ISSN : (2347-498X)

Journal of Comprehensive Health

Official Publication of The Indian Association of Preventive and Social Medicine, West Bengal Chapter

Original Article

Year: 2016 | Volume:4 | Issue-2

Spatio-temporal analysis of secondary data for usefulness and utility of Health Management Information System.

Dr. Dinesh Kumar[1], Dr. Avi Kumar Bansal[2], Dr. Sanjay Mankotia[3], Dr. Srikant Prasad Tripathy[4], Dr. Ashok Kumar Bhardwaj[5]

[1] Assistant Professor, [5]Professor and Head, Department of Community Medicine, Dr. Rajendra Prasad Government Medical College, Kangra, Himachal Pradesh, India.

[2] Scientist-D, [4]Director, National JALMA Institute of Leprosy and Other Mycobacterial Diseases (NIJL&OMD), Agra, Uttar Pradesh, India

[3]Block Medical Officer, Haroli, Una, Himachal Pradesh, India

Corresponding author:

Dr. Dinesh Kumar, Assistant Professor,
Department of Community Medicine,
Dr. Rajendra Prasad Government Medical College, Kangra, Himachal Pradesh, India.
Email: dinesh9809@gmail.com

Abstract

Introduction: Health Management Information System (HMIS) is a coordinated effort to improve the decision making for reorienting health care services to a large populace. Since its adoption and its revitalization its use in primary health care was assessed for usefulness and utility. **Methods:** Study was carried out at Community Health Centre (CHC), Haroli, Una, Himachal Pradesh. Standardized reporting formats for every month was collated and analyzed at Primary Health Centre (PHC) Level for year 2011, 2012, and 2013. **Results:** In year 2003 with an average pregnancy registration of 20/1000 population study area exhibited high rate and an increasing trend across all the PHCs. An interesting mismatch was observed when the reported birth rate was 3.2/1000 population in year 2013 which

Address for correspondence:
The Editor/ Managing Editor,
Journal of Comprehensive Health
Dept of Community medicine
NRS Medical College,

was relatively very low against pregnancy registration. Most of the deliveries have happened at home and have been conducted by the Non-Skill Birth Attendants. Overall and even across all the PHCs, the poor sex ratio (number of females per 1000 males) at birth is reported. **Conclusion:** Good maternal and child health (MCH) and sex ratio at birth were observed. Computed indicators revealed a mismatch like low birth rate despite the high rate of antenatal registration and care over three years which required to be studied for underlying determinants.

Key Words: HMIS, NHM, Usefulness, Utility

Introduction:

In India, universal health care has provided through the primary health care model to the population as an established mechanism to reach out to the underserved and inaccessible population. The various National Health Programs targeting a few diseases of public health importance supplement the efforts of the primary health care system in providing for the specific preventive, promotive and curative services for the particular disease/health problem. For both urban and rural areas of the country, an approximately 25,000 specialists, 0.6 million general medical officers, 0.7 million nurses, 0.25 million peripheral health workers, and 0.3 million village level activists are working to deliver health care services through the vast infrastructure of about 2000 hospitals and 0.25 million peripheral health care units. (Deo MG, 2007) The day to day functioning of the health care services including those offered by the National Health Programs is documented in the Health Management Information System (HMIS). The activities are as per the laid down standards of the NRHM including the individual national programs and recorded against the variables of monthly reports. This information is being used both for macro and micro-level planning for allocation of resources to achieve the set objectives of the general health system. The launch of Health Matrix Network (HMN) in 2005 demonstrated the emergence of HMIS as an important activity in the global health agenda. It was meant to provide better information with focus for enhancing the health information repositories and health care services. This in turns helps in strengthening the data

compilation for timely use of an information and also for developing the scientific foundation for matrix and evaluation. (WHO, 2008) Concurrently in year 2005, Government of India (GoI) kept HMIS as an important agenda for National Rural Health Mission (NRHM) and a web based portal for regular and rapid flow of information was launched in September 2008. In addition, the monitoring and evaluation team was constituted to ensure data consistency, gap identification and identifying strengthening measures. (GoI, 2005)

