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11 July 2012

Online at <https://mpra.ub.uni-muenchen.de/40014/>
MPRA Paper No. 40014, posted 11 Jul 2012 13:57 UTC

**Opportunities and challenges of Health Management Information System in India:
A case study of Uttarakhand**

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Abstract

*The introduction of the National Rural Health Mission has increased the demand for micro-level data on population and health for use in monitoring, planning and programme implementation. This calls for the introduction of a **Health Management Information System (HMIS)**. The launching of a national portal-based HMIS by Government of India in 2008 was a bold and innovative step. However, there are several challenges that must be overcome to develop HMIS as an effective tool for planning and monitoring. In particular, without training and motivating grass-root functionaries to report HMIS data in an accurate, timely manner and monitor its quality, HMIS data cannot be used for health sector planning. The study analyzed HMIS portal data in details in order to evaluate the quality of HMIS in Uttarakhand, a high focus state with a poor HMIS. It also documents challenges to improve HMIS based on a field survey at selected health facilities in the state.*

Keywords: Health Management Information System, Health policy, National Rural Health Mission, India.

1. Introduction

In 2005 the Government of India had introduced the National Rural Health Mission (NRHM) as a flagship scheme of the Ministry of Health and Family Welfare (MoHFW). The objective of this scheme was to “carry out necessary architectural correction in the basic health care delivery system ... to improve the availability of and access to quality 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 facilitates monitoring the objectives of NRHM for which an efficient Health Management Information System (HMIS) is required.

HMIS may be defined as “A tool which helps in gathering, aggregating, analyzing and then using the information generated for taking actions to improve performance of health systems.” (GOI, 2008: 2). It is a system of maintenance and taking care of health related data. This can be done either by using tradition and conventional methods like using paper for maintaining health records, or by adopting contemporary techniques like computing and web-system. It is an important tool in the management of health care services delivery in both developed and developing countries in two ways. Firstly, it enables assessing health needs of the population (and its geographical variations); secondly, it enables effectiveness and coverage of health programmes. The revolutionary progress made in the IT sector and its integration into the HMIS of even developing countries has provided speedy access to micro-level data that may be updated frequently. This greatly facilitates evaluation and assessment, and the designing of appropriate remedial strategies as long as the data quality is of a high order. This is particularly important given the drive to attain Millennium Development Goals and review the progress made in attaining these goals. Moreover, in developing countries where donors are increasingly linking release of funds to performance based indicators, HMIS

The HMIS web portal launched by the MoHFW on 21st October, 2008 is a bold and innovative step in this direction. The objective of the HMIS portal is to enable capturing of public health data from both public and private institutions in rural and urban areas across the country. The portal is envisaged as a “Single Window” for all public health data for the MoHFW. The MoHFW initially rolled out the HMIS up to the district Level and, from 2011 onwards, this has been expanded to allow the Sub District/Block level facility wise data entry. Currently, over 630 districts are reporting their monthly performance on a regular basis.

In spite of this important initiative by GOI, the 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 Programme 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.

The objectives of the study are: 1) Analyze the coverage of reporting of HMIS data; 2) Identify underlying causes for data errors in HMIS; and 3) Discuss challenges to improve HMIS quality in near future. The study is based on analysis of state-level and district-level data downloaded from the HMIS portal and a recently conducted field-visit of health facilities in Uttarakhand. We visited Sub Centres (SC), Primary Health Centres (PHC), Community Health Centres (CHC), District Hospitals (DH) and Sub-District Hospitals (SDH). During these visits, we examined registers and previous monthly reports, and interviewed Auxiliary Nurse Midwives, Lady Health Visitors, Staff Nurses and Block Programme Managers with semi-structured questionnaires on issues like data quality, concepts related to HMIS, duplication of data, work load, etc. We also

interacted with officers in the Uttarakhand State Health Mission and Chief Medical Officers (CMO) of districts surveyed.

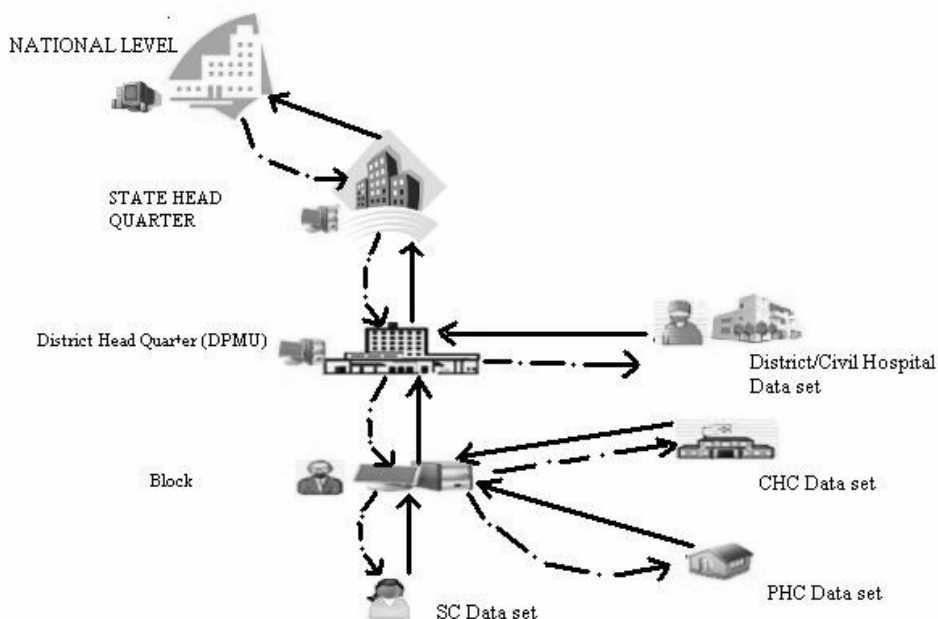
Survey sites were chosen purposively on the following principles. We covered each District Hospital (DH) and Sub District Hospital (SDH) in both districts. Apart from this, two blocks were selected in each district. One of the blocks was close to the district headquarters whereas the other was at a distance from it. We visited the Community Health Center (CHC) of the block, one PHC and two SCs under the PHC. The specific sites were chosen after discussion with CMO and BPM of concerned districts and blocks. The field study was conducted during July to September, 2011.

The paper is structured as follows. Section 2 describes the HMIS in India and presents a snapshot of its quality at the all-India level, and for selected states. Section 3 onwards we focus exclusively on Uttarakhand. After describing the HMIS in Uttarakhand, we analyze data uploading and data quality in the state for the period 2008-09 to 2010-11 using HMIS portal data. In Section 7 we describe our experience in the field. The paper concludes by suggesting some measures that may be considered to improve quality of HMIS.

2. Health Management Information System in India (HMIS)

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 a monthly basis using HMIS forms to the Block. This data is consolidated at the block level by the Block Program Managers and forwarded to the district. District Hospitals forward data directly to the District Programme Manager. District-wise data is forwarded to the State Health Mission, 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 feedbacks provided to facilities (denoted by broken lines). Periodically, a national level meeting is called, where the performance of states are reviewed.

