DISSERTATION

AT

NATIONAL URBAN HEALTH MISSION, GUJARAT

By

Dr. Shweta

PGDHM

2012-2014

International Institute of Health Management Research

DISSERTATION

AT

NATIONAL URBAN HEALTH MISSION, GUJARAT

SIGNIFICANCE OF HEALTH INFORMATICS IN PUBLIC HEALTH WITH DETAILED EVALUATION OF MATERNAL CHILD TRACKING SYSTEM (E-MAMTA) IN URBAN AREA OF VALSAD DISTRICT

By

Dr. Shweta

Under the guidance of

Dr. Abhijit Chakrabarty

Post Graduate Diploma in Hospital and Health Management

Year 2012-14

International Institute of Health Management Research

TO WHOMSOEVER MAY CONCERN

This is to certify that **Dr. Shweta (OT)** student of **Post Graduate Diploma in Hospital and Health Management (PGDHM)** from International **Institute of Health Management Research, New Delhi** has undergone dissertation at **National Urban Health Mission (NUHM) Gujarat from** 6th February 2014 to 8th May 2014.

The Candidate has successfully carried out the study designated to her during internship training and her approach to the study has been sincere, scientific and analytical.

The Dissertation is in fulfillment of the course requirements. I wish her all success in all her future endeavors.

12/5/14

Dr. A.K. Agarwal
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Certificate from Dissertation Advisory Committee

This is to certify that **Dr. Shweta (OT),** a graduate student of the **Post- Graduate Diploma in Health and Hospital Management** has worked under our guidance and supervision. She is submitting this dissertation titled "**SIGNIFICANCE OF HEALTH INFORMATICS IN PUBLIC HEALTH WITH DETAILED EVALUATION OF MATERNAL CHILD TRACKING SYSTEM (E-MAMTA) IN URBAN AREA OF VALSAD DISTRICT**" at "**NATIONAL URBAN HEALTH MISSION (NUHM) GUJARAT**" in partial fulfillment of the requirements for the award of the **Post- Graduate Diploma in Health and Hospital Management.**

This dissertation has the requisite standard and to the best of our knowledge no part of it has been reproduced from any other dissertation, monograph, report or book.

12/05/14

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Assistant Professor
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Certificate of Approval

The following dissertation titled **"SIGNIFICANCE OF HEALTH INFORMATICS IN PUBLIC HEALTH WITH DETAILED EVALUATION OF MATERNAL CHILD TRACKING SYSTEM (E-MAMTA) IN URBAN AREA OF VALSAD DISTRICT"** at **"NATIONAL URBAN HEALTH MISSION (NUHM) GUJARAT"** is hereby approved as a certified study in management carried out and presented in a manner satisfactorily to warrant its acceptance as a prerequisite for the award of **Post Graduate Diploma in Health and Hospital Management** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the dissertation only for the purpose it is submitted.

Dissertation Examination Committee for evaluation of dissertation.

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DR. ASHISH CHOUDHARY	12/05/14

The certificate is awarded to

Dr. Shweta (OT)

In recognition of having successfully completed her Dissertation in the department of

DISTRICT URBAN HEALTH UNIT

And has successfully completed her Project on

Significance of Health Informatics in public Health with Detailed Evaluation of Maternal Child Tracking System (E-Mamta) In Urban Area of Valsad District

Date: 08 May 2014

Organization: NATIONAL URBAN HEALTH MISSION

She comes across as a committed, sincere & diligent person who has a strong drive & zeal for learning

We wish her all the best for future endeavors

Training & Development

Zonal Head-Human Resources

FEEDBACK FORM

Name of the Student: Dr. Shweta (OT)

Dissertation Organisation: National Urban Health Mission (NUHM) Gujarat

Area of Dissertation: DUHU

Attendance: 100%

Objectives achieved: Field Visit, timely reporting of info asked by state

Deliverables: Proposed NUHM PIP 2014-15, NRHM 2014-15, Asha Incentive Annexure, Presentation for Executive Body meeting, CPSMS registration Information, ASHA & MAS Presentation

Strengths: Good coordination and well trained in IT.

Suggestions for Improvement: In depth knowledge of health programs & health related infrastructure, indicators etc.

Parmar

Dr. R.G. Shrimali
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Date: 08 May 2014
Place: Valsad, Gujarat

INTERNATIONAL INSTITUTE OF HEALTH MANAGEMENT RESEARCH,
NEW DELHI

CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled **Significance of Health Informatics in Public Health with Detailed Evaluation of Maternal Child Tracking System (E-Mamta) in Urban Area Of Valsad District** and submitted by **Dr. Shweta (OT)** Enrollment No. PG/12/083 under the supervision of **Dr. Abhijit Chakrabarty** for award of Postgraduate Diploma in Hospital and Health Management of the Institute carried out during the period from 6th February 2014 to 8th May 2014 embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other Institute or other similar institution of higher learning.

Signature Shweta

EXECUTIVE SUMMARY

HI is vast field that is intersection of information science, computer science and health care. When all these domains combines to deliver HI, the effectiveness of services rendered to population becomes enhanced and focused.

With HI, communication is enhanced, decision support system is strengthened and public health surveillance becomes easier and systematic. HI focuses patient care, information technology and information management.

Gujarat, is working diligently in HI aspect with implementation of healthcare software in public health. A long list of software is available in NHM, Gujarat, which assisting healthcare professional very efficiently. The software like Ability Gujarat, BADEA, DLIMS, and HMIS are software enhancing service delivery.

E-mamta is a software that rendering services in context to maternal and child health. Along with this it supports healthcare professionals. E-mamta functions in 4 phases which covers entire cycle of service delivery.

E-mamta has a huge list of characteristics and features which improves service delivery. Through E-mamta one can generate work plan, generate reports (including summary and case based) and HMIS monitoring. E-mamta delivers services to UHO/MHOs, FHWs and beneficiaries.

The software implemented in public health by NHM, Gujarat caters to entire population and covers entire state. Individually they deliver services in their master domain. The entire study focus on these software and their functionality.

The various review literature were taken as reference which says that HI aids in public health with their innovative technology and management.

Methodology included data collection with questionnaire and observation technique over a period of 3 months. Sample size was of 26 covering UHO/MHOs and FHWs.

The study findings revealed that UHO/MHOs agree that E-mamta is supporting them to a much extent but they are facing some issues also which need to be dealt. Where on interviewing FHWs it was found that they have no clear vision of E-mamta, although they know about it. On the basis of findings recommendations are also given within the study.

ACKNOWLEDGMENT

It is my esteemed pleasure to present the project whole heartedly and to thank to each and everyone who helped me in this task.

This study is an accomplishment due to the timely help, guidance, and constant support of several people. The investigator owes a deep sense of gratitude towards all those who have contributes to successful completion of this endeavor.

I am grateful to Dr. Abhijit Chakrabarty, Assistant Professor, IIHMR for allowing me to do this study under their able guidance, direction and encouragement. With his continuous support and guidance I was able to complete this study.

I offer my gratitude to Dr. R.G. Shrimali, Additional District Health Officer, NUHM, Gujarat for guidance and encouragement for my project as Mentor.

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LIST OF ABBREVATIONS

HI- Health Informatics

HIP- Health Informatics Professional

IT- Information Technology

NHM- National Health Mission

PwD- Person with Disability

BADEA- Birth And Death Entry Application

DLIMS- Drug Logistics Information & Management System

HMIS- Health Management Information System

MCTS- Maternal Child tracking System

MDG- Millennium Development Goals

NRHM- National Rural Health Mission

NFHS- National Family Health Survey

NUHM- National Urban Health Mission

FHS- Family Health Survey

FP- Family Planning

MMR- Maternal Mortality Ratio

IMR-Infant Mortality Rate

TFR- Total Fertility Rate

CDHO- Chief District Health Officer

RCHO- Reproductive Child Health Officer

MO- Medical Officer

UHO- Urban Health Officer

MHO- Municipal Health Officer

DEO- Data Entry Operator

FHW- Female Health Worker

ANM- Auxiliary Nurse Midwife

UHC- Urban Health Centre

ANC- Ante Natal Care

PNC- Post Natal Care

BPL- Below Poverty Line

RSBY- Rashtriya Swasthya Bima Yojna

JSY- Jananai Suraksha Yojna

BSY- Bal Swasthya Yojna

CY- Chiranjeevi Yojna

SIGNIFICANCE OF HEALTH INFORMATICS IN PUBLIC HEALTH WITH DETAILED EVALUATION OF MATERNAL CHILD TRACKING SYSTEM (E-MAMTA) IN URBAN AREAS OF VALSAD DISTRICT

INTRODUCTION

HEALTH INFORMATICS

Health Informatics (also called as health care informatics) is a field at the convergence of information science, computer science and health care. It works upon the resources, equipments, and strategies expected to optimize the acquisition, storage, retrieval, and use of information in health and biomedicine.

Health informatics tools include computers, guidelines formulated for clinical practice, medical terminologies, and additional informational and communication systems.[1]

HI implies the involvement of information technology to alleviate the creation and use of health-related data, information and knowledge.

HI APPLICATIONS:

The HI applications involve the design, development, implementation, maintenance and evaluation of:

- Communication protocols for the secure transmission of healthcare data.
- Electronic patient record systems.
- Evidence-based clinical decision support system.
- Classification systems using standardized terminology and coding.
- Case management systems. (e.g. for community, home and long-term care)
- Access and referral system for healthcare services.
- Patient monitoring systems.
- Digital imaging and image processing systems.
- Telehealth technologies to facilitate and support remote diagnosis and treatment.

- Public health surveillance and protection systems.
- Methodologies and applications for data analysis, management and mining.
- Clinical information data warehouse and reporting systems.
- Business, financial, support, and logistics system.[2]

Configuration of Health Informatics

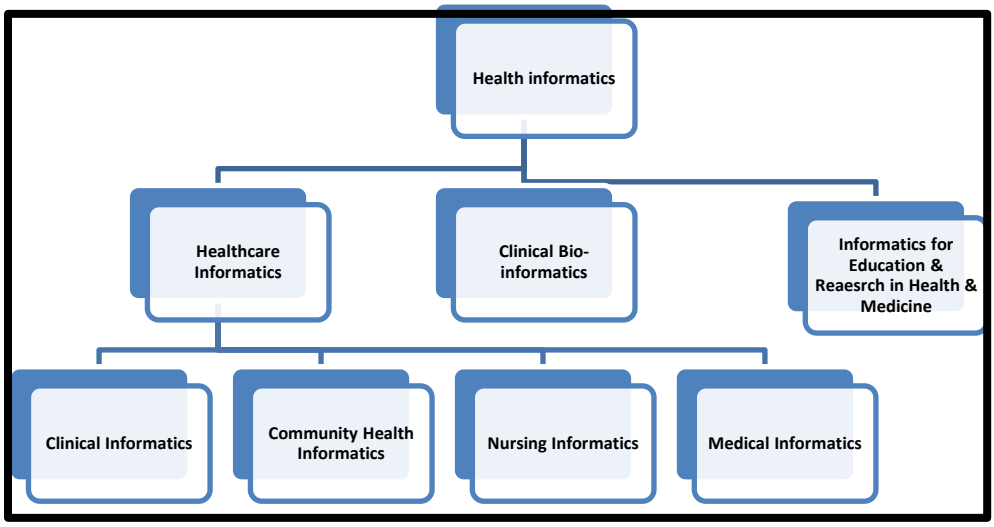

Figure 1: Health Informatics Configuration

HIP CORE COMPETENCIES

Figure 2: HIP Competencies

Deliverables of Health Informatics

In healthcare, Health Informatics is crucially devoting to three key areas.

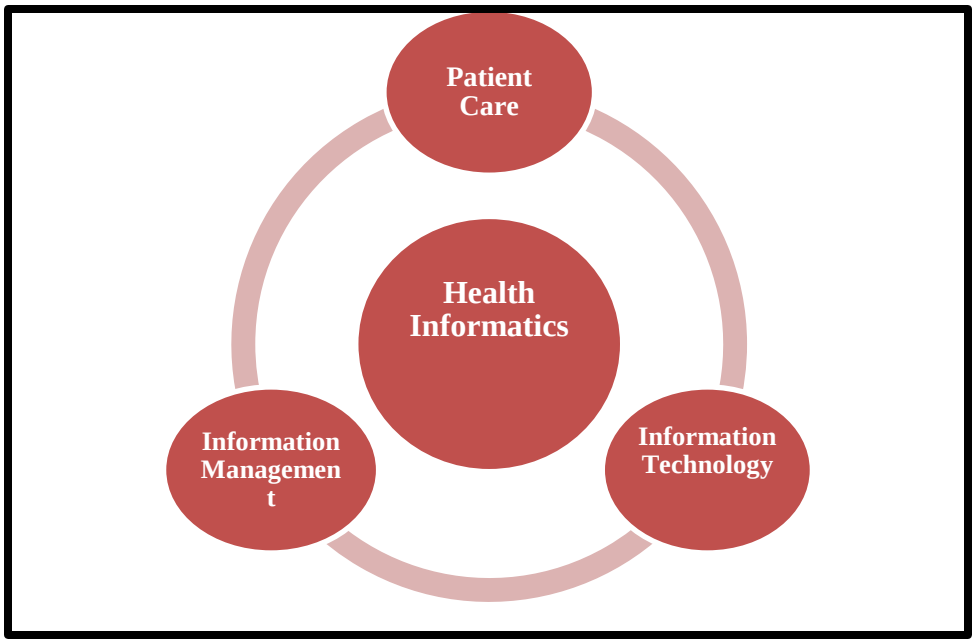

Figure 3: Healthcare Informatics Deliverables

- **Patient Care:**

Information is instantly and easily accessible through HI. Through HI patient can be informed about services that assist them to analyze and decide whether they want to receive the services or not. As list of services is being shared with patient they can better understand it and physicians get opportunity to deliver improved services.

- **Information Management:**

HI makes information sharing between physicians easy. So information is timely available and managed in an effective way. Through information management inefficiencies are being dealt diligently and confusions are avoided.

- **Information Technology:**

HI aids in knowledge sharing. Quality data and knowledge is shared within healthcare professionals. Through integrated IT, HI ensures confidentiality and privacy.[3]

HI in NHM Gujarat

ABILITY GUJARAT

Ability Gujarat is a web based application being developed to cater PwD,s population with ICT advantages to enhance effectiveness and efficiency of services delivered to them.

GOAL:

To archive a comprehensive database of PwD's and issue them disability certificate based on guidelines available for enhancing quality of life of PwD's.

Short Term Objectives:

- Introduction of a database of all PwD's inside the state.
- Evaluation of all PwD's by reaching to them.
- Issuing certificate to PwD's if they have obvious disability.

Long Term Objectives:

- Creation of comprehensive database of all PwD's in Gujarat State.
- Advancement and prevention of disability to ensure opportunities equality, rights protections and complete participation.[4]

BIRTH AND DEATH ENTRY APPLICATION (BADEA)

The data concerned with Birth, Death and Still birth registrations are described through this online software with all the information in detail. The operations held over are being monitored through Audit Trail integrated with in the software.

All the districts of Gujarat fed data into this software. The data sharing is managed between Villages, Talukas (Tehsils), District and State.

The Information that is generated from the system includes following related data:

- 23 Birth reports for Place of Occurrence with Population, Birth Rate, Time Gap in Registration, Sex and Month of Occurrence, Type of Attention during Delivery, Type of Institution where delivery occurred, Age of Mother at the time of delivery, Birth Order with Population, Level of Education of Mother/ Father, Religion of Family, Occupation of Father / Mother, Duration of Marriage of Mother, Duration of Pregnancy, Birth Weight and Method of Delivery.
- 21 Death reports for Place of occurrence with population, Death Rate, Time gap in Registration, Sex and Month of Occurrence, Type of Attention, Religion of the Deceased, Occupation, Death Cause with Medical Certification, Infant Deaths with Population / Sex, Pregnancy Related Death with Medical Certification / Occupation and Habit.
- 7 Still Birth Reports for Place of Occurrence, Still Birth Rate, Sex & Age of Mother, Duration of Pregnancy, Type of Medical Attention Received at Delivery, Cause of Still Birth, Age of Mother and Duration of Pregnancy.
- All the reports are even segregated to Year, District, Taluka and Villages.
- 10 Graphical Reports for Male – Female birth, Birth Order, Male – Female Death, Male – Female Infant Death, Delivery Attention, Pregnancy Death,

Live Births Age Group-wise, Age Specific 3 & 3+ Birth Order, 3 & 3+ Birth Order with Mother's Education Level & Father's Education Level.

The Forms that is available in BADEA

- Birth Entry Form
- Death Entry Form
- Stillbirth Entry Form
- Data Entry Detail Page
- Login History Page[5]

DRUG LOGISTICS INFORMATION & MANAGEMENT SYSTEM (DLIMS)

NIS has developed an online application called as Drug Logistics Information & Management System (DLIMS) to integrate various activities of Centre Medical Stores Organization Office.

DLIMS has a crucial role in monitoring various Govt. sponsored National programs such as Anti-Malaria, School Health Program, Epidemic, Nirmal Gujarat, Anti Rabies, and Medical Camps.

Objectives of DLIMS:

1. To improve efficiency and effectiveness of drug logistics and warehousing system.
2. Using latest information and communication technology to improve various functions like procurement; indenting, placing order, bill payment etc. to serve in a better and effective manner.
3. To facilitate continuous online monitoring of all activities.
4. To integrate all inter-related activities through common database to avoid redundancy, increase accuracy and enhance transparency.

Outputs of DLIMS

1. Centralized database is enhancing accuracy as activities are inter-related and same database is being used.
2. Transparency is increased as supplier is also a part of system.
3. NIC's technical resources are taking care of issues like data disaster and data backup by hosting server within central server.
4. Online monitoring has enhanced drug procurement and supply management.[6]

Health Management Information System (HMIS)

HMIS was conceived and designed by Department of Health & Family Welfare to ascertain quality health care by implementing IT application in a way that it strengthens integration of management information at state level leading to authentic and easy online review and monitoring.

It has integrated standard clinical and diagnostic protocol tools and hospital management tools.

Objectives:

1. To aid in accessible quality health care.
2. To enhance clinical and diagnostic services.
3. To provide alerts on disease trends and Cause of death as per international codes for disease surveillance and rapid action.
4. To generate integrated state-level view of the resource utilization.
5. To monitor distinguished indicators and to acquire comparison report of efficiency and performance among hospitals.
6. To aid in tools for effective health policy making and planning.

BIOSURVEILLANCE

Biosurveillance is a term that focus science and health related data management and information for early warning of threats and hazards, early detection of events, and rapid detection of events so that effective measures can be implemented to extenuate adverse health effects.

Biosurveillance exemplify a new health information paradigm for public health that attempts to integrate and effectively manage health-related data and information across a wide range of information systems with primary goal of timely and authentic population health situation awareness.