HMIS serves as one of the data sources along with census, civil registration system, surveys, service and administrative records to harvest the information to monitor and evaluate the services of the general health system. Despite the validity concerns; routine, standard, specific, easily available and accessible nature of HMIS attracts the attention of health planners to understand the health issues of any community (even up to village level). This study was, therefore, undertaken to understand the usefulness and the utility of the HMIS through an analysis of the data generated in the HMIS. The data was analyzed over time and geographical aspects. Only the reported data was analyzed and no attempts were made to validate neither with other sources of similar information nor with the records from which the data was extracted. This study is a standalone analysis of the reported data in the HMIS with the objective of understanding the usefulness of the present structure of the HMIS in reflecting on the performance of the services of the health system.

Methodology:

The study was carried out in a Block, Haroli, Una, Himachal Pradesh in the year 2014. According to census 2011, the Block Haroli has a total of 190 villages (1,66,446 population), 59 Sub-Centers (SCs) and 7 Primary Health Centres (PHCs) providing primary health care services to the population. PHC was considered as a study unit and the annual HMIS reports were collected, compiled and analyzed. The block is spread over an area of 20 square kilometers approximately with similar socio-cultural milieu. However, various social strata do persist among this population which is more or less equitably distributed throughout the block. It can be considered that the demographics of the population accessing services at the various PHCs in the block are largely similar. The services available at each of the PHCs and the SCs in the block are also largely similar as the whole block is under

a single administrative unit. The infrastructure including both the human and physical is also similar at each of the service delivery points.

To understand the differential in reporting pattern information was collected for three years of that of 2011, 2012, and 2013. The data was collected on pre-designed structured data extraction sheet.. Trend analysis was done with Chi-Square test for trend at the 5.0% level of statistical significance. Though the data was collected for three years (2011, 2012, and 2013) but an insignificant change in the population was observed. Hence the population for year 2013 was kept as a denominator to calculate the program specific indicators.

Prior formal administrative approval was sought from the concerned authorities and ethical approval was also sought from the Institute Ethics Committee (IEC).

Results:

Prima facie it was observed that the variables included in the HMIS on which the information is being captured presently are sufficient and appropriate to reflect on the prevailing health problems in the study area. The information is being captured in standard NHM formats designed for SC, PHC and CHC. In the study area filled formats are collected from respective health facility and collated at CHC. Then this information is entered into specifically designed online information system (DHIS-2: District Health Information System) at CHC level due to better internet connectivity at this level in entire state. The filled information is further complied and analyzed at State Surveillance Unit (SSU) with monthly feedback. In present study the analysis was limited to assess the state of Reproductive and Child Health (RCH), utilization of general patient care services and cause specific mortality.

In year 2003 with an average pregnancy registration of 20/1000 population study area exhibited high rate and an increasing trend across all the PHCs. (Table: 1) Early (1st trimester) pregnancy registration showed significant improvement in the study area and across all the PHCs. (Table: 2) All the registered ones reportedly received all the minimum (3) visits for antenatal care checkups. An interesting mismatch was observed when the reported birth rate was 3.2/1000 population in year 2013 which was relatively very low against pregnancy registration. (Table: 1)

Table 1: Annual report based analysis of pregnancy registration and crude birth rate (CBR) reported at the level of Primary Health Centers (PHCs) of Haroli, Una, Himachal Pradesh, 2011-13.

