

A Review of progress and impact of Health Management Information System (HMIS) in Public Health Care system of India

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Abstract

The Government of India's initiatives in public health have recorded noteworthy successes over time. Unfortunately, Indian health system is still ranked 118 among 191 World Health Organization (WHO) member countries on overall health performance (WHO, 2000). One of the reasons is poor management of health programs. The hurdles found in DHIS includes poor data quality, the unfulfilled promise of integration and a continuing weak culture of information use. Some key strategies identified to address these challenges included the promotion of decentralization of information to support decentralized action, the adoption of a data warehouse approach and strengthening collaborative networks. There was an urgent need to create data processes and supervision guidelines that complement existing workflows and service delivery priorities. Health staff should be trained to implement these guidelines. MCTS outputs, such as service delivery planning tools, should replace existing tools once data quality improves. In HMIS there was a very strong bias with policy makers (though slowly disappearing) on the use of computers. Cost escalation of major projects by 50% to 100% delays of programs by 2 to 5 years, non-achievement of objectives of programs are the common features of the projects. This means that the billions of public money invested in this programs are producing (has produced) half or less than half the results. By employing computers, by building databases, by monitoring effectively and by improving the planning ability to focus and attack issues, we will be able to reduce the wastages, time delays and save few billions in the minimum. The Health Information Systems like DHIS, MCTS, HMIS, have definitely improved the Public health system in India but still lagging in desired objectives like proper, adequate and quality data collection, timely reporting etc. The most important part is to train the health workers at gross root level to generate more efficient data production in these health information systems.

Key Words: DHIS, MCTS, HMIS, NIKSHAY, ICDS Software's, Integrated RCH portal Maternal and child death software.

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INTRODUCTION

There was a time when there was minimal role of technology in public health and physicians only were the sole caretakers and saviors of people.¹ Nowadays,

technology is at its peak and there is a boom in the availability of the computers to an extent that nearly 500 million computers are available throughout the world.² No field today is uninfluenced by computers, and so is public health, which has benefitted through the pioneering concept of public health informatics i.e., systematic application of information, computer science, and technology to public health practice, research, and learning, which eventually facilitates transmission of data from healthcare staff to local health agencies, then to state health agencies and finally to National Center of Disease Control leading to formation of Public Health Information Network (PHIN).³ Presently, computers play a crucial role by providing care in all aspects of health. Apart from the formation and maintenance of patient's records, they play a judicious role in public health surveillance. On one

hand, computers are the key functionalities of health management information system and on the other hand, they are key handlers of geographic information system, electronic medical records, bioengineering, education, and research. They are also being used in statistical analysis of various data and hence, play an innovative role in leveraging the quality standards of public health professionals and workers.⁴

HMIS is the key component of any health program and is defined as a tool that helps in gathering, aggregating, analyzing, and using the information generated for taking actions to improve performance of health systems.⁵

Web-based HMIS helps in easy aggregation of data, reduces workload on field staff, strengthens decentralization, and hence, improves the planning ability by formulating 18 national, 52 state/district, 51 facility, and 18 community indicators.⁶

At the national level, it is primarily a tool of policy- and strategy-making. At the state and district level, it helps in program monitoring and management. At the sub-district level (block, primary health centre, and sub-centre), it facilitates effective registering and collection of data, provision of data analysis tools, generation of reports, and development of indicators for comparison.

The Government of India's initiatives in public health have recorded noteworthy successes over time. Unfortunately, Indian health system is still ranked 118 among 191 World Health Organization (WHO) member countries on overall health performance (WHO, 2000). One of the reasons is poor management of health programs. Health management requires the monitoring of the health status of the population, provision of services as to the coverage and utility, drugs stock and consumption patterns, equipment status and availability, finances, and appointment of personnel on a regular basis. This requires timely and accurate information from various sources, so as to help health service managers to recognize weakness in health service provision and take actions that will improve service delivery. In other words, the development of an effective information system is a necessary precursor to managerial improvement (Bodavala, 1998). Health Information System integrates data collection, processing, reporting and use of information for necessary improvement of health services. The Health Management Information System (HMIS) is designed to assist in management and planning of health program (WHO, 2004). WHO has led down 5 major components of evaluation pertaining to HMIS, these are data generation and report compilation, data utilization, computer hardware and software, training, and monitoring.⁷

