Dissertation in National Health System Resource Centre, New Delhi

A report on

"Issues & Challenges in Data Quality of HMIS in Maharashtra State"

A dissertation submitted in partial fulfilment of the requirements

For the award of

Post-Graduate Diploma in Health and Hospital Management

Submitted By:

Dr. Tarun Singh Sodha

Post Graduate Diploma in Hospital & Health Management
2011- 2013

International Institute of Health Management Research

New Delhi -110075

May 2013

Certificate of Internship Completion

This is to certify that Dr. Tarun singh sodha has successfully completed his internship in our organization from February 11, 2013 to April 30, 2013. During this intern he has worked on **"Issues & challenges in data quality of HMIS in Maharashtra State"** under the guidance of me and my team at National Health System Resource Centre.

We wish him/her good luck for his/her future assignments

Sandhya ahuja

Dr. Sandhya Ahuja

Senior Consultant

HMIS Division

NHSRC, New Delhi

Date

30/4/2013

Certificate from Dissertation Advisory Committee

This is to certify that **Dr. Tarun Singh Sodha** , a graduate student of the **Post- Graduate Diploma in Health and Hospital Management**, has worked under our guidance and supervision. He is submitting this dissertation titled **"Evaluation of Health Status and Issues and Challenges in Data Quality in State of Maharashtra"** 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.

Sandhya Ahuja

Faculty Mentor	Dr. Sandhya Ahuja
Designation	Sr. Consultant, HMIS Div.
IIHMR	NHSRC
New Delhi	New Delhi
Date	30/4/13

Certificate of Approval

The following dissertation titled **"Issues and challenges in data quality of HMIS in Maharashtra state"** is hereby approved as a certified study in management carried out and presented in a manner satisfactory 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

Name Signature

Dr Dharmesh Lal

Suparna Pal

FEEDBACK FORM

Name of the Student: Dr. Tarun Singh Sodha

Training Institution: National health resource centre

Area of Internship: Health management information system

Attendance: 96 %

Objectives met: yes

Deliverables: Different types of analysis, state wise, districtwise, State across districts, 19 indicators & progress, using web portal

Strengths: learning capacity very fast & good

Suggestions for Improvement: Practising more analysis.

Date: 30/4/13
Place: New Delhi

Signature of the Officer-in-Charge (Training)

ACKNOWLEDGEMENT

I must offer my profoundest gratitude to my thesis advisor Dr. Sandhya Ahuja, Senior consultant HMIS for mentoring me throughout my dissertation period. From finding an appropriate subject in the beginning to the process of writing thesis, Dr. Ahuja offers his unreserved help and has given me a huge platform time and again to showcase my work I express my deepest gratitude to Dr. Vinay Tripathi, Dissertation Guide from IIHMR for approving changes in dissertation topic and enabling me to keep a focused approach throughout my dissertation.

I also want to thank Dr. Alia Kauser , Ms. Itisha Vasisht, Dr. Amit Mishra and my colleagues to offer suggestions and help me get a new insight every time I found myself stuck up in the middle of dissertation.

Abbreviations	
ANM	Auxiliary Nurse Midwife
ASHA	Accredited Social Health Activist
DH	District Hospital
DHIS-2	District Health Information System
FP	Family Planning
HMIS	Health Management Information System
IFA	Iron Folic Acid
IUD	Intra Uterine Device
JSY	Janani Suraksha Yojana
MTP	Medical Termination of Pregnancy
MoHFW	Ministry of Health and family Welfare
NRHM	National Rural Health Mission
OCP	Oral Contraceptive Pill
PHC	Primary Health Center
PNC	Post Natal Care
RH	Rural Hospital
SC	Sub Center
SDH	Sub District Hospital
VHND	Village Health and Sanitation committee

List of Tables

Executive summary

The study is related to HMIS, it provides information on service delivery relating to maternal and child health care utilization including Ante Natal Care (ANC), Post Natal Care (PNC), immunization, Janani Suraksha Yojana (JSY) registration and beneficiary, and delivery details. These data are available on a monthly basis. In addition, the HMIS provides data on physical infrastructure and financial performance on a quarterly and annual basis respectively. The data is available on the password protected HMIS web portal maintained by MoHFW (http://nrhm-mis.nic.in).

The performance of the HMIS, however, varies from state to state. Although level of data uploading has been relatively satisfactory in the state of Maharashtra, quality of data remains a major challenge, with many of the validity rules broken and existence of outliers in many variables. Validation rules are data quality check mechanism based on verification of the logic of relation between related data elements. Validation rules are relational expressions comprising of related data elements and an operator that states the expected / logical relation between the elements. Effective data uploading also needs to be improved substantially. Such inadequacies pose a challenge to improve the quality of HMIS data.

I. Introduction of the Organization

Organization Profile

Policy

NHSRC is committed to lead as professionally managed technical support unit organization to strengthen public health system and facilitate creative and innovative solutions to address the challenges that this task forces.

In the above process, we shall build extensive partnerships and networks with all those organization and individuals to share the common values of health equity, decentralization and quality of care to achieve its goals.

NHSRC is set to provide the knowledge- centred technical support by continually improving its processes, people and management practices.

Vision

We are committed to facilitate the attainment of universal access to equitable, affordable and quality healthcare, which is accountable and responsive to the needs of people.

Mission

Mission is to provide technical support and capacity building for strengthening public health system.

Thematic Areas

NHSRC works on certain thematic areas these are –

1. Communicable diseases
2. Community participation
3. Financing and PPP
4. HMIS
5. Human resource for health
6. Non communicable diseases
7. Public health administration including legal framework in health
8. Quality Improvement
9. Reproductive and Child Health

II. Issues & Challenges in Data Quality of HMIS in Maharashtra State

Introduction

In 2005 the government of India had introduced the National Rural Health Mission as flagship scheme of the Ministry of Health and Family Welfare. The objective of this scheme was to "carry out necessary architectural correction in the basic health care by people, especially for those residing in rural areas, the poor, women and children"(GOI 2005:1). The overhauling and redesigning of the health system requires availability of ready and accurate micro level data to indicate gaps in the existing system and identifying remedial actions. At the same time, understanding the synergy between availability of services, cost involved in provision of public health care services, expenditure and pattern of utilization among various sections of population, including vulnerable sections of the society, are important for policy making. A continuous flow of good quality information on inputs, outputs and outcome indicators facilitate monitoring the objective of NRHM for which an efficient Health Management Information System is required.

