.4 Discussion

Through the study of CGNetSwara, Mobile Vaani and GPower in the category of Civic Participation, it has been found that these projects have been facilitating participation of citizens within the community to help improve conditions of individuals in the community and further shape their future. CGNetSwara was designed and deployed as a voice-based extension to an already existing citizen journalism platform. Its goal is to foster inclusive dialogue. Mobile Vaani is using the low-cost IVR system to build a social media platform equivalent to Facebook, YouTube and Twitter for rural areas. GPower is helping reduce the increasing incidents of child marriages and women trafficking.

The demographic details of the survey conducted shows that in case of CGNetSwara, the maximum number of community users are over 50 years of age, and more than half of the total respondents are literate. Likewise, the maximum number of respondents in the non-user category is over 50 years of age, and more than half of the respondents are literate. In case of Mobile Vaani, the largest number of respondents, in both the user and non-user category, are under 20 years of age. About 43 per cent of these respondents have attained secondary level of education. In case of GPower, most of the girls interviewed aged 10-20 years of age have attained middle school level of education. About less than half of the parents interviewed are illiterate.

Assessment of the relevance of these projects against their stated objectives has been verified during field investigations. In CGNetSwara's case, the percent of respondents reporting is 54 as against 27 per cent using for both listening and reporting issues. More than 75 per cent of the respondents believe that their issues have been voiced through CGNetSwara. All the staff of the CGNetSwara does believe that it provides an alternative media platform. The government officials have also assured that CGNetSwara is bringing positive changes. The users of Mobile Vaani confirmed that 96 per cent of them are aware about Mobile Vaani. About 87 per cent of the respondents reported calling Mobile Vaani to listen. Under G-Power, 75 per cent of the girls interviewed were aware of their registration with the tracking device. Though most of the girls interviewed could not express their opinion, about 40 percent regarded GPower as an appropriate means to their security and is instilling self confidence in them. Though there seem to be a lack of clear understanding about the mechanism of GPower, the data indicates that the parents, community facilitators and frontline workers are supportive of GPower initiative. Hence, it becomes clear that all the three projects have high relevance in their area of intervention, suggesting appropriateness of the method of intervention. The application of IVR system, mobile phones and internet in these projects are transforming information dissemination and negotiation of power.

In an attempt to estimate the extent to which the projects under consideration are able to meet their objectives, the effectiveness of each project was studied. The data of CGNetSwara shows that the number of people satisfied with CGNetSwara is much more than the number of people dissatisfied. The study says that the number of first-time callers to CGNetSwara in Chhattisgarh has increased over time. With confidence, about 50 per cent respondents believed that their post was broadcasted, and about the same percentage of people vouched that the public service delivery has improved after the introduction of CGNetSwara. The survey data of Mobile Vaani indicates that the number of listeners has been growing steadily. Half of the government officials

interviewed admitted that Mobile Vaani has increased accountability. However, others believe that Mobile Vaani does need improvisation to be more effective. In the survey conducted for GPower, none of the rescued trafficked victim was interviewed. The girls in the target age group, about 30 per cent, were informed of the former incidents of trafficking, school dropouts and early marriage. As per data, the common perception about GPower among parents, adolescent girls, teachers and community facilitator is that GPower has helped sensitise parents, panchayats, and adolescent girls. Community facilitators, recording and monitoring the vulnerability of adolescent girls, seemed to believe that GPower app is effective in gathering latest whereabouts and tracking every child in the targeted age group. As per preceding discussion, it gets clear that CGNetSwara, Mobile Vaani and GPower are effective in evoking civic participation. Besides other factors, lack of availability of multi-lingual features in the apps and the technology is inhibiting further expansion and outreach.

The component of efficiency in the studies undertaken were determined by investigating how the output can be increased without increasing the per unit input in terms of money and time. Majority of the users of CGNetSwara assured that it's user friendly and getting connected to the IVR system is not difficult. The staffs of CGNetSwara suggested that awareness and advocacy about government related schemes, publication of recorded data in the IVR system, increasing the wage of field staffs, and improved availability of mobile phones with staff can increase the efficiency. Among the community users of Mobile Vaani, almost half of the respondents agreed to vouch that they are happy with the campaign methods used, are able to understand different surveys, are able to connect in one go, and find it easy to listen. The remaining half of the population could not answer the question. More than half of the staff of Mobile Vaani shared that the reported cases are uploaded immediately after field verification. An overwhelming number of targeted girls under GPower were conscious of being tracked each day. Though the community facilitators do not have a clear understanding of the apps and data synchronisation with the central server, half of them regarded registering and updating details of the targeted girls as efficient. The government officials, in majority, accepts that GPower is time efficient in collecting and disseminating information, but considerable number of them believe that GPower alone will not work efficiently. Referring back to the data set and the observation reports of the field investigators suggest that the efficiency of Mobile Vaani, CGNetSwara and the GPower are curtailed by the physical and infrastructural challenges, lack of trained technical support, inadequate incentive for field staff, widespread poverty and associated security risks.

Estimates of the capacity of the projects under considerations to sustain after funding is withdrawn were also judged. The team of CGNetSwara believes that their model is not sustainable until medium or short wave radio is attached. Apparently, the users are not willing to pay unless they are assured that their problems for which calls are being made will get resolved. The users of Mobile Vaani were eager to pay on per call basis. However, majority of Mobile Vaani staff believes that making calls chargeable will reduce users' satisfaction as most of the users belong to low income groups. The community facilitators of GPower shared their experiences of struggling with manpower, financial resources and lack of technical assistance. Also, the community facilitators work on voluntary basis. The sustainability of Mobile Vaani, GPower and CGNetSwara indicates fuzzy collaboration with the government and the partner organisations.

Education

The literature on mLearning points to a variety of benefits that mobile phones could have on the educational sector. The impacts of mobile phones on educational outcomes that are identified in the mLearning literature can be classified into two broad categories. On the one hand, mobiles impact educational outcomes by improving access to education while maintaining the quality of education delivered. On the other hand, mobiles impact educational outcomes by facilitating alternative learning processes and instructional methods collectively known as new learning. In theory, mLearning increases access for those who are mobile or cannot physically attend learning institutions – those who would not otherwise be able to follow courses in a traditional educational setting due to the constraints of work, household activities, or other competing demands on their time. mLearning, as Visser and West[77] suggest, can also increase access in those situations where cost represents a significant barrier to learning. For those in rural or remote areas where environmental and infrastructure challenges hinder other learning modalities, particularly eLearning, mLearning presents great opportunities.

With regards to cost, the benefit of increased access afforded by mLearning is particularly relevant in the developing country context. Many developing countries are completely bypassing investments in costly, fixed telephone infrastructure for the installation of mobile phone networks[78,79,80]. Thus, mLearning provides a potential way forward for the expansion of education programmes to larger segments of the population rather than via the eLearning model that has been adopted in much of the developed world. mLearning allows a method of educational delivery that could be more cost effective than eLearning methods, not to mention that the ubiquity of mobile phones means that many people are already familiar with mobile phone applications[81].

mLearning, the literature suggests, broadens the availability of quality education materials through decreased cost and increased flexibility while enhancing the efficiency and effectiveness of education administration and policy. Others suggest that the benefits of mobile phones are not merely limited to increased access to educational services. mLearning, they indicate, can also facilitate changes in the character of learning modalities that in turn impact educational outcomes. In this regard, mLearning represents more than a mere extension of traditional forms of education; mLearning facilitates alternative learning processes and instructional methods that the theories of new learning identify as effective for learning.

Donner[82] in Research Approaches to Mobile Use in the Developing World: A Review of the Literature reviews 200 recent studies of mobile phone use in the developing world. He categorises his research into three common themes, with one of them being 'Mobile Impact on Education'. Donner argues that mobile's portability, simplicity and affordability make it a natural fit for education initiatives in places where PCs and Internet connectivity may be scarce. Kumar et al[83] argue that mobile devices like cell phones are a perfect vehicle for making educational opportunities accessible to rural children in places and times that are more convenient than formal schooling. They conducted a 26-week study to investigate the extent to which rural children would voluntarily make use of mobile devices like cell phones to access educational content. Their results show a reasonable level of academic learning and motivation. Koole[84] emphasises that there is a tremendous scope for learning with mobile devices and establishes a framework to assist practitioners in designing activities appropriate for mobile learning.

Valk et. al.[85] examined the extent to which the use of mobile phones helped to improve educational outcomes in two specific ways: (1) in improving access to education, and (2) in promoting new learning. They reviewed the evidence of the role of mobile phone-facilitated m-Learning in contributing to improved educational outcomes in developing countries of Asia by exploring the results of six m-Learning pilot projects that were initiated in the Philippines, Mongolia, Thailand, India, and Bangladesh. They concluded that the analysis of these projects indicates that while there is important evidence in the developing world that mobile phones impact educational outcomes by facilitating increased access, much less evidence exists to show how mobiles impact educational outcomes by promoting new learning.

Mobile phones theoretically make learner-centred learning possible by enabling students to customise the transfer of and access to information in order to build on their skills and knowledge and to meet their own educational goals[86]. mLearning, thus, exerts a democratising effect on the learning experience as learners take a greater responsibility for the learning process instead of being passively fed information by an instructor. Whereas, in traditional models of education, the goal is the transfer of knowledge from teacher to student, mLearning empowers students to actively participate in the learning process to make it a process of construction and not mere instruction[87].

As a facilitator of new learning, mLearning goes beyond an emphasis on the possession of information to enabling learners to find, identify, manipulate and evaluate existing information[88]. Mobiles can also supposedly facilitate knowledge-centred learning by providing efficient and inventive methods by which students can learn with understanding – meaning that they deepen their understanding of a specific subject matter rather than merely memorising large amounts of information – and then use this knowledge as a basis for new learning through integration and interconnection. Mobile devices make possible assessment-centred learning as well by enabling the provision of continual feedback throughout the learning process, presenting learners with diagnosis and formative guidance as to what might be improved or what might be learned next. Moreover, in providing prompt feedback, mLearning maintains the appeal of learning and provides a motivating factor that can at times be lacking in traditional modes of education[89].

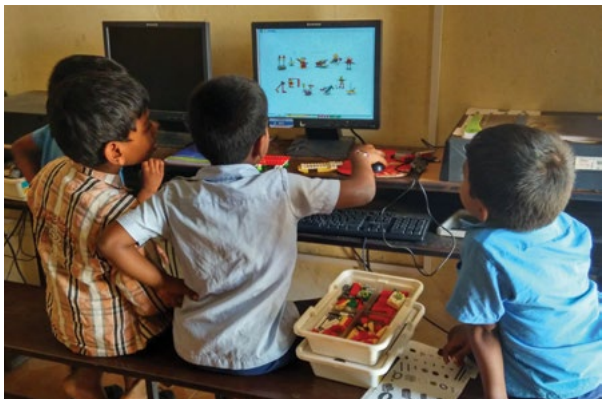
Mobiles, therefore, should impact educational outcomes by altering the character of education and learning because the nature of mobile technology converges

with and facilitates new learning. The new learning is personalised, learner-centred, situated, collaborative, ubiquitous, and lifelong. Likewise, mobile technology is increasingly personal, user-centred, mobile, networked, ubiquitous, and durable[90].

The literature indicates that the benefits afforded by this convergence should exert a positive impact on educational outcomes. It is opening new avenues for educators with a new, low-cost tool for teaching. Some of the projects in which mobile is used as a tool in providing interactive learning are discussed. Nokia launched MoMath in South Africa capitalising on the popularity of social networking platforms[91]. It was a mathematics teaching tool for users of Mxit, which is a very popular social media platform . Dr. Math is another interactive tutoring tool where real-time volunteer tutors helps primary and secondary school students solve queries with numbers. MobiLiteracy is another such app that promotes learning through SMS and audio technology outside the classroom in Uganda[92] . Similarly, EPROM is giving computer lessons in Africa's 10 countries like Mozambique, Kenya, Ethiopia, Uganda, Senegal, Ghana, South Africa, Tanzania, Rwanda and Nigeria[93].

This study comprises of three projects in the education sector - Bridge IT, Learn out of the Box and GIS @ School.

8.1 BridgeIT



8.1.1 Introduction

The BridgeIT (Nokia Education Delivery) Project (BridgeIT India/Nokia Education Delivery is currently Microsoft Education Delivery) aims to significantly increase educational quality and student achievement in maths, science and life skills through the innovative use of cellular and digital technology, using a standard mobile phone to improve the quality of teaching. The project was a partnership between Indian schools, Nokia, The Pearson Foundation, and EZ Vidya. It was live from 2011-12 to 2013-14. Our study was conducted in January 2015.

The objectives of BridgeIT India are to integrate the mobile platform into teaching and evaluate its effectiveness through teachers experience of using it in the classroom; to evaluate learning improvements due to the integration of mobile technology, content, and methodologies into the teaching processes and; to broaden impact of mobile technology in education, evaluate sustainable models, and identify how to scale at low increment cost.

NED/ BridgeIT India was introduced in schools in Andhra Pradesh and Tamil Nadu as a pilot project in the academic year 2011-12. Based on the success of the programme, NED/ BridgeIT India scaled to more educational boards and schools in Tamil Nadu, Andhra Pradesh, Haryana and New Delhi. Currently, the programme is present in around 160 schools, with over 300 participating teachers, impacting thousands of students.

BridgeIT India uses a standard mobile phone to improve the quality of teaching. Through BridgeIT, teachers receive a TV-out cable and C7 mobile phone pre-loaded with Nokia Education Delivery (NED). Teachers get training, activity guides, classroom visits and remote support. The school provides a TV or LCD projector. The teacher uses NED and the TV-out cable to display content in class.

Objectives

- To understand the relevance of the project in terms of impact of technology on learning ability of students; impact of technology on teaching methods and ability (interactive and updated content; impact on the teaching environment.
- To study the effectiveness of the project in terms of project scale and reach; number of schools and teachers that have adopted the digital platform; number of disciplines/subjects covered; quality of the content.
- To assess the efficiencies of the project in terms of time taken to deliver content, learning and teaching; resource efficiency in technology-enabled learning; user friendliness for the participants and adaptability to use; maintenance and feasibility in day-to-day learning.
- To understand the sustainable components of the project in terms of identified challenges in the project implementation, delivery, management and maintenance; scope for adjusting learning and teaching outcomes and course correction; scalability and replicability of the project; sustainability of the project including an analysis of the business model of resource mobilization and technical assistance.

8.1.2 Research Methodology

The analysis was based on a mix of qualitative and quantitative methods. Data was collected from a mix of primary and secondary sources. In order to ensure a representative sample, the selection of schools for impact analysis was based on purposive sampling. A total of 258 respondents were, therefore, surveyed for the purpose of this assessment.

Reliability

Data reliability for each variable was checked by means of Cronbach's Alpha[94], which was found to be as follows: Teachers[95] - PLE = .875, PEF = .899, PEOU = .909, PM = .876, and PA = .874. Students – PLE = .866, PEF = .810, PM = .826, and PA = .700. Since all of these values are greater than 0.70, they fall in an acceptable range[96].

8.1.3 Research Outcomes

8.1.3.1 Demographic Profile of Respondents

Of the 62 teachers interviewed, most (62.9 per cent) had been teaching for 6 to 10 years. This allows us an opportunity to contrast their perceptions on teaching with the app with teaching without the application. However, 58 per cent responded that the application is not working at their schools. This is due to mobile related issues (11), lack of a projector (8) or other technical issues that include electricity and backup issues at schools (17).

Table 13: Demographic Profile of Respondents

Detail		Teachers	Students
Gender	Male	12	83
	Female	50	113
Age distribution	8-10		
	11-12		25
	13-14		150
	15-16		21
	20-24	1	
	25-29	2	
	30-34	28	
	35-39	22	
	40-44	6	
	45-49	2	
	>50	1	
Residence	Urban	37	128
	Rural	25	68
Total		62	194
No. of schools	18 school types/50 schools in total		
State/Block/District/ Panchayat	Four States/ 10 Districts/ 14 Blocks/17 Panchayats, three District Centers & 1 City Corporation		

Of the 196 students interviewed of standard sixth and seventh for this survey, 115 (58.7 per cent) have been in school for more than four years. About 97 per cent (190) had been in the surveyed schools for over three years. With BridgeIT having scaled up two years ago, this allows us to gauge the perceptions of the students' w.r.t the application both, before and after the implementation. This is highlighted when looked at the length of their experience with the application. A total of 117 (59.7 per cent) of the students have had more than one years' experience of working with the BridgeIT application. Only 28.1 per cent of the students have been using the application for less than a year while 24 (12.2 per cent) students interviewed did not respond to our question.

Most of the teachers were in the age range of 30-39 years. The relatively young age of the teachers in the sample group leads us to make an assumption that younger people will adapt technology much faster and be able to leverage the application to augment their teaching *(Table 13).*

The faculty taught classes of varying sizes, ranging from 21 students to 107 students per class. On the question of the number of hours per week of use, 98.4 per cent of the respondents claimed that they used the BridgeIT application in teaching for less than four hours per week. A significant percentage (61 per cent of total) used the application for two to four hours per week. Only one teacher used the application for more than five hours per week in teaching.

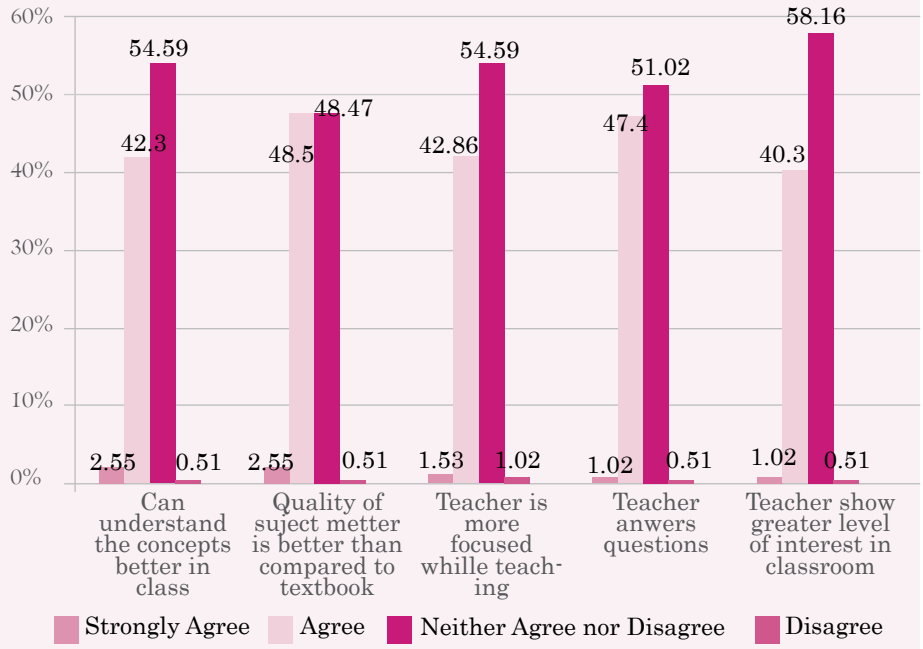
8.1.3.2 Learning Environment

Upon analysis of the findings, it is clear that at an aggregate level, students felt more neutral towards the impact of the BridgeIT application than teachers. Some of the students stated that the application had not been used at their schools for more than a year. This gap in the use of the application made them forget many aspects of the application and its impact on their learning quality.

Students in schools where the application was still active gave more positive responses towards the application. With regards to the perceptions of the impact of the BridgeIT application on the learning environment, our study found that 48.5 per cent of the students agree with the statement that the application delivers subject matter in a better manner and quality than their text books. An equal 48.5 per cent also felt neutral about the quality of content. A much smaller 2.6 per cent felt that the quality of content delivered through the application is far superior and only 0.5 per cent disagreed with the statement.

The impact of the content is a key determinant of the quality. About 54.6 per cent (107) of the students had neutral perceptions about the content with regards to the ease of understanding a concept through the use of the application. 42.3 per cent (83) agreed with the statement and 2.6 per cent (5) felt strongly about the same. Only 0.5 per cent felt that the quality of the text book content was superior to that of the application in ease of understanding *(Figure 37).*

Figure 37: Learning Environment



8.1.3.3 Effectiveness

Students' perceptions on the impact of the application on teachers are also a key determinant in assessing the effectiveness. About 54 per cent of the students felt neutral about any increase in the focus of the teacher while in classroom. Around 43 per cent revealed that the teacher was more focused due to rollout of BridgeIT. Only one per cent of the students disagreed with this assessment. 47 per cent of the respondents felt that the teachers were better equipped to answer their questions in the classroom. 51 per cent felt neutral about the same while only one per cent felt against this assessment.

Further, a majority 58 per cent of the students felt neutral with regards to any increase in interest in the classroom by the teacher. Only 41 per cent agreed with the assessment. Only one per cent of the population disagreed and claimed that teachers did not show any increased level of interest in the classroom.

At an aggregate level, it may be said that the application helped in the improvement of learning environment in schools. However, opinions and concerns of majority of the population — that had a neutral stance to the effectiveness of the app — should be taken into consideration to allow an effective and positive impact.

However, there was still a sizeable population who gave neutral responses. This may have to do with elements of the content that is delivered through the application. Only half of the students citied an increase in their understanding of the subject matter and in the ease of understanding. Some teachers had given the study team feedback that the content was delivered in English causing hindrance to learning for students who studied in Hindi or regional language medium schools.

About half of the students also claimed that teachers were better equipped to answer their questions in class while 51 per cent felt

neutral about this. This contrasts with the 90 per cent of teachers who felt that that they were able to answer questions more effectively. A follow up study exploring this lack of congruence should be conducted.

There is a level of congruence in students' and teachers' perceptions towards the ease of explaining concepts with 60 per cent of students and 90 per cent of teachers agreeing with the statement. Students who responded neutral about this element were from schools where the BridgeIT application was unsuccessful for various reasons and had forgotten about its effectiveness. Similarly, teachers who also disagreed or felt neutral about the same were from similar schools.

According to about half the students, there was an increase in their speed of absorption of content. Most of them, however, felt neutral about this. Teachers on the other hand were very positive about the speed at which they were able to finish course of a particular subject. This points to the possibility that teachers may rely on information in the application for teaching which may not always be optimised for consumption by students.

Finally, with regards to the engagement of students in the learning process, teachers felt that the application was instrumental in increasing their ability to keep students interested in the classroom to a great extent. About half the students agreed with the teachers' stance. Another element on which students and teachers had differing views was that of any increase in the students' participation in the classroom. Seventy seven per cent of teachers versus only 53 per cent of students felt the same. About 81 per cent of teachers also believed that participation is an important element of the learning process.

About 60 per cent of the students felt that BridgeIT facilitates easier explanations of the concepts taught. Only 40 per cent felt neutral about this aspect of the application.

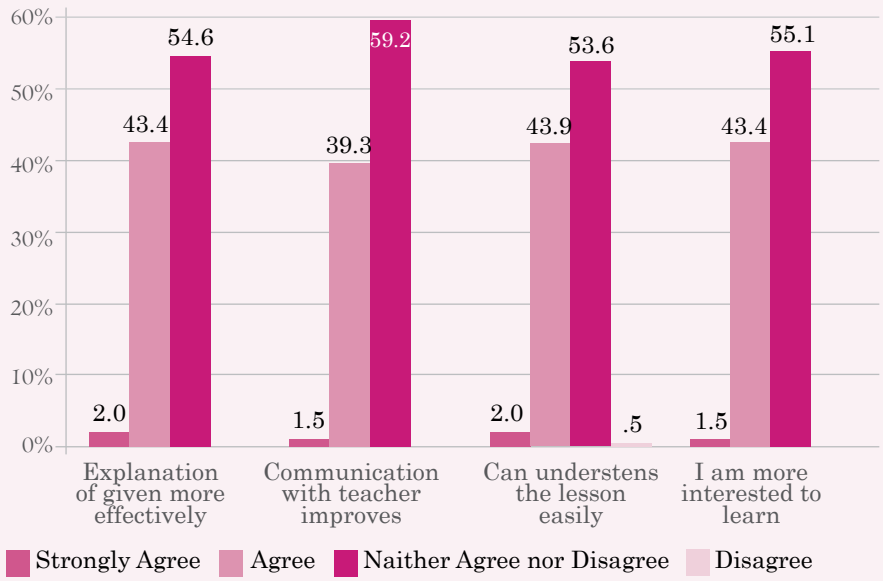
Among the students, 45 per cent felt that the application also lessened the time taken by students to learn and absorb a concept while 55 per cent felt neutral about this. This shows us that while the concept is taught more efficiently, the time taken is almost the same with the application as without. This may have to do with the level of the content itself. While conducting this survey, some of the students studying in schools — where the medium of teaching was Hindi or a regional language — said that the choice of English for delivering content made understanding information difficult and, thus, impeded the learning process in all the states where surveys were conducted *(see Figure 38).*

One of the aims of the application is to facilitate and improve the dialogue between teacher and learner. Most of the respondents felt neutral about any improvements in communication. The balance 41 per cent of students felt that the dialogue between student and teacher was better and, therefore, made classes more interesting.

About 45 per cent of the students felt that the application made them more interested in the learning process and improved their abilities in school. However, 55 per cent of the students still felt neutral about this aspect. Students who responded neutrally also citied certain gaps in the information delivery. They claimed that if content was delivered

in regional language(s) and additional improvements were made to the application, they would consider the impact on their overall perception as positive.

Figure 38 : Efficiency of BridgeIT



On a more holistic note, most of the respondent students felt neutral about the efficiency improving aspects of the application. Further study should be conducted to explore the reasons behind such a high neutral perception about the efficiency of BridgeIT, and steps should be taken by the developers to improve the content delivery.

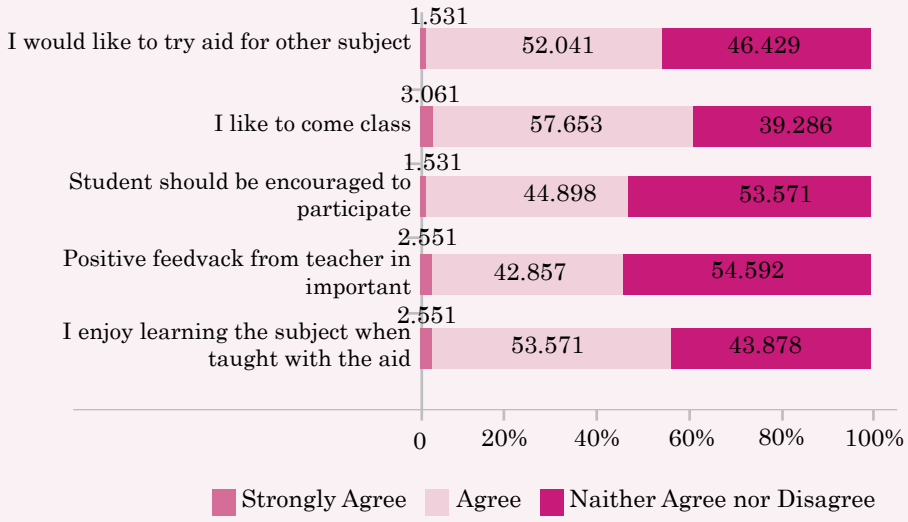
8.1.3.4 Motivation

Most of the teachers and students felt that using the application for teaching contributed to an increased level of enjoyment for the students. Picking up from this, teachers are also interested in adopting newer methods of teaching. About 89 per cent of teachers were interested in exploring newer teaching pedagogies.

This would be beneficial to the students as well as over 61 per cent of students said they were more interested in attending classes when the application was deployed. A majority of teachers would also like BridgeIT to expand the current offering of courses to include others. It was found 54 per cent of students would also like to learn more subjects from the application. Also, 59 per cent of the students enjoy learning the subjects with the help of the application, contrasted with only 44 per cent of the students who felt neutral about the same. This points to the fact that students did indeed enjoy using the application for learning purposes. However, language choice and certain improvements to the overall content delivery are needed to improve the overall enjoyment and engagement with the students.

With regards to feedback from teachers about students' ability to learn, 46 per cent of the respondents cited this as an important element in increasing their motivation to use the application. A majority 54 per cent of the students felt neutral about this element *(Figure 39).*

Figure 39: Motivation of students



Fifty three per cent of the students felt that encouragement to participate in the class is not significant in any way to the overall success of the application. Further, 47 per cent of the students felt participation and engagement is an important element. About 61 per cent of the students felt interested in attending classes where the application was deployed. This points to an overall recognition that BridgeIT is an important element in the pull factor for students to attend school. A smaller 39 per cent felt neutral about the same. Apart from the subjects in which the application is deployed, it was found that 54 per cent of the students wanted to try the application for the learning process for different courses while 46 per cent of the students felt neutral about this.

On a holistic note, most of the students agreed with the impact that the BridgeIT application has on their overall motivation to attend classes and understand subject matter. Feedback from teacher to student and vice versa should form part of the dialogue that creates a holistic and positive learning environment. A smaller number of students believed that this was important to their learning while over 85 per cent of teachers believed that feedback from students was important. The low numbers on the part of the students may have to do with the fact that most of the students are of a comparatively younger age group and, as yet, have not realised the importance of feedback.

On the whole, BridgeIT has achieved certain key milestones on the path to increasing motivation on part of students and teachers. However, fine tuning of the software and content should be done to achieve higher numbers.

8.1.3.5 Perception

There is significant congruence between the students' perceptions on any increase in their subject matter knowledge and the teachers' perception of the same. This is indicative of a high quality of content by BridgeIT developers. Learning skills and test scores of students,

however, were not augmented to a large extent by the use of the application. Only 41 per cent of students claimed any increase in their confidence of learning concepts, 42 per cent felt that it had a positive impact on test scores and 41 per cent claimed any increase in their interest in learning for learning's sake.

Seventy one per cent of students also felt that the application did not increase their interest in asking questions in class. This may be a contributor to 65 per cent of teachers' perception that they were able to teach concepts quickly. This is contrasted by the belief by 55 per cent of teachers that subjects were taught more effectively and 68 per cent of teachers also claimed that the use of the app reduced the time taken to prepare for lessons. This may point to a level of overdependence on the application on the part of the teachers that compromises the students' learning experience.

On an aggregate level, it can be said that while BridgeIT had a positive impact according to teachers, this is not mirrored by students in most cases. Steps must be taken to evaluate the content and its quality to improve students learning skills and induce a positive impact on their test scores.

8.1.3.6 Ease of Use

In the previous sections, many teachers were approving of the impact and the quality of the content. This was highlighted again when 84 per cent of teachers claimed the information presented in the application was logical and understandable. However, there was some concern from the teachers, in Haryana and Tamil Nadu, who cited the lack of local language content as a key issue in their evaluation of the application. For the understanding of the students, the instructions should be in the regional language. On top of it, the videos play for a very short duration and it becomes difficult for students to comprehend the issues. Further, technological problems like sudden crash of the application, and periodical monitoring and repairing of equipment like projector, television, mobile, etc., should be addressed.

Most of the teachers also claimed that the application allows them the control and flexibility over the administration and delivery mode of content. This allowed them to modify their teaching style and incorporate the information from the app more effectively in their pedagogy.

However, one significant avenue where the application drew a lot of ire was with regards to the user interface and user experience (UI & UX) design. While the design is consistent across sections, most teachers found navigating to get to the desired content difficult, with them having to recall the steps taken to access information rather than the application facilitating recall. This argument is further augmented by their complaint that relevant information takes time to access.

8.1.3.7 Sustainability

There are some important components that will make the project sustainable. The project is easy to replicate as it is cost effective. Bridge IT is running at a very low cost of USD 1.56 (INR 75) per child per year. The application uses very simple technology i.e., one mobile phone for the teacher and a display unit-TV or projector for the students, making the classrooms very interactive. The content (AVs) are closely aligned/ mapped to the syllabi making the application very effective. There

is also a multiplier effect which not only impacts students' academic performance but also on their social and behavioural attitude. The Bridge IT application is replicable in remote settings and can also be used during power crisis. NED software is an open source that can be modified according to the requirements and remote support can be provided. Initial costs towards project management, liaison with government agencies, content development and pilot testing were funded by external agencies like Nokia and The Pearson Foundation. Further deployment would require only additional investments towards equipment and support.

Uniqueness of the project

- At a low cost, the app provides high quality content, higher engagement and changes in teaching methods.
- Takes less time to operate and use the technology in classroom teaching and learning process.
- Even during power crisis or in absence of alternate power supply mobile technology can be used in classroom for displaying AVs.
- Pre-installed with Nokia Education Delivery software for uploading and downloading AVs.
- Content is mapped to the syllabi.
- Higher usage of NED AVs and can be used in remote settings.
- Downloaded AVs can be played during absence of connectivity.

8.1.4 Conclusion

The project findings are presented by SWOT analysis to understand the weaknesses and strengths of the project. This will further guide to strengthen the project in the future.

Table 14: SWOT Analysis of BridgeITT

Strengths	Weaknesses
• Easy for teachers to make the lessons understandable • Engaged and motivated students • Affordable access to high-quality learning	• Content not in local language • Technical glitches often occur • Software should be user friendly

Opportunities	Threats
• With the success in schools of Andhra Pradesh and Tamil Nadu, the app has been implemented in schools of Haryana and New Delhi	• Lack of electricity back up at the macro scale • Lack of monitoring

In conclusion, it is clear that the application has succeeded in delivering on the promises of digitally connected teachers and engaged students. The application showed a high level of acceptance in mostly English-medium schools of Andhra Pradesh and Telangana.

Students and teachers in Tamil Nadu and Haryana were mostly neutral or against the application. Teachers in these regions also pointed to a myriad of technical issues that hampered the roll-out of the application, including unreliable electricity supply and mobile related issues. While extraneous problems like electricity back-up cannot be addressed by the developers at a macro scale, explorations should be taken in providing a solar-powered back-up for the electronics that require continuous supply or frequent charging. On mobile-related issues, it is suggested that the developers explore problems related to service of the mobile devices after they have been deployed in schools.

Students have, on most part, benefitted from the roll-out of the application and, moreover, believe that themselves. However, this study is hampered by the non-functionality of the application in most schools. It is suggested that the problems in these schools be addressed and a follow-up study be conducted to assess the impact of BridgeIT.

8.2 GIS@ School

8.2.1 Introduction

GIS@School is a Geographical Information System (GIS)-based mobile App developed by a Madhya Pradesh NIC (National Informatics Centre) team in partnership with the Education Department to facilitate compliance of the Right To Education Act 2009 (RTE Act) to bring quality education in the state. The app has been operational since 2013. With a strong Management Information System (MIS)-based integration and support, the Android-based app is designed to capture, store, manipulate, analyse, manage, and present all types of geographical data and geo-tagged photographs on a real-time basis.

The stakeholders register themselves first and subsequently use their education portal user name and passwords for uploading or reporting information. The portal also records the unique ID of individuals, IMEI (International Mobile Equipment Identity) number of the device, mobile number of the SIM of the device that has been used for uploading the GIS information and geo-tagged photos.

The app has helped in data gathering and analysis, policy planning, monitoring and evaluation, and decision making for the state government. Secondly, the app has enabled interdepartmental collaboration, coordination, seamless integration of activities, smooth automation of key processes and updation of key information in real-time. The system is created for effective, timely, and reliable monitoring and implementation of various programmes and interventions with transparency and social oversight. It also helps monitor each and every work with GPS enabled mobile app, introduces transparency in all operations, and takes proactive remedial action on the defaulters.

Finally, the target beneficiaries of the project are 16 million students and their parents. More than 1.2 million photographs from 125 thousand schools have been uploaded through this app.

Objectives

- To measure the relevance of project in terms of whether the app enables users to report, share information to comply with RTE Act and allows inter-department coordination and collaboration to better provide service delivery; whether the app is user-friendly for stakeholders to access and provide information; and whether the app enables users to voice their grievances, track progress in a transparent manner and provide feedback to enhance quality education.
- To study the effectiveness of project in terms of whether the MIS-based system allows real-time data collection, sharing and monitoring to further enhance evidence-based policy decisions, and engage and communicate with users across the state; whether the MIS-based system works in a user-friendly and simple manner to collect data, conduct analysis, and help find solutions; whether the users are having a user-friendly experience with the app and are reporting challenges or gaps within the system on a regular basis; and whether the app is designed to meet the needs of the users, the education system, state government and local governments on a continuous basis.
- To assess the efficiency of project in terms of whether the initiative is cost-efficient in terms of operating cost structure, resources, time, and staff; whether the app is efficient in implementation of the project on a continuous basis and time-efficient in terms of

uploading, downloading and synchronizing data; and whether both, the team and the state, have a timely process to solve queries after problems or challenges have been reported.

- To understand the sustainability aspect of the app in terms of the technical, physical, and socio-cultural, political and other challenges to use the app; whether it identifies incentives, enablers and motivating factors for the users to continue using the app; whether there are sustained resources for project and operating cost – school geo-mapper's structure, staff, training and expertise; and whether the project team has developed multi-stakeholder partnerships for replication and documenting, is and offering lessons learned and best practices in public to ensure transparency and accountability.

8.2.2 Research Methodology

The study was undertaken to provide insights into the GIS@School app and its impact to facilitate geo-mapping services and GIS-based services to School Education Portal. The study was conducted in five blocks across five districts in the state of Madhya Pradesh where the project was operational. The sample size was 188 respondents which included stakeholders of the project like students, teachers, engineers and government officials.

Four sets of questionnaire were prepared for all four stakeholders for data collection. The school selection criterion was based on road connectivity and existing DEF presence; and four schools from each block of target districts were selected for the study. In terms of administrative and geographical locations, five blocks in five districts were covered.

8.2.3 Research Outcomes

8.2.3.1 Demographic Profile of Respondents

The profile of respondents was studied into following terms of age, gender, educational qualification and geographical distribution.

a) Students - Out of the 123 students interviewed for this survey, 81 were females and 42 were males. In terms of the age distribution, most of the students were aged 11-14 years *(Table 15)*.

b) Teachers - A majority of the teacher respondents in the survey i.e. 60 per cent were male and rest 40 per cent were female. All of the teachers were aged above 40 years with 36 per cent aged 50 years and above. In terms of educational qualification, all of them had completed their education upto graduation or and above *(Table 15).*

c) Engineers - All of the engineers interviewed were male and the majority i.e. 69 per cent were aged 35-39 years, followed by 19 per cent aged 40-44 years. In terms of educational qualification, 44 per cent were graduates, another 44 per cent held technical degree and remaining 12 per cent had completed post graduation *(Table 15).*

Table 15: Demographic Profile of Respondents

Detail	Statistics in percentage	Students	Teachers	Engineers
Gender	Male	34	60	100
	Female	66	40	-

Detail	Statistics in percentage	Students	Teachers	Engineers
Age Distribution in years	(11-14) (15-17) (30-34) (35-39) (40-44) (45-49) 50 and above	68 32 - - - - -	- - - - 22 42 36	- - 6 69 19 - 6
Educational Qualification	Graduation and above Technical	100 -		56 44
Total		123	45 (Female- 18 Male- 27)	16
State/District/ Block		Madhya Pradesh/5Districts		

8.2.3.2 Assets and Housing Characteristics

a) Students' Assets and Housing Characteristics - Almost all the students had the basic assets i.e. house, an electric fan, electricity, bicycle and bank or post-office account. Out of 123 students, only 23 students had computer at their home.

Out of the 123 students, 114 students had *pakka* toilets at their home, six had *kachcha* toilets and three of them went for open defecation. In terms of roof type, 88 per cent had the strong concrete roof over their houses that protected them from heavy rain and storm. Half of the students used tap as a source of drinking water at homes and only 17 per cent used filtered water for drinking. In case of household chores, 59 per cent used tap and 16 per cent used tube well. Other sources of water for household chores were hand pump, boring water and well.

b) Teachers' Assets and Housing Characteristics - All the teachers had a house, electricity connection, an electric fan, a motorcycle or scooter and a bank or post-office account. Around half the teachers (44 per cent) had computer at their homes. In terms of drinking water, out of 45 teachers, 24 used boring water for drinking purposes while the rest relied on government tap and a public tap. Almost all of them, i.e. 98 per cent, had pakka toilets and only 2 per cent used kachcha toilets.