Figure 1. Information flow from Sub-center to National Level under the HMIS.



Source: GOI (2008): 4 .

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 HMIS provides critical micro level information on MCH and other service delivery related indicators on a monthly basis. Since this is important in achieving the millennium development goals 4 & 5 (Reduce child mortality and improve maternal health, respectively.), the focus of the MoFHW is to streamline the service delivery component of the HMIS and enhance its capacity to provide policy inputs to monitoring and planning activities. This is very important as maternal and child health is often considered to be the starting point for extending universal health coverage - an issue that is increasingly becoming important in developing countries with poor health indicators (GOI, 2011).

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 (Table 1), quality of data remains a major challenge, with many of the validity rules broken and existence of outliers in many variables. Effective data uploading (see Table note b), too, needs to be improved substantially. Such inadequacies pose a challenge to improve the quality of HMIS data.

Table 1: Summary of HMIS in 2010-11: All-India and selected states (Percentages)

State	Data uploading ^a		Effective data uploading ^b		Data quality	
	All variables	Excluding mortality statistics	All variables	Excluding mortality statistics	Internal inconsistency ^c	Outliers ^d
Andhra Pradesh	100.00	100.00	91.20	92.80	8.70	4.30
Assam	100.00	100.00	91.92	94.44	10.23	3.87
Bihar	100.00	100.00	81.19	95.68	17.80	5.79
Chattisgrah	100.00	100.00	83.10	88.20	8.70	3.60
Delhi	98.56	97.82	84.80	89.32	17.05	3.28
Gujarat	100.00	100.00	95.35	97.22	10.23	3.19
Himachal Pradesh	100.00	80.66	85.60	0.00	0.00	3.73
Jammu & Kashmir	98.28	99.96	71.11	87.05	8.33	4.75
Jharkhand	100.00	100.00	87.87	92.91	9.09	3.93
Karnataka	94.50	93.90	87.60	90.30	19.70	1.90
Kerala	97.80	99.70	76.40	90.70	11.40	3.90
Madhya Pradesh	99.70	100.00	94.50	96.50	13.60	3.50
Maharashtra	99.60	100.00	82.80	95.10	4.5	5.1
Orissa	97.50	99.00	92.10	92.90	4.90	3.80
Rajasthan	100.00	100.00	94.70	96.20	9.50	3.40
Tamil Nadu	100.00	100.00	90.30	92.40	10.60	3.50
Uttarakhand	97.97	100.00	76.46	87.14	15.53	4.63
Uttar Pradesh	100.00	100.00	91.60	96.50	12.10	4.70
West Bengal	99.90	100.00	93.90	95.40	14.40	4.50
India	100.00	100.00	99.75	99.96	12.88	2.26

Source: Tabulated on data downloaded from HMIS portal from 1 to 16 December 2011.

Notes:

- Data uploading is defined as: $100 \times \text{No. of cells with (zero or positive) entries} / \text{Total cells}$
- Effective data uploading is defined as: $100 \times \text{No. of cells with positive entries} / \text{Total cells}$
- Internal inconsistency is measured as: $100 \times \text{No. of validity rules violated in a year} / (\text{Total validity rules} \times 12)$. MoHFW has defined 22 validity rules, which are available in HMIS portal.
- Outliers are defined as values falling outside the range $Q3 \pm 2IQR$, when $Q3$ is median and IQR is Inter-quartile range. The proportion of outliers is: $100 \times \text{No. of outliers in year} / (12 \times \text{Total cells})$

This calls for a study to identify defects in the HMIS and suggest appropriate remedies. In this paper, we evaluate quality of HMIS in Uttarakhand, a high focus state which performs poorly with respect to most parameters (consistently ranking among the bottom five states).¹ In keeping with the MoFHW's focus, this study concentrates on service delivery components, and not on physical infrastructure and financial parameters.

3. Health Management Information System in Uttarakhand

3.1 Profile of state

Uttarakhand, formerly known as Uttaranchal, was carved out from Uttar Pradesh in November, 2000. It is spread across 51,125 km area. Located at the foothills of the Himalayan mountain ranges, 93 percent area is covered with mountainous regions and 64 percent is covered with forest areas. It is bounded by Himachal Pradesh in the north-west and on the south by Uttar Pradesh. The state is divided into two divisions (*mandals*), namely Kumaon and Garhwal, containing 6 and 7 districts respectively. The districts of Almora, Bageshwar, Champawat, Nainital, Pithoragarh and Udham Singh Nagar are under the Kumaon *mandal*. On the other hand, the Garhwal *mandal* comprises of the seven districts of Dehradun, Haridwar, Tehri Garhwal, Uttarkashi, Chamoli, Pauri Garhwal and Rudraprayag. The current study is focusing on two districts namely, Udham Singh Nagar² and Rudraprayag.³

These districts differ sharply with respect to each other in terms of political, geographical, economic and other social indicators. For example, Udham Singh Nagar is a plain district in the

¹ Except for data uploading without mortality statistics.

² Udham Singh Nagar was a part of Nainital district before it gained the identity of a separate district in October 1995. The area of the district is 2,912 sq. kilometer. Udham Singh Nagar is basically an industrial district and many industry related professions are prevalent here. On the other hand, the fertile land lends itself to different forms of agriculture giving rise to agriculture related activities. This place is surrounded by Kumaon Himalayas on one side and Nepal on the other. The district is also called as the 'Gateway to Kumaon hills'. According to the 2011 Census, the population of the district is 1,648,367, which has grown at a rate of 3.34% per annum. HMIS figures for 2011 reveals that SCs, PHCS, SDHS and DHs in this area are 152, 26, 1 and 1 respectively. In addition, there are 25 private facilities providing reproductive and child health related facilities in Udham Singh Nagar.

³ Rudraprayag, located in the Central part of the state, was established in September 1997. It is the point of confluence of rivers Alaknanda and Mandakini. According to Census 2011, population of the district is 236,857 and it is growing at the rate of 4.14% per annum. The area covered by district is around 1,896 sq. km. As compared to Udham Singh Nagar, Rudraprayag district has higher sex ratio hovering at around 1120. Till July 2011, the number of SCs, PHCs and DHs in Rudraprayag are 68, 11 and 1 respectively, according to the HMIS. There are no private facilities offering reproductive and child health related facilities.

Kumaon division whereas Rudraprayag is a hilly district in the Garhwal division. The hilly terrain in Rudraprayag has resulted in poor transport and communication facilities, and lack of industries. Udham Singh Nagar has a developed agricultural and industrial sector; this attracts migrant laborers from other districts and states. Rudraprayag, on the other hand, is primarily a service based economy. Out-migration is high in Rudraprayag – to the plains, or to other districts. Despite all these disadvantages, Rudraprayag has better sex ratio, higher literacy rates and higher per capita health infrastructure than Udham Singh Nagar.