PHC Name	Population (Number)	Pregnancy Registration (per 1000 population)			p value	CBR (per 1000 population)			p value
		2011	2012	2013		2011	2012	2013	
Basdhera	26458	17.5	17.0	18.7	0.31	2.9	2.5	0.9	NA
Bathuri	13554	22.7	22.5	26.3	0.05	8.1	5.2	4.9	0.31
Delhan	28335	19.8	19.7	18.2	0.71	2.9	1.6	1.8	NA
Dulher	15094	19.3	16.8	18.0	0.37	7.8	4.1	4.8	0.33
Haroli	37247	19.8	18.9	20.6	0.45	4.8	3.8	3.8	0.85
Kungrath	15617	18.8	17.2	17.8	0.44	8.4	4.9	4.5	0.32
Santokhgarh	30141	20.0	18.5	19.7	0.79	3.3	4.0	3.5	NA
All	166446	19.6	18.6	19.7	0.82	4.8	3.5	3.2	0.72

Based on reported rate of pregnancies total 3261 births were expected but only 636 births were reported in 2013. The possible explanation could be that the births occurred in private sector despite the pregnancy registration in public sector or unregistered home deliveries. These arguments do not hold true as about 90.0% of births were reported at home and were counted. (Table: 3)

Table 2: Annual report based analysis for percentage of first trimester pregnancy registration and women with at least three ante-natal care (ANC) checkups of total registered pregnancies at the level of Primary Health Centers (PHCs) of Haroli, Una, Himachal Pradesh, 2011-13.

PHC Name	1st Trimester Registration			p value	>3 ANC Check-ups			p value
	Year (Percent)				Year (Percent)			
	2011	2012	2013		2011	2012	2013	
Basdhera	24.8	43.7	65.2	0.00	77.9	96.2	95.5	0.00
Bathuri	33.8	42.0	56.0	0.00	100.0	95.7	90.4	0.00
Delhan	37.4	40.6	70.9	0.00	98.5	94.9	100.0	0.00
Dulher	52.1	59.4	80.8	0.00	80.1	93.3	86.6	0.00
Haroli	36.5	46.0	65.6	0.00	99.3	94.3	92.7	0.00
Kungrath	50.0	55.6	75.2	0.00	96.6	98.1	95.3	0.18
Santokhgarh	36.3	32.6	60.0	0.00	100.0	98.7	93.6	0.00
All	38.6	45.6	67.6	0.00	93.2	95.9	93.7	0.00

Another glaring reason could be a "Very High Rate of Premature Termination of Pregnancy". Block Haroli also reported very low sex ratio at birth and this could be one of the main reasons of low observance of births as expected against

the rate of pregnancy registration. Table 8 again reveals a very low rate of abortion in the study area. Interestingly are we missing something here? This issue could be of improper reporting which has been discussed in later paragraph. Here we would like to emphasize on the fact that this analysis throws open the pandora's box on issues regarding health seeking behavior of the communities and/or certain prevailing practices in the community which need to be urgently explored and studied. The above example categorically demonstrates how the HMIS can be used for detecting and identifying issues and instituting operational researches to study these issues aimed at identifying appropriate interventions/actions to resolve them.

However at Table 3 we observe that most of the deliveries have happened at home and have been conducted by the Non-Skill Birth Attendants (Non-SBAs). This reveals poor conversion of good quality ANC to high quality services at delivery services. Could this be due to a simple error of reporting wherein premature termination of pregnancy has been reported as a birth happening at home by a Non-SBA or may be due to lack of understanding and training of the health workers for filling up of the information in the monthly reporting form. Again at

Table 3: Annual report based analysis for percent of home deliveries and by non skilled birth attendant (Non-SBA) reported by the level of Primary Health Centers (PHCs) of Haroli, Una, Himachal Pradesh, 2011-13.

PHC Name	Home Deliveries			p value	Non-SBA			p value
	Year (percent)				Year (percent)			
	2011	2012	2013		2011	2012	2013	
Basdhera	53.2	65.6	96.0	0.00	97.5	95.4	95.8	0.66
Bathuri	100.0	100.0	100.0	NA	78.8	91.5	98.5	0.00
Delhan	98.7	100.0	100.0	NA	83.7	82.2	88.0	0.60
Dulher	100.0	100.0	100.0	NA	82.6	100.0	90.2	0.03
Haroli	70.2	64.5	56.3	0.01	92.8	94.6	95.0	0.52
Kungrath	100.0	100.0	100.0	NA	80.1	86.8	85.9	0.25
Santokhgarh	100.0	100.0	100.0	NA	94.0	97.5	90.5	0.28
All	88.8	90.0	93.1	0.01	87.1	92.6	92.0	0.00

