

Data Quality Assessment and Factors Responsible in
District Bareilly, Uttar Pradesh

By

Prerna Choudhary

*Dissertation submitted in partial fulfillment of the requirements of the degree
MBA Hospital and Health Management*

Academic year, 2017-2019



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TO WHOMSOEVER MAY CONCERN

This is to certify that Dr. Prerna Choudhary student of MBA Health and Hospital Management from The IIHMR University, Jaipur has undergone internship training at IHAT from 04/02/19 to 04/05/19

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

The Internship is in fulfillment of the course requirements.

I wish her all success in all his future endeavors.



Dean, Academics and Student Affairs

The IIHMR University, Jaipur

16 May 19.



Professor

The IIHMR University, Jaipur

Ref. No. IHAT/HR/CERT/2019-2020/33

Date: 10 May 2019

The certificate is awarded to

Prerna Choudhary

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

Monitoring & Evaluation

And has successfully completed her Project on

**DATA QUALITY ASSESSMENT & FACTORS RESPONSIBLE IN DISTRICT
BAREILLY, UTTAR PRADESH**

4th Feb 2019 - 4th May 2019

At

India Health Action Trust

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

We wish her all the best for future endeavors



Monitoring & Evaluation



Human Resource

THE IIHMR UNIVERSITY, JAIPUR

CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled 'DATA QUALITY ASSESSMENT & FACTORS RESPONSIBLE IN DISTRICT BAREILLY, UTTAR PRADESH' and submitted by Prerna Choudhary , 0629 under the supervision of Dr. Anoop Khanna for award of MBA in Hospital and Health in Health and Hospitals of the University carried out during the period from 4th Feb 2019 to 4th May 2019 embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other institute or other similar institution of higher learning.


Signature

ACKNOWLEDGEMENT

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1) ABBREVIATIONS

ARO: Assistant Research Officer

BPM: Block Program Manager

CHC: Community Health Centre

DH: District Hospital

GIS: Geographic Information System

HMIS: Health Management Information System

IHAT: India Health Action Trust

NFHS: National Family Health Survey

PHC: Primary Health Centre

RCH: Reproductive and Child Health

UPHMIS: Uttar Pradesh Health Management Information System

2) INTRODUCTION

HMIS- HEALTH MANAGEMENT INFORMATION SYSTEM:

Health care data is defined as that information used to provide, manage, pay and/or report on the services used across the entire health care system. HMIS produce data about health service provision and population health status to be used for decision making and program planning at all levels of the health system.

Accurate, timely and reliable public health data are essential for the delivery of high-quality healthcare services and for ongoing improvement of public health programs.

Quality and timely data from a health information system should be used to guide decision making across all the other health system functions (service delivery, Health workforce, access to essential medicines, financing, leadership, and Governance).

These decision-making processes include priority setting, health resource allocation and utilization, introducing and improving service delivery and policymaking to promote greater utilization of health services and improve health outcomes by annual health planning and budgeting.

Data-informed decision making contributes to a culture of transparency and accountability, as available information is used to ensure that resources such as workforce, finances, and commodities are being used effectively and appropriately.

UTTAR PRADESH HEALTH MANAGEMENT INFORMATION SYSTEM-

The salient features of UPHMIS are as depicted in the figure.