A health management information system (HMIS) is a process whereby health data are recorded, stored,

retrieved and processed for medical decisions making. Its broadly includes managerial aspects of any organization such as planning, organizing and control of health care facilities at country as particular and world as a globe.⁸ It has been observing globally that very less number of computerized HMIS is operational and working properly to deliver the health care services.⁹⁻¹⁰ If HMIS is introduced in the public health system, then the data collected will have more values and better information and ultimately meaningful decisions can be acquire. It will also improve access to health care and its services¹¹. Many of the evaluations have also looked at the utility of HMIS as a tool for overall development of health organization^{12,13}. Health Care is one of the most important dependencies for economic sustainability and growth of a country. India as compared to other developing nations spends slightly higher amount in the health sector. While India has made significant strides of economic growth in the last two decades, there is a steep growth of health spending alongside. It is improved mainly due to increase incidence and prevalence of diseases. Growth rate of human resources and hospitals significantly lags the disease incidence rate, and hence the gap in demand versus supply is widening at an alarming pace. Most of the health awareness education camps are still being conducted in old manner therefore more technical and professional ways to be applied to educate population¹⁴. Health Information System Programme, India (HISP) is a non profit NGO that has been established to design, development, implementation and institutionalization of health information systems for the public health care sector in India. At initial stage HISP India activities were initiated in a very small scale in 2000 with University of Oslo support and today HISP India has a Memorandum of Understanding at the national level and also with various states in the country to carry out these activities.¹⁶ Major contribution of HISP in health care sector of India is that it developed open source software- District Health Information Software –DHIS2, to support the routine health information systems in the states. Further, HISP engaged in its support and institutionalization in India. WHO has been accepted DHIS2 as a key component of their Public Health Information Toolkit. Presently more than 20 states in India, has introduced DHIS2. In the developing countries, this is certainly one of the largest implementation of open source software for health information systems.¹⁷

The best review of it can be done by reviewing the Various components of it like DHIS, MCTS, HMIS software's presently working in public health department of India respectively.

DHIS: (District Health Information System): DHIS 2 is the preferred health management information system in

47 countries and 23 organizations across four continents. DHIS 2 helps governments and health organizations to manage their operations more effectively, monitor processes and improve communication. DHIS 2 is typically used as national health information systems for data management and analysis purposes, for health program monitoring and evaluation, for facility registries and service availability mapping, for logistics management. With DHIS 2 you can capture data on any type of device, including desktops, laptops, tablets, smartphones and feature phones. Most solutions work-offline, enabling improved reach in locations with poor connectivity. DHIS 2 provides a wide range of solutions based on HTML5, SMS and Java.¹⁸

The key functionalities offered by DHIS2 include¹⁹: It comprises of a tool kit of modules to develop an IHIA, Data layer – platform and database independent, can inter-operate and collate disparate types of aggregate data (services, human resources, infrastructure, aggregate patient data and others). This system is fully equipped to handle data validation, import survey data and many others such things. The application layer of this system has facility to easily define new datasets, indicators, and create reports. The system is integrated with various other party applications and outputs exportable to enable processing in EpiInfo, Excel, SPSS and various others. Web API allows integration with other databases and supports the development of an “Integrated Information Portal.

Sundeep Sahay²⁰ Has assessed the progress; noted in areas of data coverage in that some sporadic examples of information use were present and enhancements in capacity and infrastructure were accumulating. Challenges still remained key ones included poor data quality, the unfulfilled promise of integration and a continuing weak culture of information use. Some key strategies identified to address these challenges included the promotion of decentralization of information to support decentralized action, the adoption of a data warehouse approach and strengthening collaborative networks. Achieving this however, requires some structural interventions such as the broad basing of education in public health informatics, institutionalization of a cadre of public health informatics staff within the Ministry of Health, and promoting the use of software which is open source and based on open standards such that widespread local use is supported.

MCTS: The Mother and Child Tracking System (MCTS) is a centralized web-based application launched by the Ministry of Health and Family Welfare in India in December 2009 to provide reliable data for effective decision-making through name-based tracking of each client.¹⁵ More than 4.06 crore pregnant women and 3.3

crore children have been registered in the system since its inception.²² Few experiences of MCTS implementation have been documented in the states of Gujarat (e-Mamta),²³ Tamil Nadu (Pregnancy and Infant Cohort Monitoring and Evaluation System - PICME),²⁴ Rajasthan,²⁵ and Chhattisgarh. A study by Pallavan Nagarajan et al found Lack of appropriate training, overburdened data entry operator (DEO) and auxiliary nurse midwife (ANM), poor internet connectivity, slow server speed, and frequent power failures were revealed as major limitations for the effective implementation of MCTS. Nearly 18% of the clients reported receiving short message service (SMS) and only 6% could understand the SMS. In conclusion MCTS has led to accountability and improved supervision of health workers, apart from empowering the community.