Scope & Function:

- Covers all hazards including biological, chemical, radiological, and nuclear and explosives.
- Covers urgent reported diseases and non-specific and novel health events.
- Covers ad hoc data gathering, analysis and application of information.
- Functions include: Case Detection, Event Detection, Signal Validation, Event Characterization, Notification and Communication and, Quality Control and Improvement.

Characteristics:

- Quality data and information is base of biosurveillance.
- It is flexible enough to equalize and corresponds the needs for speed, scale and specificity.
- It is adaptive to information needs of an event, having capabilities that are broadened beyond public health surveillance to support the comprehensiveness of information requirements across phases of an event.

- It is scalable allowing the needed granularity of information at the operational level while referencing the need for situation awareness at other levels based on roles, responsibilities and assets.
- It ensures the sharing of data across all levels of government, but does not mandate it.
- Notification and reporting channels are characterized, explicit, and designed to optimize situation awareness among all those with a need to know.
- It has the ability to record unforeseen incidents through reliance on human judgment.
- Biosurveillance's prerequisite is skilled workforce.[8]

Health Informatics In Biosurveillance

Efficient, extensive assembling and analysis of actionable biosurveillance data is compromised by the lack of common descriptors and methods for aggregation as well as inadequate data sharing and use agreements.

Standards, metrics, validation protocols, diagnostic platforms, terminology, operational systems, and cultures vary by region, making it difficult for different agencies to seamlessly share information.

It is important to develop operating principles for data collection, integration and sharing that allow for flexibility, expansion and innovation. The most crucial is to create an inclusive biosurveillance system that is capable of monitoring and integrating environmental, agricultural, and health-related data.

These goals can be accomplished through the adoption of standard protocols, validation and use of broadly applicable metrics based on quantitative research, development of technologies that facilitate real-time data collection, reporting,

and analysis, creation of nominal and computation models of disease and wellness, and use of digital clinical records.

Challenges Of Biosurveillance That Health Informatics Will Be Dealing

- **One Health:** Domestic animal, wildlife and plant disease surveillance systems and food and vector disease monitoring systems should be integrated into the national biosurveillance strategy for human health.
- **Normalized data and Interoperability:** The biosurveillance enterprise requires data sharing, systems integration, efficient and timely exchanges of information, standardized diagnostic platforms, interoperable information technologies, and broad data access.
- **Common Standards:** Metrics must be established to assess the utility of tools, training programs and strategies employed to support national and global biosurveillance efforts.
- **Data Use Agreements:** Data sharing agreements are an essential building block for developing national and international capabilities, addressing concerns of trust, responsibility, and liability.
- **Language:** Variability in terminology is a barrier to biosurveillance. Standardization of methods for recording and reporting information is critical to realizing the promise of data sharing, informing biosurveillance and facilitating situational awareness and event detection.
- **Data Sharing:** Proprietary diagnostic and disease data from animal and wildlife populations should be shared with public health officials; issues of incentives, confidentiality, and potential political and economic consequences must both be understood and overcome.[9]

E-MAMTA

INTRODUCTION

Maternal Child tracking System also called as E-mamta is online software that facilitates name based tracking of individual. The aim of this software is to ascertain service delivery to population of Gujarat with special emphasis on mother and children.

MCTS is software that focuses to render health services details received by an individual, by capturing all the encounters that the same individual has gone through his/her health program.

MCTS also aids in monitoring of health services to the individual level that allows tracking of patient information effectively.

Objectives of E-mamta

- To aid in extensive and qualitative service delivery to mother through ensuring:
  - Full Ante Natal Care (ANC) services on time
  - Full Post Natal Care (PNC) services on time.
- To provide comprehensive care to children by ensuring full immunization coverage.
- To aid in authentic reporting and enhanced analysis of data.
- To enhance coordination across departments.
- To improve stock management.
- To target critical healthcare issues, on the basis of MDG, Swarnim Gujarat goals and the goals of NRHM.
- At last, to achieve decline in MMR, IMR and TFR.[10]

Phases of Service Delivery Through E-mamta

The service delivery through E-mamta is a cyclic process. The ending of one phase initiates other phase and there by complete a wheel of services delivered to both mother and child.

The roll out of E-mamta is as mention below:

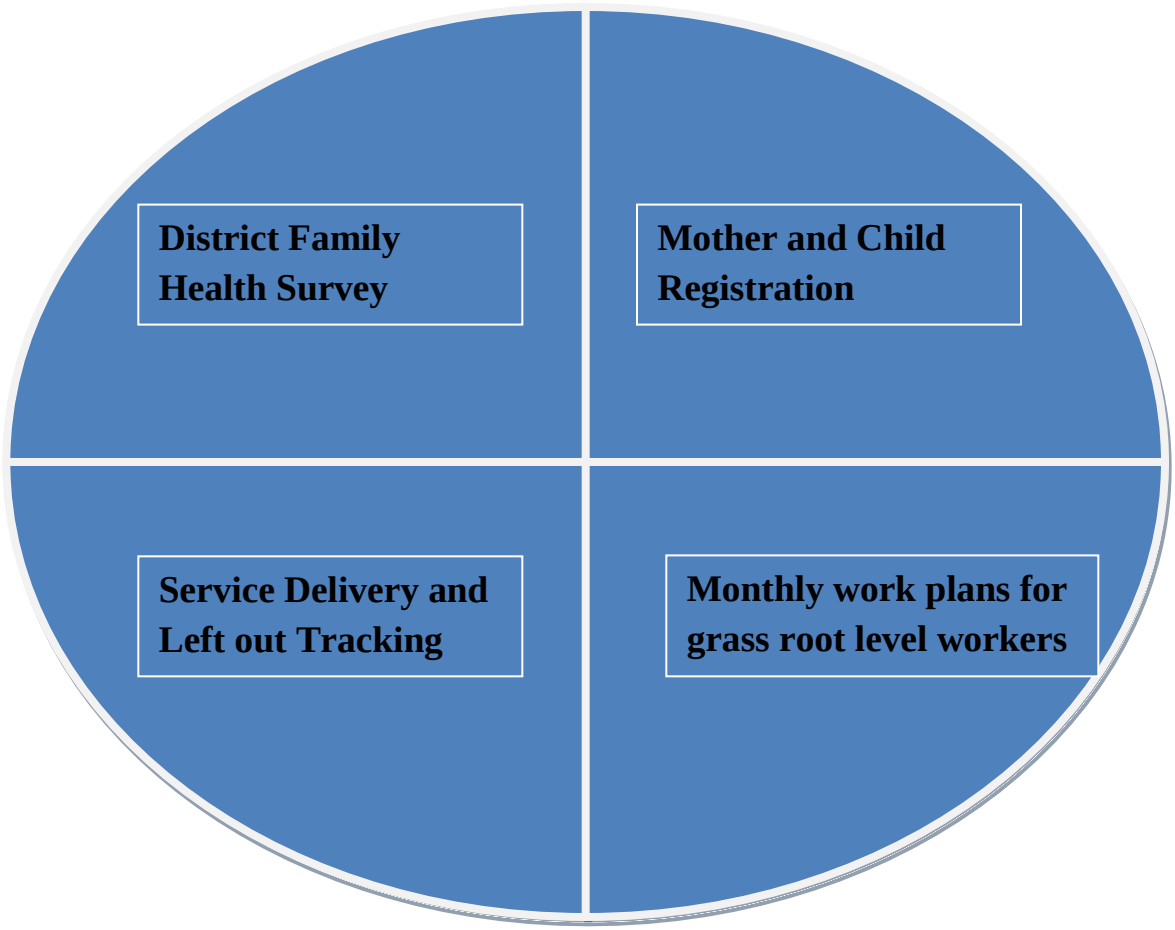

Figure 4: Phases of E-mamta

Phase 1: Family Health Survey

The very first step is Family Health Survey covering both urban and rural populations. Approximately 80% of Gujarat population is being covered in E-mamta.

The entries of FHS in E-mamta are being validated first by ASHA/FHW/MOs, then after cross validated by District and Block officials.

The accuracy and reliability of data is assured by comparison of data with BPL list, RSBY list, Voter list and Ration Card. The children registration is also validated with comparison of registration in Aanganwadi and Primary school.

Phase 2: After the registration, a unique family health care ID is being generated and given to beneficiary who in future assist in to conquer migration details and prevent loss of cases due to migration.

Phase 3: Registration of Pregnant Mothers and Children

All women who are pregnant and children upto 6 years of age are being registered and given a unique mother/child ID.

Phase 4: Tracking of Healthcare Services Through Monthly Work plans

E-mamta covers services given to pregnant mother namely ANC, Delivery, PNC and immunization and nutrition. Thus the services are being delivered in following ways:

- Detailed work plans created by sub-centre further given to ASHA/FHW to provide due services to beneficiary.

- The services rendered to the mother and children for ANC, immunization, PNC, and nutrition are recorded in E-mamta and use to identify the gaps in service delivery.
- It also sends SMS to beneficiaries/health workers/District and Block level authorities to monitor the services that are due.
- HMIS report can also be generated through E-mamta by aggregation of services.

Characteristics of E-mamta:

E-mamta is an innovative initiative taken by Gujarat Government to enhance the service delivery to mother and child. The following salient characteristics of E-mamta aid in achieving those objectives:

- It is a management tool that caters targeted population with comprehensive maternal child health services and assures complete and well timed service delivery with added unique feature of name based tracking.
- It also holds on comprehensive Family health data base of the entire population.
- It focuses on complete life cycle of an individual by proving information from birth to death.
- Targeted beneficiaries are being reached with work plan.
- It provides unique ID to each individual registered in system which aid in dealing migration/transfer issues.
- There is no duplication of entries as once recorded a woman all her pregnancies get updated with in one record.
- Healthcare services that are due are acknowledged to beneficiaries and service provider through SMS.
- It is integrated with HMIS and aid in automatic generation of reports and registers through aggregation.

- It aid in extensive search by provide various parameters to search with. For e.g., Name, Village name, Ration card number, Mobile number, Health ID, Family ID, RSBY card number, and BPL card number.
- It is compatible with Unique ID i.e. AADHAR card.
- It also records the information of various incentives paid to all health workers records for the benefit of JSY, BSY and CY schemes.
- It saves entire database of service provider.
- It serves as communication platform between service providers and between service provider and beneficiaries.
- Dashboard provides brief overview of Data entry, Deliveries, Immunization services, Maternal and Infant deaths.

Features of E-mamta:

1. **Work plans: Facility Wise**

- Work plan for new registration
- Work plan for ANC
- Work plan for delivery
- Work plan for PNC mother
- Work plan for Neo-natal (PNC child)
- Work plan for child services
- Work plan for adolescents
- Work plan for anemia
- Work plan for malnutrition
- Work plan for institutional delivery

2. **Reports: Facility Wise**

- Registration Details:
  - Complete information including age, address, services that are to be given (due) and date of services that are received through:

(a) Family survey data entry status

(b) Family survey form print

(c) Registration of adolescents

(d) Registration of pregnant women report

(e) Registration of child services

(f) User log report

- Summary reports for the region:
  - It unveils the number of beneficiaries getting benefitted from healthcare services within the region

  (a) Pregnant woman summary

  (b) Child immunization record

  (c) Child summary (0-1 years)

  (d) Child summary (1-6 years)

  (e) Mother care (From no 4 report)

  (f) Mother data search

- Cased based reports:
  - It describes individual child and mother's details by case ID

  (a) Child growth chart (male)

  (b) Child growth chart (female)

  (c) Mother Hb/wt chart

3. <u>HMIS Monitoring</u>

- Details of existing manpower in healthcare domain of the state
  - ANM
  - ASHA
  - MO
  - CDHO
  - RCHO
- Generation of Form no. 6,7,8,9

How the E-mamta has transformed the way services were delivered

Some of the changes that E-mamta has brought to service delivery are:

- E-mamta aided in individual based service information in contrary to earlier service based numerical information.
- Reports are more reliable after E-mamta implementation.
- Now the service delivers can switch to paper less information.
- Now the information entered is real time instead of month old.
- Systematic Monthly work plans assist health workers with improved service delivery.
- The captured information is individualized able to track with name and facilitative for comprehensive service delivery, analysis and management.
- State and District officials can view name based reports.
- Old information and services given can be retrieved immediately.
- Immunization record can be traced any time.
- Child growth report is saved and can be find out anytime.[11]

MCTS ADVANTAGES TO BENEFICIARIES

- Information about desired services, Government Schemes & Benefits
- Advance information about the due services
- Facilitate in timely delivery of full complement of services
- Facilitate better interaction with Health Service Provider
- Facilitate availing the services from any Health Centre based on need
- Free consultation from Central Helpdesk (Toll Free No)

MCTS ADVANTAGES TO FHW

- Auto generation of work-plan
- Better guidance from senior supervisors
- Contact details of the Beneficiaries
- SMS based work plan
- Micro planning for Field Visit
- Readily available Services due list

MCTS ADVANTAGES TO MHO/UHO's

- Readily available analytical reports
- Better planning for Vaccination Supply & Management
- Group /Individual SMS's to health workers and beneficiaries
- Direct communication with FHWs and beneficiaries
- Facility reporting status
- Actionable reports of registration and service updating status.[12]

NATIONAL URBAN HEALTH MISSION (NUHM)

According to Census 2001, urban population was 28.6 crore, which has been increased to 37.7 crore in Census 2011. The urban population comprise of people living in slum and other squatter areas.

Although the health facilities are nearer to urban poor but still their access to those facilities are restrained. The possible reason for this are:

- Inadequacy of urban public health delivery system
- Ineffective outreach and weak referral system
- Social exclusion
- Information and assistance lack from secondary and tertiary hospitals
- Economic resources shortage don't allow them to access private services
- Standards and norms for urban health care delivery system is not very clear and understandable

Urban Poor Health Status

As per NFHS III (2005-06) information, the key health status data for urban poor is as follows:

- Under 5 Mortality Rate (U5MR) is 72.7
- More than 46% of children are underweight
- Approximately 60% children miss total immunization before completing 1 year.
- Even the environmental condition of slum areas makes the population more prone to lung diseases like Asthma and Tuberculosis (TB) and also to vector borne disease and malaria.

In order to efficiently deal with these health issues of urban slum population, National Urban Health Mission (NUHM).

Focus Areas of NUHM

The NUHM focuses on:

- Urban Poor Population living in listed and unlisted slums
- All other vulnerable population such as homeless, rag-pickers, street children, rickshaw pullers, construction and brick and lime kiln workers, sex workers and other temporary migrants.
- Public health drive on sanitation, clean drinking water, vector control etc.
- Strengthening public health capacity of urban local bodies.

Urban Health Care Delivery Model

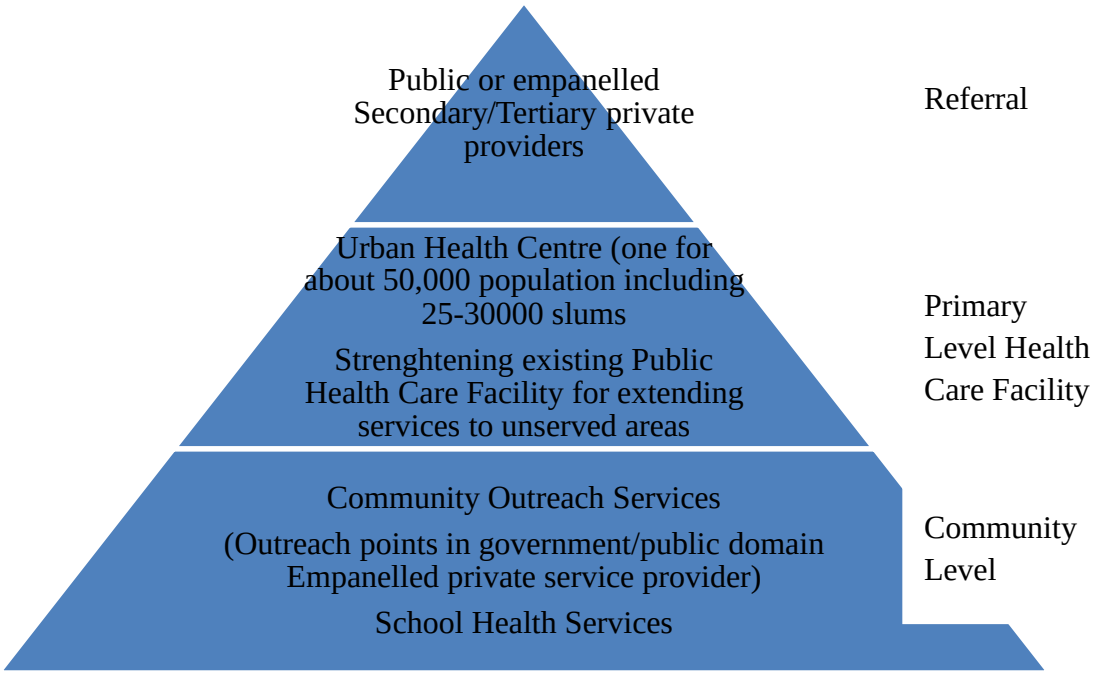

Figure 5: Hierarchy in UHC

Goals of NUHM:

The National Urban Health Mission (NUHM) aimed to enhance health status of urban population in general, but peculiarly of the poor and other disadvantaged sections, by facilitating equitable access to quality health care through a revamped public health system, partnerships, community based mechanism with the dynamic involvement of the urban local bodies.