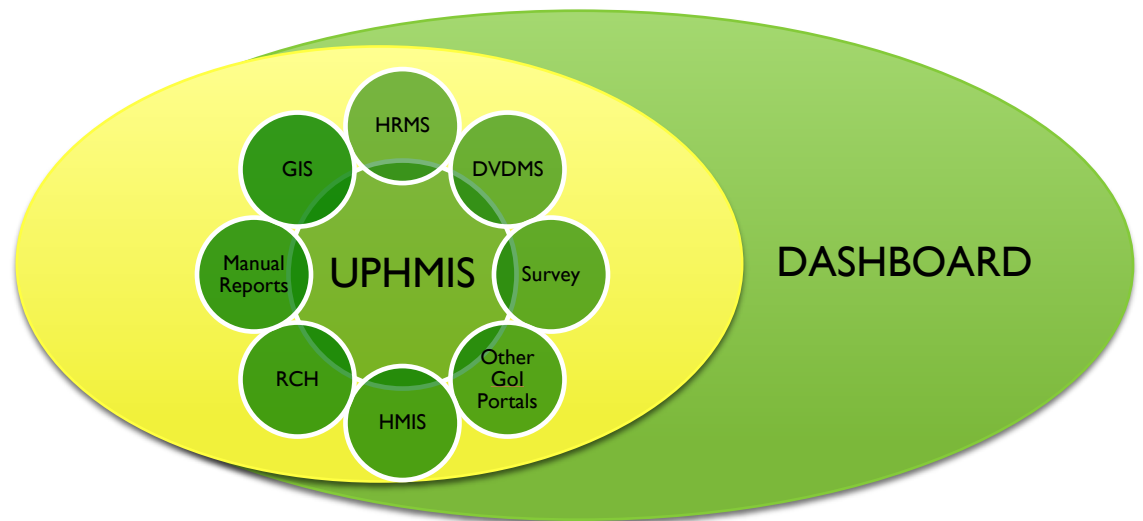


FIG 1: UPHMIS- Salient Features

- **Integrated portal** for all data sources like HMIS, GOI portals, manual reporting (MPR)
- **Integrated data set** can be generated and analyzed through UPHMIS
- **UPHMIS hosts** the comprehensive data for the Dashboard display
- **GIS map** can be populated through UPHMIS

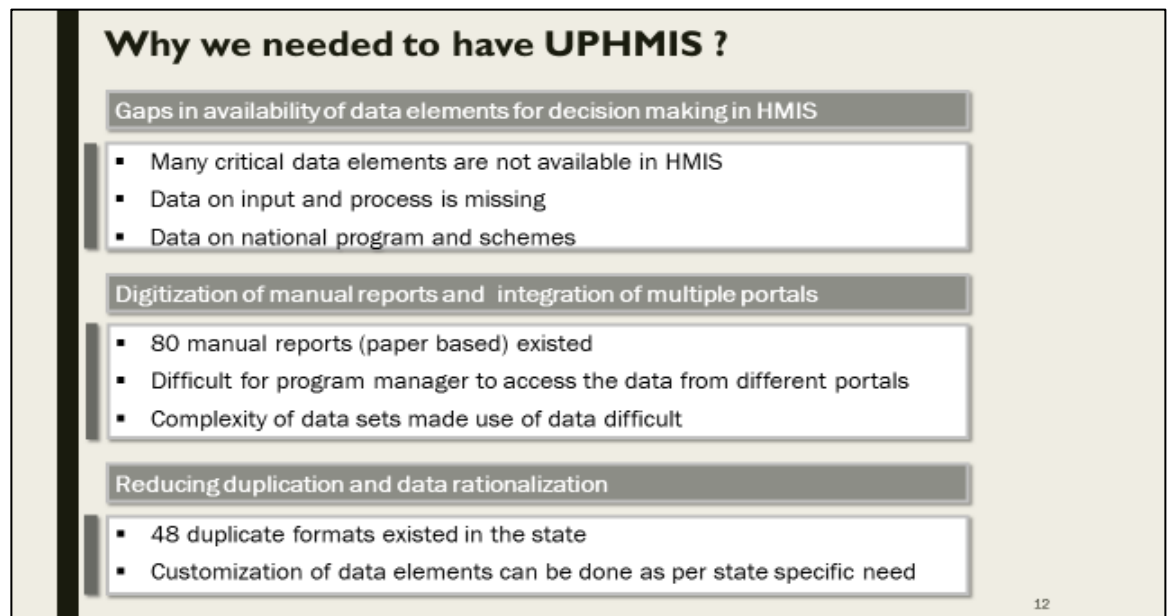


FIGURE 2: NEED FOR UPHMIS

3) LITERATURE REVIEW:

- I. Barriers to Use of Health Data in Low- and Middle- Income Countries done by USAID and MEASURE EVALUATION suggested that low data quality can be attributed to a variety of root causes and is exacerbated when health workers are unmotivated to collect accurate data. Data quality practices can also be dependent on leaders that value and incentivize quality data for decision making; organizational supports that outline roles, responsibilities, or procedures for data quality improvement activities; and the design of health information systems that facilitate easy collection and reporting of data. (Michelle et al,2018, p.6)
- II. A quality assessment of Health Management Information System (HMIS) data for maternal and child in Jimma zone, Ethiopia suggested the importance of quality of data and the ways to improve the quality of HMIS data. (Ouedraogo Mariame, 2011, p.3)

- III. Main barriers for quality data collection, done by University of Porto stated that the volume of health data is rising, and health information technologies are a promising solution. However, they often cause errors instead of preventing them. A study using 5 different database engines were conducted from which data availability, format, accuracy and data accessibility were the most focused problems to address. (Rui et al,2009, p.1)

4) RATIONALE:

- Data quality analysis in health care is a large and ongoing problem. As the scope of health care information systems is extremely broad and have either a direct or indirect impact on the provision of health care, their quality is a topic of critical importance.
- However, while data has the potential to be very helpful in healthcare, it is not always organized or managed properly, making it difficult to understand required data management and analysis.
- There are multiple facilitators that strongly influence the ability of individuals and organizations to use data effectively, as well as barriers that prevent this from happening. Despite the global recognition for the need to strengthen data-informed decision making, little is known on how to best accomplish this goal.
- Even after improvements in technological solutions facilitating the collection of data and improving data analytics and visualization, actual use of data remains limited in many settings, especially at lower levels such as the district or community.

5) OBJECTIVES:

The specific objective includes:

- To identify the data quality status on key parameters in district Bareilly
- To analyse the provider side barriers (person responsible for data entry at the facility) for poor data quality.

Ideal process of data reporting

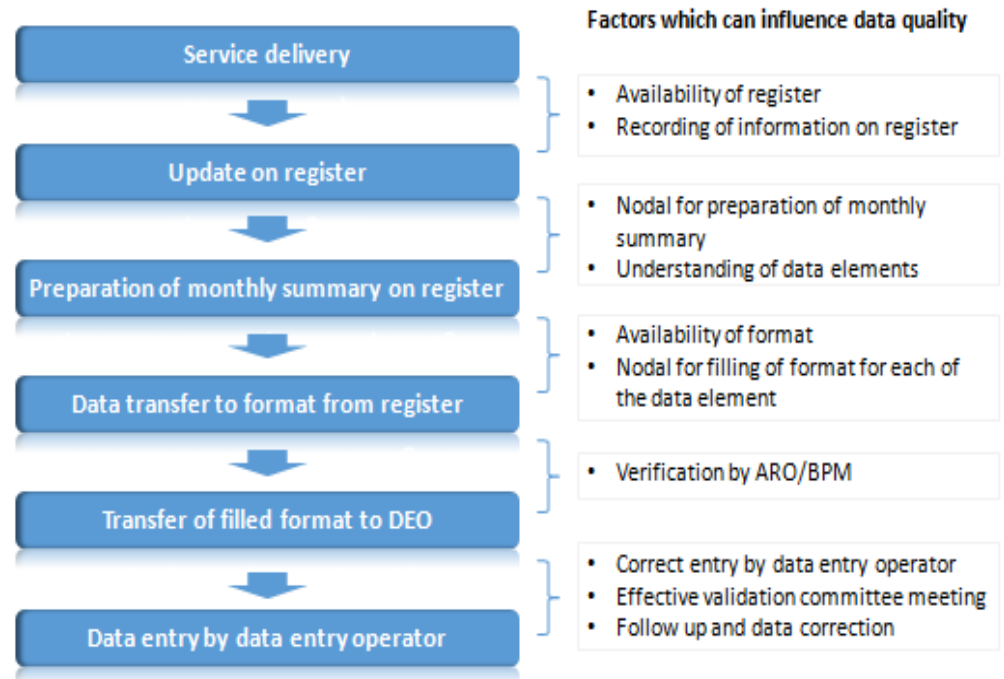


FIGURE 3: Data Reporting Process

6) DATA QUALITY PARAMETERS:

Data quality or accuracy can be defined as the gap between the *actual* (the reality which seeks to be measured) and the *measured* (what is actually measured). The following data quality parameters have been identified:

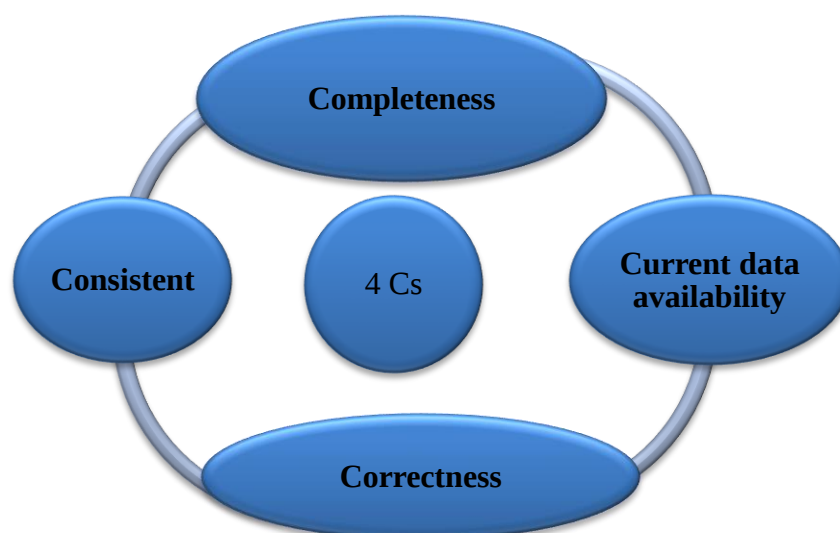


FIGURE 3: Parameters of data quality

I. **Current data availability –**

Current or recent data must be available for all the facility/units for all formats

- Timely availability of data (30th of the month for UPHMIS and HMIS import)
- Available for all the facility and formats
 - Facility level format (SC, PHC, CHC, DH)
 - District level format

II. **Completeness -**

All the data elements for all the facility must be completely filled

- **Non-blank data**
 - All the reported data must not be blank.
 - Services for which facility is eligible to provide services but not provided in the reporting month must be reported as zero.
- **Non-zero data**
 - Ideally the facility is supposed to provide all the services for all the data elements listed in its specified format.
 - The reported data should also be non-zero considering facilities are providing all the eligible level of services

III. **Correctness-**

Data must be correct and accurate

- **Validation rule**
 - There are around 68 validation rules are established within HMIS/UPHMIS data set.
 - The facility must pass all the serious validation rules

- **Matching of calculated indicator value with survey data (NFHS 4)**
- **Matching of reported data with the source document**
 - Data audit need to be conducted to get the matching status of reported data with source document
- **Correct data must be reported in source document**
 - Interaction and validation with beneficiaries are required to get the status

IV. Consistency-

- Variation in reported data of same data element across different months should not be beyond acceptable range
- Number of units reported less than lower control limit (LCL) or higher than upper control limit is called an outlier

$$UCL = \text{Mean} + 3 \sqrt{\text{Mean}}$$

$$LCL = \text{Mean} - 3 \sqrt{\text{Mean}}$$

7) DATA QUALITY INDICATORS:

Indicators are usually numerical measures that help to compare expected results with actual results on a particular point of time or on a periodic basis. Following are the 9 indicators for data quality based on the selected four parameters:

S. No.	Parameter	Indicator	Type
1	Current availability	% of facilities uploaded/imported UPHMIS and HMIS file in UPHMIS portal (timely and total availability)	Positive
2		% of districts uploaded all the district level format (format wise)	Positive
3	Completeness	% of facilities with greater than 80% of non-blank data elements (including zero)	Positive
4		% of facilities with greater than 30% of non-zero data elements (excluding zero)	Positive
5		% of facilities (DHs and CHCs) reported non blank/zero in ≥ 14 (Out of 20) critical data elements	Positive
6	Correctness	% of facilities with at least 1 validation rule error	Negative
7		District with indicator value (5 key indicators) variation from NFHS 4 is $\pm 15\%$	Positive
8		% of data elements matched with source document	Positive
9	Consistency	% of facilities reported outlier	Negative

TABLE 1: Data Quality Indicators

8) METHODOLOGY:

- STUDY DESIGN: Cross sectional
- SETTING: Study was done in the blocks of district Bareilly, Uttar Pradesh
- STUDY POPULATION:
 - Inclusion criteria: All the public health facilities of district Bareilly, Uttar Pradesh
 - Exclusion criteria: Any other private facility at district Bareilly.
- STUDY TOOL: Questionnaire
- DURATION: 3 months
- SAMPLE SIZE: 9 facilities
- SAMPLING TECHNIQUE: Multi-stage
- Analysis of data of blocks of Bareilly district was done. On the basis of analysis of data quality indicators, the best performing, and worst performing blocks were identified.
- From the 2 blocks 1 PHC, 1 block facility (CHC) & 2 sub centers were chosen for the study randomly.

Data Collection

- The data was collected by the means of questionnaire
- Blocks were selected and then from those blocks sample facilities were selected for collection of data.

S. No.	Block	Facility	Respondent
1	Kyara	BPHC Kyara	BPM
2		PHC Kandharpur	SN
3		SC Sadpur hakansh	ANM
4		SC Vidholiya	ANM
5	Mudia Nawi Bux	BPHC Mudia Nawi Bux	BPM
6		PHC Riccha	SN
7		SC Damkhoda	ANM
8		SC Riccha	ANM
9	District headquarters	District Female Hospital	Quality Manager

TABLE 2: Blockwise analysis

KEY STEPS TO DEVELOPING COMPOSITE INDEX

- Composite index is simple average of index value of each indicators for each domain
- Weightage is assigned to composite index value of each of the domain (outcome, input and data integrity) for computing final composite index

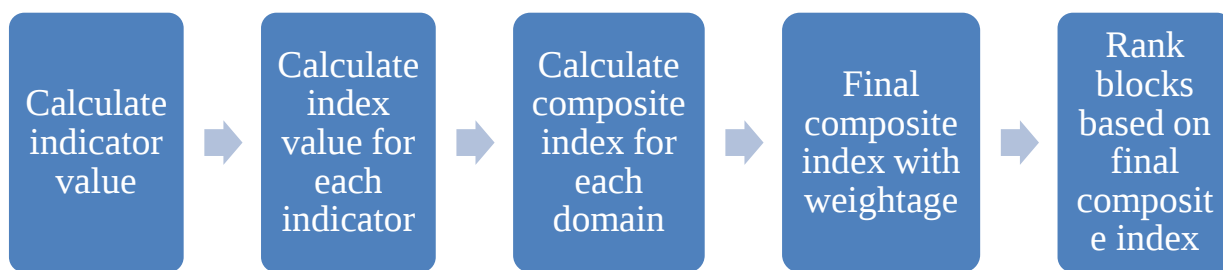


FIGURE 5: COMPOSITE INDEX

- Index value is calculated by using formula

Positive Indicator: Index value= $(V_i - V_{min}) / (V_{max} - V_{min})$

Negative Indicator: Index value= $(V_{max} - V_i) / (V_{max} - V_{min})$

Where, V_i = *Percent value of indicator*

V_{min} = *minimum value of indicator out of all district*

V_{max} = *maximum value of indicator out of all district*

9) RESULTS:

A. DATA QUALITY ANALYSIS:

Block wise ranking of the 16 blocks in district Bareilly, based on the composite index of all data quality indicators.

