"Mobile-based Reporting: Process of Implementation & Capacity building of the end-users"

A Dissertation Proposal for

Post Graduate Diploma in Health and Hospital Management

by

Chahat Narula

PG/10/010

International Institute of Health Management Research
New Delhi

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ABSTRACT

Problem Statement & Its Importance to study

Capacity building is a strategic and coordinated approach towards goal-attainment that focuses on a thorough understanding of the factors that inhibit people, organizations from reaching their end-goals. This approach enhances the capability of the end-users in order to achieve measurable goals. The whole concept puts emphasis on two major aspects: (a) capacity building as the catalyst for change management, and the (b) involvement of a wide range of different groups of end-users of the software.

Objective

To train a critical mass of people who will eventually use the system. This is of utmost importance to sustain change.

Methodology (site/timelines/method of data collection/data sources)

The study will be carried out in the District of Solan from **29th March to 7th April 2012**. The data collection was in form of a questionnaire. The participants were the end-users of the application. They will once be assessed before the training sessions to judge their existing level of competency and then a post-training evaluation (in form of competency tests) was carried out. Thus a detailed methodology with the following steps will be carried out for the completion of the study:

1. Clarity of the objectives of capacity building between providers and the end-users.
2. Analysis of the end-users in terms of existing capacity of the end-users. This will become the basis on which the new capacity building activities can be built on.
3. Formulizing an effective approach and using a wide range of approaches depending on the needs of the end-users.
4. Scheduling the training sessions as per the time and availability of the end-users.
5. Making the training-of-trainers approach, thereby making training and learning a cyclic process.
6. Timely evaluation of the trainers and the end-users.

7. Hand-holding support followed by post Go-live support, till the time the application stabilizes and becomes a part of the functioning of the hospital.
8. Analysis of gaps and difficulties encountered during the training sessions and later on. Feedback at each level of training will be of importance.

Data Analysis

The data is collected in form of close-ended questionnaire. The data is analyzed using Microsoft Excel.

Expected results

At the end of the training sessions, the end-users will be:

1. Comfortable and compatible in using the system
2. Clear about the system, its usability and its functionality

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ABBREVIATIONS

DHIS- District Health Information System

SMS- Short Message Service

JAR- Java Archive

TOT- Training of Trainers

JSR- Java Specification Request

HMIS- Health Management Information System

NRHM- National Rural Health Mission

ANM- Auxiliary Nurse Midwife

PHC- Primary Health Center

CHC- Community Health Center

SC- Sub Center

MHW- Male Health Worker

FHW- Female Health Worker

FRU- First Referral Unit

MIDP- Mobile Interface Information Profile

CLDC- Connected, Limited Device Configuration

GSM- Global System for Mobile Communication

CMO- Chief Medical Officer

BMO- Block Medical Officer

PART 1 : INTERNSHIP REPORT

CHAPTER-1

ORGANIZATION PROFILE

H*i*SPindia is a not-for-profit NGO specializing since more than a decade in designing and implementing solutions in health informatics for the public health sector in Indian states, and also recently in Bangladesh and Sri Lanka. It is not a solely technology focused organization, but a multi-disciplinary organization concentrating on the domains of public health and informatics. The organization has a strong commitment to free and open source technologies, and works with a global perspective of the **Health Information Systems Programmes (HISP) network**, coordinated by the University of Oslo, Norway, and is active in more than 20 countries in Africa and Asia. H*i*SPindia has a registered and head office in New Delhi, and project offices in Kerala, Himachal Pradesh, and Punjab. The team members are intensively travelling to different parts of the country to provide technical support services.

1.1 VISION

"To enable and coordinate a network of excellence in public health informatics, specializing in integrated health information architectures, with a geographical focus on South-East Asia."

1.2 HISTORY

In 1999, an informal group of idealists got together to start a project in a primary health centre in the remote villages of Kuppam, Chittoor district in Andhra Pradesh. These efforts were supported by the University of Oslo, Norway, and had initial partnerships with IIM Bangalore and ASCI Hyderabad. During the first five years, it remained focused on Andhra Pradesh and carried out implementations of the first version of the DHIS software application. From 2005, it

started to work in the State of Kerala first in one facility and by 2008 all the facilities were reporting data in the DHIS2. The DHIS2, which is a global standard today for facility reporting, took birth in a clinic in Kerala in 2006. The achievements in Kerala prompted the state of Gujarat first, and then Jharkhand and Madhya Pradesh to initiate DHIS2 implementations. This led to collaboration in 2008 at the national level with National Health Systems Resource Centre (NHSRC) to provide technical support on DHIS2 nationally. About 25 states took up DHIS2 in 2008. Today, HISP has gained international recognition, and has also been invited to provide technical support in Bangladesh, Sri Lanka, Rwanda, and Philippines.

1.3 GEOGRAPHICAL COVERAGE

With a 30 team members, HISP has a strong national and global coverage of work. In India, it has worked in at least 90% of the states, and currently has a presence in about 20 states. Internationally, H*i*SPindia has worked in Bangladesh and Sri Lanka, and on an individual basis, experts have contributed to Global HISP activities in various countries including Vietnam, Tanzania, Zanzibar, Ethiopia, Mozambique, South Africa, and those in West Africa.

The following **Gantt Chart** explains and summarizes the work done over the period of 3months

Activities	February Week 1	February Week 2	February Week 3	February Week 4	March Week 1	March Week 2	March Week 3	March Week 4	April Week 1	April Week 2	April Week 3	April Week 4
Introduction to open MRS	▓											
Finalization of dissertation topic		▓										
Allotment, Documentation and concept finalization of allotted hospital		▓										
Preparation of database for hospitals			▓									
Literature review for dissertation			▓									
Testing of Mandi, hamirpur and Kullu modules				▓								
Testing of Mohali modules					▓							
Questionnaire for Dissertation				▓	▓							
Development of Baselines						▓						
Testing and Training in Mohali							▓					
Documentation and customization of Mohali Modules							▓	▓				
Mobile-based reporting training									▓			
First draft of the report										▓		
PMCH & NMCH Requirements											▓	▓
Finalization of the report												▓

PART2: DISSERTATION REPORT

CHAPTER-1

OBJECTIVE OF THE REPORT

This report summarizes the process of implementation of the mobile-based ANM Information System, focusing largely on the training and capacity-building of the top-management and health-workers.

SUB-OBJECTIVES

With the capacity-building of the ANMs at each level, the application will also be tested for the following and hence the sub-objectives of the study are:

- Establish the technical feasibility of mobile phones to report sub-centre data
- Testing the application in field situation and scope for scaling up
- Understand the response of ANMs towards the usage of mobile phone reporting and specifically to this application
- Empirically determine the volume of data that can be reported through SMS and mobile phones
- Understand the response of PHC/CHC/health workers towards mobile-based reporting and use of mobile phones for communication with ANM

INTRODUCTION

Now when mobile phone has become a part and parcel of a common man then how the heath sector should remain untouched. M-Health (also written as m-health or mobile health) is a term used for the practice of medical and public health, supported by mobile devices. The term is most commonly used in reference to using mobile communication devices, such as mobile phones and PDAs, for health services and information. The m-Health field has emerged as a sub-segment of e-Health, the use of information and communication technology (ICT), such as computers, mobile phones, communications satellite, patient monitors, etc., for health services and

information. m-Health applications include the use of mobile devices in collecting community and clinical health data, delivery of healthcare information to practitioners, researchers, and patients, real-time monitoring of patient vital signs, and direct provision of care (via mobile telemedicine).

National Rural Health Mission (NRHM) and Society of Heath Information Systems Programmes (HISP) India partnership is the leading public–non government technical support alliance for a pioneering initiative in using mobile phones to strengthen HMIS reporting, improving data quality and also monitoring local action towards strengthening health program delivery. The partnership has some core commitments:

- To develop SMS based application for reporting through mobile phone in an effective manner
- Integrating mobile reporting with the State DHIS2 online application for facility reporting and analysis
- Deployment of the application in mobile phones as well as on the server side
- Capacity building of the application users: primarily ANMs
- Technical & handholding support after the implementation
- Establish the basis for next phase of applications namely integrating tracking system with mobile reporting on one side, and with facility reporting on the other
- Exploring the feasibility of establishing other applications with the existing infrastructure

Capacity building is a strategic and coordinated approach towards goal-attainment that focuses on a thorough understanding of the factors that inhibit people, organizations from reaching their end-goals. This approach enhances the capability of the end-users in order to achieve measurable goals. Thus an organization's approach to any kind of development and training should be aligned to support its mission, vision, goals, objectives and strategies. The automation of the HMIS reporting via SMS needs the health-workers to upgrade themselves in knowledge.

The whole concept of capacity-building puts emphasis on two major aspects: (a) capacity building as the catalyst for change management, and the (b) involvement of a wide range of different groups of end-users of the application. [1]

One of the studies published in Technology Management for Economic Growth said that globalization is triggering evolution of knowledge. This is coupled in parts by the transfer of technologies, which becomes a challenge for most of the developing countries like ours. Thus it is important to understand what kind of association exists between technology transfer, capacity building and sustainable building [2].

Another study done by Nigel Simister and Rachel Smith on Monitoring and Evaluation of the Capacity Building in Jan 2010 examine theory and the current practice and presents some practical guidelines that are or could be used in making Capacity Building effective towards goal-attainment. The study also enlists some barriers to progress. It talks about accountability & commitment of not only the beneficiaries but also the providers at all level[3].

In a study published in 2005 on the Capacity Building Challenge in Developing Countries, Jamil Salmi states "need to train people to be flexible and to acquire the capacity to adapt easily to a rapidly changing world." The study emphasizes on training being a cyclic process because life span of technologies and products gets progressively shorter [4].

CHAPTER-2

OVERVIEW OF THE MOBILE-BASED REPORTING APPLICATION

The state of Himachal took a pioneering step and decided to use the mobile-based reporting system to strengthen their system of reporting. The ANM are already overburdened with clinical and administrative tasks and on top of it the unavailability of the public transport and adverse climatic conditions especially during the winter season. [5] So to overcome these problems, the use of mobile for reporting was seen as a tool to overcome these problems faced by the ANMs. This application will integrate the various sub-centre facility reporting and the ANM will be able to manage the monthly reporting in an effective manner. The ANM will have to send an SMS from any place to a specific number via SMS from her workplace and at any point of time. The mobile phone of the health worker is used. During the capacity building sessions, the application is loaded into their mobile phones and they eventually use it to send the monthly report via SMS. The data will be sent in a fraction of second. The data transmission is very rapid and efficient. It is believed that with the adoption of the mobile-based reporting system there will be marked improvements in data quality in terms of timeliness and coverage of reporting. The transmission requires a network coverage 20% which means like two signal bars are sufficient to send the data.

The data is recorded in paper formats and submitted to the blocks. Here the supervisor enters the data into the server. But with the mobile-based information system, at each SC or PHC, the heath-worker will be able to send the report using the application installed in to their mobile phones. The ANM sends the report via the SMS and the same is received by the server placed at the state level. A confirmation message is followed after each successful submission of the report.

The Block users can access this data through the online application by logging into the server. Each user is given a username and password so that they can access the data that is entered by the ANM at various sub-centers. As a matter of precaution, the ANM will continue to send the report on paper for 3 months until and unless the application and the system stabilize.

Data information flow
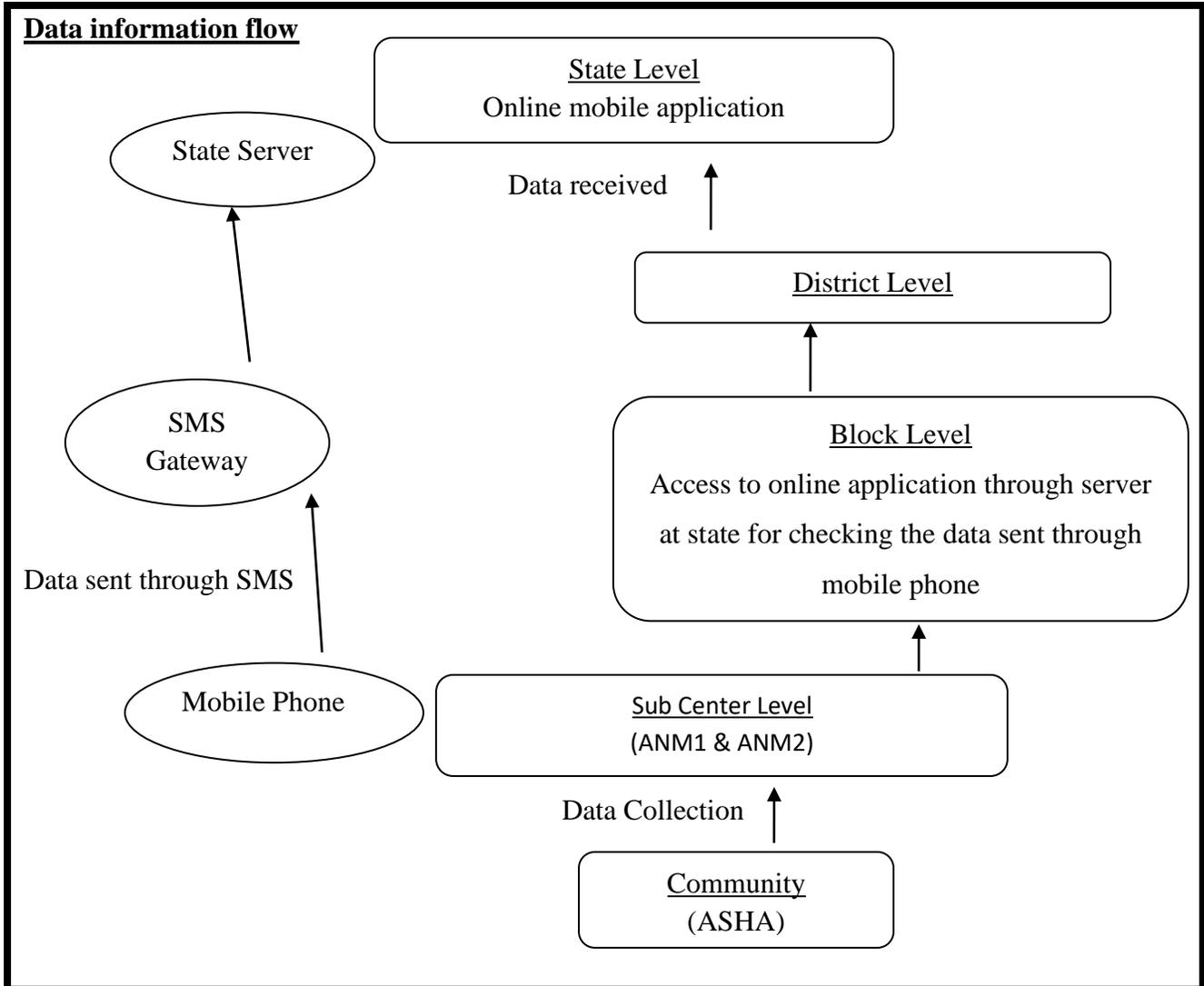
Fig 1: Basic flow of Information from one level to another

Each ANM will send a SMS through her application installed in her mobile phone. This SMS is transmitted through the SMS gateway to the server. Each SMS is sent to a specific number (51969 in Himachal Pradesh). This SMS is converted into an XML file. This is followed by the deletion of the SMS at the gateway. The data is imported into the DHIS2 server every minute and an acknowledgement message is sent to the user via SMS. On an average 30 acknowledgements can be sent at once.