8.2.3.3 Use and Ownership of Mobile Phone

a) Students' Ownership of Mobile Phones - Out of 123 students interviewed for this survey, 113 (92 per cent) used mobile phones. About 26 per cent of the students had been using mobile phones for last three years, followed by 22 per cent for last four years and 10 per cent for five years and more. So, more than half of the students were using the mobile phones for three years and more.

Three-fourth of them were using mobile phones of their family members and 19 (15 per cent) had their own phones. Interestingly, in the terms of type of phone, a majority of the students, i.e. 60 per cent, were using smartphones. In terms of usage, 111 out of 123 students were mostly using mobile phones for making calls, 105 students used for listening to music, 100 students for playing games and only 45 students used the mobile phone for net surfing. So, it was very important for students to start net surfing other than making a call or watching movies as Net surfing can improve the overall performance of students in academics.

b) Teachers' Ownership of Mobile Phones - Out of 45 teachers, 41 had mobile phones for last 10 years.

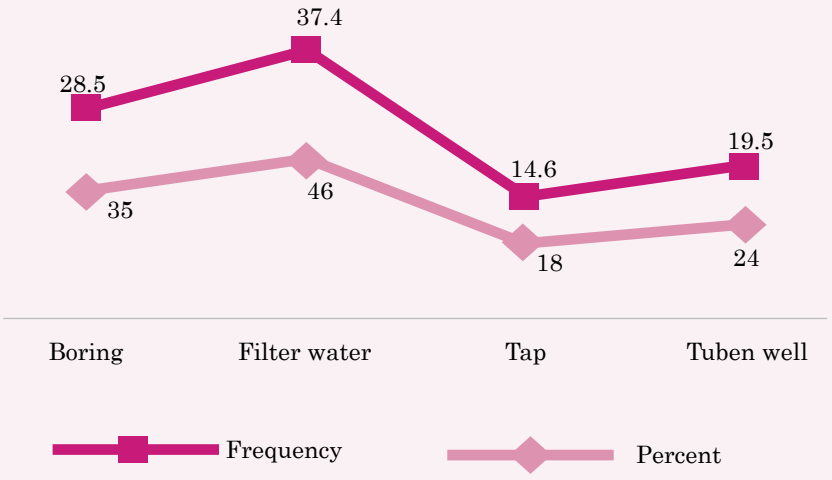
8.2.3.4 School Infrastructure

School infrastructure in terms of drinking water, toilet facility etc. plays an important role in motivating the students to attend school and learn. These infrastructure facilities are responsible for reducing the push out factors in school drop outs.

Upon analysis of the finding it was clear that the school was using several sources to provide drinking water to students. However, only 37.4 per cent of the students were provided the filtered water to drink whereas the rest of the students were drinking water from boring, tap and tube well. *(Figure 40).*

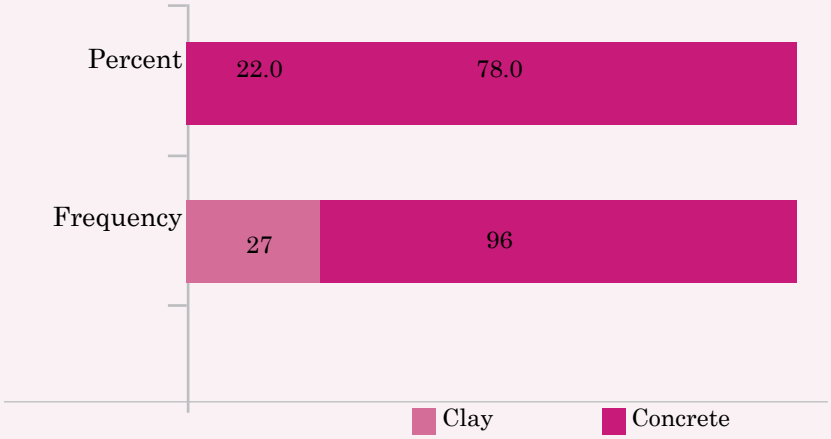
All the schools had *pakka* toilets; none of them had any *kachcha* toilet neither did students had to opt for open defecation. All the students were comfortable in using the toilets and didn't had to hold on all day until they got home. All the teachers responded that all schools had pakka toilets with lock mechanism and they had separate toilets for boys and girls.

Figure 40: Source of Drinking Water



Out of 123 schools, 27 had clay roof; majority (96 per cent) of the schools had concrete roof and none of them had roof made of organic materials. It was clear from the data that majority of the school had strong roof, capable to withstand wind, storms and rain. *(Figure 41)*.

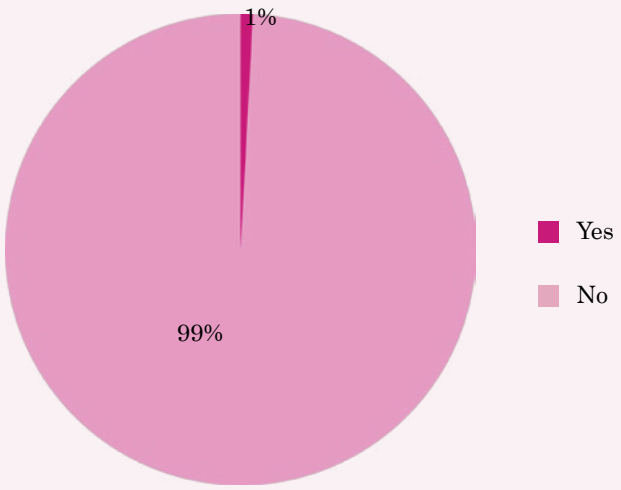
Figure 41: Type of School Roof



8.2.3.5 Relevance

a) Students' View - Only 1 out of 123 students (one per cent) was aware of the GIS@School app and responded that no one uses it in the school).

Figure 42: Students's awareness on GIS@ School app



A majority of the students i.e. 82 per cent said that they were changes in overall quality of the school in terms of physical infrastructure (drinking water, toilet, roof and seating arrangement). This change has helped the students to sustain their motivation to regularly attend the school and reduced the push out factors of school drop-outs.

In terms of the changes in school in the past two years, the students sighted development in terms of physical infrastructure that not only improved the overall quality of the school but also made attending school interesting. Around one-fourth of the students said that water coolers have been installed in their school and they now don't have to drink unfiltered tap water; they also said that separate toilets have been constructed for boys and girls with water facilities.

Other students reported that they now have well-furnished classrooms that are equipped with blackboard, benches to sit, fans and lights, besides playground, computers and gates in the school. Also, cleanliness drive is regularly run in the school to maintain the hygiene of the school environment.

b) Teachers' View - None of the teacher knew of the GIS@School app. About 87 per cent of the teachers responded that there has been improvement in infrastructure but they didn't have an idea whether the change was because of the app or some other reason.

c) Engineers' View - The app started in 2003 and is in Phase-II now. The team is composed of 14 engineers, including one Assistant Engineer and 13 Sub-Engineers. The main responsibilities of the engineers include visiting the government school, uploading the GIS information and geo-tagging photographs on the GIS@School app, etc. Based on these geo-tagged images, the exact requirements of the schools in term of physical infrastructures were captured.

8.2.3.6 Effectiveness

According to the engineers, the app was designed to capture, store, manipulate, analyse, manage and present all types of geographical data and geo-tagged photographs of various facilities and other infrastructure in schools. The app was well integrated with the School Education Portal and was able to interact with education portal and its domain specific live data like school facilities and infrastructure. The app also involved web-interface for viewing the geo-tagged photographs of the schools and executing various geo-spatial queries for planning and management.

8.2.3.7 Efficiency

According to the engineers surveyed, 1,197 (primary and middle) schools were covered under the application in Bhopal. Initially, the data was uploaded on a daily basis but now it depends upon the requirement or once in three months. For uploading the GIS information and geo-tagged photographs, username and password of education portal was given to sub-engineers, block resource coordinators and teachers. The portal also recorded the unique ID of individuals, IMEI number of the device, mobile number of the SIM of the device that was used for uploading the information.

8.2.3.8 Sustainability

a) Project Cost
According to a government official, there was little to no resource cost in development of the app as the cost was internalised within the NIC team. NIC servers are used by the engineers to upload the geo-tagged images on servers and server cost was also borne by the NIC. Also, the engineers were paid by the government.

b) Technical Factors
The app can be installed on any Android-based smart phone that is

equipped with GPS facilities. It can be also installed on phablets, tablets with android and GPS facilities. The app is well integrated with the School Education Portal and is able to interact with education portal and its specific live data like schools, enrolments, facilities and infrastructure, etc. It also involves web-interface for viewing the geo-tagged schools, photographs of the schools and executing various geo-spatial queries for planning and management.

c) Technical errors and challenges

- Battery use
- Connectivity problem resulted in repetition of geo-tagged photos that are uploaded on the portal
- Not suitable for higher version of Android phones
- Many of the engineers don't have the smartphones on which the app can be installed

d) SWOT Analysis

Based on the findings of the study, SWOT analysis of the project was carried out to focus upon the recommendations for strengthening the system and making it more responsive to the needs of beneficiaries.

Table 16: SWOT Analysis of GIS@School

Strengths	Weakness
• Low cost • High replicability • Minimal time to deploy • Human error is minimised • Uses existing data differently	• Low penetration of mobile phone • Network connectivity problem • Technical issues • Not suitable for higher Android versions
Opportunities	**Threats**
• Implementation at national level	• Red tape • Bureaucratic procedures • Political threats

The app has its own strengths that make it sustainable and the project team has to work on to minimise the weakness, make optimal use of opportunities and remove the threats.

e) Project Replication

The app should be upgraded so that it's compatible with higher Android versions, the performance of battery use should be improved, size of photographs should be reduced, and the Internet should be provided for free to users as the app consumes data to upload heavy geo-tagged images.

8.2.4 Conclusion

GIS@School initiative of the Madhya Pradesh School Education Department and NIC, aimed at creating a comprehensive GIS and Web platform for scientific planning and proactive governance of schools so

as to facilitate compliance of various provisions of the RTE Act 2009. All the schools had basic physical infrastructure and facilities like *pakka* toilets, water, playground and all-weather proof buildings to motivate the children to regularly attend school, thus reducing the push-out factor of school drop-outs.

The study showed that it was only the engineers and government officials who were using the app; and teachers and students didn't have any awareness about the app. The data revealed that the app provided decision support system through GIS technology for providing improved physical infrastructure in terms of drinking water, toilet facilities, playground, chairs, tables and computers. The app has certain weaknesses, which engineers encountered, like network connectivity problem, technical issues and compatibility issues with various Android versions. The app, however, is sustainable enough as the project is funded by the state government.

It can be concluded that the GIS@School app ensured presence of proper and basic school infrastructure such as buildings, teaching staff and learning equipment.

8.3 Learn out of the box

8.3.1 Introduction

In this course, 'Learn, Out of the Box' (LOTB), is a project aimed at delivering high quality but low cost education in low-income schools in India through the induction of technology as a teaching tool. It is jointly implemented by the Vodafone Foundation and the Pratham Education Foundation. The project aims to bring a low-cost digital learning solution to 1,000 low-income schools across 13 states, reaching over 1,47,000 children. LOTB helps teachers engage students by making learning fun and enhancing the classroom experience by expanding learning activities and improving learning outcomes - hence, improving students' subject as well as practical knowledge.

The Web Box, provided to teachers, is an Internet-enabled Android 2.1 OS smartphone, packaged as a keyboard. With an AV cable, Web Box plugs into television. The course content of mathematics and science, for standards VI and VII, is made available to teachers in digital format through SD cards that can inserted in the Web Box. Thus, Web Box is equipped with learning application for classrooms with NCERT curriculum-aligned digital content. These include concept videos, in-class activities, projects, group discussions, games, practice questions, and quizzes for assessment that can be used by teachers, both in classroom and during lesson planning. The Internet accessible through a 2G SIM card in the Web Box is used by teachers to search on the Internet beyond the course content stored on the SD card.

The project aims to impact economically disadvantaged children by teaching English and Hindi medium government, government-aided, private and NGO-run schools in rural, semi-urban and urban localities. LOTB project was launched in two phases. The first phase started in July 2012 and covered 151 schools in Maharashtra, Karnataka, Delhi, Assam and Rajasthan. The remaining 849 locations, spread across several states, were launched in the beginning of July 2013.

Objectives

- To measure the relevance of the project in terms of whether the content provided is aligned to the state curriculum; is the project providing pedagogical support to the teachers; what is the relevancy in lesson planning activities for teachers; what are the project's objective for enhancing the classroom experience.
- To study the effectiveness of the project in terms of technical and pedagogical support to teachers; level of students participation and interaction in classroom; teachers' and students' classroom experiences; level of subject knowledge and retention of standard VI and VII students.
- To assess the efficiency of the project in terms of expenditure incurred to link Web Box usage and provide necessary support to teachers/schools; time taken and overall resource required to set up the project; time taken to deliver content, learning and teaching; user friendliness for participants; ways in which the delivery mechanism has been appropriately resourced and is cost effective; efficiencies in terms of unit – school, teacher, and children.
- To understand the project's sustainability in terms of challenges in the project implementation, delivery, management, maintenance and operating costs; potential for replication and scaling-up of the identified good lessons learned; any partnerships developed for replication or future sustainability.

8.3.2 Research Methodology

The survey of the District Education Department and schools with LOTB intervention was designed to capture data on outcomes in usage of the Web Box by teachers and teaching practices. The study was conducted in the state of Assam where both phases of the project are operational. The sample size for the purpose of this study was 64 teachers (at 95 per cent confidence level and 10 per cent margin of error) and 167 students i.e. a total sample of 231. The questionnaire was divided into five sub parts - learning environment (PLE), efficiency (E), ease of use (EOU), motivation (M) and perception (P).

Reliability:
Data reliability for each variable was checked by means of Cronbach's Alpha which was found as follows. Students- PLE= 0.940, E= 0.889, M= 0.936, P= 0.804. Teachers- PLE= 0.700, E= 0.246, EOU= 0.862, M= -0.407, P= -0.002. Most of the values are higher than 0.70 and, hence, it can be assumed that data is within acceptable range.

8.3.3 Research Outcomes

8.3.3.1 Demographic Profile of Respondents

Among the teachers, 75 per cent had a graduation degree and 11 per cent had post-graduation degrees. There were 41 per cent of the teachers who had been in service for less than five years, 36 per cent had been in service for six to 10 years and about 25 per cent had been in service for more than 20 years.

Of the students, 36 per cent of the students had been in school for two to three years while 35 per cent for more than four years. About 56.3 per cent of the students were aged 10-12 years and 43.7 per cent were aged 12-14 years *(Table 17).* About 32 per cent of the students were learning the aid for 6-12 months and 60 per cent were working for more than one year. There were about 61 per cent of students who were learning through the application for two to four hours per day and about 20 per cent were learning through the app for five to seven hours.

Table 17: Demographic Profile of the Respondents

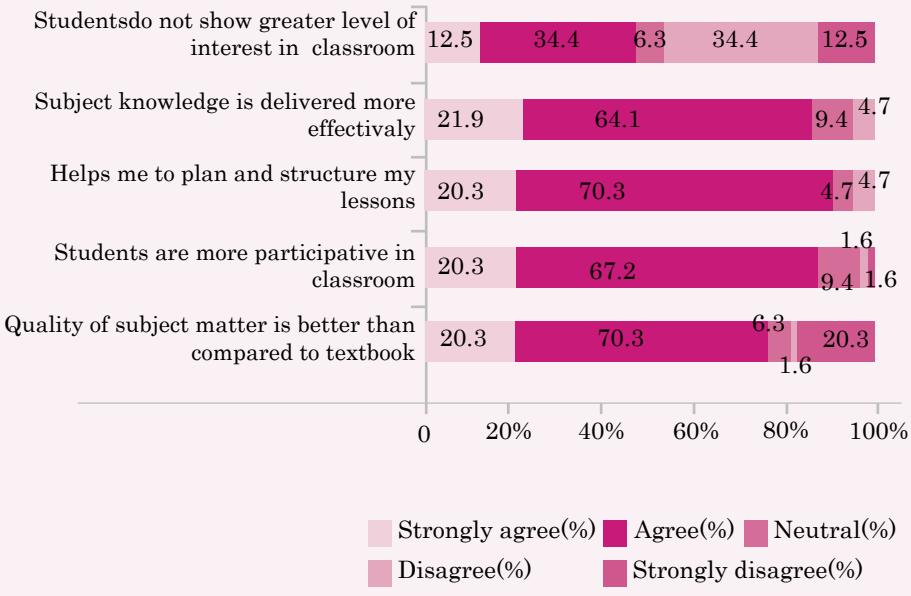
Detail		Teachers	Students
Gender	Male	82.8	56.3
	Female	17.2	43.7
Age distribution	8-10	-	1.2
	10-12	-	57.5
	12-14	-	40.1
	14-16	-	1.2
	20-24	6.3	
	25-29	31.3	
	30-34	21.9	
	35-39	10.9	
	40-44	18.8	
	45-49	9.4	
	>50	1.6	
Total		64	167

Detail		Teachers	Students
Educational Qualification	Bachelor Masters Diploma Others	75 10.9 3.2 7.8	- - - -
		64	
No of schools		120	
State/Block/District/ Panchayat	1 State/Nine Districts /43 Blocks/52 Panchayat		

8.3.3.2 Learning Environment

a) Views of the teachers: With regards to the perception of the LOTB application, our study found that 70 per cent of the teachers agreed that the quality of the subject matter was better compared to textbooks. On the other hand, only 49 per cent of the students feel that quality was better in comparison to textbooks. Therefore, the study found out that a discrepancy of opinion is present. There were also 20 per cent of the teachers who strongly disagreed that the course content is better. About 67 per cent and 20 per cent of the respondents strongly agreed that students were more participative in the classroom. There were also about 70 per cent of the teachers who said they believed that LOTB had helped them plan and structure their lessons well *(Figure 43).* There was a large proportion of teachers who believed that with LOTB application, subject knowledge was delivered more efficiently.

Figure 43: Learning environment

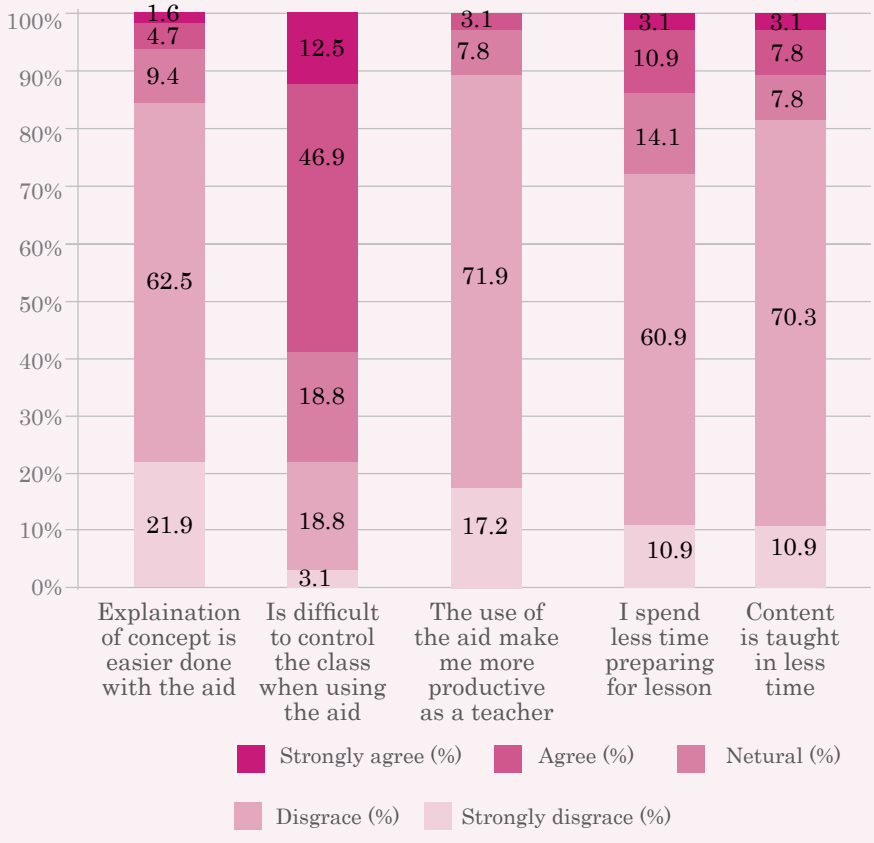


b) Views of the students: Among the students, 54 per cent and 36 per cent agreed and strongly agreed, respectively, that the concepts were better understood with the app's aid. Hence, our study outcome shows that LOTB application has helped in making the concepts more clear. Also, 54 per cent felt that the aid had made the teachers more focused about their job and helped them answer questions more appropriately. There was also a huge agreement (about 80 per cent) among the students that the application had helped in boosting up interest in classroom.

8.3.3.3 Efficiency

The teachers were asked about their views on how they thought LOTB had helped increase their efficiency as a teacher. There were 63 per cent of teachers who agreed that the application had aided in explaining the concepts better in contrast to about 54 per cent of students who felt the same. Almost 50 per cent had negated that the notion that the application had made it difficult to control the class. However, only 18 per cent had agreed to this proposition. A large majority (almost 90 per cent) either agreed or strongly agreed that use of the application had made them more productive as a knowledge imparter. The application had also helped teachers devote less time for preparing lessons, and about 61 per cent agreed to this fact. Similarly, the teachers also felt that the application had helped them teach the content in lesser time, and about 70 per cent had agreed to this. Overall, it can be said that the application helped the teachers become more productive and efficient in running the class *(Figure 44)*.

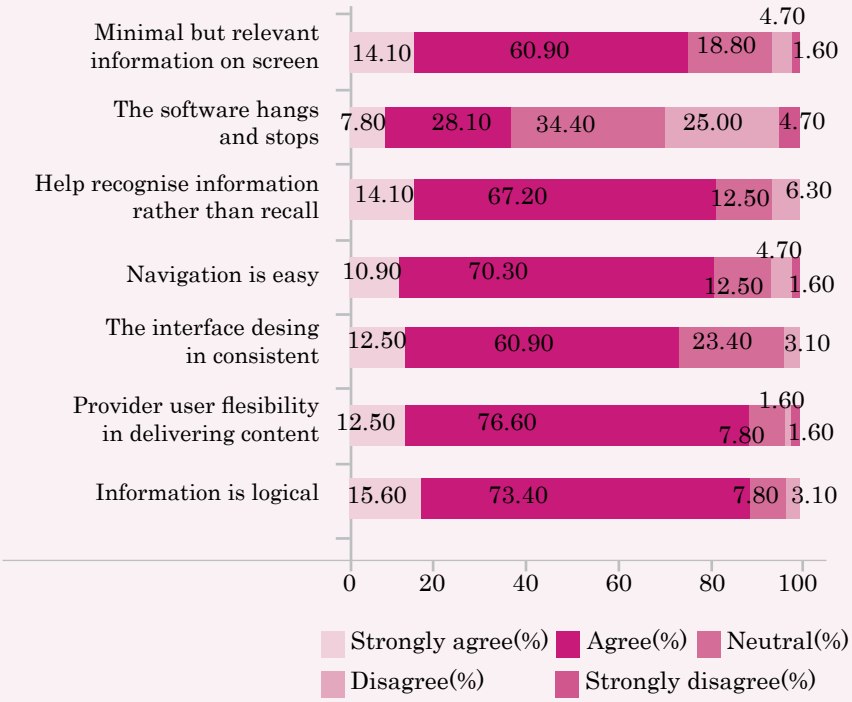
Figure 44: Efficiency (Teacher)



8.3.3.4 Ease of Use of Application

a) Views of the teachers: They were asked about their opinion on easiness of use of the application. About 70 per cent of the teachers agreed that the navigation of the application is easy and 77 per cent believed that it gives user flexibility in delivering content. The interface was also consistent, and 61 per cent of the teachers agreed to this. There is also an understanding that the application helped in recognising the relevant information, and 67 per cent agreed to this. The teachers were also happy that the application had helped to give relevant information (61 per cent) to the students in the easiest and simplest way possible. The teachers were asked if they had any problem with the application such software getting hanged or crashing, and about 32 per cent disagreed while 19 per cent remained neutral *(Figure 45)*.

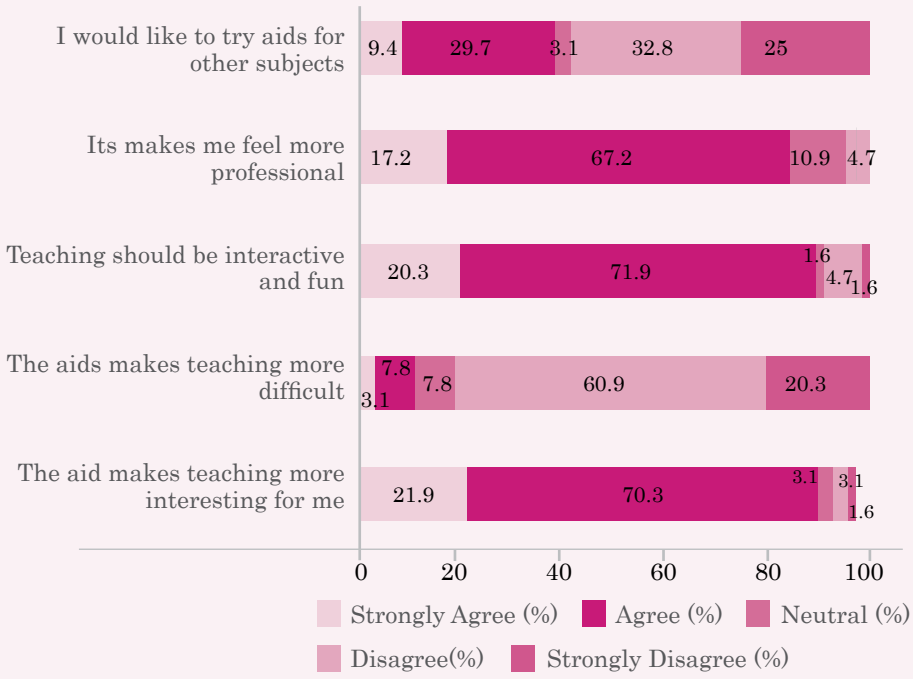
Figure 45: Ease of use on application (Teacher)



8.3.3.5 Motivation

a) Views of the teachers: They were asked on how the application motivates them in the class. In 70 per cent of the cases, the teachers agreed that the LOTB application had make teaching more interesting and fun. Seventy two per cent felt that teaching should be interesting and fun. About 61 per cent of the teachers disagreed that the aid had caused any problems in their teaching. The application also helped in building more professionalism among the teachers, and about 67 per cent agreed with that. There were issues like whether this application can be used for other subjects where 30 per cent agreed to it and 33 per cent disagreed with the issue *(Figure 46)*.

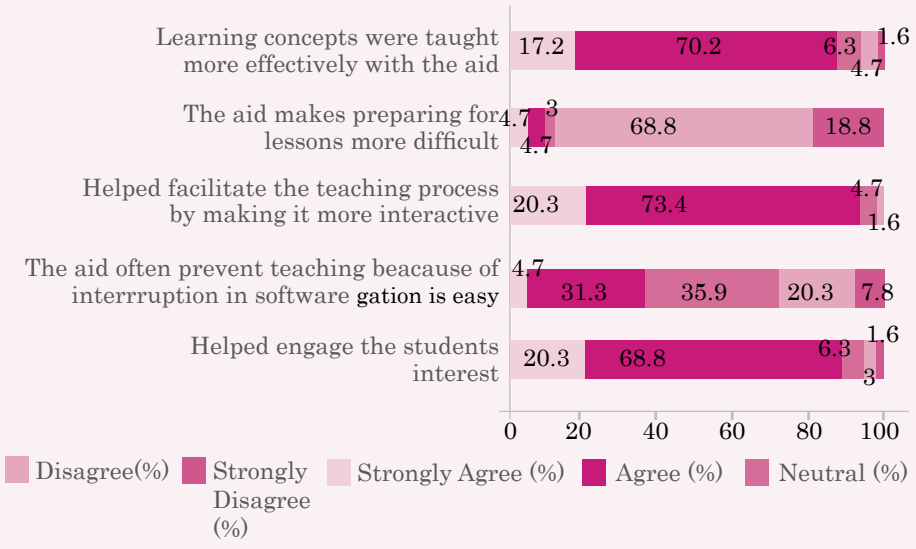
Figure 46: Motivation of teachers with the applications (Teachers)



8.3.3.6 Perception

a) Views of the teachers: The perception of the teachers had been explored and they were asked as how the application helped in engaging students' interest, technological interruptions and efficiency of the application. About 68 per cent felt that it had helped in engaging the interest of the students, though about 31 per cent agreed that there were some technological interruptions in software. But, of course, 73 per cent assured that they agreed that the app has helped them as teaching has become more interactive. Corroborating to this fact, 69 per cent felt that aid had not made the lessons difficult. On the contrary, 70 per cent agreed that learning concepts were taught more effectively with the aid *(Figure 47).*

Figure 47: Perception about the application among the teachers



b) Perception of the students: There was an overwhelming majority who agreed and strongly disagreed that the app had helped in increasing the knowledge of the students, led to better results in examinationsa and made students more confident, encouraging them to ask more questions in class. This shows that large amount of interest was generated among the students and they became more hooked to the class environment *(Figure 48)*.

Figure 48: Perception among the students

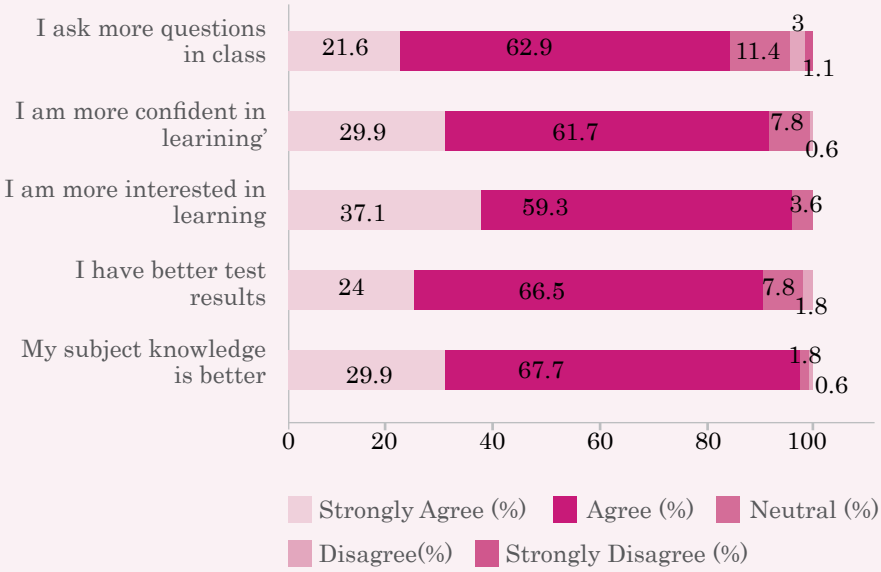


Table 18: SWOT Analysis of LOTB

Strengths	Weaknesses
• Innovative learning for students • Continuous engagement between students and teachers • Strengthening of the conceptual understanding • Content of the WebBox is aligned to the state curriculum	• Poor video quality • Content not in local language
Opportunities	**Threats**
• The project has been implemented in 8 states with extra deployment in already four existing states • With success in subjects like mathematics and science the project can be rolled out to other subjects and classes as well	• Red tape • Bureaucratic procedures • Political threats

8.3.3.7 Sustainability

Pratham uses a cascade model of training the teachers. In this process, the central team first orients the Assistant Trainers.

They then, in turn, train the teachers with support from the Regional Programme Manager and Regional Programme Associates in respective districts. In the process of strengthening the programme regular feedback is obtained in terms of usage report. This iss done by cloud computing technology which tracked the real-time usage. Besides, Pratham team members also visit the schools regularly and receive the observation sheets which are further used for analysis and insights for action.

8.3.4 Conclusion

The project findings are presented through SWOT analysis to understand the weaknesses and strengths of the project. This will further guide towards strengthening the project in the future.

From our study, it came out that LOTB is sufficiently successful in imparting quality and informative education to the students. It has also helped generate greater urge and interest among the students towards learning new things in innovative ways. There were though some shortcomings found during our field visit in terms of stable Internet connections and quality of video content shown through television and Web Box. There is also a language gap as most schools under the framework are Assamese medium, where English study material is often not easily comprehendible. Hence, multilingual support for the project is recommended.

8.4 Discussion

Among the three case studies on education in the report, all of them dealt with mobile use and upgrading the quality of education to help us understand new innovative nature of this kind of learning. Further, the projects can be compartmentalised on the basis of the purpose of the app used i.e., improving access to education by providing quality digital education material and facilitating alternative learning process and monitoring. LOTB and Bridge IT fall under the ambit of apps that aspire to develop better educational outcome. On the other hand, GIS@School is a mobile-based app developed by a Madhya Pradesh NIC team in partnership with the Education Department to facilitate compliance of the Right to Education Act, 2009. The app has helped in data gathering and analysis, policy planning, monitoring and evaluation, and decision making for the state government. All the projects were analysed under components like relevance, effectiveness, efficiency and sustainability.

Both LOTB and Bridge IT have similar format of working but the impact is different. From our study, it was clear that in terms of learning environment the apps have helped develop a conducive environment for learning. Overall, it was found out that larger proportion of teachers using LOTB rather than Bridge IT had agreed/strongly agreed that the app had helped make the quality of the subject matter better in digital form, making students more participative in the classroom and helping structure the lessons and delivery of the subject knowledge more effectively. During our field visit, it was found out that there were gaps in the application of the aid, and students often had forgotten about the impact of the aid on their learning.

Whereas, in terms of effectiveness, a higher proportion of teachers agreed that the explanations of concepts are easier done with the aid of Bridge IT than LOTB. Teachers using LOTB also agreed that it helps in preparing lessons in less time. Surprisingly, a large proportion of students gave neutral responses on their view of how the teachers' interest had increased. A large proportion of neutral responses indicate that the course content has to become more engaging and impactful. Also, perception of students and teachers varied in terms of understanding of the digital content. Though teachers are comfortable with the content students may take time to imbibe the crux of the content.

In case of ease of use of the aid, it is also found that the teachers in LOTB schools found the app to be more helpful in giving out logical information, providing user flexibility in delivering content and helping in recognising information which is minimal but relevant. In case of motivation, it was found that the teachers from Bridge IT schools want to use the aids for other subjects also. This indicates that the app has helped generate interest among the teachers in Bridge IT schools in a greater way than in LOTB schools.

So, in terms of effectiveness, the Bridge IT project had an edge on certain verticals. In terms of time taken to teach educational content and the teacher's

self-confidence of their teaching prowess, the LOTB project scored better than the Bridge IT schools.On an aggregate level, between these two projects, it came out from our study that LOTB has become more effective and affected the teachers and students in a greater way. So, in terms of effectiveness, the project of Bridge IT had edge on some issues.. Overall, it was found from the study that LOTB is successful in sustaining the effort of imparting access to quality education though the effectiveness and motivation indicators are more favorable for Bridge IT teachers. There were some lacunas in both the projects like challenges of preparing the study material in local languages and technical glitches during the operation of the course material. LOTB has been able to sustain the project with regular upgradation, capacity building and monitoring at the local and central level. In the case of Bridge IT, after the implementation of the programme, lack of monitoring and measures to address the challenges were evident. Whereas, this has become the USP of LOTB that they have continuously monitored the progress of the project and addressed the technological glitches from time to time.

Overall, it was found that the app has made students more motivated and the teachers more effective in imparting lessons. Students have benefitted from the rolling of the application as the curriculum has become more fun and interactive. Understanding of the curriculum has also become more lucid and vivid. Technological glitches need to be addressed and rectified at regular interval so that aid supports the student engagement and an enhanced learning environment. This study has shown that mobile can transform educational experience for both teachers and the students. In spite of all the facts and figures, it also has to essentially remember that mobile or any tool cannot be an alternative for traditional teachers in classroom settings. But it can definitely act as an aid to more informative and engaged classroom.

GIS@School, on the other hand, tried to build a comprehensive GIS and web platform for scientific planning and effective governance of schools to enable compliance of various provision of RTE Act, 2009. In terms of relevance of project GIS@School, it was found in our study that it has helped the students to sustain their motivation to be regular in schools. This has also majorly reduced the school dropout rates. Facilities in terms of separate toilets for boys and girls and provision of drinking water have been made available in schools. The major USP of the app is that that there was little to no external resource required in the development of the app as it is integrated with the NIC team. So the entire cost of the project was internalised. The app has addressed the issue of retaining the students in schools and reduced the number of school dropouts.

Health

Information and Communication Technologies (ICTs) act as a bridge in minimizing the distance and improving access to health care and services for people residing in rural areas of developing countries. ICTs, particularly mobile phones, are playing an important role as mobile phones are readily available in remote rural areas, helping women and health care workers to access health services.

Mobile health or m-Health is a medical and public health practice which is supported by all kinds of mobile devices, like mobile phones, patient monitoring devices, PDAs and other wireless devices for providing health services and health information for people[97]. Use of mobile applications for health care is a dynamic field in the health sector with a range of applications designed to improve the quality of and access to health services, thereby improving the health outcomes over a long term. Mobile telephony has quickly spread its roots and reached the community from richest to poorest as mobile technologies can carry and process information in many forms: coded data, text, images, audio and video, thus addressing health care challenges such as access, affordability and behavioural norms. The dissemination of information on mobile phones play an important role in improving rural maternal health care and other essential health services in developing countries[98].

According to a World Bank (2011) report, "the main technologies carrying m-Health information are GSM, GPRS, 3G and 4G-LTE mobile telephonic networks; Wi-Fi and WiMAX computer-based technologies; and Bluetooth for short-range communications[99]". m-Health is improving the efficiency of health care delivery, making health care more effective and ultimately bringing the change in the health practices of people. In both the developing countries and developed countries, there are many mobile applications that are designed to combat health challenges to improve health outcomes. A Chinese study conducted by Zhejiang University researchers found that sending text messages as appointment reminders improved attendance at a health promotion centre as effectively as phone reminders, while costing over one-third less[100]. Another Thai study in 2007, showed that TB patients who received daily text message medication reminders jumped to over 90 per cent adherence. A device called SIMpill that uses mobile technology to monitor and direct medication adherence also shows promise[101].

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India has done a lot in mobile health applications to monitor public health with the launch of different services focusing on maternal and newborn health; and achieving MDG 4 and 5 are the major challenges in India. According to a UN Report (2015), globally, the neonatal mortality rate fell from 36 deaths per 1,000 live births in 1990 to 19 in 2015, and the number of neonatal deaths declined from 5.1 million to 2.7 million. However, the decline in neonatal mortality from 1990 to 2015 has been slower than that of post-neonatal under-five mortality: 47 per cent compared to 58 per cent globally[102].

To reach the unreached and to reduce the maternal and infant mortality rate, Frontline Health workers are appointed by National Rural Health Mission (NRHM) in India to provide effective, efficient and affordable health care to rural population. Mobile technology with low-cost handset and penetration of mobile phone network is mPowering the Frontline Health workers by offering a revolutionary opportunity to strengthen their capacity and expand the reach, quality and timeliness of critical maternal and newborn health interventions. Health systems in developing countries, which are often already constrained by resources, have benefited from m-Health through increased access to health care and health-related information, especially for the hard to reach population[103].

The study on m-Health application was done to gain insights into the use of technology in improving the counseling skills of health workers, reducing burden of data-related work, making health workers more productive and improving the quality of services they provide.

Aroyashreni, eMamta, Hamari Ladli, mSakhi, Mobile for Mother, ReMiND and Vatsalya were studied under the Health section.