Rank	Block	Composite Index
1	Mudia Nawi Bux	0.278
2	Ramnagar	0.303
3	Bithrichainpur	0.331
4	Kuadanda	0.365
5	Fatehganj(West)	0.376
6	Bhojipura	0.428
7	Mirganj	0.448
8	Dalelnagar	0.469
9	Behedi	0.495
10	Faridpur	0.513
11	Bhamora	0.520
12	Shargarh	0.563
13	Majhganwa	0.565
14	Nawabganj	0.569
15	Bareily DHQ	0.593
16	Kyara	0.618

TABLE 3: Data quality index

Block	% of facilities uploaded/imported UPHMIS and HMIS file in UPHMIS portal (timely and total availability)	% of facilities with greater than 80% of non-blank data elements (including zero)	% of facilities with greater than 30% of non-zero data elements (excluding zero)	% of facilities with at least 1 validation rule error	% of facilities reported outlier
Bareilly DHQ	97	43	2.11	17	4.7
Behedi	100	52	1.65	77	3.0
Bhamora	100	22	0.00	33	2.8
Bhojipura	93	0	0.00	13	3.8
Bithrichainpur	83	5	0.28	25	3.1
Dalelnagar	100	4	0.29	31	3.2
Faridpur	100	16	0.00	26	3.2
Fatehganj(West)	87	14	0.30	30	3.3
Kuadanda	87	5	0.55	30	3.0
Kyara	97	72	0.00	29	3.4
Majhganwa	90	73	0.22	38	2.4
Mirganj	94	12	0.30	27	3.3
Mudia Nawi Bux	79	1	0.00	24	3.2
Nawabganj	100	67	0.00	33	5.4
Ramnagar	94	0	0.00	26	7.1
Shargarh	80	6	9.09	35	0.0

Table 4: Index value

For explanation, Bareilly's data analysis has been shown along with the indicators used based on data quality parameters.

The table shows that Bareilly DHQ and kyara are good performing blocks and the worst performing is Mudia nawi bux, in accordance with the composite index of all data quality indicators.

Mudia nawi block does worst of all, suggesting that the data quality has been compromised in most of the aspects and important steps are required to be taken at every place for improvisation of quality of data.

Bareilly DHQ and kyara does well in the data quality, but still have scope for improvement. The efficiency of data collection and quality aspect at every phase should be taken care of, for best quality of data.

B. IDENTIFICATION OF PROVIDER SIDE BARRIERS:

.	BARRIERS	FACILITY	MN BUX	KYARA	DWH
Source document					
1	Total no. of elements for which summary was prepared in the record	Block facility	12%	44%	31%
		PHC	9%	38%	
		Sub- centre	3%	22%	
2	Total number of data elements for which responsibility is assigned	Block facility	39%	79%	82%
		PHC	46%	70%	
		Sub- centre	0%	40%	
System level					
3	Whether health facility has a printed format for HMIS reporting	Block facility	No	Yes	Yes
		PHC	No	Yes	
		Sub- centre	No	Yes	
4	Training received by computer operator/BPM/ANM on HMIS in last one year	Block facility	Yes	Yes	Yes
5	Validation Committee meeting	Block facility	No	Yes	
6	Visit by government officials for data quality assessment (data audits)	Block Facility	No	Yes	Yes
		PHC	No	Yes	
		Sub- centre	No	Yes	
Knowledge & understanding					
7	Knowledge of reporting period (Period- 21 st to 20 th)	Block Facility	Yes	Yes	Yes
		PHC	Yes	Yes	
		Sub- centre	Yes	Yes	

8	Knowledge and Understanding (Of indicators)	Block facility	64%	86%	86%
		PHC	67%	78%	
		Sub- centre	80%	80%	

TABLE 5: Results

INTERPRETATION OF TABLE:

As the above table shows, Kyara and DWH(Bareilly) are the best performing blocks and the barriers are also comparatively less to MN BUX. The parameters directly affecting data quality include:

- Number of data elements for which responsibility is assigned
- Printed format for HMIS reporting
- Validation committee meeting
- Visit by government officials for data quality assessment

10) DISCUSSION:

Data quality can be affected by either of the following factors:

- ❖ Assigning data element responsibilities to the staff-

A successful data management plan requires that the appropriate staffing resources are available and trained. Assigning responsibilities to the concerned staff helps to reduce the workload on the DEO/BPM, hence increasing their efficiency and

- ❖ Maintaining summaries at the end of each month-

Summary maintenance reduces the chances of error and helps attain precision in turn leading to improved data quality.