"Health Management Information Systems" (HMIS) is a tool which helps in gathering, aggregating, analyzing and using information for taking actions to improve performance of health systems. The necessity of sound information system as a support to the various developmental activities of the Health sector in India was identified as early as Bhore committee report soon after the independence. The national health policy of India (1983) inter-alia states that appropriate decision making and program planning in the health and related fields is not possible without establishing an effective health information system and that nationwide organizational set up should be established to procure essential health information which may provide support for the local management of the health care and effective decentralization of the activities.

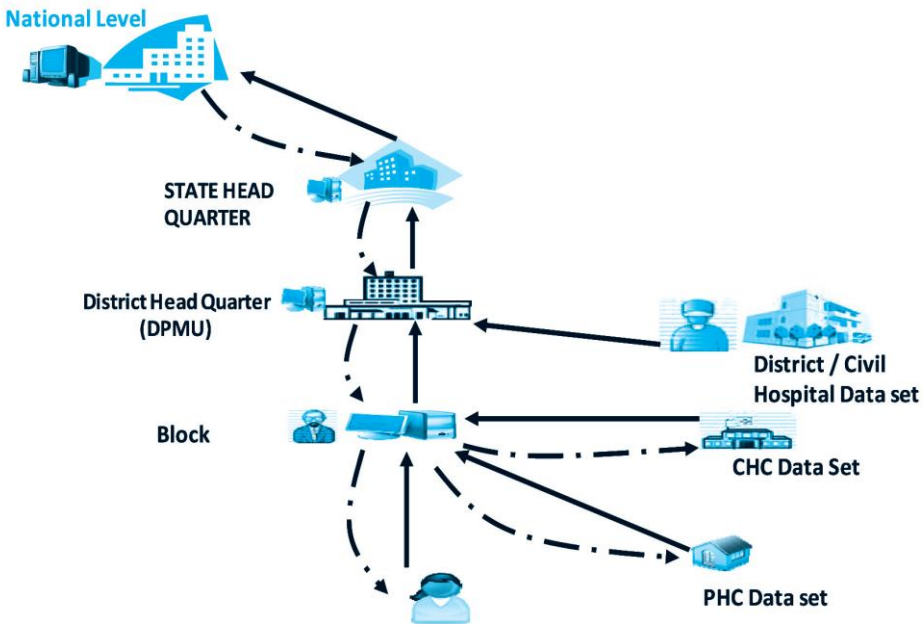
The Health Management Information System (HMIS) has been envisaged to not only help the administrators to have better monitoring and control of the functioning of hospitals across the state using decision support indicators but also assist the doctors and medical staff to improve

health services with readily reference patient data, work flow enabled less-paper process and parameterized alarms and triggers during patient treatment cycle.

HMIS enables monitoring pre-defined health indicators and the embedded exception reporting facilitates decision making by the hospital management and state level administrators for policy and strategic decisions. HMIS has enabled providing better care to patients by automating all the major functional areas of the hospitals & the entire gamut of hospital activities.

The HMIS in India provides data on service delivery, physical infrastructure and financial performance of all public health facilities in rural areas. In some special cases, such as Delhi even urban facilities are included within the system. The flow of information is shown in Fig 1 .SCs, PHCs and CHCs send data on monthly basis using HMIS forms to the block. This data is consolidated at the block level by Block Program Managers and Forwarded to the districts. District hospitals forward data directly to district program manager. District-Wise data is forwarded to state health missions, and then to the MoHFW. The upward flow of information is depicted by straight lines. Data is checked for quality and consistency at the block, district and state levels, and feedback provided to facilities (denoted by broken lines). Periodically, a national level meeting is called, where the performance of states are reviewed.

HMIS reporting system in India



Source GOI HMIS MANUAL (2008)

The HMIS provides information on service delivery relating to maternal and child health care utilization including Ante Natal Care (ANC), Post Natal Care (PNC), immunization, Janani Suraksha Yojana (JSY) registration and beneficiary, and delivery details. Facilities also report on laboratory testing for disease like HIV, STI/RTI, TB and cataract operation under Blindness Control Program. These data are available on a monthly basis. In addition, the HMIS provides data on physical infrastructure and financial performance on a quarterly and annual basis respectively. The data is available on the password protected HMIS web portal maintained by MoHFW (http://nrhm-mis.nic.in).

The performance of the HMIS, however, varies from state to state. Although level of data uploading has been relatively satisfactory in almost all the states, quality of data remains a major challenge, with many of the validity rules broken and existence of outliers in many variables. Effective data uploading too needs to be improved substantially. Such inadequacies pose a challenge to improve the quality of HMIS data.

Validation rules are data quality check mechanism based on verification of the logic of relation between related data elements. Validation rules are relational expressions comprising of related data elements and an operator that states the expected / logical relation between the elements.