The selection of such contrasting districts enabled us to see whether there are common areas of concern in HMIS data quality despite these differences; it also enabled us to see whether unique features of each district caused problems in HMIS data specific to the district.

3.2 Functioning of HMIS in Uttarakhand

In Uttarakhand, the reporting period is 21st to 20th of every month, and not the calendar month followed in other states. Based on registers available at facilities, ANMs at SCs and PHCs fill in the Monthly HMIS formats in the last week of the month. This has to be verified by LHV, who forwards the filled questionnaire/formats to the BPM at the CHCs. Data is thus forwarded by SCs and PHCs to CHCs around 26-28th of every month. The BPM also obtains data from the CHC and SC attached to the CHC in printed copy. This data is entered using the District Health Information System (DHIS),⁴ and uploaded on to the HMIS portal. The electronic copy is accessed by the District Program Manager (DPM). Both DPM and BPM are supposed to evaluate the data. The State Program Unit also evaluates the data and sends feedback to districts. The DHs upload their data directly, using the DHIS.⁵

⁴ The District Health Information System (DHIS) is a free and open source software that is both platform and database independent. It was developed in 1997 by the Department of Informatics, University of Oslo, Norway for application in South Africa. DHIS is being used in more than 20 countries and has become an official component of the WHO Public Information Toolkit. The software can be deployed in online or offline settings so that it is compatible with the diversity of environments existing in the public health sector in countries like India. The main purpose of DHIS is to: [a] Provide comprehensive HMIS solution based on data warehousing principles and a modular structure that can be readily customized. [b] Provide data entry facilities. [c] Provide tools for data validation. [d] Provide tools for reporting. [e] Allow generation of health indicators for monitoring and evaluation.

⁵ In Rudrapur District Hospital, Udham Singh Nagar, the HMIS format has been broken into several components, relevant for each Department of the Hospital. The data submitted by each Department in the disintegrated HMIS form is collected centrally and uploaded on to the DHIS-2 portal.

For monitoring the flow of data, the process of data uploading is divided into four levels. In HMIS terminology, level 1 refers to the stage when district has not uploaded HMIS data on the portal, level 2 when data has been uploaded but not committed by district (that is, the data uploaded is being checked), level 3 when state has to commit the data, and level 4 when state, too, has committed and frozen the data, indicating that it is final and will not be changed in future. Thus, quality of the data is supposed to be checked in level 2 by district personnel and, in level 3, by state personnel. Unfortunately, revision of data uploaded continues for a much longer period than the scheduled one month. In 2010-11, for instance, in both districts, data is yet to be committed for the entire year by the district (level 2). The state should therefore seek to accelerate the process of data commitment.

Until March 2011, data was consolidated and uploaded only at district level; information was not available below district level for individual facilities in any districts of India. Thereafter there has been a shift to facility base reporting throughout India. In Uttarakhand, due to technical problems, the shift to facility-wise reporting was not completed at the time of our field visit. So there was consolidated upload of data at CHC level. After Uttarakhand shifted to facility based reporting in the latter half of 2011, SCs and PHCs started sending their data in HMIS formats to BPMs, who upload this data for each facility on to the HMIS portal.

Since data compilation for HMIS is often a major issue in Hospitals – because of their size and multiple departments – we paid special attention to the data collection and reporting system in District Hospitals of the two districts covered under our survey. In Rudrapur District Hospital, Udham Singh Nagar, the HMIS format has been broken into several components, relevant for each Department of the Hospital. The data submitted by each Department in the disintegrated HMIS form is collected centrally and uploaded on to the DHIS-2 portal. In Rudraprayag, on the other hand, the HMIS of the District Hospital is quite weak. In District Hospital, the DHIS format is circulated to the concerned Departments. The relevant information is filled in by the Departments, who also authenticate it by signing the section pertaining to their Department. However in practice, several departments do not fill in the data. For instance, data relating to patient services is not provided; data on laboratory testing is also not reported regularly. In

addition to this, the DH has not provided computer facilities or a Data Entry Operator for HMIS purposes. So, the HMIS data is sent to the CMO office where the data is entered.

In Rudraprayag, there are no private health facilities. This makes HMIS coverage easier than Udham Singh Nagar. All public sector units are reporting in this district. On the other hand, in Udham Singh Nagar, although public sector (SCs, PHCs and CHCs) coverage is 100%, only 11 out of 25 private facilities providing reproductive and child health facilities reported HMIS data – that, too, only on deliveries. Even these units reports such data irregularly, and only to the District Health Statistics Department. In Udham Singh Nagar, we found that the DPM was not accessing data on deliveries at private sector from the District Health Statistics Department. Subsequently, when this issue was raised before the CMO and DPM staff by us, data on private sector facilities was uploaded on the portal.

Table 2: Snapshot of HMIS in Udham Singh Nagar and Rudraprayag districts, Uttarakhand

Research Question	Udham Singh Nagar	Rudraprayag
Do the all service units report HMIS? If yes, since when?	All public sector facilities are providing HMIS data since inception of HMIS portal in 2008.	All public sector facilities are providing HMIS data since inception of HMIS portal in 2008.
What is the coverage of private sector health facilities?	14 (out of 25) private sector facilities providing MCH services are not reporting HMIS data at all. The remaining 11 facilities provide data irregularly to the Statistics unit, Health Department.	There are no private sector units providing MCH services Not applicable
Do the reporting units provide data on all health indicators in HMIS?	Public facilities are reporting data on all services provided by them. However, as the range of services provided by them is narrow, this is reducing effective data upload. Private sector units report only live births and immunization.	Facilities are reporting data on all services provided by them. However, as the range of services provided by them is limited, this is reducing effective data upload.
Are the reporting units regular in reporting?	SCs and PHCs are sending data to CHC by 28 th of month (Reporting period is 20-19 of each month) SDH are forwarding data to CMO by 2-3 of next month.	SCs and PHCs are sending data to CHC by 28 th of month (Reporting period is 20-19 of each month) SDH are forwarding data to CMO by 2-3 of next month.
Does proper mechanism exist to collect data from hospital?	HMIS reporting system exists in the public sector hospital (DH/SDH) and data is being reported regularly	HMIS reporting system exists in the District Hospital and data is being forwarded to CMO regularly. However, data capturing is weak as all Departments do not report data (e.g. patient services). Data on immunization is recorded by ANM attached to Agustmuni CHC and consolidated with their records.
What is the system of record maintenance of services rendered?	While records are being properly maintained in some facilities, in other facilities records could not be inspected due to absence of concerned staff (despite prior intimation of visit sent by CMO). Registers are properly maintained.	Variation in quality of record maintenance by facilities. Generally, hard copies of HMIS reports available with LHV or BPM. Registers are properly maintained.

We now turn to an evaluation of the HMIS data coverage and quality.