NA: Not applicable as not computed

Table 4 we observe a very low rate of abortion in the study area. Clearly we are missing something. This complete lack of internal consistency is a strong pointer towards the fact that the collection and reporting of data needs major overhauling. The HMIS needs to have an automated mechanism to routinely identify such internal consistencies and offer it for suitable corrective actions. Going further it is also observed that high quality of antenatal checkups correlates well with the low prevalence of abortion and low birth weights (LBW) as reported except at PHCs Dulher, Kungrath, and Bathuri which reported high rate of abortion; and, Haroli and Bathuri which had relatively high figures for LBW prevalence. (Table: 4) In an unexpected situation of better ANC coverage, high rate of home deliveries (by Non-SBAs), low pregnancy wastage and low rates of LBW requires a detailed investigation, only after ruling out the reporting errors.

Table 4: Annual report based analysis of burden of abortion and Low Birth Weight (LBW) among registered pregnancies registered at the level of Primary Health Centers (PHCs) of Haroli, Una, Himachal Pradesh, 2011-13.

PHC Name	Abortion (percent)			p value	LBW (Percent)			p value
	2011	2012	2013		2011	2012	2013	
Basdhera	3.8	2.2	1.4	0.01	0.0	0.0	0.0	NA
Bathuri	0.6	1.3	3.0	0.01	0.0	2.8	3.0	0.09
Delhan	1.0	1.9	1.9	0.25	0.0	3.9	2.0	0.28
Dulher	5.4	4.7	4.0	0.42	0.8	0.0	1.3	0.60
Haroli	3.7	2.9	1.4	0.00	5.0	9.8	5.2	0.07
Kungrath	3.7	2.9	4.6	0.56	1.5	2.6	0.0	0.49
Santokhgarh	0.3	0.0	1.3	0.02	0.0	0.8	1.8	0.15
All	2.7	2.3	2.5	0.60	1.0	2.8	1.9	0.15

When it was looked into women who were beneficiaries of JSY (*Janani Surkasha Yojana*) scheme, as a proxy for women of socially disadvantage families, it was found that in 2013, 21.2% registered women were benefited. The PHCs of Bathuri and Dulher observed a staggeringly high trend for JSY beneficiaries as compared to other PHCs. (Table: 5) JSY benefit has paid in terms of monetary incentive, which is indifferent for home and hospital delivery. This differentiation in the format could have indicated for reporting errors or actual occurrence of home deliveries in the study area.

Table 5: Annual report based analysis for percentage of JSY (*Janani Surkasha Yojana*) beneficiaries of total registered pregnancies at the level of Primary Health Centers (PHCs) of Haroli, Una, Himachal Pradesh, 2011-13.

PHC Name	Year (Percent)			p value
	2011	2012	2013	
Basdhera	18.5	19.7	22.2	0.15
Bathuri	9.4	11.1	15.6	0.01
Delhan	10.7	16.3	24.6	0.00
Dulher	2.7	2.7	33.2	0.00
Haroli	10.4	12.3	16.2	0.00
Kungrath	14.9	17.1	19.7	0.12
Santokhgarh	13.0	12.5	16.9	0.03
All	11.4	13.1	21.2	0.00

Table 6 reflects on the percentage of women with Hb less than 11 gram% among the total registered pregnancies. The time series analysis reflects an unusual/unexpected variation in most of the PHCs. This could probably be due to the fact that many of the pregnant women are not being tested for Hb but are included in the denominator and perhaps warrants a change in the associated variables. The indicator could have better been the percentage of women with Hb less than 11 gram% among the total registered pregnancies tested for Hb. Similarly a wide variation is observed between the PHCs. Since the population demography is similar the finding is again unexpected and could be due to faulty variables being collected. If not this data is indicative of undertaking a study to identify the causes for the same.