Review of literature

According to *Ime Asangansi(2012)*, health management information systems (HMIS) have been hailed as important tool for health reform. However, their implementation has become a major challenge for researchers and practitioners because of the significant proportion of failure of implementation efforts. Researchers have attributed this significant failure of HMIS implementation, in part, to the complexity of meeting with and satisfying multiple (poorly understood) logics in the implementation process.[1]

According to R. Bodawala (1998) 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, 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. Health information system. (HIS) is a process whereby health data (input) are recorded, stored, retrieved and processed for decision-making (output).[2]

According to Bashir Ahmed Bhatt (2011) to ensure necessary architectural corrections in the basic health care delivery system; The plan of action includes: increasing public expenditure on health, reducing regional imbalance in health infrastructure, pooling resources, integration of organizational structures, optimization of health manpower, decentralization and district management of health programmes, community participation and ownership of assets, induction of management and financial personnel into district health systems, and operational zing Community Health Centers into functional hospitals in each block across the country that meet Indian Public Health Standards (IPHS). These interventions have increased the demand for data on population and health for use in both micro-level planning and program implementation. For reasons such as these, efficient Health Management Information System (HMIS) is required. HMIS is an information system that has been specially designed to assist health program managers, at all levels, in managing and planning health programmes.[3]

According to Zakir Husain and Nandita Sharma (2011) - HMIS is by and large unutilized by the district and state administration for monitoring the health sector and planning remedial intervention to improve delivery of critical MCH and other health services. We suggest that the HMIS data quality has to be improved substantially before it may be used for monitoring and planning of the health sector. This paper argues that a major reason for the limited functional utility of the HMIS portal is the failure to prepare grass-root level functionaries – the Auxiliary Nurse Midwives (ANMs), Lady Health Visitors (LHVs) and Block Program Managers (BPMs) – to provide data in an accurate and timely manner, as well as monitor the quality of data being provided. The failure to prepare grass root level functionaries, who form the backbone of the system, led to errors creeping in at the facility level, which get compounded as this data is aggregated at the district and state level. The final data set, therefore, is of a not sufficiently high quality to be used by researchers or policy makers as of now.[4]

According to Sarvadhikari (2011) The Health Management Information System (HMIS) is a digital initiative for creating a system of accurate, relevant and regular data on health services at all levels of health care service delivery. This information system is essential for health providers at all levels so as to initiate action on the gaps based on evidence and information as envisioned in the NRHM. One of the core strategies is strengthening capacities for data collection, assessment and review for evidence based planning, monitoring and supervision. Quality of HMIS data being uploaded on the web portal depends on its verifiability and validity which in turn leads to reliable and accessible data for improving decision making at different levels. However, the quality of this uploaded data has its limitations due to technical, training or reporting reasons. This report provides an insight into errors in data capturing, plausible causes of such errors and cases of few data errors with respect to maternal and child health indicators.

Table 1 HMIS Reporting System in Maharashtra

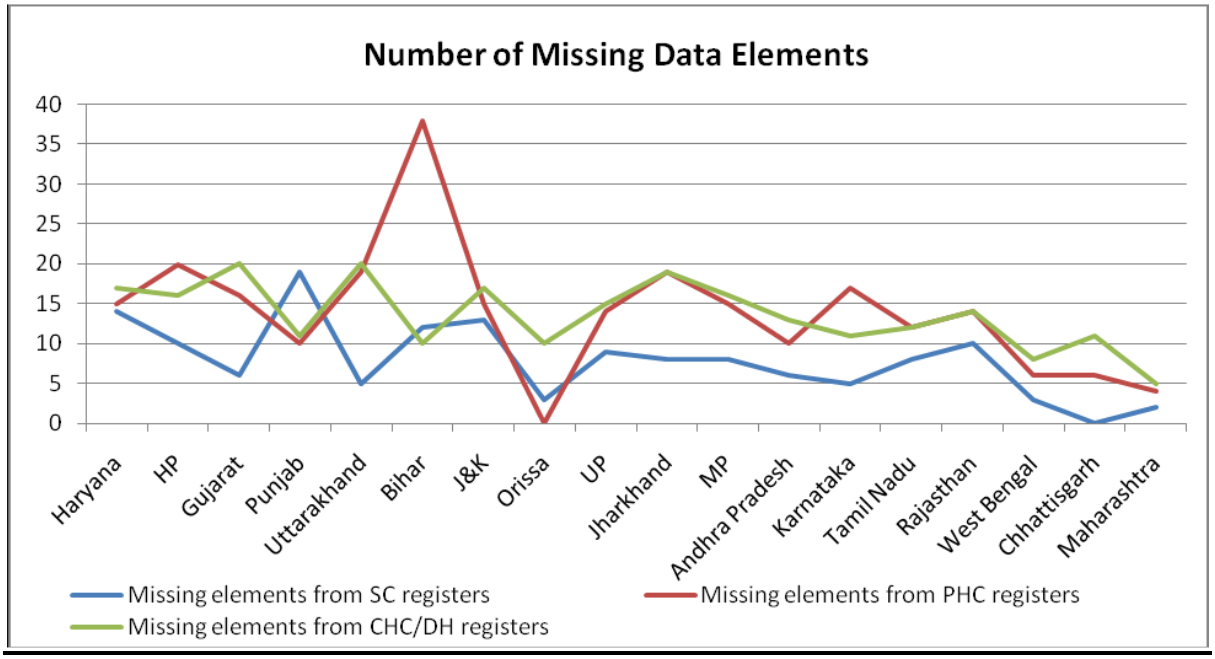
Level	***Day of each Month***	***Work to be done***
Sub center	1st	Manual report preparation & submission to PHC
PHC,RH,SDH,DH,WH & corporations	2nd &3rd	Manual compilation
	3rd &5th	Data entry in DHIS-2
	6th &7th	Validation& report finalization in DHIS-2
Block	7th & 8th	DHIS-2 outputs taken, validate for completeness, correctness, run for validations & feedback given to respective institutes GOI National portal run for outliers, if there are some then check whether this outlier is due to data error ,if data error then rectify in DHIS-2 by communication with respective institute. After rectification of data by respective institute again check for outliers. repeat this [procedure till the correct reports get uploaded on website
District	4th&5th	Checking of data status & Null and Nil elements. Feedback given to respective institutes.
	7th&8th	DHIS-2 Outputs taken; validate for completeness, correctness, run for validations & feedback given to respective institutes GOI national portal-run for outliers, if there are some-check whether this outlier id due to data error then rectify data in DHIS-2 by communicating with the respective institutes
	9th& 10th	Confirm for upload status of all the institutes in the districts
	11th at 11.00am	Final upload on web Portal
Regional level	7th &8th	DHIS-2 Output taken &feedback given to respective district if there are data problems. GOI national Portal –Check for upload status, outliers &communicate with respective district
Bureau Chief	11th evening	Outputs taken &state level MIS preparation
	13th	Submit Monthly MIS report along with one page ”Review Note” to DHS

Table 2 Maharashtra Health Department HMIS Report 2011

States	Data Entry point	Level of Entry	Manual Aggregation levels	Districts	No. of Districts uploading Facility-wise data
Maharashtra	PHC/Block HQ	PHC consolidated (State application)	One (PHC)	34	0

Source: National HMIS assessment report NHSRC 2012

Fig 1 Number of Missing data elements



Source: NHSRC Assessment report 2012

Fig1 Report of NHSRC shows that Missing data elements are very less in Maharashtra as compared to other states so completeness of data reporting is very good in Maharashtra.

