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ROUTINE DATA QUALITY ASSESSMENTS IN HARYANA, INDIA: ROUNDS 1 & 2 SUMMARY REPORT

October 2015

This publication was produced for review by the United States Agency for International Development and the Haryana National Health Mission. It was prepared by Alia Kauser, Jordan Tuchman, Anthony Leegwater, and VJ Rao of the Health Finance and Governance Project and Amit Phogat of the National Health Mission Haryana.

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October 2015

Cooperative Agreement No: AID-OAA-A-12-00080

Submitted to: Neeta Rao, Project Management Specialist
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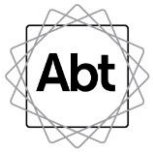
USAID/India

Recommended Citation: Kauser, Alia, Jordan Tuchman, Anthony Leegwater, VJ Rao and Amit Phogat. October 2015. *Routine Data Quality Assessments in Haryana, India: Rounds 1 & 2 Summary Report.* Bethesda, MD: Health Finance and Governance Project, Abt Associates, Inc., (AK, JT, AL VJR), and National Health Mission Haryana (AP).



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ROUTINE DATA QUALITY ASSESSMENTS IN HARYANA, INDIA: ROUNDS 1 & 2 SUMMARY REPORT

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ACRONYMS

ANC	Antenatal Consultation
BCG	Bacillus Calmette–Guérin (vaccine)
C-Section	Caesarean Section
CHC	Community Health Center
DH	District Hospital
DHIS 2	District Health Information System (version 2.0)
DQA	Data Quality Audit
FRU	First Referral Unit
HFG	Health Finance and Governance project
HIS	Health Information System
HMIS	Health Management Information System
IUCD	Intrauterine Contraceptive Device
M&E	Monitoring and Evaluation
NHM	National Health Mission
PHC	Primary Health Center
PPIUCD	Postpartum Intrauterine Contraceptive Device
RMNCH+A	Reproductive, Maternal, Newborn, Child and Adolescent Health
RDQA	Routine Data Quality Assessment
SC	Sub Center
SDH	Sub-district Hospital
UHC	Urban Health Center
USAID	United States Agency for International Development
WHO	World Health Organization

ACKNOWLEDGEMENTS

The Routine Data Quality Assessment activity was accomplished thanks to the strong support of the National Health Mission Haryana, Mission Director S. Narayanan, Director of MCH Dr. Usha Gupta, Deputy Director Dr. Amit Phogat and Program Officer for Information Technology Mr. Harish Bisht. The Health Finance and Governance project would also like to thank former Mission Director Dr. Rakesh Gupta, and former Director of MCH Dr. Ravi Kant Gupta for their significant efforts in initiating Data Quality Assessment activities in Haryana. The project further acknowledges the assistance provided by the Civil Surgeons and District Program Management Units of Bhiwani, Faridabad, Jind, Mahendragarh, Mewat, Palwal, and Panipat as well as Michael Rodriguez and Jim Setzer for their invaluable contributions.

EXECUTIVE SUMMARY

The National Health Mission (NHM) is responsible for monitoring health indicators across India, particularly those related to the Government of India's strategic Reproductive, Maternal, Newborn, Child and Adolescent Health (RMNCH+A) initiative. Various stakeholders, including the Ministry of Health and Family Welfare and the NHM, have expressed concerns about the quality of data within state-level Health Management Information Systems (HMISs). In Haryana, for instance, under- and over-reporting of data is seen as a significant obstacle for many districts in the state, complicating the NHM's ability to take evidence-based decisions grounded in reliable data.

In 2013, the Health Finance and Governance (HFG) project, funded by the United States Agency for International Development (USAID), was requested by the NHM Haryana to conduct a review of HMIS data quality in the state. A Data Quality Audit was administered in four districts within the state, which resulted in a series of recommendations including routine data reviews to identify, investigate, and address data quality issues. In September 2014, HFG, in collaboration with NHM Haryana, initiated the first round of a Routine Data Quality Assessment (RDQA) exercise. The second round was conducted in January 2015.

The RDQA exercise, implemented in two rounds across seven districts in the state, gathered information designed to assess the quality of data collected and reported by select facilities, and to evaluate the underlying components of the state, district, and facility-level HMIS. RDQA implementation involves the application of two protocols: Protocol 1 is designed to document whether the appropriate system structures are in place to facilitate the timely collection and reporting of high-quality data; Protocol 2 focuses on verifying the quality of data recorded and compiled at the facility level.

The application of Protocol 1, carried out during Round 2, generated relatively uniform results across the select districts related to the HMIS' various component areas. In general, the NHM Haryana HMIS has sufficient human resources, in number and capacity, to ensure data quality from where it is produced up to where it is used. For example, less than five percent of Information Assistant positions were found to be vacant across the seven districts. Job descriptions are clear, and roles and responsibilities are appropriately assigned among those that operate the system. Staff are clear on what needs to be reported, how, and when, and more than 95 percent of state HMIS users were submitting on time. Concurrently, there are areas that merit consideration for strengthening. Staff do not always use standardized, government-approved registers. Data verification at the facility level, typically the responsibility of senior clinical staff, does not seem to be occurring as regularly as necessary to ensure data quality. Moreover, there is no effective mechanism in place to measure and manage incomplete, inaccurate, and missing reports, and to provide systematic feedback from one reporting level to another.