Table 6: Annual report based analysis for percentage of women with Hemoglobin (Hb) less than 11 gram% among total registered pregnancies at the level of Primary Health Centers (PHCs) of Haroli, Una, Himachal Pradesh, 2011-13.

PHC Name	Year (Percent)			p value
	2011	2012	2013	
Basdhera	0.4	5.9	7.4	0.00
Bathuri	40.5	29.8	60.7	0.00
Delhan	7.6	44.7	76.9	0.00
Dulher	17.8	3.9	18.4	0.91
Haroli	21.1	26.7	27.7	0.00
Kungrath	48.2	70.1	47.7	0.98
Santokhgarh	9.1	5.5	40.1	0.00

All	20.7	26.6	39.8	0.00

Male child preference has been a known socio-cultural phenomena and is reflected in terms of poor sex ratio prevailing in the area. Overall and even across all the PHCs, the poor sex ratio (number of females per 1000 males) at birth is reported. Furthermore concerning is that across the years there has been a deterioration of sex ratio (Table: 7).

Table 7: Annual report based analysis for sex ratio (number of females per 1000 males) at the level of Primary Health Centers (PHCs) of Haroli, Una, Himachal Pradesh, 2011-13.

PHC Name	Year (Percent)		
	2011	2012	2013
Basdhera	898	1000	499
Bathuri	745	511	1193
Delhan	764	451	786
Dulher	1105	441	499
Haroli	894	689	739
Kungrath	953	582	706
Santokhgarh	1141	1033	709
All	919	642	709

Despite the save girl campaign and strict implementation of preconception and prenatal sex determination test by the state government, this practical state of male preference requires urgent evidence based intervention/action. Such a poor sex ratio and abortion at the rate of 2.0% hinting towards missing abortions, poses a grave threat to the demography in the future. This can be further better understood if the monthly reports include sex of a still birth (SB) baby. It is so worker reports only those abortions which were legal but families could report illegal ones either as a SB or did not reported at all. Though the current report analysis reported low SBR of about 11/1000 Live Births (LBs) as compare to the expected national average of 20/1000 LBs. Quite a differential pattern was observed across all the PHCs like Dulher, Santokhgarh and Delhan reported nil in 2013 as they were reporting quite high in 2011 and 2012. Whereas, Bathuri and Kungrath started reporting in

2013 but reported nil in the early years. (Table: 8)

Table 8: Annual report based analysis of still birth rate (SBR) per 1000 live births (LB) at the level of Primary Health Centers (PHCs) of Haroli, Una, Himachal Pradesh, 2011-13.

PHC Name	Year (per 1000 LB)			p value
	2011	2012	2013	
Basdhera	13.1	15.1	14.6	0.44
Bathuri	0.0	14.8	15.1	0.24
Delhan	12.0	22.2	0.0	0.47
Dulher	33.9	16.1	0.0	0.10
Haroli	5.5	21.2	7.0	0.81
Kungrath	0.0	0.0	14.2	0.13
Santokhgarh	20.2	8.1	0.0	0.13
All	12.1	13.8	11.1	0.87

This could be due to differential understanding and lack of uniformity for the definition of SB across all health workers of the area. This differential pattern was observed for infant and neonatal deaths as well despite relatively better understanding for neonatal and infant deaths. (Table: 9) Though no inference can be made out of the reported neonatal and infant death rates but the actual reasons for death should be ascertained for these deaths and SB at the level of household. This will clarify that whether these were actual one or suspected abortions, as the sex ratio of some of the PHCs were poor and declining reportedly.

Table 9: Annual report based analysis for Neonatal Mortality Rate (NMR) and Infant Mortality Rate (IMR) per 1000 live births (LB) reported at the level of Primary Health Centers (PHCs) of Haroli, Una, Himachal Pradesh, 2011-13.