In Maharashtra according to NHSRC Assessment report still area wise reporting is present in most of the districts.

According to NHSRC assessment report 2012 most of the reporting errors in Maharashtra are due to:

Noncompliance of standard definition and double counting for any case is a problem. e.g. if vaccine is provided by PHC to RH, RH vaccination cases are also reported by PHC and RH separately.

Table 3 Use of HMIS Data in Maharashtra& Feedback System in Maharashtra

State	**Availability of analysis tool**	**Capacity to use of processed information**	**Availability of State specific customized report**	**Conversation of Data**		**Level**	**Mode**	**Type**	**Format**	**Periodicity**
Maharashtra	State application dashboard	PHC Level	Present	On indicators in quarterly meetings at state & monthly meetings at district.		S-D & D-B	Verbal, DO	Data quality	NA	Monthly

Source: NHSRC Assessment Report 2012

Table 3 is showing that how information is used in Maharashtra. Feedback system shows that feedback first come from state to district than district to block. Capacity to Use of information is limited to PHC level. Maharashtra is having their state application Dashboard for analysis of HMIS data.

Rationale

The under reporting or misreporting of the data in the HMIS data formats leads to poor Data entry and compromise the data quality. This study intends to find the gaps in the current HMIS reporting system for the state of Maharashtra.

General Objective

- To evaluate the data quality issue and challenges of HMIS system in Maharashtra.

Specific Objectives of Study

- To analyze the coverage of reporting of HMIS data in Maharashtra.
- Identify the underlying cause for Data errors in HMIS in Maharashtra.
- To discuss the challenges and opportunities for HMIS in State of Maharashtra and India.

Methodology

Sampling Frame

Sampling frame is all the districts and blocks of Maharashtra for year 2012-13.

Type of Study

Cross sectional descriptive Study.

Data Source

The study is based on analysis of state and district level HMIS data which is downloaded from HMIS portal of GOI.

Study Tool

Microsoft excel

Data Collection

Data is collected from GOI portal. Data is retrieved on 15th April. Standard reports were used for analysis and used live data reports for data quality analysis.

Result of HMIS Data Analysis

Table number 4 is showing the broad picture of Health status in Maharashtra state. Red colour indicates that concerned indicators are showing reporting more than or equal to 100%. For example ANC registration against expected delivery is above 100% which is unusual. 3 ANC check up rate is 74% and 100 IFA Tablet distribution is also completed with completion of 3rd ANC check up but we can see 100 IFA tablets given against ANC registration is only 64%.

Table 4 RCH PERFORMANCE INDICATORS

Maharashtra- Summary -Apr'12 to Mar'13			
ANC			
ANC Registration against Expected Pregnancies	***102%***	**TT2/ Booster given to Pregnant women against ANC Registration**	83%
3 ANC Checkups against ANC Registrations	74%	**100 IFA Tablets given to Pregnant women against ANC Registration**	64%
Deliveries			
Reported Deliveries against Expected Deliveries	91.9%	**Home Deliveries(SBA& Non SBA) against Estimated Deliveries**	3.6%
Institutional Deliveries against Estimated Deliveries	88.3%	**Home Deliveries(SBA& Non SBA) against Reported Deliveries**	3.9%
Institutional Deliveries against Reported Deliveries	96.1%	**C Section Deliveries against Institutional Deliveries(Pvt & Pub)**	16.1%
Births & Neonates Care			
Live Births Reported against Estimated Live Births	93.7%	Newborns weighed against Reported Live Births	**98%**
Still Births against reported 1000 live Births	16.8	Newborns weighed less than 2.5 kgs against newborns weighed	**16%**
Sex Ratio at Birth	907	Newborns breastfed within one hr of Birth against Reported live Births	**84%**
Child Immunization(0 to 11 months)			
Measles given against Expected Live Births	97%	**Measles given against Reported Live Births**	***104%***
Fully Immunized Children against Expected Live Births	94%	**Fully Immunized Children against Reported Live Births**	***100%***
Required numbers of VHNDs per thousand population in 12 months	13,48,476	**Immunization Sessions held as percentage of required VHNDs**	53%
Family Planning & Abortions			
Family Planning Methods Users (Sterilizations(Male &Female)+IUD+ Condom pieces/72 + OCP Cycles/13)	14,86,277	Total Sterilizations (Male & Female)	**5,79,068**
MTP up to 12 weeks	41,147	**Abortion (spontaneous/induced)**	**91,202**
MTP more than 12 weeks	2,285	Abortion Rate against Expected pregnancies	**11.6%**

Table 5 Demographic indicators

	Demographic Denominators - Maharashtra					
	IMR of the state - Maharashtra	CBR - Maharashtra	Total Population	Expected Pregnancies Apr'12 to Mar'13	Expected Deliveries Apr'12 to Mar'13	Eligible Couple (17% of total population)
Source	SRS - 2011	SRS - 2011	Census 2011	Derived	Derived	Derived
	25	16.7	11,40,67,506	20,95,420	19,28,739	1,93,91,476