Core Strategies of NUHM:

The various strategies implemented by NUHM to improve service delivery to urban poor and vulnerable group are as follows:

- Ameliorating the efficiency of public health system in the cities by strengthening, revamping, and rationalizing existing government primary urban health structure and designated referral facilities.
- Advancement of access to enhanced health care at household level through community based groups: Mahila Arogya Samiti.
- Strengthening of public health with innovative preventive and promotive actions.
- Increased access to health care through creation of revolving fund.
- IT enabled services (ITES) and e-governance has been used to improve access to enhanced surveillance and monitoring.
- Capacity building of stakeholders.
- Identifying and prioritizing the most vulnerable among poor.
- Assuring quality health care services.[13]

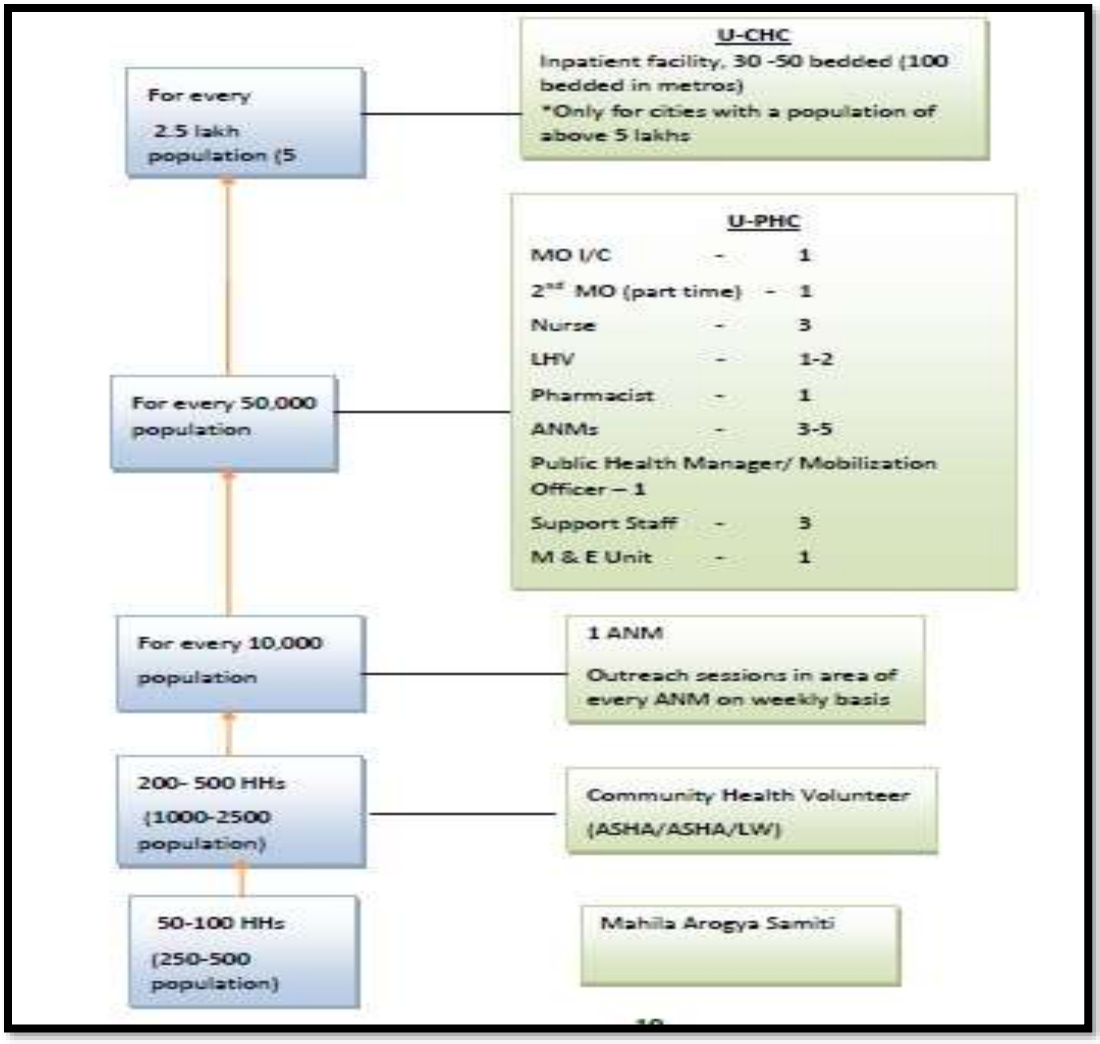

Figure 6: Urban Health Care Facilities

REVIEW OF LITERATURE

1. **The role of public health informatics in enhancing public health surveillance. (2012)**

Author: Savel TG, Foldy S.

The author believes Public Health Informatics is sub-division of Biomedical or Health Informatics. Public Health Surveillance has not only got advantage, but also initiated informatics analyses and solutions. Health informatics also caters emergency response, environmental health, nursing and administration. Health IT is not substitutable to health information technology, but implementation of IT into health care domain. Public Health Informatics aid in public health decision making by providing timely, relevant, and high quality information.[14]

2. **Evidence-based healthcare and health informatics: derivations and extension of epidemiology. (2006)**

Author: Nakayama T.

The study says, Epidemiology is the source of valid information and evidence in context to human health. Epidemiological finding in reference to major illness needs to be accumulated, improved, and elaborated in associate domains to aid in evidence-based medicine. So the author believes a system that can develop information resulting into effective decision making in clinical medicine and public health issues are needed. The Health Informatics system should aid in efficient flow and dissemination of health and medical information. The Health Informatics assisted with applications to develop, communicate and use the information and further being amplified as practical applied sciences.[15]

3. **Public Health Informatics: Improving and Transforming Public Health in the Information Age. (2000)**

Author: William A.Y., Patrick W

Timely, accurate and authoritative information is what required for the effective public health practice. Although, public health professional are the most former users of computers and till yet number of technological systems has been devised. But still we need a system that can be used to take complete advantage of public health activities. The public health informatics should see technology as population derived not an individual focused. So the technology should be designed considering the population. The Health Informatics should aid in creating the hindrance to disease and injury by manipulating conditions and environment that bring population to risk. At this particular time, Public Health Informatics is very crucial because of the threats to public health system and inventions in medical care delivery system. Even after having so many advantages there are many challenges to Public Health Informatics including integration of public health and clinical care, integration with national information system and the chaos about effect of information technology on confidentiality and privacy. These challenges can well be dealt with supporting and providing training, realizing the need of Health Informatics in public health and enhancing the physical infrastructure and architecture.[16]

4. **Application of an essential data set based computer system in support of maternal and child care. (1992)**

Author: Moidu K.

Software was installed in some organization focusing on services like perinatal care, family planning and immunization of infants. The purpose of software is to aid in information management in context mentioned above. The assessment of software was done through observations and experiences reported. Along with this end-users ability to define community needs were

observed. And lastly the social impact was assessed, by measuring the drop outs from immunization. The result of this shown that information delivered was almost valuable, which was one of the objective. The data quality was also ensured by the software. Administrative purpose was met by providing compiled reports from data entered.[17]

5. **Using technology to reduce maternal mortality in low-resource settings: challenges and opportunities. (2002)**

Author: Tsu VD, Free MJ.

Technology is playing very crucial role in pregnancy related complication management by proving equipments, supplies, procedures and techniques. In developing countries, skilled human and financial resources are constrained and along with this physical and epidemiological environment is challenging so sometimes proved interventions failed to meet the needs. So this study's objective was to assess the limitations and challenges faced by health technology in resource scarce settings and implementing a model to aid in technology based solutions. The study result proved that in given situation having knowledgably and skilled service provider, practice guidelines, financing and distribution systems, and community support, technology assisted solutions can impart substantial reduction in maternal mortality throughout the world.[18]

6. **mHealth Series: Measuring maternal newborn and child health coverage by text messaging – a county–level model for China. (2013)**

Author: Yanfeng Zhang, Li Chen and Wei Wang.

The researchers believed that deaths of children under five years of age could be prevent by attaining full population coverage. Tracking progress and evidence based decisions can be achieved by quality based maternal, newborn and child

health (MNCH). Methodology included fieldworker's interview of preselected households. The result of study showed that text messaging can aid in measuring MNCH interventions. The explanation to this is through text messaging aid in remote data collection and time and money can be saved. Large sample size can easily be targeted for data collection. Survey bias will be reduced to greater extent. Thus text messaging can be an effective tool in data collection for MNCH coverage measurement.[19]

7. **e-mamta: Name based mother and child tracking system in Gujarat. (2011)**

Author: Rajnish M, Anand S and Anju S.

India is dealing with crucial public health challenges and most important of which is reduction in Infant Mortality Rate (IMR) and Maternal Mortality Ratio (MMR). To provide efficient healthcare services to mother and baby tracking of them is considered to be of utmost importance. Through tracking population left out from immunization, anemia and malnutrition can be reached. The objective of e-mamta is to aid in maternal and child care services, real time reports and efficient analysis and intra-departmental communication. The study result revealed that 80% of population was being registered within software till 2012 and it was being implemented throughout Gujarat state.[20]

8. **E-mamta- Mother and Child Tracking System (MCTS). (2010)**

Author: State Rural Health Mission

The study addresses rural health challenges like drop outs, left outs, quality of services and difficulty in tracking pregnant women and children. The organization believes these challenges can be combat with E-mamta as it made tracking quite smooth by aiding the search with unique ID, family ID, health ID, mobile number, BPL and ration card number. The mentioned strength and weakness of E-mamta are: the uniqueness is it covers huge population at single time, and the area of improvisation is implementation of real time data collection.[21]

9. **EMAMTA: MOTHER AND CHILD INFORMATION TRACKING SYSTEM DOCUMENTATION OF BEST PRACTICE. (2012)**

Author: Governance Knowledge Centre (GKC) team.

Gujarat is being known for innovative and progressive e-governance initiatives that enhance citizen based service delivery. E-mamta is one of such initiative that focuses safe motherhood and child survival. E-mamta targeted towards integration of information from different sources, decentralization of information, and aggregation of information into database. As a result effective information management and monitoring mechanism has been developed; population can easily be connected to healthcare services including ANC/PNC/Immunization. The conclusion of result is although e-mamta is successful it need to be integrated with other initiatives like ICDS, primary education and school health.[22]

10. **Strengthening Mother and Child Tracking System (MCTS) in Maharashtra. (2013)**

Author: Unicef

The paper was published in demonstrate Unicef partnership with Public Health Department, Government of Gujarat and Ridhi Management Services Pvt. Ltd. to implement strategies that enhance Maternal Child Tracking System (MCTS) performance. As it was found that MCTS is not able to capture data of indicators, sending alerts to field workers was not addressed; failure to save real time data and no attempts to cover hardly reached population and tracking of children too was slow. So Janani software was developed to support MCTS, so that frontline worker can deliver timely and quality services to pregnant women and mother. With Janani above mentioned issued were dealt effectively. The result shows that field worker are very satisfied and as per their words, now they do not need to carry heavy stuff to field, through mobile they get the work plan and start working through it only.[23]

OBJECTIVES

General Objective

To assess the significance of health informatics in public health along with detailed evaluation of Maternal Child Tracking System in Urban areas of Valsad District

Specific Objectives

- To explore various healthcare software available in Gujarat.
- To evaluate impact of health informatics in public health.
- To understand the health informatics and biosurveillance integration.
- To assess whether objectives of MCTS are met or not.
- To find out gaps that prevents MCTS to be completely functional.
- To find out bottlenecks from MO's and ASHA/ANM's perspective.
- To implement strategies that aid in better functioning of MCTS.

METHODOLOGY

- The study was conducted in urban health centers of Valsad District.
- Urban health staff was included in the study.
- In all, 7 Urban Health Officers and 19 Female Health Workers were selected on a convenience basis.
- There were no exclusion criteria in this study.
- Questionnaire is being developed for UHOs to acknowledge their view points for improvement.
- Questionnaire being developed to understand how much FHW's are benefited from MCTS.
- To explore MCTS through online software.
- **Study Area:** Valsad, Gujarat
- **Study design:** A descriptive cross-sectional study involving 26 urban health staff.
- **Time:** 6th February to 8th May 2014.
- **Study population:** Urban Health Officers and Female Health Workers.
- **Sample size and method:** Non probability convenience sample consisted of 26 including 7 Urban Health Officers and 19 Female Health Workers.
- **Tools and techniques:** Questionnaire and observation techniques.

STUDY FINDINGS

HMIS is one of the best administrative tools; with which higher authority quite easily track the performance of various health care facilities. It also aid in keeping record of services delivered to beneficiaries.

The study was conducted to assess HI significance in public health with MCTS or E-mamta evaluation. This study is an attempt to realize how the HI can improve service delivery in public health and how software can contribute to strengthen nationally implemented program that is RCH program.

The study findings are developed from 3 key activities that are interviewing UHO/MHO, interviewing FHWs and online evaluation of E-mamta and other software in Gujarat.

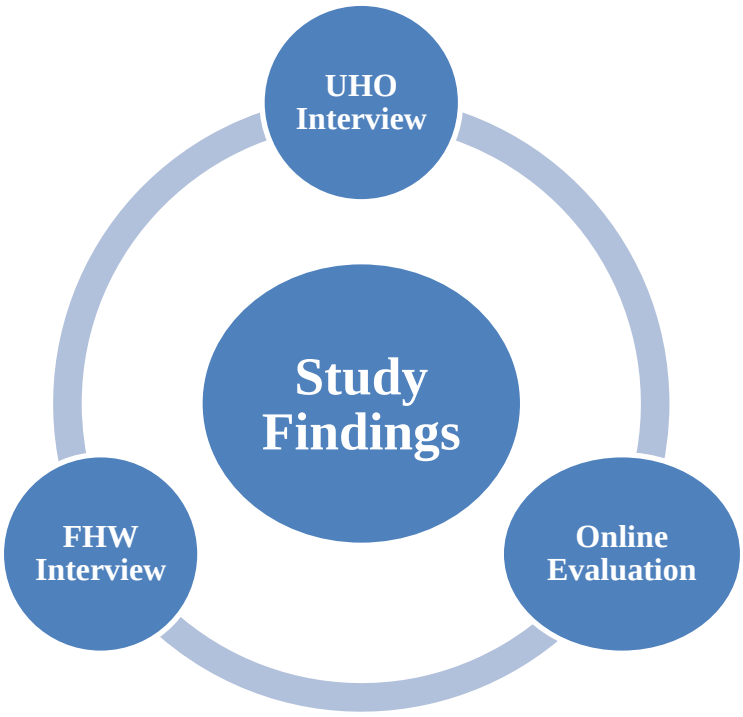

Figure 7: Study Findings Pillars

The HI is vast domain that covers not only healthcare informatics but also clinical bioinformatics and informatics for education & research in health & medicine. So HI in total caters each and every aspect of health.

HI completely directed towards the patient care, information management & information technology. These elements make HI more facilitative to deliver enhanced and improved services in public health.

NHM Gujarat has much online software that facilitates improved and focused service delivery to patient and also effective administrative supervision to higher authority.

ABILITY GUJARAT

Ability Gujarat software is based on belief that every individual is equal regardless of their physical or mental impairment. Hence, addressing the challenges faced by person with disability is one of the human rights contributions.

Through Ability Gujarat, the services delivered to PwD's are more effective and efficient.

The key features of Ability Gujarat that has minimized the hassles to PwD's are:

- **Registration:** with providing online registration facility, DEO easily register a PwD from the form provided to them dully filled by field workers or sent them by any mean.
- **Physical Assessment:** the physician will perform physical assessment on basis of which certificate will be issued to them.
- **Issuance/Rejection of Certificate:** after the registration on the basis of degree of disability either the certificate will be issued or rejected.

The study findings revealed that Ability Gujarat software aids in following enhancement to public health:

- First of all it is significant software that caters to those who are neglected or avoided section of community.
- Through this software a centralized database of all registered PwD's are saved.
- The information fed is authentic & verified.
- Real time information is captured.
- With this software it becomes quite easy for PwD to get disability certificate.
- Hassles to disabled person is reduced, the entire process is very systematized and simpler for them.
- Records life is quite long, they are saved for years.

BIRTH & DEATH ENTRY APPLICATION

BADEA is health management tool that helps to capture vital statistics, which makes an integral part of health information.

The information that is saved in BADEA software includes:

- Information related to birth of time like whether it is a home delivery or institutional delivery, mother's age at time of baby birth, and full term delivery or pre-term delivery.
- It captures both the date of birth of baby and registration date, so the delay in registration will be noticed within it.
- When data related data is entered it saves date of death with age at time of death, it also check whether the death is medically verified or not, and whether medical assistance was given or not.

- When save still birth entry critical information like mother's age is asked and whether delivery get medical assistance or not, and fetal death cause is asked.
- Through summary report, one can see aggregated report of individual category like birth, death and still birth. The information for particular year and month can be traced.
- With help of graph one can understand the information like birth, Infant deaths, pregnancy details and medical assistance more conveniently.

DRUG LOGISTICS INFORMATION & MANAGEMENT SYSTEM (DLIMS)

Through DLIMS, pharmacy department has improved their functioning as manual & hectic processes are now minimized. Almost each & every activity of pharmacy including procurement, supply and management of drugs is assisted through it.

The services that have been improved with DLIMS are:

- Online indenting aid in efficiency and saves time and resources.
- With centralize database duplication are minimized and output is enhanced.
- Drug status monitoring is enhanced.
- Monitoring of national program like TB, Anti-malaria and epidemics becomes significant.

Health Management Information System (HMIS)

HMIS is not just a data collection tool but a tool on which one can rely for real-time monitoring & evaluation of various projects.

Through HMIS, reports analysis becomes easy, as the reports available in monthly, quarterly and annual formats.

HMIS captures information related to RCH under heads of:

- **ANC Services:** includes total number of pregnant women registered for ANC, out of this how many registered in 1st trimester, new women registration under JSY, number of pregnant women received 3 ANC checkups, number of pregnant women given TT1 and TT2 or booster, Total number of pregnant women given 100 IFA tablets.
- **Delivery:** measure home delivery numbers, in case of home delivery whether attended by SBA trained doctor, nurse or ANM, number of new-borne visited within 24 hours of home delivery, and number of delivery conducted at public institution, in it how many discharged within 48 hours of delivery
- **Pregnancy outcome & details of new-born:** number of life births, including male and female birth number, still birth & abortion details. New borne details captured are their weight at birth.
- **PNC care:** women receiving post partum checkup within 48 hours of delivery, women getting post partum checkup between 48 hours and 14 days and PNC maternal complications attended.
- **Family Planning**: Number of NSV/conventional vasectomy conducted, number of laparoscopic sterilizations conducted, and number of IUD insertions.
- **Child Immunization:** number of 0-11 month old infants who has received BCG, Pentavalent, OPV, Hepatitis B and Measles vaccination, number of children of more than 16 months of age receiving DPT booster, OPV booster, MMR vaccine.

The Findings Related To UHO/MHO's Acknowledgment And Understanding Of E-Mamta

All 7 UHO/MHOs have fair understanding of E-mamta, but somewhere the exact functionalities of E-mamta are not clear to them. Although it is very user friendly and uncomplicated software, but so many features confuse them to access it & acknowledge it.

In today's technology savvy time, UHO/MHOs are not considering E-mamta as their one of the powerful tool to deliver quality services to pregnant women, new mother and new born and lastly the child.

Although they are using it to develop work plans, to make FHS entries, and pregnant mother & child entries, still the complete utilization of software is poor.