A Study by Rajiv Gera et al²⁶ done a Data Quality Assessment (DQA) to evaluate data quality and an assessment survey to identify implementation challenges. The survey comprised semi-structured questionnaires for health staff in the sampled districts, observation checklists and survey investigator notes. Purposive sampling was used for selecting two districts in each state and two blocks in each district. For the DQA, 45 mothers who became pregnant and 84 children born within the stipulated time frames were randomly sampled. They found DQA overall performance numbers were 34 % for pregnant women and 33 % for children in the Rajasthan study areas, while UP's performance numbers were 18 % for pregnant women and 25 % for children. Weaknesses in the MCTS' data completeness accounted for much of this performance shortfall. The beneficiary profiles for Rajasthan were largely incomplete, and the MCTS in UP struggled to register beneficiaries. Shared challenges in both states were the absence of clear processes and guidelines governing data processes, and the lack of systematic monitoring and supervision frameworks for MCTS implementation. As a result, Front Line Health Workers (FHWs) were overburdened with data documentation work, and there were long delays in data capturing. FHWs and block level health officials were not adequately trained in using the MCTS. UP staff reported unreliable internet and electricity availability, lack of dedicated data entry personnel, and a shortage of consumables such as MCTS registers. In conclusion, there was an urgent need to create data processes and supervision guidelines that complement existing workflows and service delivery priorities. Health staff should be trained to implement these guidelines. MCTS outputs, such as service delivery planning tools, should replace existing tools once data quality improves.

HMIS: Health management requires the monitoring of the health status of the population, the provision of services as to the coverage and utility, drugs stocks and consumption patterns, equipment status and availability, finances, resource personnel on a regular basis. This requires timely and accurate information from various sources. Accurate, relevant and up-to-date information is essential to health service managers if they are to recognize weakness in health service provision and take actions that will improve service delivery. Accordingly, the development of effective information systems is a necessary precursor to managerial improvement.²¹ A

health information system. (HIS) is a process whereby health data (input) are recorded, stored, retrieved and processed for decision-making (output). Decision making broadly includes managerial aspects such as the planning, organizing and control of health care facilities at the national, state and institution levels and clinical aspects which can be subdivided into (I) providing optimal patient care, (ii) training of medical personnel to generate appropriate human resources, and (iii) facilitate research and development activities in various fields of medicine.²⁸

**Term health management information systems is generally used to describe the following subsystems
Various sub- components/sub-systems of Health Information System²⁹**

Epidemiological surveillance	Identification/notification of diseases and risk factors, Investigation, follow-up, control measures
Routine service reporting	Hospital/health center based indicators on performance of the various services
Specific program reporting	Various programs in operation in a particular country, typically include; Reproductive child health, AIDS, Malaria, TB, Leprosy, Integrated Child health and many other programs under different departments, names
Administrative systems	Account and financial systems, Drugs management (procurement, storage and delivery), Personnel management, Asset management (equipment/buildings etc)Maintenance system
Vital registration	Birth, deaths, migration etc.,

NIKSHAY³²-To keep a track of the TB patients across the country, the Government of India has introduced a system called NIKSHAY. The word is combination of two Hindi words NI and KSHAY meaning eradication of tuberculosis. NIKSHAY (www.nikshay.gov.in) is a web enabled application, which facilitates monitoring of universal access to TB patients data by all concerned. The system has been developed jointly by the Central TB Division of the Ministry of Health and Family Welfare and National Informatics Centre (NIC) and it was launched by the Government of India in June 2012 with issue of required administrative directions from Central TB Division for use of NIKSHAY. A gazette notification was published by the Government of India mandating all private health establishments to inform the details of TB patients treated by them to NIKSHAY repository.

NIKSHAY has two broad objectives. One is to create database of all TB patients including Multi-Drug Resistant cases across the country and to use this database for monitoring and research purposes at all levels so that TB can be eradicated from India in an effective manner. NIKSHAY utilises SMS technology in an effective manner. Through SMS, it communicates with TB patients and grassroots level healthcare services providers as well as health and family welfare policy makers, health managers and health administrators at different tiers of the healthcare delivery system. Whenever a new patient is registered on NIKSHAY, an SMS is sent to the

patient with registration ID and details of DOTS Operator along with advisory note to take the regular medicine.

Daily SMS is sent to all monitoring authorities in CTD, to State TB Officers (STO), District TB Officers (DTO) giving the number of patients, Designated Microscopic Centre (DMC)/Peripheral Health Interface (PHI) registered. The emergence of resistance to drugs being used to treat tuberculosis (TB), and particularly multidrug-resistant TB (MDR-TB), has become a significant public health problem in a number of countries and an obstacle to effective TB control. NIKSHAY has also felt the importance of MDR-TB patients and a module has been developed for keeping the records of patients at Intermediate Reference Laboratory (IRL), who are referred for Culture and DST test. These patients could be from RNTCP or come as follow-up patients from DRTB Centres or directly sent for pre-treatment test. NIKSHAY was launched on 4th June, 2012 at <http://www.nikshay.gov.in>. As of now more than 3.6 lakh TB patients have been registered. Details of 34,261 DMCs/PHIs, 2268 TBU, 629 DTO and 53 STO are available

The impact of this NIKSHAY is that, the TB patients are now being given advisories through SMS. This facility has helped in awareness generation as well as encouraging patients to comply with their DOTS Programme. Another benefit of NIKSHAY is correlation between TB & HIV, leading to outcome analysis of treatment, which may give new directions to TB treatment in the coming years.