Protocol 2 was administered across the seven districts during both rounds, and assessed the accuracy of data at 72 and 69 facilities respectively during Rounds 1 and 2. Summary reports were generated from the national HMIS for 24 data elements, which were then compared to facility-level registers. A key finding that emerged in comparing data verified in Round 1 and Round 2 of the Haryana exercise was an improvement in the accuracy of data reporting. Perfect matches between recorded and reported values jumped from 50.5 to 67.4 percent, and acceptable variation (defined as a variation of no more than 10 percent between recorded and reported) went from 62.7 to 75.5 percent, as displayed in Table ES-1.

TABLE ES-1: VERIFICATION COMPARISON BETWEEN ROUNDS 1 AND 2

Rounds	N	Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Under-reported by >10%	Over-reported by >10%
Round 1	827	50.5%	12.2%	17.4%	19.8%
Round 2	745	67.4%	8.1%	9.8%	14.8%

The improvement between rounds was compared across all the facilities assessed, with matches increasing for all facility types from the first to second round, as well as across districts with the exception of one district that experienced a mild decrease. At the same time, there were differences in quality trends across various data elements. While the accuracy of data reporting of post-partum sterilization rose from 63.6 percent of matches to 100.0, 3rd ANC checkup went from 44.1 to only 48.3. Although improvements were widely observed across facility types, districts, and most data elements, the accuracy of some verification merits further investigation and discussion.

In absence of any large-scale systemic adjustments, a possible cause for changes observed in data quality between Round 1 and Round 2 may be shifts in the procedures and processes undertaken by NHM Haryana staff around the recording and reporting of data. Interaction between RDQA assessors and personnel within the HMIS may have prompted a better understanding of the processes and procedures most appropriate to generating and maintaining high quality data.

The process of conducting the RDQA in Haryana, and the results generated through its application, has demonstrated that administering routine data assessments in the state can facilitate improvements in data quality. In order to catalyze and sustain such improvements, such assessments should be considered as one part of a more comprehensive approach that includes systems-level interventions. Routine quality assessments would provide regular data with which to monitor progress of data quality, identify systemic gaps, and ensure compliance by relevant HMIS personnel (i.e. service providers, information assistants, M&E officers, and supervisors) to the appropriate processes. Through prioritization of systems strengthening initiatives, the NHM can bolster the HMIS' underlying components and better foster and sustain data quality improvements. Possible systems strengthening initiatives include:

- Strengthening data management processes and procedures, particularly the verification and authentication of data prior to submission, and the provision of feedback from one reporting level to another;
- Increasing the availability of data collection tools to capture data at the moment of service delivery and avoid use of unstructured and/or customized alternatives;
- Making data definitions available in local languages and ensuring they are present at all locations where collection, compilation, or use of data take place;
- Installing a competency-based training plan to improve the skills of existing staff and ensuring refresher trainings.

1. BACKGROUND

Health information systems (HIS) – called health management information systems (HMIS) in India – are one of the World Health Organization's (WHO) six pillars of a health system. An HIS that provides high-quality data[1] and information to decision-makers is an essential element of any health service delivery system. To ensure the effectiveness of the HIS, a health system must periodically assess HIS operations, particularly the quality of the data it captures and the information it produces. Ideally, health authorities should audit the HIS system several times per year to identify and address shortcomings, and then follow up regularly to ensure that improvements are sustained.

In India, the National Health Mission (NHM) is responsible for monitoring health indicators across the country, particularly those related to the Government of India's strategic Reproductive, Maternal, Newborn, Child and Adolescent Health (RMNCH+A) initiative. The NHM has used a proprietary web-based national HMIS since 2008 for this purpose. In several states, another parallel information system, such as the web-based District Health Information System 2 (DHIS2), is employed to transmit routine facility-level data to the state level, where the data are compiled and subsequently uploaded to the national HMIS portal. Such is the case in the state of Haryana.

The Government of India, Ministry of Health and Family Welfare, National Health Systems Resource Center, and the NHM Haryana, have expressed concerns about the quality of data captured by Haryana's HMIS, including under- and over-reporting of data for many districts in the state. In response to these and other concerns, the USAID-funded Health Finance and Governance (HFG) project was requested by the NHM Haryana to conduct a review of HMIS data quality in the state. In 2013, HFG carried out the review across four of the state's high priority districts (i.e. districts with poor performance on various health indicators), using a methodology and set of tools intended to assess underlying systems and structures supporting the flow of health data.

The HFG assessment team found that NHM facilities were generally doing a notable job of leveraging limited resources to routinely record and report data. It was also determined that data quality could be improved with the implementation of a number of key interventions requiring a moderate increase in resources. Among the recommendations of the assessment team was the implementation of data quality audits on a routine basis to identify emerging data issues, track those issues over time, and develop action plans to address them.

HFG was engaged by the NHM Haryana in 2014 to lay the foundation for routine data quality audits in the state. In collaboration with the NHM, the project identified a sample of facilities in seven high-priority districts to initiate regular data reviews. The intervention had five primary objectives:

a. Provide quantitative measures of data quality (principally data accuracy) within the Haryana HMIS.

b. Verify the appropriateness of data management systems at the district level in Haryana to ensure quality of collected data.

[1] High-quality data is often defined as being timely, accurate/valid, reliable, complete, accessible, and appropriate.

c. Identify strategies to address data quality issues for key RMNCH+A indicators at selected sites that could be applied across all Haryana district sites.

d. Contribute to strengthening the capacity of NHM monitoring and evaluation systems.