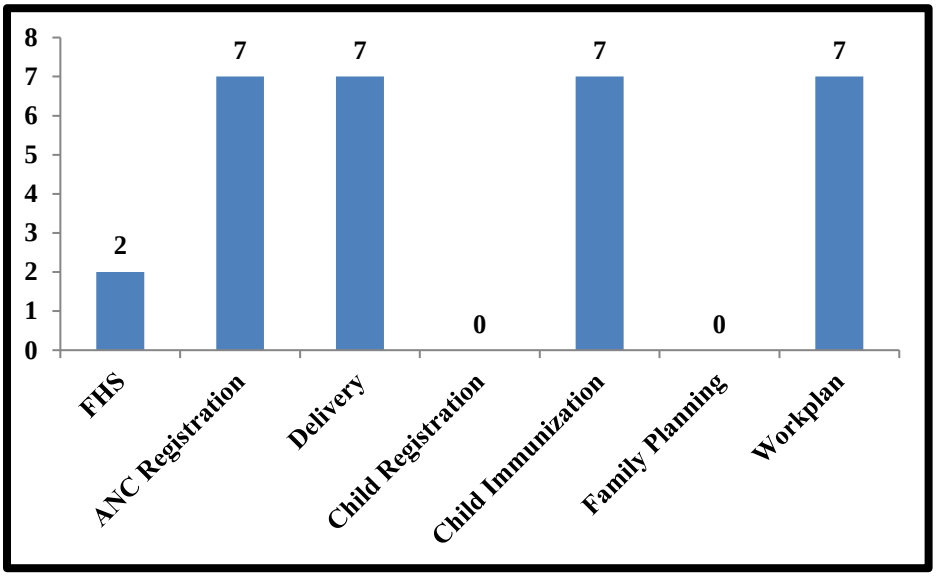

Figure 8: Utilization of Services

E-mamta is used at every level of organizational hierarchy, only the level of monitoring differs. At higher level it is more used to assess whether the objectives of E-mamta implementation is met or not. But when one goes down in hierarchy the monitoring actually shifted to implementation.

So the UHO/MHOs are supposed to track the entry on regular basis and check where the service delivery is lacking so that necessary action can be taken.

On interviewing it was identified that UHO/MHO's are accessing E-mamta on almost regular basis contributing to enhanced service delivery.

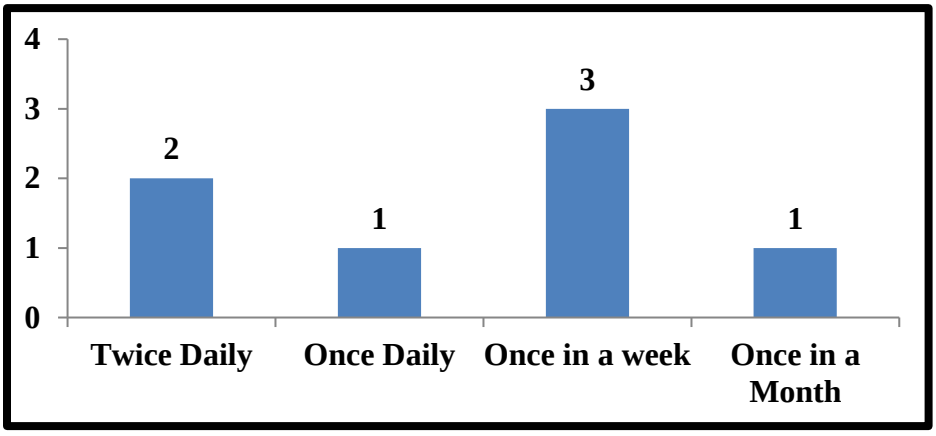

Figure 9: UHO/MHO Accessing E-mamta

E-mamta is not only for UHO/MHO to track the entries of mother & child but to aid in service delivery. For this SMS feature is provided through which they can send messages to beneficiaries by informing them about their next visit and due services. They can use it to send micro plan or work plan to field workers.

Out of 7 UHO/MHO everyone sends SMS to beneficiaries as well as field worker's but the frequency varies.

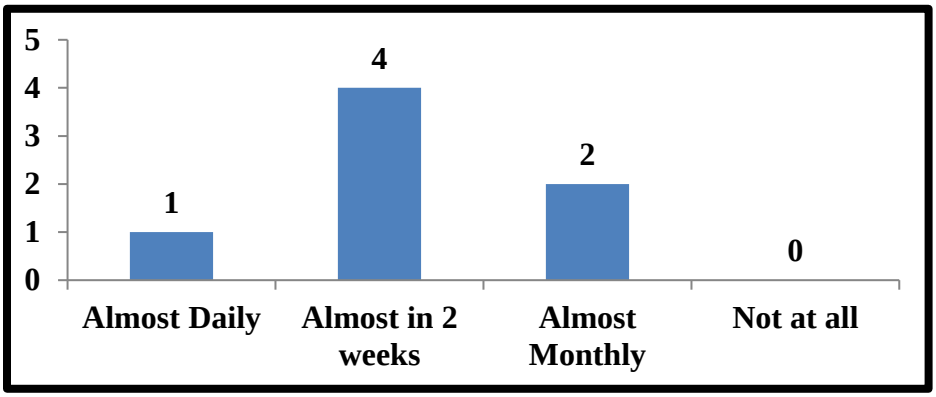

Figure 10: Frequency of SMS Sends

Although E-mamta is facilitative software for implementation of RCH program, but still there is some scope of improvement. As suggested by UHO/MHO's, the area of improvement is removal of fake entry, resolution to server issues, and integration with FHS.

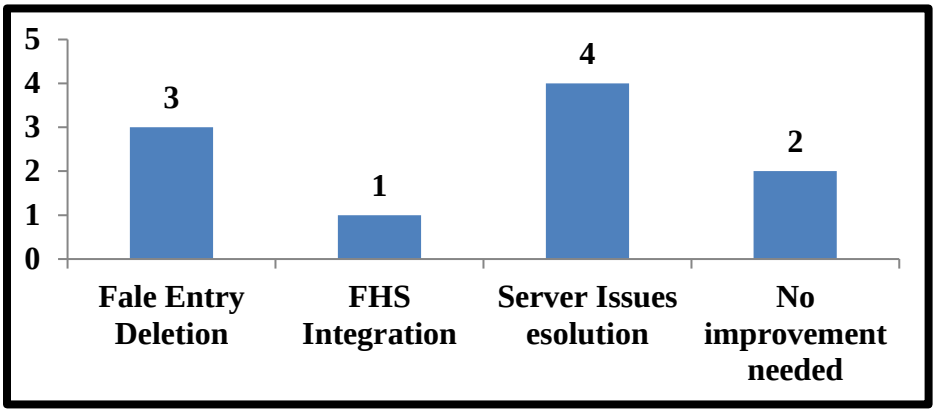

Figure 11: Areas of Improvement

E-mamta is software implemented to improve service delivery to mother & child but for UHO/MHO it is a tool to simplify their duties. As it helps them to track almost every mother & child whose services are due. But being a software E-mamta has its own flaws which induce troubles to UHO/MHOs.

The very frequently encountered troubles are issues with login ID & password. The UHC are not able to login so they cannot make entries and also cannot monitor it, no professional training is provided and slow server.

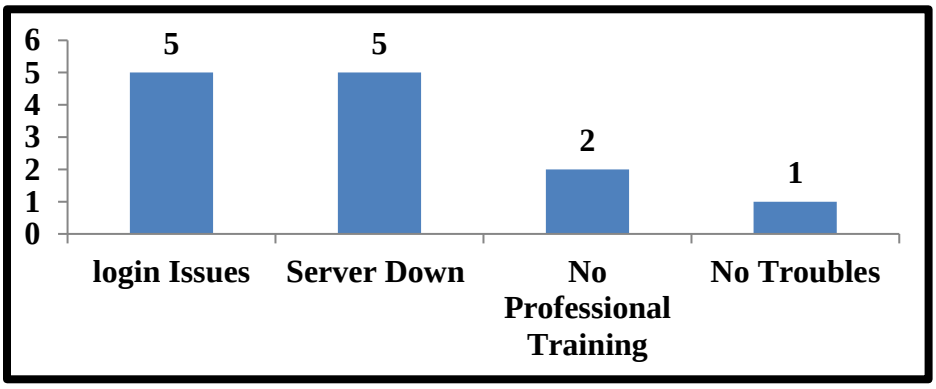

Figure 12: Troubles Encountered By UHO/MHOs

The very important supportive pillar of E-mamta functioning is infrastructure availability. E-mamta functioning have some basic requirements that needs to be fulfilled prior to its functioning.

The infrastructure analysis has shown that 5 UHC have their own centre, while 1 has rented building and 1 UHC has donated building.

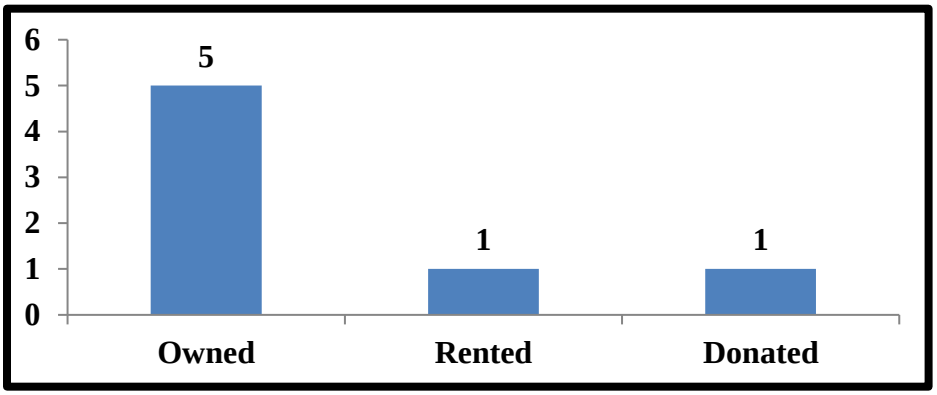

Figure 13: UHC Building

To support E-mamta the UHC need to have 27*7 electricity supplies. Out of 7 UHC, 6 have electricity supply, but 1 still need to improve in that area.

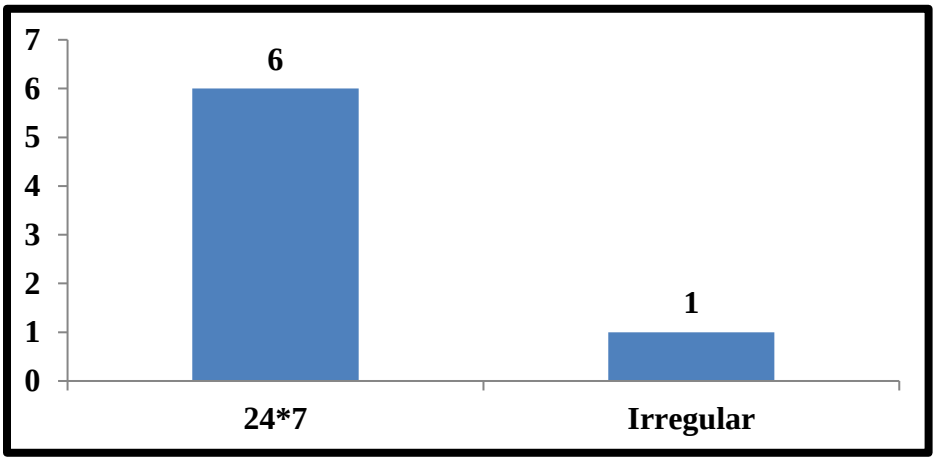

Figure 14: Electricity Supply

Data entry facility including desktop, keyboard, CPU & mouse in functional condition is basic requirement for E-mamta utilization. So all UHO/MHOs were asked about their technical support, so result proved that this point is very well undertaken and all UHC have their own technical equipments at their facility site itself.

Along with this to ensure smooth functioning, these PC need to have antivirus installed within it. Out of 7 UHC, 6 UHC have antivirus installed.

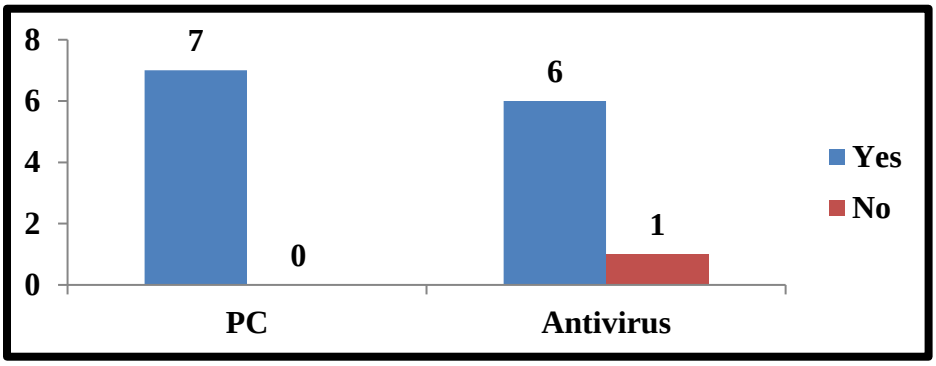

Figure 15: Technical Support & Antivirus Status

To make E-mamta entries & to cross examine the entered data, Broadband connection is must. Out of 7 UHC, 4 UHC have no broadband connection.

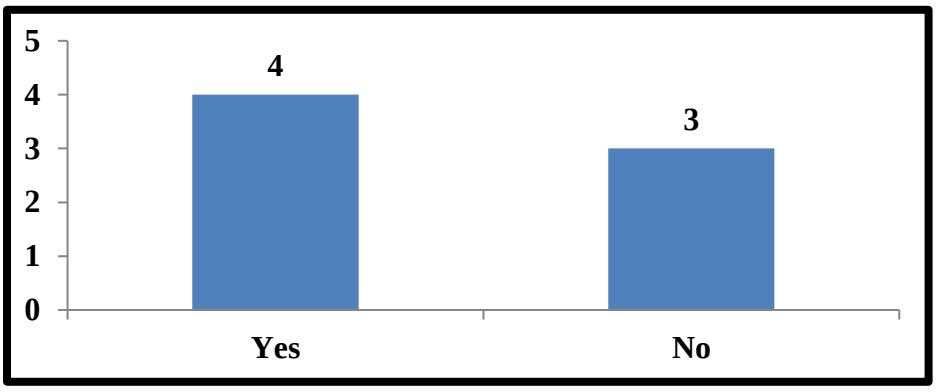

Figure 16: Broadband Connection

The biggest asset for E-mamta software is DEO, they are the one who collect data from FHW and manually feed all the data in E-mamta software. So their training is a crucial issue. But unfortunately the 50 percent DEO are not trained enough so mistakes in data entry happen sometimes.

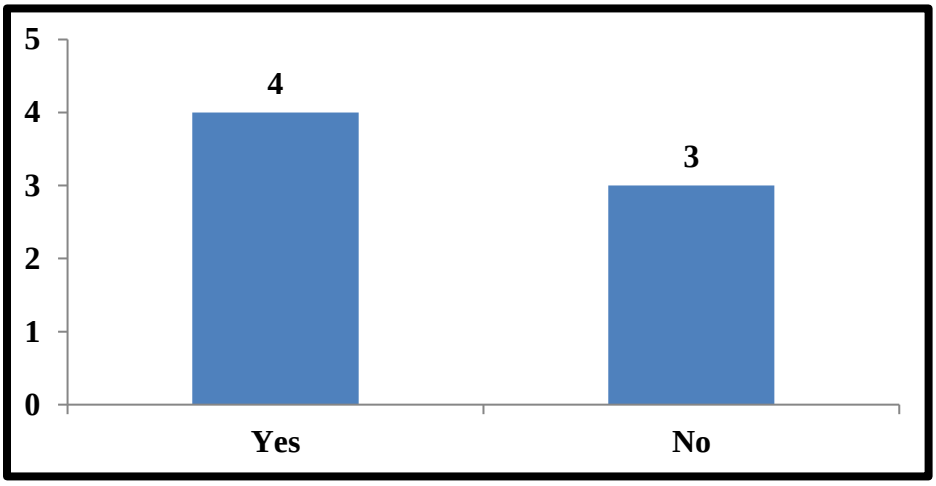

Figure 17: Trained DEO

The UHO/MHOs are very well aware of time taken per data entry in various heads. When entries related to mother services are done the average time taken per entry is 5 minutes and when child services entries are made then on an average 10 minutes are taken.

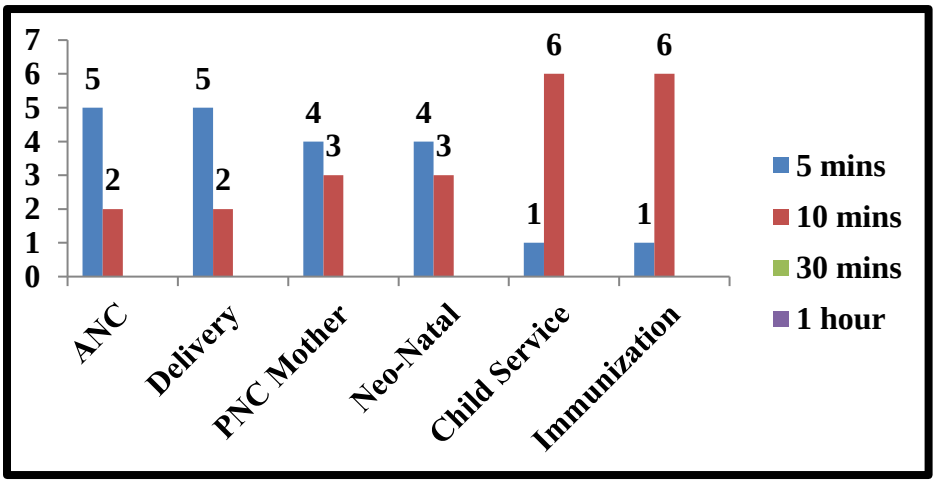

Figure 18: Data Entry Time

The services delivered are assessed through the entries made in E-mamta. So the average number of entries depicts how well services are delivered to beneficiaries.

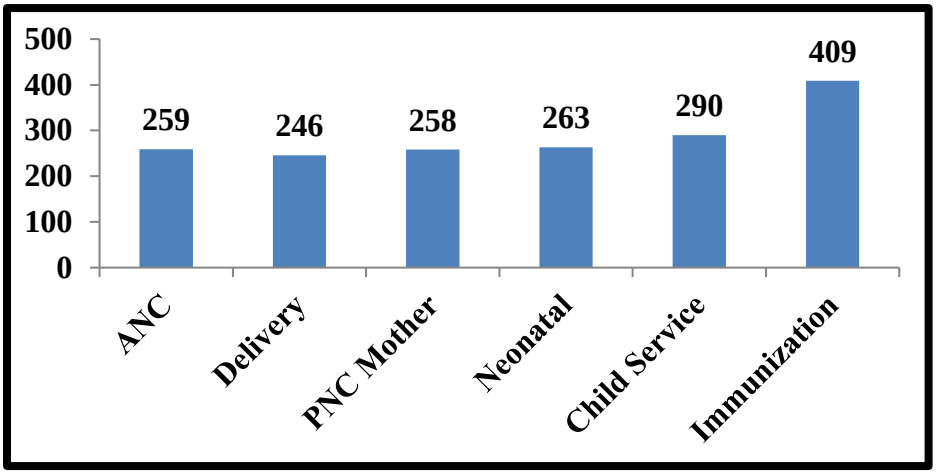

Figure 19: Date Entry Amount

As we are aware that technology enhances functioning & service delivery. UHO/MHOs do not agree with above statement. Out of 7 5 UHO/MHOs still considers manual data more authentic then E-mamta data.