Through NIKSHAY, CTD in association with NIC, wish to develop an integrated application for all types of TB patients across the country. Use of mobile technology for fast data availability and effective monitoring is expected from NIKSHAY. Innovative ideas through the use of other technological options are also being explored so that TB can be monitored effectively for its eradication from India.

ICDS Software's³³: The Integrated Child Development Services Programme aims at providing services to pre-school children in an integrated manner so as to ensure proper growth and development of children in rural, tribal and slum areas. ICDS is a centrally sponsored scheme.

Integrated RCH portal³⁴: Ministry of Health & Family welfare has introduced an innovative web based application called Mother and Child Tracking System (MCTS) with the objectives to (i) Facilitate timely delivery of all services to pregnant women and children (ii) Strengthen health care service delivery system, (iii) Improve service delivery coverage and (iv) Monitoring mechanism at all level. MCTS has been implemented across the country and currently, all the States/UTs are reporting regularly on MCTS portal. Due to the changing data requirements of National Reproductive and Child Health (RCH) programmers, the Ministry has designed RCH portal, wherein, Eligible Couples, Pregnant Women and Children will be tracked for health care service delivery to them. The RCH portal will transit MCTS portal in phase manner. The RCH portal will further strengthen health care delivery system; improve service coverage and monitoring mechanism. The use of this information for early identification and management of basic complications during pregnancy, childbirth and post-partum period at field level will help in reducing the maternal, neonatal and infant mortality rates and support to achieve the Millennium Development Goal (MDG) numbers four and five.

It involves 3 Steps; Step 1: Identification Process of Beneficiaries, Step 2: Registration Process of Beneficiaries, Step 3: Recording Tool: Integrated RCH register Version 1.1-- This register has the following parts: Village-wise information (Profile Entry), Section 1: Tracking of Eligible Couples and use of contraceptives, Section 2: Tracking of Pregnant Women, Section 3: Tracking of Children, Section 4: Annexure --- Ready Reckoner Calendar for Calculation of Expected Date of Delivery (EDD) from the date of last menstrual period (LMP), National Immunization Schedule for Infants, Children and Pregnant Women, Record of each immunization sessions etc.

Maternal and child death software³⁵: UNICEF India in 2014 also supported modelling and scale up of a unique software for Maternal Death Review (MDR) in five

states. The software provides timely data on the causes and location of maternal deaths. It is planned to scale up the software in 10 more states in 2015 and eventually nationwide by 2016. Historically, Maternal Death Reviews have been a very good tool to support improvements in health systems by analyzing the key causes of deaths among pregnant women and those who have delivered.

Way back in 1983, Indian Journal of Public Health commented in the editorial on the need for HMIS in India. "A good health service superstructure can be built only on a solid base provided by the reliable health statistics collected through a well organised infrastructure".³⁰ The several inadequacies in the HMIS system make it very unreliable and undependable. Industry has progressed from private networks running server/client based proprietary programs to Internet based applications which are platform independent, accessible anywhere, user friendly, cheap and universally available. Every sector either in developing countries or developed countries has begun using the extensive availability and cheaply managed web based systems.

Unfortunately, the Public health management is the last one to employ the technology. It is common practice in developing countries that the priorities in the health sector are set by government, in the light of political pressures. In a sustainable system for health-care policymaking and planning, the major role of new computerized technologies for the improvement of national health-care policy making and planning for socio-economic development should be understood³¹ There is a very strong bias with policy makers (though slowly disappearing) on the use of computers. Cost escalation of major projects by 50% to 100% delays of programs by 2 to 5 years and hence non-achievement of objectives of programs are the common features of the projects. This means that the billions of public money invested in this programs are producing (has produced) half or less than half the results. By employing computers, by building databases, by monitoring effectively and by improving the planning ability to focus and attack issues, we will be able to reduce the wastages, time delays and save few billions in the minimum. Computers certainly do not cost not more than couple of millions.

Now even after more than 20 Yrs. of launch of computer based HMIS system over paper based system, still there are few issues that are affecting the achievement of the desired HMIS goals (hurdles - poor data quality, reporting, computer illiteracy of staff etc.)

CONCLUSION

Now even after more than 20 yrs of launch of computer based HMIS system over paper based system, still there are few issues that are affecting the achievement of the desired HMIS goals. The Health Information Systems like DHIS, MCTS, HMIS, have definitely improved the Public health system in India but still lagging in desired objectives like proper, adequate and quality data collection, timely reporting etc. The most important part is to train the health workers at gross root level to generate more efficient data production in these health information systems.

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