Technical Features

SMS Gateway

SMS Received

Done once the SMS is received

XML File Creation

Delete SMS

Will be scheduled for every 5mins (can be changed), 30 acknowledgments at once

Importing into DHIS2 server

Sending Acknowledgment

Fig 2: Technical flow of Information

CHAPTER-3

THE PROCESS OF IMPLEMENTATION

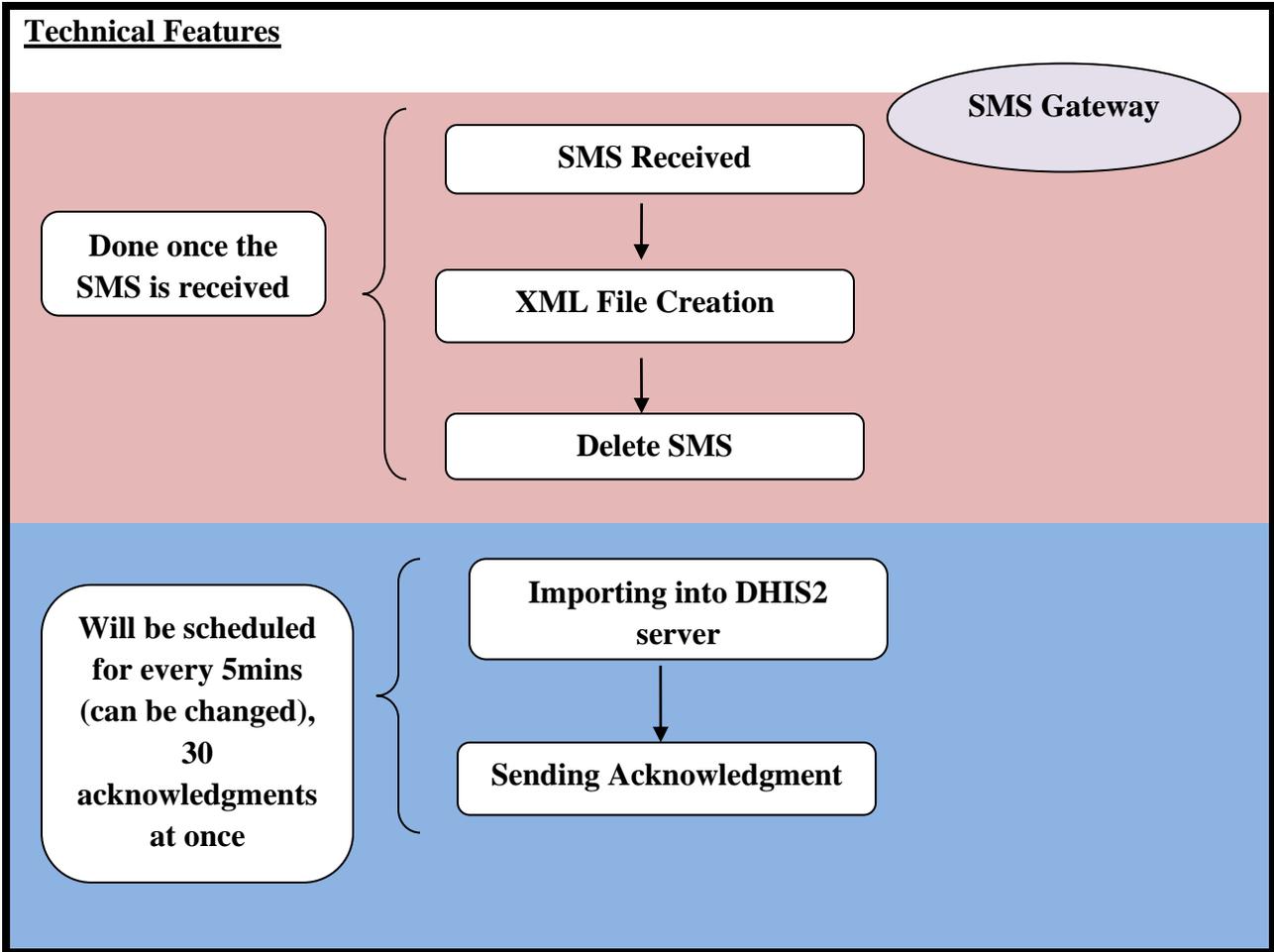The process of implementation is the summation of the total process involved right from the starting to the end. It is a run through from the demonstration of the application to capacity-building to its deployment in the field to hand-holding support and analysis. The process of implementation is a 7-staged process involving:

3.1 Procurement of hardware (Mobile phones)

3.2 Finalization of formats

3.3 Finalization of database in DHIS2

3.4 Release of *JAR* Files

3.5 Testing of the application

3.6 Capacity building

Each step is explained in detail here with:

3.1 Procurement of hardware

3.1.1   Mobile Phones

The phone of the end-user will be used as a reporting tool. The application will be installed in their phones during the capacity building sessions and therefore the phones can be used to send SMS. The application requires the following minimum requirement for the application to work. They are:

* Bluetooth (to transfer *JAR* files)
* Java-enabled phone

JSR	JSR Specification
JSR 118	MIDP (Mobile Information Device Profile) 2.1
JSR 139	Connected, Limited Device Configuration (CLDC) 1.1

Table1: JSR & JSR Specifications

* SMS service activated on the phone (this generally depends on the service used on the mobile phone) E.g.- BSNL
* Phone number to which SMS is to be sent (e.g. 51969 short code in case of Himachal Pradesh).

3.1.2   SMS Gateway

An **SMS gateway** is a telecommunications network facility for sending or receiving Short Message Service (SMS) transmissions to or from a telecommunications network that supports SMS. [6] Most messages are eventually routed into the mobile phone networks. Many SMS gateways support media conversion from email and other formats. SMS gateway is developed for GSM Modem using standard AT Command Sets (GSM 07.07 and GSM 07.05 Protocol). It receives UID transmitted by GSM handset and send authentication report to the client. The SMS gateway & short code (51969) to which the SMS is sent is provided by **CDAC**.
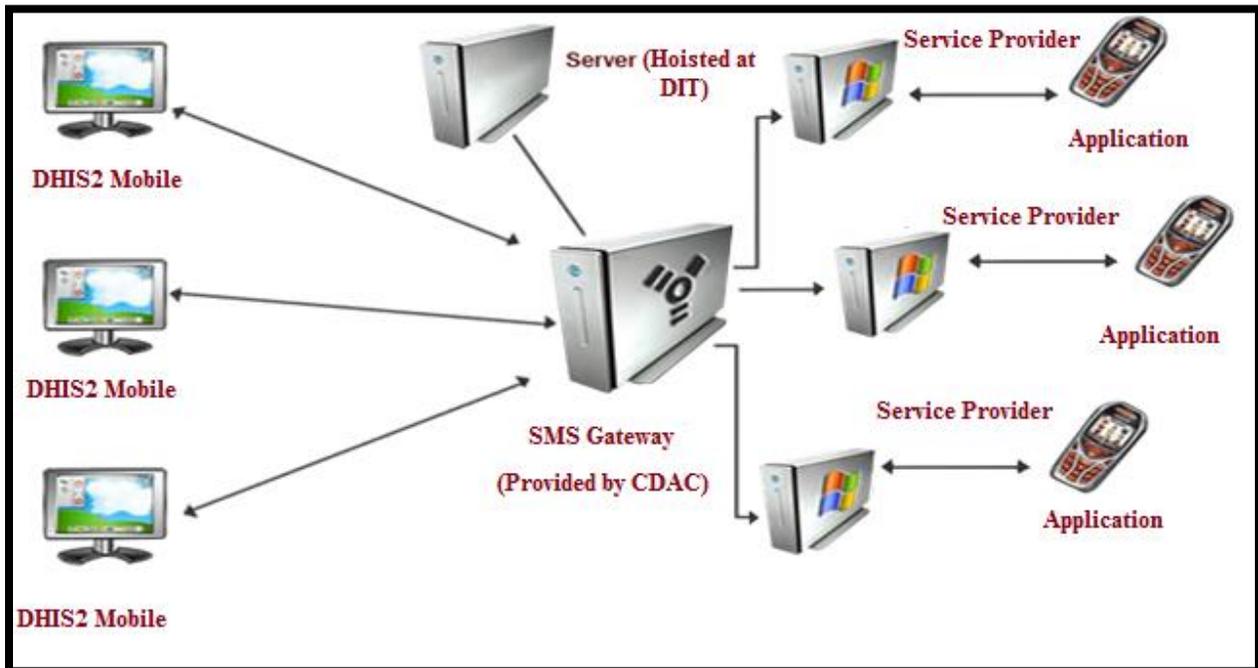

Fig3: SMS Gateway and Import of Data

3.2 Finalization of Formats

The application has 74 data elements. To address memory constraints, the application was divided into three forms, Monthly 1, Monthly 2 and Monthly 3. The customization is summarized below:

Form	Total Data Elements
Monthly 1	26
Monthly 2	26
Monthly 3	23

Table2: Forms & Data Elements

3.3 Finalization of database in DHIS2

This step involves a lot of manual work. An exhaustive list of all the health workers was captured, and their names under their specific sub-centers were added in DHIS2 database.

To access DHIS2 main application the user needs a username and password to access the server application. The DHIS2 server is logged in by a username and password. On the main screen **'Maintenance'** is selected. The following screen is seen as the homepage on logging onto the server:
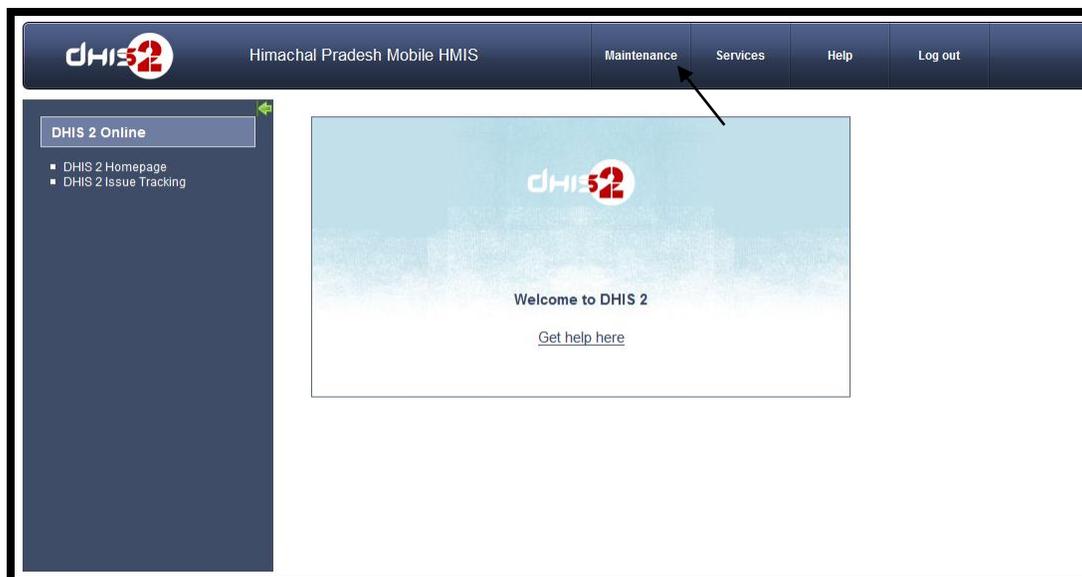

Fig4: Home-Page-DHIS2 Mobile

After selecting maintenance, a drop-down appears (as shown in the screen-shot). Here **'Organisation Units'** is selected.
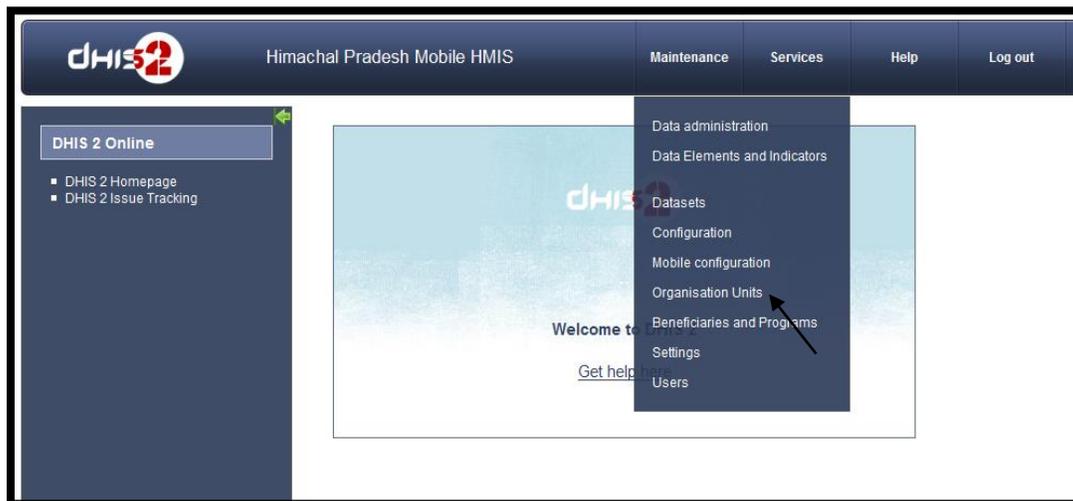
Fig5: Selecting 'Organization Unit' from the drop-down