Examples of Data quality issues in HMIS

Fig 2 – Discrepancies in reporting

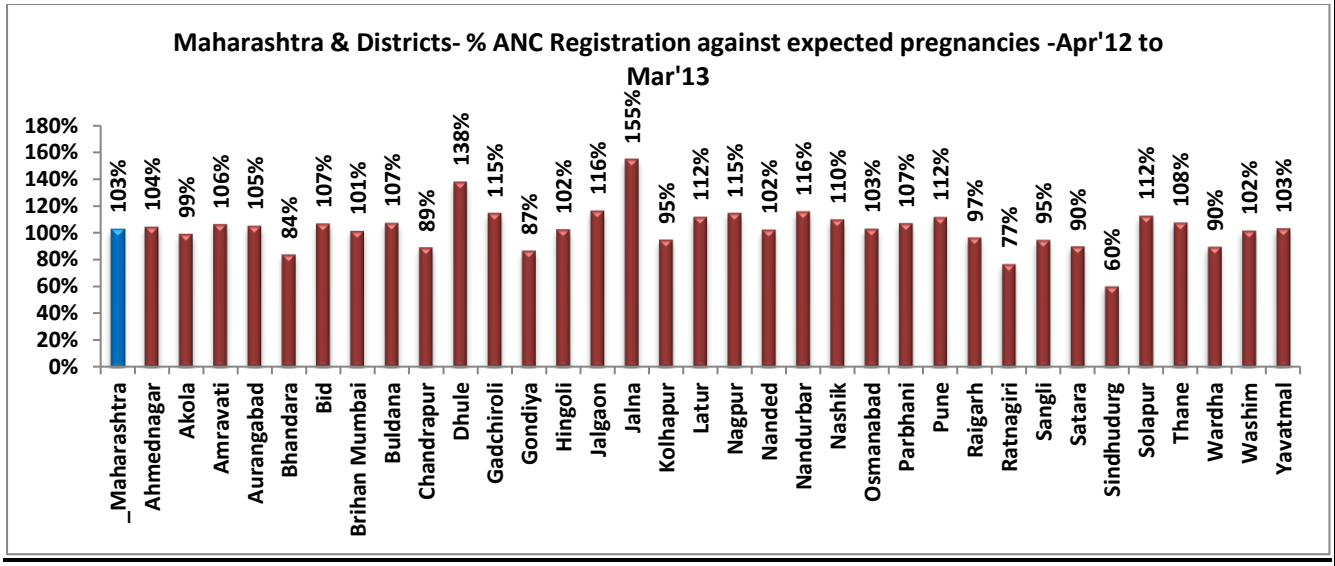
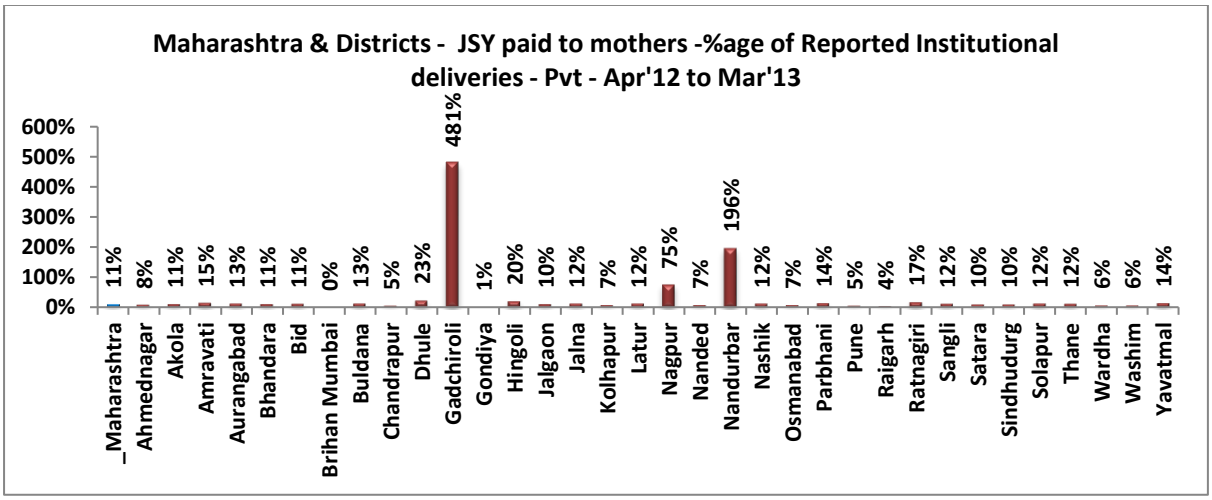


Fig 2 is showing % ANC registration against expected pregnancies. it shows that most of the district showing ANC registration above 100%. It indicates Data quality error in ANC registration it may be because of double reporting or may be due to still existence of area wise reporting in Maharashtra.