- ❖ Availability of printed formats for reporting-

The availability of printed formats at all levels (Pharmacists, staff nurse, lab technician) directly affects the data quality.

- ❖ Continuous monitoring (Data audits)-

Supportive supervision of the facility for data leads to data profiling to discover inconsistencies and other anomalies in the data

❖ Validation committee meetings-

Validation committee meetings on a regular basis, help improve the data quality and maintain the same.

11)RECOMMENDATIONS:

Following recommendations can be made on the basis of study:

- A) As discussed from the study there is requirement of division of labor is utmost important and should be exercised in every facility.
- B) Monitoring while collection and even uploading of data should be done in a continuous fashion. It should be made adamantly clear that the data is to be of quality which includes timely uploading and completeness, both including and excluding zero.
- C) Summary maintenance at the end of each month should be exercised. In every validation meeting the summary should be checked, verified and cross-checked for improvement in the quality of data.
- D) Data audits should be conducted frequently and formats for reporting should be given and should be properly made so that they can be used and validated whenever required.

12)REFERENCES:

- Ouedraogo Mariame. A quality assessment of Health Management Information System (HMIS) data for maternal and child health in Jimma Zone, Ethiopia. Jou. Pon 2011
- University of Porto. Main barriers for quality data collection, porto,2017

13)ANNEXURES-

ANNEXURE 01

The informed consent form was as follows:

CONSENT TO ACT AS A PARTICIPANT

Participant's Name:

My name is Dr. Prerna Choudhary, and I work with UPTSU (IHAT) and we are asking you to take part in the research study to identify the data quality status of district Bareilly, to know the barriers to poor data quality. We want to be sure that you understand the purpose and your responsibilities in the research before you decide if you want to be a part of the study/survey. Please ask us to explain any words or information that you may not understand. As part of the research, interviews will be conducted. This is a research study & not health care provision. If you agree to participate, we will ask some questions about data quality, your understanding, current record maintenance & your suggestions. This interview is likely to last for about 3-4 hours.

Roles & benefits of participating in the study

If you choose to participate, we will give you a copy of this form. It is important that you know:

- Your participation is voluntary
- You may choose not to take part or to stop the discussion at any time if you choose not to participate in this, will not be told to anyone.
- Confidentiality if desired, will be maintained.

There are no costs to the participant or payments made for participating in this study. By signing this consent form, you are agreeing that you read, or it has been read to you, and you fully understand the contents of this document and are willing to take part in this study. In case of any information regarding the study is required, then please contact the concerned authority whose contact details are given below.

Signature/ thumb impression: _____

Date: _____



Please consider the environment before printing this email

ANNEXURE 02

The tool (questionnaire) that was used for data collection is as follows :

Assessment of Data Quality Status

General Details								
Name	Designation	MOIC.....1 ARO.....2 BPM.....3						
District	Date of joining on this position (dd/mm/yyyy)	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> </tr> </table>						

S.no	Questions	Response	Skip
1	System and availability		
1.1	Whether health facility has a printed format for HMIS reporting	Yes1 No 2	All
1.2	Are validation committee meetings held on a regular basis (minutes)	Yes1 No 2	Block Facility
1.3	Has computer operator/BPM/ANM have received any training on HMIS in last one year?	Yes1 No 2	Block Facility
1.4	Did any review meeting held in last month & HMIS/MCTS feedback shared? (verify with meeting minutes)	Yes1 No 2	Block Facility
1.5	Did HMIS/MCTS data quality issues discussed in last review meeting?	Yes1 No 2	Block Facility
1.6	Are there visit by government officials for data quality assessment?	Yes1 No 2	All
1.7	Do you share this data on a regular basis to your MOIC and other officials?	Yes1 No 2	All
2	Knowledge and Understanding		