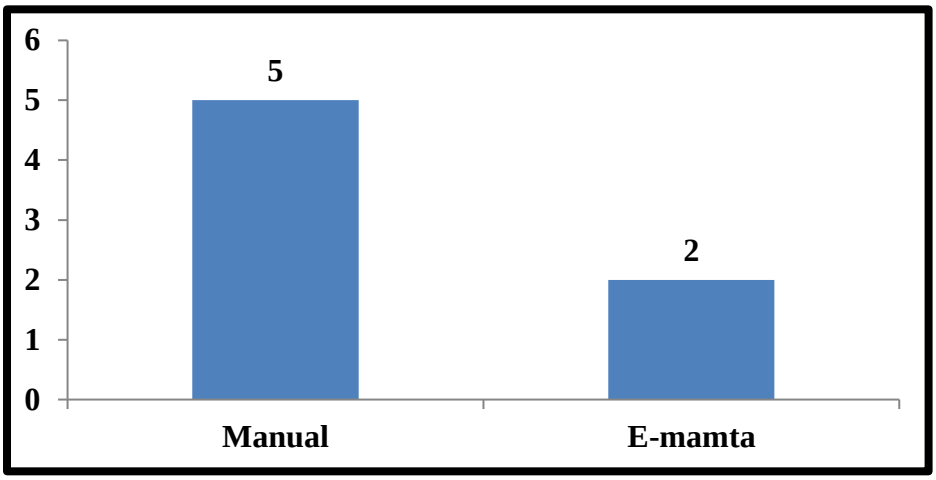

Figure 20: Quality of Data

Although UHO/MHOs consider manual documentation more authentic then E-mamta, but most of them considers E-mamta information more user friendly over manual documentation.

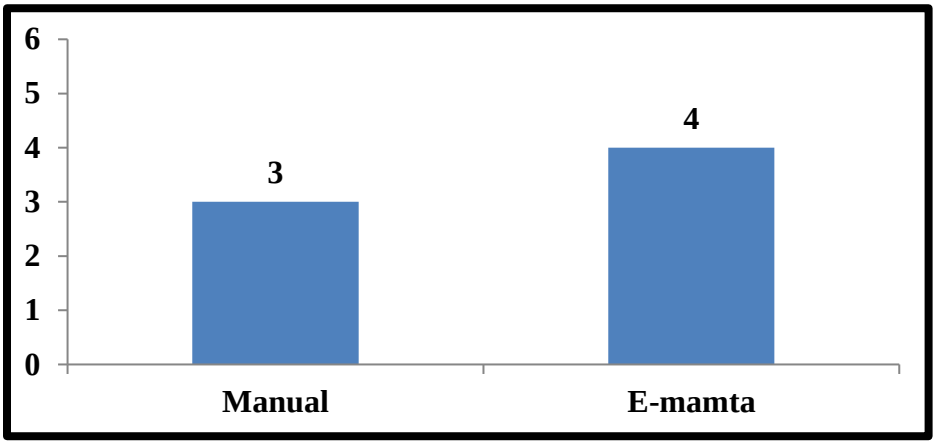

Figure 21: User Friendly Documentation

The reason to consider E-mamta documentation user friendly are:

- With E-mamta documentation and reports viewing is easy.
- E-mamta helps to generate work plan.
- Recording of data becomes easy.
- Analysis & implementation of services will be easier.

On being interviewed on features of E-mamta, the inferences drawn out of it are as follow:

- **Data Sharing:** The UHO/MHOs believes that with E-mamta data sharing is very easy. It helps to share information on various program and schemes.
- **Easy Available Information:** According to UHO/MHOs information regarding ANC & PNC mother list, child immunization & reports are easily accessible. They all believe that for any kind of information related to mother & child they can rely on E-mamta.

- **User Friendly Software:** UHO/MHOs believes E-mamta is a user friendly software. But currently they are facing issues with login ID & password, which creating a lot of issues to their data entry and accession.
- **Sustainable Information:** UHO/MHOs believe E-mamta provide authentic & sustainable information. It is very excellent tool to search for sustainable information. The long year back data can also be traced.
- **Usefulness in Supervision & Monitoring:** UHO/MHOs believe E-mamta is very helpful to supervise ANC, PNC & child service related activities. They can generate reports instantly to supervise their workers efficiency.

When we talk about technology, it brings some additional expenses with it. To aid in effective functioning one should not run out of budget. This is one of the crucial issues that must be undertaken. Because E-mamta is online software but to support it lots of physical infrastructure is needed. Along with that one need to have supporting services like printer facility, sheets rim, and transportation added to it.

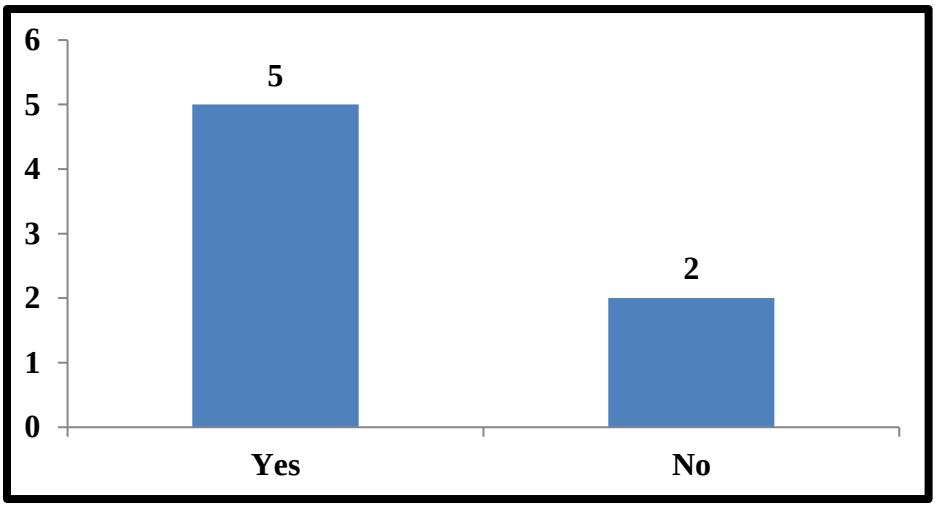

Figure 22: Monetary Support for E-mamta

The Findings Related to FHW's Acknowledgment and Understanding of E-Mamta

FHWs are the strongest pillar to E-mamta functioning. They are the one who are in direct contact of beneficiaries & UHO/MHOS. They are a bridge that not only fills for the communication gap between beneficiaries & physicians, but also the one who delivers services as per the RCH program and gathers the data that has to be entered into E-mamta.

So, the understanding & efficiency of FHW in gathering information for E-mamta is extremely significant. Through this study, I am able to draw a conclusion about how much FHWs are aware of E-mamta & how they utilize E-mamta for their benefit & service delivery.

The results of study are mentioned below.

E-mamta software is not only for RCH program. It is beyond these boundaries. It captures FHS also, where a family get registered and modified accordingly with addition or deletion of member from the family.

The FHWs were asked about various information or data entry types that are available in E-mamta. The entries that are made are of FHS, ANC care, PNC care, Immunization & FP. Out of all FHWs, 74% knows that FHS entries are captured in E-mamta, all 19 knows about ANC care, PNC care and Immunization data is captured within E-mamta software. And 79% knows that FP data is also captured into E-mamta software.

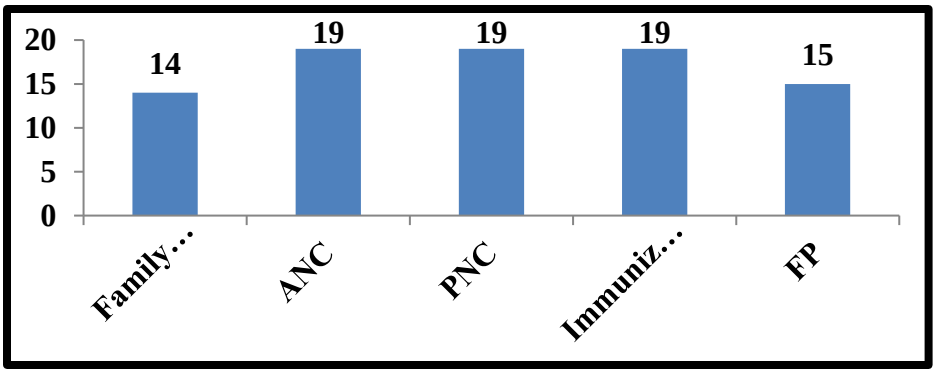

Figure 23: Data Entry Type

The next issue is whether FHW knows E-mamta is beneficial for beneficiaries or not. The result is very satisfying as all FHW knows it is beneficial & helpful for beneficiaries.

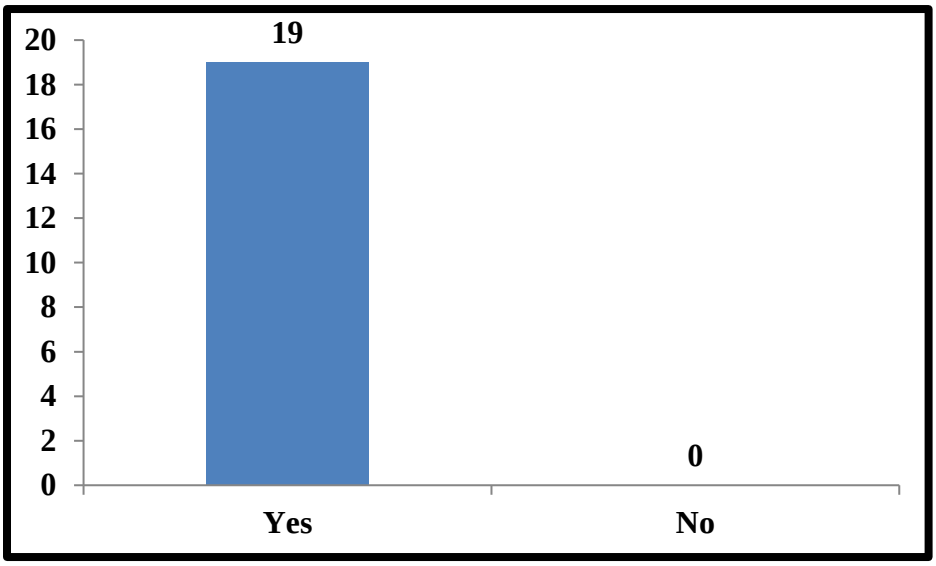

Figure 24: Beneficial for Beneficiaries

All FHW agree the E-mamta is beneficial for beneficiaries, so they were asked how the beneficiaries get advantages of E-mamta. So the inference drawn reveals that FHW knows through E-mamta

- Quality services can be delivered to women & child through timely & routinely monitoring of services delivered,
- Track them for due services,
- Save information of every service that is delivered,
- Follow-up becomes easier, and
- Beneficiaries can take advantage of various schemes implemented for them.

Although data entry in E-mamta is not FHW's part, but for understanding a basic orientation or training is must. So, on asking whether they have been sensitized for E-mamta software. It was found that none of them have given any training or orientation which a huge gap in service delivery.

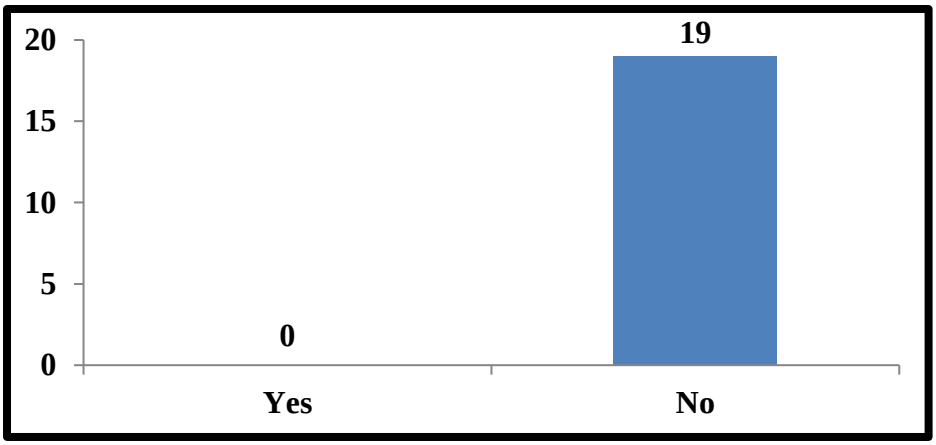

Figure 25: E-mamta Training

It is seems that E-mamta is being implemented for mother & child tracking that enhances mother & child service delivery, but whether it provide any assistance or support to FHW is also equally important. On interviewing, FHW told that they are aware of its benefit to them.

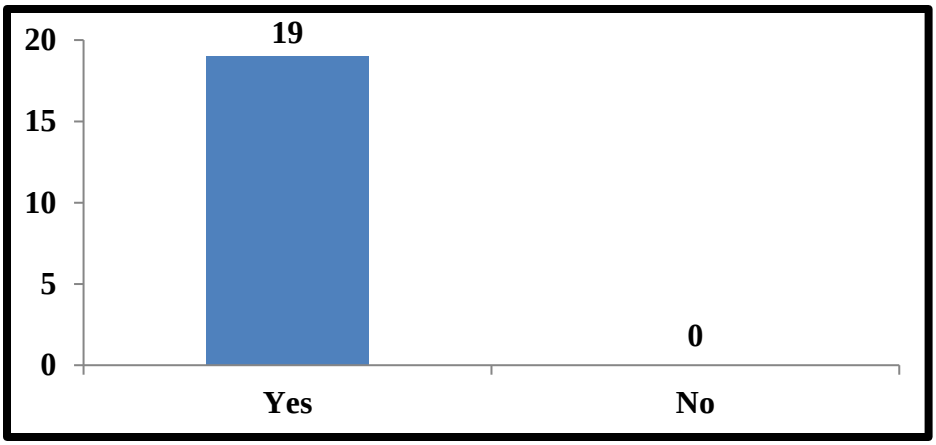

Figure 26: Beneficial for FHW

Now, once it is clear that FHW believes that E-mamta is beneficial for them, the next question arises do they know what all features are available for them?

In answer to above question, FHW answered which revealed that 53% FHW knows that they can save FHS entries into E-mamta, 100% FHW knows about ANC care, PNC care, and child health services monitoring is possible through E-mamta, 84% FHW knows that FP data is also captured in E-mamta and only 16% knows that they can print work plan through E-mamta that make their tracking more simpler and efficient.

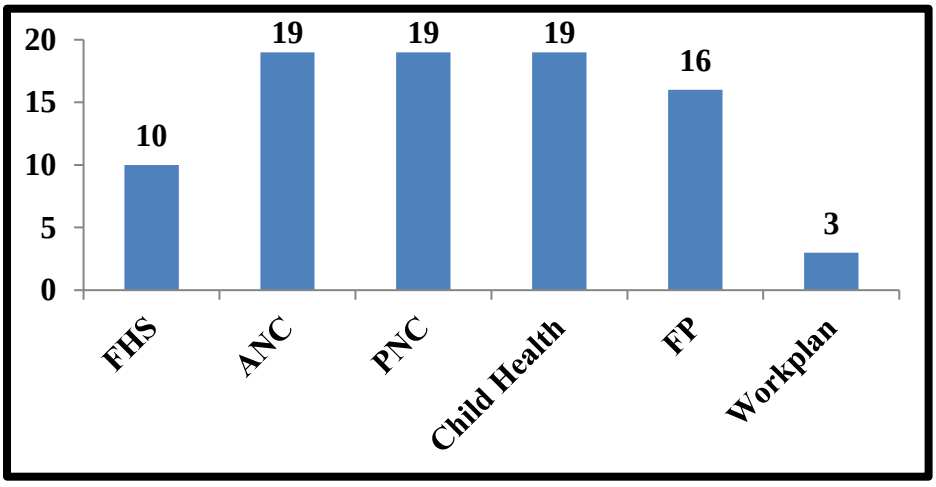

Figure 27: Features for FHW

Knowledge and utilization of knowledge into practice is 2 different aspects. To assess whether FHW implementing their knowledge into their practice or not, they were asked to answer how they uses the features provided by E-mamta to them.

FHW told that to acquire beneficiaries information they can use E-mamta, to develop work plan they can rely on E-mamta, to check for due services & timely delivery of services they take assistance from E-mamta and to provide quality services to pregnant mother & child they consider E-mamta.

One of the greatest assistance that E-mamta provides to FHW is E-mamta report printing, which helps them to verify information that entered. 89% FHW use to print report from E-mamta.

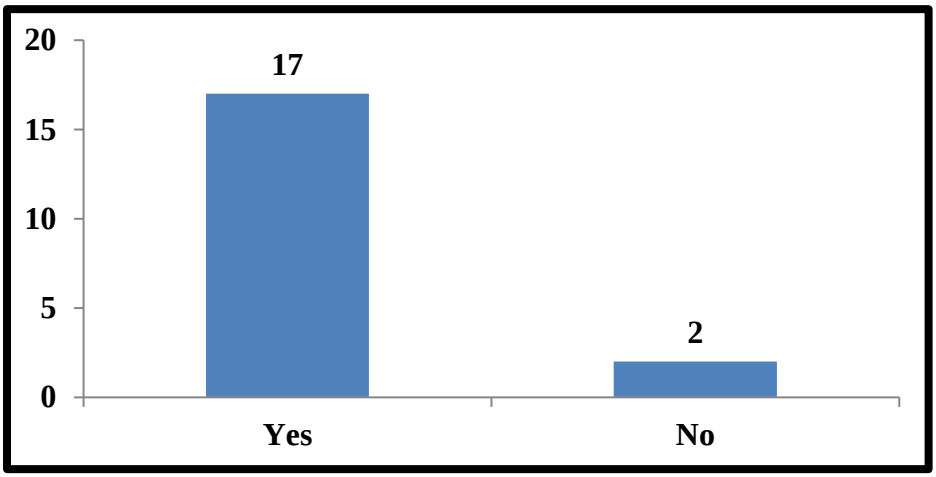

Figure 28: E-mamta Report Printing

After report printing the key task of FHW is to verify the data entered. The complete utilization of E-mamta is dependent on authentic & real data. So the efficiency of FHW in verifying data is dependent on whether they cross verify the data or not is extremely crucial. All the FHW verify the data but time period after which verification is done varies. Out of total, 53% FHW done verification on weekly basis and 47% use to do on monthly basis.