4. Trends in missing data

We examine the trend of missing data components since this provides a quick check of data quality. The trend of missing data components has been examined with and without mortality statistics (Table 3). This is because reported mortality statistics is often zero when such data is classified by different age groups and causes of death.

Table 3: Trends in missing data in Uttarakhand during 2008-2011 in percent

State / District	Missing data	2008-09	2009-10	2010-11
Udham Singh Nagar	For all variables	60.44	54.9	54.62
	Excluding mortality	41.19	31.53	30.76
Rudraprayag	For all variables	79.65	68.27	71.79
	Excluding mortality	68.94	51.59	57.04
Uttarakhand	For all variables	36.71	26.07	24.66
	Excluding mortality	13.23	12.29	14.36

Source: Tabulated from HMIS portal data accessed on 26 July 2011.

Table 3 shows that percent of missing data are substantially higher in both districts compared to that of the state. A positive trend of decreasing missing data from 2008-09 is observed in Udham Singh Nagar. In Rudraprayag, however, the trend in missing data is not satisfactory – with an increase of six percentage points being observed over the last two years (excluding mortality statistics). This raises the question why percent of missing data has increased in Rudraprayag. To understand this, further theme-wise comparison of missing indicators is necessary.

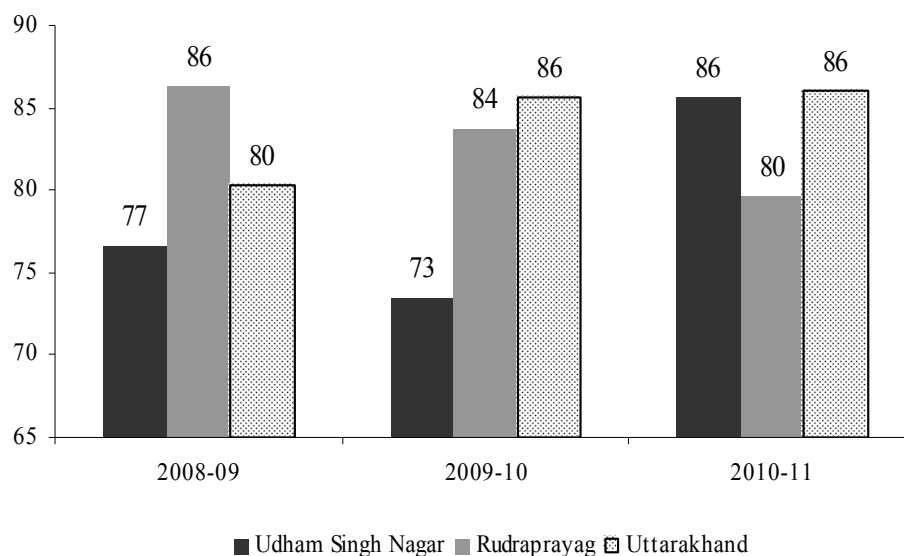
Analysis of HMIS portal data reveals that there has been a sharp decline in new cases of hypertension detected at facilities, cases of anemia (total and severe) and children over 5 years given DT5. If we assume non-reporting of such events is result of improvement in health status due to NRHM, there should have been an increasing trend in Village Health and Nutrition Days (VHNDs) or number of fully immunized children aged 11-23 months in HMIS data. Actually this is not happening. On the contrary, number of VHNDs or number of fully immunized

children aged 11-23 months has been decreasing in HMIS. Similarly the decline in number of complicated pregnancies, RTI/STI cases, number of children suffering from diarrhea and dehydration, and number of school going children with refractive errors may not necessarily be a result of better health facilities, but simply due to failure to detect such cases or lacunae in the HMIS reporting system. Thus, the overall trend in effective data uploading in Rudraprayag is not satisfactory, and may be said to have deteriorated over the study period.

5. 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) has improved in Udham Singh Nagar (Fig. 2). Although there is still scope for improvement, internal consistency levels of this district matches state level. In Rudraprayag, on the other hand, there has been a decline in internal consistency by six percentage points.

Fig. 2: Trends in internal validity of HMIS data in percent terms - Uttarakhand



We have also identified the rules violated most frequently in the two districts.

Table 5: Number of months validity rules are violated in Udham Singh Nagar in year

Validation	2008-09	2009-10	2010-11
Live births <= Total Deliveries	5	3	0
Number of receiving postpartum check up between 48 hours and 14 days<= Total pregnancy outcome	4	0	0
Number discharged under 48 hours<=Deliveries at facility	8	6	0
Pregnancy outcome(Live births + Still births + Abortion)>=Total deliveries (in case of twins)	5	8	1
Blood Transfusion<=Number of cases of pregnant women with Obstetric Complications and attended at facility	1	5	10
Women receiving post partum checkups within 48 hours after delivery< (live birth male + live birth female + still birth)	12	12	3
Total number of children aged between 9 and 11 months who have been fully immunized (BCG + DPT123 + OPV123 + Measles) during the month MALE + FEMALE <= Measles	7	9	8
Total MTPs conducted at Public and private institutions <= Spontaneous and induced abortions	10	12	12
Number of Infants who received OPV 0 (Birth Dose) <= Total Number of deliveries	5	4	2

Source: Tabulated from HMIS portal data accessed on 26 July 2011.

Analysis of Table 5 reveals that the incidence of violation of the following three rules remains very high in Udham Singh Nagar. Discussion with district-level officers and facility staff indicated possible explanations for the violation of these rules.

- Blood Transfusion given to complicated pregnancies <= Number of cases of pregnant women with obstetric complications and attended at facility:

Given the poor socio-economic status of patients in District Hospital, it may be expected that a large proportion of expectant mothers suffer from some degree of anemia. Such patients are given blood transfusion, even though their case may not strictly justify such treatment. As a result, blood transfusion is being given not only to complicated pregnancies, but also 'normal' pregnancies. However, the Delivery Room hospital of

District Hospitals do not distinguish between these two cases of pregnancies; as a result, the number of *all* pregnant mothers given blood transfusions are recorded in the monthly formats. This problem occurs mainly at the DH and SDH level.

It was also noted that the number of complicated pregnancies was less than the number of such women administered antibiotics (in 11 cases in 2010-11), antihypertensive (in 6 cases in 2010-11) and IV Oxytocin (in 12 cases in 2010-11). The reason is similar - routine administration of antibiotics and IV Oxytocin⁶ to all pregnant women, coupled with the failure to distinguish between complicated and normal pregnancies in registers.⁷

- Total number of children aged between 9 and 11 months who have been fully immunized (BCG + DPT123 + OPV123 + Measles) during the month <= Measles

This, according to the DPM and BPMs, was probably because of the high rate of in-migration observed in the district. Migrant workers enter the district, particularly from Moradabad, Bareilly and Pilbith in the adjacent state of Uttar Pradesh and from Rampur in Uttarakhand, in search of work in the highly developed industrial sector of the district.⁸ Another reason suggested was the lack of stock of measles vaccine for long periods. For instance, in Udham Singh Nagar, ANMs reported that stocks were not available for two months (July-August 2011). However, as measles vaccine is the last vaccine administered, these explanations cannot be accepted.