S.no	Questions	Response	Skip
2.1	Does the health facility/ANM know what the reporting period for HMIS data is? (write: 1 for Period- 21st to 20th ,2 for 16th to 15th of Month or 3 for any other please specify		All
2.2	Has the staff been assigned data element responsibility?	Yes.....1 No2	All
3	Source document		

Section III: Understanding of HMIS formats			
Name:		Designation:	
S. No	Understanding of Data Element – HMIS format	Applicable for	Response (Yes/No)
1	Pregnancy Care		
1.1	What according to you is the correct definition of % of pregnant women received 4 or more ANC against estimated pregnant (Correct :Number of PW received 4 or more ANC check - ups?)	All	Yes / No
1.2	What according to you is the correct definition of % of pregnant women tested for Hemoglobin 4 or more times during pregnancy against estimated PW? (Correct :Number of PW tested for Hemoglobin (Hb) 4 or more time)	All	Yes / No
1.3	What according to you is the correct definition of pregnant women diagnosed with anemia i.e. Hb level <11? (Tested cases by a hemoglobinometer)(Correct :pregnant women tested and found with Hemoglobin (Hb) less than 11 grams/dl)	All	Yes / No
2	Child Birth		
2.1	What according to you is the correct definition of % of pregnant women delivered in health institution against estimated delivery ?(Correct: Number of Pregnant Women Delivered in Health Facility (Public and Private))	All	Yes / No
2.2	What according to you is the correct definition of % of C-section delivery against reported delivery? (Correct: Total C - Section deliveries performed against reported deliveries)	All	Yes / No

2.3	What according to you is the correct definition of Still Birth Ratio ? (Correct: Number of still birth reported (Fresh + Macerated) against total live births)	SC	Yes / No
3	Post natal Mother & Child care		
3.1	What according to you is the correct definition of % of women receiving postpartum check-up within 48 hours of delivery against reported delivery (Home +Institutional) ? (Correct: Number of women receiving 1st post - partum check - up within 48 hours of home delivery and institutional delivery)	All	Yes / No
3.2	What do you mean by Newborns having weight less than 2.5 kg? (Correct: infants (live births) who were weighed and found to be less than 2500g in this facility)	All	Yes / No
3.3	What do you mean by fully immunized children with age group of (9-11 month) ? (Correct BCG, Penta 1, 2, 3, Measles)	All	Yes / No
4	Reproductive Age Group		
4.1	What do you mean by % of eligible couple accepted limiting method ? (Correct: Total number of eligible couples accepted any of the following limiting methods in a specified time period: Minilap + Lap + Post-Partum Sterilization + Post-Abortion Sterilization + Non-Scalpel Vasectomy (NSV))	All	Yes / No
4.2	What do you mean by % of eligible couple accepted spacing method (Correct Total number of eligible couples accepted any of the following spacing methods in specified time period -IUCD - PPIUCD -DMPA 4th Dos)	All	Yes / No

5	Vector Borne Diseases		
5.1	What do you mean by Total case notification rate of TB against expected TB cases? (Correct :Number of new and relapsed TB cases notified during a specific time period)	All	Yes / No
5.2	What do you mean by % of PW screened for HIV against estimated Pregnancy (Correct Total number of pregnant women screened for HIV during pregnancy)	All	Yes / No
6	Data Quality		
6.1	What do you mean % of facilities reported non blank value (including zero) for the identified indicators of ranking? (Correct: Number of facilities reported non blank value (including zero) during a specified period)	All	Yes / No
6.2	What do you mean by % of facilities reported Outlier for the identified indicators of ranking	All	Yes / No

B. Register availability:

SN	List of registers	Type of format (Printed or Manual)	Records updated (up to March 2019) (Yes/No)	Remark

C. Summary of data elements in the record: A sheet with all data elements will be given to record in YES/NO

SN		HMIS
1	Total no. of elements for which summary was prepared in the record	
2	Total number of data elements for which responsibility is assigned	