On selecting 'organisation units', a list of options on the left side of the screen appears. The first option **'Organization Unit'** is selected. The organization units that exist appear at the lower left side of the screen. For e.g. India, it is the highest in the hierarchy. The names of the states (e.g. Himachal Pradesh) appear in the drop-down of the country. This is followed by the names of the districts (e.g. Solan) that are part of the state. After the names of the districts, appear the names of the blocks that are contained in the districts. The blocks further contain the names of the CHC/PHC that are part of the block. The following screen-shots explain the process:

Fig6: Selecting 'Organization Unit' from the side menu

Fig7: Selecting the Organization

A new organization unit can be added by selecting **'Add new'** as shown in the screen-shot above. The following screen appears and hence a new organization unit can be added.
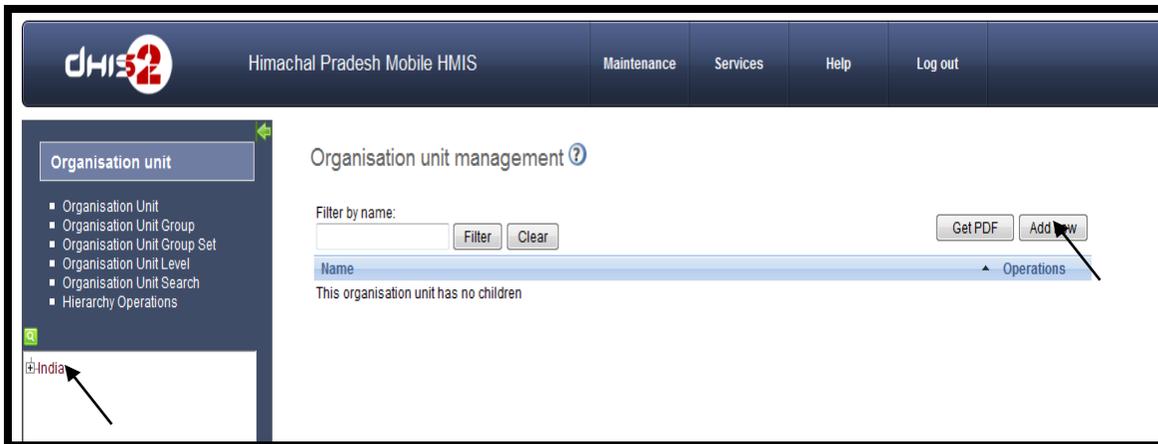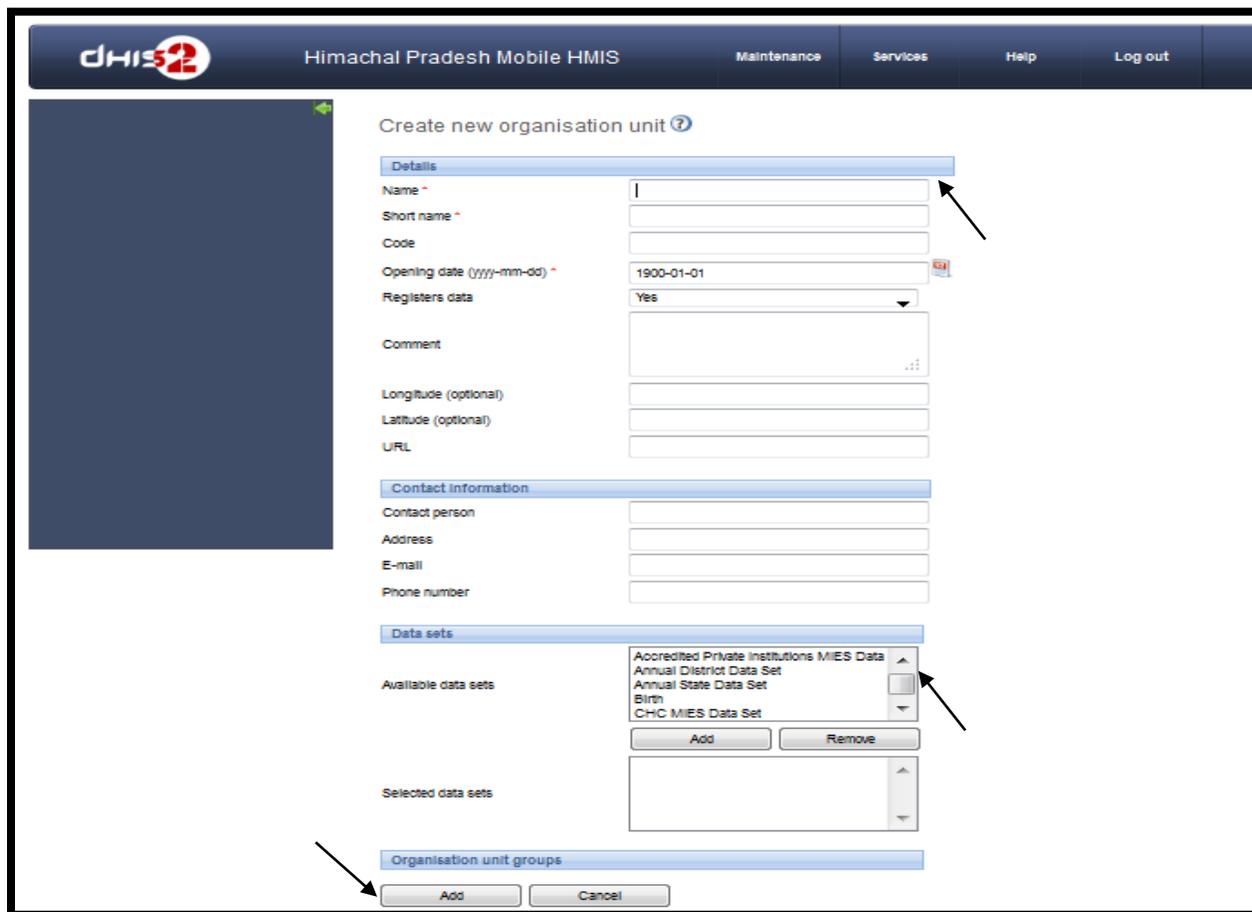

Fig8: Process to create a new 'Organization unit'
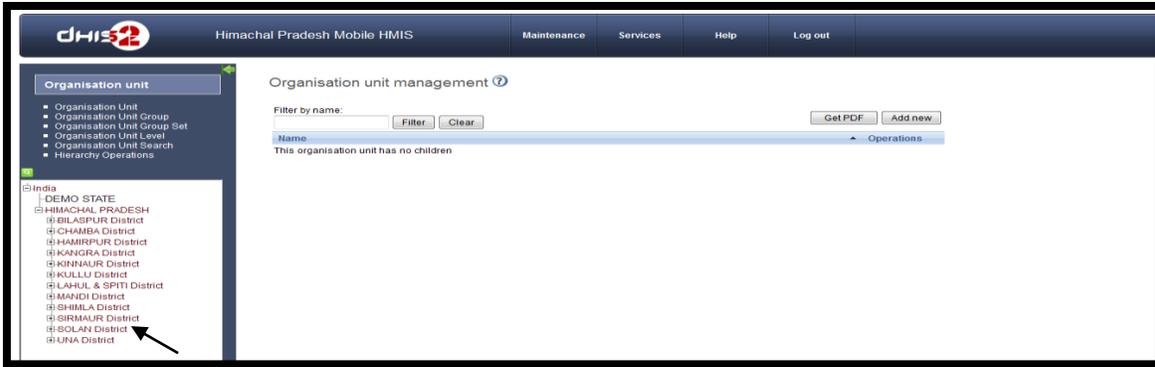
Fig9: Selecting 'Solan' from the drop-down
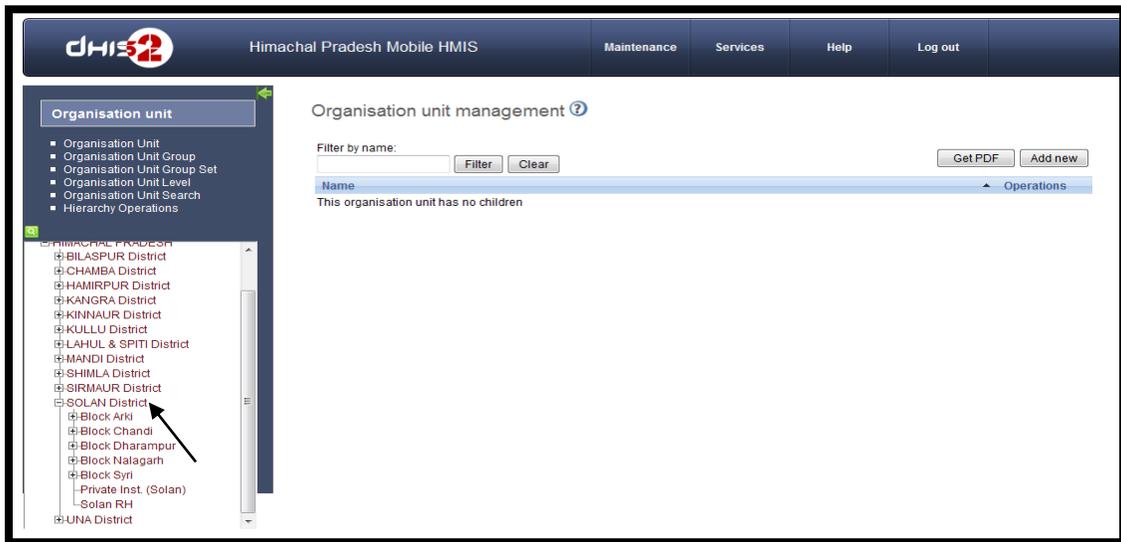
Fig10: Display of all the Blocks under the District
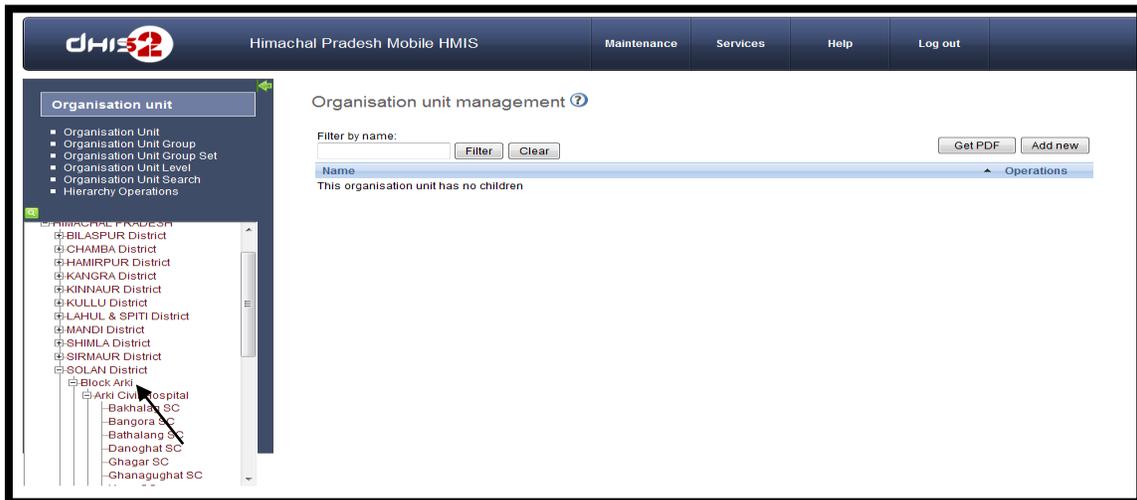
Fig11: Select 'Arki' from the drop-down

On clicking the name of the CHC/PHC (e.g. Arki Civil Hospital as shown in the screen-shot above), on the major part of the screen appears the name of the sub-centers that are part of that particular Health Center. E.g. on clicking Arki Civil Hospital, following list of sub-centers appear on the screen. In the same screen, there appears an option to EDIT the details entered in the name of the sub-center. This is done by selecting the first option that appears in front of the name of the sub-center like in the screen-shot below:
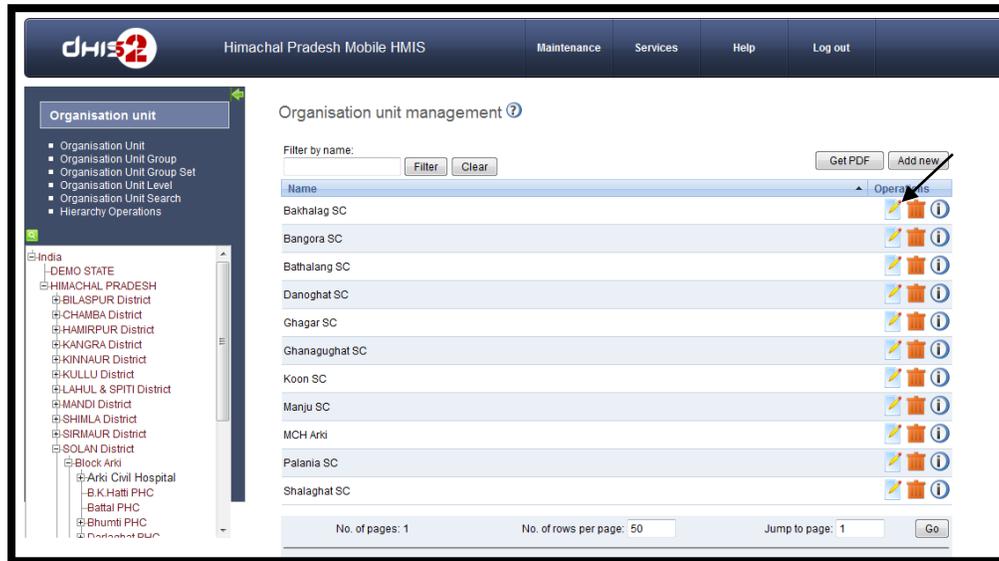
Fig12: Selecting 'Edit' from the menu

On clicking the EDIT option the following screen appears in which details, like the name of the Health-worker with their phone numbers are entered and finally the details are saved.