We also found that there was an error in the HMIS form for SCs (Hindi version). Item 22.1 seeks number of children aged 9-12 months (instead of 9-11 months, as in the English version) who have been fully immunized, whereas item 24.1 seeks the number of children fully immunized aged 12-23 months. This has created confusion among ANMs, leading to errors. It was reported that, due to this confusion, number of children receiving measles vaccine was not being reported. This may have led to the validity error.

- Total MTPs conducted at public and private institutions <= Spontaneous and induced abortions

⁶ WHO guidelines state that 2 ampoules of Oxytocin (10 units) should be used in active management of third stage of labour.

⁷ This problem was also observed in Rudraprayag DH, where antibiotics and oxytocin are administered routinely to all delivery cases, and all complicated cases are referred to Srikot Medical College.

⁸ There are 253 industrial units in Pantnagar and 60 units in Kashipur.

This error is occurring at the DH/SDH level, due to the wrong definition of abortion being followed.⁹ Medical Termination of Pregnancy (MTP) is termination of unwanted (for medical reasons) 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 births occurring between 12-22 weeks are being counted in field for abortion (Spontaneous/Induced). This is leading to MTPs exceeding abortion.

Table 6: Number of months validity rules are violated in Rudraprayag in year

Validation	2008-09	2009-10	2010-11
Live births<=Total Deliveries	4	2	6
Pregnancy outcome (Live births + Still births + Abortion)>=Total deliveries (in case of twins)	6	6	4
Women receiving post partum checkups within 48 hours after delivery< (live birth male + live birth female + still birth)	7	11	7
Number of women registered under JSY < Total number of women registered under ANC	1	0	9
Number of newborns visited within 24 hours of home delivery <= Total of home deliveries	0	1	8
Total MTPs conducted at Public and private institutions <= Spontaneous and induced abortions	8	9	10
Number of Infants who received OPV 0 (Birth Dose) <= Total Number of deliveries	1	4	6

Source: Tabulated from HMIS portal data accessed on 26 July 2011.

In Rudraprayag a common cause of internal inconsistency is due to errors in the recording of live birth related data. There are two reasons for such errors. Firstly, it was found that data on live births was not being properly entered by BPM in the ‘Line reporting of births’ module within DHIS leading to errors. Although BPMs are supposed to enter total number of male births and female births in *both the concerned facility, as well as home deliveries*, in several blocks data for *only births in facility was being entered*. Another source of error is that live births include births taking place within the district only, while Post Natal checkups are given to deliveries that had

⁹ We also observed this error in Rudrapur DH. Only dilation and curettage cases are reported in abortions.

occurred within Rudraprayag and also *those infants delivered in Srikot Medical College, in the adjacent district of Pauri*. This is leading to violations of the first three rules in Table 6.

As in Udham Singh Nagar, the wrong definition of abortion being followed at the Rudraprayag DH is leading to violation of the rule “Total MTPs conducted at Public and private institutions \leq Spontaneous and induced abortions”. In Rudraprayag the failure to distinguish between complicated pregnancies and the routine administration of IV Oxytocin and antibiotics in *all* pregnancy cases is leading to internal inconsistency of HMIS data, similar to what we found in Udham Singh Nagar,.

Among other common violations in Rudraprayag are:

- Number of women registered under JSY $<$ Total number of women registered under ANC

It was observed during field visits that some ANMs were entering the number of mothers *receiving Janani Suraksha Yojana (JSY) benefits after delivery*, rather than JSY registrations in the row for number of women registered under JSY. This leads to mismatch between JSY registrations and ANC registration.

- Number of newborns visited within 24 hours of home delivery \leq Total of home deliveries

In Rudraprayag district, we found high incidence of such violation in certain sub centers. The reason was even those women who had delivered in institutions (like the DHs in Rudraprayag or Pauri, or in lower level facilities within Rudraprayag) sought release immediately after delivery (approximately after 2-3 hours after delivery)¹⁰ 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 the PNC service is generally provided within a week of the delivery.

¹⁰ On inspection of medical records we noted some such cases:

Laxmi Das: Admitted on 13 September at 8:00 PM, delivery occurred at 10:00 PM and released (on bond) at 8:02 AM.

Beena Devi: Admitted on 16 September (time not stated), delivery occurred at 9:00 AM and released (on bond) at 12:41 PM.

Arti Das: Admitted on 18 September at 7:15 AM, delivery occurred at 7:56 AM and released (on bond) at 4:52 PM.

Sunita: Admitted on 18 September at 6 AM, delivery occurred at 11:04 AM and released (on bond) at 4:55 PM.

- Number of Infants who received OPV 0 (Birth Dose) \leq Total Number of deliveries

This is partially explained in terms of vaccine stocks. In the absence of stocks, live births may not be given OPV0 at birth but after 2-3 days when stock becomes 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 many cases, pregnant women are referred to District Hospital in the adjacent district of Pauri. In such cases, deliveries are not recorded in Rudraprayag, but OPV0 may be administered on return to Rudraprayag if stocks are not available in Pauri. Further, in case of migrants who have administered OPV0 to babies elsewhere, registers in Rudraprayag facilities record OPV having been given. When monthly HMIS reports are submitted, this leads to double counting.

6. Outliers

A third problem related to data quality is that of outliers. 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 outliers. The rule is:

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

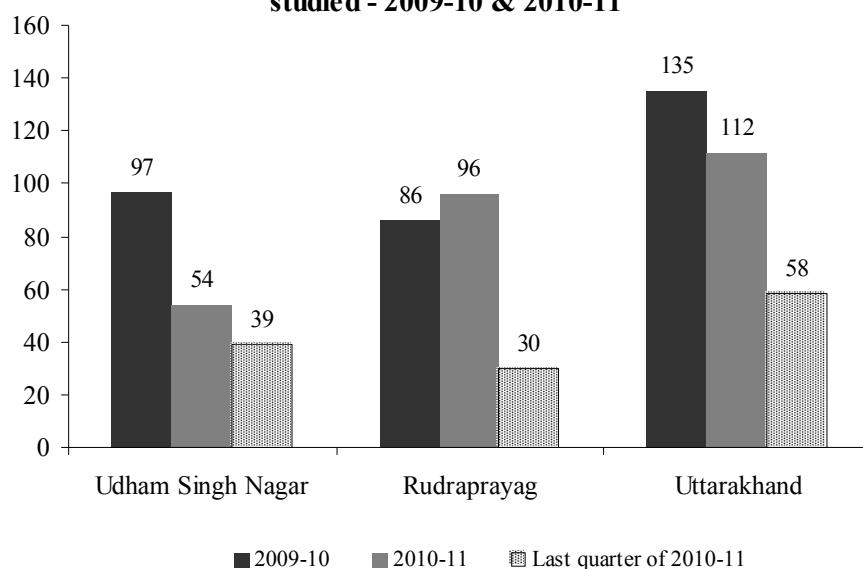
when Q_1 , Q_2 and Q_3 are the three quartiles and x is a value taken by the data component in question.