9.1 Arogya shreni

9.1.1 Introduction

Arogyashreni was an initiative by GRAAM, a not-for-profit policy research and advocacy organisation based out of Mysore. It was a community-based monitoring initiative at village level to facilitate better delivery of health services in 113 Primary Health Centres (PHC), spread across seven talukas of Mysore district. It was implemented by Grassroots Research and Advocacy Movement (GRAAM), which was a subsidiary of Swami Vivekananda Youth Movement till 2015 March. Arogyashreni used Interactive Voice Response System (IVRS) to capture community feedback on the delivery of health services. The information gathered was analysed to find possible solutions to the problems. Subsequently, the knowledge and experience gained were spread to create awareness in the community. Arogyashreni brought communities and PHC personnel closer and pushed forward their perspective to develop ownership of PHC among community representatives, and enabled the members of Planning and Monitoring Committee (PMC) to understand and communicate the requirement of funds and services with local elected representatives and public health officials. It was an action research project to test the model developed to ensure people's participation in the governance of public health service delivery, determine the feasibility of IVRS technology, and the effect of community monitoring on management of PHCs.

The project was committed to enhance community participation in monitoring health care institutions. A questionnaire containing 36 close ended questions, on various aspects of PHC functioning, was prepared with the help of medical doctors, academicians and community representatives. The questionnaire installed in the toll free IVRS was answered by the selected members of Planning and Monitoring Committee (PMC) which was represented by the representatives of Village Health and Sanitation Committees (VHSNCs) and other stakeholders, including elected members of the community for their respective PHCs. The findings of the data analysis were validated through physical verification. After proper assessment of rural PHCs, rank cards were prepared and disseminated among the community as well as to the Department of Health and Family Welfare.

Objectives

- To measure the relevance of the project in terms of using IVRS technology-based monitoring system to capture community perspectives on the delivery of health services at the grassroots level and advocacy at the local health centre level to identify issues related to health care service.
- To understand the effectiveness of the project in terms of participation of the PMC and community members in articulating the shortcomings of their PHCs and suggesting practical ways of solving them.
- To study the efficiency of the project in terms of cost effectiveness and time efficiency of IVR to gather responses to the questionnaire about the status of PHCs. Frequency and modes of monitoring, evaluation and report card generation further help to gauge the efficiency.
- To understand the sustainability component of the project in terms of identifying challenges in the project implementation, delivery, management and maintenance. Potential replication and scale-up of the identified good lessons learned further help understand the project's sustainability.

9.1.2 Research Methodology

A triangulated research methodology was proposed for this assessment study, which included both primary and secondary research. The community survey instrument was designed to capture data on effect of awareness generation by ARS on services provided by PHCs, representation of issues by PMC. Additional sections of the instrument were obtained on various characteristics of the communities and respondents, which were used to support a range of descriptive analysis.

9.1.3 Research Outcomes

9.1.3.1 Demographic Profile of Respondents

The profile of the respondents was studied in terms of gender, age, educational qualification and geographical distribution.

a) Community: Amongst the community members, the majority, i.e. 31.6 per cent, were aged 26-35 years old followed by 21.3 per cent aged 46-55 years and 13.2 per cent aged above 65 years. In terms of educational qualification, more half of the respondents, i.e. 61 per cent, were literate with 44.8 per cent qualified up to high school, 12.5 per cent had studied till higher secondary and only 5.1 per cent were graduates *(Table 19).*

Table 19:Demographic Profile of Respondents

Details	Statistics in percentage	Community	PMC	PHC	Graam Team	Government Officials
Gender	Female	47.8	51	47.8	33	25
	Male	52.2	49	52.2	67	75
Age Distribution(in years)	(16-25)	8.8	3.4	5.8	-	-
	(26-35)	31.6	22	42.3	67	-
	(36-45)	15.4	44	30.8	33	-
	(46-55)	21.3	25	11.5	-	50
	(56-65)	9.6	3.4	9.6	-	50
	(<65)	13.2	1.7	-	-	-
Educational Qualification	Illiterate	39	1.7	-	-	-
	Primary School	14	3.4	7.7	-	-
	High School	44.8	78	44.3	-	-
	Higher Secondary	12.5	8.5	17.3	-	-
	Graduates	5.1	16.9	25	-	100
	Masters and above	-	-	-	100	-
State/Districts/ Blocks	Karnataka/Mysore/7 blocks					

b) PMC: Amongst the PMC workers, majority of the respondents, i.e. 44 per cent, were aged 36- 45, another one-fourth aged 46-55 and only 1.7 per cent were aged above 65 years. In terms of educational qualification, the respondents varied in terms of formal education. Only 1.7 per cent of the respondents were illiterate while the majority of the respondents, i.e. 78 per cent, had finished high school and 16.9 per cent were graduates *(Table 19)*.

c) PHC: Amongst the PHC workers, the majority i.e. 42.3 per cent of the respondents were aged 26-35 years, 30.8 per cent aged 36-45 and only 9.6 per cent were 56 -65 years. In terms of educational qualification, only 5.7 per cent of the respondents were illiterate. Around 0.3 per cent had passed high school and 25 per cent were graduates *(Table 19)*.

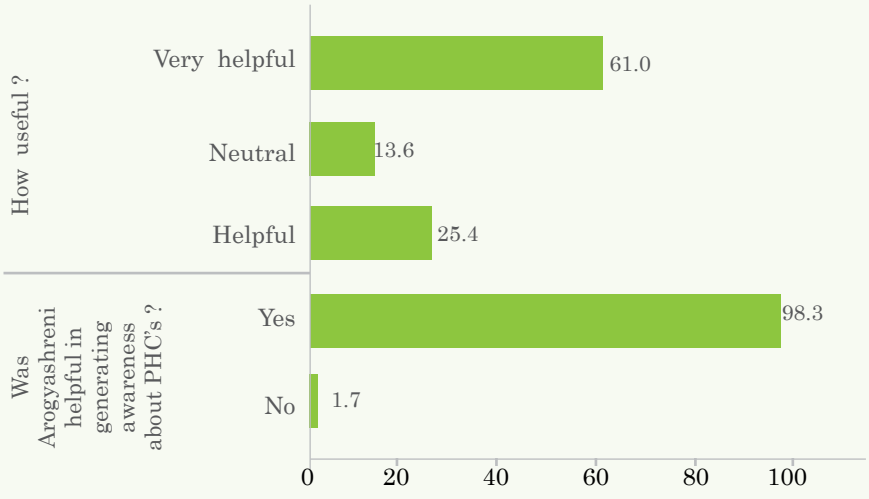
d) GRAAM Team: Amongst the GRAAM members, 67 per cent were aged 26-35 and 33 per cent were aged 35-46. They all were highly qualified as they all had educational qualification up to masters or above *(Table 19)*.

e) Government Officials: Government doctors and health inspectors were interviewed in the survey. Half of the respondents were aged 35-45 years and another half were aged 46-55 years. All the doctors had bachelors of medicine and bachelors of surgery degree. However, no one had done doctor of medicine. All the health inspectors were also graduates *(Table 19)*.

9.1.3.2 Relevance

a) PMC view - The relevance of the project was mapped by analysing the responses of PMC workers. None of the community members interviewed were aware of the project since the project was dead for almost two years. The relevance was analysed by checking if information stored in the monitoring system were used to create awareness and ownership among community representatives about the status of health care and services provided by the PHC and whether the IVRS technology-based monitoring system was able to capture community perspectives on the delivery of health services at the grassroots *(Figure 49)*.

Figure 49: Relevance of Arogyashreni(PMC view)



When asked if Arogyashreni helped spread awareness about health services in the block, 95 per cent of the responders said that it did help spread awareness . About 98.3 per cent of the *(Figure 49)* respondents felt that the project did help spread awareness about primary health centers in their blocks. In terms of the problem identification, 88 per cent agreed that the app helped identify problems at local PHC level while 5 per cent did not know if it did.

b) Government Official's View - The government officials interviewed felt that the project did create a certain level of awareness about PHCs amongst the community members; they felt that it should be brought back as "something is better than nothing".

c) GRAAM Team's View - As far as relevance in terms of value addition was concerned, the team felt that the project led to community participation - community monitoring of health service delivery, capacity development of planning and monitoring committee members in understanding health services delivered by the PHCs, and utilising technology for community monitoring. The members also felt that community monitoring and participation was key to success of any development programme. In the case of Arogyashreni, it was very much relevant becausethe National Rural Health Mission (NRHM) desired for community participation in health service delivery and provided a structure called planning and monitoring committee. But, unfortunately, the department has given very little prominence to establishing these committees. Hence, it is necessary to strengthen those committees. Also, though NRHM defined the need and importance of community participation and monitoring, the process was not defined. Arogyashreni innovated processes for participation and cost effective response documenting mechanism that is further used to support decision makers for improving the public health system.

9.1.3.3 Effectiveness

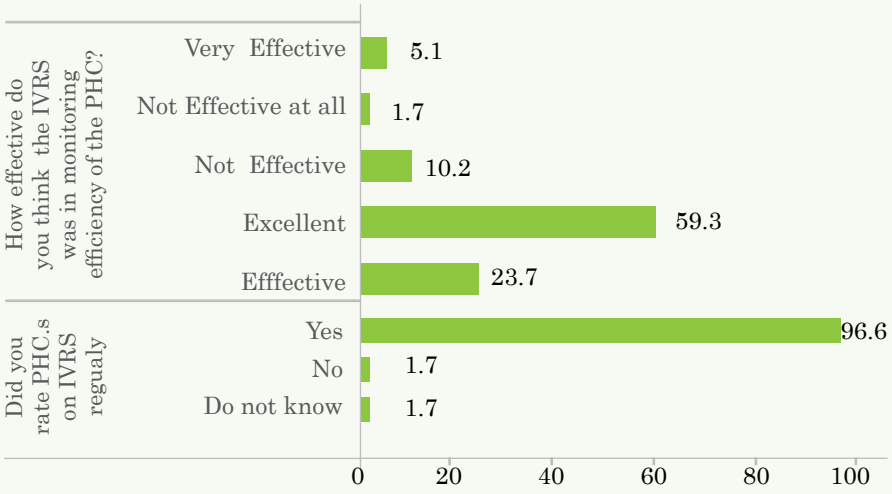
Effectiveness of Arogyashreni was assessed by analysing the usefulness of the IVRS technology, participation of the PMC and community members in articulating the shortcomings of their PHCs, experience of PMC in using the technology to monitor services, perception about monitoring facilities and services at PHCs using IVRS technology and experience of the PMC in strengthening of local governance.

a) PMC View - When asked if they rate PHCs at regular interval over phone, 96.6 per cent said yes *(Figure 50)*.

A good 88.1 per cent felt that IVRS was an excellent means to communicate issues related to PHCs *(Figure 50)*.

More than three-fourth of the respondents, i.e 81 per cent, said that IVRS helped in strengthening the health care system at PHC level. The responders were also asked if it helped in strengthening communication between PHC and local community members to which 88 per cent said it did and 59.3 per cent also felt that it was excellent in effectiveness while 10.2 per cent felt that it was not effective at all Eighty four per cent of them felt that the training given by Arogya Raksha Samiti (ARS) was effective.

Figure 50: Effectiveness of IVRS in monitoring PHC



"We came to know our role as members of PHC Planning and Monitoring Committee through this project and were also inspired to bring changes by ourselves in our PHC." - *Ninganna, Graam Panchayat member, Beerihundi PHC, Mysore Taluk*

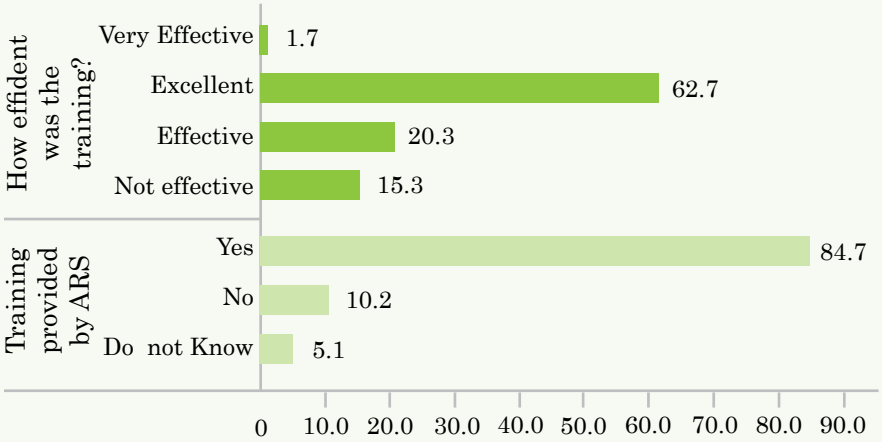
b) Government Officials - Some government officials felt that accountability, transparency and efficiency were already there, hence, Arogyashreni did not bring anything new to the system. However, others think that Arogyashreni did bring in a greater sense of accountability and, thus, was very effective.

c) GRAAM Team's View - The team felt that the project had achieved its target to a great extent, the approach that they followed provided a well-rounded concept of monitoring-intervening-monitoring cycle which played a significant role in community's understanding of the need for their continuous involvement in such interventions. It educated the planning and monitoring committee members about health services that were offered in the PHC. Though capacity building was not intended to be the project objective, in order to make them effective monitors, training programmes were imparted. Also, generation of ranking card brought a healthy comparison and competition amongst PMCs and PHCs. They identified that each stage of the project had involvement of all stakeholders. Further, the ranking cards and their public dissemination made sure that the project was held accountable not just to the community but also to the community of doctors and other PHC personnel. The planning and intervention aspects of the project were actually led/driven by the community itself and, hence, ensured accountability to the community members.

9.1.3.4 Efficiency

Efficiency of the project was assessed by exploring the cost effectiveness and time efficiency of IVRS to gather responses to the questionnaire about the status of PHCs. Project and operating cost – structure, staff, time, software, hardware, expertise, cost of call, etc. were — also examined.

Figure 51 : Efficiency of Arogyashreni



a) PMCs' View - To analyse the efficiency of the project, the respondents were asked if the trainings provided by ARS were efficient enough to understand the PHC services, 84.7 per cent agreed to the statement stating that training was helpful and 62.7 per cent felt that the training was excellent whereas 15.3 per cent felt that it was not effective at all *(see Figure 51)*.

b) Government Officials' View: The officials felt that the project lacked in spreading awareness amongst the community members, PHC workers and higher authorities at the ministry level. This led to a gap in information provided, which led to the project's inefficiency and it not delivering to its full potential.

c) GRAAM Team's View: The team felt that utilising technology for data collection and recording perspectives of the community had greatly reduced the cost of research. Open source software/platforms were used to set up the IVRS and data management system, thus making the mode cost effective. Also, ranking cards were generated using the collected data in a simple manner, thus less resources were to be invested to read and act on the report. Bulk SMS package was adopted to disseminate information. Model was conceptualised, keeping multiplier effect in mind. The Planning and Monitoring Committee (PMC) members being the representatives from the village panchayats system, and village health and sanitation committees took back the information and orientation they obtained by the project to respective institutions, thus contributing their participation and resources to strengthen public health system.

The team felt that the decision to involve all stakeholders in important phases of the project created a joint sense of intervention, involving

the government machinery as much as possible in the intervention (beginning with the inauguration of the IVRS at the DHO office premises, PMC meetings being held in the presence of the doctor at the PHC premises, dissemination of ranking cards to medical officers) created an environment of joint ownership and responsibility. Also, the decision of not creating new community structures enabled the project to be implemented without creating alternate power structures and involved issues of ownership, authority and credibility of the community participants.

> "We have seen a change in the way communities articulate the problems of their PHCs. From making ambiguous comments about their PHCs such as 'This PHC is of no use' or 'This is a bad PHC; nothing works here', the same community members now refer to specific issues, rather than making any sweeping statements. That is an important indicator of the success of the model." - *Ravi C.S., Community Coordinator - Arogyashreni*

9.1.4 Sustainability

Sustainability of the project was identified by looking at the challenges in project implementation, delivery, management and maintenance and possibility of replication of the project.

a) Project Cost
The overall cost of the project is as follow:

Table 20: Project Cost of Arogyashreni

GRAAM - Grassroots Research and Advocacy Movement Project: ArogyaShreni		
Particulars	Grand Total	Percent
Personnel Cost Operational Cost Program Cost Capital Cost	900000 ($ 13,740) 420000 ($ 6,412) 2102000 ($ 32,092) 0	26.30 12.27 61.43 0.00
TOTAL	3,422,000.00	100.00

** 1 dollar= Rs. 65.5(in 2015)*

Collaborators and Partners:
- Corporate sector as part of their CSR activity
- Technology Partner: Mahiti Infosystems, Bangalore

Arogyashreni provides an easily understandable monitoring questionnaire to the selected trained members of PMC of each PHC who use it to assess the quality of services being offered by their PHC. Their

responses to this monitoring survey are recorded digitally from their mobile phones to a central server, using a toll-free IVRS questionnaire in the local language. This monitoring exercise is conducted every quarter to align with the monthly meeting schedule of these committees. The digitized responses received from community members form a dynamic community monitoring database of health services provided by PHCs in the given area as well as community feedback on the performance of PHCs.

The database is used to generate quarterly ranking cards of PHC performance as well as other evidence-based decision support tools. The ranking cards are disseminated widely among communities, bureaucrats and elected representatives using SMS and printed ranking cards. On the one hand, this technology-aided monitoring model of PHCs helps in sustaining community interest in improving the services offered by their PHCs and, on the other hand, allows real-time disaggregated analysis of performance of PHCs in a given area. The technology is highly scalable since the design of the monitoring questionnaire, the IVRS set up and processes involved do not change with scale. Small investments on technology and monitoring processes can help bring large benefits in disaggregated understanding of the status of services provided by PHCs across different regions of a district/ geographical area.. The project's field facilitators worked intensively with PMC members in 34 out of 112 PHCs in rural Mysore, facilitating regular meetings among the members, dialogue with doctors, identifying problems and strategising on addressing them locally, or escalating the matter appropriately. These efforts have yielded positive changes on the ground as well as in attitudes and perspectives. With a little handholding, we found that communities are extremely innovative in identifying gaps to be filled, mobilising local resources and utilising their circle of influence to address issues of their health centres.

c) Critical Lessons and the Road Ahead

- Communities got not only orientation and training, but hand holding in the form of sustained continuous coordination and motivation by organisations working at the grassroots on health and community empowerment. Therefore, the government must commit to sustenance of community monitoring by drawing up programmes lasting a minimum of three years with committed and reliable partner organisations, and allocate budget towards the same.
- There is significant diversity among communities in the readiness and response to community monitoring, resulting in variation in the time and intensity of the capacity building initiatives. Models similar to Arogyashreni, with suitable modifications must be piloted in at least four other districts of the state in different regions that vary in the socio-economic background of the people as well as health indicators.
- Communities have demonstrated the ability to use technology and the use of technology has also given them comprehensive data base of issues in the PHCs that can be analysed and used for planning as well as monitoring the effectiveness of schemes launched by the government. The State must invest in the deployment and maintenance of technology for monitoring the services at the level of health centres based on data provided by communities.
- The success of community monitoring not only depends on the

activeness of the communities, but also on the responsiveness and supporting role of medical officers and other health staff. Adequate training must be provided to medical officers and other health staff in the community mobilisation processes envisaged in NRHM, so that they internalise the concepts and attitudinal aspects needed to work with communities.

d) Challenges

- During the study, it was noted that most of the PMC members wanted the project to be re-started after it ended in 2012-13.
- The main problem identified was lack of awareness about the project amongst community and PHC members. Also, in spite of the PMC members voicing their issues, no one took heed of the problems. Hence, there should be more co-ordination between the community, PMC members and decision making authorities.
- As far as project implementation, delivery, management and maintenance were concerned, an average 62 per cent of the stakeholders felt that the system was very good and it should start again.

The government officials felt that the project was not sustainable due to lack of awareness amongst the community members, however, they wanted the programme to continue as it benefited the community members.

The team felt that the complete project model was fit and necessary for scale up in building community-led monitoring structure in PHCs. If the replication is done in other sectors, the technology-based monitoring model (IVRS, SMS, Rank Cards, etc) can be adopted. They also felt that the project resulted in many small executions like that of the Rank Cards, which bought changes that improved the effectiveness of public health service delivery as mandated by the health policy of the state although lead to no major change in the policy. As to why the project could not be sustained, they acknowledged that the project phase out strategy was planned for a period of eight months of which two months would be in the end of third year and six would be in the fourth year. The funding for the project was stopped at the end of the fourth year by the donor and, hence, the remaining six months were cut short. Thus, six months of community engagement to continue the monitoring without the support of technology were lost and the activities could not be sustained. Also, while the project was ending, the term of the then village panchayat members also came to an end. The new committees should have been oriented about the responsibilities of the PMC, however, there was no systematic programme in the health department to capacitate and engage the members of the PMC. This is one of the major reasons for the ineffective sustainability. Absence of designated system and lack of manpower in the government to ensure people's participation in the health service delivery system was another major cause.

9.1.5 Conclusion

A SWOT analysis was done based on the understanding of the project:

Table 21: SWOT Analysis of Arogyashreni

Strengths	Weakness
• Regular health services at PHC • Problem identification at PHC level • Utilising technology for community monitoring • Accountability and transparency • Capacity building of PMC members in monitoring • Open source software	• Lack of awareness and motivation about the project amongst the community members
Opportunities	**Threats**
• Awareness amongst the community members about availability of basic health facilities • Collaborations with different private and government institutions for resource mobilisation • Community participation	• Lack of awareness among community members, PHC workers and higher authorities at ministerial level about the project • Lack of funds • Negative connotation about 'community monitoring' by the health personnel at the operation level

Arogyashreni was an ideal effort by GRAAM to highlight the problems of the Primary Health Centres (PHC) in the rural areas of Mysore, Karnataka. According to the community members, before the project was initiated, there was no basic health facility in the PHCs. Since, there was no accountability, the doctors were hardly attending the patients, medicines were always in short supply, electricity or water was hardly available either. Arogyashreni brought with it accountability, facilitation and implementation of policies for the betterment of the community. However, lack of awareness about the project amongst the masses and PHC members themselves, absence of government participation and lack of relevant manpower to address the issues highlighted by the community members are challenges faced by Arogyashreni. Since the project was meant to benefit the community members, it was very important for the GRAAM team to ensure that they, at least, are well aware of the project so that when they face a challenge they can directly contact their respective PMC members and get the issue noticed and subsequently rectified.

Had the loopholes been identified and worked upon in time, this project had the strength and potential to become a replicable project. Most of the community members and PMC members feel that the project should re-start and be replicated elsewhere too, but after resolving the above issues.

9.2 eMamta

9.2.1 Introduction

To reduce Infant Mortality rate (IMR) and Maternal Mortality Rate (MMR), tracking of pregnant mothers and children was recognised as a priority area. The Health and Family Welfare Department under the government of Gujarat introduced a mother-and-child-name-based tracking information management system called 'eMamta' in collaboration with NIC Gujarat. This online name-based tracking system ensures service delivery to every individual with special focus on mothers and children. The initiative was conceptualised and developed by the government of Gujarat in 2010, and the Government of India adopted it for replication across all states.

The programme was rolled out in four phases. First, Family Health Survey in rural, urban and slum areas was accomplished by health workers. The data gathered covered 8.5 million families, comprising 43 million beneficiaries. The survey covered 80 per cent of the total population of Gujarat. The data was physically verified through ASHA/FHW/MOs and cross-verified with BPL list, SBY list, voter list and ration card database. Second, a system generated Unique Family Health Care ID was created to capture the migration details and prevent loss of cases due to migration. Third, all pregnant women and children up to the age of 16 years were registered and provided unique mother/child ID. Fourth, the services provided to pregnant mothers viz. Antenatal Care (ANC), delivery, Post-Natal Care (PNC), immunization and nutrition etc. were captured, monitored and tracked.

Objectives:

- To measure the relevance of the project in terms of whether the eMamta mobile application helps health workers in tracking pregnant women (for ANC, delivery and PNC), children (for immunization and nutrition), adolescents and eligible couples (family planning services); whether it facilitates closer monitoring of check-ups of pregnant women and monitoring of immunisation of children and nutrition of the pregnant women and children; and whether it aids the health workers in facilitating family planning services for eligible couples.
- To study the effectiveness of the project in terms of provision of support to health workers in registering data for monitoring and tracking; experience of health workers in using the application to enter data; and whether it is meeting its objective of informed health care service delivery through monthly work plans.
- To study the efficiency of the project in terms of project and operating costs for structure, staff, time, software, hardware, expertise, etc.; whether the project mechanism has been appropriately resourced and is cost effective; what was the time taken and overall resource requirement to set up the project.
- To understand the sustainability component of the project in terms of resourcing for the project and its operating cost for structure, staff, training and expertise, hardware and other infrastructural expenditures; identifying challenges in the project implementation, delivery, management and maintenance; scalability and replicability of the project for a sustainable model; funding; and partnerships developed for replication or future sustainability.

9.2.2 Research Methodology

The district of Sabarkantha was chosen for this evaluation because eMamta was first launched here, and two other projects using tablets and Android apps – Swasthya Samvedna Sena, and Pub Care are being

tested here. A triangulated research methodology was used for this study, which included both primary and secondary research.

Reliability

Data reliability for each variable was checked by Cronbach's Alpha. In the present case study, it was applicable for front line workers. Following are the details: Relavance = .738, Efficiency = .178, Motivation = .444, Perception = .607, Training = .971, Effect = .550. However, the consistency when checked together, comes.826, making it acceptable.

9.2.3 Research Outcomes

9.2.3.1 Demographic Profile of Respondents

The demographic profile of the respondents was studied in terms of age, gender, educational qualification and the geographical distribution.

Table 22: Demographic Profile of Respondents

Details		Statistics (in per cent)		
		FHW/MPHW/ ASHAs/ANM/ Anganwadi Workers	Beneficiary	Government Officials
Sample Size		136 FHW – 44.1 ASHA – 22.8 MPHW – 20.6 Anganwadi Workers – 10.3 ANM – 2.2	38	16 Medical Officer – 87.5 Ayush – 12.5
Age (Years)	Under 20 (20 – 24) (25 – 29) (30 – 34) (35 – 39) (40 – 44) (45 – 49) (50 and above)	- 15.4 23.3 21.3 8.1 6.6 11.8 13.2	2.6 39.5 34.2 5.3 2.6 7.9 2.6 5.3	- 6.3 43.8 31.3 18.8 - - -
Gender	Male Female	22.1 77.9	7.9 92.1	87.5 12.5

Details		Statistics (in per cent)		
		FHW/MPHW/ ASHAs/ANM/ Anganwadi Workers	Beneficiary	Government Officials
Education Qualification	Illiterate Primary Middle Secondary Higher Secondary Graduation and above	1.5 2.9 15.4 50.0 27.9 1.5	23.7 13.2 5.3 42.1 0 15.8	Graduate – 81.3 Masters – 12.5 Technical – 6.3
Years of Experience	(0 – 4) (5 – 9) (10 – 14) (15 – 19) (20 – 24) (25 – 29) (30 – 34)	41.9 28.7 8.8 0.7 3.7 11.0 5.1	- - - - - -	56.3 37.5 6.3
State/ District/ Block	Gujarat/Sabarkantha/ 7 blocks			

a) Front Line Health Workers

Altogether 136 respondents in Front Line Health Worker category were contacted in the six of Sabarkantha district of Gujarat. 44.1 per cent of the respondents were Female Health Workers (FHW), 22.8 per cent were Asha, 20.6 per cent were Multipurpose Health Workers (MPHW), 10 per cent Anganwadi Workers, and 2.2 per cent ANM. Gender wise 22.1 per cent of the respondents were male, while 77.9 per cent of the respondents were female. The maximum number of the respondents was in the aged 25-29 and the minimum number of the respondents was aged 40-44 per cent *(Table 22)*

b) Women

Altogether, 38 per cent respondents were contacted in the same six blocks of Sabarkantha district. The majority of the respondents were aged of 20-24 years. More than 90 per cent of the respondents contacted were females. In terms of educational qualification, 23.7 per cent were illiterate, 13.2 per cent had finished primary education, 5.3 per cent had completed middle school, 42.1 per cent had achieved high school level of education, and 6 per cent were graduate or above *(Table 22).*

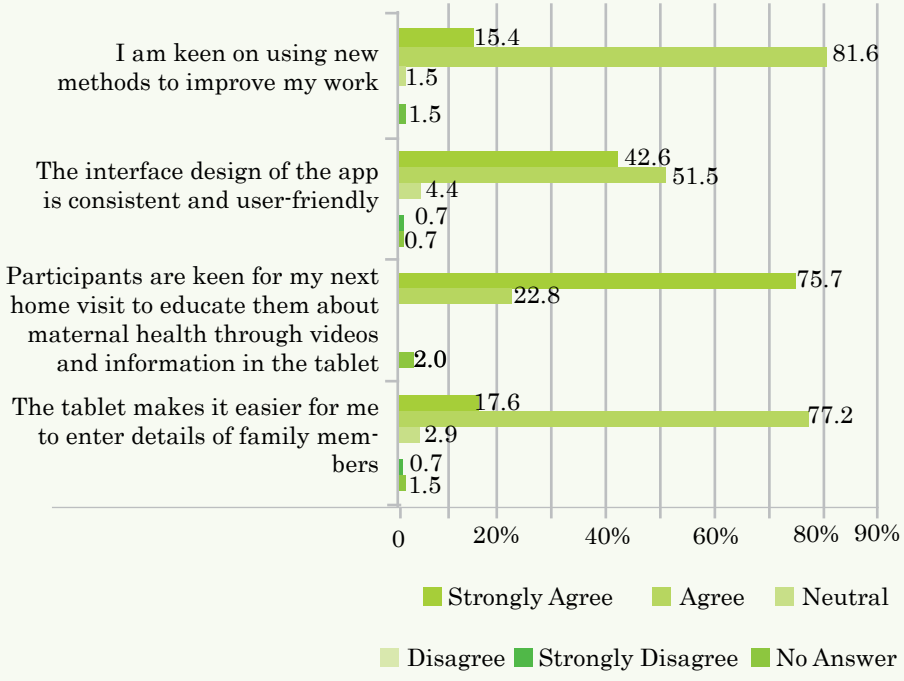
c) Government Officials

On an average, the number of villages covered by a single PHC is 25. About 43.8 per cent of these health professionals were aged 25-29. The maximum number of these representatives had a year experience; the highest number of years of experience was 10. In terms of gender, 87.5 per cent of the respondents were male. All the respondents were clear about the objective of the eMamta project that it is a tracking and monitoring tool to counter IMR and MMR *(Table 22)*.

9.2.3.2 Relevance

a) Front Line Workers' View- The relevance of eMamta among front line workers was examined by asking them how well they were able to use the tablet to spread health education using Swasthya Samvedna Sena app, and update family health survey data using Pub Care app to meet the goals of the eMamta Programme. About 77.6 per cent respondents agreed and 17.6 per cent respondents strongly agreed that the use of tablet had made entering family details easier. This was further strengthened by the 75.7 per cent of the respondents agreeing and 22.8 per cent of the respondents strongly agreeing that participants were looking forward to their next home visit to educate them about maternal health through videos and information on the tablet. Nearly 58 per cent respondents agreed and 42 per cent respondents strongly agreed that the participants were more helpful in the registration process and were eager to receive knowledge when the tablet was used *(Figure 52)*.

Figure 52: Relevance for Front Line Workers



b) Women's View - Relevance of eMamta from a beneficiary perspective tells that 52.6 respondents were availing benefits since last one year. This may be assigned to increased awareness brought by eMamta and/or gestation period. Of the total respondents, 73.7 per cent said that

it was free and good, 3 per cent agreed that institutional delivery has increased, and 10.5 per cent expressed that the tablets had enhanced learning abilities in the community because one could listen and see, even if one was not able to read and write. The per cent of respondent not facing problem in receiving eMamta services was 84.2, and 7.9 per cent respondent stated that the female health workers gave necessary information. Every individual in the sample recommended eMamta services for their family, relatives and village members.

c) Government Official's View - Relevance of eMamta with respect to government officials shows that 93.8 per cent respondents were able to capitalise monitoring and tracking of mother and child through eMamta software, which further streamlined incentives given through government schemes such as Janani Suraksha Yojana, free and zero expense treatment, free drugs and consumables, etc. The eMamta programme with the support of Swasthya Samvedna Sena app and Pub Care app helped fight illiteracy and social issues through educational videos, and 62.5 per cent of the officials agreed to it. However, 25 per cent of the officials stated that they lost track of migrating population.

9.2.3.3 Effectiveness

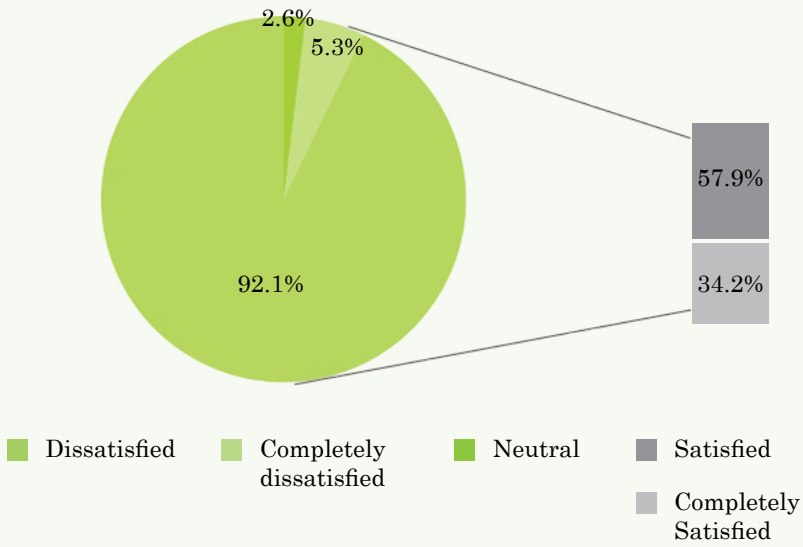
a) Front Line Workers View - About 82 per cent of the frontline workers were keen on using tablets and apps to improve their work. Using tablets made them feel professional and gave a sense of belongingness to do their work. More than half of them were keen to receive more formal education around health to prosper and make a better living. Almost every respondent affirmed that the use of tablets had enhanced learning about maternal health among people as family members pay more attention to audio visual contents in the tablet. Consecutively, 64.7 per cent of the front line worker opines that more women were following the advice regarding immunisation of newborns and other children, and maternal health related matters. About 50.7 per cent of the respondents agreed that the training provided by the Department of Health and Family Welfare had increased their knowledge, and 47.8 per cent agreed that all their doubts were clarified during the training session.

b) Women's View - More than half of the respondents (58 per cent) were satisfied with the services provided through eMamta, and 34 per cent were very satisfied. An overwhelming 92 per cent of respondents affirmed that they found positive health changes due to eMamta and tablet use, the change that they had been looking for. All the respondents said that they received relevant information and services in a timely manner. When asked what lessons have been learnt from the experience, 68.4 per cent of the respondents could not answer the question, 21.1 per cent said that people must take the benefit, 5.3 per cent respondents felt the need for spreading awareness and 2.6 per cent respondents emphasised on the need to get educated and to educate *(Figure 53)*.

c) Government's View - Only 31.3 per cent claimed generation of work plan as the greatest strength of eMamta, and 50 per cent agreed that tracking was the greatest strength of eMamta. For 56.3 per cent respondents, the slow processing of the system was the greatest weakness, sometimes after multiple attempts work plan was generated. The per cent of people accepting losing track of migrating people and duplication of entry as the greatest weaknesses of eMamta were 56.3

per cent. The respondents suggesting data entry using tablets by FHW/MPHW/ASHA/Anganwadi Workers/ANM to increase data accuracy were 87.5 per cent.

Figure 53: Perception of People about eMamta Services



9.2.3.4 Efficiency

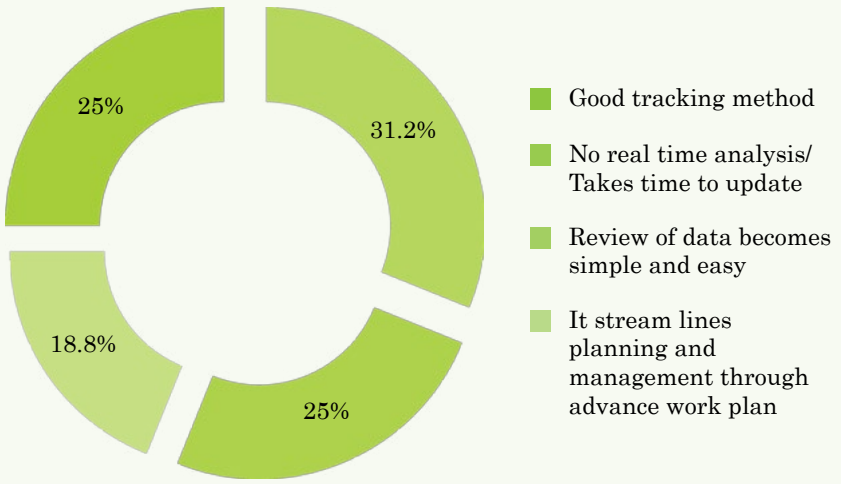
a) Frontline Workers' View - Assessment of efficiency among the front line workers were done by asking how eMamta helps them in performing their duty. After eMamta intervention, automatic work plans were generated, it was impossible to miss out anyone. Once a mother gets registered online, she receives Mamta Card and all due services for mother and child gets highlighted through it. This even included the details of ambulance that will carry her for delivery when the need arises. Advance work plan for two months allows FHW/MPHW/ASHA to keep reminding the beneficiary about their due services. These reminders were in addition to voice call reminders and text message reminders. About 52 per cent respondents agreed that the app was consistent and user friendly, and 43 per cent strongly agreed. Because of the app, FLWs do not have to carry volumes of material and lessons in the App allow them to discuss every topic in the subject. The app had relieved them of the tension of forgetting minute details of the topics.

b) Women's View - Among the respondents in the beneficiary category, 97.4 per cent declared that service delivery had improved after eMamta intervention. All the respondent in this category agreed FHWs were friendly and delivered services on time —video lessons, PPTs and question answer sessions had helped break the barrier of suffering in shame. This had been especially effective for adolescent girls and their menstrual hygiene. Besides, it had also helped bring awareness about sexual health, reproduction and family planning. As an ostensible evidence of positive change in service delivery, 55.3 per cent of the respondents pointed out online registration, tracking, free and timely vaccination. While 23.7 per cent could not answer the question, 13.2 per

cent mentioned reduced IMR and MMR in their locality.

c) Government Officials' View - To the officials of the Health and Family Welfare Department, the updating of data allows the seniors up in the hierarchy to monitor the subordinates. The data showed the details of ANCs and PNCs with unique IDs, which helped in tracing them through different means such as mobile number, husband's name, father's name and village's name, etc. At any time, the status of vaccination in any block or village could be found; the details of high risk mothers could be assessed. The work plan generated was two months in advance and showed the load of immunisation, vaccination, ANC and PNC care, including delivery *(Figure 54)*.