Fig13: Saving of data

3.4 Release of *JAR* Files

A *JAR* file is the compressed file format. A number of files can be stored in a *JAR* file. *JAR* stands for the Java Archive. This file format is used to distribute a set of java classes. This file helps to reduce the file size and collect many file in one by compressing files. Downloading the files is completed in very short duration of time because of small file size. The *JAR* file format is based on the popular ZIP file format. Usually these file format is not only used for archiving and distribution the files, these are used for implementing various libraries, components and plug-ins in java applications. Compiler and JVMs (Java Virtual Machine) can understand and implement these formats for java application. Each *JAR* file has a specification on which it could work on. These specifications are summarized as **Java Specification Requests (JSRs)** – the formal documents that describe proposed specifications and technologies for adding to the Java

platform. [7] After the formats have been finalized, 3 *JAR* were created (by the development team) in order to make a complete monthly reporting form. The basic structure of the *JAR* files is as under:

Forms	Total Data Elements	Keyword + Form id + Month/year	Data element value	Separators	Total Characters
Monthly 1	26	15	52	25	92
Monthly 2	26	15	64	25	104
Monthly 3	23	15	46	22	83

Table3: Forms & Total Characters

3.5 Testing of the *JAR* files in a JAVA compatible phone

These *JAR* files are then installed in a JAVA compatible phone via Bluetooth (feature of a phone). A SIM card is inserted into the phone, with activated message sending facility. This number is updated in DHIS2 application as per the procedure explained above under the name of DEMO state. The no on which the SMS is to be sent is installed in the phone. The form is completely filled and message is sent from the mobile phone. The same is confirmed by checking the data in the DHIS2 application by logging into the server using a username and password. On the home page, under the **'Services'**, the option of '**Data-entry**' is chosen as shown in the screen-shot below:

Fig14: Selecting 'Data entry'

Here the organization unit from the left side of the screen is chosen. The form is selected along with the reporting month, as shown in the screen shot below:
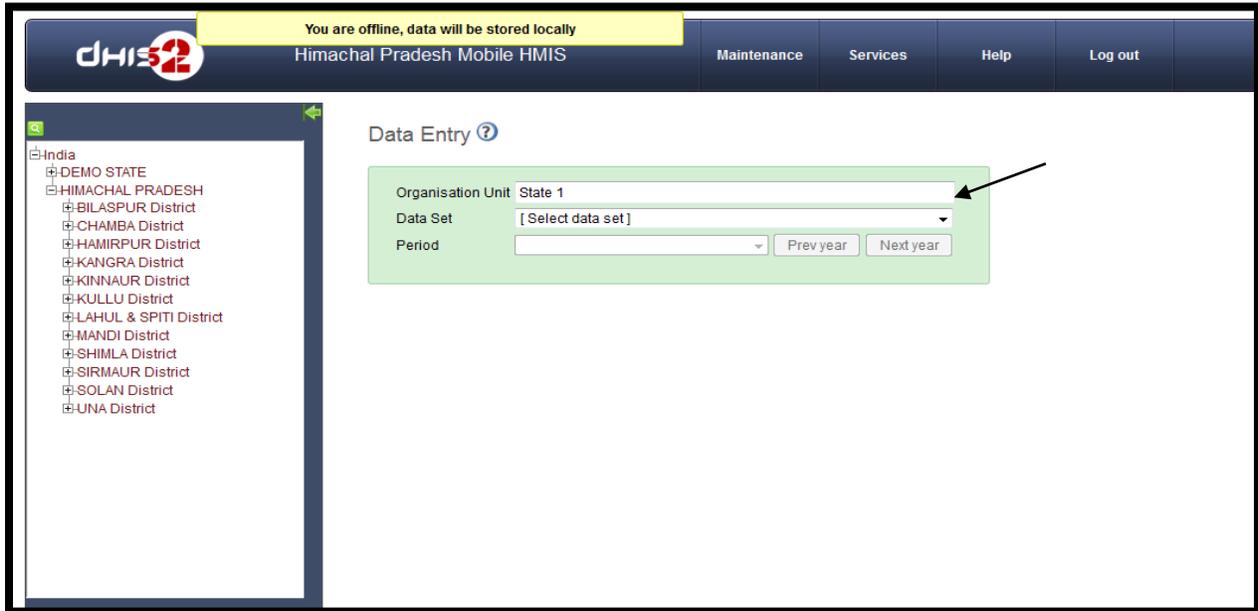
Fig15: Selecting the fields to view the data entered

The form can be viewed and the entries made in the form can be seen on the server, as follows:
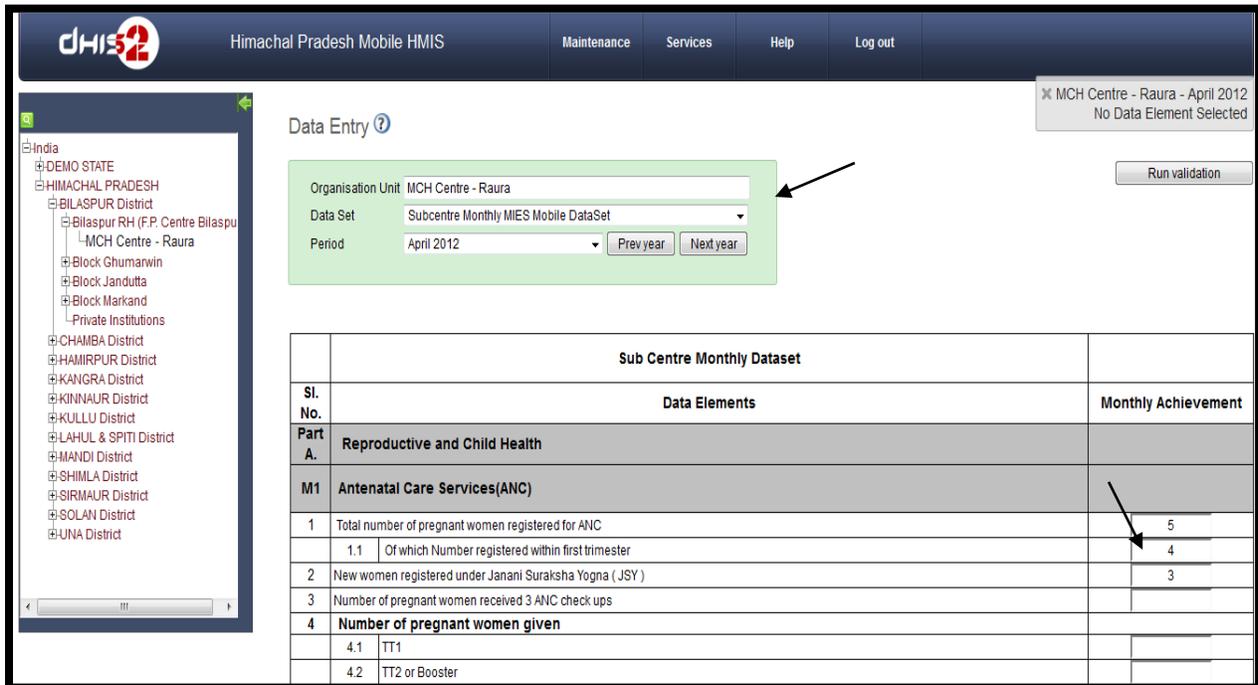
Fig16: Confirming the data on the DHIS server

The next step of capacity-building is very crucial and involves a lot of field work. The stable version is now to be deployed in the phones of the end-users and thus the team has to travel to various blocks and if need be to the sub-centre to manually transfer the application into their phones. Thus capacity building is discussed as a separate chapter. The final application has the following features:

Application details	
Application name	DHIS2 mobile
Application type	J2ME
Mode of reporting	SMS (gateway based)
No of *JAR* files	3
Name of reporting form	HMIS (monthly)
Total data fields	75
Data entry type	Numeric

Table4: Details of the Mobile Application

CHAPTER-4

METHODOLOGYOF CAPACITY-BUILDING

After the testing of the application and procurement of a stable version, the next step in the process of implementation is the training and capacity-building of the end users of the application. The training is a multi-leveled process which ahs the following steps:

4.1 Preparation of the user-manual & TOT manual

4.2 Preparation of a training check-list

4.3 Training schedule

4.4 Training agenda

4.5 Field training

4.1 Preparation of the user manual & TOT manual

A team of two people were responsible for documentation which consisted of the training material for the users and for the trainers. This is a word or a PDF easy-to-learn document. It contains all necessary information like the advantages of the application, guidelines by the state, information flow and various screenshots of mobile application to be used on the phone. The documentation is then approved by the state. The manual after the approval is sent for printing. The same is distributed amongst the various users during the training sessions.

4.2 Preparation of a training check-list

An exhaustive check-list is prepared before the team is sent on the field. A copy of the check-list is circulated amongst various team-members to ensure consistency. The check-list for the training purpose in Himachal Pradesh is as follows:

S.No	Training Process	Done/ Not done
1	Make sure the requisite *JAR* files are downloaded in the laptop	✓
2	Make sure the required presentations exist in the laptop	✓
3	Make sure to carry the training manuals (TOT manual and user	✓

	manual)	
4	List of health workers (SC name, health worker name, phone number)	✓
5	All other relevant training documents like phone details sheet, username/passwords	✓
6	Nokia emulator (series 40 5th edition SDK) installed/working in the Laptop.	✓
7	Make sure Bluetooth is working in the Laptop or have a data cable.	✓
8	All important contacts (CMO,BMO, State HMIS consultant etc)	✓
9	The server no. (the no. that is to be used to send report to)	✓
10	Training schedule with you before you leave for training.	✓
11	Data card along for important mail exchanges/downloads.	✓
12	Make sure the understanding is proper about the mobile training (concepts, testing, training method etc)	✓
13	Make sure that all processes are documented in the prescribed format.	✓
14	Capture training photographs/errors during installation/any other important thing.	✓

Table5: Check-list for Training

4.3 Training Schedule

Once the team is ready is ready with the documentation, a training schedule is prepared. This is in accordance with the availability and convenience of the health-workers. A date-wise training schedule is prepared covering all the blocks in the district. This is mailed to the BMO and is mandatory that the same is approved by the BMO of each block. He further informs all the health-workers of each sub-centre and PHC to gather on the scheduled date. The training schedule in Solan was as follows

Block	Total Participants	Batches	Date
District TOT	16	1	26th March
Dharampur	73	2	29th &30th March

Arki	57	1	31st March
Syri	38	1	2nd April
Chandi	23	1	3rd April
Nalagarh	70	2	4th & 5th April

Table6: Date & Batch-wise Schedule of Training

Training team had 5 members from HISPindia, each of whom was allotted a specific task while on the field. All work on the field was coordinated by the Team Lead.

4.4 Training Agenda

S.NO	Topic	Time	Methodology
1	Brief Introduction	11:15 am	
2	Attendance of the participants	11:30 am	Paper
3	Introduction of DHIS Mobile	12:00 pm	Presentation
4	Orientation on formats	12:15 pm	Presentation
5	How to install the application on mobile phone through Bluetooth	1:00 pm	Presentation
6	Demonstration of the application on emulator	1:15 pm	Emulator
7	To show the data sent through phone in DHIS2	2:00 pm	Presentation
8	Installation of application on participants phone	Simultaneously	Team Exercise
9	Hands on session	2:15 pm	Team Exercise
10	Checking of data status and generating reports in DHIS2 application.	3:00 pm	Presentation
11	Q/A Round	3:15 pm	Team Exercise
12	Feedback from the ANM through a questionnaire	3:30 pm	Team Exercise

Table7: Agenda of Training

4.5 Field Training

The training is done at two levels

- **District TOT**
- **ANM Training**

District TOT

Before the training of the ANM, a district TOT was arranged i.e. a training team at the district level was made. This comprised of 5 persons from the district and 3 persons from the block. This team was made to check the smooth functioning of the application, technical troubleshooting and also for the later on support of ANMs. [8] The participants in the district TOT from district level were Civil surgeons, District Programme Managers, District Monitoring and Evaluation officers and District Account officers and from block level the participants were Block Senior Medical Officers, Block Statistical Assistant and Block Accountant. Laptops, projector, training manuals and black board were the training tools used.

ANM Training

After the district TOT, the ANM training began. This was scheduled on a different date. The venue was generally the block PHC/ CHC or FRUs. Participants in the training were ANMs, LHVs, Block SA and Block Accountant. Laptops, projector, training manuals and black board were the training tools used. After each session, the ANMs were asked to send their monthly reports of March through SMS. Orders were passed for the same.

Block	Total SC	FHW	MPHW	FHS	MHS	Total Participants	Batches
District TOT	-	-	-	-	-	16	1
Dharampur	43	37	26	5	5	73	2
Arki	36	30	22	3	2	57	1
Syri	23	24	10	2	2	38	1
Chandi	16	14	4	3	2	23	1
Nalagarh	61	41	20	5	4	70	2

Table8: Distribution of Participants

Following is the step by step method to use mobile application

Press the centre button to open the main menu.

Select the Applications as shown and press the center button.

Three folders will appear. Select the NRHM folder

Two forms: Monthly 1 & monthly 2 will appear. Select any form for data entry.

Select required frequency of reporting by pressing center button

Select required month by pressing center button

Form will appear with section name. Start filling the data value in the numeric box given below each data

Select 'Next' to go to next section and enter numeric values

If you fill all the fields then, "all fields are filled" prompt will appear

Fig 17: Step-by-step Demonstration of the Mobile-based Application

CHAPTER-5

DATA ANALYSIS

The capacity-building sessions were followed by filling of a questionnaire by the health-worker in order to assess their level of understanding. There were **201** total participants in the district of Solan, out of which 198 carried mobile phones.