The absolute number of outliers in HMIS data for Uttarakhand and the two districts studied is given in Fig. 3. In the year 2009-10 we found that the HMIS data in Udham Singh Nagar contained 97 outliers. This indicates that, over a period of 12 months, 295 HMIS indicators were found to be outlier 97 times. In Rudraprayag there were 86 outliers. This is relatively low compared to Uttarakhand (137 outliers). In the last year, 2010-11, the number of outliers in Udham Singh Nagar and Uttarakhand reduced – number of outliers was 54 and 112, respectively (Fig. 3). In contrast, performance of Rudraprayag deteriorated, with number of outliers increasing to 96. Another interesting point to note is that a high proportion of these outliers were occurring in the last quarter of the financial years. In Udham Singh Nagar, 72% of outliers had occurred between January-March; in Rudraprayag this figure was 31%. In Uttarakhand, 52% of outliers were in the last quarter of the financial years. Examples of such outliers include number

of laproscopic sterilization undertaken in SDH/DH and mini-lap sterilization undertaken in PHCs in Udham Singh Nagar, and number of pregnant women registered within first trimester and number of vasectomies conducted by PHCs and CHCs in Rudraprayag.

This indicates that such errors may be a possible result of deliberate manipulation of figures to attain targets set for ANMs. In the absence of DPM staff, some of ANMs reported that they often faced pressure to inflate targets for components like JSY, ANC registration and immunization during monthly meetings. This was also reported by the staff in several facilities in Rudraprayag. Rather than being singled out for poor performance in areas like IUD insertion, ANC services and immunization, they admitted to inflating figures for such components in every month. This was reported by both BPM and ANMs in Udham Singh Nagar,¹¹ and corroborated by the state-level officers.

Fig. 3: Absolute number of outliers in state and districts studied - 2009-10 & 2010-11

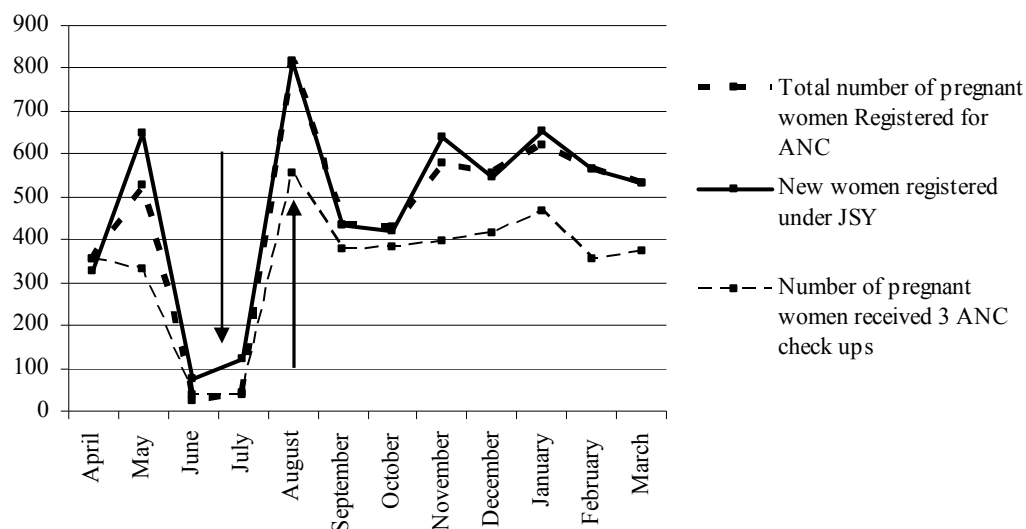


We had noted that the number of outliers in Rudraprayag had increased sharply by 12% between 2009-10 and 2010-11. This may be attributed to the strike for better pay undertaken by ANMs in Garhwal Mandal in the months of June-July 2010. As a result of this strike, figures reported by SCs decreased sharply in June-July 2010, when few ANMs were reporting, and increased

¹¹ Unfortunately, it is difficult to detect such data manipulation based on outliers. The reason is that the rule adopted in the HMIS for detecting outliers works only if there are less than two extreme values. If figures are inflated over the entire year, or even the last quarter, then the quartiles get affected so that the inflated values fall within the inter-quartile range.

sharply in the month of August, as quite a few ANMS reported combined figures for the period June-August 2010. This becomes clear if we consider figures for some important indicators (Fig. 4).

Fig. 4: Trends for selected HMIS indicators in Rudraprayag - 2010-11



Further, 41 out of the 96 outliers identified for 2010-11 occurred in this period (June-August). Dropping outliers occurred in these three months, the number of outliers in Rudraprayag decreases sharply to 55, which is relatively satisfactory.

Table 7: Classification of outliers in Udham Singh Nagar and Rudraprayag by HMIS themes – 2010-11 (in percent terms)

Theme	Udham Singh Nagar	Rudraprayag	Uttarakhand
ANC services	2.3	11.4	2.3
Deliveries	2.4	2.4	0.6
C- Section deliveries	2.8	0.0	2.8
Pregnancy outcome & weight of new-born	1.0	1.0	1.0
Complicated pregnancies	5.0	4.2	5.8

Theme	Udham Singh Nagar	Rudraprayag	Uttarakhand
Post-Natal Care Services	0.0	5.6	0.0
Medical Termination of Pregnancy (MTP)	4.2	2.1	2.1
RTI/STI Cases	12.5	6.3	0.0
Family Planning	2.5	1.7	3.5
Child Immunization	1.4	7.8	3.6
Number of Vitamin A doses	2.8	8.3	2.8
Number of cases of Childhood Diseases reported during the month 0-5 years	5.6	0.0	5.6
Blindness Control Programme	2.8	5.6	4.2
Patient Services	0.3	4.3	3.0
Laboratory Testing	1.3	2.6	2.2
Total	100	100	100

Source: Tabulated from HMIS portal data accessed on 26 July 2011.

In Table 7 we classified outliers by themes. It may be seen that in Udham Singh Nagar, relatively high proportion of outliers occur for RTI/STI cases, followed by Childhood Diseases and Complicated Pregnancies and Medically Terminated Pregnancies. In Rudraprayag, on the other hand, ANC services, Vitamin A doses, Childhood Immunization, RTI/STI, PNC services and Blindness Control Programme display a high proportion of outliers. In Uttarakhand, highest proportion of outliers is observed for the themes Complicated Pregnancies and Childhood Diseases.