Figure 54: Efficiency of eMamta Software for Government Officials



9.2.3.5 Sustainability

The sustainability of the eMamta Programme in terms of FHW/MPHW/ ASHAs/ANM/Anganwadi Workers can be assessed through the money invested in their salary, training, medicines, food supplements and device costs. All these staff members are paid through government, either as fixed salary or incentive based. Though some apprehension has been expressed by the Medical Officers (MOs) regarding ASHAs having tablets, all the ASHAs encountered in the field expressed their desire to have tablets and undergo training.

a) Project Cost

The funding for the initiative was done by the government of Gujarat and under National Rural Health Mission (NRHM) programme. The technology support was provided through National Informatics Centre (NIC), Gujarat. The human resources involved were as below: Female Health Worker and ASHA (Accredited Social Health Activist) workers, State Medical Officer, Chief District Health Officer, Additional District Health Officer, Block Health Officer, Reproductive and Child Health Officer and Data entry operator at Primary Health centers.

b) Technological Factors

eMamta is a management tool for the health care system to provide quality MCH services, track drop outs and ensure complete service delivery and, thereby, reduce IMR/MMR. The app was conceptualised by the State Rural Health Mission of the Health and Family Welfare Department of Gujarat in January 2010, following which funding support was sought under NRHM and the programme was developed through NIC Gujarat. The application is web based and is accessed by a unique ID on broadband, Wi-Fi, data card anywhere in place and time on

1. http://eMamta.guj.nic.in/.
2. http://mcr.guj.nic.in demo version is also prepared for the purpose of training on the web address: http://eMamtademo. guj.nic.in/

The application had minimal requirements for roll out in the public rural health set up. The physical pre requisites, a computer and an internet connection at the Primary Health Centre (PHC), already existed at the set up. Manpower requirements were of a data entry operator who is a regular employee at the PHC. Other operational activities like trainings, fields' surveys were carried out by regular staff.

c) Stakeholders and their roles

- State Rural Health Mission - Conceptualisation, implementation and roll-out across the nation
- Commissionerate of Health - Conceptualisation, implementation and roll-out across the nation
- National Informatics Centre (NIC) - Developed the eMamta software application and provided training to the department officers and field functionaries. NIC played an important role in providing continuous support and maintenance of the application.

d) Training

Regular regional, district and block-level trainings are conducted for proper penetration of information. Two rounds of regional trainings have been completed for CDHO/CDMO & BHO. Trainings through SATCOM for ANM/FHW are also held.

e) Monitoring

The state office regularly monitors the data entry at each facility. Special reports to monitor timely registration of pregnant woman and infants have been developed to store information like daily statistics report and pregnant woman registration report. Regular communication is also maintained with district officials for speeding up data entry.

f) Sustainability of the initiative amounts from:

- Programme developed by the Gujarat state government and NIC, Gujarat, and supported for life. The source code of the IT application is freely transferable to other states, and replication is already underway.
- Dedicated funding is assured through NRHM and state funds, at the same time, the recurring expenses are not significant and, hence, the initiative is light on use of funds.
- The initiative has been well integrated and institutionalised within the state health system
- Minimal infrastructure and familiar and easy-to-use software for grassroots workers

- Involvement of regular staff from state, district, block and PHC
- The initiative has changed the mindset of the rural and semi urban population about institutional child births. This social change has sustained since the launch of eMamta and almost 95 per cent births are happening at hospitals and not at homes. This, in turn, has given boost to the eMamta project
- One-time data entry of the basic details (family health survey) and then just updating it through the regular field level work.
- ASHA incentives, incentives through AADHAR-enabled Direct Benefit Transfer for Janani SurakshaYojana (JSY), etc. are implemented through the eMamta platform
- The achievements of the programme have also been recognised by other states. Several measures have been adopted to replicate the model and intensify its impact.
- The Government of India has recognised the initiative of eMamta and replicated it at the national level with some selective indicators from eMamta as MCTS, the Mother and Child Tracking System.
- As a step towards overall improvement in the public health of the entire country, the government of Gujarat has trained senior state level health and NIC officers of 26 States and all Union Territories of India.

9.2.4 Conclusion

The preceding discussions on eMamta make it clear that the project was initiated with the objective of tracking mother and child to reduce IMR and MMR. In 2008, before eMamta Programme was launched, the IMR in Gujarat was 50. In 2013, within three years of the launch of eMamta Programme, the IMR was reduced to 36. Similarly, MMR was 172 in 2001- 03 and 112 in the year 2013. The programme effectively mapped more than 80 per cent of the population of Gujarat and gained the confidence of the common people. The work plans were efficiently generated and ensured that no one was left out. Inspired by the outcome of e-eMamta, the Government of India replicated eMamta all across the nation. SWOT analysis provides better understanding of project.

Table 23: SWOT Analysis of eMamta

Strengths	Weaknesses
• A management tool to provide comprehensive MCH services to the target population and ensuring complete & timely service delivery via the unique feature of name-based tracking. • Incorporation of work plans for grassroots level functionaries for clear understanding of targeted beneficiaries. • Search on several parameters like name, village, ration card number, mobile number, health ID, family Id, RSBY card number, BPL card number, UID.	• Data is entered manually by FHW and MPHW, and then submitted at PHCs. The data is entered and uploaded at the PHCs. • All types of work plans are not generated throughout the day, and in the allocated slot require multiple attempts. • Duplication of registration of mothers and child. • Tracking of migrating population is difficult.

Strengths	Weaknesses
• Records and e-details of various incentives paid to all cadres of health workers; individual records for the benefits of JSY, BSY and CY schemes. • Database of all service providers and communication platforms. Dashboard to give a brief overview of data entry, deliveries, immunisation services, maternal and infant deaths. Detail analysis of data.	• A huge amount of paperwork at all levels of service providers requires repeated entry of data under different programmes.
Opportunities	**Threats**
• Adequate ICT training of FLW/MPHW/ ASHA/Anganwadis can increase accuracy of data • Providing suitable ICT device and software to FLW/MPHW/ASHA/ Anganwadis for data collection and spreading awareness through apps like Pub Care and Swasthya Samvedna Sena. • To develop a continuous interoperability system for eMamta. • To keep the motivation of field workers by compensating them adequately.	• Eavesdropping

The views of front line workers, women and government officials establish that eMamta is appropriate and suitable for ANC, PNC, Neo Natal, nutrition and adolescents. The effectiveness of the programme can be directly inferred with the satisfaction level of the mothers, 58 per cent of whom were very satisfied and 34 per cent were satisfied. The efficiency of eMamta and implementation of work plans have been doubled with the introduction of tablets, Swasthya Samvedna Sena app and Pub Care app. eMamta is the initiative of the government of Gujrat and funding is sought through NRHM and other state and district-level funds. Health is the top priority of the governemnt of Gujrat and the Government of India, and the Government of India had even replicated eMamta across India. Hence, the robustness of eMamta makes it highly sustainable. Therefore, we conclude that eMamta is a relevant, effective, efficient and sustainable programme in the social, political, economic and institutional setting in India. However, the project may not have similar outcome in different settings. The issues faced with the use of tablets are due to its testing phase and are likely to be resolved in the near future.

In comparison to the international estimates of ICT use in the health sector, the eMamta programme has achieved Managed Level of the Australian National Health Interoperability Maturity Model.

9.3 Hamari Ladli

9.3.1 Introduction

'Save the Baby Girl' is using ICT dependent Active Tracker to ensure compliance under PCPNDT Act 1994 (Pre-Conception and Pre-Natal Diagnostic Techniques Act) & MTP Act 1971 (Medical Termination of Pregnancy Act). This device helps to track and monitor activities during different stages of pregnancy (i.e. abortion or delivery).

The Government of India has enacted these laws to stop the illegal practice of sex selection and termination of pregnancy only because of sexual determination of the foetus. The Act defines the guidelines from registration of ultrasound centre, record keeping of every obstetric ultrasound performed, containing details of the pregnant woman, details of the referrals, result of the ultrasound, details of the medical professional, procedures to submit the records to the authorities and so on. However, non-implementation of the Act has been the biggest failing of the campaign against sex selection and because of which the project came in to addresses the key issue of generating the primary evidence of the every ultrasound performed in the form of online report and actual video of the ultrasound.

It also resolves under-reporting and false reporting and provides easy tools to government authorities to remotely track the suspect by saving time, manual efforts with facility of quick decision making and timely action to save the girl child.

Functioning of Active Tracker

Active Tracker+ is a device that is connected securely to the sonography machine and remotely connected through a GPRS/SMS dongle. Active Tracker is a method and system invented using information technology solution based on the guidelines of the PCPNDT and MTP Act. It addresses the key issue of generating the primary evidence of the every ultrasound performed in the form of online report and actual video of the ultrasound. It also provides the facility to track and monitor pregnancy from ultrasound till abortion or delivery. The system has resolved the issue of under reporting and false reporting and provided an easy tool to government authorities to remotely track the suspect by saving time, manual efforts with facility of quick decision-making and timely action, thus saving the girl child. It also provided a stress-free environment to the ethical medical professional and a deterrent to unethical.

Active Tracker+ is the latest version after Silent Observer and Active Tracker. This drive was initiated in 2009 by Mr. Laxmikant Deshmukh, IAS, District Magistrate and Collector of Kolhapur, in association with Magnum Opus. The project is being run in the states of Madhya Pradesh, Rajasthan, Gujarat, Jammu & Kashmir, Haryana, Maharashtra, and Punjab under different names such as Hamari Ladli, Hamari Beti, Meri Gudia, Save the Baby Girl. The Madhya Pradesh, Rajasthan and Bombay courts have issued the order to implement the Active Tracker+ across the state.

The higher authority people at the district level monitor the data and find out the suspected cases (for example pregnant ladies who want to go for abortion and already have two or three daughters and the risk at pregnancy is written on the F-form (details of pregnant women filled by sonography centres) which is the mandatory record that captures detailed information like the name, address, previous children with

their sex, previous obstetric history related to the pregnant woman undergoing ultrasound scan) and send the health workers to the pregnant ladies to confirm the status. If cases of abortion are confirmed, then the doctors and people involved are put behind bar.

Implementation:
In Indore district (in Madhya Pradesh), there are 237 registered ultrasound centres and 320 ultrasound machines under the project where Active Tracker is installed.

However, the project is implemented in more than 60 districts across India with over 5,000 centres made online and 2,000 Active Trackers installed. The software has the following modules: (i) Ultrasound centres; (ii) MTP centres; (iii) Delivery centres; (iv) Authority module; (v) Health worker module; (vi) Module on online submission of reports; (vii) Data analysis module; (viii) Suspect's identification module; (ix) MIS and reports; (x) Notices and information; (xii) Complaint management; (xiii) Administration module. Besides, technology used includes: (i) Microsoft.NET, MS SQL Server, Designing Tools; (ii) Two-way SMS broadcasting; (iii) Auto email broadcasting

Objectives
The objectives of the study can be broken into four specific verticals: Relevance, Effectiveness, Efficiency and Sustainability. The specific study parameters across the identified verticals were:

- To study the relevance of the project by measuring the problem of under-reporting and false reporting of F-Forms; reducing unnecessary harassment of medical professionals; identifying suspected cases of pre-natal sex-determination and increasing the number of F-Forms reported to the authorities; and increasing the accountability of testing centres.
- To understand the effectiveness of the project in increasing/decreasing the number of F-Forms reported after the implementation of the device; increasing/reducing the number of complaints filed under the PCPNDT Act, 1994 & MTP Act, 1971; increasing the number of F-Forms that are reported online; and whether authorities find the technology appropriate for tracking suspected cases and taking appropriate action on time.
- To measure the efficiency of the project in time taken to install a device on an ultra-sonography (USG) machine, costs associated with staff, software, hardware and capital costs; tracking suspect women without compromising the privacy of other patients and the frequency of monitoring and evaluation.
- To understand the sustainability of the project with specific regards to issues in maintenance, implementation; resourcing for project costs; supporting policy and regulatory frameworks; and identifying the potential for replication and scale-up.

9.3.2 Research Methodology

The District of Indore was chosen as the study location which has 237 centers registered under the PCPNDT Act and 320 USG machines fitted with Active Tracker+. Indore was selected as it's a commercial capital of Madhya Pradesh and also because the state government has ordered to replicate the project throughout the state.

The three major stakeholders of the project were identified as: Government Authorities (from the PCPNDT Cell of the Collectors' Office

at the district level), Medical Professionals (who use the USG machine to conduct tests), and Members of the Community. Due to the sensitive nature of the subject matter, the analysis could not incorporate a sample of pregnant women and were, hence, excluded from the study. The data collected under the study aims to cover 36 (15 per cent) testing centres registered under the PCPNDT Act in Indore. As there are only 16 testing centres located in the blocks of Indore, all of them were included in the study. The balance 20 centres were chosen randomly from across the city of Indore.

9.3.3 Research Outcomes

9.3.3.1 Demographic Profile of Respondents

The results showed that 28.4 per cent of the medical professionals, which included doctors and attendants, were aged above 50. In fact, 55 per cent of medical professionals were aged above of 40. This indicated an older group that could be tough to sway to newer technologies. A good 93 per cent of medical respondents held undergraduate degrees or above. All the PNDT Cell respondents were men who were aged above 50 and held at least a postgraduate degree *(Table 24)*.

Table 24: Demographic Details of Respondents

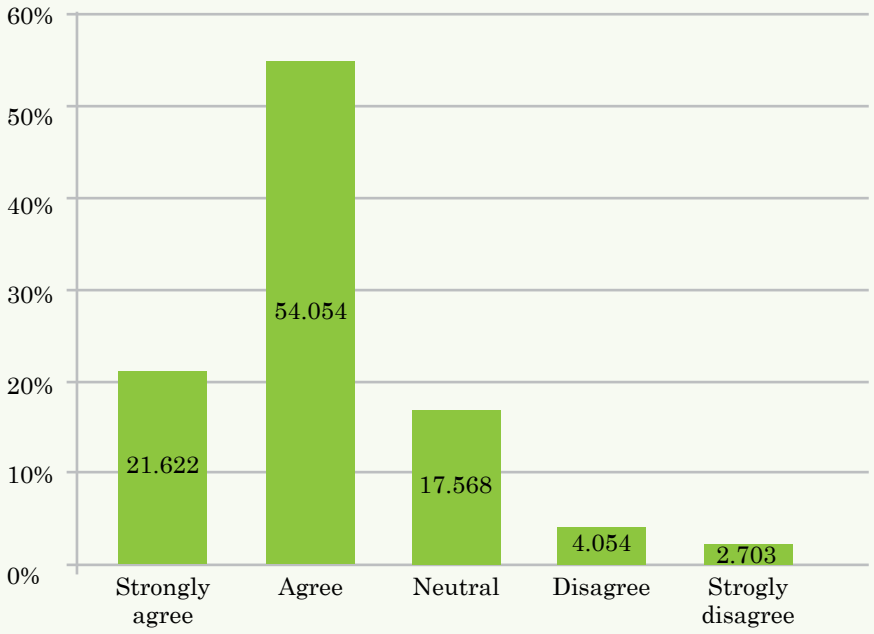
Parameter		Medical Professionals	Community	PNDT Cell (Collectors Office)
Gender	Female	43.2	65.5	-
	Male	56.8	34.5	100
Age distribution	<20	1.4	8.6	-
	20-24	5.4	41.7	-
	25-29	5.4	2.9	-
	30-34	20.3	23.0	-
	35-39	12.2	9.4	-
	40-44	17.6	7.2	-
	45-49	9.5	5.0	-
	>50	28.4	2.2	100
Educational level	High School	6.8	-	100
	Graduation	21.6	-	-
	Post-Graduation	71.6	-	-
	Others	-	-	100
Total		75	139	4

9.3.3.2 Relevance

All the medical professionals interviewed stated that the ultrasonography machines at their centres had the tracker installed. This statement was consistent with the claim by the PNDT Cell that all testing centres and, consequently, all the machines in these centres were registered with the Cell and had the tracker installed. District officials strongly believe that the installation of the tracker has dramatically increased the number of F-Forms that are reported, citing

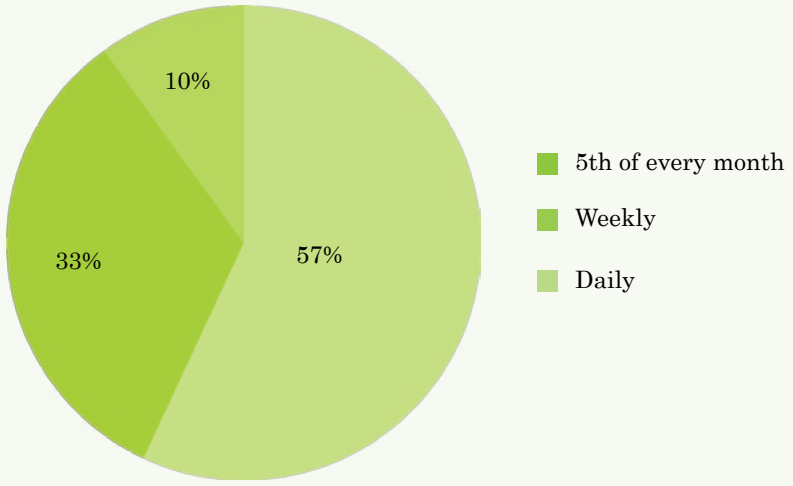
an increase of around 100 per cent. However, only 75 per cent of medical professionals echo this belief, with 7 per cent disagreeing strongly, citing no significant increase *(Figure 55)*.

Figure 55: Increase in F-Forms (Medical Professionals)



The entire 'Hamari Ladli' package consists of Active Tracker and online F-Form reporting software. The increase in F-Forms cited by the PNDT Cell is also attributed to the ability of medical professionals to file F-Form reports online through this software. About 57 per cent of medical professionals interviewed claim to use this software to file reports on F-Forms with the PNDT Cell daily *(Figure 56)*.

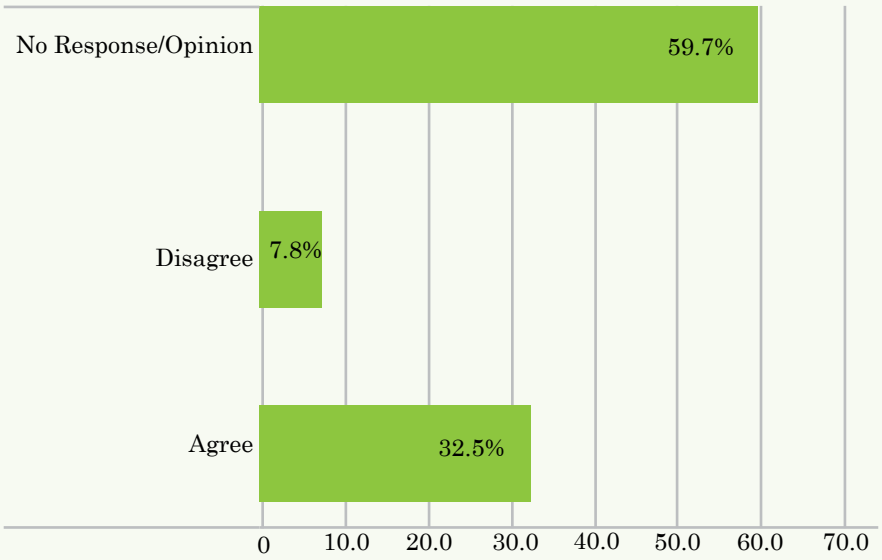
Figure 56: Reporting Frequency of F-Forms



One of the key intentions of deploying Active Tracker was to aid the PNDT Cell in identifying and tracking suspected cases of sex determination and female foeticide to gather statistical data. In the responses garnered from members of the PNDT Cell, it is shown using hardcopy of F-Forms, the time taken to identify suspected cases was far too long. This duration did not allow the PNDT Cell to take action in time and allowing suspected doctors and women to go without prosecution. Registration of women in USG centres requires the mandatory presentation of a photo ID. According to the PNDT Cell, the induction of Active Tracker has added a crucial element that has bridged this major barrier.

However, this opinion is not reflected in the opinions of medical professionals, with only 32 per cent agreeing with the statement. Roughly, 60 per cent of medical professionals had no opinion or did not give any response *(Figure 57)*.

Figure 57: Relevance of Active Tracker in identifying suspect cases



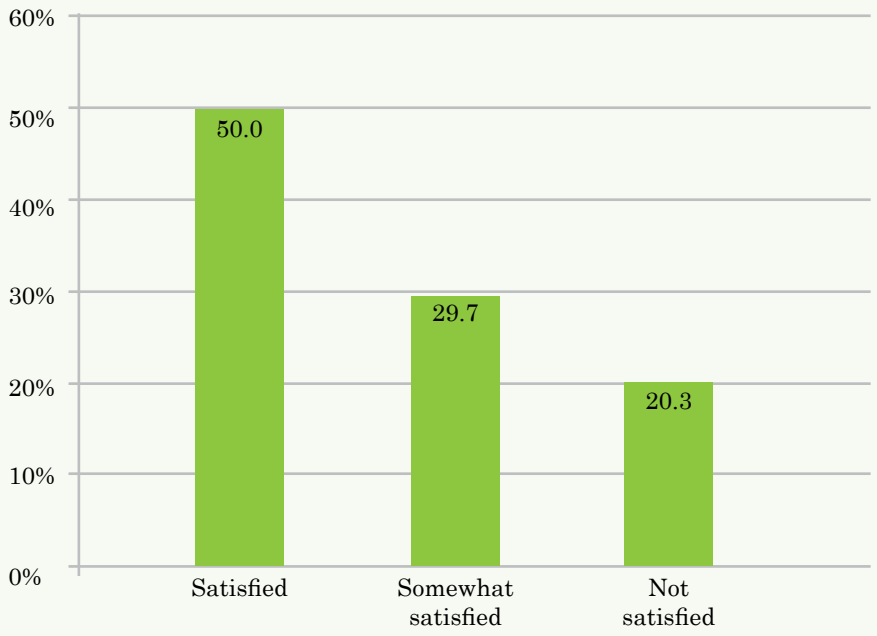
The relevance of the project was further highlighted when it emerged that 95 per cent of community respondents were aware that sex--determination occurs in India and 99.3 per cent of community respondents stated that they knew of the methods of sex- determination and female foeticide. Interestingly, 98 per cent of community respondents did not know about Active Tracker being deployed at all the USG testing centres.

One of the key areas of conflict between the opinions of the PNDT Cell and medical professionals was on the topic of harassment of said medical professionals. Representatives of the district administration were completely satisfied with the reduction in the unnecessary harassment of medical professionals. Medical professionals (about 80 per cent), while mostly agreeing with the statement regarding the decrease in harassment, also mentioned various scenarios of undue

harassment by the PNDT cell (Figure 58). Interestingly, one doctor also mentioned added protection from the harassment of journalists and TV stations, which used to extort doctors under threat of running stories on suspected sex determination.

The cases of harassment on part of the PNDT Cell were mostly an outcome of accidental breakage of the power management system of Active Tracker. This model included a soldered extension from the power cable of the USG machine to power the tracker. The relatively crude soldered joint was prone to breakage by accidental movement or handling of the joint. With no power, Active Tracker cannot record any ultrasound sessions, which is against the advisory put out by the PNDT Cell and leads to multiple compliance checks.

Figure 58: Success in reducing the harassment of medical professionals



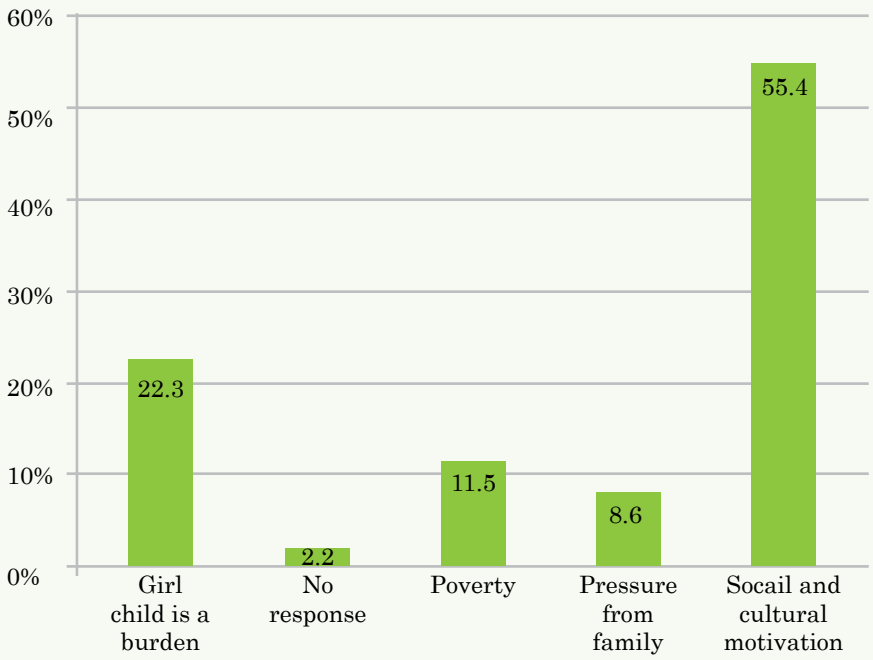
Discussions with members of the PNDT Cell revealed that the issue of wire breakage, apart from others have been recognised by the manufacturer of Active Tracker and have been addressed with the development of Active Tracker+. This model is the third iteration in the development cycle; the first being Silent Observer and the second; Active Tracker.

Additionally, a member of the Monitoring Team of the PNDT Cell mentioned that the Hamari Ladli project is in line with the requirements of the PCPNDT Act 1994, and the sale of the tracker should be made mandatory when purchasing a USG machine by law as has been done in Rajasthan.

With regards to the tracking of women, the PNDT Cell revealed that any woman with two living girls is automatically placed on a watch list and their sonography records on Active Tracker are closely monitored to guard against sex-determination.

Only 3 per cent of community respondents explicitly stated that they would prefer a male child. About 55 per cent of total respondents cited social and cultural motivations as the key reason for female foeticide and 22 per cent stating the girl child is a burden *(Figure 59)*.

Figure 59: Male child preference (community level)



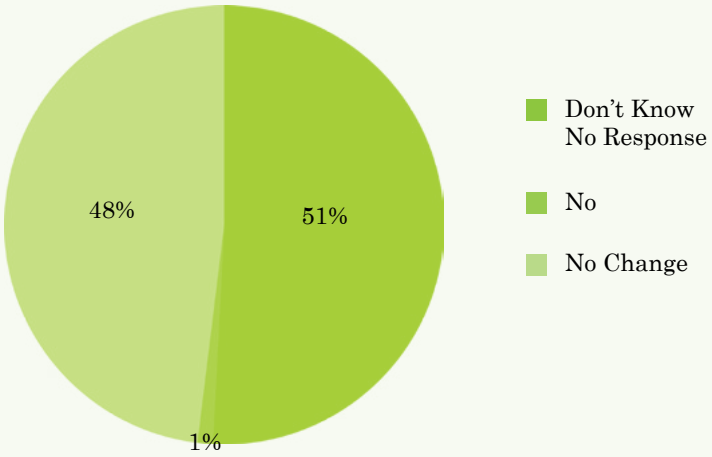
9.3.3.3 Effectiveness

The drive of the district administration has led to 100 per cent coverage of centres and USG machines with Active Tracker. Secondary population data of areas where Active Tracker was deployed before Indore shows an increase in sex ratio based on the decrease in the incidence of female foeticide. Gwalior showed an increase from 840 girls per 1,000 boys to 890 girls. The sex ratio in Kohlapur increased from 839 to 903 girls per 1,000 boys after the implementation of the project.

When queried on the impact of the project on increase/decrease the number of MTP cases, none of the medical professionals agreed that the roll-out of the project has had an impact on the number of MTP cases. In fact, 48 per cent of respondents outright disagreed with the statement and 1 per cent cited no change *(Figure 60)*.

According to the district administration, there has been an increase in the number of complaints filed under the PCPNDT Act and MTP Act. However, they also state that any such increase is a function of a much more complex set of factors than just the roll-out of Active Tracker, and it cannot be reliably isolated as a major factor.

Figure 60: Medical professionals' opinion on change in MTP cases



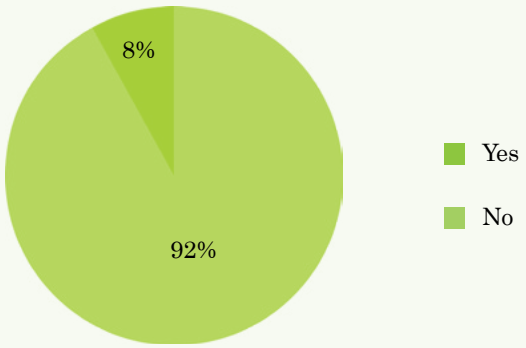
9.3.3.4 Efficiency

According to the PNDT Cell, the time taken to install Active Tracker on a USG machine is around 30 minutes. However, with the roll-out of Active Tracker+, this is bound to decrease as power box has been removed and a socket is provided in the tracker.

When the project was rolled out in Indore district in 2012, there were 230 centres registered with the PNDT Cell. The cost of installing Active Tracker at these centres was covered by the Collectors' Office. From 2012 till the period of study, there was an increase of seven centres. The cost of installing the tracker at these seven locations was borne by the proprietor of the centre. About 90 per cent of the respondents worked in locations that were covered in the first phase of the roll-out and the associated costs of set-up were borne by the district administration. About 5 per cent of the respondents did not know anything regarding the costs of set-up.

Additionally, roughly 92 per cent of medical professionals had no idea about the operating costs of the tracker and who bore the costs. Only 8 per cent were aware that these costs are borne by the proprietor of the centre *(Figure 61)*.

Figure 61: Knowledge regarding operating costs



The Hamari Ladli project has an online reporting component, which is done through optional computer software. The PNDT Cell reports a decrease in the amount of on-site compliance verification that they need to engage in, only choosing suspect locations to focus their attention on. This is a function of the increase in number of doctors who choose to submit their F-Forms through the online portal. At the moment, apart from the requirements of the PCPNDT Act 1994, there are no special indicators under which monitoring takes place. This opinion is echoed by the PNDT Cell as well as doctors.

The data that Active Tracker captures is in the form of 10-minute snippets of a USG test. As a USG test can go for longer, the device creates multiple 10-minute clips. The data is encrypted using an MD5 algorithm within the device on a one-terabyte hard drive. A PNDT Cell-authorised engineer visits each centre once a month along with a non-technical representative to retrieve the data. Retrieval is done using a One-Time-Password (OTP) to gain access to the data. The OPT is obtained using the on-board SIM card and mobile connectivity.

9.3.3.5 Sustainability

As stated in the previous section, very few medical professionals knew about the initial and operating costs of Active Tracker. Our conversation with members of the PNDT Cell yielded a detailed breakdown of the costs of the project for an individual machine.

Table 25: Cost breakup of Hamari Ladli project per centre

Project Head	Costs	Remarks
Active Tracker	INR 30,000 + tax ($ 458+ tax)	One time cost
Maintenance	INR 5,500 + tax ($84 + tax)	This includes advance rental for the SIM card for one year, 4 onsite visits and comprehensive warranty for every part
Software	INR 3500 per year ($ 534)	This is an optional component
Camera for F-Form Scanning	INR 700 + tax ($ 11+ tax)	This is an optional component

** 1 dollar= Rs. 65.5(in 2015)*

Magnum Opus, the manufacturer of Active Tracker, aims to keep the cost of each unit of the tracker at the same point, increasing the acceptability of the tracker amongst the medical fraternity.

Both, the PNDT Cell and medical professionals, identify certain challenges in Active Tracker and the project as a whole.

Challenges according to the PNDT Cell: There has been some pushback from the doctors in the area. While the success of the project is determined on the successes with early adopters; some doctors, with inaccurate and incomplete information, have influenced the local chapter of the Indian Radiology Association to take up legal proceedings

in court. This is under adjudication. There is a sense of Active Tracker being another monitoring system that interferes with the doctors' workflow. What is needed is acceptance by influential doctors who can pave the way for future success.

> "Observations cannot be made by the machine alone. There should be a qualitative element. Selling the tracker with sonography machines should be made mandatory through law – any sonography machine entering the country should come with the tracker attached."- Mukesh Kumar Sinha, Executive Director – Madhya Pradesh Voluntary Health Association, Former Member – District Advisory Committee & Member - *Monitoring Team, PC&PNDT Cell*

As the device is manufactured by a single organisation, Magnum Opus, there have been some accusations of monopolies. However, the manufacturer welcomes competition in the sector. Further, members of the PNDT Cell argue that the project should be made mandatory either through legislation or through associated laws. This requires government commitment at the highest level and the PNDT Cell hopes that the Ministry of Woman and Child Development adopt the Active Tracker across India.

Magnum Opus, the manufacture, claims that they have filed the patent in year 2010 and have already got the Trademark registered, which is issued by the Government of India only, and it is an intellectual property similar to many of the lifesaving drugs having patents.

Magnum Opus has already accepted and agreed to the guidelines issued by the state, controlling the increase in the price of Active Tracker by a maximum of 5 per cent every year.

Challenges according to medical professionals: Almost all the doctors cited the easily broken power cable as the most pressing issue in the current iteration of the device; that accidental breaks can lead to compliance raids by the PNDT Cell and sealing of the center. This wire break is not immediately apparent and is difficult to detect. Some doctors state that due to the meticulous requirements needed for registration of patients, emergency ultrasounds are held up that lead to conflicts between legal requirements and the doctor's ethical duty to aid a patient. Difficulties in repairing the device have been cited as another major issue.

Some doctors question the very need of the tracker, stating that while the technology has a noble purpose, it does not seem to have any effect on curbing the issue of sex-determination due to the actions of a "few nefarious doctors". The success of Active Tracker in various districts of India has prompted the Rajasthan High Court and Chhattisgarh High Court to pass judgments making the intervention legal and provided instructions to roll-out the project across their respective states.

"To truly achieve success, we need to prepare the doctors physically and mentally to follow the Act."- *Satish Joshi, Nodal Officer – PC&PNDT Cell, District Collectors Office*

9.3.4 Conclusion

The intention of the Hamari Ladli intervention was to combat the decreasing sex ratio in the selected districts and to reduce the incidence of female foeticide. The SWOT analysis of the project is as follows:

Table 26: SWOT Analysis of Hamari Ladli

Strengths	Weaknesses
• Integrated technology solution with mobile connectivity • District policy is conducive towards roll-out of the project • Adds always-on, ubiquitous monitoring and data collection • Iterative development based on learning from errors from previous models	• District level intervention does not discourage individuals from travelling to other districts to conduct sex-determination and/or abortion • Single supplier keeps costs higher as compared to a saturated market • Issues in electrical supply of device leading to frequent breakage of connection
Opportunities	**Threats**
• Legal judgments in favour of the intervention • Expansion of project across states led by state government	• Additional legal threats • Accusations of monopolistic behaviour on part of the supplier

The study demonstrated the impact that concerted efforts at various levels have on the penetration of an intervention and its consequent success. The district administration, led by the Collector, has pushed for the implementation of Active Tracker by legitimising its installation by placing it under the aegis of the PNDT Cell. Through the success of the device in Indore and other locations, the State High Court is also attempting to legitimise the device towards further implementation across the state. While the local chapter of the IRIA has demonstrated considerable pushback against the project, we found that a large majority of medical professionals believed in the positive impact.

It must be mentioned that the minority that did not believe in the project were also very vocal about it. While the overwhelming majority of community members that were interviewed in this study did not claim to prefer a male child, our study period coincided with an increase in television and radio coverage of the issue of female foeticide. This may have introduced a bias in the responses of community members.

The PNDT Cell is actively pursuing community sensitisation across multiple channels. However, it is our belief that the sensitisation methodology should be modified keeping contemporary behavioural change models and theories in cognizance to increase the effectiveness.

Another aim of the project was to decrease the incidence of female foeticide in a cost-effective, easy to use and readily replicable manner. The cost of the device and its associated extensions are not prohibitively excessive and the manufacturers promise to keep the price of the device static for the medium term, which means the cost effectiveness will increase over time. The ease in operations of the project helps medical professionals in filing F-Forms and the district administration in monitoring and ensuring compliance of doctors.

9.4 Mobile Kunji

9.4.1 Introduction

The community health worker is crucial human resource to promote maternal health and reduce maternal and infant mortality in a state like Bihar in India. The basic problems faced by the workers across the state in their functions until now included lack of proper tools through which they could convince the rural families on health prevention and treatment issues. In order to help front line health workers function better in the state in health care services delivery, they are now provided with an innovative job aid called 'Mobile Kunji'.

Mobile Kunji is an audio visual job aid for community health workers (ASHAs and AWWs) to use with families that provide information about nine life-saving maternal and child health behaviours. The project considered first-of-its kind initiative in the country, and is being taken up in eight districts of Bihar, including Patna, under a partnership forged between the Bihar government, Bill and Melinda Gates Foundation (BMGF) and BBC Media Action (India). With the aid of Mobile Kunji, workers with adequate training use mobile tools to effectively disperse health messages and increases the demand of health services provided by service delivery partners under the newly launched Ananya programme since 2012.

'Mobile Kunji' is a pack of 40 well illustrated cards on a ring that communicate important health messages to rural families with the help of graffiti and text. Each card has a unique toll-free short code that when dialled by the health worker from his/her mobile phone, takes the listener (or the audience) to a free audio recording that further elaborates the health message that the particular card carries. Each card has its own unique code. The audio message is delivered by a fictional doctor character, Dr. Anita. The 'Kunji' can be carried all the times and doesn't require reams of paper or very improved technology, but just a normal mobile handset that has a speaker. This is seen as a low-end technology for high-end gains. The major challenge in the project has been to train about two lakh health workers with the least possible cost involved. For the purpose, a 'Mobile Academy' was designed. In 2013, the projects were implemented in all 38 districts of the state.

Making content sticky: Meet Dr. Anita

In addition to localising content to align it with factors influencing behaviour change, well-designed mobile content is often informed by local tastes as well, so that people can identify with the content. To use a term that's popular in the information technology sector, the content needs to be 'sticky' i.e. it must compel users to want to return to the service again and again. In India, as in many other mobile markets, users have a legal right to opt out of receiving subscription-based messages at any time if they choose to do so. Therefore, the importance of relevant, quality content is paramount for retaining users.

Creative techniques are used to make educational content engaging and entertaining. Mobile Kunji features an empathetic yet authoritative female doctor character, Dr Anita, who 'speaks' to rural families. She is designed to be both trusted and respected by community health workers and families alike.

A midwife in Samastipur, Bihar, was surprised to hear someone giving such expert advice in her local language: "Even though she is a doctor and educated, she was speaking in Bhojpuri!," she said. Another community health worker from Champaran, Bihar, summed it up by saying, "I have learned how to explain things in simple and easy language. Now I can explain the content to the beneficiaries in the same way."

The audio message from the doctor is followed by rhyming couplets, punctuated by drum beats and the sound of a stringed instrument, which function as a mnemonic for key health messages. This rhyme is about preparing for delivery: "Keep three phone numbers in mind - Hospital, transportation and community health worker. To keep tension at bay, plan as we say!" Localised content is, thus, crucial for achieving resonance with users. One downside, however, is that it's much harder to take context-specific content to scale across disparate geographical regions.

Objectives

The research was done on the basis of secondary sources to study the following objectives:

- To Measure the relevance of the project in terms of the effect of Mobile Kunji on the knowledge of health workers; on counseling skills of health workers and on the counseling environment.
- To study the effectiveness of the project in terms of project scale and reach; number of health workers that have adopted the digital platform; accessibility and adaptability of Mobile Kunji; quality of the services delivered; and change in knowledge and skill of health workers.
- To understand the efficiency of the project in terms of time taken to deliver content, learning and services; resource efficiency in technology-enabled learning; user friendliness for participants; number of institutional deliveries, ANC (Antenatal Care) and PNC (Post-Natal Care) check-ups, neonatal check-ups; and cost involved.
- To study the sustainability component of the project in terms of identifying challenges in the project implementation, delivery, management and maintenance; and scalability and replicability of the project for a sustainable model.

9.4.2 Research Methodology

To gain an in-depth understanding of Mobile Kunji, the data was taken from the secondary sources that included the documents available both online and offline.

9.4.3 Research Outcomes

9.4.3.1 Relevance

In terms of relevance, this job aid included both an interactive voice response (IVR)-based mobile service and a printed deck of 40 illustrated cards on a ring, which communicate essential information on pregnancy and health of newborns. The deck of cards was designed to be portable and durable. Each card carried a unique, seven-digit number ('short

code') that can be dialed from the community health worker's mobile phone.