Out of these 198 phones only 84 mobile phones were compatible with our application i.e. only 42 percent of the phones in the entire district were compatible.
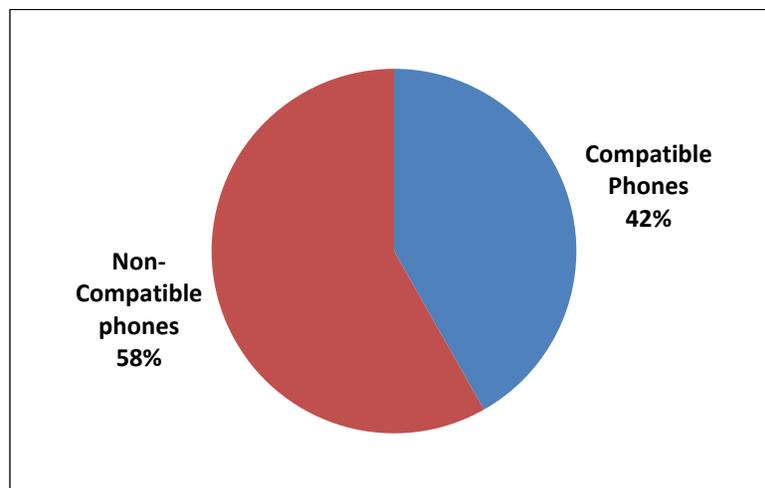
Fig 18: Figure showing ratio of Compatible & Non-compatible phones

Out of the 198 phones, the break-up of the phones brand-wise was as follows:
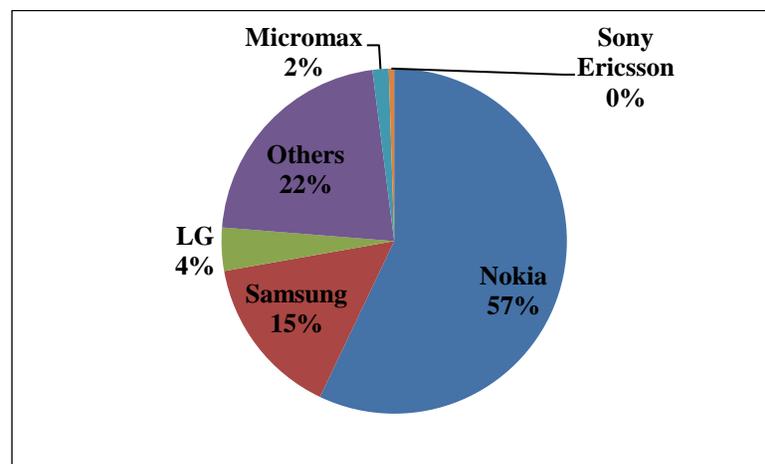
Fig 19: Figure showing break-up of mobile phones brand-wise

The data collected from each block was analyzed using Microsoft Excel

- **Block Dharampur**

Fig 20: Figure showing feedback from the health-workers (Block Dharampur)

The health-workers whose phones were compatible were given a separate set of questions and the data that was fetched was as under:

Fig 21: Figure showing the status of the health-workers whose phones were compatible

- **Block Arki**

Fig22: Figure showing feedback from the health-workers (Block Arki)

The health-workers whose phones were compatible were given a separate set of questions and the data that was fetched was as under:

Fig 23: Figure showing the status of the health-workers whose phones were compatible

- **Block Syri**
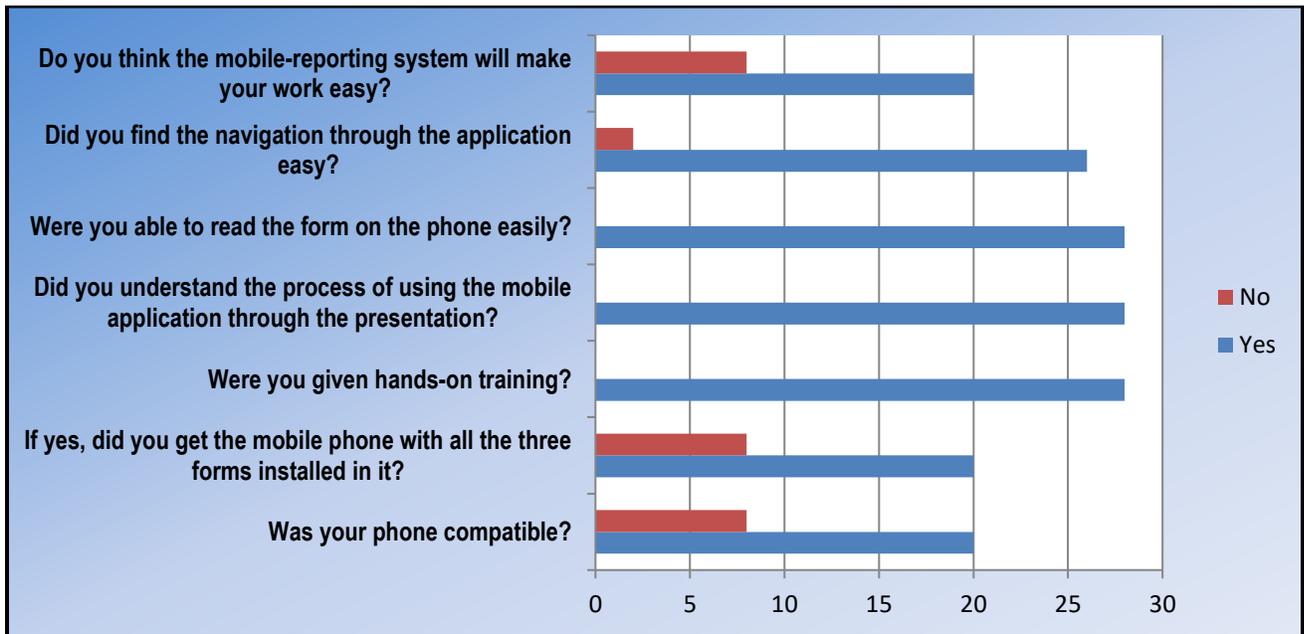
Fig 24: Figure showing feedback from the health-workers (Block Syri)

The health-workers whose phones were compatible were given a separate set of questions and the data that was fetched was as under:
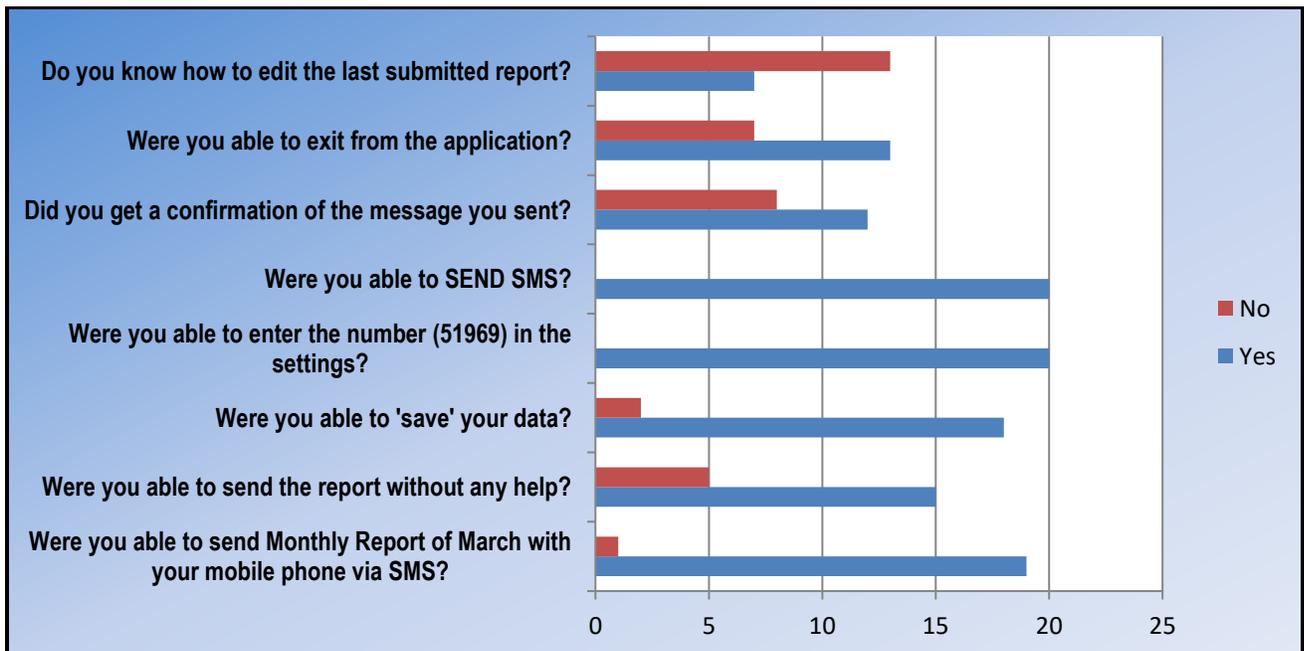
Fig 25: Figure showing the status of the health-workers whose phones were compatible

- **Block Chandi**
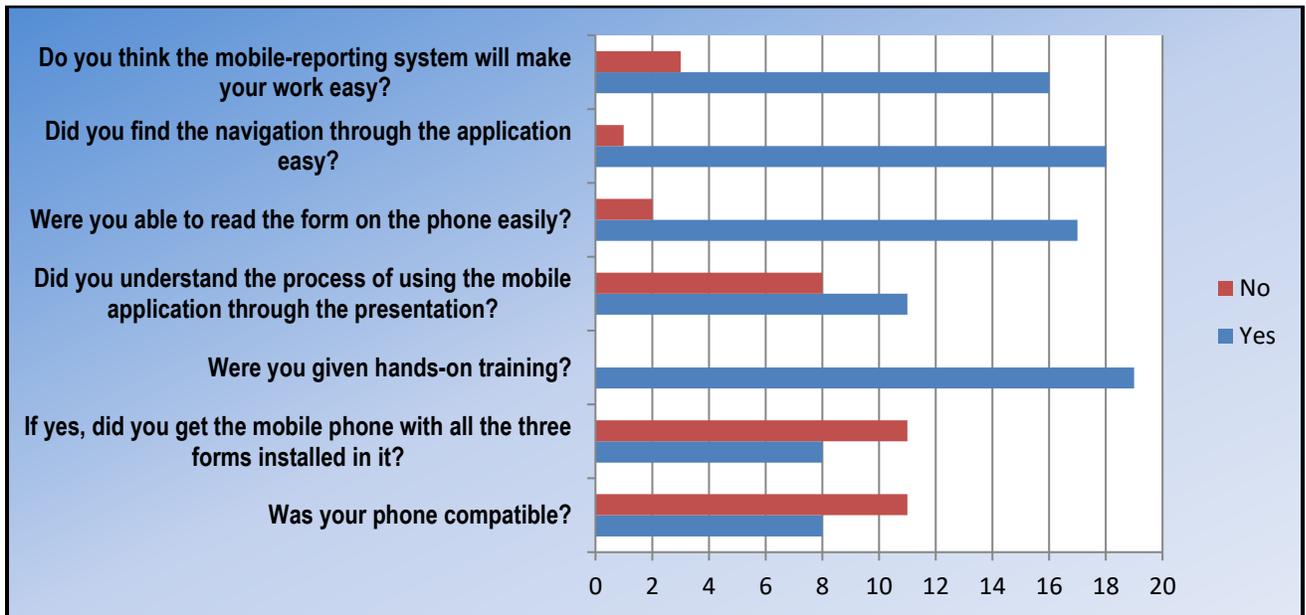
Fig 26: Figure showing feedback from the health-workers (Block Chandi)

The health-workers whose phones were compatible were given a separate set of questions and the data that was fetched was as under:
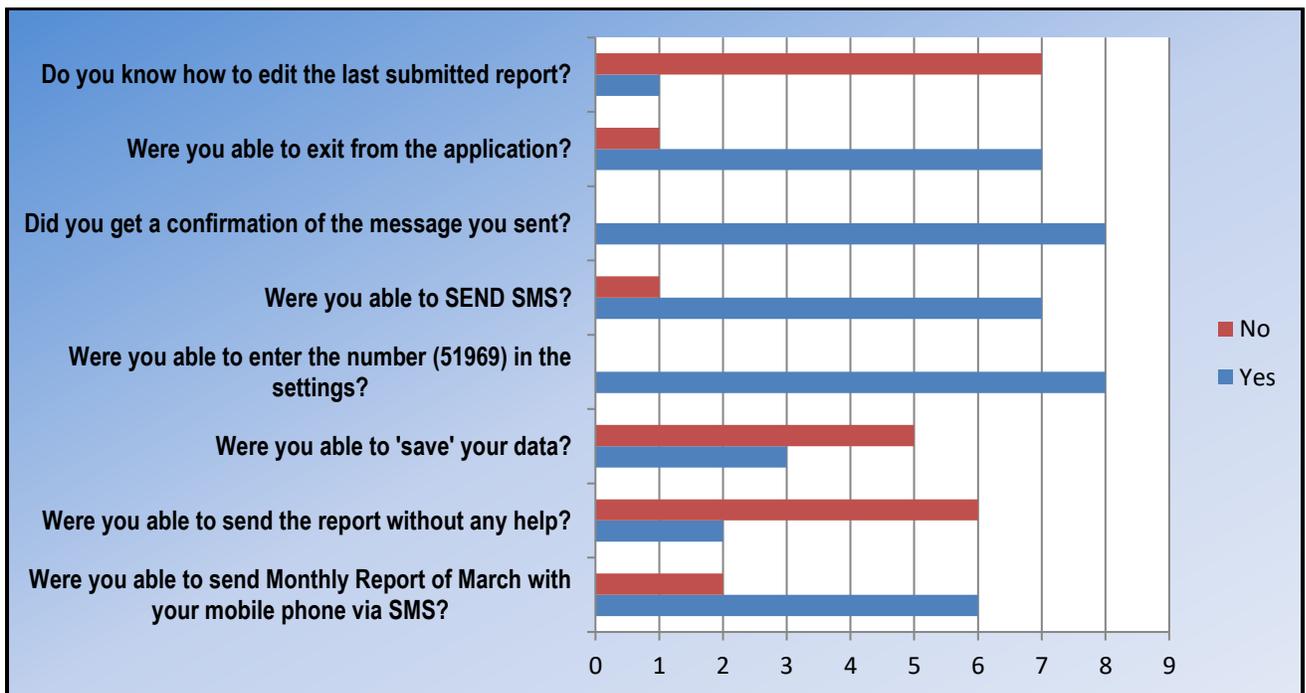
Fig 27: Figure showing the status of the health-workers whose phones were compatible