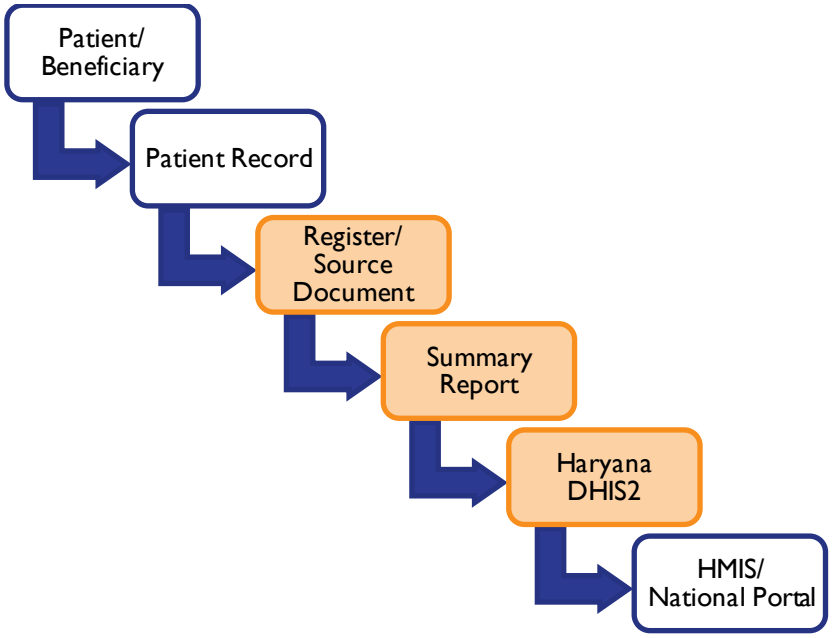
e. Promote the use of data for decision-making at the district level.

The assessment exercise itself was also intended to promote an increased appreciation for data quality and information use within the state's health system.

Following discussions with the NHM Haryana, the focus of the exercise centered on assessing the capture and flow of data from the health facility level up to the state HMIS. This included evaluating the accuracy of the system in compiling and aggregating data from source documents (i.e. reproductive and child health registers), the reporting of those data to the district via the required/specified forms, and their introduction into the state-level DHIS2 platform, where data can then be made available to a variety of authorized users at all levels.

The flow of data from the point of care up to the Haryana State HMIS and ultimately the national HMIS is shown in Figure 1. The routine assessment was designed to examine the steps highlighted in orange in the figure.

FIGURE 1: HMIS DATA FLOW WITHIN HARYANA STATE HMIS



This report summarizes the methodology used to assess the quality of Haryana State's HMIS and presents the findings of two rounds of assessments. This report also offers recommendations for improving data quality in Haryana and institutionalizing data quality assessments in the state.

2. METHODOLOGY

In consultation with the NHM Haryana, the assessment team used a modified version of the Routine Data Quality Assessment (RDQA) methodology as its guiding framework. The RDQA methodology was developed under the USAID-funded MEASURE Evaluation project and is an internationally recognized approach for assessing the data quality of a health information system.[2] The approach encompasses the commonly accepted parameters of data quality within routine HMIS, as well as an investigation into the origins of data issues and the development of strategies to improve data quality. The RDQA is intended to be conducted over several rounds in areas with weak HMISs to monitor improvements over time.

2.1 RDQA Assessment Tool

Implementing the RDQA methodology involves the application of two assessment *protocols*. ***Protocol 1*** is intended to assess the underlying systems and structures that support the flow of health data through the routine NHM reporting system. This involves the evaluation of data management and reporting systems by analyzing the quality of indicator definitions, data collection forms, data management processes, functional components of monitoring systems, and links with national reporting systems. ***Protocol 2*** is intended to assess, on a limited scale, if data are collected accurately at the health facility level.

Protocol 1 is comprised of a series of questions across five domains that support the HIS: Monitoring and Evaluation (M&E) Structure, Functions, and Capabilities, Indicator Definitions and Reporting Guidelines, Data Collection and Reporting Forms / Tools, Data Management Processes, and Links with National Reporting System. Answers to the questions in Protocol 1 across these categories provide a systematic way to catalogue common issues found across multiple facilities and to compile recommendations for system improvements. Protocol 1 includes topics such as: existence of data definitions, manuals, and electronic reporting tools at facilities; and provision of comprehensive and routine training to staff. The overall objective of Protocol 1 is to document whether the appropriate system structures are in place to promote the timely collection and reporting of high-quality data.

Protocol 2 focuses on verifying that data captured at the facility level (i.e. on source documents used by health facility staff) are recorded and compiled on an accurate and timely basis. To do so, data collection teams operating at a higher level of the HMIS, typically at the national or state-level, generate summary indicator reports for a given month and facility. Select indicators from these outputs are then compared to source documents, such as service registers, for that month and facility, by a process frequently referred to as "trace and verify." In most cases, facility visits require collection teams to review two or three distinct service registers to trace values for data elements and indicators from the summary report and verify them at the facility.

[2] Documentation regarding the RDQA methodology and its applications can be found at the USAID-funded Measure/Evaluation Project website: http://www.cpc.unc.edu/measure/tools/monitoring-evaluation-systems/data-quality-assurance-tools.

HFG and the NHM Haryana adapted the generic RDQA methodology and tool to ensure that the assessment focused on the stated priorities of the NHM Haryana: accuracy of data collected; aggregation of individual-level data as captured in source documents; and transfer of data from source documents to the required paper-based monthly reports for eventual inclusion in the DHIS2-based Haryana State HMIS.