> "We decided to use interactive voice response (IVR) technology to give people easy access to content on their existing phones, rather than investing in technology that would require people to have smartphones or Internet access."- Chamberlain associated with the project for the last two years.

The community health worker dials the short code and puts her phone on speaker mode so that both she and the family can hear the audio content, or she may simply hand the phone to a pregnant woman or mother to listen. The content, which is delivered in the authoritative yet sympathetic voice of a woman doctor character, is deliberately designed to be both engaging and conversational to reinforce the health message illustrated on the card.

For example, one of the leading causes of maternal death is severe bleeding. One card encouraged women to involve their husbands in decisions around planning for birth so that families will identify their nearest hospital, make arrangements for emergency transportation, ensure that they have their health worker's phone number handy and save money to cover costs in case of complications during labour and delivery.

Mobile Kunji was a toll-free service which can be accessed by any health worker in Bihar from any mobile handset, across five of the largest mobile networks in India. These operators accounted for approximately 80 per cent of all mobile subscribers in Bihar.

> "Each card has been given a mobile short code that corresponds to a specific audio health message in the IVR service. By dialling the short-code CHW, (the system) can play the message to the families in order to persuade them to adopt positive health practices," said Chamberlain. She added that as part of the project, the team created a fictional character called Dr. Anita, who speaks through the IVR to the families in a language they understand. The character speaks in "Bhojpurized Hindi", said Chamberlain, adding that the language used has a mix of words from popular dialects in Bihar such as Maithili, Bhojpuri etc.

IVR can thus serve as a simple, widespread solution to the needs of illiterate, poor populations in many developing countries by providing access to audio content via a simple phone call from any mobile phone.

Most Used Themes in Mobile Kunji

FLWs were generally very happy with the content and range of themes covered by MK.

- The only topic felt to be missing by multiple FLWs was information for younger women/ girls (menstruation, hygiene, marriage).
- Feedback on the different topics and themes also demonstrated how challenging the issue of family planning is for the FLW to discuss.

1. As you would expect, this topic appears to be one greatly affected by social norms, myths and other household influences (particularly husbands).
2. While overall the FLWs were happy with this card/ audio, some mentioned the desire for additional information to be included.
3. At the same time, some FLWs indicated that they rarely use this card as conversations on this issue are better tackled verbally.

9.4.3.2 Effectiveness

According to the BBC study that included quantitative surveys with 585 front line workers and 3,300 target beneficiaries (pregnant women and mothers with an infant aged 6-11 months), as well as qualitative discussions with the same target groups. Regression analysis was used to establish the association between exposure to messages through Mobile Kunji and the practice of simple doable actions related to birth preparedness and complementary feeding. The analysis enabled to understand the relationship between the two, while taking into account social and demographic factors that might have affected respondents.

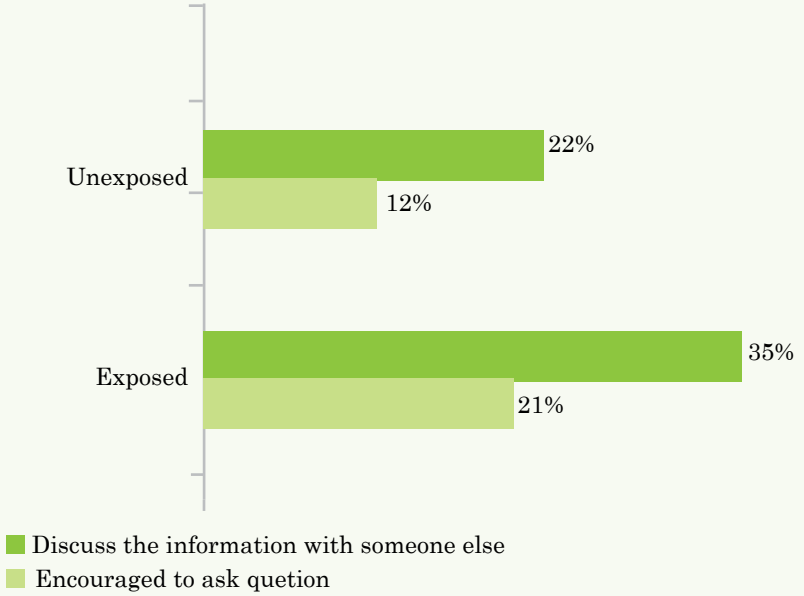
> As a community health worker in Begusari, India explained: "Ever since I started using [the job aid] Mobile Kunji during my visits with women and their families, the community's respect for me and what I do has grown. What's more, when I now walk into a village, people call me 'doctor didi' (sister) and ask me to give them information.

> "I will show the cards first, explain the cards, and then play the audio. After I explain the concept and Dr. Anita [the voice on the audio] says the same things, they trust us and she [the beneficiary] understands."- *Front line worker, Khagaria*

The findings of the study were:

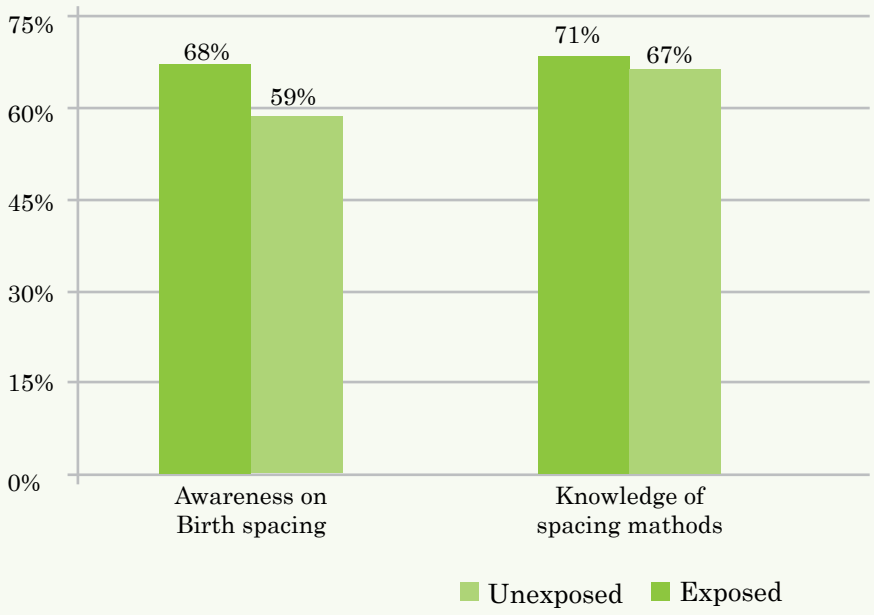
- Beneficiaries exposed to Mobile Kunji reported greater levels of engagement than those who were not exposed. FLW visits took longer (20mins vs. 10mins); they were more likely to have asked questions during the visits (21 per cent vs. 12 per cent); they were more likely to have discussed the information they got from the visit with someone else (35 per cent vs. 22 per cent) *(Figure 62)*

Figure 62: Effectiveness of Mobile Kunji



- Beneficiaries exposed to birth preparedness messages through Mobile Kunji were almost three times more likely to have saved their FLW's phone number.
- Beneficiaries exposed to complementary feeding (CF) messages through Mobile Kunji were almost twice as likely to have fed their 6-11 month old with at least one infant and young child feeding (IYCF) food in the previous 24 hours. Those exposed also reported higher awareness of the correct month to initiate CF (62 per cent vs. 49 per cent).

Figure 63: Implications and impact



- While those exposed to family planning messages through Mobile Kunji did report higher awareness of the correct gap to leave for birth spacing (68 per cent vs. 59 per cent) and slightly better knowledge of spacing methods (71 per cent vs. 67 per cent, named at least two) there was nothing to indicate that this translated to improved levels of practice *(Figure 63)*.
- Feedback on Mobile Kunji suggests it is highly valued by front line health workers both for its impact on their own confidence and knowledge, and for beneficiary trust, comprehension and acceptance of the information they are providing. Data also reveals Mobile Kunji is particularly effective with harder to convince beneficiaries.
- Findings indicate that the use of Mobile Kunji contributes to overall improved engagement during interactions between front line workers and beneficiaries.
- The study showed encouraging differences by exposure in levels of knowledge and supportive attitudes related to birth preparedness, complementary feeding and family planning. However, data also identified some gaps across the study in detailed knowledge of birth preparations and feeding practices as well as the presence of some unsupportive attitudes. Future work should look at how to continue to improve knowledge and challenge lingering myths.

9.4.3.3 Efficiency

Almost 75,000 unique users have already called Mobile Kunji, suggesting that its use is going far beyond the 38,800 that have been trained directly. Already, more than 1.4 million minutes of Mobile Kunji have been played (each message is just over a minute long). Mobile Academy has had similar success. Considering that community health workers have to pay for Mobile Academy from their own pockets, it is impressive that 21,500 have called the service. Twenty two per cent of users have already completed the course. Just over 4,700 health workers are eligible for certificates for passing the course and trainees have accessed more than 1.7 million minutes of content[104].

Qualitative feedback from FLWs on this aspect was often, on the surface, contradictory: FLWs describe that using MK takes time, and the duration of their visits has increased, at the same time they describe how using MK speeds things up. It would seem that while the actual duration of visits may have increased, FLWs feel the speed with which they are able to get the beneficiaries to accept information is improved; therefore they feel MK improves efficiency.

9.4.3.4 Effects

Early data from Bihar shows a strong positive correlation between the roll-out of Mobile Kunji and changes in specific health behaviours. The Ananya midline evaluation surveycarried out by Mathematica Policy Research found that almost 40 per cent of the women who had received a home visit from an FLW in the previous six months had been exposed to Mobile Kunji. The research also found that households exposed to Mobile Kunji typically received longer home visits from FLWs (15 minutes on average, compared to 10 minutes in non-exposed

households), although the two are not necessarily causal. This is welcome news, given that there was concern that the use of Mobile Kunji might shorten home visits. Longer home visits could be assumed to be beneficial because they allow the FLW to communicate more information and answer more questions.

The research also found that use of other Ananya tools, such as the complementary feeding bowls, uterus models, and IUDs, was seven to 10 times more likely if the FLW was using Mobile Kunji. Most importantly, the midline research found that, among pregnant women exposed to Mobile Kunji in the period examined, there was a 28 percentage point increase in the number who prepared for birth (arranged transport, identified a hospital in case of emergency, saved critical phone numbers, saved money) over those who had not been exposed.

It found further that mothers of children 6-11 months old who were exposed to Mobile Kunji had a 13.5 percentage point increase in the practice of complementary feeding. However, the use of Mobile Kunji was not found to be significant for certain behaviours, particularly where the adoption of the behaviour was intrinsically linked to supply side management, such as facility delivery and immunisation. The Ananya midline research established that exposure to Mobile Kunji adds substantial value in predicting behaviour change, especially for birth preparedness and complimentary feeding. In the Ananya baseline survey, Mathematica estimated that only 23.6 per cent of women in the programme's eight priority districts had prepared for the birth of their child. In the midline survey, it was predicted that, if all of the pregnant women in the eight districts had been exposed to Mobile Kunji in the six months prior to the midline, it is highly probable that the percentage who effectively prepared for the birth of their child would have increased to more than 43 per cent — an increase of 19.7 per cent over the baseline.

The Mathematica research found a similarly high probability that if mothers of 6- to 11-month-old children had been exposed to Mobile Kunji, the number practicing complementary feeding would have increased from 65.4 per cent to almost 77 per cent — an increase of 11.5 per cent over the baseline. At the 1 per cent level, both of these increases are statistically significant. However, the following caveats should be noted: these are correlational analyses, and not necessarily causal; Mobile Kunji exposure might be a proxy for general FLW ability or effectiveness; exposure is general – and not linked to specific advice. Reverse causality also needs to be considered – i.e. those adopting behaviour may be less likely to need visits. Further research in understanding when FLWs use Mobile Kunji, with which women, and what the quality of that engagement looks like will be invaluable. BBC Media Action has contracted IMRB to conduct qualitative and quantitative research to explore different Mobile Kunji use case scenarios, and the impact of Mobile Kunji and Mobile Academy on changes in knowledge, attitudes, self-efficacy, social norms, and specific practices.

he Mathematic midline evaluation concludes that exposure to Mobile Kunji adds substantial value in predicting behaviour, is strongly correlated with delivery preparation and complimentary feeding, and

also serves as a good complement to other job aids and tools used by FLWs.

9.4.3.5 Impact of Mobile Kunji

The impact of Mobile Kunji on knowledge, attitudes, inter-spousal communications and self-efficacy around future uptake of specific priority behaviour(s) were as follow:

a) Birth Preparedness

- Beneficiaries who were exposed to messages on birth preparedness through MK were 2.72 times more likely to save their FLW's phone number.
- A quarter (25 per cent) of those exposed to messages on BP through MK was able to spontaneously mention at least three key BP steps, compared to 20 per cent among those not exposed.
- Agreement with the myth that early disclosure of pregnancy is negative was the same among those exposed and not exposed (35 per cent) but those exposed reported lower levels of agreement with other unsupportive attitudes: that there is no need to prepare (17 per cent vs. 25 per cent) and no need to start thinking about transport until close to the birth (17 per cent vs. 27 per cent).
- Agreement with supportive attitudes (registration is important/ place of delivery with husband) was higher among those exposed.

b) Complementary Feeding

- Beneficiaries who were exposed to messages on complementary feeding (CF) through MK were 1.72 times more likely to have fed their child at least one infant and young child feeding (IYCF) food item in the previous 24 hours.
- A higher proportion of those exposed to MK messages on complementary feeding (62 per cent), compared to those not exposed (49 per cent), and was aware of the correct month to initiate complementary feeding.
- Agreement with statements on self-efficacy related to complementary feeding was also higher among those exposed to MK messages on CF.
- About 93 per cent of those exposed agreed they will be able to convince their family to feed their child three times a day (compared to 80 per cent of those not exposed).
- About 94 per cent of those exposed agreed that they think they can feed their child in a separate bowl (compared to 83 per cent of those not exposed).
- While agreement on the point that a child should be able to digest semi-solid foods at six months was high – 85 per cent (compared to 77 per cent among those not exposed), 44 per cent of those exposed still agreed that a child of 6-7 months will not be able to digest a small amount of ghee/ butter (similar to not exposed – 43 per cent).
- Those exposed also reported higher levels exclusive breastfeeding (59 per cent vs. 51 per cent).

c) Family Planning

- Beneficiaries exposed to FP messages through MK reported higher agreement that keeping a three-year gap between children makes sense (90 per cent vs. 81 per cent among unexposed) and that they are confident they can convince their husband to birth space (83 per cent vs. 77 per cent).
- About 68 per cent of those exposed were aware that the ideal gap

between two children should be three years (compared to 59 per cent of those not exposed). Beneficiaries exposed to FP messages through MK reported good awareness of birth spacing and family planning methods, differences in awareness between those exposed to FP messages and those not exposed were inconsistent.
- Agreement that they do not trust OCPs because they can affect your chances of getting pregnant was similar between exposed and not exposed (42 per cent vs. 41 per cent).
- There was no difference in reported levels of using modern FP methods between those exposed to MK and those not exposed, this was 17 per cent for both groups

9.4.3.6 Sustainability

a) Initial Cost

The initial cost of the Mobile Kunji was INR 450 (US$7), including the deck of the cards with a handy pouch. In response to the interest indicated by NRHM for mass production of Mobile Kunji, a more cost-effective Kunji has been procured, which costs 40 per cent less than the original cost. This was priced at INR 286 (US$ 4.5). The new card material was equally durable, lighter and of similar quality[105].

The sustainability of the model is the USP of the whole service. Airtel, Vodafone, Idea, Reliance, Tata and Bharat Sanchar Nigam Ltd (BSNL) cover 95 per cent of the mobile phone market in rural Bihar. These companies gave the NGO a common short code (57711). Different numbers can be added to this code that suggests different lessons to be given orally to the women[106].

> "The BBC Media Action zeroed in on Bihar because 90 per cent of health workers had cell phones." - *Priyanka Dutt, Project Manager for BBC Media Action in India.*

b) Training

The training course – 'Mobile Academy': Mobile Academy is an audio training course for health workers, designed to refresh their knowledge of life-saving health behaviours, delivered via mobile phone. The course is 190 minutes long, but only costs health workers around Rs 95/- to complete. Community health workers can complete this standardised course anywhere, anytime at a fraction of the cost of face-to-face training[107].

c) Partnership

BBC Media Action launched Mobile Kunji and Academy in Bihar in May 2012

- A partnership with six of the biggest mobile operators in India, accounting for 90 per cent of the market in Bihar: Airtel, BSNL, Idea, Reliance, TATA and Vodafone
- Leverages an existing, proven mobile technology platform provided by On Mobile Global Ltd, integrated with the networks of all participating operators not just in Bihar but pan India
- The services can be used on any handset, and are available on common short codes and common tariffs across all participating operators

- Developed with funding from the Bill & Melinda Gates Foundation and with the support of the Government of Bihar as part of the Ananya Programme

d) Challenges

BBC Media Action's Mobile Kunji is an example of a service that has been developed with a public sector business model in mind. When surveyed in the course of the project's formative research, community health workers said they couldn't afford to pay for the ongoing use of mobile phones required for daily family health visits. They felt the government should be required to cover the costs because it is the families who benefit from the service. As a result, the donor agreed to cover the cost of calls to Mobile Kunji for the first year of the programme's life-cycle[108] .The idea was to demonstrate the efficacy of the service to the government, particularly within poor, marginalised communities, that might not otherwise be able to afford m-Health services themselves.

The other major challenge was to train about two lakh health workers with the least possible cost involved. For the purpose, a 'Mobile Academy' was designed. It involves an audio training course of nine chapters for health workers, which trains them in communication skills apart from improving upon their knowledge of delivery and infant health care. The entire content can be accessed at a cost of Rs 192, which will have to borne by the health workers.

e) Strengths and Weaknesses

- The project 'Mobile Kunji' by BBC Media Action has been implemented in eight districts of Bihar. This project is aimed at imparting integrated knowledge, self-efficacy, and health practices to counter the growing demands in health sector. The project covers a wide spectrum of health issues. It has enhanced the interpersonal communication to improve the quality of home visits of front line workers.
- The project was supposed to scaled up to other districts by 2015. Towards this, the state government had drafted a programme layout for implementation in all districts from 2013.
- The two key gaps identified were - the front line workers did not receive any formal training on how to build strong communication with beneficiaries; and there were no material to aid the training.
- For the project rather than scalability, there should be more focus on sustainability and cost.
- There should be resourcing from community for IVRS and there is a need for collaboration with different government schemes, especially in the health sector.

f) Prove demand and scale

- About 85,000 people have begun using Mobile Kunji during the last 10 months, playing 2.3 million minutes of life-saving health content via their mobile phones
- As many as 27,000 people have begun the Mobile Academy training course, accessing 2.8 million minutes of health education content via their mobile phones. More than 8,000 have already completed the course.
- They are now being scaled to the state of Odisha, with funding from the UK Department for International Development and with the

support of the Government of Odisha.
- We are in discussion with the central Indian government to scale the services to all the north Indian states, including Uttar Pradesh, which has a population of 200 million people.

9.4 Conclusion

Mobile Kunji is highly valued by front line workers as a job aid; they credit MK with improving beneficiary comprehension and trust, as well as their own knowledge and confidence. FLWs describe MK as very supportive to their work and as having a positive impact on their interactions with beneficiaries as well as on their own knowledge and confidence. Beneficiaries also report that it increases comprehension of the information provided by the FLW. Dr Anita is key to this; she is regarded as a colleague by the FLWs and is a credible, engaging and authoritative voice for the beneficiary. The success of Dr Anita should be leveraged in other elements of the intervention, where possible. The FLW is considered a key source of information for all of the three most used themes (birth preparedness, complementary feeding and family planning), with findings indicating that MK is adding to the trust and credibility of the FLW. Future research could explore why the remaining themes are used less by FLWs; the project team could explore ways to encourage MK use for communicating messages other than BP, CF and FP. There are several factors that influence whether or not the FLW uses MK. Sometimes the issue is practical (connectivity/lack of minutes) or if the beneficiary has the time available to discuss in detail, but the profile of the FLW (her experience) and the beneficiary (her education, stage of pregnancy and how many children she already has, i.e. how difficult she may be to convince) also affect this (demographics like social category and religion do not). Overall, decisions on usage appear to be linked to FLW's judgment of the beneficiary's need and ability to take on board information. Encouraging FLWs to share experiences/ success using MK to convince difficult clients may help increase usage; the project team should also explore any potential ways to overcome the practical barriers to usage.

The study showed encouraging differences by exposure in levels of knowledge and supportive attitudes related to BP, CF and FP. However, general knowledge of some aspects still appears relatively low and there remain some myths that are proving harder to shift. There is a need to look again at how best to address the harder-to-shift myths and unsupportive attitudes, across the intervention. Although the study was not designed to identify impact of MK exposure on practice, analysis does show higher levels of several of the simple doable actions measured around birth preparedness and complementary feeding, and a positive relationship between exposure to MK and taking these steps. The same positive difference in simple doable actions was not seen for family planning. Findings suggest that this is one of the most difficult themes for the FLW to address with the beneficiary, largely because of the other influencers and decision makers involved in this practice (husbands) as well as some unhelpful myths about modern family planning methods. While MK cannot directly target husbands (other parts of the intervention are tackling this), the project team should explore if there is more that MK can do to address these issues directly during the FLW interactions[109].

9.5 Mobile for mothers

9.5.1 Introduction

Mobile for Mothers (M4M) is a project implemented by NEEDS. It was developed as a mobile-based application, ensuring that information was contextualised for India and translated into Hindi or other local languages by using an open source software CommCare. M4M was developed as a comprehensive application to reduce maternal mortality and morbidity by bringing changes in practices.

M4M is designed as multimedia-based software that runs on mobile phones, working as an interpersonal communication tool for women during their antenatal care and prenatal care, educating them on safe pregnancy behaviours. It also serves in monitoring of services received and behaviour changes of pregnant women during and post pregnancy, monitoring of home visit of Sahiyas to the individual pregnant woman, creating a check-point for individual maternal and neo-natal death cases. The objectives of M4M are reaching unreached pregnant women, who still deliver at home and improve the practices during pregnancy and post pregnancy period for safe motherhood.

Objectives
The research was done to study the following objectives:

- To measure the relevance of the project in terms of the effect of M4M mobile application on knowledge of Sahiya workers; their counselling; and the counselling environment.
- To study the effectiveness of the project in terms of the project's scale and reach; number of Sahiyas that have adopted the digital platform; accessibility and adaptability of M4M mobile application; quality of the services delivered through M4M mobile application; and change in knowledge and skill of Sahiya workers.
- To understand the efficiency of the project in terms of time taken to deliver content, learning and services; resource efficiency in technology-enabled learning; user friendliness for the participants; number of institutional deliveries, ANC (Antenatal Care) and PNC (Post-Natal Care) check-ups, neonatal check-ups; and cost involved.
- To study the sustainability component of the project in terms of identifying challenges in the project implementation, delivery, management and maintenance; and scalability and replicability of the project for a sustainable model.

9.5.2 Research Methodology

For the study, Sarwan and Sonaraithadi blocks in Deoghar district were selected where the projected is already implemented. Sahiya workers and women (pregnant and lactating women) became the sample for our study. A total of 74 Sahiya workers (at 95 per cent confidence level and 10 per cent margin of error) and two beneficiaries under each ASHA worker were interviewed, taking the total to 148 pregnant/lactating women. The multistage sampling technique was followed for selecting the sample. In order to ensure a representative sample of health workers, the selection of health facilities for impact analysis was done purposively. For household sampling (women and children), snowball sampling was carried out.

Reliability
Data reliability is checked for those variables where Likert scale is used by means of Cronbach's Alpha. The result found is as follows:

a) For FLW Questionnaire - Counselling Environment =.315, Efficiency

= .-.228, Ease of use= .384, Motivation = -.517, Perception= .528, Training = .262, Effect= .318
So, the individual items in all were not relating well with each other.
b) For Women questionnaire - Counseling Environment = -.582, Efficiency = .186, Motivation = -.716, Perception= .507, Practices = -.167
So, the individual items were not reliable.

9.5.3 Research Outcomes

9.5.3.1 Demographic Profile of Respondents

The findings of the study have been divided into the followings sections:

The profile of the respondents was studied in terms of age, gender, educational qualification and geographical distribution.

a) Sahiya
A majority of the Sahiyas, i.e. 39 per cent, were aged 30-34 years followed by 24 per cent aged 35-39 years and least i.e 1 per cent was aged 50 years and above. The Sahiyas were found to be varying in their levels of formal education as 59 per cent of the Sahiyas had the educational qualification up to high school followed by 36 per cent who went up to middle school and only 3 per cent of them were graduated or having higher degree(s) *(Table 27)*.

In terms of the experience of using the application, more than half i.e. 57 per cent had the experience of 6-12 months, 42 per cent of them had the experience of 1-5 months and only 1 per cent had the experience of more than a year.

Table 27: Demographic Profile of Respondents

Details		FLWs (in per cent)	Women (in per cent)
Gender	Male Female	- 100	- 100 Pregnant-68 Lactating -32
Age (years)	(20-24) (25-29) (30-34) (35-39) (40-44) (45-49) 50 & above	– 9 39 24 22 4 1	76 18 4 2 0.
Educational Qualification	Illiterate Primary Middle High School Graduation& above	- 1 36 59 3	26 16 30 24 4
Total		74	142 Women Pregnant women-101 Lactating mother-47
State/District/Block		Jharkhand Deoghar/ Sarwan & Sonaraithadi	

b) Pregnant and lactating women
Three-fourth of the women (beneficiaries), i.e. 76 per cent, were aged 20-24 years, followed by 18 per cent who were aged 25-29 years. It can be concluded that majority of the women conceived or had children at a very young age. In terms of educational qualification, 26 per cent of the respondents were illiterate, 30 per cent of the women had studied up to middle school and only 4 per cent of them were graduates or above.

More than half, i.e. 68 per cent, were housewives and the rest were involved in some occupation to earn their livelihood through farming (18 per cent) or labour work (13 per cent) *(Table 27)*.

9.5.3.2 ICT Usage

The study shows that the FLWs were very used to mobile phones and the Internet. Almost all of them were had mobile phones, the majority of the FLWs (63 per cent) had featured phones, 57 per cent had basic phones and only 10 per cent had smart phones. Only 10 per cent of the Sahiyas had touchscreen mobiles and rest, i.e. 90 per cent, didn't have the touchscreen mobiles.

Most of the FLWs, i.e. 68 per cent, didn't have access to the Internet on mobile and rest 32 per cent had access to the Internet on mobile phones. Majority of them, i.e. 30 per cent, were using the Internet for other purposes i.e. other than the social networking sites, music sites and Google. In terms of connection users, 87 per cent were Airtel users and there were no users of BSNL, Uninor or Tata i.e. majority of them were using the private connection and no one was using the government connection.

9.5.3.3 Counselling Environment

ASHA counselled the pregnant and lactating women on ANC, INC, PNC and family planning. The environment of counselling sessions were studied from both the FLWs' and women's perspective.

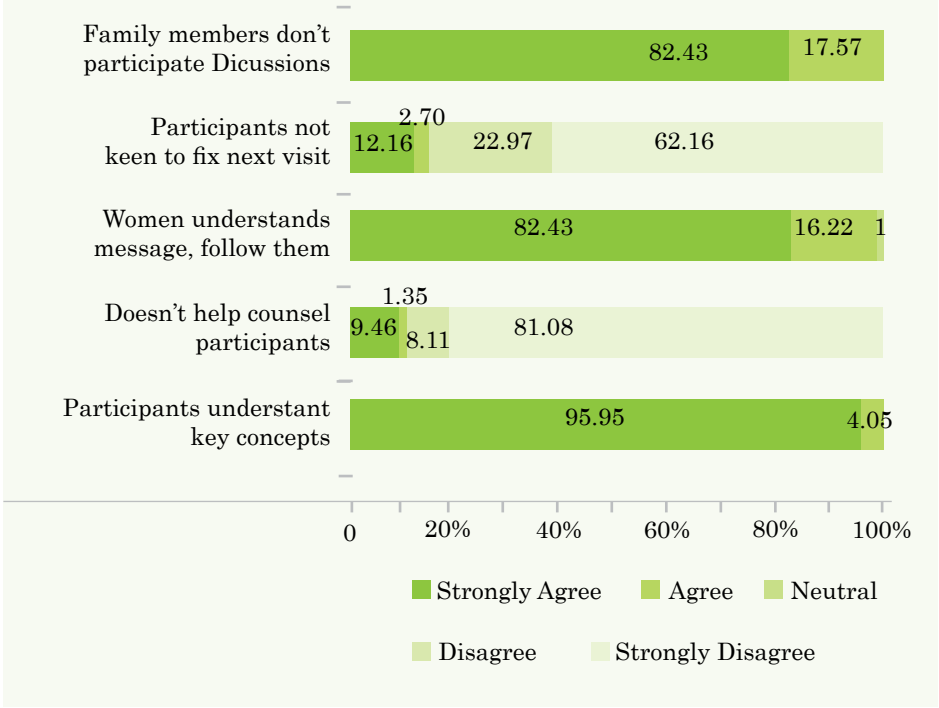
a) Perception of FLWs - A majority of the FLWs, i.e. 96 per cent, strongly agreed that the aid which has pre-installed information in the form of graphics and audio helped them to understand the key concepts related to health issues like importance of ANC, INC, PNC and family planning.

Almost all — 98 per cent — respondents also agreed that aid helped to counsel the participants in a better way as the images and audio helped FLWs to relate with the issues that have to be discussed with beneficiaries. Using the graphics attracted the participants to listen with a great enthusiasm, understand the message and follow them.

Almost all of the FLW respondents, i.e. 85 per cent, also pointed out that participants were keen to fix the next visit and it acted as a catalyst for FLWs to mobilise the community and counsel the women on health determinants. They also complained that family members didn't participate in the discussion and it became a little challenging for them to convey their messages and motivate the women to go for good health practices in the phase of pregnancy and lactation.

It can be stated that counselling environment contributed towards the engagement of women and helped them to understand the message communicated by health workers clearly *(Figure 64)*.

Figure 64: Counselling Environment (ASHAs)



b) Perception of Women - Majority of the respondents, 72 per cent, strongly agreed that FLWs greeted before starting the session that helped both FLW and women to know each other. About 28 per cent agreed with this and none of the women respondents disagreed with this.

More than half, 63 per cent, of women strongly agreed that FLWs included their family members in discussion and, thus, it becomes easy for the women in rural areas to motivate their family members to follow good health practices. As many as 37 per cent women agreed that their family members were included in the discussions.

About 44 per cent respondents said that they were encouraged to ask questions in between counselling sessions. It proves that the environment of counselling sessions were very open and encouraging. About 56 per cent of the women agreed with the point and none of the women disagreed on this.

Majority of the respondents also strongly agreed that FLWs explained the message in detail that not only helped the rural women to enhance their knowledge but also increased utilisation of existing health services. More than half of the women, i.e. 52 per cent, strongly agreed that FLWs encouraged them to fix their next visit and counselling sessionon other health topics while 48 per cent of the respondents agreed with this.

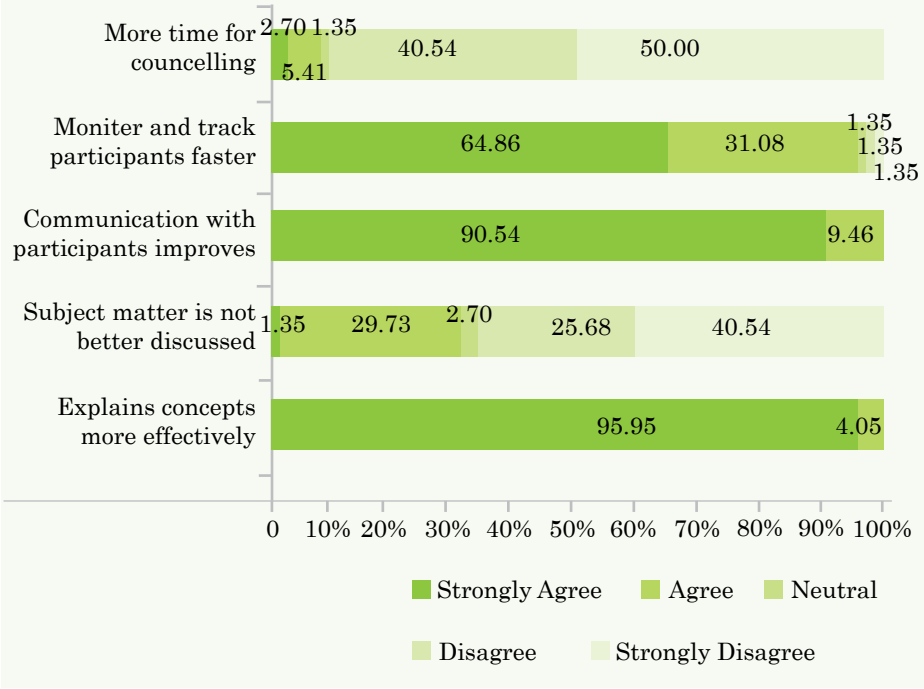
Thus, the counselling environment was very open, egalitarian, inspiring and interactive that helped the women build on their knowledge on health issues.

9.5.3.4. Efficiency

a) Perception of FLWs - All of the FLW respondents said they agree that use of aid helped them to explain the concept effectively to the participants and, eventually, this improved the quality of counselling and institutional deliveries and ensured regular ante-natal care, timely vaccinations and post-natal care.

Only 67 per cent of FLWs stated that it use helped in better discussion of the subject matter because of the images and audio, 41 per cent said that it did help in the clarification of discussion sessions and 3 per cent were neutral in their response (Figure 65). FLWs also responded that M4M helped them monitor and track the participants' better and the short message service.

Figure 65: Efficiency of Counselling



Half of the FLW respondents strongly disagreed and 41 per cent disagreed with the point that use of aid in counselling takes more time. About 3 per cent of FLWs said that they strongly agree with the point that is usage of aid takes more time in counselling and 5 per cent agreed to it *(Figure 65)*.

b) Perception of Women - More than half the women i.e. 57 per cent strongly agreed that use of aid by FLW in counselling has helped them understand the importance of pregnancy registration. They understood that registering themselves will not only help them to have an institutional deliver but will also enjoy other benefits like timely access to other health services. All of the respondents disagreed with the option that aid makes counselling session longer as the use of aids in sessions, in fact, made the counselling interesting.

All the respondents strongly agreed or agreed with the fact that an FLW is more confident and communicated effectively when he/she is

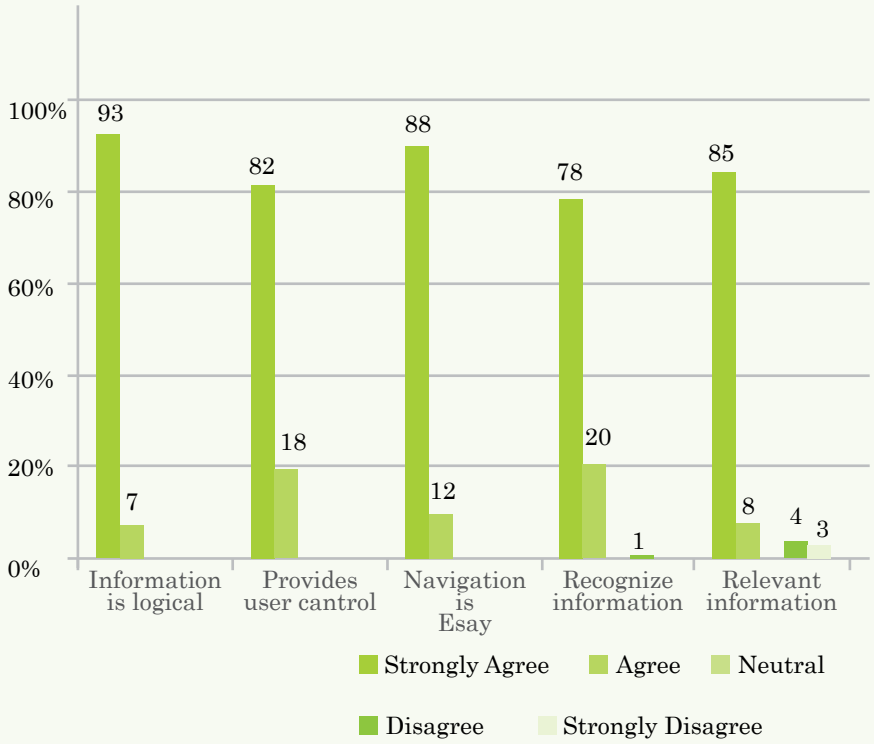
using the aid. The aid that are used by the FLWs consist of graphics that are linked to certain questions that assist them to conduct efficient interpersonal communication sessions and create better health awareness among beneficiaries. These also help the beneficiaries to have a better understanding.

9.5.3.5 Ease of Use

All the FLW respondents said that the information provided through aid was very relevant, logical and they had control over the administration of the content. This allowed them to modify their counselling style and incorporate the information from the app more effectively.

Thus, it had helped them to mobilise the community in a better way *(Figure 66)*.

Figure 66: Ease of Use

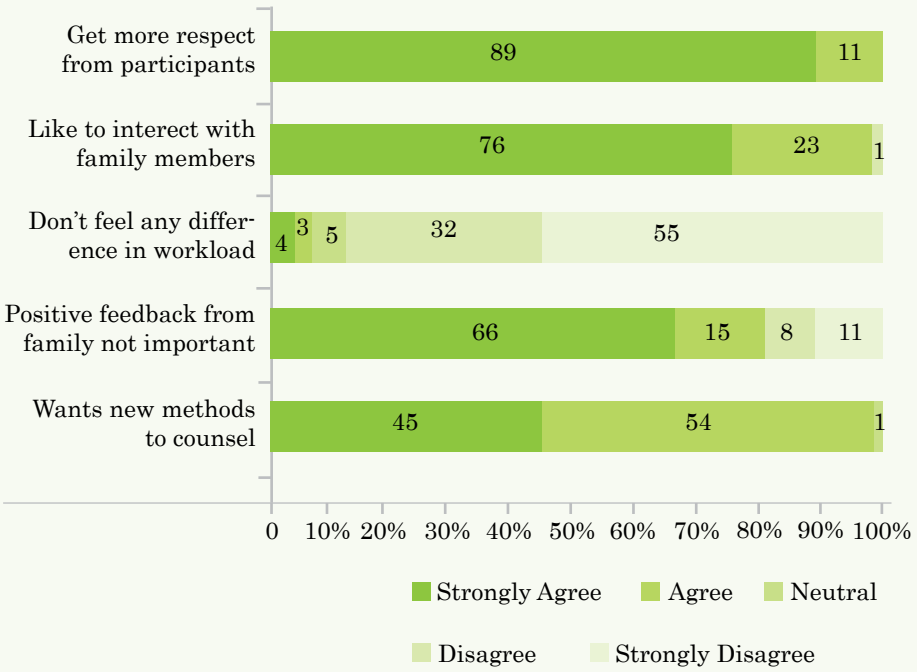


9.5.3.6 Motivational Profile

a) Motivation of FLWs - All the FLWs responded that they are motivated to learn new methods of counselling so that they can make the counselling sessions more interesting and also motivate the beneficiaries to enjoy the health benefits.

As many as 66 per cent of the respondents strongly agreed and 15 per cent agreed to the point that positive feedback from family was not so important in motivating the beneficiaries. About 11 per cent strongly disagreed and 8 per cent agreed that family members' support is not important as the support from family acted as a catalyst that helped the women to go for institutional delivery and avail other health benefits.