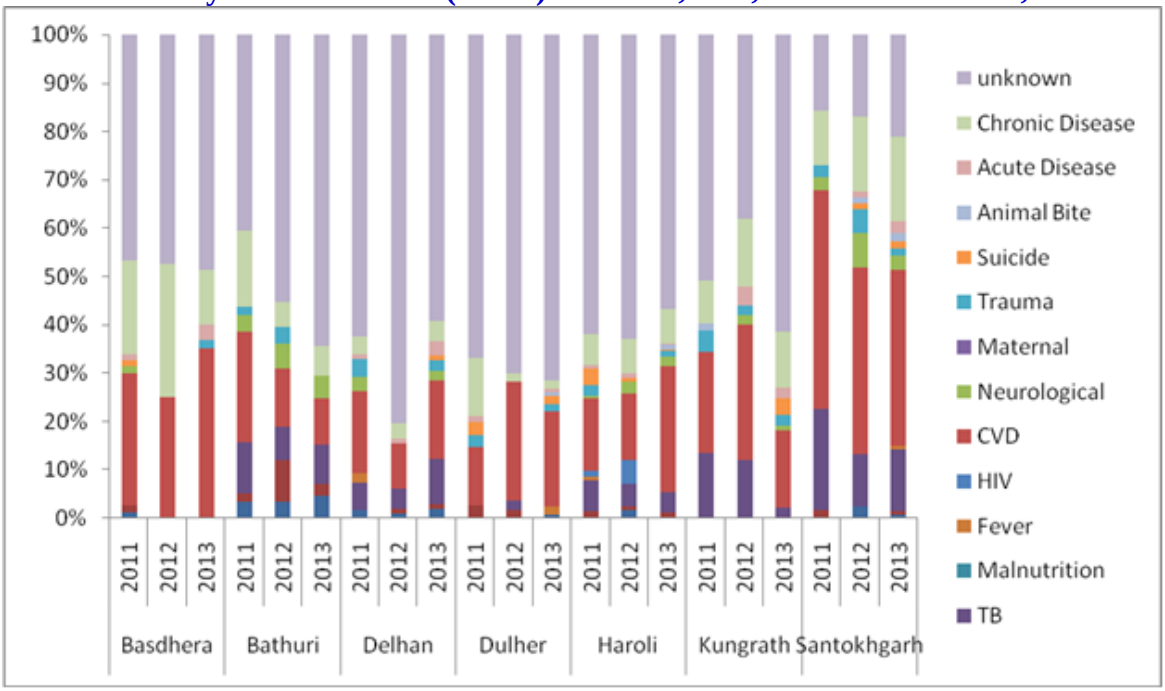
PHC Name	Year NMR (per1000 LB)			p value	Year IMR (per1000 LB)			p value
	2011	2012	2013		2011	2012	2013	
Basdhera	13.5	0.0	0.0	0.33	13.5	0.0	0.0	0.33
Bathuri	18.1	28.1	60.6	0.13	9.0	70.4	30.3	0.29
Delhan	24.0	22.2	40.0	0.61	0.0	22.2	20.0	0.24
Dulher	0.0	0.0	13.8	0.16	16.9	16.1	0.0	0.32
Haroli	0.0	14.0	0.0	0.88	11.1	7.0	21.2	0.48

Kungrath	0.0	0.0	0.0	NA	0.0	0.0	0.0	NA
Santokhgarh	0.0	16.3	9.4	0.49	20.2	0.0	9.4	0.43
All	7.9	11.5	17.7	0.11	10.0	16.5	11.5	0.73

NA: Not applicable as not computed

As CBR the unexpected crude death rate (CDR) was reported and was very low as 0.4, 0.3, and 0.5 per 1000 population in three years respectively. (Data not shown) Unknown cause of death was reported least in Santokgarh and Basdhera in all the three years. Across all PHCs, the cardiovascular diseases (CVDs) related deaths reported as a common cause. TB related death was next common cause in Bathuri, Delhan, Santokgarh, Haroli (from year 2011 to 2013) and Kungrath (in year 2011 and 2012). In addition to CVD and TB related deaths, trauma also observed as a fraction of cause specific mortality across all the PHCs. (Figure: 1) Cause specific mortality was reported by the health workers and should be based on available hospital records or Verbal Autopsy (VA) using standard method of classification of Death like ICD-10 (International Classification of Diseease-10th version). It was observed that most of deaths were not able to be classified and reported as "Unknown" cause of death, indicative of lack of application of standard tools.