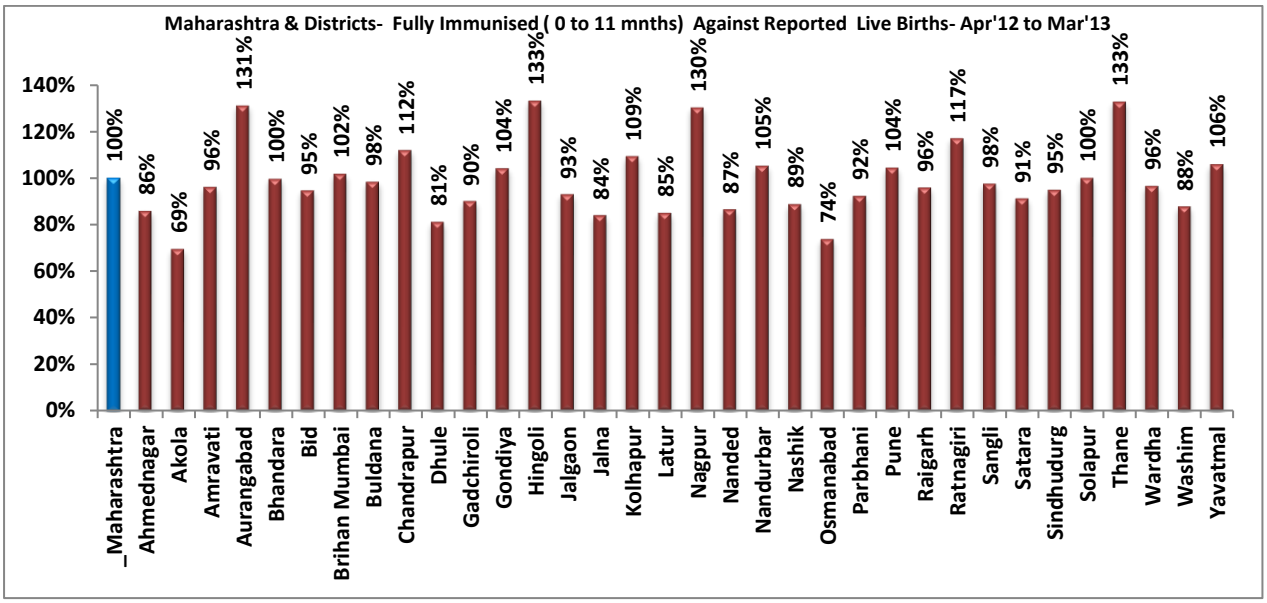
Fig 3



This figure is showing data quality issue in JSY Payment it shows in gadchirroli JSY payment given to mothers against percentage of reported institutional Deliveries is 481% and in Nandurbar it is 196%.

Reason for this may be due to release of previous month's payment or it may be because of entry of amount given to beneficiaries not number of beneficiaries.

Fig 4



This figure again showing data quality issues in Maharashtra as most of the districts are showing this above 100% which is because of double reporting or may be because immigration.

DATA QUALITY ISSUES

Status of Facility wise Data Uploading - Month wise 2012-13													
		Month											
District	Total Facility	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Aurangabad	343	7							343	343	343	343	342
Nagpur	377	2					1		377	376	377	370	376
Pune	662	96	83	84	79	97	73	85	661	661	659	658	596
Akola	217			1					216	216	216	216	216
Chandrapur	411			1					411	411	411	411	411
Jalgaon	555	11				1			544	544	544	544	544
Parbhani	255								251	255	239	255	255
Solapur	532	87	81	81	81	81	82	78	519	515	518	518	515
Thane	593	3	1			1	1	7	580	579	571	564	409
Latur	312	1						2	304	311	311	311	311
Brihan Mumbai	3								1			1	
Buldana	348	3	1	2	1	1	1	3	344	346	345	347	270
Dhule	287	10		2				1	280	280	280	280	202
Kolhapur	511	101	97	98	99	98	100	101	510	510	510	510	491
Nanded	460	2				2	3	1	459	456	459	459	459
Raigarh	354	2	1						354	354	354	354	354
Amravati	404	10	8	23	8	8	8	8	403	400	400	404	363
Nashik	735	9						1	711	711	711	711	683
Wardha	217	2		6			1		217	217	217	217	217
Ahmednagar	695	4	1						678	678	678	678	594
Bid	345	3							345	341	345	345	322
Bhandara	236								236	236	236	236	135
Gadchiroli	434	2						1	422	420	427	419	428
Jalna	264	5							264	264	264	264	264
Osmanabad	259	2							259	259	259	258	259
Ratnagiri	459		2					6	439	456	451	440	457
Sangli	397	4	1	1	1	1	1	3	393	392	388	390	356
Satara	490	14	4	5	1		2	2	489	490	490	485	430
Sindhudurg	298			1					296	297	297	297	297
Yavatmal	547	9		1			1	1	503	506	485	507	500
Nandurbar	362							1	362	362	362	362	362
Washim	186	2	1						183	186	185	185	185
Gondiya	289	6						1	289	289	289	289	289
Hingoli	161	1							161	161	161	161	161

Table 6 Source Tabulated from HMIS portal data accessed on 15th April 2013

Table 6 is showing facility wise data uploading month wise for year 2012-13. From April 2012 facility wise reporting was necessary but this table shows that most of the facilities are not reporting specially from May to October. This table is showing that 19 districts have not reported for consecutive 6 months. These figures are showing that data quality issues are very high in Maharashtra. Facilities are not reporting properly in Maharashtra. Reporting is very low in most of the facilities.

After November every facility was reporting till March. Then to evaluate the current status we took the current reporting for Month of April we found that still there are some districts which are not reporting. Table is showing that in Brihan Mumbai no facility is reporting. District hospital of Thane is showing Reporting status of 40%. Solapur and Yawatmal District Hospital are showing reporting of Zero percent. When we see the Data for sub centre it shows that most of the Sub centres are reporting regularly. So if data is not regularly reported then quality of data is very low as timeliness of reporting is very crucial aspect for data quality.

Table 7 Source Tabulated from HMIS Portal Data accessed on 15th april 2013

DISTRICTWISE HEALTH INSTITUTIONS IN THE STATE (20th April 2013.)															
District	**DH**			**SDH**			**RH**			**PHC**			**SC**		
	Tot	**Reported**	**%**	**Tot**	**Reported**	**%**	**Tot**	**Reported**	**%**	**Tot**	**Reported**	**%**	**Tot**	**Reported**	**%**
Br.Mumbai	1			0			0			0			0	**0**	**0**
Thane	10	4	40	5	2	40	14	12	86	78	55	71	492	362	74
Dhule	1	1	100	2	1	50	4	4	100	41	33	80	232	175	75
Ahmednagar	2	2	100	2	2	100	23	19	83	96	86	90	555	485	87
Pune	3	2	67	3	2	67	21	19	90	96	86	90	539	496	92
Solapur	1	0	0	3	3	100	13	13	100	77	77	100	431	428	99
Osmanabad	1	1	100	2	2	100	8	8	100	42	42	100	206	206	100
Beed	2	2	100	2	2	100	11	11	100	50	50	100	280	278	99
Nanded	2	1	50	4	4	100	12	12	100	65	65	100	377	377	100
Akola	3	2	67	1	1	100	5	5	100	30	30	100	178	178	100
Washim	1	1	100	0	0	0	7	7	100	25	24	96	153	153	100
Amaravati	3	3	100	4	4	100	9	9	100	56	56	100	333	332	100
Yawatmal	0	0	0	3	3	100	14	12	86	63	59	94	435	426	98

Bhandara	1	1	100	2	2	100	7	7	100	33	14	42	193	111	58

Validity Analysis

The MoHFW has defined 22 validity rules in order to examine internal consistency. It was found that internal consistency (Measured by Proportion of validity rules satisfied) is showing no improvement in Maharashtra state. There is very much scope for improvement, internal consistency levels of the state is decreased when compared with last year's status.