Some of the other outliers were either reporting errors or typographical errors during data entry. An example is the entry of 410 against number of MTP conducted within 12 weeks of conception in Udham Singh Nagar in January 2011. Inspection of the Labour Register at the Rudrapur DH revealed that this was a typographical mistake. Among other examples of such errors are the 3000 Centchroman pills distributed in Udham Singh Nagar in July 2010 and the 34,560 condoms distributed in December, 2010 in a single CHC in Rudraprayag. However, in some cases, like wet mount cases in Udham Singh Nagar (133 in July 2010 and 73 in January

2010, against zero values for other months in 2009-10), the sharp fluctuation in values across months noted is due to availability of stocks. In other cases, high figures are linked to camps. An example of this is the 64 cases of Hepatitis B vaccine noted for Udham Singh Nagar in June 2010. Inspection of records revealed that this figure had been reported by Rudrapur DH; it was further reported to us that a Non Government Organization (NGO) conducted Hepatitis awareness camp in this institution at intervals, resulting in sudden spikes in the number of Hepatitis B vaccination reported in specific months.

7. Challenges to improve quality of HMIS data – What does the field study reveal?

During our field visit several issues were raised by the functionaries that have important implications for HMIS data quality. These are discussed below.

7.1 Training

Our survey reveals that 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 officers. The trainers were consultants from National Institute of Health & Family Welfare (NIHFW). Subsequently, these state-level officers and consultants from NIFHW trained district level and block level officers.¹² The duration of workshops is too short (over two days) to cover every details of the complex HMIS format. In addition to this, most of the officers are non-medical persons for whom retaining instructions on health-related issues is not easy. Further, some of the BPMs opined that the state-level training was of a poor quality, as the trainers themselves did not seem to be aware of all concepts. Another complaint voiced was that trainers did not explain properly when BPMs had any queries; rather, they simply repeated themselves without addressing the query.

Although, ANMs and Staff Nurses – who are responsible for filling in the monthly formats in SCs and CHCs – have been given instructions on filling in forms at monthly meetings by BPMs, they have not been trained formally. Their misconception about different HMIS questions was clear during our field investigation. As a result, ANMs and Staff Nurses fail to understand the principles underlying HMIS data entry and often commit basic mistakes.

¹² Such training has been completed in June 2011.

In most facilities we observed that there appeared to be confusion over use of blank (when concerned service is not provided by facility) and zeroes (no cases were observed) whilst filling in HMIS format. Almost all ANMs from different facilities mentioned that they kept fields blank if no cases were reported even if service is provided by the PHC. This was also observed when we inspected previous HMIS reports.

To avoid violations of validity rules, BPMs often gives instructions 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 the value of HMIS in programme evaluation and planning.

In Uttarakhand, the state government has translated monthly HMIS formats for SCs into Hindi. This is a welcome step as it Hindi formats are much convenient to ANMs, who are often not very conversant in English. The problem was, however, poor quality of the photocopy of the forms, which often leads to wrong entries as row items are ineligible. This is a common complaint among ANMs from Sub-centre's of both districts, which could easily have been addressed by printing the forms at the state-level and charging ANMs on a cost basis.

7.2 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. SCs or PHCs do not maintain copies of the monthly data submitted by them. One reason for this may be that SC forms are not used for HMIS data entry. It was reported in Rudraprayag district that Form 6,¹³ circulated by the Govt. of Uttarakhand, to be submitted within 15th of each month was often used as the base for data entry. Form 6 is submitted on a separate date to the LHV by each sector under a CHC. She checks the data submitted on the spot and seeks clarifications. This data is subsequently used for data entry. In stark contrast, the HMIS forms are submitted by ANMs to

¹³ This form is used by the State Government to monitor progress with respect to the 20 Point Programme. When asked for information, the DPM claimed not to be aware about the form.

LHVs, who forward it to the BPM without checking or seeking any clarifications. In fact, the ANMs generally leave after submitting the data, so that there is no scope to seek clarifications. In some cases, one of the ANM reported that she has not submitted HMIS form for several months prior to our visit whereas the BPM, who was also present during the interview, reported that HMIS forms were being received regularly from *all* the facilities.¹⁴ Another unhealthy practice observed was the submission of monthly data by PHCs in Udham Singh Nagar on blank paper, or by phone – without using monthly formats.

7.3 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. However, this is not happening in reality. For example, LHVs rarely check data. On inspection of HMIS forms at several facilities we found basic mistakes in the data submitted. However, the LHV had verified them without noting errors and inconsistencies. In one particular Block Primary Health Center the BPM was requested to identify errors in some of the HMIS forms submitted in earlier months. However, the BPM failed to identify any of the errors and was unaware of even basic terms like first trimester of pregnancy.¹⁵ The DPM had also not sought clarification for many of the errors. This casts doubts on the extent to which HMIS data is being monitored at lower levels. In this context, the inability of respondents to recall instances of errors pointed out by the district HMIS officers or the BPM during our field visits is significant.¹⁶

Some discussion regarding HMIS data quality is undertaken at monthly meetings, where common errors are pointed out. However, the focus is more on data submitted in Form 6 and fulfillment of targets in indicators under the 20 Point Programme.

¹⁴ The casual nature with which the HMIS forms are viewed may be seen from the fact that one ANM in Rudraprayag is notorious for filling in the forms when traveling to the CHC.

¹⁵ Examples of such errors were: data had been entered for PNC checkups even though no home deliveries had been reported, discrepancy between immunization and live births, and failure to note details of complicated pregnancies.

¹⁶ For instance, the Staff Nurse attached to a CHC in Udham Singh Nagar reported that she had received feedback from the BPM about the inconsistency between DPT1 and OPV0 – a non-existent validity rule! On the other hand, though the BPM of another CHC in Rudraprayag was able to detect some errors, he had not checked the data submitted in HMIS forms by SCs under his jurisdiction. His justification was that he relied on data from Form 6 to fill in the consolidated data for his CHC.

An indispensable step for the better performance of HMIS is to inculcate good reporting habits among ANMs. This is not an easy task. Generally, ANMs are aged above 40 years, were generally only Higher Secondary (Intermediate) qualified, were rigid in their attitudes and tended to look down upon BPMs because of the contractual nature of their post and low salary.¹⁷ As a result, in several cases, ANMs were reluctant to change reporting practices even when their errors were pointed out to them. In fact, one BPM reported that he personally corrected the HMIS data when entering it using the DHIS software. Such detection is not always feasible. For instance, data on live births and OPV0 may not match. In such cases, the assumption that the first data (in this case, live birth) is correct is used to ‘rectify’ the submitted data. Another instance of such errors is mismatch between ANC registration and JSY beneficiaries. In this case, also, the first entry (ANC registration) is assumed to be correct.

Monitoring and feedback is also supposed to be undertaken at the state level. Such supervision is cursory. Even when the State Health Mission seeks clarification on data-related issues, response to queries is slow. This is partly because both the district and facility staff is over burdened with work. Further, district or block staff may receive requests for data on some other aspect of NRHM on an urgent basis. As a result, response to clarifications may occur after the scheduled time for freezing HMIS data is over. This delays the process for committing HMIS data on the portal (see ff. 6). As a result HMIS data for 2010-11 in Uttarakhand is even now only in level 2 (data uploaded by district, but not committed) at the time of the survey (September 2011).