Figure 67: Motivation of ASHA to use aid



Almost all, i.e. 87 per cent of the respondents, agreed to the point that usage of aid has reduced their workload and helped them achieve better health outcomes. Another factor that motivated the Sahiya is the opportunity to interact with the family members where they gain knowledge on the different perspectives of people and learn ways to change their mind set. Another factor that motivated all the respondents was the 'gain in respect' as the people from the community started respecting the front line workers because they were able to communicate effectively on the health benefits concerning expecting and lactating mothers *(Figure 67)*.

b) Motivation of Women - All of the women respondents agreed that they liked to follow the FLW to avail the health benefits. It showed that the FLWs succeeded in motivating the expecting and lactating mothers to get them registered under ASHA as the data clearly showed that none of the respondents relied on Dai for the delivery. They all trusted the information given by FLWs and were motivated to have the institutional delivery.

All the women respondents also said that they wanted to ask FLWs more questions and clear off their doubts as the aid explained well about health-related issues such as importance of nutritious food, personal hygiene, care during pregnancy, importance of antenatal check-up and institutional delivery, home remedies for minor ailments and importance of immunisation, among other things.

9.5.3.7 Perception

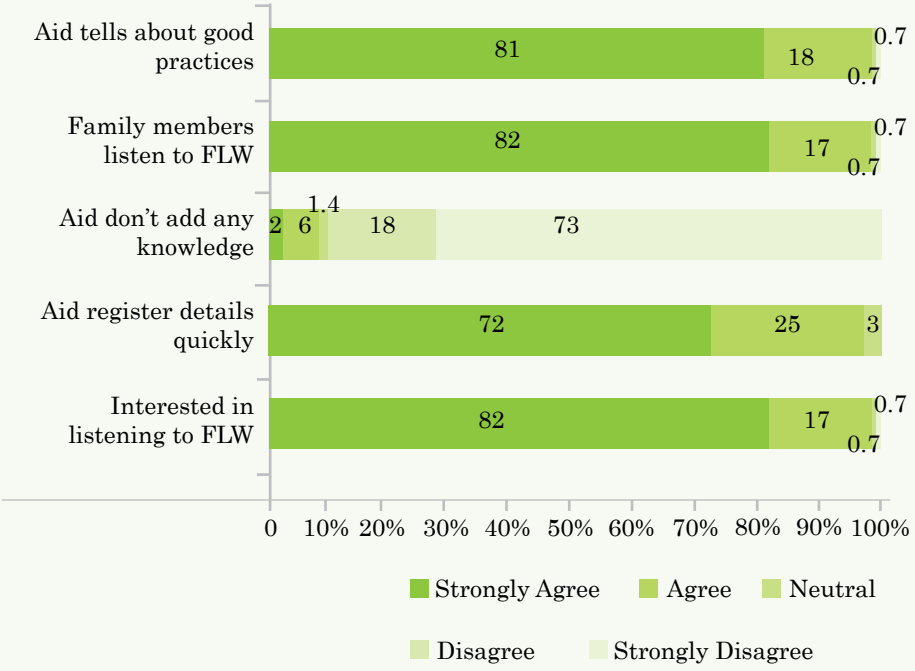
a) Perception of FLWs - The data revealed that all the Sahiyas (FLWs) perceived that usage of aid helped them in a number of ways in achieving their targets. They agreed that using the aid not only helped

them to cover more participants but had also enhanced their knowledge on how to articulate and disseminate knowledge better among the target group(s).

All the respondents said that use of graphic images had made the counselling sessions interesting as the participants didn't get bored and grasped the information faster. The respondents also pointed out that it has also saved time in data entry as now they don't have to carry bulky registers along with them as the registration can be done easily on the tablets provided to them.

b) Perception of Women - Almost all the women respondents agreed that the use of aid in counselling makes the sessions very interesting where the gain in knowledge is high as compared to the sessions where aids are not used.

Figure 68: Perception of Women



The use of aid also makes the information interesting and attractive for the family members and this had made it easy for the expecting and lactating mothers as they don't have to motivate their family members separately for having institutional delivery and avail other health benefits.

A good 95 per cent of women agreed with the point that the aid registered the details quickly and 3 per cent were neutral in response *(Figure 68)*.

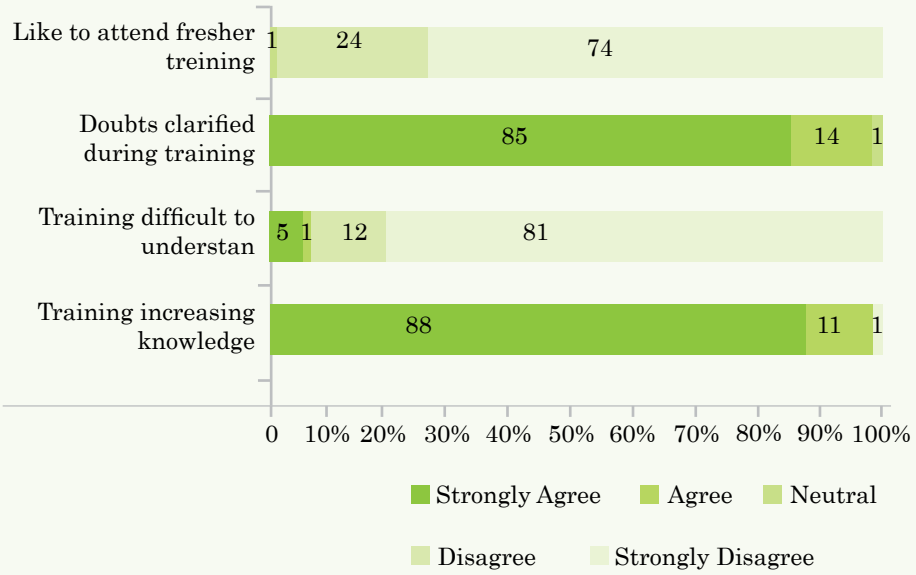
9.5.3.8 Training

About 88 per cent of FLWs strongly agreed and 11 per cent agreed with the fact that the training helped them to build on their existing knowledge and also learn new concepts that improved their counselling

sessions. Only 1 per cent of the respondents strongly disagreed to it *(Figure 69)*.

Almost all the FLWs said that training was very informative and interactive that made their doubts clear. The training sessions were easy to understand and helped them acquire the necessary knowledge, skills and confidence for performing spelled out roles. None of the participants wanted to attend the fresher training again, it meant that they felt they were trained enough to counsel the women.

Figure 69: FLWs perspective on Training

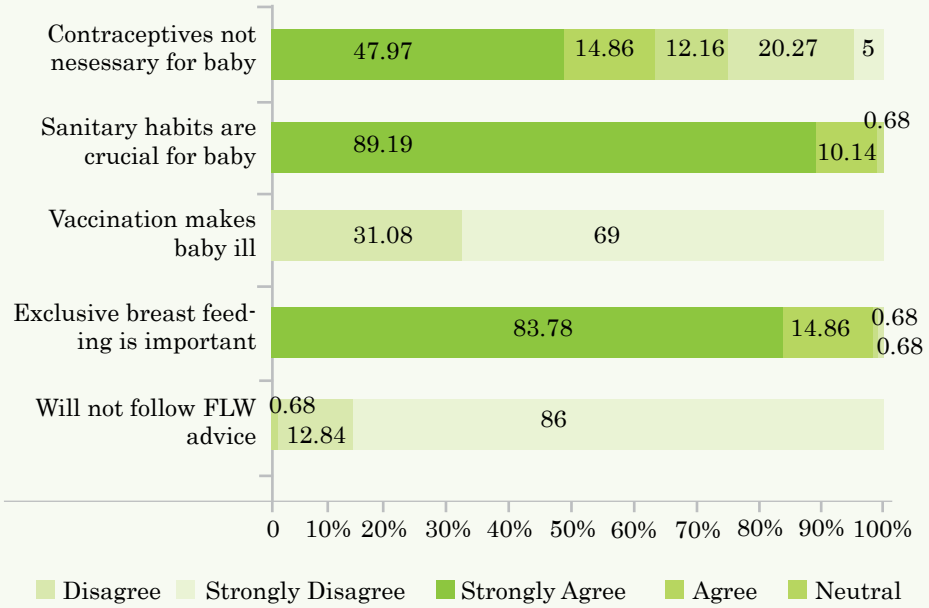


9.5.3.9 Effects

The data revealed that the counselling sessions had a great impact on the women as almost all of them had decided to go for the safe institutional delivery and none of them wanted to have their baby delivered at home. They also reported that all the participants and their family members followed their advice and decided to use the contraceptives.

In the study, all the women respondents agreed that they will sincerely follow the FLW device and will go for the health concerned issues. They all agreed that they will go for the institutional delivery and also understood the importance of exclusive breast feeding for a baby up to 6 months. They understood that colostrum is rich in nutrition and not to be discarded. Though it's not easy for the women to go against the practices that were followed at their homes but the motivation and gain in knowledge inspired them to take a decision of not even giving the water to their babies up to 6 months.

Figure 70: Practices Followed by women



Twenty-four-year-old Anita Devi*, who hails from Bandajori panchayat in Sarwan block of Deoghar, had her first pregnancy when she was 16 years old. Two years ago, during her last pregnancy, she felt pain during urination and very itchy around her genitals. She shared the same with her mother-in-law who replied it was a common problem during the pregnancy and suggested her not to worry, it would be cured on its own.

During this period, Namita Devi* — a Sahiya didi from her village — visited her house one day to counsel her on good practices during pregnancy. Namita Devi was trained by NEEDS under the project Mobile for Mothers. Through this project, Sahiyas, during their home visits, used the Interactive Voice Recorded System (IVRS) in their mobiles for counselling of pregnant women. This was done through a centralised database and when the Sahiya connected the pregnant lady with the mobile, the IVRS starts asking some health-related questions to the lady and provides answers and counseling to them. During her visit to Anita Devi's house , Namita Devi started providing her information on pregnancy care by using her mobile. At the same time, the mobile also asked Anita Devi whether she knew about these care tips or was practicing them? The voice through the mobile then asked her, "Whether she had any symptoms like painful or burning urination and itchy genitals"? Anita Devi could relate her problem with the question and replied, "Yes." The Sahiya didi then asked her to explain her problem in detail.When she did, the Sahiya didi told her it might be a problem of reproductive tract infections and she should take it seriously and consult a doctor. The doctor examined Anita Devi, prescribed some medicines and asked her to return after 10 days. The lady doctor also appreciated the couple's visit her in time, otherwise if the problem hadcontinued; it might have affected the mother as well as the child's health.*Names changed

They also understood the importance of immunising their babies against diseases as taking the children for immunising will not make their baby ill but will protect them from different diseases. All of the respondents also agreed to the fact that following the healthy sanitary habits is crucial for a good health of baby and they have to use the contraceptives while breastfeeding to avoid pregnancy and meet the nutritional demands of both baby and mother.

9.5.3.10 Sustainability

a) Project Operating Cost - The project operating cost is Rs 4 lakh that includes the training of master trainers, training of 100 ASHA workers, monthly review meeting with ASHA workers, programme monitoring and dissemination meeting with front line workers.

b) Implementation Cost

Table 28: Implementation Cost of Mobile for Mothers app

	Cost	Detail
Software	₹ 5,00,000 ($763)	To convert the Java version to Android version by DEF
Hardware	₹ 6,00,000 ($9160)	@6000/- For 100 Android Phone
Expertise	₹ 2,40,000 ($3664)	1 Data Manager @20000/- PM
Other Infrastructural expenses	₹ 60,000 ($ 916)	For stationaries, communication & Hospitality @5000/- per month

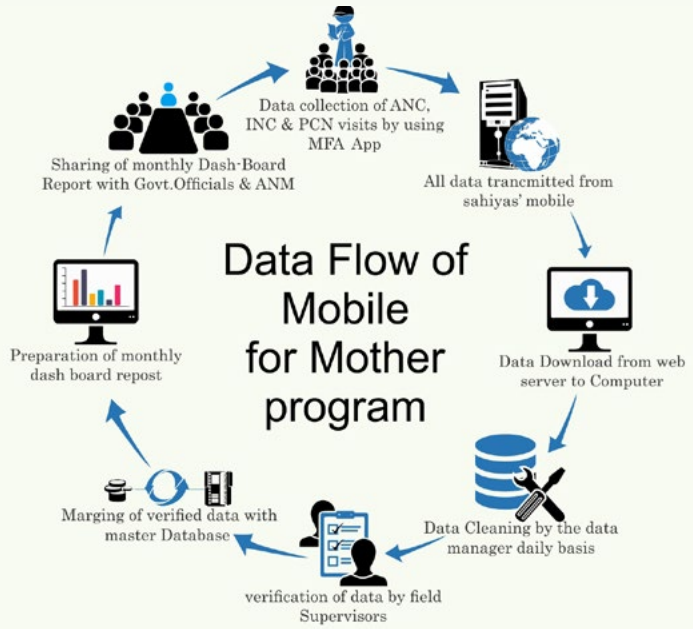
c) Staff Cost - The staff cost is ₹ 7,68,000 that includes 1 Programme Manager @ ₹ 40,000/- PM and 2 Field Supervisors (1 Supervisor per 50 Asha workers) @ ₹ 12,000/- per person per month.

d) Partners and Funders: SIMAVI/ Netherland, WHH/ECV and Vodafone

e) Technological Factors:
Mobile For Mother is the name of application that we use in M4M project in pilot phase, runs on mid-range, multimedia-enabled Nokia handsets and the central server, www.mobileformother.in, is an online web application.

The mobile application contains multimedia and textual information and can present users with informative prompts, *yes/no and multiple selection questions, and text and numerical input.* Each application form may contain skip logic, data validation and calculation. Both the mobile application and the central server require username and password for entry. Client data is submitted via GPRS and cloud hosting ensures reliability of the server *(Figure 71).*

Figure 71: Data Flow of Mobile for Mothers Program



e) Gaps and Challenges that were identified by the project stakeholders were in following terms:

- Non-existence of ASHA workers in a few villages
- Transfer of government officials who were supporting the project

f) Enabling and disabling factors: Co-operation of Sahiyas and their motivation to learn new technology in their counselling environment played a very important role in the achievement of desired outcomes whereas the delayed government approval for the roll-out of the project acted as a hindrance.

f) Project replication: According to the project team, the project can be replicated to other parts of the country as well if the resources and support is provided. The project team has used local languages to develop the content/audio messages which can be recorded in any other languages and can be linked to the application.

9.5.4 Conclusion

M4M mobile application, which is women and child centred, has improved the knowledge and counselling skills of Sahiyas on MNCH issues; and increased the availability of health care to expecting and lactating mothers. The SWOT analysis on the basis of findings is proposed as follow:

Table 29: SWOT Analysis of Mobile for Mothers

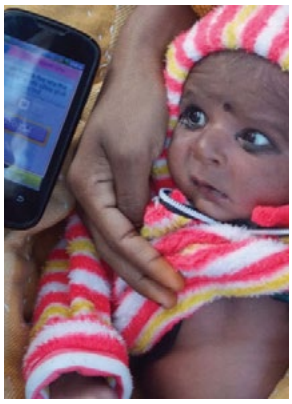
Strengths	Weaknesses
• Content in Hindi/local language • Co-operation of Sahiyas and their motivation to learn new technology	• Lack of family members' participation in counselling sessions

Strengths	Weaknesses
• Enhanced counselling skills of Sahiyas • Easy navigation • User control • Inter-personal communication between health workers and pregnant/lactating women • Encouraging and participative environment of counselling sessions • Enhanced women's knowledge on continuum of MNCH. • Improvement in health-related practices	• Lack of family members' participation in counselling sessions • Non-existence of ASHA workers in a few villages • Transfer of government officials
Opportunities	**Threats**
• Collaboration with private and government institutions for generating funds and mobilising other resources • Expansion of project to other parts	• Lack of funds and other resources

The training sessions were easy to understand and helped Sahiyas acquire the necessary knowledge, skills and confidence for performing spelled out roles. It has also resulted in generating awareness and increasing knowledge on MNCH issues as the app's messages was tailored according to the needs and didn't have any language barrier. The ASHA workers also acknowledged the family members of the pregnant and lactating women as they acted as the gatekeepers and influenced the decision of women to go for good health practices.

In terms of sustainability, the project has to tie up with the government and other private institutions so that the funds and support can be generated, and the hurdles in project implementation in other areas can be removed.

9.6 mSakhi



9.6.1 Introduction

mSakhi (where Sakhi means "a friend" in Hindi) is an interactive vernacular audio/video-guided mobile application that provides support to ASHAs (Accredited Social Health Activists) in conducting routine activities across the continuum of MNCH (Maternal, Newborn and Child Health) care. mSakhi uniquely combines the functions of existing paper-based tools, thereby eliminating the need for difficult-to-use-and-carry flipbooks, manuals, registers, and other job aids. mSakhi content is based on the NRHM (National Rural Health Mission) ASHA manuals and home-based newborn care (HBNC) guidelines and formats. The objectives of mSakhi are:

- To empower front line health workers (FLW) through a mobile phone-based tool for timely identification, management and referral of sick newborns.
- To overcome literacy and poor training barriers among FLWs through an interactive mobile-based multimedia application, which provides critical maternal and newborn health information

The functionalities and features of mSakhi are as follow:

Table 30: mSakhi Functionalities and Features

Functionalities	Features
Self-learning	Voice-guided vernacular messages, illustrations, videos
Beneficiary registration	Easily accessible on-the-go content
Automated home visit schedulers and reminders	Auto-categorisation of sick newborns with automated alerts to supervisors
Beneficiary counselling across MNCH	Web-based dashboard and reports
Step-by-step guide and decision-support for identification, management, and referral of sick newborns	-

ASHAs register pregnant/lactating women and children up to 6 years by entering basic information such as name and village into mSakhi during home visits. Upon registration, mSakhi generates a home visit schedule for each participant and provides a set of audio-video guided instructions for counselling, assessment, and referral specific to each visit. The ANMs receive the data entered by ASHAs into mSakhi, and the data is stored in the mSakhi central database, allowing for real-time tracking of both ASHAs and participants.

The database is designed for seamless integration with existing government Information and Communication Technology (ICT) systems such as the Mother-Child Tracking System (MCTS) and the Health Management Information System (HMIS). This integration has the potential to save time and reduce delays.

Objectives

- To measure the relevance of the project in terms of effect of mSakhi mobile application on knowledge of ASHA workers, counselling skills of ASHAs and the effect on the counselling environment.
- To study the effectiveness of the project in terms of the project's scale and reach; number of ASHAs that have adopted the digital platform; accessibility and adaptability of mSakhi mobile application; and quality of services delivered through mSakhi mobile application.
- To understand the efficiency of the project in terms of time taken to deliver content, learning and services; resource efficiency in technology-enabled learning; user friendliness for the participants; number of institutional deliveries, ANC and PNC check-ups, neonatal check-ups and costs involved.
- To study the sustainability component of the project in terms of identifying challenges in the project implementation, delivery, management and maintenance; and scalability and reliability of the project for a sustainable model.

9.6.2. Research Methodology

The study was undertaken to provide insights into the relevance of mSakhi mobile application and its impact on the counselling environment and health practices of pregnant and lactating women. The study was conducted in Badagaon block of Jhansi district in Uttar Pradesh.. For the selection of sample, multistage sampling was done. A total of 63ASHA/ANM and 126 pregnant and lactating mothers were selected for the study. For the collection of data, questionnaire and semi-structured interviews were used.

Reliability

Data reliability is checked for those variables where Likert scale is used by means of Cronbach's Alpha. The result found is as follows:

a) For FLW Questionnaire - Counseling Environment =-.162, Efficiency = -.697, Ease of use= -.465, Motivation = -1.183, Perception= -1.160, Training = .361, Effect= -1.341.
The individual items all the sections were not relating well with each other, so they are not reliable.

b) For Women questionnaire - Counseling Environment =.727, Efficiency = .083, Motivation = .352, Perception= -1.025, Practices = -.132
So, the individual items in Motivation, Perception and Practices were not relating well with each other.

9.6.3 Research Outcomes

9.6.3.1 Demographic Profile of Respondents

The findings of the study have been divided into the followings sections:

The profile of the respondents was studied in terms of age, gender, educational qualification and geographical distribution of the respondents.

a) ANMs - A majority of the ANMs, i.e. 54 per cent, were aged 50 years and above, followed by 23 per cent aged 30-34 years. In terms of educational qualification, 54 per cent of the ASHAs had educational qualification up to high school and 46 per cent of them were graduates or had higher degree(s). In terms of experience in using the application,

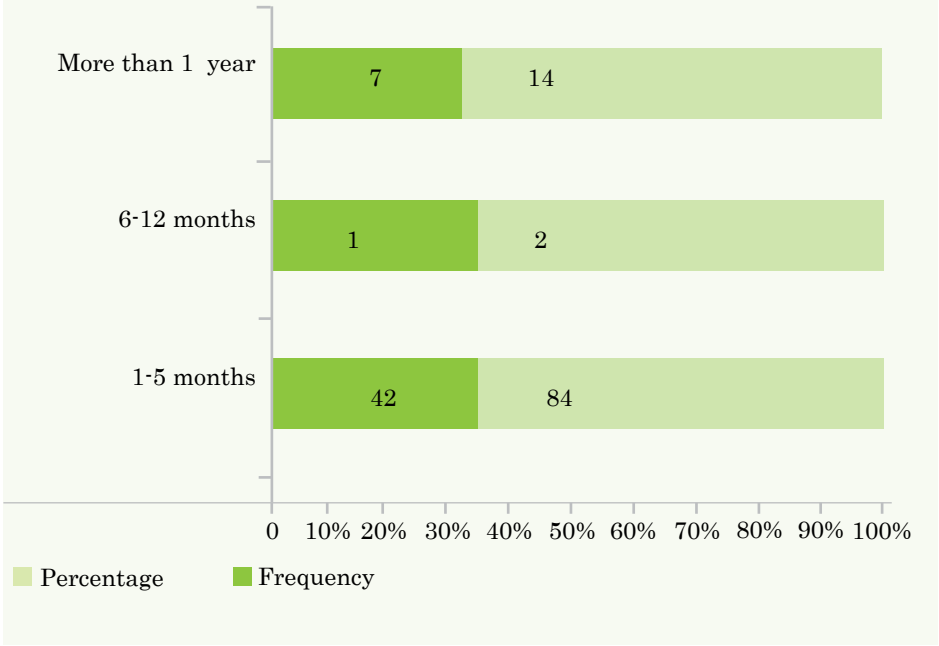
a majority, i.e. 84 per cent, had the experience of 1-5 months, 8 per cent had experience of 6-12 months and 8 per cent had experience of more than a year *(Table 31)*.

Table 31: Demographic Profile of Respondents

Details	Statistics in percentage			
Sample Size		ANM	ASHAs	Women
Age (years)	(20-24) (25-29) (30-34) (35-39) (40-44) (45-49) 50 & above	- - 23 8 8 8 54	- 16 18 30 30 10 2	63 34 3 - - -
Educational Qualification	Illiterate Primary School Middle School High School Graduation & above	- - - 54 46	- - 16 78 6	29 7 28 26 10
Experience of using application	(1-5 months) (6-12 months) More than 1 year	84 8 8	84 2 14	
Total		13	50	126 (Pregnant women-81, Lactating women-45)
State/District/ Block	Uttar Pradesh/ Jhansi/Badagaon			

b) ASHA - Thirty per cent aged 35-39 years and another 30 per cent aged 40-44 years, followed by 16 per cent aged 25-29. In terms of educational qualification, 78 per cent of the ASHAs had educational qualification up to high school, followed by 16 per cent up to middle school and only 6 per cent were graduates or had higher degree *(see Table 31)*. As per the norms also the educational requirement of ASHA is up to class eight and the respondents were higher in educational qualifications. In terms of experience in using the application, a majority, i.e. 84 per cent, had the experience of 1-5 months, 2 per cent had experience of 6-12 months and only 2 per cent had the experience of more than a year *(Figure 72)*.

Figure 72: Experience of using application



c) Women (Pregnant and lactating women)
In the sample studied, 64 per cent were mother of a child and 36 per cent of women were pregnant. A majority of the women, i.e. 63 per cent, were aged 20-24 years, followed by 34 per cent aged 25-29 years, and 3 per cent aged 30-34 years. In terms of educational qualification, 29 per cent of the women were illiterate and only 28 per cent had the educational qualification up to middle school. As most of them were illiterate, there was a higher need for FLWs to counsel these women on health issues.

9.6.3.2 ICT Usage

The study shows that the FLWs were very used to mobile phones and the Internet. Majority of the FLWs, i.e. 72 per cent, had more than two mobile phones with 82 per cent using smartphones. In terms of Internet access, 68 per cent had access to the Internet on mobiles and used it for other purposes i.e. other than social networking sites, music sites and Google Search.

A majority of them had SD cards; 82 per cent of the FLWs were using SD cards to store music, 81 per cent were using it to save images, 25 per cent for playing games, and 23 per cent for saving movies. It was quite surprising to know that none of the respondents used SD cards to store the data that would have helped them to conduct routine activities across the continuum of MNCH.

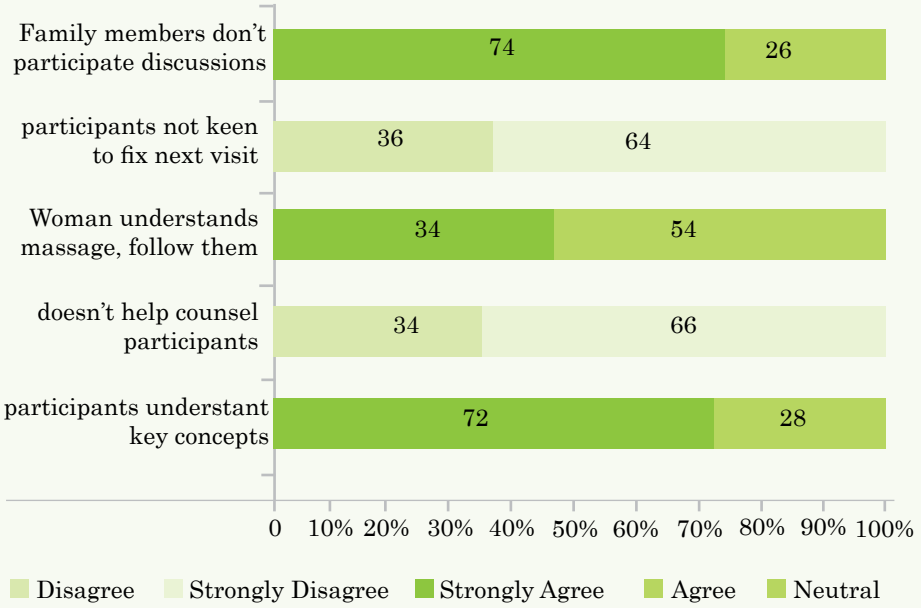
9.6.3.3 Counselling Environment

a) FLWs: ASHAs counsel pregnant and lactating women on birth preparedness, importance of safe delivery, breastfeeding and complementary feeding, immunisation, contraception and prevention of common infections including Reproductive Tract Infection/Sexually Transmitted Infection (RTIs/STIs) and care of young child.

A majority of the FLWs, i.e. 72 per cent, strongly agreed that participants understand key concepts related to health issues like importance of antenatal check-up, institutional delivery, etc. All of the respondents also agreed that mSakhi helped to counsel the participants in a better way as it had a pre-installed questionnaire which helped the FLWs to recall the issues that were discussed with beneficiaries. Using the audio-visual aids attracted the participants to listen with great enthusiasm, understand the message and follow them.

All of the FLW respondents also pointed out that participants were not keen to fix the next visit and it acted as a hurdle for FLWs to mobilise the community and counsel the women on health determinants. They also complained that family members didn't participate in the discussions and it becomes a little challenging for them to convey their message sand motivate the women to go for good health practices in the phase of pregnancy and lactation *(Figure 73)*.

Figure 73: Counselling Environment (ASHA)



b) Women (Pregnant and Lactating Women)

Majority of the respondents, 72 per cent strongly agreed that FLW greeted before starting the session that helped both FLW and women to know each other. Only 28 per cent women agreed with this and none of the women respondents disagreed with this. In terms of influencing the family members, 63 per cent of women strongly agreed that FLW included their family members in discussion and, thus, it became easy for the women in rural areas to motivate their family members to follow the good health practices. And 37 per cent of the women agreed with the fact that their family members were included in the discussion.

About 44 per cent of the respondents said that they were encouraged to ask questions in between counselling sessions. It proves that the environment of counselling session was very open and encouraging. As many as 56 per cent women agreed with the point and none of the women disagreed on this.

Majority of the respondents also strongly agreed that FLWs explained the message in detail. This not only helped the rural women to enhance their knowledge but also increased utilisation of existing health services. More than half the women i.e. 52 per cent strongly agreed that FLW encouraged them to fix the next visit and counselling session on other health topics while 48 per cent of the respondents agreed with this.

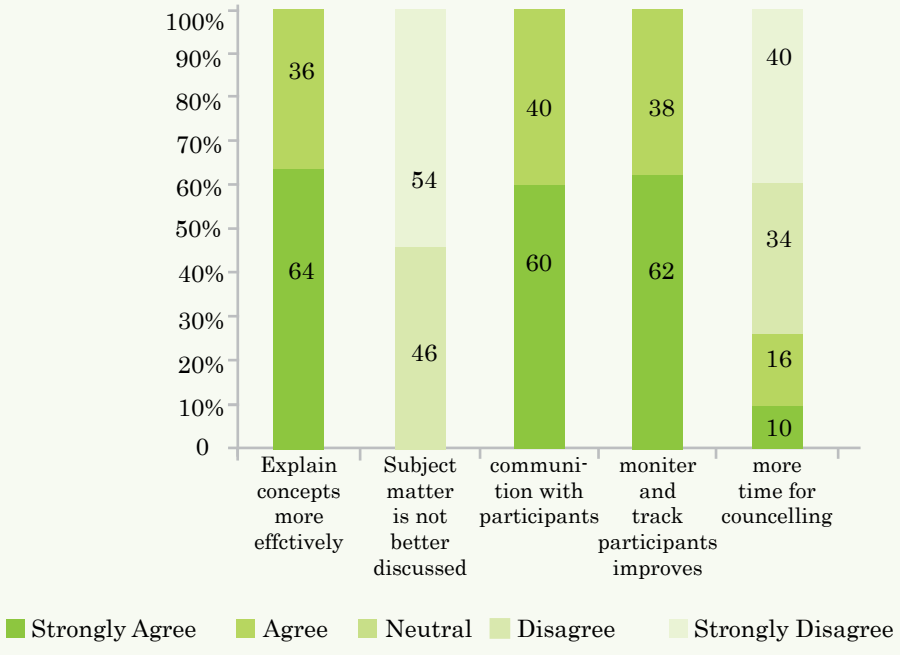
Thus, the counselling environment was very open, egalitarian, inspiring and interactive that helped the women build on their knowledge on health issues.

9.6.3.4 Efficiency

a) FLWs - All the FLW respondents said they agreed that use mSakhi helped them to explain the concept effectively to the participants and eventually this improved the quality of counselling and institutional deliveries and ensured regular ante-natal check-ups, timely vaccinations and post-natal care.

FLWs also responded that the use of mSakhi had helped them monitor and track participants better as pre-installed questionnaire helped the ASHAs to recall the issues that were discussed with beneficiaries. Majority of the FLW respondents, i.e. 40 per cent, strongly disagreed with the point that use of aid in counselling took more time and 34 per cent said that they disagreed with this point. For 26 per cent, use of aid was time consuming *(Figure 74)*.

Figure 74: Efficiency of Counselling



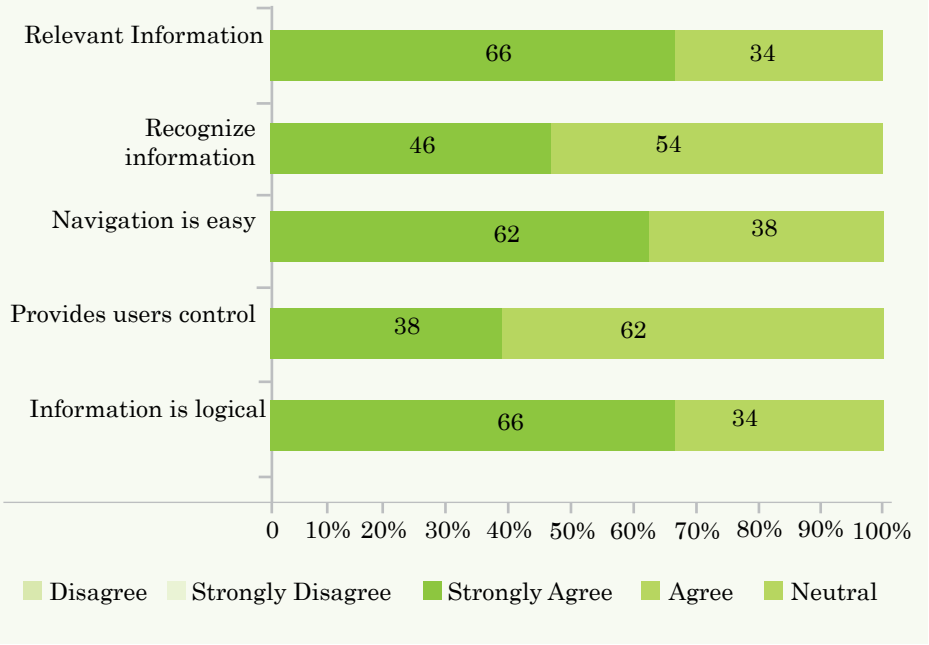
b) Women - More than half the women, i.e. 57 per cent, strongly agreed that use of aid by FLWs in counselling had helped them understand the importance of pregnancy registration. They understood that registering themselves will not only help them to have an institutional delivery but will also enjoy other benefits like timely access to other health services.

All the respondents disagreed with the option that aid made counselling sessions longer as the use of aids in sessions, in fact, made the counselling interesting. All the respondents strongly agreed or agreed with the fact that an FLW was more confident and communicated effectively when he/she was using the aid. The aid that was used by the FLW consisted of audio-visuals that were linked to certain questions that assisted them to conduct efficient interpersonal communication sessions and create better health awareness among beneficiaries. These aids also helped the beneficiaries to have a better understanding on health issues.

9.6.3.5 Ease of Use

All of the FLW respondents said that the information provided through aid is very relevant and they have control over the administration of the content.

Figure 75: Ease of Use



The aid also helped the FLWs to track pregnant woman's pre-natal and post natalcare services and provide the health benefits. Thus, the aid has helped them to mobilise the community in a better way *(Figure 75)*.

9.6.3.5 Motivation Profile

a) FLWs - For majority of the ASHA workers, i.e. 88 per cent, learning new methods to counsel motivated them to learn the functioning of aid. About 6 per cent, however, were neutral in their response and another 6 per cent strongly disagreed.

For all the respondents, positive feedback from family was important as their support acted as a catalyst that helped the women to go for institutional delivery and avail other health benefits. In terms of the reduction in workload, all the respondents agreed to the point that usage of aid had reduced their workload and helped them achieve better the health outcomes. Another factor that motivated the ASHA workers was the opportunity to interact with the family members through which

they gained knowledge on different perspectives of people and learnt ways to change their mind set.

Another motivational factor that motivated all the respondents was the 'gain in respect' as the people from the community started respecting the ASHA workers because they were able to communicate effectively on health benefits concerning expecting and lactating mothers.

b) Women - All of the women respondents agreed that they liked to follow the FLW's advice to avail health benefits. It showed that the FLWs succeeded in motivating the expecting and lactating mothers to get them registered under ASHA as the data clearly showed that none of the respondents relied on Dai for delivery. They all trusted the information given by FLW and were motivated to have the institutional delivery.

> "I feel confident as mSakhi not only gives us complete information but also help us to articulate better"- *ASHA*

All of the women respondents also said that they wanted to ask more of the questions to FLW and clear off their doubts as the aid explained well on the health related issues such as importance of nutritious food, personal hygiene, care during pregnancy, importance of antenatal check-up and institutional delivery, home remedies for minor ailment and importance of immunization etc.

9.6.3.6 Perception

a) Perception of FLWs - The data revealed that all of the ASHAs perceived that usage of aid helped them in number of ways in achieving their targets. They agreed that using of the aid not only helped them to cover more of the participants but had also enhanced their knowledge on how to articulate and disseminate the knowledge with the target group.

All of the respondents said that use of audio, graphic images and short videos had made the counseling sessions interesting as the participants don't get bore and grasp the information faster.

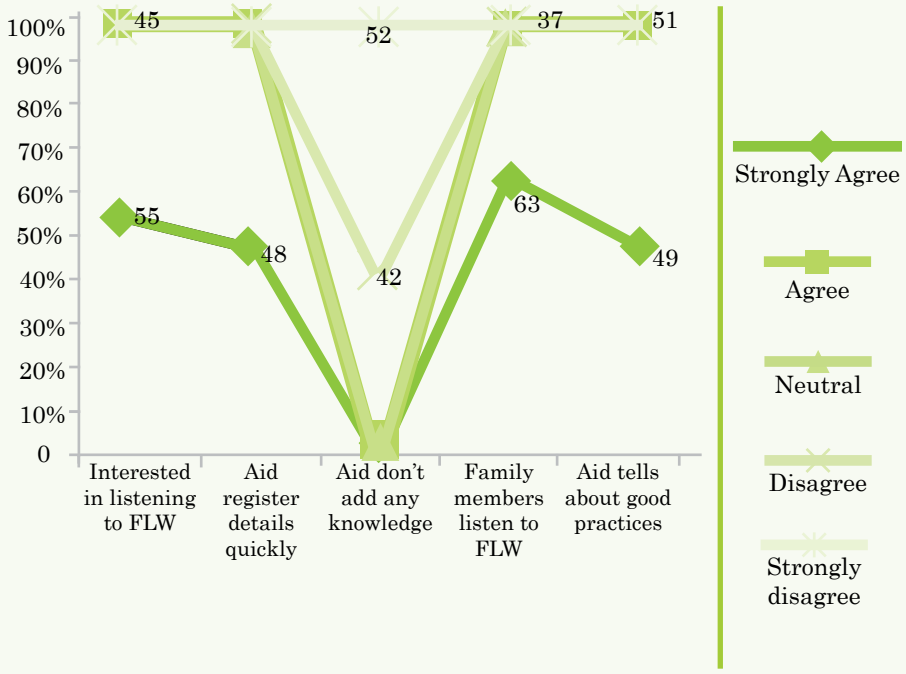
The respondents also pointed out that it has also saved the time in data entry as now they don't have to carry the bulky registers along with them and the registration can be done easily on the tablets provided to them.

b) Perception of Women - All of the women respondents agreed that the use of aid in counseling makes the session very interested where the gain in knowledge is high as compared to the sessions where aids are not used.

The use of aid also makes the information interesting and attractive for the family members and this had made it easy for the expecting and lactating mothers as they don't have to motivate their family members for having institutional delivery and avail other health benefits.

All women were agreed with the point that aid registered the details quickly and the saved time can be utilized for widening the knowledge on health related issues *(Figure 76)*.

Figure 76: Perception of Women on mSakhi



9.6.3.7 Training

The FLWs agreed with the fact that the training equipped them with necessary knowledge and skills resulting in achievement of desired outcomes. The training sessions were interactive enough to clarify the doubts. The training sessions were so informative that all of them wanted to attend refresher training.

For 82 per cent of the respondents, the training that was provided to build on their capacity in using the mobile phones was difficult to understand. For rest 18 per cent of respondents, the training sessions were easy to understand and helped them to acquire the necessary knowledge, skills and confidence for performing spelled out roles.