Given the financial and logistical challenges inherent in assessing every indicator in all facilities within a health system, application of the RDQA is typically confined to addressing a reduced number of indicators in a reduced number of facilities. Moreover, the findings from a smaller sample are largely applicable to the rest of the system, thereby proving a more efficient and easily replicable exercise in the future. For this exercise in Haryana, the final methodology focused on a sample of indicators, in a sample of health facilities, in seven high-priority districts. HFG conducted two rounds of RDQA in Haryana in collaboration with the NHM, using the same indicators and facilities for both rounds. The first round established a baseline of sorts. The second round, conducted several months later, displayed progress, if any, in data quality.

2.2 Indicators/Data Elements

Among the indicators that the NHM currently tracks through the HMIS, a set of 16 indicators measure the impact of interventions under the RMNCH+A initiative. The NHM has expressed interest in creating dashboards based on the data generated by the 16 indicators as a mechanism to promote the analysis and use of data and information. The RDQA exercise aimed to assess the quality of data within the HMIS of these 16 indicators, presented in Table 1 in groupings reflecting the RMNCH+A Continuum of Care.

TABLE 1: INDICATORS ASSESSED BY RDQA EXERCISE

Pregnancy Care	
1	1st trimester Antenatal Consultation (ANC) Registration / examination
2	3rd ANC checkup
3	Injectable Iron supplement or blood transfusion
4	High Risk Pregnancy Identification to ANC Registration
Child Birth	
5	Caesarean Section (C-Section) to Reported institutional deliveries
6	Free referral transport from Home to Health facility against total deliveries
7	Complicated deliveries referred out
8	Proportion of Pre term deliveries (less than completed 37 weeks) to total deliveries
Postnatal Maternal & New Born Care	
9	Newborns weighing less than 2.5 kg to newborns weighed at birth compared with pre term deliveries
10	Proportion of women discharged under less than 24 and 48 hours to normal deliveries
11	Birth doses before discharge to total live births
12	Bacillus Calmette–Guérin vaccine (BCG), Measles 1at Sub Center (SC)

Reproductive Age Group	
13	Post-partum sterilization to total female sterilization
14	Total female sterilization
15	Postpartum Intrauterine Contraceptive Device (PPIUCD) to Total Intrauterine Contraceptive Device (IUCD)
16	PPIUCD to total deliveries

The 16 indicators tracked by the NHM through the HMIS are calculated on the basis of 24 observable data elements, found in Table 2. For the purposes of this exercise, data collection and analysis is based, not in the 16 RMNCH+A indicators, which are compounds of the various data elements, but rather in the 24 individual data elements themselves. As different levels of facilities provide different type of services, not all elements were available for assessment at all facilities.

TABLE 2: DATA ELEMENTS ASSESSED BY RDQA EXERCISE

Pregnancy Care	
1	1st trimester Antenatal Consultation (ANC) registration / examination
2	3rd ANC checkup
3	Injectable iron supplement
4	Blood transfusion
5	High risk pregnancy identification
6	ANC registration
Child Birth	
7	C section at facility
8	Reported institutional deliveries (calculated from normal + instrumental + C-Section)
9	Free referral transport from home to health facility
10	Complicated deliveries referred out
11	Proportion of Pre term deliveries (less than completed 37 weeks)
Postnatal, Maternal, & Newborn Care	
12	Newborns weighing less than 2.5 kg
13	Newborns weighed at birth
14	Women discharged under less than 24 hours
15	Women discharged under less than 48 hours
16	Birth doses to newborns pre-discharge
17	Hep, OPV doses to newborns pre-discharge
18	Total live births
19	Bacillus Calmette–Guérin vaccine 1 (BCG), given at SC
20	Measles 1 vaccine given at SC

Reproductive Age Group	
21	Post-partum sterilization
22	Total female sterilization (i.e. Static, Fixed day camp, special camp)
23	PPIUCD
24	Total IUCD

2.3 Sample Selection

2.3.1 District Selection

The RDQA exercise was conducted in seven districts in Haryana considered as high-priority by the Government of India: Bhiwani, Faridabad, Jind, Mahendragarh, Mewat, Palwal, and Panipat.

2.3.2 Facility Selection

Within the selected districts, facilities were stratified into four distinct categories by facility type, listed below from highest to lowest level of complexity:

a. First referral units (FRUs) including district and sub-district hospitals (DHs and SDHs)

b. Community health centers (CHCs)

c. Primary health center and urban health centers (PHCs and UHCs)

d. SCs and delivery huts

The NHM Haryana requested that selection favor facilities with higher patient caseloads, and that all facility types be represented with a minimum of one facility for the exercise. More specifically, NHM Haryana requested the selection of all FRUs in the seven districts and at least one 24-hour PHC and its associated SC. NHM Haryana also asked that the sample include one delivery hut from each district and at least one UHC from the four most urban districts – Faridabad, Mewat, Palwal and Panipat. Overall, ten to twelve facilities were selected within each district, for a total of 72 facilities (see Annex A).

2.4 Data Collection

In line with the priorities stated by the NHM Haryana, the collection team applied Protocol 2 during both rounds of collection. Protocol 1 was only applied during Round 2. To collect data for Round 1 of RDQA exercise, the team visited 72 facilities in the seven high priority districts between September 2014 and January 2015, to verify data collected and reported during August 2014. The team planned to assess 1,728 data elements (24 data elements in 72 facilities) for the month, but ultimately assessed 973 as some target facilities did not provide services relevant to all selected elements. Round 2 of collection, conducted from February to May 2015, was intended to verify data collected and reported during November 2014 in the same 72 facilities. The final count for Round 2 was 69 facilities visited, as three were excluded from the assessment because they were no longer providing the relevant services, or personnel and/or data were unavailable at the time of the team's visit. For Round 1, data were captured in Microsoft Excel 2010. For Round 2, Microsoft Access 2010 was used.