Table 8 is showing that most of the validation errors are occurring between month of December, January and February. Districts showing most of the validation errors are occurring in districts like Brihan Mumbai, Nagpur, Ratnagiri and Solapur.

Analysis of table 8 reveals that the incidence of violation of the following 7 Rules remains very high in Maharashtra. Discussion with District level officers indicated possible explanation for the violation of these rules.

1. Total number of newborns visited within 24 hours of home delivery<= Total of home deliveries

In Maharashtra State we found high incidence of such violation. The reason was even those women who had delivered in institution sought release immediately after delivery and were given PNC services at home. Such cases of PNC services are included in the row for "Number of newborns visited within 24 hours of home delivery", even though PNC service is generally provided within a week of delivery.

2 Number of complicated pregnancies treated with IV antibiotics <= Number of cases of pregnant women with Obstetric Complications and attended at public + private facility

Reason for this may be failure to distinguish between complicated pregnancies and the routine administration of IV antibiotics in all pregnancy cases is leading to internal inconsistency of HMIS data.

Table 8

Total Number of Times validity rules are violated in Maharashtra			
Validation		2011-12	2012-13
1	Number of newborns visited with 24 hrs of home delivery <= Total home deliveries	5	5
2	Number of complicated pregnancies treated with IV antibiotics <= Number of cases of pregnant women with Obstetric Complications and attended at public + private facility	12	28
3	Number of complicated pregnancies treated with IV Oxytocis <= Number of cases of pregnant women with Obstetric Complications and attended at public + private facility	13	28
4	Cross Check : Number of infants(0-11 months)immunized for BCG <= Live birth	136	156
5	Total MTPs conducted at Public Institutions <= Spontaneous and induced abortions	2	12

6	Number of Infants who received OPV 0 (Birth Dose) <= Total Number of Live Births	27	26

3. Number of complicated pregnancies treated with IV Oxytocin <= Number of cases of pregnant women with Obstetric Complications and attended at public + private facility

Reason for this may be failure to distinguish between complicated pregnancies and the routine administration of oxytocin in all pregnancy cases is leading to internal inconsistency of HMIS data.

4. Cross Check: Number of infants (0-11 months) immunized for BCG <= Live birth

Reason for this may be because of high rate of immigration and area wise reporting for BCG vaccine.

5. Total MTPs conducted at Public Institutions <= Spontaneous and induced abortions

This error is occurring at DH/SDH level, Due to the wrong definition of abortion being followed. MTP is termination of unwanted pregnancy. On the other hand, spontaneous/induced abortion is defined as still birth between 12-22 weeks and still birth as still borne after 22 weeks. As a result, only MTPs occurring after 12 weeks and still birth occurring between 12-22 weeks are being counted in field for abortion (Spontaneous/Induced). This is leading to MTP'S exceeding abortions.

6. Number of Infants who received OPV 0 (Birth Dose) <= Total Number of Live Births

This is partially explained in terms of vaccine stocks. In the absence of stocks, live birth may not be given OPV0 at birth but after 2-3 days when stock become available. In some cases

this may lead to delivery occurring in one month, but vaccination being given in next month. Another reason is that in case of migrants who have OPV0 to babies elsewhere, registers in district hospital. When monthly reports are submitted, this leads to double counting.

VALIDATION ERROR MONTHWISE 2012-13

DISTRICT	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan		Feb	Mar	**Total Error**
Ahmednagar														
Akola										1	1			2
Amravati						1	1	1	1	1	1			6
Aurangabad	1	1	1	1	1	1	1	1	1	1	1			11
Bhandara	1		2	1		1	1	2	2	3	5			18
Bid						2	1	1	2					6
Brihan Mumbai	2	2	2	3	2	6	1	4		2	2			26
Buldana														
Chandrapur														
Dhule		1	1	3		1	1		5	1	1			14
Gadchiroli									2	1				3
Gondiya			1	1	1	1		1	1	1	1			8
Hingoli	1	1	1	2	1	1		1	2	2	3			15
Jalgaon														

Jalna													
Kolhapur	1					1			1	1	3		7
Latur													
Nagpur	4	4	4	3	4	4	4	1	1	2	1		32
Nanded													
Nandurbar	1	1	1	1	1	1	1	1	1	1	1		11
Nashik									1	1			2
Osmanabad	1	1	2	1	1								6
Parbhani									1	1	2		4
Pune	1	2	1	3	2	2	2	1	5	1			20
Raigarh			1		2	1		1		1			6
Ratnagiri	3	1	3	3	1	1	4	2	2	2	3		25
Sangli				1	1		2	1	1	2	1		9
Satara	1	1	2	1	1	1	1	1	1				10
Sindhudurg													
Solapur		1	1	1	1	1	1	1	1	1	1		10
Thane	3	4	4	3	5	3	5	3	5	2	2		39
Wardha						1	2	3	2	1	1		10
Washim							1						1
Yavatmal										2			2

Table 9 Tabulated from GOI HMIS portal accessed on 15th April

OUTLIER ANALYSIS

A third problem related to data quality is that of outlier. This relates to the presence of very high or very low values for a particular data component. It is very difficult to judge whether a value is very high or very low. In this case, MoHFW has adopted a median based criterion was used to identify possible outlier. The rule is

$$\text{IF } x > Q_2 \pm 2(Q_3-Q_1), \text{ Then x is an outlier}$$

When Q_1, Q_2 and Q_3 are three quartiles and x is a value taken by the data component in question.