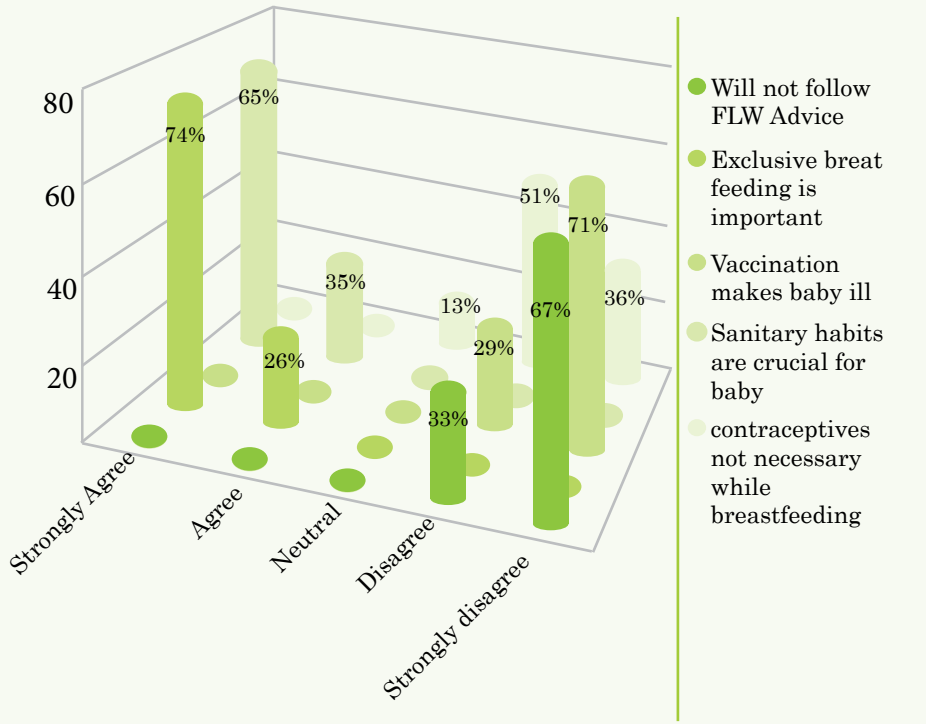
9.6.3.8 Effects

In the study, all of the women respondents agreed that they will sincerely follow the FLW device and will go for the institutional delivery. They also understood the importance of exclusive breast feeding for a baby up to 6 months. Though it's not easy for the women to go against the practices that were followed at their homes but the motivation and gain in knowledge inspired them to take a decision of not even giving the water to their babies up to 6 months.

They also understood the importance of immunizing their babies against disease as taking the children for immunizing will not make their baby ill but will protect them from different diseases. All of the respondents also agreed to the fact that following the healthy sanitary habits are crucial for a good health of baby and they have to use the

contraceptives while breastfeeding to avoid the pregnancy and meet the nutritional demands of both baby and mother.

Figure 77: Practices followed by women



The data revealed that the counseling sessions had a great impact on the women as all of them have decided to go for the safe institutional delivery and none of them wanted to have the home delivery. The ASHAs also reported that all of the participants and their family members followed their advice and decided to use the contraceptives *(Figure 77)*.

9.6.3.9 Sustainability

The respondents didn't face any challenges in the usage of aid. The app was robust enough to provide immediate health service delivery improvements and flexible enough to use. The aid stored and forwarded client information, processed diagnostic algorithms, scheduled and tracked appointments visits for ASHAs.

a) Project Stakeholders

- Department of Health and Family welfare of the State Government of Uttar Pradesh implements India's National Health Mission in Uttar Pradesh and has, along with them State Innovations in Family Planning Services Project Agency, supported m-sakhi through the creation of mhealth lab in Baragaon block in Jhansi district of Uttar Pradesh
- IntraHealth International has developed the msakhi application and deployed the application.

Qualcomm Wireless Reach is the primary project funder and provides technical and managerial support.

b) Cost of the Project

The Project enumerated the mSakhi software, hardware, and other activity costs incurred in the experimental arm to calculate the average cost per ASHA. The main cost components were hardware (smartphones), training, ongoing technical support by an ICT resource person, application development, and server management.

Table 32: mSakhi Implementation Cost

Smartphones (hardware)	4,000 ($ 61) per ASHA
ASHA Training (5 days)	1,600 ($24.4) per ASHA
Ongoing technical support (ICT resource person)	2,280 ($35) per ASHA per year
Application development, server management, and data usage	2,400 ($ 37) per ASHA per year

** 1 dollar= Rs. 65.5(in 2015)*

The project estimated the average cost per ASHA to be ₹ 10,280 for the first year, with a yearly recurring cost of ₹ 4,680 per ASHA.

c) Technological Factors

The Manthan Project initially developed mSakhi on the open-source CommCare platform using java-enabled, keypad-based mobile phones. Based on ASHA and beneficiary feedback for more intuitive and multimedia-enabled applications, the Project then modified mSakhi for touch phones using an open-source Android platform (available on Google Play). ASHAs register beneficiaries (pregnant women and/or newborns) by entering basic information such as name and village into mSakhi during home visits. Upon registration, mSakhi generates a home visit schedule for each beneficiary and provides a set of audio-video guided instructions for counseling, assessment, and referral specific to each visit. The ASHAs' de-facto supervisors (auxiliary nurse midwives or ANMs) receive the data entered by ASHAs into mSakhi, and the data are stored in the mSakhi central database, allowing for real-time tracking of both ASHAs and beneficiaries. The database is designed for seamless integration with existing government information and communication technology (ICT) systems such as the Mother-Child Tracking System (MCTS) and the Health Management Information System (HMIS). This integration has the potential to save time and reduce delays.

9.6.4 Conclusion

India has recently experienced exponential growth in its telecommunications industry, reaching rural areas to a significant extent in the form of mobile phone. The study on m-sakhi mobile app confirmed the availability and use of mobile phones by all health workers and a majority of their beneficiaries, providing further support to the proposed mHealth initiative.

Based on the findings of the study, SWOT Analysis of the project was done to focus upon what are recommendations for strengthening

the project and making it responsive to the needs of both users and beneficiaries.

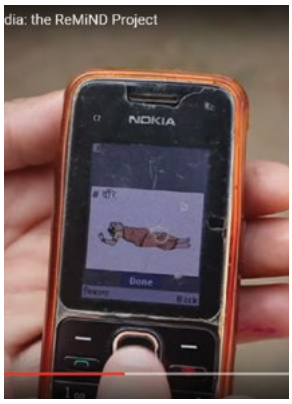
Table 33: SWOT Analysis of mSakhi mobile app

Strengths	Weaknesses
• Vernacular audio/video guided app • Government initiative • Enhanced counseling skills of ASHAs • Easy Navigation • User control • Inter-personal communication b/w Health workers and pregnant & lactating women • Encouraging and participative environment of counseling sessions • Enhanced women's knowledge on continuum of MNCH. • Improvement in Health related practices	• Lack of family members participation in counseling sessions • Transfer of government officials
Opportunities	**Threats**
• Expansion of project to other parts of country.	• Non-availability of app content in local language

From the data it can be concluded that use of m-sakhi app has shown a drastic change in improvement in counseling sessions. ASHAs indicated that use of aid helped them to remember the health topics relate to ANC, INC and PNC as all of the information is available in the mobile application and now they don't forget any important message that has to be communicated to the pregnant and lactating women. The use of voice-enabled and video-supported guided instructions helped the beneficiaries to understand the message in a better way as it made the counseling sessions interesting and the women appreciated the ASHA workers for their work.

It can be concluded that the use of mobile app has strengthen the capacity of frontline health workers and expanded the coverage, quality and timeliness of critical maternal and child health interventions.

9.7 ReMiND


dia: the ReMiND Project
NOKIA


so that ASHAs' performance is improved
and none of the patients face any problems.

9.7.1 Introduction

Reducing Maternal and Newborn Deaths (ReMiND) Project (2012-2015) is a project initiated by Catholic Relief Services (CRS), Dimagi Inc. and Vatsalya for sustained improvements in maternal, newborn and infant health outcomes in Kaushambi District, Uttar Pradesh (India). This program works on a mobile application with five modules to guide the ASHA(Accredited Social Health Activist) worker and support the job of ASHA facilitators. The five modules include functions of Registration of Pregnant Mothers, Management of Pregnant Mothers, Management of Postpartum Mothers, Management of Newborns & Young Children, and Referral Follow-Up. Under this program, ASHAs are provided with basic mobile phones operating Dimagi's open source - CommCare which equips them with multi-media job aids to support client assessment, counseling, and early identification, treatment and/or rapid referral of pregnancy, postpartum and newborn complications. The main objective of this project is to improve and provide support system to ASHAs and facilitators' knowledge and skills so that they can execute their work more efficiently and effectively.

The ReMiND Project emerged from a partnership that began in early 2011 between Catholic Relief Services India (CRS/India) and technology innovator Dimagi, Inc. At that time, CRS responded to a request from Dimagi for partners in India to participate in beta testing of a pregnancy checklist run on basic mobile phones operating Dimagi's CommCare software. Based on progress of the CommCare beta test with 10 ASHAs in Kaushambi District, CRS earmarked private funds for 2012 to support the start-up of the ReMiND Project with all ASHAs in Manjhanpur block of Kaushambi working with local implementing partner Vatsalya and in continued partnership with Dimagi. Additional USAID DIV 2.0 funding awarded to Dimagi helped to support scaleup of ReMiND to a second block, Manjhanpur, of the district in 2013. The project will contribute to the improved outcomes by increasing the adoption of MNCH and nutrition practices among CommCare clients and by improving the quality of essential MNCH services in targeted blocks.

Objectives

The objectives of the study are as follow:

- To study the relevance of the project in terms of effect of ReMiND mobile application on knowledge and counseling skills of ASHA workers; and on the counseling environment.
- To measure the effectiveness of the project in terms of project scale and reach, number of ASHAs that have adopted the digital platform, accessibility and adaptability of ReMiND mobile application quality of the services delivered and change in knowledge and skills of ASHA worker.
- To understand the efficiency of the project in terms of time to deliver content, learning and services; resource efficiency in technology enabled learning ; user friendliness for the participants; number of institutional deliveries, ANC and PNC checkups, neonatal checkups; and the costs involved.
- To study the sustainability component of the project in terms of identifying challenges in the project implementation, delivery, management and maintenance; and scalability and replicability of the project for a sustainable model.

9.7.2 Research Methodology

The ReMiND project is being conducted in 2 blocks of Kaushambi district, Uttar Pradesh. Currently it is reaching out to 13,000 women and 9,500 children through 259 ASHAs. So, Kaushambi was selected as a locale for the study. The sample size for the purpose of this study was 71 ASHA workers (At 95 per cent confidence level and 10 per cent margin of error), 2 beneficiaries under each ASHA worker were interviewed – a total of 142 pregnant/lactating women. The total sample size was 213.Multistage sampling technique was used for this study. In order to ensure a representative sample of health workers, the selection of health facilities for impact analysis was based on purposive sampling. For household sampling (women and children), snowball sampling was carried out.

Reliability

Data reliability is checked for those variables where Likert scale is used by means of Cronbach's Alpha. The result found is as follows:

a) For FLW Questionnaire - Counseling Environment =.667, Efficiency = .498, Ease of use= .663, Motivation = -0.47, Perception= .420, Training = .392, Effect= -.005.
So, the individual items in Motivation, Training and Effect were not relating well with each other.

b) For Women questionnaire - Counseling Environment =.839, Efficiency = .632, Motivation = .189, Perception= -.022, Practices = -.020
So, the individual items in Motivation, Perception and Practices were not relating well with each other.

9.7.3 Research Outcomes

9.7.3.1 Demographic Profile of Respondents

The study was done to provide in-depth understanding about the functioning of M4M mobile application and its impact on the counseling environment and the change in knowledge, attitude and practices of both ASHA workers and the beneficiaries. The findings of the study have been divided into the followings sections:

The socio-economic profile provided insights into the age, educational qualification, occupation and years of experience of using the mobile application.

Table 34: Demographic Profile of Respondents

Details	Statistics in percentage		
		Women	ASHA
Sample Size with Gender distribution	Male Female	- 100 (Pregnant women-49 Lactating mother-51)	- 100
Age (years)	(20-24) (25-29) (30-34)	30 47 17	3 20 41

Details	Statistics in percentage		
Age (years)	(35-39) (40-44) (45-49) 50 & above	6 - - -	20 14 1 1
Educational Qualification	Illiterate Primary Middle High School Intermediate Graduation & above	61 8 11 11 1 8	1 31 44 7 - -
Total		142 Women Pregnant women-70 Lactating mother-72	71
State/District/Block	Uttar Pradesh/ Kaushambi/ Manjhanpur and Mooratganj		

a) ASHAs

A majority of the ASHAs i.e. 41 per cent were aged 30-34 years followed by 20 per cent were aged 35-39 and another 20 per cent aged 25-29 years. In terms of the educational qualification, 44 per cent of the ASHAs had the educational qualification up to High School followed by 31 per cent up to middle school and only 7 per cent of them were graduated or having the higher degree.

In terms of the experience of using the application, a majority i.e. 57 per cent had the experience of (6-12 months), 42 per cent of them were having the experience of (1-5) months and only 1 per cent had the experience of more than a year *(Table 34)*.

b) Pregnant and lactating women

Around half of the women (beneficiaries) i.e. 47 per cent were aged 25-29 years followed by 30 per cent aged 20-24 years. It can be concluded that majority of the women i.e. 77 per cent were aged 20-29 years. In terms of educational qualification, more than half of the women i.e. 61 per cent of the respondents were illiterate *(Table 34)*.

37 per cent were house wives and rest was involved in some or other work to earn their livelihood like 25 per cent was farmers and 35 per cent were daily wage labor.

9.7.3.2 ICT Usage

The study showed that the ASHAs were very used to the mobile phones and the internet as 37 per cent had three mobile phones and the majority of them i.e. 71 per cent had the featured phones. In terms of

touch-screen phones only 28 per cent of the ASHAs had the touchscreen mobiles and majority i.e. 72 per cent didn't have the touchscreen mobiles.

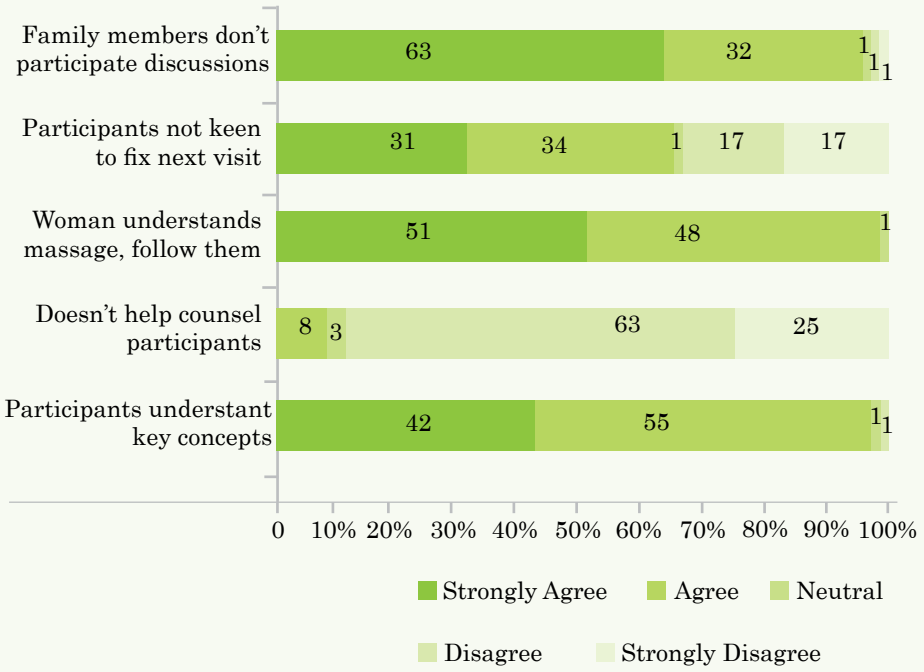
In terms of internet access, 68 per cent didn't have access to internet on mobile and all of them were using the internet for using the ReMiND application in their mobile phones. A majority of the ASHAs i.e. 82 per cent were Vodafone users followed by 58 per cent of BSNL users.

A majority of the ASHAs had the SD card which enabled them to store high capacity memory. In term of the SD card usage, majority of the ASHAs i.e. 83 per cent were using the SD cards to store the images, 79 per cent used for music, 52 per cent for playing games and 15 per cent for storing movies. Most of the ASHAs i.e. 92 per cent didn't recharge and remaining 8 per cent had a recharge of ₹ 50-100.

9.7.3.3 Counseling Environment

a) ASHA's view - Majority of them i.e. 99 per cent said that the use of mobile application that have both the graphics and audio to counsel the mothers on essential pregnancy issues such as nutrition, danger signs, or importance of IFA. Almost all of them agreed that the use of aid helped them in counseling the participants in a better way. Majority of the ASHAs i.e. 97 per cent said that the use of aid also helped the participant to grasp the message and understand the importance of nutrition, immunization, pre-natal care and anti-natal care.

Figure 78: Counseling Environment (ASHA)



Almost all of the ASHA respondents i.e. 65 per cent (strongly agree 31 per cent and agree 34 per cent) also pointed out that participants were not keen to fix the next visit and it acted as hindrance for ASHAs to

mobilize the community and counsel the women on health determinants *(Figure 78)*.

b) Women's View - ASHA counsel the pregnant and lactating women on birth preparedness, importance of safe delivery, breastfeeding and complementary feeding, immunization, contraception, importance of Iron-folic acid, postmortem and newborn complications.

More than three-fourth of the respondents said that ASHA greeted before starting the session that helped both the ASHA worker and women to know each other whereas 14 per cent were neutral in response. 45 per cent of women strongly agreed and 36 per cent agreed that ASHA included their family members in discussion. The women said that it's important to involve the family members specially mother-in-law and husbands as mother-in –law are heavily involved and consulted on issues related to accessing antenatal care, delivery, nutrition, household chores and child care where as husbands provide financial support for any direct or indirect health costs.

Eighty six per cent of the respondents said that they were encouraged to ask the questions in between of the counseling sessions which helped to solve their queries. 56 per cent of the women were agreed with the point and none of the women disagreed on this.

Majority of the respondents also strongly agreed that ASHA explained the message in detail that not only helped the rural women to enhance their knowledge but also increased utilization of existing health services. Half of the women i.e. 50 per cent strongly agreed and 33 per cent agreed that ASHA encouraged them to fix the next visit and counsel on other health topics while 13 per cent of the respondents were neutral in their response.

Thus, the counseling environment was very open, egalitarian, inspiring and interactive that helped the women build on their knowledge on health issues.

9.7.3.4. Efficiency

a) ASHA'S view - Almost all of the respondents i.e.97 per cent of the ASHA workers said they agree that use of aid helped them to explain the concept effectively to the participants and eventually this improved the quality of counseling and early identification, treatment and/or rapid referral of pregnancy, postpartum and newborn complications. This in turn improved the inter-personal communication with women.

More than half of the respondents i.e. 67 per cent of ASHAs stated that use of aid helped in better discussion of the subject matter and 32 per cent said that the aid didn't help in the clarification of discussion session. 96 per cent of the ASHAs also said that use of aid helped them to understand the importance of pregnancy registration and keep a track on the services that has to be provided to the pregnant and lactating women as they received the SMS which in turn contributed in reducing the maternal and neonatal deaths.

Forty Eight per cent strongly agreed and 27 per cent agreed with the point that use of aid in counseling takes more time. 3 per cent of ASHA said that they strongly disagree and 17 per cent disagree with the point that is usage of aid takes more time in counseling.

b) Women's view - More than half of the women i.e. 43 per cent strongly agreed & 42 per cent agreed that use of aid by ASHA in counseling has helped them to understand the importance of nutrition, immunization, pre-natal care and anti-natal care.

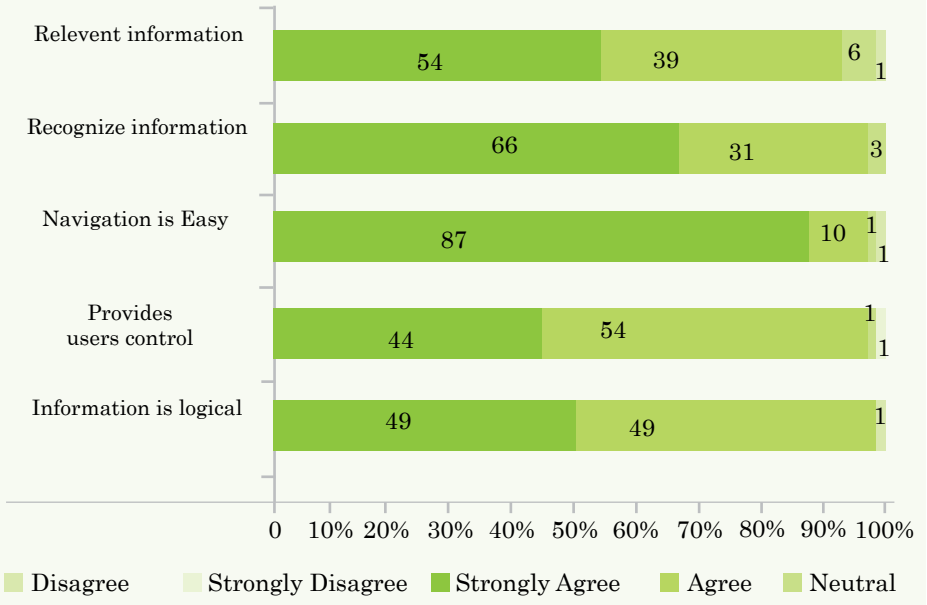
In terms of duration of counseling sessions, 71 per cent said that aid makes counseling session longer as the use of aids in sessions extended the counseling duration. 16 per cent were neutral in response whereas 8 per cent disagreed to it.

In term of the ASHA confidence, 81 per cent of respondents said that ASHA is more confident and communicated effectively when she is using the aid. The aid that was used by the ASHA consisted of graphics and audio that is linked to certain questions that assist them to conduct efficient interpersonal communication sessions and create better health awareness among beneficiaries. These aids also helped the beneficiaries to have a better understanding on health issues.

9.7.3.5 Ease of Use

All of the ASHA respondents said that the information provided through aid is very relevant and logical as it increased their knowledge on maternal and newborn health. It also helped them to recognize the information as the aid had both audio and visuals. They also had the control over the administration of content which helped them to systematically counsel and assess women and babies for any danger signs during home visits after and before the birth.

Figure 79: Ease of Use of ReMiND app



It also made the navigation easy and tracks the women through pregnancy, delivery and the postpartum period with continued tracking of infants through their first year of their life. Once a birth is reported, Interactive Voice Response (IVR) reminders repeatedly prompt the

ASHA to conduct the postpartum visit until the visit is recorded in CommCare. Thus, the aid was easy to use and helped the ASHAs to work with more enthusiasm and achieve excellence in their field *(Figure 79).*

9.7.3.6 Motivation

a) Motivational Profile of ASHAs - All of the ASHAs responded that they are motivated to learn new methods of counseling so that they can make the counseling sessions more interesting and also motivate the beneficiaries to enjoy the health benefits.

Twenty per cent of the respondents strongly agreed and 37 per cent of them agreed to the point that positive feedback from family was not so important in motivating the beneficiaries. 17 per cent strongly disagreed and 25 per cent disagreed that family members support is not important. They said that family members specially the husband and mother-in-law were equally important and were regarded as the primary decision makers in matters related to maternal and child health.

Forty one per cent of the respondents agreed to the point that usage of aid has reduced their workload as they do not have to carry the bulky and heavy registers for pregnancy registration. Another factor that motivated the ASHA workers was the opportunity to interact with the family members where they gain in knowledge on the different perspectives of people and learn the ways to change their mindset.

Another motivational factor that motivated all the respondents was the 'gain in respect' as the people from the community started respecting the frontline workers because they were able to communicate effectively on the health benefits concerning to the expecting and lactating mothers.

b) Motivational Profile of Women - All of the women respondents agreed that they like to follow the ASHA to avail the health benefits. It shows that the ASHAs succeeded in motivating the expecting and lactating mothers to get them registered under ASHA as the data clearly showed that none of the respondents relied on dai for the delivery. They all trusted the information given by ASHA and were motivated to have the institutional delivery.

All the women respondents also said that they wanted to ask ASHA more questions and clear their doubts as the aid explained well on health-related issues such as importance of nutritious food, personal hygiene, care during pregnancy, importance of antenatal check-up and institutional delivery, home remedies for minor ailment and importance of immunisation, etc.

9.7.3.7 Perception

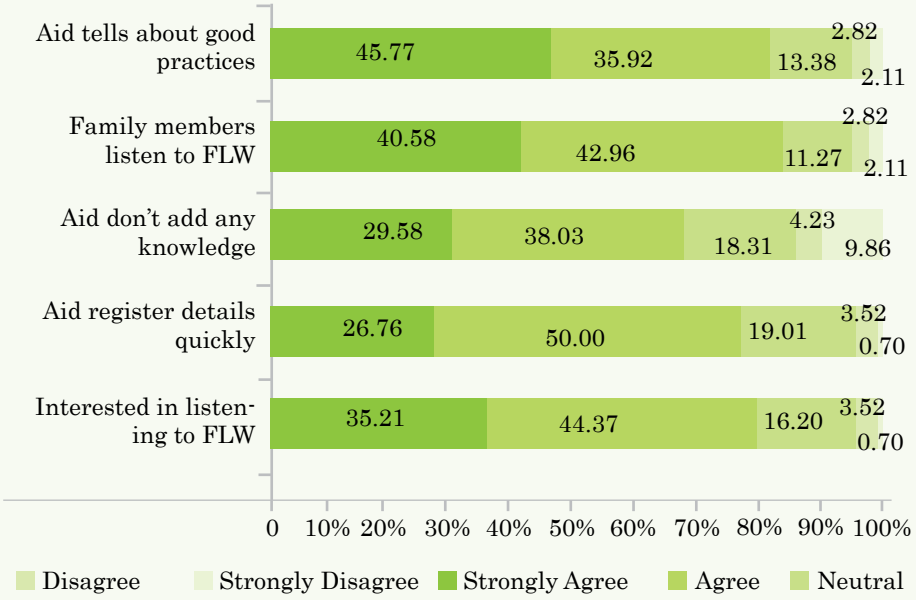
a) Perception of ASHAs - The data revealed that all the ASHAs perceived the app had helped them in a number of ways in achieving their targets. They agreed that using the aid not only helped them cover more participants but also enhanced their knowledge on how to articulate and disseminate the message to the target group.

All the respondents said that the use of graphics and audio had made the counselling sessions interesting as the participants don't get bored and grasp the information faster. The respondents also pointed out that

it had also saved the time taken in data entry as now they didn't =have to carry bulky registers along with them, and the registrations could be done easily on the tablets provided to them.

b) Perception of Women - Almost all the women respondents agreed that the use of aid in counselling made the session very interesting where the gain in knowledge was high as compared to the sessions where aids were not used.

Figure 80: Perception of Women on ReMiND app



The use of aid also made the information interesting and attractive for the family members and this had made it easy for expecting and lactating mothers as they didn't have to motivate their family members separately for institutional delivery and availing other health benefits. In terms of registration, 27 per cent of women strongly agreed and 50 per cent agreed with the point that aid registered the details quickly and 19 per cent were neutral in response *(Figure 80)*.

9.7.3.8 Training

Only 31 per cent of respondents strongly agreed and 65 per cent agreed with the fact that the training helped them add new dimensions to their existing knowledge and also learn new things in terms of knowledge, attitude and skills to council women on health issues. About 4 per cent of the respondents were neutral in their response.

Almost all said that training was very informative and interactive that made their doubts clear. More than half, i.e. 69 per cent, of the respondents pointed that the training sessions were not easy to understand. As many as 71 per cent of the participants wanted to attend the fresher training again, so that they could acquire enough skills to counsel the women.

9.7.3.9 Effects

a) ASHA's view - The data revealed that the counselling sessions had a great impact on the women as almost all (95 per cent) of them have decided to go for safe institutional delivery and none of them wanted to have a baby delivered at home. About 11 per cent of them said that women were keen to use contraceptives and 70 per cent were even ready to use contraceptives to maintain gap between children.

b) Women's view - In the study, all the women respondents agreed that they will sincerely follow the ASHA device and will go for the health concerned issues. They all agreed that they will go for the institutional delivery and also understood the importance of exclusive breastfeeding for a baby up to 6 months. They understood that colostrum is rich in nutrition and not to be discarded. Though it's not easy for the women to go against the practices that were followed at their homes but the motivation and gain in knowledge inspired them to take a decision of not giving water to their babies up to 6 months.

They also understood the importance of immunising and made sure that their babies received recommended immunisation like OPV, DPT-1, 2 & 3, HBV. All the respondents also agreed to the fact that following the healthy sanitary habits are crucial for the good health of a baby and they have to use contraceptives while breastfeeding to avoid pregnancy and meet the nutritional demands of both the baby and the mother.

According to Srimati Devi of Agiaona village in Manjhapur,

> "……..Two years ago, when Srimati Devi of Agiaona village in Manjhanpur block had a miscarriage in the second trimester of her first pregnancy, she did not know what went wrong. Last year, when she became pregnant again, she sought help of witchcraft but did not go for any antenatal check-up through available health services. Unfortunately, the second pregnancy also ended in a miscarriage before the end of the first trimester. When Srimati became pregnant the third time, her local area ASHA Manju Tripathi had recently received CommCare training and was using mobile phone-based job aid to support counselling for pregnant women. When Manju came to know about the pregnancy, she visited Srimati and used the CommCare application on the mobile phone to help convince Srimati to go for antenatal check-ups and to take recommended care during pregnancy. Manju not only counseled Srimati, she also accompanied her to the hospital for check-ups. Manju also succeeded in convincing Srimati's family to let her give birth in a nearby health facility. Srimati gave birth to a healthy baby at Karari Primary Health Centre on August 31, 2013. Both mother and baby are healthy. ASHA Manju proudly shares. "[ASHAs] were making changes [in families' health] earlier, but the mobile phone is helping us to bring this change at a rapid pace….."

9.7.3.10 Sustainability

a) Project Cost

Table 35: Project Cost of ReMiND

S.No.	Description	Expenses			
		Pre-Planning Phase	Start-up Cost	Implementation Phase	Total Cost
1	Human Resource Cost (CRS level)	₹ 5,73,203 ($ 87,512)	₹ 77,96,137 ($ 119,025)	₹ 23,68,899 ($ 361,664)	₹ 3,72,12,165 ($ 568,201)
2	Travel Expenses (CRS level)	₹ 5,98,735 ($ 9,141)	₹ 4,39,177 ($6,705)	₹ 5,67,518 ($ 86,644)	₹ 6,71,309 ($ 102,490)
3	Equipment (CRS level)	₹ 5,240 ($ 80)	₹ 1,04,092 ($ 15,892)	₹ 8,253 ($ 126)	₹ 1,05,441 ($ 16,098)
4	Communication (Partner level)	₹ 0 ($ 0)	₹ 0 ($ 0)	₹ 13,77,268 ($21,027)	₹ 13,77,268 ($21,027)
5	Programming Expenses	₹ 7,72,245 ($1179)	₹ 13,46,221 ($ 20553)	₹ 27,54,602 ($ 42055)	₹ 41,78,048 ($ 63787)
6	Other Direct Cost (Overheads)	₹ 14,72,309 ($22478)	₹ 37,45,945 ($ 5719)	₹ 46,72,508 ($ 71336)	₹ 65,19,477 ($ 99534)
7	Dimagi(CommCare Software development and technical support)	₹ 5,79,675 ($ 8850)	₹ 20,61,023 ($ 31466)	₹ 67,37,330 ($102860)	
	Total	₹ 8,40,060 ($ 1,29,240)	₹ 1,30,58,145 ($ 1,99,361)	₹ 4,49,14,070 ($ 6,85,711)	₹ 5,70,57,940 ($ 8,71,136)

b) Technological Factors - CRS is leading the project with implementing partner Vatsalya (a Lucknow-based NGO) and technology partner Dimagi Inc. (a US-based company developing mHealth technology to improve service delivery). The project has a signed MoU with the Directorate of Family Welfare, Uttar Pradesh, for the project. *Dimagi's open source mobile platform, CommCare:*CRS worked with Dimagi to develop three mHealth applications using CommCare (*www.commcarehq.org*) — an open source mobile platform that enables organisations to build mobile apps for front line workers in low-resource settings. CommCare is designed for non-technical users to design, deploy, and manage mobile data collection and case management

projects. Java-based Nokia C2-01 phones were given to ASHAs. In the coming years, the project will migrate to smartphones and ASHAs will be provided with Moto E mobile phones in this quarter.

c) Project Management, Staffing and Partnership - ReMiND has a decentralised management and staffing plan. The project team of Catholic Relief Services (CRS) includes a full-time Programme Coordinator with overall responsibility for project management, and a Programme Officer who is responsible for day-to-day support to the local implementing partner for project execution. Three members of CRS' IT team in India also provide periodic support for building CommCare applications and technology troubleshooting. The local implementing partner is Vatsalya, a nationally recognised leader in maternal and newborn health that executes project activities at the district level. The IT partner is Dimagi, which has worked to develop and deploy electronic medical records, mobile data collection and decision support, SMS-based outreach and other electronic systems in over 25 countries with numerous partners.

CRS leads ReMiND application design and development of training modules. It also supports and/or leads the build-out of ReMiND CommCare applications and provides ICT technical support. CRS provides training support for roll-out. CRS also provides management quality support and ensures active engagement of district and state-level health officials. CRS oversees project monitoring, evaluation and documentation.

Dimagi leads field iterations of CommCare applications. It leads identification of the appropriate technical support plans, data plan and phone model. Dimagi leads or provides technical backstopping to CRS for application building and backstops for technical support. It supports development of ICT training content and provides training support for roll-out. Dimagi engages primarily at the headquarter-level for strategy, application design and capacity building of CRS IT staff. Dimagi works at the field level for initial training support, field testing and iteration of the project.

d) Gaps and Challenges in implementation of the project

- Illiteracy among ASHAs - In Manjhanpur block, it was found that the number of functionally illiterate ASHAs was much higher (41.4 per cent) than project had expected. Initially, the project team found it challenging to train these ASHAs operating CommCare. However, with consistent follow-up and additional support these ASHAs' skills to use mobile as well as counselling improved gradually.
- Formalities for SIM cards - Due to strict norms imposed by TRAI (Telecom Regulatory Authority of India), purchase of prepaid SIM cards and their activation had become a tedious process. Out of 150 applications along with necessary documents submitted for purchase of SIM cards for the ASHA workers, documents of 45 ASHAs were rejected for different reasons.
- Cost of mobile repairing and loss - On an average, one ASHA worker in the project area lost (theft, lost, misplaced, turning permanently dead, etc.) her mobile phone per month. Most of these losses were theft or permanent damage due to various reasons. Resolving these issues has been a bit challenging. The particular challenge is to get money from ASHAs for the lost phones and damaged phones due to

their negligence. In such cases, ASHAs need to pay towards the cost of repair and a partial cost of the phone.

- Since Java-based Nokia phones C2 - 01 went obsolete, the project was unable to buy them for replacement of lost/damaged ASHAs phones. Also, as data of cases went increasing and postpartum module was added to the app, mSakhi started showing memory error on the Nokia Java phones. For these reasons, the project had to decide to migrate from Java-based phones to smartphones.

e) Partners and Funders of the project

- Partners: Vatsalya, Dimagi, National Health Mission
- Funders: CRS' private funding, USAIDs DIV2 funding (small proportion).

f) Scaling the project forward

CRS is currently scaling the ASHA Sangini (Sangini is the supervisory cadre of ASHAs) application throughout Kaushambi's eight blocks with support from the Kaushambi government staff and Vatsalya, and in one block of Lucknow district with support from the Sarathi Development Foundation and the state government which assisted in deployment activities. Within the two original Kaushambi blocks, training include new components of the MNCH application added by CRS, including a postpartum mother module and newborn module. The ability to scale to new areas is supported by tested systems for how to scale.

By incrementally scaling the technology, adapting it along the way, and working closely to align with updated government strategy, CRS has created a robust mobile solution to deliver impact at scale. CRS has signed a memorandum of understanding for the state government to scale the ASHA Sangini application, demonstrating a concerted interest by the government in the potential impact of supportive supervision for the ASHA role and in possibly scaling the application statewide.

h) Usage of mobiles after withdrawal of services

With the deployment of the ASHA Sanginis (supervisory cadre of ASHAs) in the project district, ReMiND will step back from supporting the ASHAs directly. Instead, the project will focus to support the ASHA Sanginis to supervise and mentor the ASHAs. This change in approach will provide valuable lessons learnt and is an opportunity for the ReMiND project team to gauge whether the ASHAs continue to make home visits at the community level and use the mobile as an aid to counsel pregnant women.

9.7.4 Conclusion

The study of relevance of the ReMiND mobile application provided us the insights into the many aspects in terms of gain in knowledge of ASHAs, the effect of technology on the counselling skills of ASHAs and effect of counselling environment on the beneficiaries. Based on the findings, SWOT analysis has done to get a better understanding of the project.

Table 36: SWOT Analysis of ReMiND

Strengths	Weaknesses
• Vernacular audio/video-guided app • Early identification, treatment and/or rapid referral of pregnancy, postpartum and newborn complications • Enhanced counselling skills of ASHAs • Easy navigation • User control • Inter-personal communication between health workers and pregnant/lactating women • Encouraging and participative environment of counselling sessions • Enhanced women's knowledge on continuum of MNCH • Improvement in health-related practices such as institutional delivery, exclusive breastfeeding, immunisation etc.	• Challenge in training of ASHAs because of illiteracy • Tedious process of SIM cards activation • Cost of mobile repairing and loss
Opportunities	**Threats**
• Expansion of the project to other parts of the country	• Non-availability of app content in local language

As majority of the beneficiaries (pregnant and lactating women) were aged 20-29 years and were illiterate, it became important for the women to rely on health workers to obtain services (e.g. antenatal care, immunisation, family planning), adopt healthy behaviours, recognise maternal and neonatal danger signs and promptly seek care. The aid that was used by the ASHAs consisted of graphics that are linked to certain questions that assist them to conduct efficient interpersonal communication sessions and create better health awareness among beneficiaries. These also helped the beneficiaries to have a better understanding on health issues. The usage of aid made the counselling environment very open, egalitarian, inspiring and interactive that helped the women build on their knowledge on health issues. All the ASHAs and the women respondents said that use of aid helped in explaining the concept effectively and, eventually, this improved the quality of counselling and institutional deliveries and ensured regular ante-natal check-ups, timely vaccinations and post-natal care.

The ReMiND application was very flexible to use that not only clarified the concepts on MNCH of both ASHAs and beneficiaries but also motivated the beneficiaries to adopt positive health practices. It can be concluded from the study that ReMiND is the important and powerful tool to support ASHAs in improving maternal and newborn health outcomes.

The project is sustainable enough as CRS has made their health system interoperable and the mHealth services more powerful by collaborating with government organisation (Directorate of Family Welfare), Vatsalya and Dimagi (ICT partner) for funds and for mobilising. This collaboration has helped the CRS to maximise the power of their project in coordinating different stakeholders of health system and making public health interventions focus on mother and newborn health using mobile application.

9.8 Vatsalya Mandla

9.8.1 Introduction

The Vatsalya Mandla Tablet-based data capturing application is built-on Vatsalya (started in Hoshangabad in 2011), which was replicated to different districts in Madhya Pradesh. The various functionalities of Vatsalya+ are: (a) GPR (General Purpose Revenue) of WCD (Women and Child Development) reporting and monitoring processes; (b) Maintaining digital records of every child (0-5 years), including monthly measurements; (c) Automatic grading of every child as per WHO (World Health Organisation) health cards; (d) Auto identification of malnourished children; (e) Generating exceptional reports and auto escalation; (f) Sending critical alerts to key officials; and (g) Capturing NRC (Nutrition Rehabilitation Centre) admission details with photographs and ensuring follow-ups.