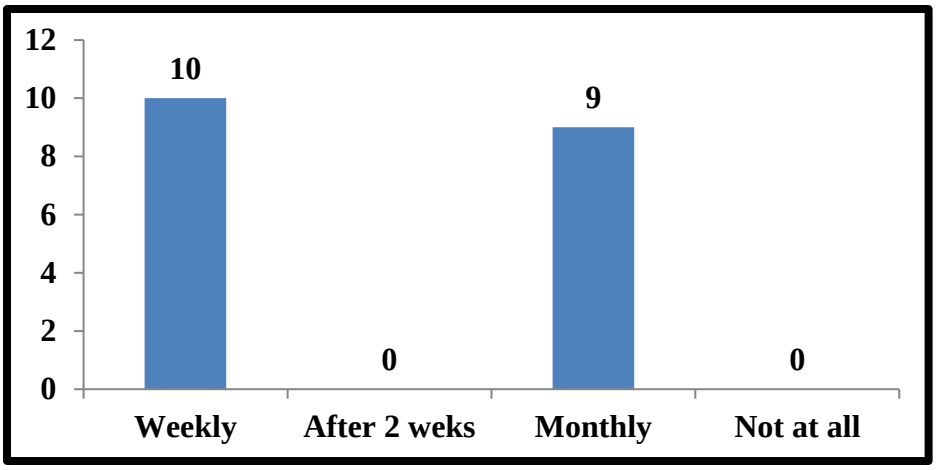

Figure 29: Verification of E-mamta Data

To minimize hassles, E-mamta provides SMS based information & Workplan to FHW, which prevent unnecessary trips. 89% FHW received SMS from E-mamta, but 11% do not receive SMS.

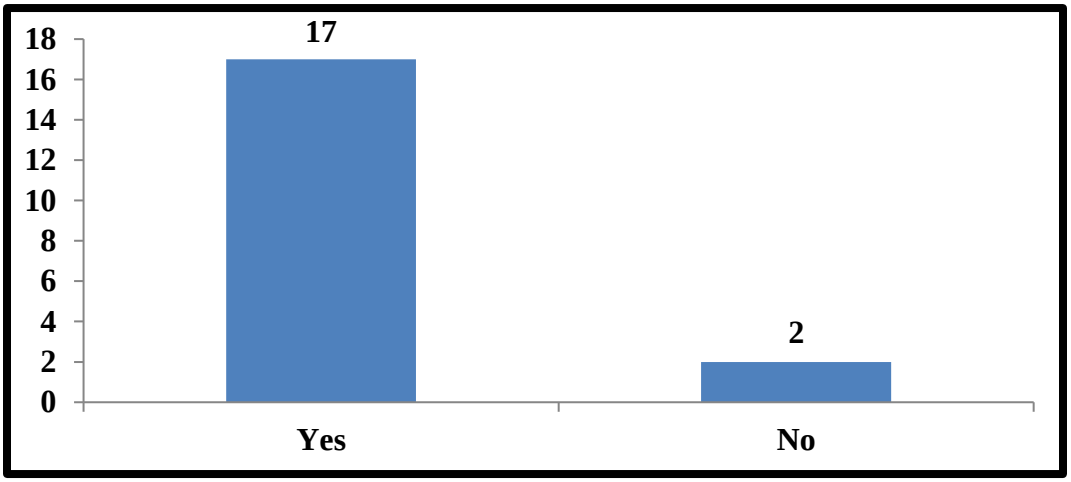

Figure 30: Receives SMS from E-mamta

Out of 17 FHW receiving SMS from E-mamta, 41% gets SMS on daily basis, 6% receives in need of week, 47% receives SMS weekly and 6 % receives SMS monthly.

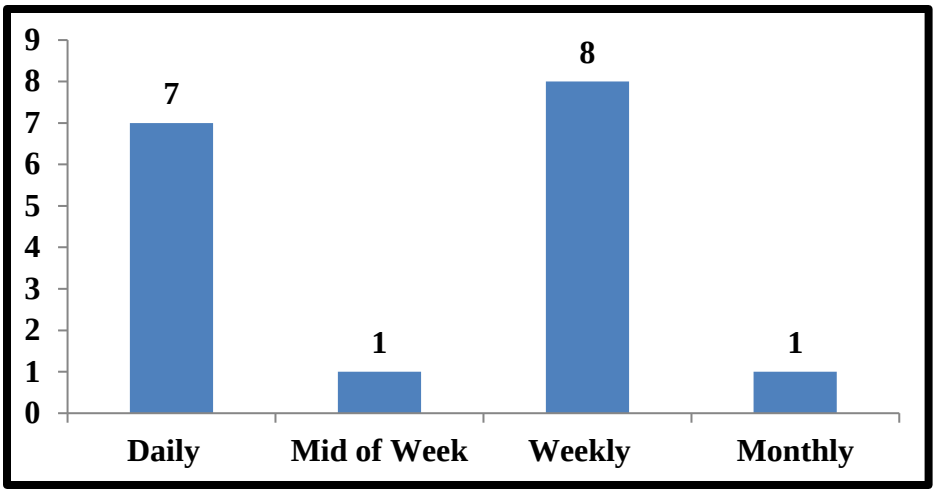

Figure 31: Frequency of E-mamta SMS

One of the significant feature that E-mamta provide to FHWs is to check for due services of pregnant mother & child. Through study it is found that 89% relies on E-mamta to check for due services of ANC registration, 100% check for due services related to immunization, 100% uses E-mamta to assess due services for child care, 53% uses it for food & nutrition due services & 84% for check for due laboratory examination of pregnant mother.

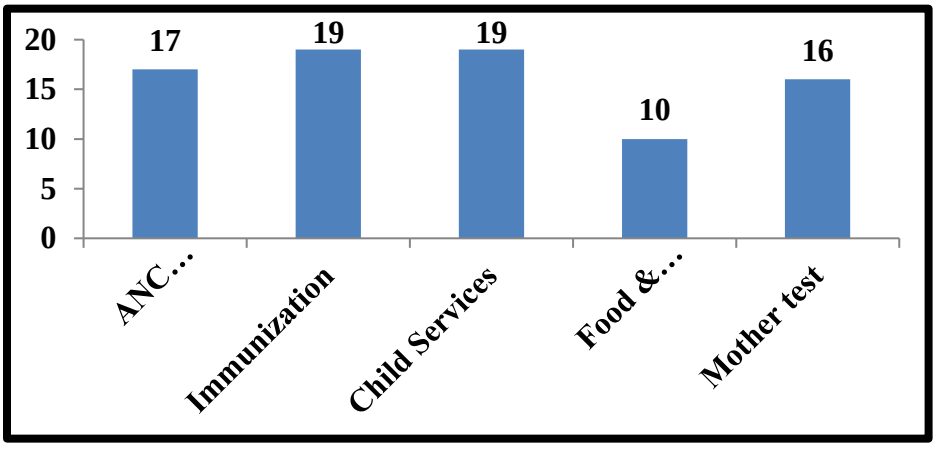

Figure 32: Due Services Check

As UHO/MHOs have their set of issues with E-mamta software, FHWs too face problems related to data reporting, data entry, and data analysis and data verification.

- **Data Reporting:** As FHW is responsible for data reporting, so it is their duty to gather data of assigned area. The problems they are facing are collecting report from private hospitals, as they do not provide data to FHWs, then because of migratory population, they are not able to capture the entire information.
- **Data Entry:** The highlighting issue is that none of FHW has data entry training and DEO is also not available at every centre so they face issues with data entry. Technical issues like server problem & login ID & password issues, data entry is quite difficult.
- **Data Analysis:** Data analysis is difficult as complete information is not being captured. Some fake entries were made before which affect the analysis. Some FHW do not know how to analyze the data.
- **Data Verification:** The key issue with verification is migratory population. When FHW goes to verify the information, the families have moved to other location so verification is difficult.

DISCUSSION

In reference to study considered, this study delivers the same result as I have found that HI software available in Gujarat caters to public health on one hand and aid in supervision on other hand.

Considering HI contribution to public health, it delivers enhanced services to population and also preserves the information related to population & manages it as well.

Implementing HI for biosurveillance will be a great initiative which will help to integrate monitoring system together, enhance data sharing and exchange of information, provide a common platform, and common terminology will be implemented. Through all these features and characteristics public health will effectively manage any epidemics and take necessary action on it.

The software implemented in Gujarat has main focus to improve service delivery. Each software with their individual focus on particular aspect of a program.

The Ability Gujarat software caters services to PwD to enhance quality of their life by providing them simplified procedure to acquire disability certificate which make their life comfortable and little less problematic.

The BADEA aids in keeping records of vitals like birth, death & still birth which further helps in healthcare service delivery. As every newborn get registered in it and also recording of death events aid to better understanding of pitfalls of service delivery. The still birth details are also been focused which provide the inference about total number of still birth and reasons which aid in improvement of service delivery.

DLIMS is software which directly does not contribute to healthcare delivery but it made drug indent processing smooth by which the drugs are delivered and tracked within time. The physicians do not fall short of medicines which help them to focus on their clinical practice well.

HMIS the administrative and healthcare tool which very diligently and accurately keep records of services rendered to beneficiaries. It captures every minute detail, which makes supervision more effective and aid in efficacious decision making.

After exploring E-mamta, I have realized that E-mamta is magnificent tool focusing mother & child health, but it has some flaws also. Although technically it aid in better service delivery, but technically it face many issues also.

It is been found that UHO/MHOs & FHWs are not completely aware of services rendered by E-mamta, although they have understanding but clear vision is lacking. To utilize it efficiently they have to take the responsibility to access it regularly & use it efficiently.

As suggested by UHO/MHOs some improvements need to be made, as they are the stakeholders and they should take full advantage of it.

FHWs knowledge and insight analysis revealed that they need a basic training that will strengthen their understanding of E-mamta software and how they can take benefit of it. They also face some issues that need to be taken into consideration.

RECOMMENDATIONS

After analyzing the study findings recommendations suggested are:

- All the software should have one common database or linked somewhere in between so that centralized information can be saved.
- All UHO/MHOs and FHWs should be given an orientation about E-mamta functioning.
- The flow of activities should be made clear to each and everyone in healthcare setup.
- 24*7 technical assistance should be given so that issues dealt with in time.
- UHO/MHOs should be encouraged to utilize E-mamta in their daily practice as a part of their service delivery.
- To access E-mamta on regular basis minimum infrastructure support need to be provided.
- SMS based workplan should be linked with annual MD planning microplan.
- Real time data entry & real time reporting should need to be encouraged.
- Offline reporting should be supported.
- Mobile supported version of all the software should be planned, so that entry can be made from anywhere and UHO/MHOs and FHWs can access it easily.

SUMMARY

HI is the implication of information technology in the healthcare domain. With readily available software one can easily implement informatics to their healthcare practices. But implementing HI in public health is not an easy task. Public health is a domain that considers entire population, so software that is implemented need to serve entire population.

The HI implemented in NHM Gujarat, is covering a huge population and made accessible to District level, CHC level and PHC level. In Gujarat, many software are functional, out of those I have chosen 5 software, out of which 4 were observed online namely Ability Guajrat, BADEA, DLIMS and HMIS and 1 that is E-mamta was explored online with interviewing the UHO/MHOs and FHWs.

The study was conducted with objective to understand the HI impact in public health with E-mamta evaluation. For the study various software were explored online. To get more insight about E-mamta, 7 UHO/MHOs and 19 FHW were chosen for the study, which were given a questionnaire to fill.

With observation and exploration of software, it was found that the software implemented assist in improved service delivery and lead to effective monitoring of services delivered from higher authority levels. From UHO/MHOs and FHWs questionnaire it was found that E-mamta very well assisting them with their work, but they have faced some difficulties with need to be taken into consideration.

To address the pitfalls identified, for which recommendations are mentioned within study.

REFERENCES

1. Health Informatics, April 2014, http://en.wikipedia.org/wiki/Health_informatics, accessed on
2. Gardner N. Health Informatics Professional Core Competencies v3.0, Canada, 2012
3. Department of Health. What is health informatics?, UK, 2011
4. Ability Gujarat, http://www.ability.gujarat.gov.in/portal/index.jsp, accessed on
5. India (Gujarat), eGov@Gujarat, Gujarat Informatics LTD.; 2006
6. India (Gujarat), eGov@Gujarat, Gujarat Informatics LTD.; 2009
7. Gujarat, Health Management Information System (HMIS), Gandhinagar, Department of Health & Family Welfare, 2009
8. Atlanta Centers For Disease Control And Prevention Defining Biosurveillance For Human Health, Atlanta: Centers For Disease Control And Prevention; 2010
9. National Biosurveillance Advisory Subcommitee, Improving the Nation's Ability to Detect and Respond to 21st Century Urgent Health Threats: Second Report of the National Biosurveillance Advisory Subcommittee. Atlanta: National Biosurveillance Advisory Subcommitee; 2011
10. Informatics.nic.in. e-Mamta: Name based Mother and Child Tracking System in Gujarat. Gujarat: Informatics.nic.in; 2011
11. India (Gujarat), eGov@Gujarat, Gujarat Informatics LTD.; 2010
12. Ministry of Health & family Welfare, Mother and Child Tracking System (MCTS). Ministry of Health & Family Welfare; 2012
13. Gujarat, NATIONAL URBAN HEALTH MISSION FRAMEWORK FOR IMPLEMENTATION, Department of Health & Family Welfare; 2013
14. Savel TG, Foldy S. The role of public health informatics in enhancing public health surveillance. Centre for Disease Control and prevention S*upplements* , July 27, 2012 / 61(03);20-24

15. Nakayama T. Evidence-based healthcare and health informatics: derivations and extension of epidemiology. Journal of Epidemiology, 2006 May; 16(3):93-100.
16. William A.Y., Patrick W. Public Health Informatics: Improving and Transforming Public Health in the Information Age. Journal of Public Health Management and Practice, 2000, 6(6), 67-75.
17. Moidu K. Application of an essential data set based computer system in support of maternal and child care. International Journal of Biomedical Computing, 1992, (3-4), 159-75.
18. Tsu VD, Free MJ. Using technology to reduce maternal mortality in low-resource settings: challenges and opportunities. Journal of the American Medical Women's Association, 2002, 57(3):149-53.
19. Yanfeng Zhang, Li Chen and Wei Wang. mHealth Series: Measuring maternal newborn and child health coverage by text messaging – a county–level model for China. Journal of Global health, 2013; 3(2):020402.
20. Rajnish M, Anand S and Anju S. e-mamta: Name based mother and child tracking system in Gujarat. Informatics.nic.in. 2011.
21. State Rural Health Mission. E-mamta- Mother and Child Tracking System (MCTS).
22. Governance Knowledge Centre (GKC) team. EMAMTA: MOTHER AND CHILD INFORMATION TRACKING SYSTEM DOCUMENTATION OF BEST PRACTICE. March 2014
23. Unicef. Strengthening Mother and Child Tracking System (MCTS) in Maharashtra. 2013

APPENDIX

Questionnaire for UHO/MHO

Name:

Age/Sex:

UHC Name:

Computer Literacy:

Q1. What is your understanding of e-mamta?

Ans

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Q2. In last 3 months how you have used e-mamta for your service delivery improvement?

Ans

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Q3. How frequently you access e-mamta?

(a) Twice daily (b) Once daily

(c) Once in a week (d) Once in a month

Q4. How often you use it to provide information through sms to health workers and beneficiaries?

(a) Almost daily (b) Almost in 2 weeks

(c) Almost monthly (d) Not at all

Q5. In which crucial areas of e-mamta you would suggest any improvement or no improvement is needed?

Ans

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Q6. Have you encountered any trouble while accessing e-mamta in last 3 months?

Ans

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……...……

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Q7. Please share the information in concern with resource availability at PHC?

(a) Building: (1) Owned (2) Rented

(b) Electricity: (1) 24*7 (2)

(c) Computer (Desktop, keyboard, CPU, and mouse)

(1) Available all time (2) Available at particular fixed time

(d) Antivirus Software: (1) Installed (2) Not Installed

If installed last updated date:

(e) Broadband Connection: (1) Available (2) Not available

(f) DEO: (1) Trained (2) Untrained

Q8. Time required per complete data entry?

(a) ANC-	(1) 5 min	(2) 10 min	(3) 30 min	(4) 1 hour
(b) Delivery-	(1) 5 min	(2) 10 min	(3) 30 min	(4) 1 hour
(c) PNC Mother-	(1) 5 min	(2) 10 min	(3) 30 min	(4) 1 hour
(d) Neo Natal-	(1) 5 min	(2) 10 min	(3) 30 min	(4) 1 hour
(e) Child Service-	(1) 5 min	(2) 10 min	(3) 30 min	(4) 1 hour
(f) Immunization-	(1) 5 min	(2) 10 min	(3) 30 min	(4) 1 hour

Q9. What is the average data entry amount of a particular month?

(a) ANC-
(b) Delivery-
(c) PNC Mother-
(d) Neo-natal-
(e) Child Service-
(f) Immunization-

Q10. What is the average monthly data entry time of your PHC?

Ans:

Q11. According to you whether the quality of manual data is authentic or of the e-mamta data?

(a) Manual Data (b) e-mamta

Q12. Please justify your answer with reason.

Ans

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……..……

……

Q13. Which option you consider more user-friendly?

(a) Manual documentation (b) e-mamta documentation

Q14. Justify the answer?

Ans

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……...……

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Q15. Please share your own experience of e-mamta on the basis of below mentioned key points:

(a) Data sharing:

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(b) Easily available information:

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(c) User friendly software:

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(d) Sustainable information:

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(e) Usefulness in supervision & monitoring:

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Q16. What is the approximated average expenditure of a year in reference to e-mamta utilization?

Ans.

Q17. Whether the funding is sufficient enough to support the average expenditure of e-mamta?

Ans.

Signature:

Questionnaire for FHW

Name:

Age:

Facility Name:

Computer Literacy:

Q1. What are the various data entry types are available in E-mamta?

Ans

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Q2. Do you think it is useful for beneficiaries?

(a) Y (b) N

Q3. Please justify your answer with reason?

Ans

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……...……

……

Q4. Is any kind of training for e-mamta is organized for you?

(a) Y (b) N

Q5. Do you know how e-mamta is helpful to you?

(a) Y (b) N

Q6. What are the features available for you?

Ans

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……...……

……

Q7. How do you use those features?

Ans

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……...……

……

Q8. How frequently you get printed report from e-mamta?

(a) Weekly (b) Once in two weeks

(c) Monthly basis (d) Not at all

Q9. Verification of information entered is done after how much time interval?

(a) Weekly (b) After 2 weeks

(c) Monthly (d) Not done at all

Q10. Do you get sms from E-mamta?

(a) Yes (b) No

Q11. How frequently you get sms fromE-mamta?

(a) Daily (b) Mid of week

(c) Weekly (d) Monthly

Q12. Do you check for services that are due for mother and child?

Ans

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……...……

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Q13. What are the problems you are facing in context to below mentioned headings:

(a) Data Reporting

Ans

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(b) Data Entry

Ans

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(c) Data Analysis

Ans

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(d) Data Verification

Ans

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SCREENSHOTS OF ABILITY GUJARAT WEBSITE:

The webpage of Ability Gujarat can be opened with using website www.ability.gujarat.gov.in.

The start-up page looks like this image.

Figure 33: Ability Gujarat's Webpage

On the start-up page a brief introduction of Ability Gujarat is given along with additional information.