2.5 Data Analysis

Data for both Round 1 and Round 2 were initially stored in a Microsoft Access 2010 database. All observations were ultimately transferred to, and analyzed, using Stata version 12. Given the straightforward nature of most responses collected, only minor data cleaning was needed. In order to compare accuracy between counts recorded and reported, we excluded observations that lacked either recorded or reported data. For example, if a particular facility recorded 10 C-sections, but there was no evidence of reporting for that data element, the observation was excluded.

For the remaining observations, verification ratios were constructed. A verification ratio is defined as the ratio of the count recorded to the count reported. In cases where both reported and recorded counts were zero, the ratio was set to one. In another scenario, where division by zero could occur (e.g. the count reported is zero, but count recorded is non-zero), the ratio was set to a value of two. This ensured that observations of this kind were judged to have unacceptable variation (defined as a ratio above 1.1 or below 0.9). On the other hand, acceptable variation was defined as having a verification ratio between 0.9 and 1.1, inclusive. This range of acceptable variation includes perfect matches in which the count recorded equals the count reported (i.e. a verification ratio equal to one). The accuracy results in this report are presented as the percentage of data elements categorized as being perfect matches, having acceptable but not perfect accuracy, and having unacceptable accuracy (i.e. a verification ratio below 0.9 or above 1.1).

3. RESULTS

3.1 Protocol 1

As the RDQA has two distinct protocols, it produces two different groupings of results. Protocol 1 results tend to be more qualitative, focus on the system more holistically, and correspond to the five functional domains of an HIS: Monitoring and Evaluation (M&E) Structure, Functions, and Capabilities, Indicator Definitions and Reporting Guidelines, Data Collection and Reporting Forms / Tools, Data Management Processes, and Links with National Reporting System. The results for the Haryana RDQA exercise are presented as a summary description of findings in the seven high-priority districts.

3.1.1 M&E Structure, Functions and Capabilities

The RDQA Protocol 1 domain of M&E Structure, Functions and Capabilities is designed to identify that the appropriate personnel and organizational structure are in place to ensure the collection, compilation, analysis, and use of high quality data. Although the NHM Haryana state and district M&E Units lack a documented organizational structure, the Mission has sufficient human resources that are supported well enough to facilitate a continuum of quality data from collection through to use. The Mission has five state-level M&E officers, a district-level M&E officer in each district (aside from Bhiwani and Hisar that have two), and Information Assistants widely in place at the CHC/PHC level. All M&E staff positions in the seven high-priority districts are filled, except for positions in Bhiwani district where one of two district-level M&E officer positions is vacant. Less than five percent of the Information Assistant positions are vacant across the seven districts.

The responsibility for recording the delivery of services provided on source documents is clearly assigned to auxiliary nurse midwives and nursing staff. Summary reports are generated at the facility level, whereby information assistants at the block and/or PHC/CHC are then responsible for entering the facility reports into the DHIS 2 and national web portals. To further ensure the quality of data submissions, a senior staff member at each facility (e.g. Medical Officer) is responsible for reviewing aggregated data prior to release of reports from the facility to the M&E Unit. Reports, however, are often not reviewed at the facility or district level by senior clinical staff. District M&E officers play an important role in data quality, by ensuring the timeliness of reporting and consistency from a month's report before uploading data into the HMIS portal. Overall, limited review of data poses a significant challenge, often occurring as a result of other pressing demands, time constraints, and high volumes of recorded and submitted data.

M&E officers and CHC/PHC-level Information Assistants have job descriptions in place and a clear understanding of the expectations that correspond to their role in processing data. All M&E officers and Information Assistants who joined NHM Haryana prior to March 2014 received orientation and training on data management processes and tools, including the DHIS 2 system. Due to staff turnover, newly joined Information Assistants had not yet been oriented; this accounts for approximately five percent of the cadre of such personnel in Haryana. NHM in the state provides ad hoc refresher trainings as needed, though there is no mechanism in place to ensure orientation at the time of joining the NHM. Although a state-level M&E officer is assigned to identify capacity-building needs of M&E officers, no documentation of training needs is available, nor is there a structured and documented training plan for staff on data-collection and reporting at the district or state level.

3.1.2 Indicator Definitions and Reporting Guidelines

Elements within the second domain – Indicator Definitions and Reporting Guidelines – have a significant impact on data quality in terms of accuracy, reliability, timeliness, and completeness. Questions within the domain strive to highlight whether operational indicator definitions are systematically followed by all service points; and whether there is clarity around what is reported to who, and how and when reporting is required.

The M&E unit of NHM Haryana developed an English-language data definition manual and has shared the manual with all relevant levels of the health system in the state (i.e. FRU, CHC, PHC/UHC, and SCs). The manual contains written guidelines from the State M&E Unit to the district-level M&E units describing each sub-reporting level in terms of: what data elements should be reported; how reports are to be submitted and to whom the reports should be submitted, (e.g. single reporting format); and when the reports are due. Aside from the English manual, there are currently no manuals of data definitions in any other language. The English manual is regularly available at the district level and used as a resource during staff training, but copies were not readily seen at the facilities. There were also varying interpretations of data element/indicator definitions at the facility level which may result from a lack of appropriate reference materials at the level where services are delivered.

Individuals at the various levels of the reporting system were clear on what elements were to be reported. There was also little confusion within the seven priority districts and among the Information Assistants on entering collected data into the DHIS2. Moreover, users of the system were aware of due dates and more than 95 percent were submitting on time. Only Mewat district was found to be reporting late in the month of September, 2014 (the month immediately before the team visited the district) due to an internet connectivity problem across the district during the reporting period.