- **Block Nalagarh**
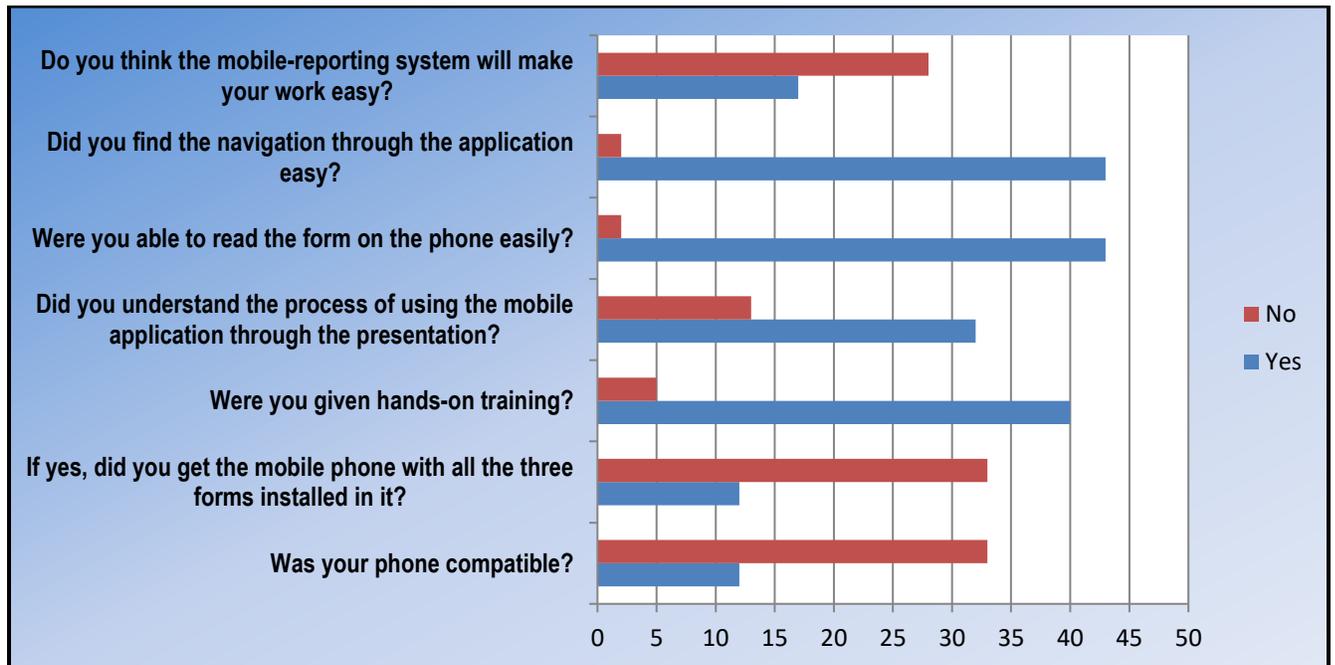
Fig 28: Figure showing feedback from the health-workers (Block Nalagarh)

The health-workers whose phones were compatible were given a separate set of questions and the data that was fetched was as under:
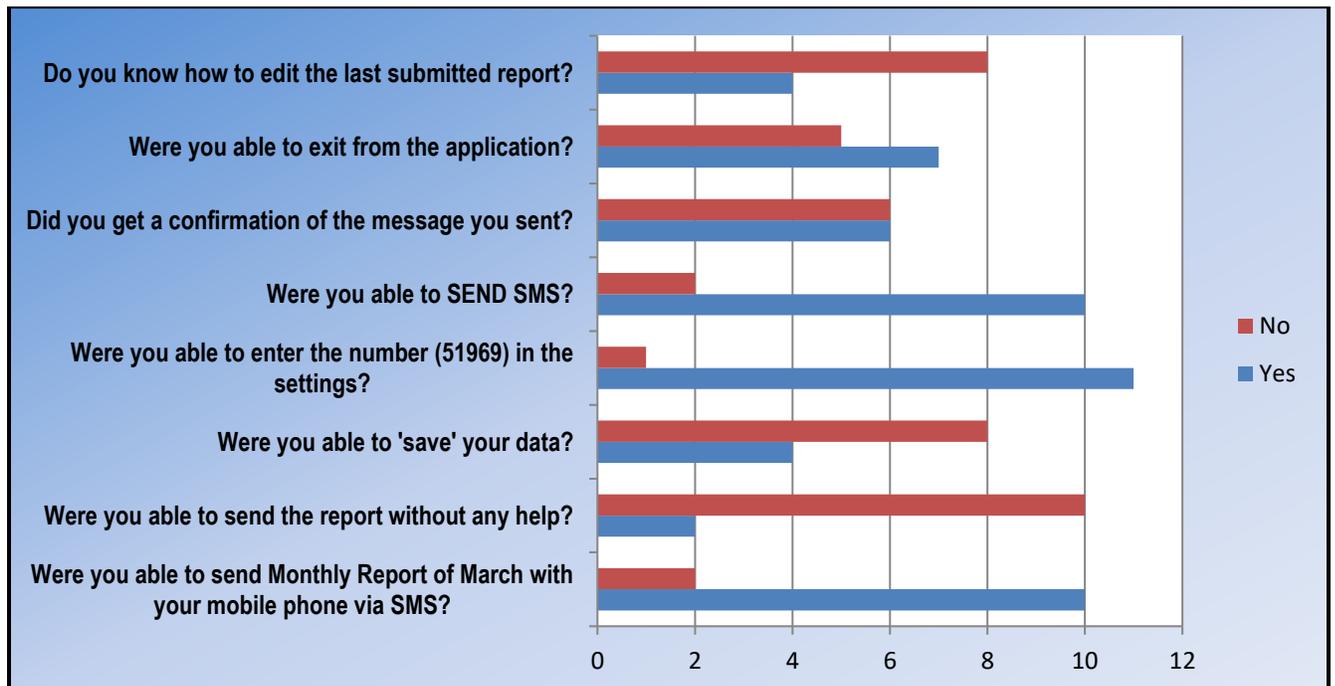
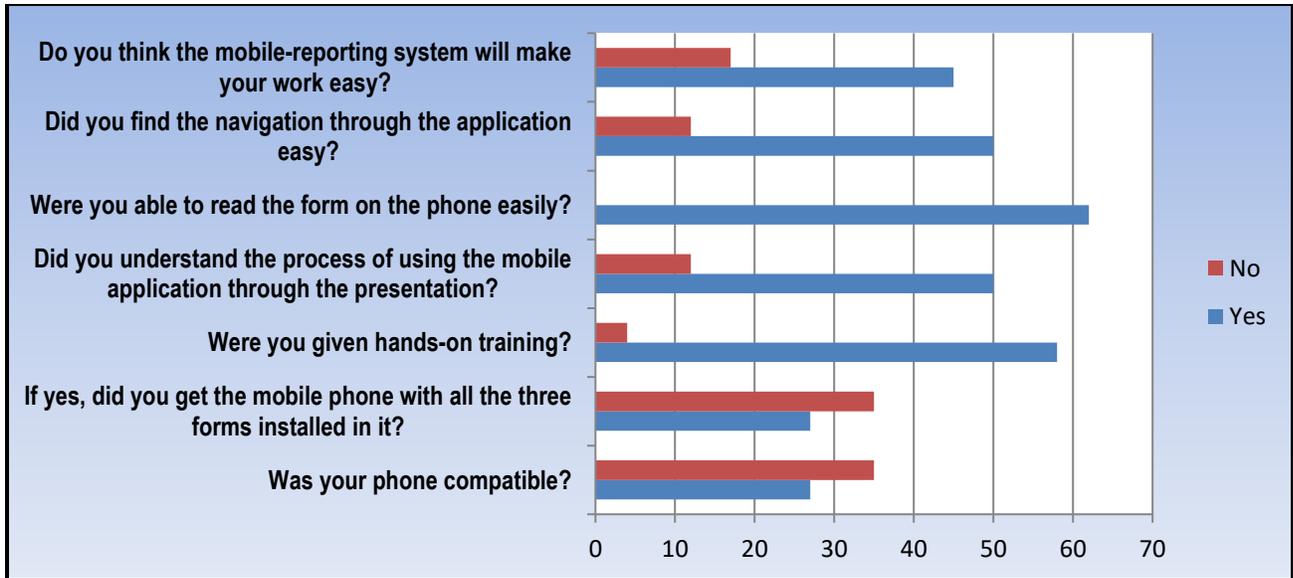**Fig 29: Figure showing the status of the health-workers whose phones were compatible**

The health-workers were then given a time of 7 days to send their monthly report of the month of March. The reports were then picked up from DHIS2 and interpreted in excel. The data was picked up after 7 days of the finish of the training in various blocks of Solan. This data is for the month of March. There were a total of 84 respondents whose phones were compatible. The following graphs show the interpretation of the successfully submitted reports:

- 23% of the health-workers sent completely filled reports. But the majority of the health-workers i.e. 45% of the respondents sent reports that had data elements filled above 50%.

Monthly 1

Completely filled 23%
Sent Empty 5%
Not Sent 8%
<50% filled 19%
>50% filled 45%
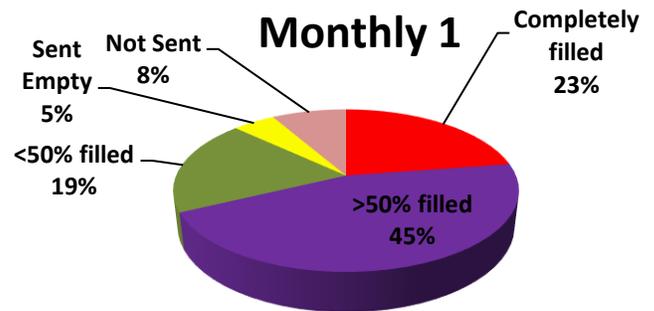
- In the Monthly2 format of the reporting, only 6% of the health-workers filled in completely. And only 29% of them sent reports that were filled more than 50%.

Monthly 2

Not Sent 21%
Completely filled 6%
>50% filled 29%
<50% filled 19%
Sent Empty 25%
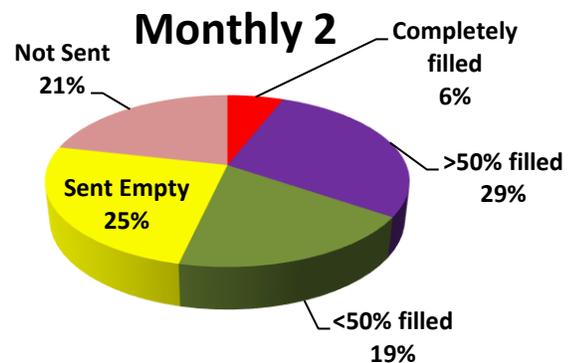
- In the Monthly3 format of the reporting, only 1% of the health-workers filled in completely. And 44% (majority) of them did not send.

Monthly 3

Completely filled 1%
Not Sent 44%
>50% filled 14%
<50% filled 19%
Sent Empty 22%
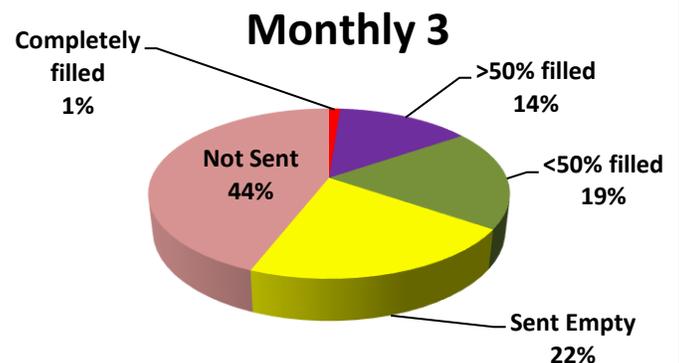
CHAPTER-6

RESULTS & DISCUSSIONS

Taking the entire district of Solan as one entity, the following results were encountered.
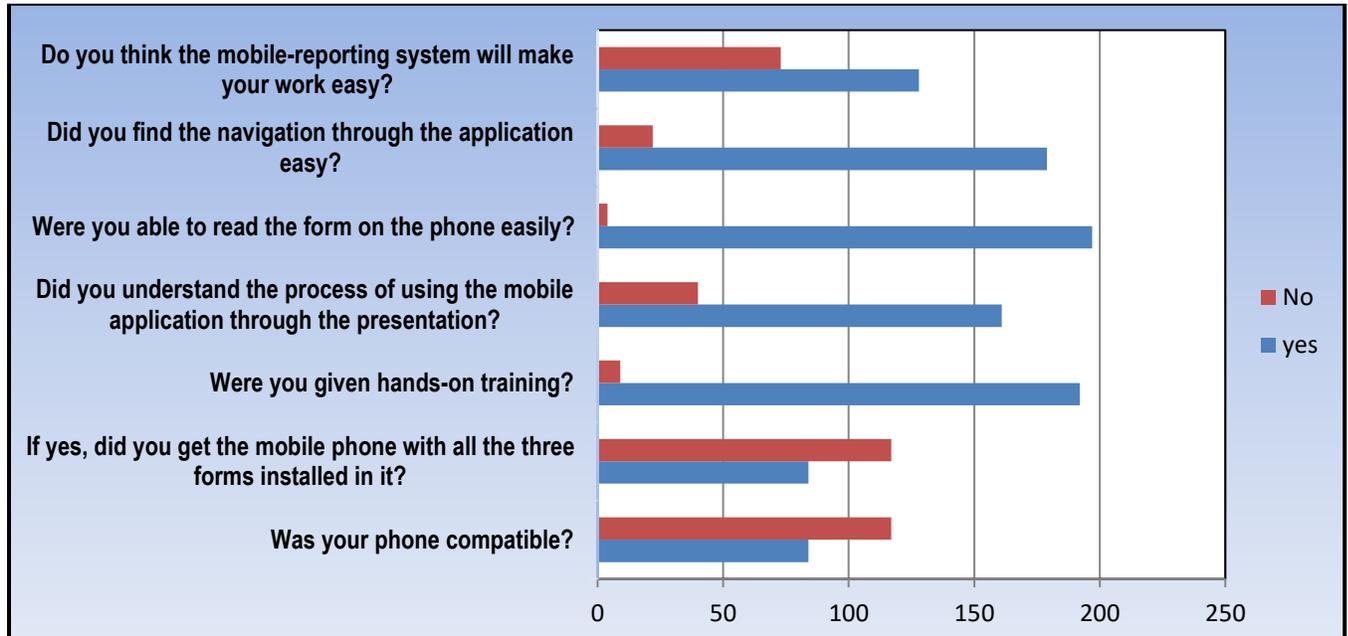
Fig 30: Figure showing feedback from the health-workers (District Solan)