Vatsalya Mandla aims to improve the child health monitoring process and facilitate school enrolment using information communication technology. The robust reporting and alerts mechanism ensures personalised attention to every child, and reduces turnaround time (TAT) and paperwork. Vatsalya Mandla is operational in all the nine blocks of Mandla district. It is being implemented by WCD Mandla (ICDS Mandla). The front line workers are monitored by 72 supervisors and are instructed by nine CDPOs (Child Development Project Officers). The CDPOs have to report to the DPO (Development Project Officer).

Bhopal was the first district in Madhya Pradesh to equip Women and Child Development Sector supervisors with GPS-enabled tablets or Android-based mobile applications, working both in online and offline modes, for data capturing and reporting. Vatsalya Mandla starts communication with parents through sending SMS. The table-based data capturing at the source eliminates data entry at CDPO level. The tablets contain complete information about children health and development. The inbuilt decision support allows supervisors to make reasonable decisions. The application allows to measure feeding of each child, carry out auto grading and upload information directly to the server.

The application is fully compatible with GIS (Geographic Information System) and, without any additional expenditure, helps to see spatial distribution of Anganwadis. The data can be viewed on the map to identify vulnerable areas. The movement of supervisors can be tracked by date, time and geographical coordinates. As inspections are automatically geo-tagged, areas not visited get identified as well. Notifications are then sent to the respective Anganwadis to visit the areas missed. The monthly malnutrition status report is automatically sent through email and SMS to all key officers. Through this software, more than one lakh children are being monitored.

The study was done for the following objectives:

- To measure the relevance of the project in terms of identifying and monitoring maln ourished children by removing various manual processes; maintaining and regularly updating digital records of every child (0-5 years) including monthly measures; monitoring the field visits of various related field staff; ICDS department getting actual figures of various categories of malnourished children; district administration using Vatsalya MIS for focused

area planning; and how to measure relevance from end-users' perspectives.

- To study the effectiveness of the project in terms of the extent to how identification and monitoring of the malnourished children is being done without a manual process; the extent to which it is useful to parents of less than 5-year-old children, Anganwadi workers, ICDS staff, health department officials, especially in the NRC and District Administration; accurate identification of malnourished children as per WHO standards; frequency of follow-ups of severely malnourished children; facilitating coordination between Aanganwadi workers, ICDS, WCD, NRC and the District Administration; and number and frequency of technological up-gradation.
- To understand the efficiency of the project in terms of increase or decrease in the number of children being monitored; number of children registered out of the total numbers of requisite children in the respective blocks; change in the level of commitment of Anganadi workers, ICDS staff, WCD staff and district administration; reduction in turnaround time and paper work at several levels; total cost of intervention broken down by sector – additional staff cost, training cost, software cost, hardware cost, etc.; how partnership strategy has influenced the efficiency of Vatsalya Mandla through cost-sharing measures and complementary activities; and systems and procedure for project/ programme implementation, monitoring and follow up.
- To understand the sustainability component of the project in terms of identifying the technical, physical, socio-cultural, political and other challenges to use the app; identifying motivating factors for mothers to engage with FLWs to update the nutrition status of their babies using the Vatsalya Mandla app; whether there are sustained resources for project and operating /recurring cost – school geo-mappers' structure, staff, training and expertise; whether the project team has developed multi-stakeholder partnerships for replication; whether the project team is documenting and offering lessons learned and best practices in public to ensure transparency and accountability.

9.8.2 Research Methodology

The study was conducted in two blocks of Mandla district in the state of Madhya Pradesh where the project has started its first operation. To gain the in-depth understanding of the project, the data was collected from the different stakeholders of the project including women, supervisors and key officers (like collector, CEO Zila Panchayat, DPO women and Child Development officials). Based on connectivity and geographical location, two blocks (progressive and backward blocks in Mandala district) were identified for data collection. In terms of administrative and geographical location, two blocks (Mandla block as a progressive block and Bichhia block as backward block) of Mandala district (at 95 per cent per cent confidence level and confidence interval of 7) will be covered.

Reliability

Data reliability is checked for those variables where Likert scale is used by means of Cronbach's Alpha. The result found is as follows:

For Community Questionnaire- Household food security and Dietary habits = 0.7, Relevance = .938, Effectiveness= .604. It meant that the

individual items under the section are adequately correlating with each other and are reliable.

9.8.3 Research Outcomes

9.8.3.1 Demographics Profile of Respondents

The demographic profile of respondents was studied in terms of age, gender, educational level and the geographical distribution.

Table 37: Demographics Profile of Respondents

Details	Statistics in percentage	Women	Supervisors	WCD key officers
Gender	Male Female	- 100	- 100	25 75
Age Distribution (in years)	(20-24) (25-29) (30-34) (35-39) (40-44) (45-49) 50 and above	33.5 45.3 16.8 3.7 - - -	- 5 24 9 33 29 9	(25-35) - 67 (36-45) -33
Educational level	Illiterate Primary Middle Secondary Senior Secondary Graduation Post-Graduation	12.5 13 24 24 11 16	- - - - - 21	- - - - - 33 67
Total		160	21	3
State/District/Block		Madhya Pradesh/ Mandla/ Bichia, Mandla		

a) Women - Around half the women (beneficiaries), i.e. 45 per cent, were aged 25-29 years, followed by 33 per cent who were aged 20-24 years. It can be concluded that majority of the women, i.e. 78 per cent, were aged 20-29 years. In terms of educational qualification, 20 per cent of the respondents were illiterate and one-fourth of the women were qualified up to middle and secondary level *(Table 37)*.

b) Supervisors - All the health workers' supervisors were female and around 70 per cent of them were aged 70 years and above. In terms of educational qualifi cation, all of them were graduate or above *(Table 37)*.

c) *WCD key officers* - The key officers that were interviewed included Collector, Development Project Officer (DPO) and Prime Minister's Rural Development Fellow (PMRDF). In terms of educational qualification, all of them were at least graduates and above 25 years of age *(Table 37)*.

9.8.3.2 Assets and Housing Characteristics

The knowledge on assets and housing characteristics of respondents helped gain insights into the economic status. The data revealed that almost all the mothers had basic assets i.e. house, an electric fan, electricity connection and a bank or post-office account. Out of 160 women, only 9 women had computer at their home.

In terms of toilet facility, majority of them, i.e. 70 per cent, were using pakka toilets and knew about the need of using toilets in preventing avoidable ill health and loss of productivity. Only 5 per cent had kachcha toilets and about another one-fourth went for open defecation.

In terms of roof type, 70 per cent had clay roof and only 30 per cent had strong concrete roof. this proved that majority of them were not protected from natural calamities.

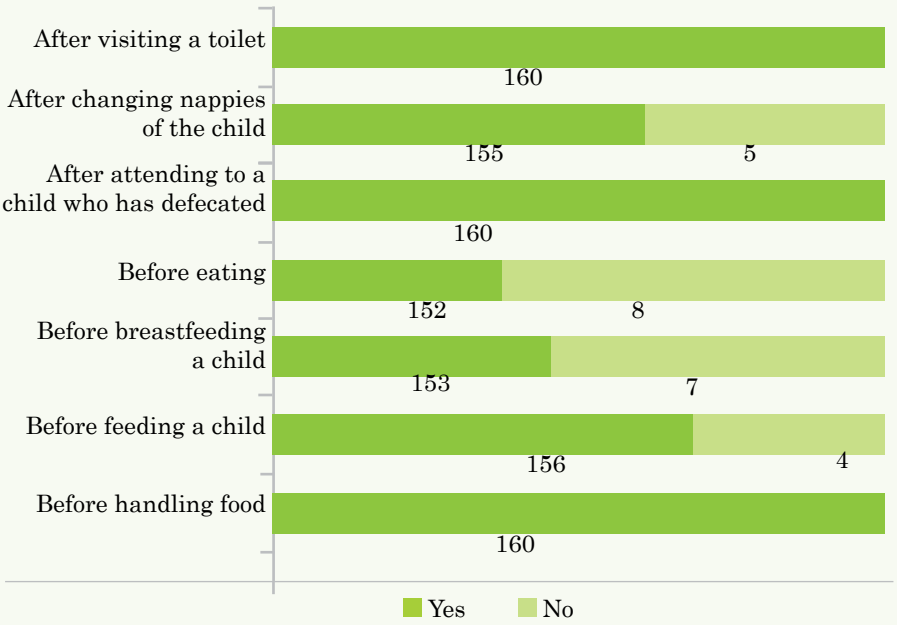
Around three-fourth of the women used government tap as a source of drinking water at home. The other sources of drinking water were boring water, hand pump, personal tap and tube well. For household chores, 70 per cent of them used government taps.

9.8.3.3 Health and Sanitation

All the women respondents washed their hands with soap after using the toilet to avoid infectious diseases that can otherwise be spread from one person to another by contaminated hands. Also, all the women washed their hands before handling food and after attending to a child who had defecated. About 95 per cent of women washed their hands before feeding and breastfeeding a child. Only 4 per cent of the women didn't wash their hands after changing the nappies of the child due to lack on information on hygiene *(Figure 81)*.

Only 2 per cent of women respondents said that their child under 5 years of age suffered with diarrhoea as almost all women followed the sanitation and hygienic practices in child care. Around half the women said their children under 5 years of age have suffered from fever with chills because of change in weather. All the women said that they continued breastfeeding or giving food to their child in fever and diarrhoea, and they approached ASHA workers and doctors if required.

Figure 81: Sanitary Habits of Women



9.8.3.4 Household Food Security and Dietary Diversity

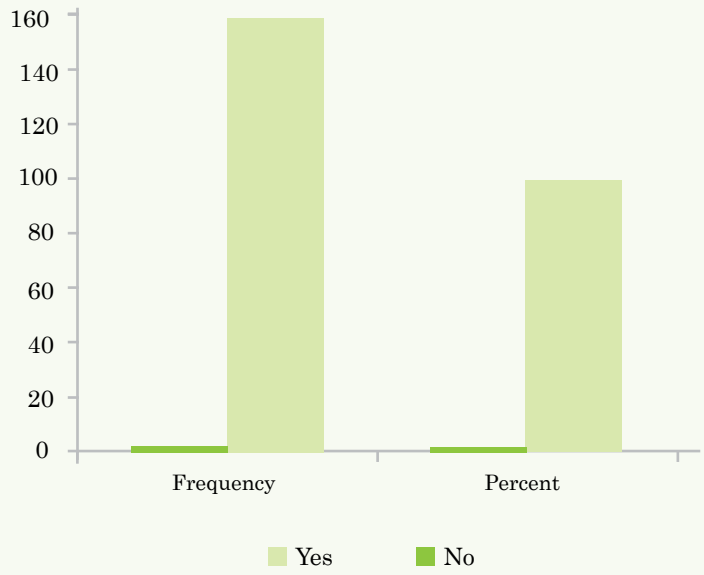
In terms of food security, 94 per cent of the women said that in the past four years, they had never worried about the availability of food at their home. About, 86 per cent of women said that it never happened that they were not able to eat the kind of food that they would have preferred to eat because of lack of resources. Almost all of them said they never slept empty stomach on account of limited food. This proved that though the respondents belonged to a lower ring of economic ladder, they were able to manage the required food for their family members.

9.8.3.5 Breast Feeding and Complementary Child Feeding

Adequate nutrition during infancy and early childhood is essential to ensure the growth, health, and development of children to their full potential. Exclusive breastfeeding for six months and introducing complementary food from six months onwards are important to meet the nutritional requirements and overall growth of the infants. About 70 per cent of the women said that their baby was put up to the breast of mother within first hour of the birth. This led to an increase in women's confidence that they can breastfeed, and also enhanced the mother-child bond. Interestingly, 98 per cent of the children had received the colostrum the first milk that mother's breast produces during pregnancy (*Figure 82*).

They said that they have norms of the eldest member of the family feeding honey to a newborn child yet they managed to give colostrum to their babies. They all knew the benefits of colostrum as they had been told about it by the health workers. They all knew that colostrum is full of antibodies that provides immunity to their child and is the perfect food for baby's first feed.

Figure 82: Children received colostrum



In terms of complementary feeding, 67 per cent of women introduced other food in addition to breast milk to their child from six months onwards. It also implies that the children were exclusively breastfed for the first six months.The complementary feeding was adequate in terms of amount, frequency, consistency and variety of foods to cover the nutritional demands of a growing child. In terms of the frequency of complementary feeding, 60 per cent of the women were feeding their child more than three times a day to meet the nutritional demands of a growing child and to avoid the malnutrition.

One-fourth of the women said that they were making cow milk substitutes such as curd, porridge and kheer for their children to make the baby's bones strong. Out of 160 women, 154 said that they used staple foods such as cereals for the child's meal. Around three-fourth of women, i.e. 72 per cent, included vegetables in blended form like mashed potato to make the meal rich in carbohydrate, protein and vitamins. About 65 per cent women used fats/sugar — concentrated sources of energy and other essential fat sources —that children need to grow. Very few women included fruits, legumes and animal food in the diet as these are expensive and people belonging to rural areas can't always afford them.

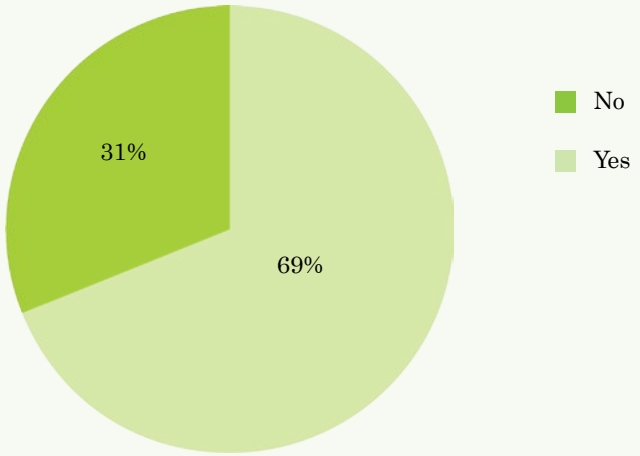
9.8.3.6 Relevance

a) Women's view - Only 69 per cent of the women have heard about Vatsalya Mandal and rest didn't have any awareness *(Figure 83)*. In terms of the source of information, 14 women came to know about the app from word of mouth, 89 from Aanganwadi workers and 10 per cent from supervisors of the programme who were monitoring the Aanganwadi workers. No one had heard about the app through newspaper, radio or television, implying that the app was not popular in electronic and print media.

In terms of the knowledge on health workers, interestingly everyone knew about the ASHAs/FLWs/Sahiyas of their village. So, it can be

stated that all of the women had a good connection with health workers and they referred health workers for meeting the health and nutritional demands of themselves and of their child.

Figure 83: Women's awareness on Vatsalya Mandla



All the women respondents knew the duties of an ASHA/FLW/Sahiya with 90 out of 160 women having a fairly good knowledge and 68 women having 'very good' knowledge. They all knew that a health worker's duty is to create awareness on health and mobilise the community towards utilising existing health services. Almost all the respondents also reported that these health workers were performing their duties well and motivating the women and their families to follow the good health practices related to nutrition and immunisation of women and child up to 6 years of age.

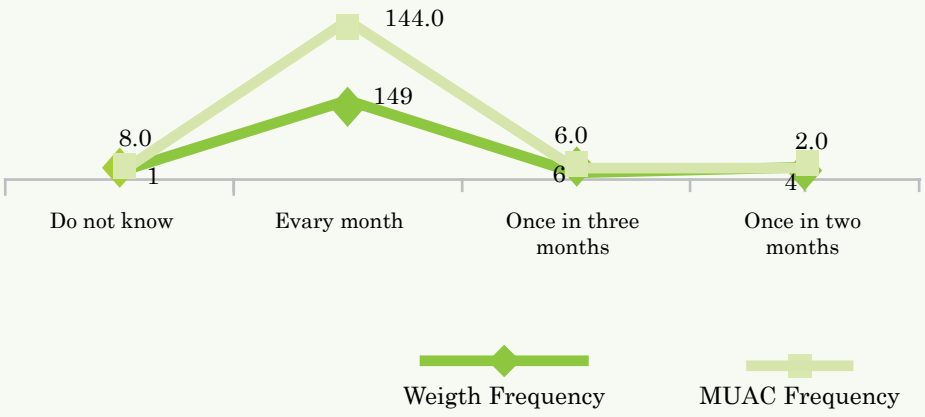
b) Supervisors' View - The supervisors surveyed in the study reported that the use of tablet in Vatsalya took minimum time to update the child's (0-5 years) data digitally including the measurements. On an average, 20 and above children were being monitored per tablet. The supervisors said that the child records were maintained by the Anganwadi workers in a register and after that the supervisor's duty started in filling in all the data digitally in the tablet. The data can be viewed on the map to identify vulnerable areas. As soon as the data was entered in the tablet, the evaluation in terms of growth chart started where the yellow colour in chart indicated a child was malnourished and red indicated a child was severely malnourished. If a child was found to be severely malnourished then the child was referred to an Nutritional Resource Centre (running in 60 villages of Mandla district till present).

9.8.3.7 Effectiveness

a) Women's view - Three-fourth of the women said that Anganwadi workers visited every month to supervise and track the health of their child. When the women visited an AWC, the workers used to give them the IFA tablets and immunise/vaccinate the child against the diseases. Out of 160 women, 157 women's children were registered under Vatsalya Mandla.

Almost all, i.e. 93 per cent, of the women said that their child was weighed every month and when the child was found to be a low-weight-for-age then the child was considered as under-weight or malnourished and referred to a Nutritional Resource Centre (NRC), which is equipped with available resources and materials on nutrition and child development. An NRC staff then rechecked the child for the weight and other parameters of growth and development, if found malnourished the child was admitted and given nutritional supplements to recover the child from deficiency.

Figure 84: Weight and MUAC Measurement



In terms of MUAC measurement, 90 per cent of the women said that their child's (aged 6 months-5 years) Mid Upper Arm Circumference (MUAC) is measured every month to check for malnutrition. All the details of the child collected by Anganwadi workers are then given to supervisors who evaluate the growth and development of child *(Figure 84)*.

b) Supervisor's View - In terms of effectiveness, all the supervisors strongly agreed to the statement that the app had greatly helped in auto-identification of malnourished children as per WHO standards.

c) WCD Key officer's View - According to PMRDF, they had to look after 2,100 Anganwadi centres and the information flow was very high and not in readable format as it was manually entered by the health workers. This aroused the problem in collecting and collating the data. Digitally entering the data in app had not only resolved the problem but also had a more visual impact as the data was shown in statistics and graphs. The GIS app also tracked the movement of supervisors by date, time and geographical coordinates. As inspections were automatically geo-tagged, areas not visited were identified as well. Notifications were then sent to the respective Anganwadis to visit the areas missed. The monthly malnutrition status report was also automatically sent through email and SMS to all key officers.

9.8.3.8 Efficiency

a) Women's View - All the women interviewed responded that they were getting the IFA tablets and porridge as nutritional supplements and foods from the government for child's nutrition. They were not getting anything from private or non-government sources. The women said that they were forced to have the IFA tablets so that the nutritional demands of both the women and child could be met. The women complained that they didn't consume the porridge as it's of not good quality.

About 72 per cent of the women said that there has been an improvement in the nutritional status of children in the region than how it was three years back. Three-fourth of the women said that the credit for these changes goes to Vatsalya Mandla as the digital records of each child (0-5 years) is maintained, including the child's measurements.

b) Supervisors' View - All supervisors responded that there has been an improvement in the monitoring of malnourished children and regular follow-up of severely malnourished children because of Vatsalya Mandla app. They said that earlier identification of malnourished children was done manually using WHO standards, which would be inaccurate sometimes due to lack of skills of Anganwadi workers in interpreting the measurements. But now, using the tablet, data processing and generating reports have become easier. All of them also said that there has been an increase in the number of children being monitored every month as the project has reduced turnaround time (TAT) and paperwork.
Also, the offli
ne working mode of the app has helped the supervisors to synchronise the data when the tablet is under network coverage (as there is a low connectivity network in Mandla district because of a dispersed population).

c) Key officers' View - According to the Development Project Officer (DPO), each Anganwadi worker collected manual data on all children by the 10th of every month. Each supervisor, who was controlling 25-30 centres, had to digitally enter the data on a tablet from 11th to 20th of every month, which has to be uploaded by 21st of every month. Also, the supervisors were tracked through GPRS because of which they had to be present at their respective Anganwadi centres (within 30m radius) so that fake reports could not be prepared.

In terms of time and cost efficiency, efforts and time required for data collection and data compiling — to generate various required reports — has reduced remarkably. Efforts are more organised and productive now as related officials are more accountable for their duties and responsibilities. Government machinery in the district is now more proactive and responsive towards severely malnourished children as well. Strong follow-ups of severely malnourished children are achieved through Vatsalya application. It had also reduced cost of stationary materials for collecting huge numbers of data offline across all Anganwadis of the district.

9.8.3.9 Sustainability

a) Project Cost - Vatsalya Mandla is operational in all the nine blocks of the district. Almost all the children of 0-5 years of age are registered in the portal. Tablets installed with Android applications are provided to all WCD Sector Supervisors (72 in total) for monthly data capturing

from source. According to key officers at the administration level, there is no any administration cost using MIS as a percentage of intervention cost as administration is an internal cost to ICDS. The budget allotment for purchase and maintenance of tablets for the year 2013-14 is:

Table 38: Project Cost of Vatsalya Mandla

Number of Purchased tablets	Details of fund for tablet purchase, training, maintenance and miscellaneous	Allotted funds (In lakh)	Expenditure (In lakh)
81	Tablet Purchase	₹ 8,10,000 ($12,366)	₹ 6,83,000 ($ 1,043)
	Google Synchronization, Training, Annual Maintenance	₹ 2,43,000 ($ 3,701)	₹ 1,03,000 ($ 1,573)
	SIM Card	₹ 8,000 ($ 122)	₹ 8,000 ($ 122)
	Internet Recharge	₹ 1,21,000 ($1,847)	₹ 30,000 ($ 458)
	Total	₹ 11,83,000 ($ 18,061)	₹ 8,24,000 ($12,580)

* 1 dollar= Rs. 65.5(in 2015)

b) Project Stakeholders and funders

Stakeholders: Children of 0-5 year of age, ICDS department, Health Department and District Administration are the key stakeholders. Each child of 0-5 years of age is now auto-identified for its malnutrition category and, hence, high chances of receiving required Anganwadi services and treatment through NRC admits. These children will be enrolled in schools after 5 years of age. ICDS department is now getting actual figures of various categories of malnourished children in the district for effective monitoring and planning, as chances of errors are least in auto-identification of categories of these children. ICDS department is also capturing data from source; it is also getting effective monitoring by ensuring regular field visits of Sector Supervisors through GPS-based inspection tracking system, emails/ SMS to key officials, and regular follow-ups of severely malnourished children for NRC admits. Health department is using optimum Nutritional Rehabilitation Centre (NRC) capacities for the treatments of severely malnourished children. District administration will use it as a tool for focused area planning as analysis of various reports generated along with poor performance areas or areas with high risks may be taken on priority.

Funders and Supporters: The initiative is successfully running since 2012 under the leadership of District Collector, District Project Officer, WCD department and Prime Minister's Rural Development Fellows, Mandla. Funds from WCD department (Atal Bal Mission) and Integrated Action Plan (IAP) were used for the purpose. Around 12.83 lakh funds were allocated for the project. This fund was utilised to

purchase tablets for the development of Vatsalya Mandla application (Android application for tablet and web portal) and annual maintenance costs.

> "If Health Department and ICDS work together, the advantages are great for everyone," - *Manjulata Singh, DPO*
>
> "We give the Anganwadi workers and sector supervisors a free hand. We trust them," - *Lokesh Kumar Jatav, District Collector*

c) Technological Factors

ICT Solution adopted: The project runs on the concept of capturing data at source, and for this purpose tablets are used. Tablets are provided to all 72 WCD Sector Supervisors for data capturing at source. The geo-tagged data ensures that the data is collected on field. The app designer had used diverse technologies like Web, mobile Android application, GPS & GIS to accomplish the task. The Android application development is based on an open source software but web application is built-on Microsoft technologies. The application is built on modular approach and service oriented architecture is used. All the communication between web and tablet application is being done through web services. The data is encrypted before it is transmitted from tablet to server.

Compliance with Standards: The tablet application developed for data collection at Supervisor/ Aanganwadi level is adhering the guidelines issued by DeitY (available at https://egovstandards.gov.in/node/2227) on the points like use of HTML5-based forms, mobile CSS, Unicode-based data display/data entry and minimum free text entry, auto transliteration for Hindi, use of client side local storage, replication of local storage with server, device IMEI base automatic sign-in, optimised network request, use of Ajax, 'Click to Call' for mobile numbers, etc. As the application is developed for Internet users and targeted audience, it is optimised for tablets only. The web application is based on service-oriented architecture. All data communication is being done through web services and JSON objects.

Digital Inclusion: Vatsalya Mandla is implemented in all nine blocks of the district. This Android-based tablet application works in both online/ offline modes in Hindi and English language. User can switch from Hindi to English or vice-versa. The project is primarily developed for all the children of 0-5 year age in the district. The children registered in the Vatsalya portal and their digitised records are maintained, updated and monitored regularly. Separate user ID and passwords are provided for district and block-level officials for effective monitoring and follow-ups in their areas of operations.

d) Challenges faced

- Lethargic behaviour of officers towards innovative technologies and lack of skills in field staffs to use new technologies were main challenges faced during implementation of Vatsalya Mandla project.

It was tried to nullify the effect of these by motivating and training them effectively in required area.

- It was a little challenging to make WCD field staff (Sector Supervisors) technology friendly as many of them were afraid of using mobile technology because they had not used anything similar in the past. Regular data entry in the portal was a serious issue in the initial stages of launch of Vatsalya Mandla because manual data collection of children from all the Anganwadi centres and their entry in the portal was a time taking and tedious task. Therefore, in order to remove bottlenecks of data collection and data entry in the portal, district Mandla has provided tablets installed with Android application to its WCD Sector Supervisors to ensure regular and timely data capturing at source. Mandla is the only district in Madhya Pradesh which is using tablets to ensure timely data capturing.

9.8.9 Conclusion

The study on Vatsalya Mandla provided in-depth understanding of the app in terms of relevance, effectiveness, efficiency and sustainability. It can be concluded that majority of the women (mother of a child in the age group of 0-6 years), i.e. 78 per cent, were aged 20-29 years and only 12 per cent of them were illiterate. The beneficiaries belonged to a lower ring of economic ladder but still followed good hygiene and sanitation habits as majority of them had pakka toilets at their home; washed their hands with soap before preparing meal and after going to the toilet; and were able to manage food for their family members.

Based on the findings of the study, SWOT Analysis of the project was carried out to focus upon what are recommendations for strengthening the project and making it responsive to the needs.

Table 39: SWOT Analysis of Vatsalya Mandla

Strengths	Weaknesses
• Works in both online/offline modes in Hindi and English language • Regular and timely data capture • Digitised records are maintained, updated and monitored regularly • Tracking of supervisors by date, time and geographical coordinates through GIS app • Officials are more accountable for their duties and responsibilities. • Government machinery in the district is now more proactive and responsive towards severely malnourished children • Data processing and generating the reports have become easier • Government initiative	• Lethargic behaviour of officers towards innovative technologies • Lack of skills among field staff to use new technologies

Opportunities	Threats
• Motivating and training the field staffs to use new technologies • Expansion of project in other parts of state.	• Bureaucratic procedures

The counselling of women by the health workers bought a change in social and behavioural practices of the women. Almost all the women breastfed their child within the first hour of delivery, thereby going against the family norm of giving honey to the baby first; they fed colostrum to their newborn baby to increase their immunity; and exclusively breastfed their child for six months. More than half the women were aware of the app and have registered their child under the Vatsalya Mandla so that their child is measured every month under 11 parameters and is immunised against the diseases.

The Vatsalya Mandla app succeeded to remove the bottlenecks of data collection and data entry in the portal and minimised the risk of exclusions of severely malnourished category children. The geo-mapping of field staff has improved the monitoring and service delivery as WCD field staff is bound to visit the centres for data capturing from site only. This, in turn, has made officials more accountable for their duties and responsibilities. Overall, it can be concluded that Vatsalya Mandla has improved in identifying category of malnutrition in a child, monitoring, regular follow-ups, record keeping and reporting.

In terms of sustainability, the application is using ppen source software, which can be replicated by others to improve the overall public health. The app was very flexible and friendly to use. The project team is trying to collaborate with central government to enhance the sustainability.

9.9 Discussion

All the m-Health apps were guided by the principles of targeting the vulnerable population like women and children in rural and remote areas that made them more relevant and effective. In rural and remote areas, people don't have access to health services and the hindrance factors include distance to resources, severe shortage of trained health professionals and lack of investment in public health. The m-Health has alleviated specific health system constraints that hindered effective coverage of health interventions by mPowering the health workers. Mother and Child Tracking System registered pregnant women and children using customised mobile-based applications to strengthen the accountability and deliver quality health services and support in reducing the morbidity and mortality rates.

m-Health apps studied focused on two broad areas - mPowering the health workers and the health management system. mSakhi, Mobile for Mother and ReMiND were under the mPowering of health workers whereas Vatsalya, eMamta, Arogyshreni and Hamari Ladli fall under the health management system.

a) mPowering the Health workers

m-Health strategies have provided with the novel channel to deliver health-related content in the form of SMS, IVR, audio/video and images which is of value among illiterate or low-literacy population. The use of aid enhanced the effectiveness of in-person counselling of the targeted population on health — Maternal, Newborn and Child Health (MNCH). In all the cases studied under the m-Health applications (mSakhi, Mobile for Mother and ReMiND) that were focusing on mPowering the health workers, 'Mobile for Mother' app was more relevant in improving the counselling skills as compared to the other two apps as 96 per cent of the respondents said that use of aid in counselling sessions had helped them make the participants understand the key concepts on MNCH and, thus, made their counselling sessions more effective. The use of aid was building the capacity of health workers by reducing the tedious and time-consuming paperwork in data collection and keeping health workers informed through active reminders of upcoming or due/overdue services.

Similarly, 'Mobile for Mother' was more effective, easy to use with high motivation of health workers in counselling sessions and with more effect of aid on pregnant and lactating women to follow the good health practices as compared to mSakhi and ReMiND app. The training provided to health workers have not only improved their counselling skills but has also boosted their self-confidence in motivating the targeted population.

In terms of the knowledge enhancement, only 20 per cent of the health workers using the ReMiND app, half of mSakhi app users and around three-fourth, i.e. 77 per cent, of Mobile for Mother app users responded that the use of aid had increased the knowledge or added new dimensions to their existing knowledge. So, these health apps were focusing more on improving the counselling sessions rather than building on the knowledge.

Though there was not an increase in knowledge of most of the health workers but it developed the ICT skills of health workers. In all the apps, with 88 per cent of the 'M4M' app health workers responded that the aid helped them navigate and track target women through pregnancy, delivery and postpartum period with continued tracking of infants through their first year of their life.

mPowering of health workers has not only improved the counselling sessions but has also resulted in change in behaviour, which in turn led to change in health practices of targeted population. Being informed about health-related practices and receiving holistic counselling from health workers was crucial in enabling the women to make rational health-related choices by overcoming the cultural norms and going for positive health practice.

In the study, in terms of the effects of mHealth apps, all the women agreed to go for institutional delivery and also understood the importance of exclusive breastfeeding for a baby up to 6 months. They understood that colostrum is rich in nutrition and not to be discarded. Though it's not easy for a women to go against the practices that were followed at their home but the motivation and gain in knowledge inspired them to take a decision of not even giving water to their babies up to 6 months. They also understood the importance of immunizing and, thus, made sure that their babies receive recommended immunisation like OPV, DPT-1, 2 &3, HBV. All the respondents also agreed to the fact that following healthy sanitary habits were crucial for the good health of a baby and so they had to use contraceptives till the period they were breastfeeding to avoid pregnancy and to meet the nutritional demands of both baby and mother.

Overall, 'Mobile for Mother' mobile app was more effective and relevant as the content of the mobile app was also available in a local language, which was not the case in the other two apps.

In terms of sustainability, mSakhi and ReMiND were sustainable as they had collaborated with government organisations and private companies for funds and for mobilising other resources.

b) Health Management system

Monitoring is essential for a health system to perform well and to strengthen the capacity of a programme. There are various systems for monitoring and evaluation of health that includes web-enabled Mother and Child Tracking System (MCTS), Health Management Information System (HMIS) and leveraging technology through the use of GIS and GPS. These systems track every pregnant woman, infant and child up to the age of three years by name for ensuring timely antenatal care, institutional delivery and post natal care for the mother; and providing immunisation or other health-related services. Also provided are relevant, accurate and timely data to improve operational planning, monitoring and evidence-based policy formulation.

All the apps under this section had different management system. eMamta used Mother and Child Tracking System with HMIS portal, which is fully functional with all 26 districts of Gujarat. HMIS data was triangulated with CRS, surveys and district officials. Vatsalya Mandal app used GIS maps and databases for planning and monitoring; for tracking the maternal and child mortality as an analytical tool; and for conducting spatial analysis through mapping mortality and health resources using GIS layer. Arogyashreni used Interactive Voice Response System (IVRS) to capture community feedback on the delivery of health services to find possible solutions to the problems. Hamari Ladli is using the ICT-enabled Active Tracker; track and monitor pregnancy from ultrasound till abortion or delivery.

In terms of awareness, 69 per cent of the respondents were aware of Vatsalaya Mandla app. In Arogyashreni, none of the community members interviewed were aware of the project since the project was dead for almost two years. Similarly, 98 per cent of community respondents did not know about Active Tracker being deployed at all the USG testing centres. Similarly, all the women knew about Mamta Cards that a mother gets after registering online but no one knew about eMamta per se. So, it can be concluded that Vatsalya Mandla was more popular among the target audience as 98 per cent of women had registered their child under the app.

In case of monitoring and follow-ups under Vatsalya Mandla, 93 per cent of the women said that every month their child was weighed and referred to a Nutritional Resource Centre (NRC) if the child was found to be a low-weight-for-age and, subsequently, categorised as under-weight or malnourished. The NRCs are equipped with available resources and materials on nutrition and child development. The GIS feature in Vatsalya Mandla also tracked the movement of supervisors by date, time and geographical coordinates. As inspections were automatically geo-tagged, areas not visited would get identified easily. Notifications were then sent to the respective Anganwadis to visit the areas missed. In eMamta, 93.8 per cent of government officials were able to capitalise monitoring and tracking of mother and child through eMamta software, which further streamlined incentives given through government schemes such as Janani Suraksha Yojana, free and zero expense treatment, free drugs and consumables, etc. On the other hand, in the case of Arogyashreni, more than three-fourth of the respondents, i.e. 81 per cent, said that the IVRS system helped in strengthening the health care system at PHC level. They also felt that the project resulted in various other interventions like the Rank Cards became one of the agenda/indicator for discussing and bringing changes that improved the effectiveness of public health service delivery as mandated by the health policy of the state but lead to no major change in the policy. So, all the apps were on the same line in monitoring and follow-ups.

In terms of sustainability, Vatsalya Mandla and eMamta are sustainable as both of them are government initiated and funded projects. On the other hand, Hamari Ladli is a private company initiative which is looking for collaboration with the department of Women and Child Development whereas Arogyashreni was an NGO initiative, which has not been active for last two years.

10. Recommendations

10.1 Civic Participation

The use of ICT tools to increase civic participation faces a number of challenges such as: (i) lack of consistent and affordable electricity in designing infrastructure for rural civic participation and, where available, such power is usually unreliable; (ii) bad rural connectivity hampers economic, social services and citizen participation; (iii) lack of affordable connectivity and bandwidth is the primary obstacle to most promising civic participation initiatives. Beside these physical and infrastructural challenges, human factors and institutional obstacles include: (i) inexperienced Internet and mobile phone users; (ii) lack of trained technical support: (iii) absence of defined, action oriented citizen participation indicators; (iv) uncoordinated or absent governance mechanism; (v) inadequate incentives for field staff; and (vi) widespread poverty and associated security risks.

The three projects (CGNetSwara, Mobile Vaani, and GPower) studied under citizen participation have the dimensions of social opportunities, economic facilities, political freedom, and psychological well-being. The social opportunities dimension of all the three projects enables individuals to live a better life, G-Power, especially, focuses on adolescent girls. The dimension of economic facilities of these projects allows individuals to utilise resources for the purpose of consumption, production or exchange. Political freedom allows people to exercise their political rights such as community development programmes, campaigns and advocacy. The use of mobile phones, tablets and Internet to exercise individual rights are helping people gain respect from peers and increases their self-esteem, contributing to their psychological well-being.

Based on the aspirations and challenges of the projects in the category of citizen participation, following are the recommendations:

1. Even though attention has been paid to local context with involvement of local community, language still exists as a barrier with the dominance of privileged languages. The G-Power app is not multi – lingual and is only available in English. Similarly, in case of Mobile Vaani and CGNetSwara, the main language is Hindi. There is a huge scope to incorporate local languages and dialects to meet the needs of the people who lack alternative media sources.

2. Local content and information can be created and updated directly by the community members. This will save time and lead to the faster dissemination of news and information. This requires clear communication about human resource needs at the local media outlet and ensuring that enough staff are available who are willing to devote time to learning mobile software components.

3. The various partners and stakeholders involved in the project need to have clear, agreed intended development outcomes, even where constituent partners may themselves have different reasons for being involved in the partnership. From the reports of G-Power, Mobile Vaani and CGNetSwara, it's clear that they lack equal collaboration with the government. It needs

equal effort from both government and the organisations to develop synergy for better result.

- Successful partnerships are built on trust, honesty, openness, mutual understanding and respect. Sustainability and scalability of the intended development intervention need to be built into partnership design at the very beginning. CGNetSwara, Mobile Vaani and G-Power projects are sustainable as people are willing to pay to see the expected changes. It's imperative that projects work on building trust among the community through transparency and accountability, and delivering results.
- Irrespective of the ease of use of technology, user interface and technology, familiarity with tools and system has a huge impact on the use of tools. From experience of other successful projects, it's recommended that only training is never enough, and longer one-to-one mentoring is necessary to make sure that a tool will be used in the long term efficiently.

10.2 Education

1. During the selection of teachers for using the aid, young teachers should be selected because they can easily adopt the new technology and are less hesitant to new system.
2. Funds should be diverted for developing the content of the aid in the local languages so that students studying in local language can easily understand the concepts.
3. There can be periodic monitoring of the software so that if teachers face any technical problems, they can be addressed immediately. In this line, various technology and mobile companies can put in their support in terms of funds and expertise under their CSR initiatives to have a strong technological back-up.
4. The content of digital material can be regularly upgraded aligned with the board curriculum.
5. In case of GIS@School, there should be 24x7 accesses to digital curriculum so that the students can refer to them even outside the classrooms.
6. The statistical information can be shared on the GIS@School portal so that engineers are continuously updated about the present status of the infrastructure in the school.
7. There should be a provision to avoid uploading a similar picture twice until the issue is rectified to avoid confusion.
8. There can be a button for getting reminders for the work that has not been completed.

10.3 Health

1. Strategic partnership should be formed to leverage the expertise of government, non-profits, and technology and mobile industry.
2. Promoting interoperability and standards to increase the sustainability of mHealth applications.
3. A collaboration with Telecom Regulatory Authority of India (TRAI), and mHealth app implementing organisations should be encouraged to :
    - Ensure that the purchase and activation of SIM card doesn't become a tedious process
    - Promote regulatory and policy framework so that the mHealth apps can be designed and implemented without any obstacle.

4. The project team has to invest time, energy and funds in creating awareness about mobile health applications among the app users.
5. All the app users should be provided with at least one technological person at the block level by the implementing organisation to assist if the app user encounters a technological problem.
6. The mobiles used should be insured so that theft, loss or any damage can be borne by the insurance company and not by the mobile app users at community level.
7. For the largest possible number of people (living in rural and remote areas) to benefit from mHealth services, the implementing organisation should enhance literacy and training in Information and Communication Technology (ICT) so that the effectiveness of mHealth services can be multiplied.

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