Figure 1: Annual report based analysis for all cause mortality (percent) reported at the level of Primary Health Centers (PHCs) of Haroli, Una, Himachal Pradesh, 2011-13.



Curative services at the level of PHCs were observed with significant improving trend (p=0.00) in Out Patient Department (OPD) consultation for various ailments. This significant change in the OPD consultation was observed in all the PHCs. Except Santokhgarh, all the PHCs had better OPD consultations. Though the type of ailment was not recorded in the OPD registers, therefore the nature of ailments could not be differentiated. PHCs also provided In Patient Department (IPD) consultations and were observed better only for Haroli as it is the CHC as well and only Delhan and Basdhera reported IPD consultations. Though the doctor is available across all the PHCs such a pattern could be due to better connectivity for district hospital or private hospitals for admissions (Table: 10)

Table 10: Annual report based analysis for the rate of the out-patient department (OPD) consultations and the inpatient department (IPD) admission per 1000 population reported at the level of Primary Health Centers (PHCs) of Haroli, Una, Himachal Pradesh, 2011-13.

PHC Name	OPD Year (per1000 population)			p value	IPD Year (per1000 population)			p value
	2011	2012	2013		2011	2012	2013	
Basdhera	772.8	798.1	706.1	0.00	8.7	13.0	6.4	0.00
Bathuri	352.2	383.9	574.2	0.00	0.0	0.0	0.0	NA
Delhan	582.7	584.0	632.8	0.00	11.8	8.1	14.1	0.00
Dulher	699.8	567.7	585.9	0.00	0.0	0.0	0.0	NA
Haroli	970.6	1031.0	959.7	0.00	19.5	16.0	13.6	0.00
Kungrath	438.6	397.8	836.0	0.00	0.0	0.0	0.0	NA
Santokhgarh	275.7	291.4	307.2	0.00	0.0	0.0	0.0	NA
All	584.6	579.1	657.4	0.00	5.7	5.3	4.8	0.00

NA: as test statistic not computed

Discussion:

Health system as a coordinated effort to deliver the health care services to a large populace requires a regular and routine recording and reporting mechanism on the laid down activities to assess its performance and also a mechanism to provide feedback to the relevant functionaries in the line for corrective actions and continual improvement. The routine information is routed from grass

root workers to program planners in the form of numbers by the monthly and annual format (reports). Such continuous, accessible, and timely information is valuable in terms of understanding the health system performance and assessing the population health. Also, remarkably this information is available for village, sub-district, district and state levels. This information is often overlooked due to validity concerns due to reporting bias--possibly due to likely administrative explanations, lack of understanding, or lack of validation. Apart from validity concerns the lack of use of this information is also due to variable knowledge and skills and the lack of time at the 'end of line functionary'.

HMIS is a tool for decision making to improve services for health of people. NHM has invested heavily to create an effective HMIS and the relevant data is now easily available for analysis. The present study clearly highlights that the HMIS is of usefulness and utility which however needs strengthening, prima facie, through a more comprehensive inclusion of variables for capturing a wider set of information, automation for internal consistency and regular feedback to concerned levels for action. Improving the analytical ability of HMIS as a unit has the potential that can guide the program planners. The ability can be improved by Information and Technology (IT) advances, from which the present HMIS has not been fully benefitted. In the present study, the presence of internet connectivity, computer and data entry software (DHIS-2) with the technical support at the block, district level and state level have observed.