There is no specific written policy on the retention of source documents and reporting forms for the HMIS. Instead, the HMIS system uses the Haryana State Government general administration department policy for all government documents, including HMIS records. Officials are largely aware of the policy, but were not able to produce the document for verification when visited by members of the data collection team.

3.1.3 Data Collection and Reporting Forms and Tools

The Protocol 1 domain relating to Data Collection and Reporting Forms and Tools seeks to address numerous dimensions of data quality, including accuracy, reliability, timeliness, as well as precision and confidentiality. Questions in this domain primarily relate to the use of source documents and maintenance of the documents and data therein.

In the state of Haryana reporting formats are standardized and are commonly found across the facilities in the high priority districts – SC, PHC, CHC and FRU all use the same reporting forms and report according to the same reporting timelines. Seven of the 72 facilities visited as of January 2015 were found to be using non-standard formats or older versions than recommended by the state, which may have directly resulted in non-reporting of a few data elements by these facilities. Data is submitted by facilities to the Information Assistants based at the PHC/CHC-level on the 5th of every calendar month that covers services provided during the previous month. Information Assistants then enter data into the DHIS 2 portal by the 10th after which district-level M&E Officers review the data and upload it to the HMIS portal by the 12th. State-level M&E Officers review the data and approve the data submitted to the HMIS portal by the 15th.

The M&E Unit has identified standard source documents to be used by all service delivery points to record services delivered. At the PHC/CHC and FRU levels, the RDQA team found that the data collection forms/registers in use were at times customized by hand and/or unstructured, and multiple registers were often in use. Instructions have been provided by the M&E Unit on how to complete the data collection and reporting forms/tools. The instructions are not documented, but the field-level staff acknowledged that the forms/tools were explained verbally during training.

3.1.4 Data Management Processes

The domain for Data Management Processes contains questions that relate to the steps and procedures that comprise the collection, aggregation, and manipulation of data. Elements within this domain primarily correspond to the accuracy and reliability of data collected, with particular emphasis on the controls that exist within the system to ensure the data quality.

In Haryana, there is a computerized procedure known as "data locking" to address late reporting, whereby data cannot be entered or modified after a specific date each month. There is, however, no effective mechanism to measure and manage incomplete, inaccurate, and/or missing reports including following-up with SC, PHC, CHC and FRU levels on data quality issues. The state M&E Unit and the Intermediate Aggregation Levels (i.e. districts and regions) do not have a documented procedure for addressing data discrepancies uncovered in reports from sub-reporting levels.

Overall, the system largely avoids double counting of individuals and services provided, as the majority of facilities visited had processes in place to avoid multiple counting. At each point of service/organization, individuals will not be counted twice for receiving the same service during a reporting period, nor are they registered as receiving the same service in two different locations. With that said, there is some evidence that may indicate that some facilities double count. For example, the district-level General Hospital and PPC units located on the same premises were double reporting in Palwal district and yet not reporting at all in Mahendragarh.

There is no systematic feedback loop that reviews the quality of reporting (i.e., accuracy, completeness and timeliness) from one level to another and communicates issues encountered (or positive results) to the level where the report emanated from. However, all district NHM offices acknowledged the existence of a monthly review meeting, where data anomalies and failures to achieve targets are discussed with the Civil Surgeon. The state and district M&E teams demonstrated that regular supervisory site visits have taken place, but the data collection team could not establish that data quality is effectively reviewed during such visits.

There are computerized logic controls (i.e. validation rules) in place for ensuring data quality when data from paper-based forms are entered into portals. There are, however, no other mechanisms, such as double entry or post-data entry verification in place to ensure that data is correctly and completely entered.

For the HMIS and DHIS 2 systems, there are clearly documented and well-functioning database administration procedures in place. This includes backup/recovery procedures, security administration, and administration of users. There is also a documented back-up procedure at the central unit level for data entry and data processing, as both the HMIS and DHIS 2 portals are internet-based and managed at a central unit level.

3.1.5 Links with National Reporting System

In order to avoid the existence of parallel collection and reporting systems and unnecessary burden on staff, many systems are designed to foster interoperability, limit overlap, and thus, ideally, to lead to higher quality data. This is typically accomplished through the existence of a single reporting channel of a nation-wide system. Questions within this domain seek to clarify the links within the HMIS from the facility up to the national level.

In Haryana, there is a clear and consistent link to national reporting system with regard to the service site identification numbers, data elements captured, and the timelines for reporting. All service sites carry unique identifiers by State, District, Block and facility, using a standard identifying mechanism proposed at the national level. Although not all data elements are identical within the two systems, and registers and other tools are customized for the state, the differences do not seem to pose a significant obstacle to attaining a high level of data quality. Reporting deadlines for the state are harmonized with the relevant timelines of the national program, including cut-off dates for monthly reporting.

There is, however, no interoperability between the DHIS 2 used in Haryana and the national HMIS web portal. This prompts a complex process of uploading at the district level into DHIS 2, exporting from DHIS 2 at the state, followed by modifications and re-uploading into the national system.

3.2 Protocol 2

Protocol 2 of the RDQA focuses on verifying the quality of reported data through a "trace and verify" process. Summary reports for 24 data elements were generated from the national HMIS and then compared to facility-level source documents. The exercise conducted in Haryana specifically zeroed in on the accuracy of data within the HMIS for 72 facilities across seven districts. For Round 1 of the exercise, the data collection team reviewed data for 24 data elements that was collected and reported for the month of August 2014 at the 72 facilities. For Round 2, the team reviewed data from the same facilities generated in November 2014, although data was not available at three of the facilities, thus leading to a final count of 69 facilities covered for Round 2.