The health-workers whose phones were compatible were given a separate set of questions and the data that was fetched was as under:
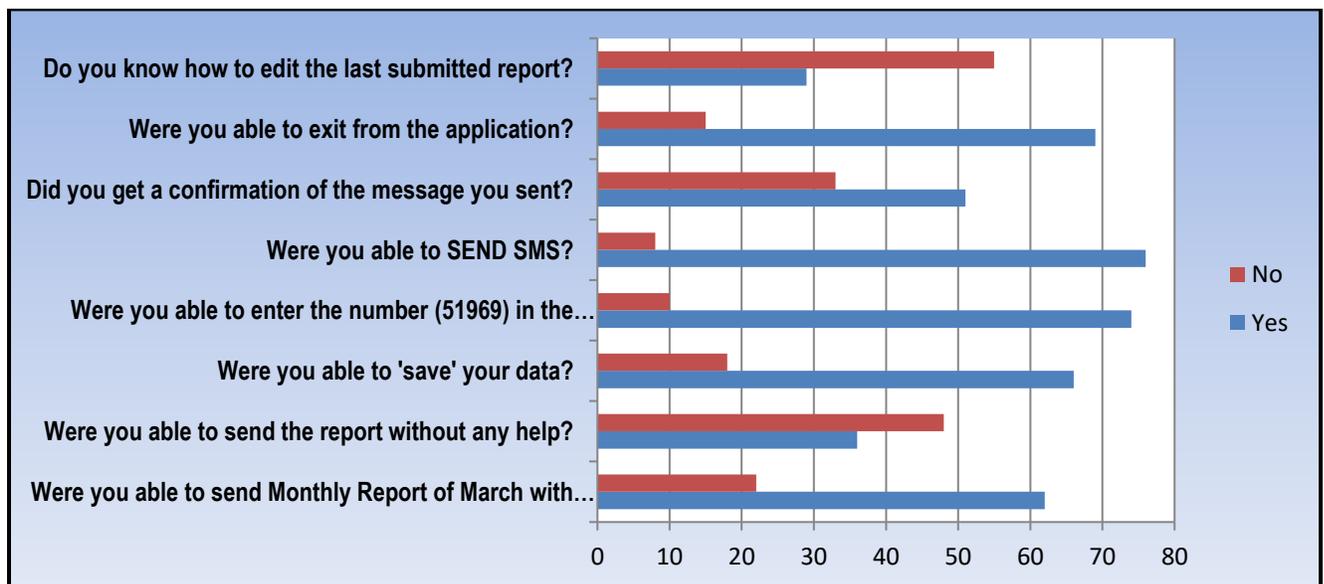
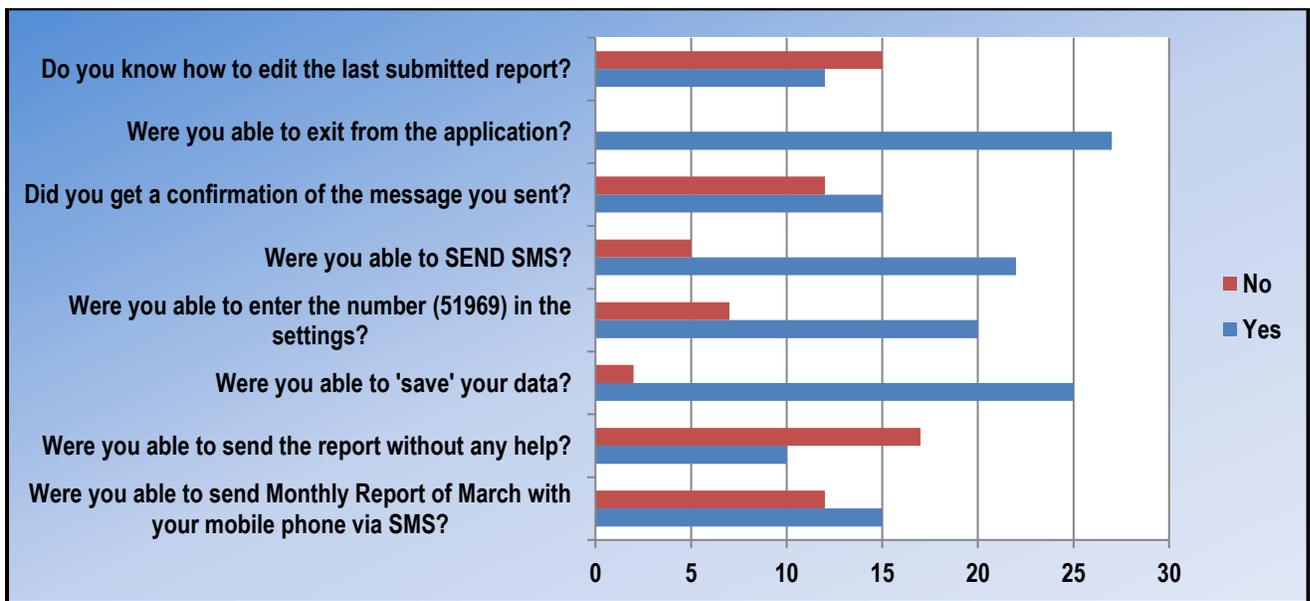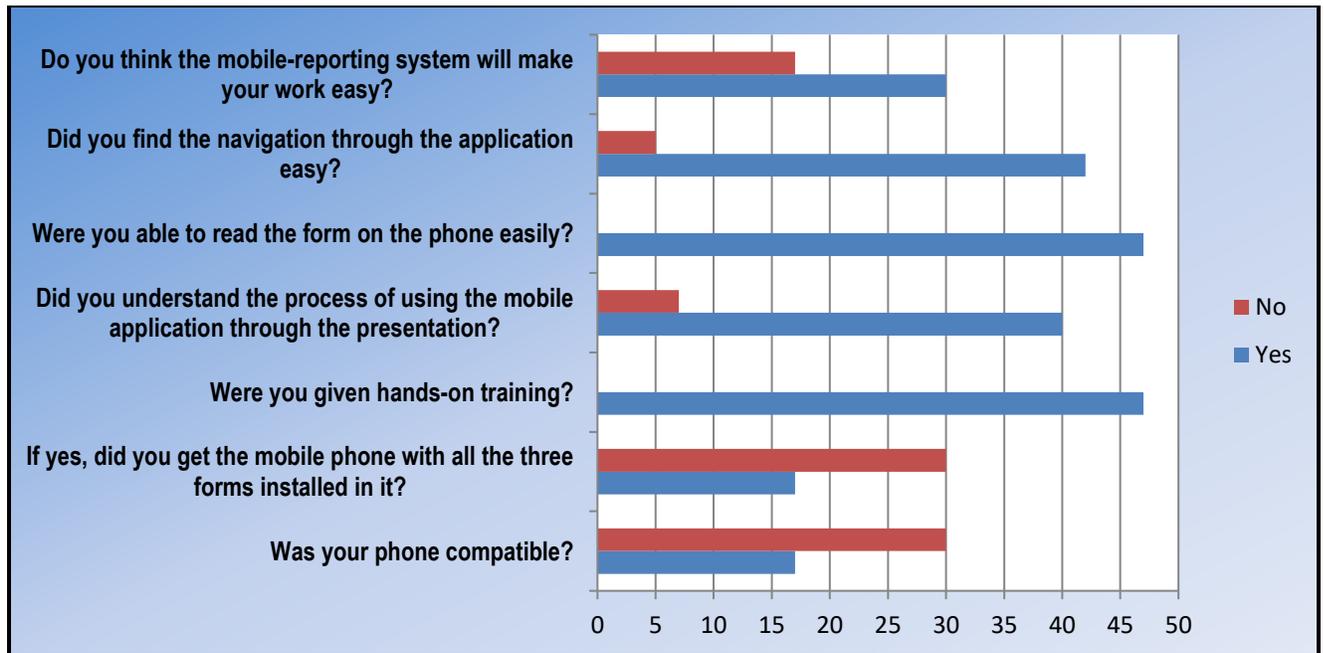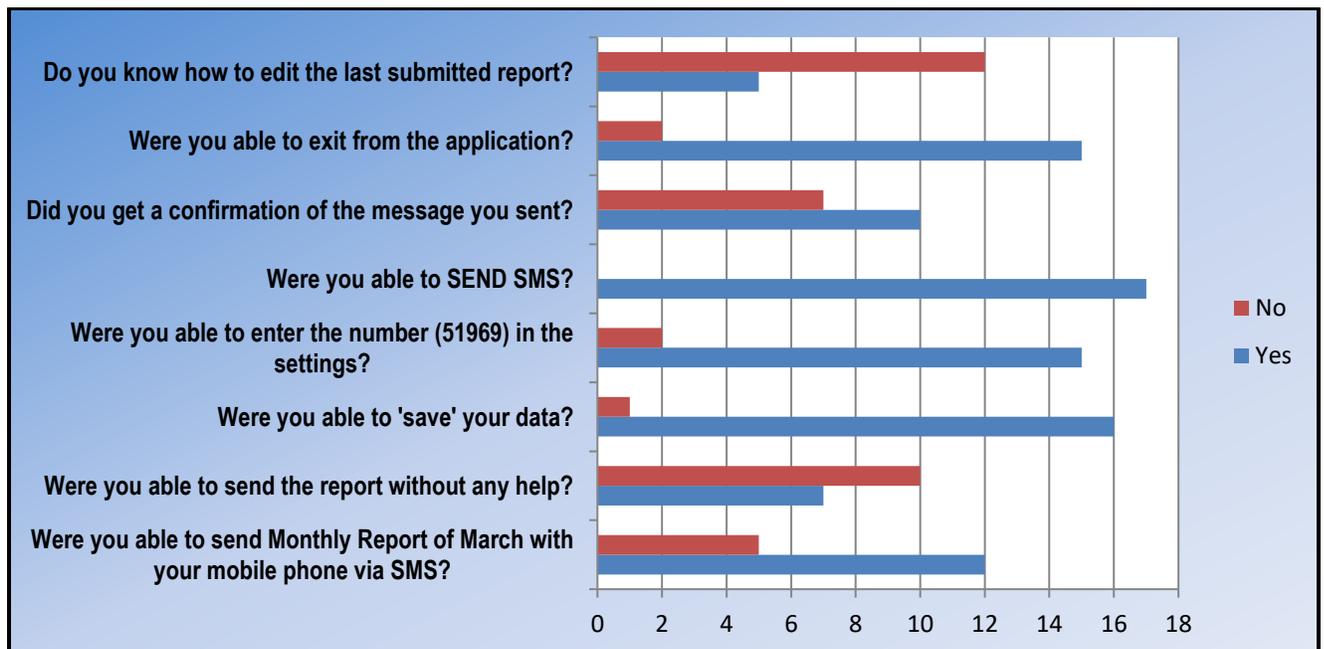**Fig 31: Figure showing the status of the health-workers whose phones were compatible**

The data was studied and the following results were encountered:

- Only 42% of the phones were compatible with the JAVA application
- 57% of the health workers preferred using Nokia phones
- In all the phones that were compatible, the *JAR* files were installed during the capacity-building
- Almost all of the heath workers (192 out of 201) were given hands on training (on the trainers phone or a phone was shared amongst a group)
- More the 75% of the health workers could read the form and could navigate through the form easily
- 128 health workers agreed that the mobile reporting will make their work easy
- On an average 75% of the health workers (whose phones were compatible) could send the monthly report (with help)
- But only 29 of them could Edit the last submitted report (a functionality where a saved/ sent report could be edited)

CHAPTER-7

ISSUES & CHALLENGES DURING THE CAPACITY-BUILDING SESSIONS

	ISSUE	EXPLANATION
TECHNICAL ISSUES	**Data not getting saved**	In one of the phones data could not be viewed after being saved
	Error in report editing	After saving the entire form, when the form was reopened and 'yes' was selected in the 'Do u want to edit the last submitted report?', error appeared. (Encountered in Chandi, Nokia C2)
	Incorrect date format	Even after the phone dates were adjusted, in the reporting month year 2046 appeared. (Encountered in Nalagarh, Samsung)
	Message sending fail	Message sending fails in case of a dual-sim phone.
	Wrong format	In many phones after sending SMS, the acknowledgment SMS received was **'wrong format'** even though the worker was registered
REQUIREMENT ISSUE	**Additional data element**	3 more data elements need to be put in the application
	ANM reporting for more than one sub-centre	In the block of Nalagarh, each ANM handles more than one sub-center. This feature was not supported by the mobile application

Although, training was imparted to 201 health workers present for DHIS2 mobile training sessions, only 84 phones were compatible with our DHIS2 mobile application. In other words only 42 % percent of trained health workers would actually be doing their monthly HMIS reporting through their mobile phones as of now.

The implementation challenges will be discussed under following headings:

- **User end challenges**
- **Challenges with user phones**
- **Administrative challenges**

User end challenges

Following training challenges with respect to health workers were faced by the training team

- **"My phone is not compatible then how do I report?"**

Most of the health workers whose phones were not compatible with DHIS application were un-happy with this fact. And for implementers giving answer to such a question was quite difficult since we didn't know whether government would be providing new phones to health workers or not. Also it's very difficult to convince the health workers to buy new compatible phones from their own personal expenses.