The next step is to go to registration. On clicking Registration page will open up which shows 3 types of forms and the certificate of disability.

Figure 34: Registration Page

The online form that DEO will fill on the basis of hard copy of form looks like.

Figure 35: Online Form

Figure 35 Continued

Figure 36: Submit Form

A person can see their certificate by providing their PWD number.

Figure 37: View PWD Certificate

SCREENSHOTS OF BADEA WEBSITE:

Figure 38: Login Screen of BADEA

Figure 39: Home Page

Figure 40: Birth Entry Form

Figure 41: Death Entry Form

Figure 42: Stillbirth Entry Form

Figure 43: Entry Details Page

Figure 44: Audit Trail

Figure 45: Logout

SCREENSHOTS OF HMIS:

The HMIS is used online by entering website www.nrhm-mis.nic.in in the browser. The webpage of HMIS looks like.

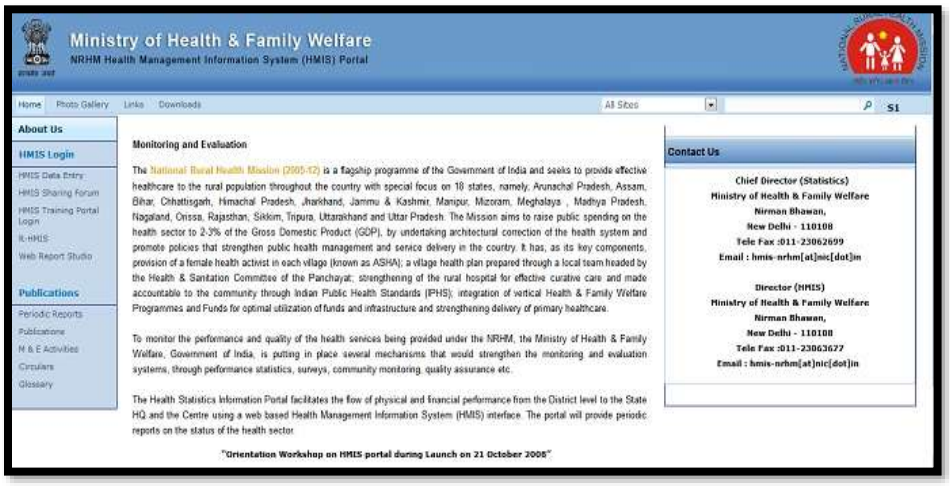


Figure 46: Webpage of HMIS

To login, one has to click on HMIS data entry, and then the login page will open up.

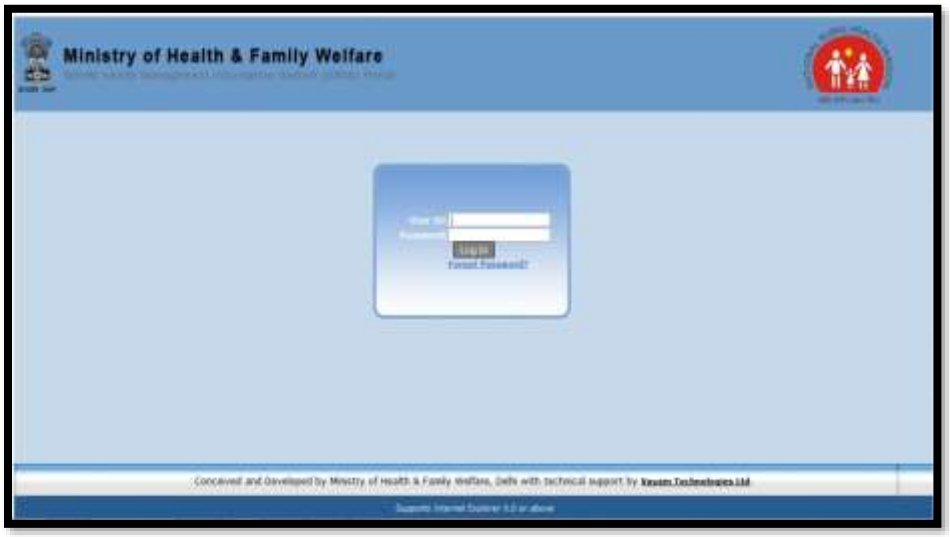


Figure 47: Login Page of HMIS

After login the startup page will open up, where one can see the features available and the messages.

Figure 48: Startup Page of HMIS

Figure 48: Continued

The first feature available in HMIS is MIS report which is available in Monthly, Quarterly and Annual MIS Format.

Figure 49: MIS Format

After one has clicked monthly, the page will open up which ask user to select the year and then month to see the data entry.

Figure 50: Monthly Format

After clicking Move Next, if entries will be filled for selected period of time, message will be shown on screen.

Figure 51: Data Filled For Selected Month

To check for quarterly data entry click Quarterly, then one has to select the year and quarter of which data entry need to be checked.

Figure 52: Quarterly Format

After clicking move next, on next page the status of health infrastructure will be entered.

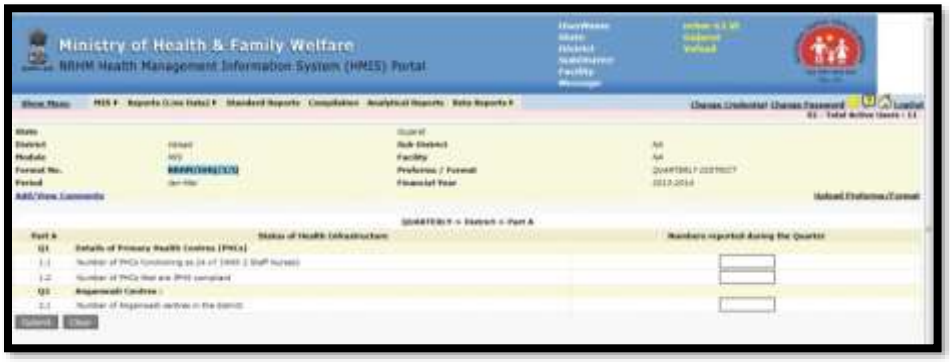


Figure 53: Quarterly Filled Data

The last type of data entry is annual MIS format. Here only year has to be selected.

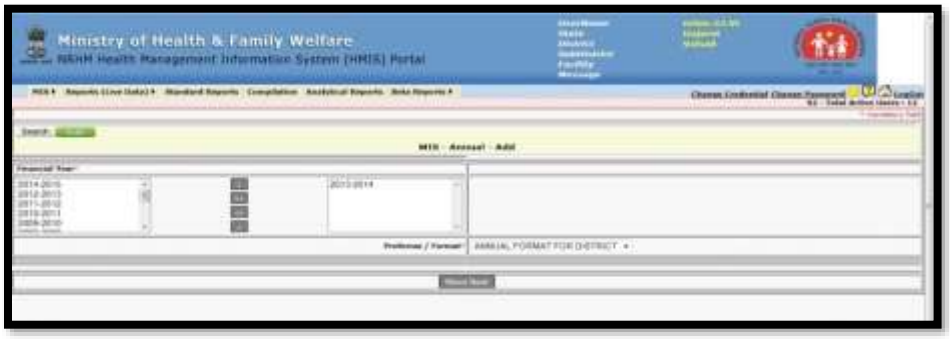


Figure 54: Annual Format

After clicking move next, the message will say whether the entries for selected period are completed or not.

Figure 55: Annual Data Entry

Now, after saving all the entries the next step is to see reports. These reports shows the live data and various reports are available to see.

Figure 56: Reports in HMIS

In Data Entry Status, three types of reports are available namely, **Uploaded and committed Report**, **Least Common Factor** and **Percentage Fill**.

When Uploaded and Committed Report will be selected, one has to fill the requirements.

Figure 57: Uploaded and Committed Report

After clicking Generate Report, Report will pop-up, which can be viewed and can also be saved in desired format like Excel, PDF or Word document.

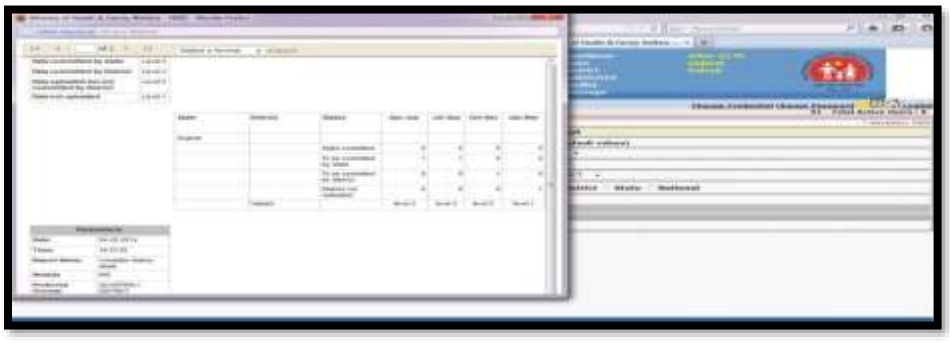


Figure 58:Save Uploaded Report

Next is Least Common Factor Report, after filling the information, click Generate Report.

Figure 59: Least Common Factor Report

The report will be generated that can be saved either in PDF, excel or Word document format.

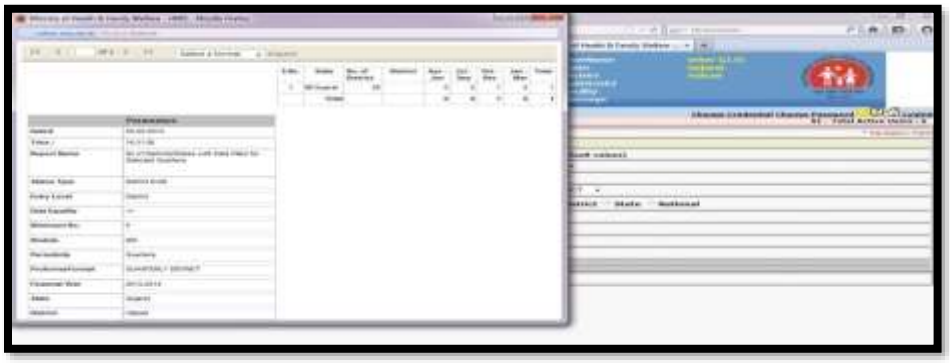


Figure 60: Save Least Common Factor Report

The last type of Data Entry Status Report is Percentage Fill, where the percentage of facilities is shown that have filled the entries.

Figure 61: Percentage Fill

The next report is Data Filled Summary Report.

Figure 62: Data Filled Summary

On clicking Generate Report, the reports will pop-up, which can be saved in either of format of PDF, Excel or Word Document.

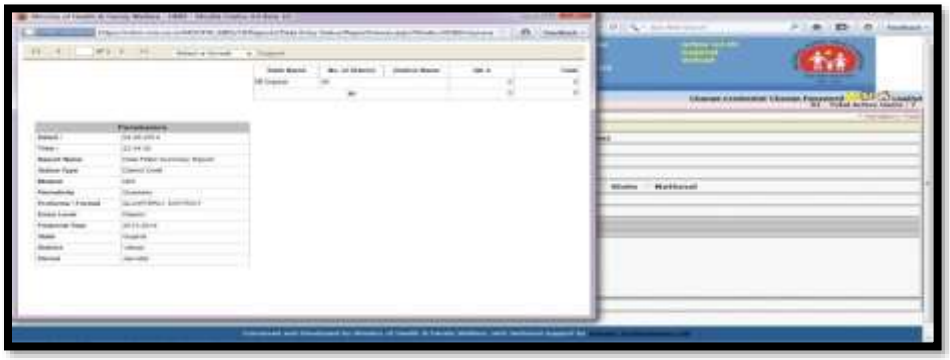


Figure 63: Save Data Filled Summary

To see reports of HMIS Indicators, click on HMIS Indicator, the select Financial year of which report one would like to see, and then month and Indicator Group and lastly Indicator Sub-group.

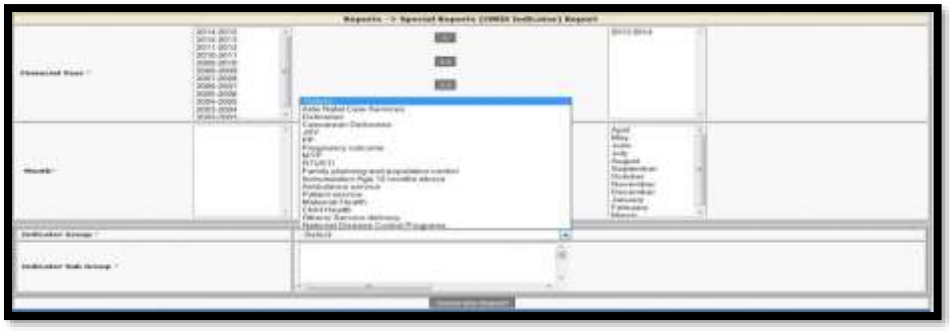


Figure 64: HMIS Indicator

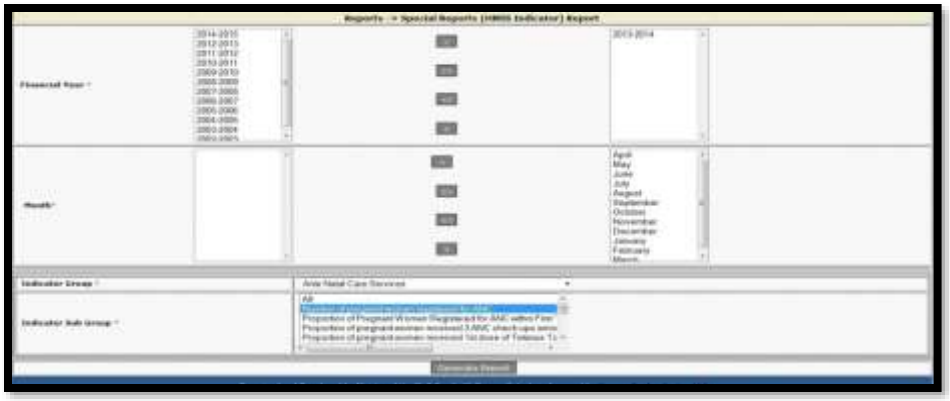


Figure 64 Continued

By clicking Generate Report, the report will pop-up, which further can be saved.

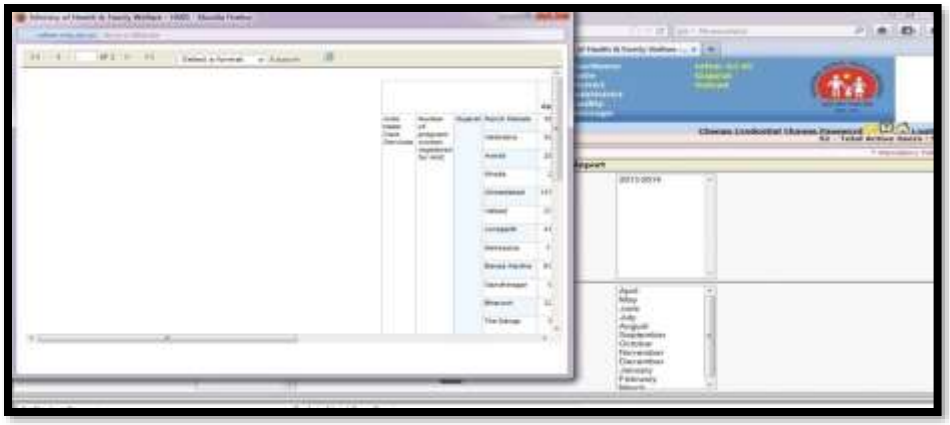


Figure 65: HMIS Indicator Report

The next section is standard reports, where one can see reports in standard way.

Figure 66: Standard Reports

The next section is of Analytical Reports.

Figure 67: Analytical Reports

SCREENSHOTS OF E-MAMTA

The E-mamta webpage will be open by entering http://e-mamta.gujarat.gov.in in the browser. The webpage shows Welcome Message and brief information of data entry.

Figure 68: E-mamta Webpage

After clicking login, another page will pop-up where ID and password need to be entered. After login, at the startup page once can see all the features that can be used for administrative purpose.

Figure 69: Startup Page of E-mamta

To start with Data Entry, click on Data Entry page will open up where once have to fill up for Taluka, Area that is Rural or Urban, PHC, Sub-centre,Village and Anganwadi.

Figure 70: Data Entry Location

Figure 71: Data Entry Type

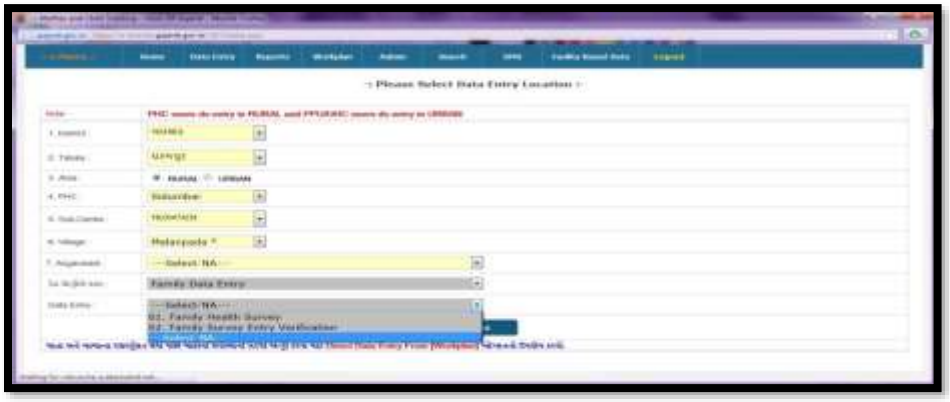


Figure 72: Data Entry

Once Data Entry will be selected, new page will open up where the details can be saved.

Figure 73: Save Data Entry

The next section is of Reports, where list of reports are available. One can choose according to their objective.

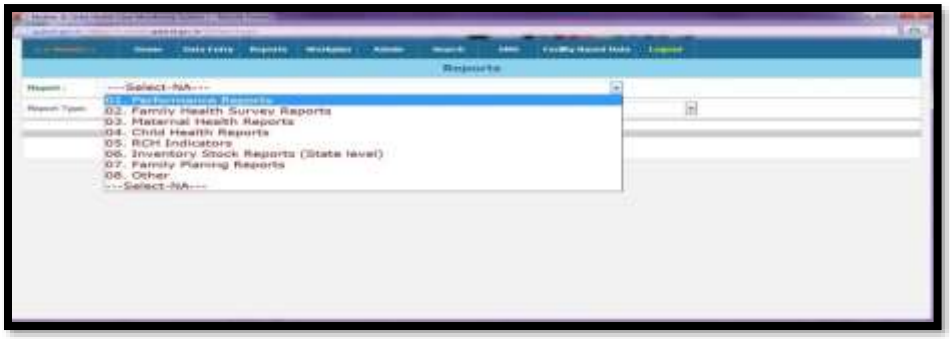


Figure 74: Select Report Indicator

Then one has to select Report Type.