As different types of facilities vary in terms of complexity and services provided, relevant data is not available for all 24 data elements at all 72 facilities. In addition, data presented in the ensuing tables are restricted to the 69 facilities that were verified in both rounds 1 and 2 of the RDQA exercise in order to maximize comparability and gauge progress, if any, which may have occurred between rounds. Moreover, if data was missing or unreported it was not presented in the tables.

For the purposes of the analyses contained in this report, a deviation of no more or less than 10 percent between reported and recorded values is considered as an "Acceptable variation." A deviation of more than 10 percent is therefore deemed as an "Unacceptable Variation." While there is no standard, per se, as to the acceptable percent of deviation, 10 percent is a common threshold utilized in other instances of RDQA application. To use the data element "1st Trimester ANC registration" in Table 3 as an example, in Round 1, 39 percent of the facilities had an acceptable degree of variation between data contained within the source registers and summary data generated within the national level HMIS. This included 31.7 percent of facilities that matched perfectly and an additional 7.3 percent that reported values within 10 percent of recorded values. For 26.8 percent of the 41 facilities with 1st Trimester ANC registration as a verifiable data element, facilities under-reported by more than 10 percent during Round 1; for another 34.1 percent of facilities, facilities over-reported by more than 10 percent.

3.2.1 Round 1

Results from Round 1 of the RDQA exercise are presented in Table 3 for all data elements, districts, and facility types. Comparisons falling within the acceptable range between reported and recorded values (again, matching exactly, or within less than 10 percent deviation) varies from 28.1 to 100 percent, for Injectable Iron Supplement and C-section at facility, respectively. Approximately one-third of the data elements have 75 percent or more of facilities recording and reporting in the acceptable range. For two-thirds of the data elements in the table, 50 percent or more of the facilities appear to be acceptably recording and reporting data. Only slight variations exist for data elements related to deliveries, with C-sections, institutional deliveries, and total live births showing minor variations between recorded and reported data.

Aggregated values for Round 1 indicate that 827 data element comparisons were verified and had non-missing values for reported and recorded counts. Of these 827 data elements verifications from Round 1, 50.5 percent were recorded and reported identically, and for an additional 12.2 percent of the total data element verifications, a count within 10 percent of the recorded value was reported. The data also presents a trend in which data elements verified during Round 1 were slightly more likely to have been over-reported (19.8 percent) than under-reported (17.4 percent).

TABLE 3: ROUND 1 COMPARISONS ACROSS ALL FACILITY TYPES AND DISTRICTS

Data Element	N	Reported vs. Recorded comparison (in % of facilities)			
		Acceptable variation		*Unacceptable variation*	
		Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Under-reported by >10%	Over-reported by >10%
Pregnancy Care					
1st trimester ANC registration	41	31.7	7.3	26.8	34.1
3rd ANC checkup	34	32.4	11.7	20.6	35.3
Injectable iron supplement	32	28.1	0.0	53.1	18.8
Blood transfusion	14	28.6	0.0	42.9	28.6
High risk pregnancy Identification	28	50.0	3.6	39.3	7.1
ANC registration	37	56.8	13.5	13.5	16.2
Child Birth					
C-Section at facility	11	100.0	0.0	0.0	0.0
Reported institutional deliveries	51	76.5	19.6	2.0	2.0
Free referral transport (Home to Facility)	18	44.4	0.0	11.1	44.4
Complicated deliveries referred out	48	45.8	8.4	33.3	12.5
Proportion of pre-term deliveries	47	38.3	4.3	21.3	36.2

Data Element	N	Reported vs. Recorded comparison (in % of facilities)			
		Acceptable variation		*Unacceptable variation*	
		Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Under-reported by >10%	Over-reported by >10%
Postnatal, Maternal, & Newborn Care					
Newborns less than 2.5 kg	55	41.8	7.3	20.0	30.9
Newborns weighed at birth	55	43.6	21.9	20.0	14.5
Discharged less than 24 hours after delivery	47	40.4	14.9	8.5	36.2
Discharged less than 48 hours after delivery	14	35.7	7.2	14.3	42.9
Birth doses to newborn pre-discharge	32	46.9	12.5	21.9	18.8
Hep, OPV doses to newborn pre-discharge	42	35.7	45.3	2.4	16.7
Total live births	54	70.4	20.3	3.7	5.6
BCG1	27	55.6	11.1	18.5	14.8
Measles	30	50.0	10.0	13.3	26.7
Reproductive Age Group					
Post-partum sterilization	11	63.6	0.0	18.2	18.2
Total female sterilization	17	76.5	17.6	0.0	5.9
PPIUCD	39	69.2	7.7	15.4	7.7
Total IUCD	43	74.4	4.7	7.0	14.0
Round 1 Verifications	**827**	**50.5%**	**12.2%**	**17.4%**	**19.8%**

N = number of facilities with comparable data for a given data element

3.2.2 Round 2

Results from Round 2 are presented in Table 4 for all data elements, districts, and facility types verified during the RDQA exercise. In examining Table 4 for data from the month of November 2014, and verified during Round 2 of the RDQA exercise, observations falling in the acceptable range varied from 48.3 percent for 3rd ANC checkup to 100 percent for both Post-partum sterilization and total female sterilization. For 13 of the 24 data elements, more than 75 percent of facilities were verified as having an acceptable degree of variation between recorded and reported data. For only two of the data elements – 3rd ANC checkup and Discharged less than 48 hours after delivery – the percentage of facilities with an acceptable degree of variation did not exceed 50 percent. Data elements related to reproductive age group were reported more accurately, on average, than those in the other three element groupings.