Although most ANMs and BPMs reported that they received feedback and queries about the HMIS data submitted by them to higher authorities, it is significant that few of them were able to report what such queries related to.

7.4 Physical constraints to data uploading

During our field visits, BPMs complained about shortage of manpower. For instance, in Narayanpur BPHC has 17 SCs under it. Data for all these SCs have to be uploaded by the BPM

¹⁷ BPMs earn Rs12,000 per month. In contrast, the monthly salary of ANMs were about Rs.30,000; LHVs earn about Rs.26,000 per month.

himself in the absence of Data Entry Operators (DEOs). Although they are supposed to be dedicated to NRHM activities, in reality they are often multi-purpose workers typing letters, performing clerical jobs, and even paying telephone bills. BPMs, as well as ANMs, are also responsible for forwarding data on other schemes like *Rashtriya Swasthya Bima Yojana*. This is affecting data quality as sometimes BPMs are making wrong entries during data entry. For instance, in Kashipur SDH, we observed a mismatch between C-section deliveries actually performed in May 2011 and the number entered.

As mentioned earlier, in some blocks we found BPMs were over-worked and served as multi-purpose workers. The low pay and contractual nature of their jobs is also affecting morale of BPMs. They often resort to absenteeism or do not perform the work properly. In some facilities, BPMs seemed to avoid their duties, shifting their responsibilities to other functionaries.

Another important problem is the lack of steady internet facilities. All BPMs complained of slow connectivity, which often broke down. Power supply too is not steady after due to the heavy industrial demand for power. In several facilities in Udham Singh Nagar we found that lack of power at facility hinders data entering in facility.

The problem is more serious in Rudraprayag, having a hilly terrain. The District HMIS Consultant reported that checking even emails was a problem. During our meeting with the CMO, Rudraprayag, in July 2011, there was no power for about two out of three hours. The BPM reported that there was no internet connectivity for the three days prior to our visit. Although data uploading is possible in the local office of National Informatics Centre (NIC), there are some problems. The office may not be accessible easily, or may be a distance from the facility. Further, the NIC office is also used by other Departments to upload data, so that a queue forms up, leading to delays.

8. Summary and policy recommendations

As the Eleventh Plan draws to its end, it is important to critically appraise different aspects of the NRHM and draw lessons to streamline the functioning of the scheme. It is regrettable that the HMIS, a core component of NRHM that was designed with the objective of facilitating this

monitoring and evaluation exercise, should itself be unprepared to play any role in identifying weaknesses of NRHM. Our study of the HMIS in Uttarakhand exposes systemic weaknesses and shortcomings that are likely to be found in other states also.

The study reports that, although all public health facilities report HMIS data on a monthly basis, coverage of the private sector remains very poor. Further, quality of the reported data remains a major issue that must be addressed for the HMIS to serve a useful tool to policy makers. Our experience during field visits show that the crux of the problem is at the grass root level. *The HMIS was introduced following a top-down approach, without adequately preparing the facility and block level staff for the critical role that they had to play in the system.* This is very important in developing countries like India, where the level of education of health staff is low. With the shift to facility-based reporting this issue will become even more serious. ANMs and Lady Health Visitors were not provided with any training. Block Programme Managers were trained. But the training was inadequate and not consistent with their functions in HMIS (monitoring and supervising). Further, the multiplicity of tasks that these functionaries have to undertake and uneasy working relations with ANMs do not motivate them to carry out their supervisory tasks effectively. As a result, errors are creeping in to the monthly data reported by facilities. When these data are compounded at the district and state level, they result in an information system that provides a faulty guide to assessing performance, resource allocation and target setting through District and State plans.

This brings us to the question, how can the HMIS be improved? Our analysis indicates some possible measures, which may be considered by policy makers.

It has been observed that non-reporting by private sector remains a major problem to improving coverage under HMIS. This is a major problem in urban areas. This may be remedied by circulating an abridged HMIS format seeking institutional delivery details, birth details and MTP data. In addition, submission of such forms can be linked to submission of Pre Natal Diagnostic Tests forms that have to be submitted on a compulsory basis by registered private facilities.

Checking of HMIS data is a vital component of HMIS. Training modules of BPMs should, therefore, be redesigned to focus on detecting errors in data, possible reasons for such errors and how such errors can be eliminated. Since poor documentation is another constraint to monitoring HMIS data, all facilities - SCs in particular - should be instructed to maintain copies of data submitted by them as this will facilitate checking of data. The feedback mechanism also needs to be overhauled. Currently, BPMs are correcting errors without sending them back to ANMs. Although this saves time, accuracy of data might be affected; further, this is not desirable in terms of accountability. To prevent this, current monitoring efforts by the district and state officials may be supplemented by monitoring undertaken by external agencies. Though the MoHFW has involved Population Research Centres (PRCs) in monitoring HMIS data, the latter tend to concentrate on analysis of portal data, partly because their involvement is viewed with suspicion and even seen as a form of interference or duplication of efforts by the district and state level officials. Involvement of PRCs in overseeing the monitoring and feedback mechanism process might be, in such circumstances, a strategic alternative.

Most important, however, is to prepare the facility level staff and BPMs for their respective roles in HMIS. As mentioned previously, only BPMs have been trained in HMIS. However, most of the HMIS data is generated from the SCs, where such data is reported by ANMs and verified by LHVs. These people are neither trained, nor do they have the necessary aptitude for 'learning by doing'. In fact, their age, security of tenure and higher pay (relative to BPMs) make them resistant to suggestions. Training of ANMs and 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. Forms for SCs, PHCs and CHCs should also be translated in Hindi/local language to facilitate easy understanding and use by ANMs.

To sum up, despite being the only data source in India at the facility-level and being available for every month, the potential utility of the HMIS in providing micro-level information for improving health care service delivery has remained largely unutilized because of the failure to prepare the grass root functionaries. The question is will the MoHFW rise to the challenge by abandoning its top-down approach and refocusing its attention to the grass-root level?

Acknowledgement

This paper is based on the report of the study of HMIS in Uttarakhand submitted to MoHFW by Population Research Centre, Institute of Economic Growth, Delhi, in October 2010. Authors are grateful for financial and logistic support provided by MoHFW and the Uttarakhand State Health Mission. In particular, we wish to thank Dr. Rattan Chand (Chief Director, Statistics, MoHFW), Mr. Biswajit Das (Director, Statistics, MoHFW), Mr. Girish Khanduri (State Data Officer, Uttarakhand State Health Mission), Mr. Neeraj Saxena and Mr. Himangshu Naudial (District Programme Managers of Udham Singh Nagar and Rudraprayag, respectively). We wish to clarify that the opinions expressed in this paper is that of the authors, and does not reflect with views and opinions of either the MoHFW or the Uttarakhand State Health Mission. The responsibility for any omissions or errors that have crept in inadvertently lies with the authors.

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