Figure 75: Report Type

All the reports can be seen by selecting them and clicking submit, the report will pop-up, which can be saved to computer in desired format.

Figure 76: View or Save Report

One can also see mother HB/Wt chart in graphical way and medication prescribed on that basis.

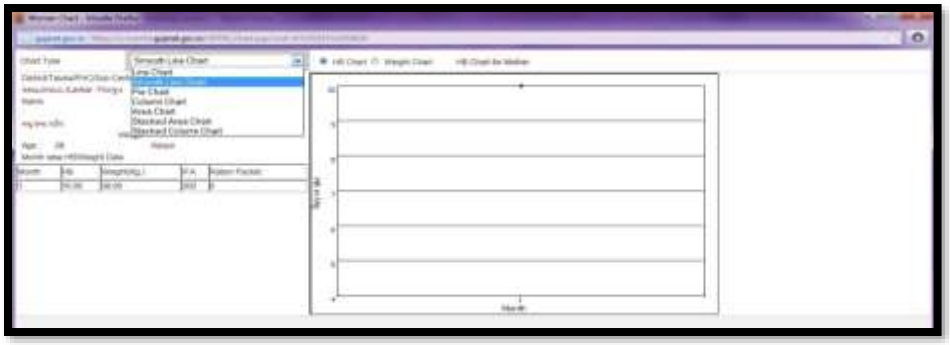


Figure 77: Mother HB/Wt Chart

In the same way, services given to child can be seen.

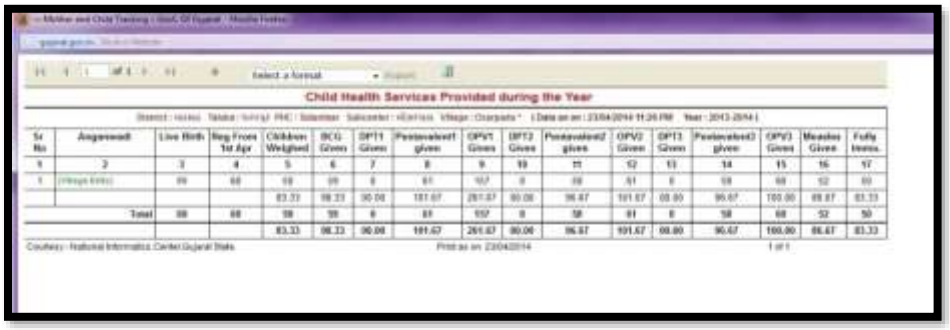


Figure 78: Child Given Services During Year Report

The next section is Work plan, which is very significant to effective service delivery. There are number of work plan are available for mother and child.

After clicking on work plan, page will open up where the desired work plan will be selected.

Figure 79: Work Plan List

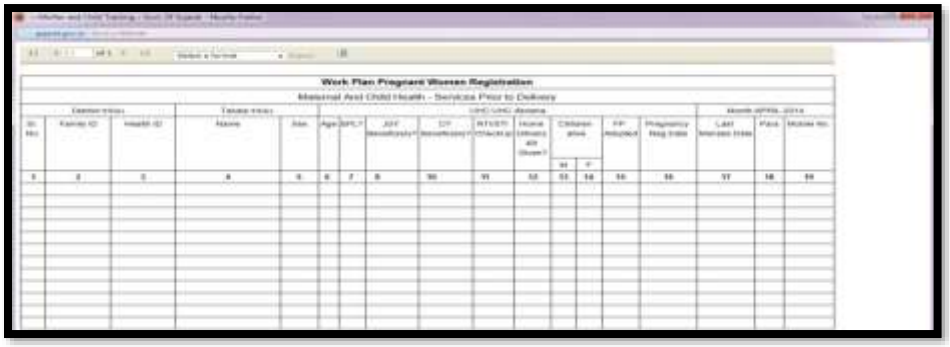


Figure 80: Pregnant Woman Registration Work Plan

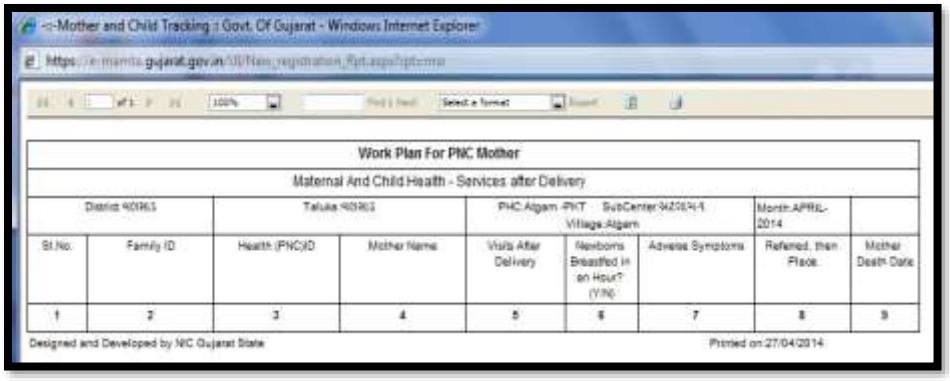
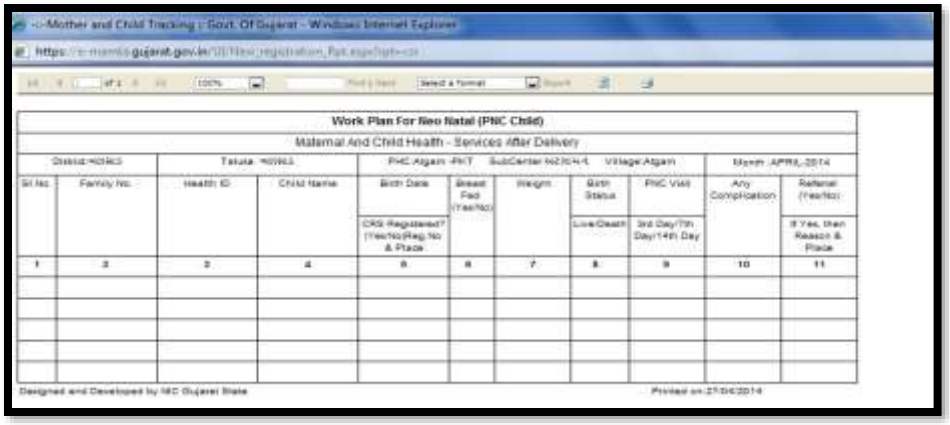


Figure 81: PNC Mother Work Plan



Work Plan For Neo Natal (PNC Child)

Maternal And Child Health - Services After Delivery

Sl No	Family No	Health ID	Child Name	Birth Date / CRS Registered? (Yes/No,Reg.No & Place)	Breast Fed (Yes/No)	Weight	Birth Status / Live/Death	PNC Visit / 3rd Day/7th Day/14th Day	Any Complication	Referral (Yes/No) / If Yes, then Reason & Place
1	2	3	4	6	8	7	8	9	10	11

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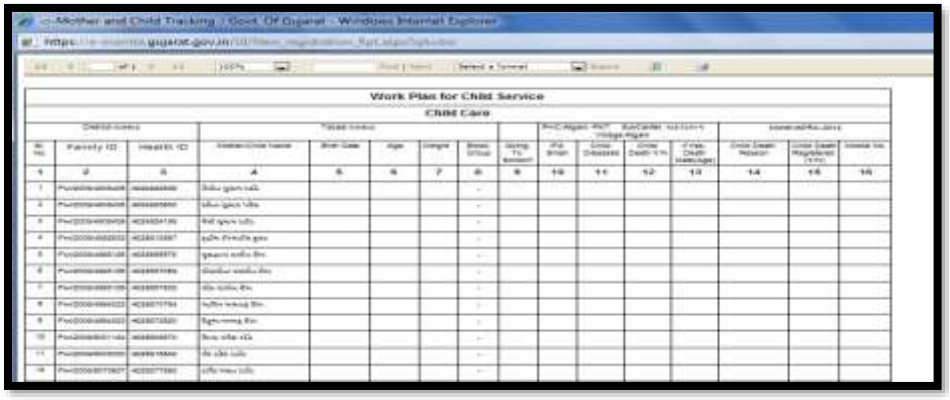
Printed on:27/04/2014

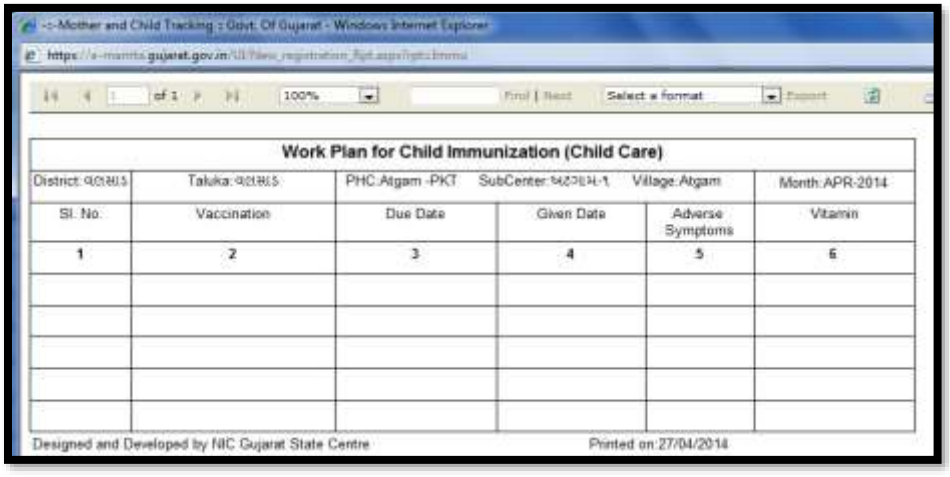
Figure 82: PNC Child Work Plan



Work Plan for Child Service

Child Care

Figure 83: Child Service Work Plan



Work Plan for Child Immunization (Child Care)

District: [illegible] Taluka: [illegible] PHC:Atgam -PKT SubCenter:[illegible] Village:Atgam Month:APR-2014

Sl. No.	Vaccination	Due Date	Given Date	Adverse Symptoms	Vitamin
1	2	3	4	5	6

Designed and Developed by NIC Gujarat State Centre

Printed on:27/04/2014

Figure 84: Child Immunization Work Plan

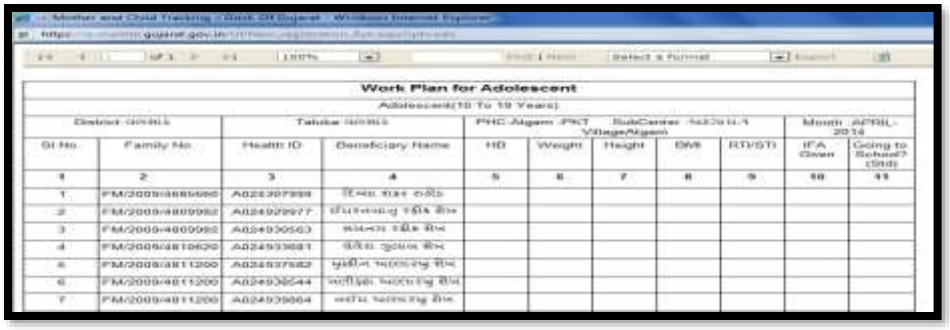


Figure 85: Adolescent Work Plan

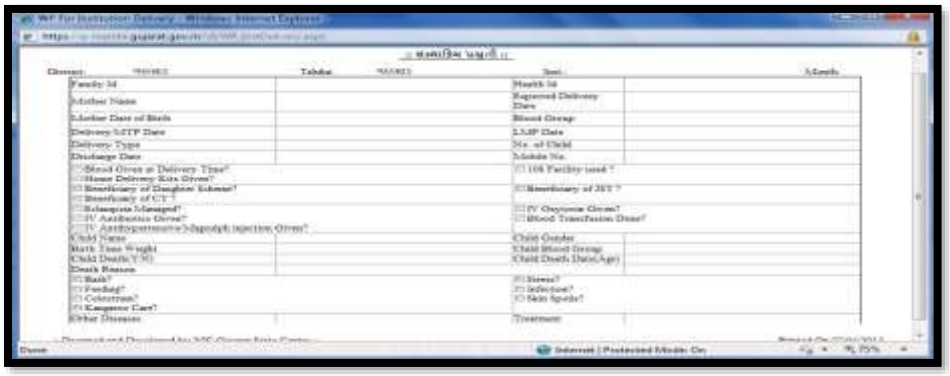


Figure 86: Institutional Delivery Work Plan

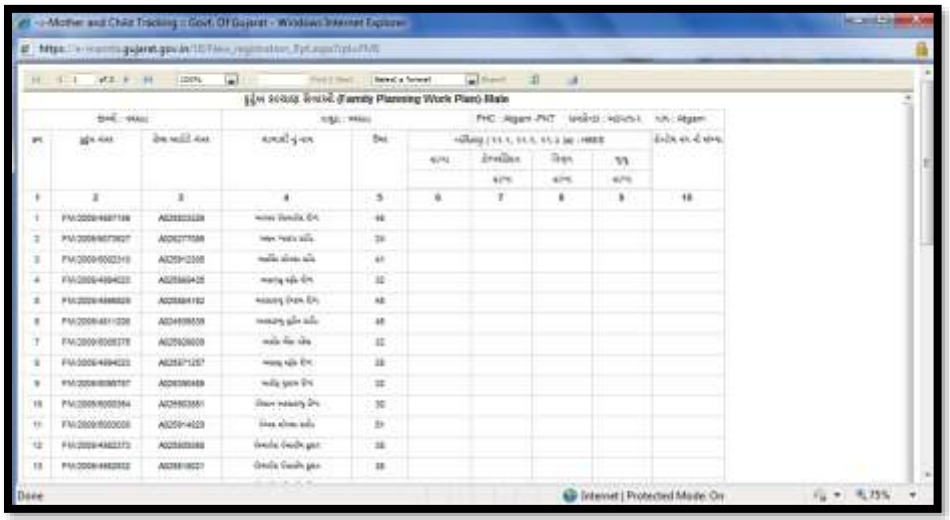


Figure 87: Family Planning Work Plan (Male)

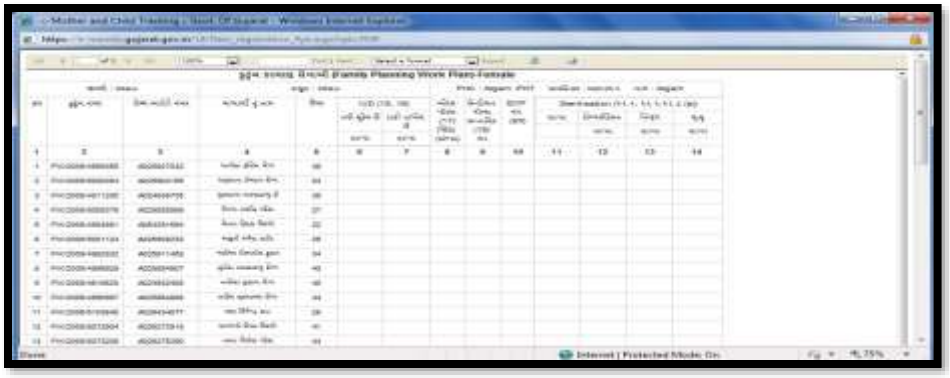


Figure 88: Family Planning Work Plan (Female)

The next feature is to Dashboard, where the brief information of indicators are available.

Figure 89: Dashboard

The next feature is SMS, from where SMS can be send to beneficiaries, officials or reports can be send.

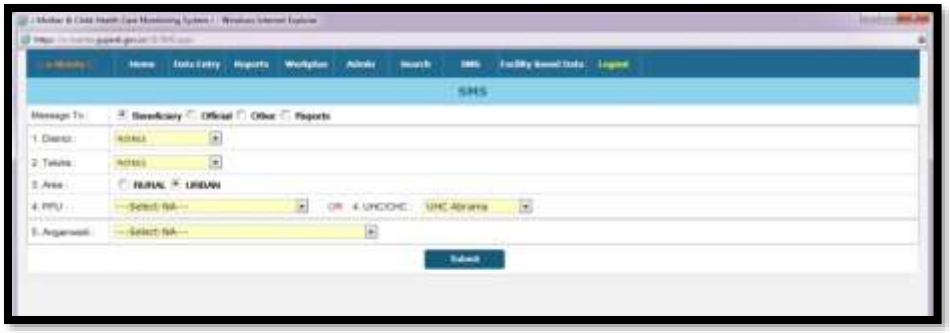


Figure 90: SMS

When SMS to beneficiary is sent, it includes a message that authority wants to deliver. It can be regarding PNC visit or Immunization.

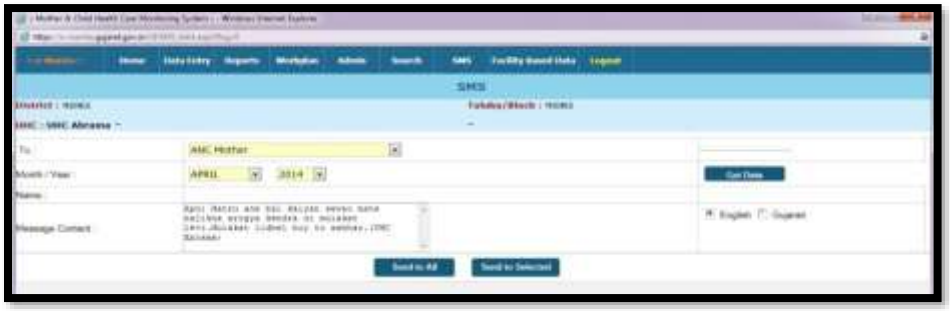


Figure 91: Message for Beneficiary

When SMS is sent to Official, first Official need to be selected from list and then manually message has to be typed.

Figure 92: SMS to Official

The next feature is Facility Based Data, where one can check for verification of HMIS Forms.

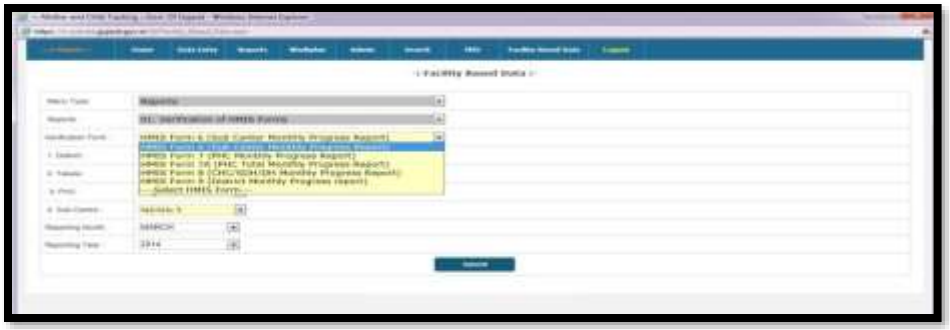


Figure 93: Facility Based Data Report