Comparison of Occurrence of Outliers				
Theme	2012-13	%	2011-12	%

ANC Services	9	7.38	2	4.08
Deliveries	7	5.74	2	4.08
C- Section Delivery	5	4.10	0	0.00
Pregnancy outcome & weight of new born	6	4.92	1	2.04
Complicated pregnancies	1	0.82	0	0.00
PNC Services	2	1.64	0	0.00
RTI/STI Cases	3	2.46	0	0.00
Family Planning	16	13.11	6	12.24
Child Immunization	25	20.49	0	0.00
Number of Vitamin Doses	3	2.46	2	4.08
Number of cases of Childhood Diseases reported during the month 0-5 Years	4	3.28	3	6.12
Blindness Control Programme	7	5.74	4	8.16
Patient Services	5	4.10	9	18.37
Laboratory Testing	3	2.46	1	2.04
Details of Death	26	21.31	16	32.65

Table 10 Tabulated from HMIS portal data accessed on 15 April 2013

The absolute number of outliers in HMIS data for Maharashtra is 122. This indicates that, over a period of 12 months, 122 times HMIS indicators were found to be outlier. Performance of Maharashtra deteriorated as outliers in 2011-12 year were only 89. This indicates that such errors may be a possible result of deliberate manipulation of figures to attain targets set for ANMs.

In table 10 we classified outliers by themes. It has been seen that in Maharashtra, Relatively high proportion of outlier occurs for Details of Death, Child immunization and Family planning.

Challenges

There are lot many challenges at ground level for ministry of health to improve the data quality. Most of the challenges discussed here are those which are the commonly encountered during review of literature.

1. **Training**

As discussed before data entry at block level has been done by ANM or LHV and most of the discrepancies arise from block level which get aggregated at district level and lead to huge data quality error. It is imperative to train ANMs on HMIS in order to improve the quality of data reporting. Training has occurred in two stages. At the national level, MoHFW provided training in HMIS to state-level officer, and these state level officers' gives training to district and block level officers. Usually the duration of workshops is too short to cover every details

of Complex HMIS format. In addition many of the officers are non medical person for whom retaining instruction on health related issues is not easy.

To avoid violations of validity rules, BPMs often gives instruction like number of ANC registration in the month should be copied to number of women registered under JSY. This leads to distortion of health indicators, Affecting Value of HMIS in evaluation and planning.

2. **Documentation**

Given the issues of Data quality in HMIS it is necessary to maintain proper documentation of the records submitted at each level. Although registers that form the core of the HMIS are generally maintained properly, HMIS monthly formats are hardly maintained in any facility.

3. **Monitoring and Feedback of HMIS data**

HMIS data is supposed to be checked at several stages. For Instance, ANMs submit monthly data to LHVS at PHCs, who forward it to the BPM at CHCs. The BPM is also supposed to check the data before uploading it.

Monitoring and feedback is also supposed to be undertaken at the state level. Such supervision is cursory. This is partly because both the district and facility staff is overburdened with work.

4. **Physical Constraints to Data Uploading**

- over-worked staff and served as multipurpose workers.
- Low pay and contractual nature of their jobs is also affecting morale of BPMs.
- Lack of steady internet facility

Discussion and Recommendation

Health management information system is very important part of monitoring and evaluation system of NRHM as it records regular status and progress of states, districts or blocks, but in current situation Health management system itself is in very difficult situation. This study is limited to Maharashtra state which shows the systematic weakness like outlier and validity analysis and also some common data entry errors.

Currently all facilities in Maharashtra is reporting but major challenge lies with the data quality issues which includes discrepancies which are related to completeness, timeliness and accuracy. HMIS was designed to help policy makers to take decision regarding health promotion but quality of data is major issue with HMIS.

HMIS was designed to record data from facility level for April 2011 which is a top down approach but staff which belongs to block and outreach areas was not adequately prepared and trained by government. So root cause of problem lies at grass root level because human resource at grass root level in India is not have adequate educational level to understand difference between facility wise reporting and area wise reporting. ANM and LHV did not get proper trainings. If we shift our discussion from block level to district program manager the major issue is with training part they don't get proper trainings. In India block level and district level staff is occupied with multiple works which leads to overburden of work which leads poor quality work from grass root level staff. This data quality problem from block leads to wrong information at district level and state level which leads to wrong planning of resource allocation and other monitoring activities.

Recommendations for HMIS improvements are discussed below which can help in improvement of data quality in HMIS.

1. Inclusion of Private sector- It will make the HMIS data coverage wide for services like institutional deliveries, MTP and birth details. Data will be added from these private facilities will improve the current situation of HMIS.

2. Strong Monitoring system- Monitoring is very important and vital component of any health system so strengthen this system government should take appropriate steps like strong documentation work, Maintenance of Hard copies and other registers.

3. Training- Training to ANMs & LHVs is essential to improve the quality of HMIS data. Such training should be followed by visits to randomly selected facilities to evaluate the extent to which the training has been understood by the facility staff. Form of SCs, PHCs and CHCs should also be translated in Hindi/Local language to facilitate easy understanding and use by ANMs.

4. Strong Feedback system- Feedback system has to be strengthened for betterment of HMIS system because inputs from top level will not work if proper follow up and proper feedback from bottom will not come to top. Also at block and district level managers correct the mistake of ANM's without sending them back. It may be supplemented by external monitoring agencies.

At last to sum up whole situation w can say that HMIS is a only source in India which includes so much of useful data related to different health services at micro level and having

very granularity but services of HMIS system is largely unutilized because of failure of to prepare grass root functionaries. So government of India should focus on these problems which are related to grass root functionaries and should think about some alternative approach to combat these issues.

Reference

1. Asangansi I (2012), Understanding HMIS implementation in a developing country Ministry of health context – an institutional logics perspective, online journal of public health informatics, Vol. 4 ,No.3.

2. Bodawala R. (1998), Evaluation of HMIS in India, Need for computer data base in India, Harvard Publication.

3. Bhatt Ahmad (2011), Level of reporting of maternal and child health services under HMIS in Shopian district of Jammu and Kashmir, Journal of population Research Vol.2.

4. Hussain Zakir, Saikia Nandita, Bora S.R. (2012), Opportunity and challenges of HMIS in India: Case study of Uttrakhand, MPRA Publication Paper no 40014.

5. Sarbadhikari S.N. (2005), The state of medical informatics in India: a road map for optimal organization, Journal of Medical systems, Vol.29, No.2.