Presently, the analysis of information is at state level with the communication to district officials about the reported errors. These are then discussed with end of line functionaries at monthly meetings. Clearly a time lag exists herewith and the corrective actions so undertaken are delayed and lose its relevance. It is therefore required that the information should move in real time as far as possible. Further, the analytical capability should be transferred close to professionals actually representing their work i.e. till the village level. The focus should not be on finding and correction of errors but application of decision making process. Application basic software for data analysis or shareware at the level of sub-district where the internet penetration is relatively better will help to improve the data quality at the earliest. Such low cost technologies need to be tested for their cost effectiveness in HMIS considering system as a subject to research. Formulation of software/shareware as tool should come under the ambit of product development

technologies in health care along with drug, vaccine, diagnostic appliance etc. HMIS related product development also follows steps of development cycles like discovery, steps to manufacture, and scalability of optimize. (Mahmoud, Danzon & Barton, 2006)

Health worker motivation to effectively utilize the health information plays a role in improving their performance. The process of errors reporting, identifying, communicating and re-correcting is to be transformed into a fact finding based decision making process. The concept of HMIS needs to be discussed in the refresher trainings and reporting of actual facts is to be encouraged for discussion. Inculcation of IT based analytical skills among health care professionals is now required to reshape the HMIS as a culture than just as a tool. In addition to motivating the workforce, a supportive environment needs to be constructed to develop the instruments and methods to improve the efficiency and effectiveness of HMIS. So far, the use of HMIS based information seeks way to policy articulation. Limited experiences exists like USAID funded MEASURE (Monitoring and Evaluation to Assess and Use Results) project, in which it was designed to improve and institutionalize the data collection and use of information for policy development and program management. In addition to HMN assisted financial packages various international efforts like STATCAP (Statistical Capacity building) program by the World Bank are available for strengthening the HMIS. There is a separate trust for statistical capacity building which offers grant funding to prepare a statistical master plan which is required for obtaining the STATCAP loan. (Stansfield, Walsh & Prata, 2006)

HMIS as an established entity now requires a sustained high level commitment and identified changes of management. It is to be well supported by an identified agency which will carry out HMIS reform engaging all the stakeholders and work across the sectors. A simple information structure is to be structured to drive the decision making process at the grass root level—where the data are collected. The structure should have inherent provision for the incentives and accountability for performance. ((Stansfield etal, 2006) An effective HMIS delivers routine information not only to enable the policy formulation and health management but also promotes research by identifying the areas of research.

Acknowledgement: We express our sincere thanks to National JALMA Institute of Leprosy and Other Mycobacterial Diseases (NIJL&OMD),

Agra, Uttar Pradesh, India for the funding support.

Competing Interest: We declare no competing interests.

References:

1. Deo MG. (2003) Doctor population ratio in India: The reality. Indian J Med Res; 137:632-635.
2. World Health Organization. (2008) Health Matrix Network. Assessing the National Health Information System: An assessment tool, Geneva. Available at: http://www.who.int/healthmetrics/tools/Version_4.00_Assessment_Tool.pdf?ua=1 Accessed 8 September 2015.
3. Government of India. (2005) Ministry of Health and Family Welfare. National Rural Health Mission. Mission Document. Available at: http://www.nird.org.in/brgf/doc/Rural%20HealthMission_Document.pdf Accessed 7 September 2015.
4. Mahmoud A, Danzon PM, Barton JH, et al. (2006) Product Development Priorities. Decision Making for Health. In: Jamison DT, Breman JG, Measham AR, Alleyne G, Claeson M, Evans DB, Jha P, Mills A, Musgrove P (Eds) Disease Control Priorities in Developing Countries, 2nd edition (pp:139-155). New York: Oxford University Press.
5. Stansfield, SK, Walsh J, Prata N, et al.(2006) Information to Improve Decision Making for Health, In: Jamison DT, Breman JG, Measham AR, Alleyne G, Claeson M, Evans DB, Jha P, Mills A, Musgrove P (Eds) Disease Control Priorities in Developing Countries, 2nd edition (pp:1017-1030). New York: Oxford University Press.
6.