- **"My phone is not compatible so why do I need to undergo training?"**

Many health workers initially refused to undergo training since they didn't have compatible phones. Motivation level to learn new things obviously does not come naturally to such kind of health workers and hence more effort needs to be put in from the implementation side. [9]

- **"Unless all the health workers are not provided phones we will not report."**

At many blocks the health workers which had compatible phones initially refused to undergo trainings saying that unless all health workers have compatible phones they would not go for mobile reporting. It's difficult to make health workers undergo behavioral change if they think they are being forced to do so.

- **"We won't be sending SMS's for reporting till we get paid for it."**

Few health workers refused to send demo data through SMS for practice saying that they would not be using their own money to send reports. Health workers are always reluctant to spend their

own money fearing that government won't reimburse them or would not provide them any allowance at all.

- **"We will not send reports using our personnel mobile phones."**

Majority of the health workers were reluctant to use their personnel phones for reporting purposes. Many said that their phones are also used by their family members so they cannot use their phones for reporting. Relying on user's personnel phones for mobile reporting is not a good idea since accountability does not come into action. [10]

- **"Why should only female health workers do the mobile reporting?"**

Many female health workers said that why should only they do the mobile reporting if they also have a male health worker at the sub-centre. Giving a satisfactory answer to such a question becomes difficult for the implementers. Defining the role of health worker (male and female) should also be taken into consideration before starting the training.

- **"I only know how to receive calls?"**

Many of the health workers had never used their mobile phones except for receiving calls. Such kinds of health workers have apprehensions regarding use of phones for reporting. They don't feel comfortable by the idea of using mobile phones for their professional work. Sensitization of health workers to technology in addition to training and education is also important for successful implementation.

- **Not all health workers present for training**

At many blocks the training team could not train all the health workers since many of them were absent. The reason being they were busy with other health activities like immunization sessions, school health programme etc. Training dates should be decided in such a way that all the health workers are available for training.

- **How many times do we need to undergo training?**

In many blocks like Syri the mobile team had previously imparted training to health workers (browser based). Many health workers were upset with the fact that they again need to undergo training. Inconsistency in use of technology [11] and repetition of training decreases the motivation. [12]

Challenges with user phones

Since the DHIS mobile training was given on the personnel phones of the health workers, a lot of implementation issues (technical as well as training) were faced by the training team. They are discussed as follows:

- **DHIS2 mobile compatibility issue**

Using different mobile phones (brands and models) for training makes mobile health implementation a difficult thing. The application could be installed only on 42 % user phones. Remaining 58 % phones were in-compatible. These phones were either:

> ➢ not java based
> ➢ were black and white phones
> ➢ were not Bluetooth enabled
> ➢ 'jar' file could not be located in some phones (local and Chinese brands)
> ➢ some mobile phones hung while using the application (local and Chinese brands)
> ➢ some phones had memory issues and hence 'jar' files could not be installed
> ➢ in some dual sim phones (local and Chinese) there is no prompt of sim1/sim2

- **Different brands and models of mobile phone behave differently**

The user phones are never tested before going for implementation.

> ➢ Local and Chinese phones have a totally different kind of user interface which in most of the cases is not user-friendly. Thus health workers are reluctant to undergo training with such kind of phones.
> ➢ Some phones had poor touch screen responses and few QWERTY phones had very small keypads, the user often makes mistakes with such kind of phones while making data entry.
> ➢ The application was getting installed in different locations in different phones.

Inconsistency in phone models creates problems in giving training as well as learning (for both health worker and trainers).

- **Accountability issue**

Using the health workers personnel phones for training and reporting makes them less accountable. They are less receptive to training (their phones being not compatible or the expecting phones to be provided) and hence making them less accountable to send reports on timely basis can be an issue. [13]

Administrative challenges

- **Timely information not given to health workers and other officials**

In many blocks the health workers are not given timely information about the training schedule or the training dates are kept in such a way that it clashes with their other day to day work. For example in block Nalagarh, a few health workers coming for training after the training was over since they are on field for immunization camps. Similarly even BMO's were not aware of the training dates at many blocks.

- **State not sure about which technology to go for and whether to provide phones to health workers or not**

Before the start of state wide implementation the state should be sure of which technology (sms or gprs) to go for. This not only helps in better training plan but also prevents wastage of time, money and human resources.

CHAPTER-8

RECOMMENDATIONS & LIMITATIONS

Few recommendations from the Solan mobile training which can help us in better mobile implementation in the entire state of HP and other states as well are:

- **State should provide mobile phones to health workers:** Training experience from Solan tells us that its always better that state provides mobile phones to all health workers or one mobile per sub-centre. This has following advantages:
    * No need to depend on mobile phone of health worker
    * No issue of application incompatibility
    * Training becomes easy and fruitful
    * Any technical or user issue can be solved quickly
    * It becomes easy for the testing team to do testing and report bugs/issues
    * Health workers would be more accountable for their mobile reporting
    * A sense of encouragement and motivation [14] to learn new technology is there
    * Health workers can learn and share their user experiences with each other since all would be having same kind of phones
    * Any up-gradation or change in the application can be made quickly
    * No issue of phone being used by family members of health worker

- **Training should be started only when the use of technology is decided:** Once the implementation is started there should be least changes in things. Browser-based training was already given to Syri block. And now SMS based training has to be given. Sustainability cannot be ensured in mobile health implementation if we keep on changing our technology use. [15]

- **Implementation should not become a pilot and vice-versa** unless proper study and analysis is done. This will not only ensure sustainable and scalable implementation but also save money, time and human resources. [16]

The study had the following limitations:

- SPSS could not be used for analysis. It is not an analytical study. The training sessions are aimed at troubleshooting of the application and judging the level of acceptance of the end-user [17]

- The language is a barrier to effective training

- Due to terrain and extreme climatic conditions making regular field visit is not an easy task

- Network connectivity is a limiting factor in some areas

- Each time a change in the application the team has to manually travel to the field to deploy it in the health-worker's phone

- Shifts of work of the health-worker leading to about 75 % attendance in the blocks

CHAPTER-9

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APPENDIX

1. Format and guidelines for filling the sub-centre form:

	Sub Centre Monthly Dataset	
State :		
District:		
Block :		
SC :		
Month :	Year :	
Sl. No.	**Data Elements**	**Monthly Achievement**
M1	**Antenatal Care Services(ANC)**	
1	Total number of pregnant women registered for ANC	
	1.1 Of which Number registered within first trimester	
2	New women registered under Janani Suraksha Yogna (JSY)	
3	Number of pregnant women received 3 check ups	
4	**Number of pregnant women given**	
	4.1 TT1	
	4.2 TT2 or Booster	
5	Total number of pregnant women given 100 IFA tablets	
6	**Pregnant women with Hypertension (BP > 140/90)**	
	6.1 New case detected at Institution	
7	**Pregnant women with Anemia**	
	7.1 Number having Hb level < 11 (tested cases)	
M2	**Deliveries**	
8	**Deliveries conducted at Home**	

	8.1	**Number of Home Deliveries attended by**	
	(a)	SBA Trained (Doctor / Nurse / ANM)	
	(b)	Non SBA (Trained TBA / Relatives / etc.)	
		Total {(a) to (b)}	
	8.2	Number of newborns visited within 24 hours of Home Delivery	
	8.3	Number of mothers paid JSY incentive for Home Deliveries	
9		**Deliveries conducted at Facility**	
	9.1	Number of deliveries conducted at Facility	
	9.2	Of which Number discharged under 48 hours of delivery	
	9.4	**Number of cases where JSY incentive paid to**	
	(a)	Mothers	
	(b)	ASHAs	
	(c)	ANM or AWW (Only for HPS States)	
M3		**Pregnancy outcome & details of new-born**	
10		**Pregnancy Outcome (in number)**	
	10.1	Still birth	
	10.2	Abortion (spontaneous / induced)	
M4		**Post -Natal Care**	
11		Women receiving post partum checkup within 48 hours after delivery	
12		Women getting a post partum check up between 48 hours and 14 days	
M5		**Family Planning**	
13		Number of new IUD Insertions	
	13.1	At Facility	
14		Number of IUD Removal	
15		Number of Oral Pills cycles distributed	

16		Number of Condom pieces distributed	
17		Number of Centchroman (weekly) Pills given	
18		Number of Emergency Contraceptive Pills distributed	
19		**Quality in sterilization services**	
	19.1	Number of complications following sterilization	
	(a)	Male	
	(b)	Female	
	19.2	Number of failures following sterilization	
	(a)	Male	
	(b)	Female	
M6	**Child Immunization**		
20	**Number of Infants 0 to 11 months old who received the following:**		
	20	BCG	
	20	DPT1	
	20	DPT2	
	20	DPT3	
	20.1	OPV0	
	20.1	OPV1	
	20.1	OPV2	
	20.1	OPV3	
	20.1	Hep-B1	
	20.1	Hep-B2	
	20.1	Hep-B3	
	20.1	Measles	
	20.1	Total number of children aged between 9 and 11 months who have been fully immunized (BCG + DPT123 + OPV123 + Measles) during the month	
	(a)	Male	
	(b)	Female	

		Total {(a) to (b)}	
21		**Number of children more than 16 months who received the following**	
	21.1	DPT Booster	
	21.2	OPV Booster	
	21.3	Measles, Mumps, Rubella (MMR) Vaccine	
22		**Immunization Status**	
	22.1	Total number of children aged between 12 and 23 months who have been fully immunized (BCG + DPT123 + OPV123 + Measles) during the month	
	(a)	Male	
	(b)	Female	
		Total {(a) to (b)}	
	22.2	Children more than 5 years given DT5	
	22.3	Children more than 10 years given TT10	
	22.4	Children more than 16 years given TT16	
	22.5	**Adverse Event Following Immunization (AEFI)**	
	(a)	Abscess	
	(b)	Others	
23		**Number of Immunization sessions during the month**	
	(a)	Sessions planned	
	(b)	Sessions held	
	(c)	Number of sessions where ASHAs were present	
M7		**Number of Vitamin A doses**	
24		**Administered between 9 months and 5 years**	
	24.1	Dose-1	
	24.2	Dose-5	
	24.3	Dose-9	
M8		**Number of cases of Childhood Diseases reported**	

		during the month (0-5 years)	
25		Measles	
26		Diarrhea and Dehydration	
27		Malaria	
Part B.		**Health Facility Services**	
M9		**Patient Services**	
28		Number of Aanganwadi Centers reported to have conducted VHNDs during the month	
29		Outpatients	
	29.1	OPD attendance (All)	
M15		**Laboratory Testing**	
30		**Lab Tests**	
	30.1	No. of Hb tests conducted	
	30.2	Of which numbers having Hb < 7 mg	

2. DHIS2 mobile monthly HMIS reporting format

Monthly form 1

Mobile-Screen	
SNO	**Data Elements**
Heading	**ANC Services**
1	ANC Registration
2	ANC Reg 1 Trimester
3	JSY Registration
4	ANC 3 check-ups
5	TT1
6	TT2 or Booster
7	100 IFA tablets
8	New cases BP>140/90
9	Hb level <11 (tested cases)
Heading	**Deliveries**
Sub Heading	**Home Deliveries**
10	SBA
11	Non SBA
12	Newborn vstd <24hrs
13	Mothers paid JSY
Heading	**Institutional Deliveries**
14	Deliveries at facility
15	Discharged <48hrs
16	Mothers JSY incent
17	AWW JSY incent

Heading	**Pregnancy outcome**
18	(M)Live Birth
19	(F)Live Birth
20	Still birth
21	Abortion
Heading	**Newborns weighted**
22	At birth
23	Less than 2.5 kg
24	Breastfed >1hr
Heading	**Post -Natal Care**
25	PP with in 48hrs
26	PP b/w 48hrs-14days
Heading	**Family Planning**
27	IUD Inserted
28	IUD Removed
29	Oral Pills cycles distributed
30	Condom pcs distributed
31	Centchroman pills given
32	ECP distributed
33	(M)Sterili Compli
34	(F)Sterili Compli
35	(M)Sterili Failures
36	(F)Sterili Failures
37	(M)Sterili Death
38	(F)Sterili Death
Heading	**Child Immunization(0-11 months)**
40	BCG
41	DPT 1
42	DPT 2
43	DPT 3

44	OPV 0 (birth dose)
45	OPV 1
46	OPV 2
47	OPV 3
48	Hep-B1
49	Hep-B2
50	Hep-B3
51	Measles
52	(M)(9-11 mnt) Full Immu
53	(F)(9-11 mnt) Full Immu
Heading	**Following Immunization (>16 months)**
54	DPT Booster
55	OPV Booster
56	MMR Vaccine
56	(M)(12-23 mnt) Full Immu
57	(F)(12-23 mnt) Full Immu
58	DT 5(>5yrs)
59	TT 10(>10yrs)
60	TT 16(>16yrs)
Heading	**AEFI**
61	Abscess
62	Death
63	Others
Heading	**Immunization sessions**
64	Sessions planned
65	Sessions held
Heading	**Vitamin A Dose (Between 9 months & 5 yrs)**
66	Vitamin A(Dose-1)
67	Vitamin A (Dose-5)
68	Vitamin A\u00a0(Dose-9)

Heading	**Childhood Diseases reported (0-5 years)**
69	Measles
70	Diarr & Dehyd
71	Malaria
Heading	**Health Facility Services**
72	VHNDs at Anganwadi
73	OPD (ALL)
Heading	**Lab Tests**
74	Hb tests conducted
75	Hb <7mg

3. Feedback Questionnaire

Name:

Sub-center:

Phone No.

	Yes/No
Was your phone compatible?	
If yes, did you get the mobile phone with all the three forms installed in it?	
Were you given hands-on training?	
Did you understand the process of using the mobile application through the presentation?	
Were you able to read the form on the phone easily?	
Did you find the navigation through the application easy?	
Do you think the mobile-reporting system will make your work easy?	
If no, please explain reason for the same?	
Out of the phones that were compatible,	
Were you able to send Monthly Report of March with your mobile phone via SMS?	
Were you able to send the report without any help?	

Were you able to 'save' your data?	
Were you able to enter the number (51969) in the settings?	
Were you able to SEND SMS?	
Did you get a confirmation of the message you sent?	
Were you able to exit from the application?	
Do you know how to edit the last submitted report?	