Aggregated values for Round 2 include 745 data elements. For 67.4 percent of the data element verifications, the reported count perfectly matched the reported count; an additional 8.1 percent of such verifications reported a count that fell within the acceptable range, with less than 10 percent of variation from the recorded value. As in Round 1, over-reporting data (14.8 percent) occurred more frequently than under-reporting (9.8 percent).

TABLE 4: ROUND 2 COMPARISONS ACROSS ALL FACILITY TYPES AND DISTRICTS

Data Element	N	Reported vs. Recorded comparison (in % of facilities)			
		Acceptable variation		*Unacceptable variation*	
		Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Under-reported by >10%	Over-reported by >10%
Pregnancy Care					
1st trimester ANC registration	41	63.4	2.5	4.9	29.3
3rd ANC checkup	29	48.3	0.0	24.1	27.6
Injectable iron supplement	30	53.3	6.7	20.0	20.0
Blood transfusion	9	77.8	0.0	22.2	0.0
High risk pregnancy Identification	24	70.8	4.2	12.5	12.5
ANC registration	37	67.6	5.4	0.0	27.0
Child Birth					
C-Section at facility	10	80.0	10.0	0.0	10.0
Reported institutional deliveries	49	79.6	14.3	0.0	6.1
Free referral transport (Home to Facility)	7	71.4	0.0	0.0	28.6
Complicated deliveries referred out	44	61.4	0.0	31.8	6.8
Proportion of pre-term deliveries	43	46.5	4.7	27.9	20.9
Postnatal, Maternal, & Newborn Care					
Newborns less than 2.5 kg	52	65.4	11.5	13.5	9.6
Newborns weighed at birth	51	72.5	11.8	11.8	3.9
Discharged less than 24 hours after delivery	38	39.5	10.5	13.2	36.8
Discharged less than 48 hours after delivery	13	38.5	23.0	15.4	23.1
Birth doses to newborn pre-discharge	29	65.5	13.8	10.3	10.3
Hep, OPV doses to newborn pre-discharge	39	66.7	23.0	2.6	7.7
Total live births	52	86.5	5.8	1.9	5.8
BCG1	27	55.6	11.1	3.7	29.6

Measles	25	56.0	4.0	4.0	36.0
Reproductive Age Group					
Post-partum sterilization	9	100.0	0.0	0.0	0.0
Total female sterilization	13	84.6	15.4	0.0	0.0
PPIUCD	38	89.5	5.2	0.0	5.3
Total IUCD	36	88.9	2.8	0.0	8.3
Round 2 Verifications	**745**	**67.4%**	**8.1%**	**9.8%**	**14.8%**

3.2.3 FRU Facilities

Results from the trace and verify exercise for Rounds 1 and 2 at FRU facilities are presented in Table 5 (For facility and district-level tables, under- and over-reporting are combined into an "Unacceptable Variation" category. For full data tables, including under- and over-reporting, consult Annexes B and C). For FRUs in Round 1, data was available and verified for all 24 data elements. Observations falling within the acceptable range varied from zero (for 3rd ANC checkup) to 100 percent for five of the data elements. For only a third of the 24 data elements, at least 75 percent of facilities were verified as having an acceptable degree of variation between recorded and reported data. Verification counts for ten of the 24 data elements showed less than 50 percent of facilities with an acceptable degree of variation. At an aggregate level, 42.8 percent of the 215 data element verifications matched perfectly between reported and recorded counts. Another 15.8 percent of the verifications still fell within the acceptable range. Facilities tended to over- rather than under-report.

For Round 2, data was available for 22 of the 24 data elements in facilities at the FRU level. Reported vs. recorded comparisons falling within the acceptable range varied from 33.3 percent (Complicated Deliveries Referred Out, and Discharge less than 24 hours after delivery) to 100 percent (4 indicators). More than half of the data elements were verified as acceptable in at least 75 percent of the facilities in the district. Four of the 24 data elements presented less than 50 percent of acceptability of variation. For the 196 verifications in Round 2, 62.8 percent reported a count equal to the recorded value; another 12.8 percent of data element verifications were within 10 percent of the recorded amount. Similar to other facility levels, an improvement can be observed from Round 1 to Round 2, with reported counts in the unacceptable range falling from 41.4 percent of verifications in Round 1 to 24.5 percent in Round 2.

For 'High Risk Pregnancy Identification' and 'Free referral transport (Home to Facility)' data were available for Round 1 and not Round 2. This may be due to lack of presentation of related conditions at FRU facilities during the second round of verification. Another possible cause is the poor documentation for some data elements; evidence suggests that underreporting of referral is common in large part due to limited and/or inefficient systems for documenting referrals.

TABLE 5: FRU COMPARISONS ACROSS ALL DISTRICTS, FOR ROUNDS 1 AND 2

Data Element	Round 1				Round 2			
	N	Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Over or Under-reported by >10%	N	Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Over or Under-reported by >10%
Pregnancy Care								
1st trimester ANC Registration	3	33.3	0.0	66.7	5	60.0	0.0	40.0
3rd ANC checkup	2	0.0	0.0	100.0	1	100.0	0.0	0.0
Injectable Iron supplement	11	27.3	0.0	72.7	11	36.4	9.1	54.6
Blood transfusion	11	27.3	0.0	72.8	9	77.8	0.0	22.2
High Risk Pregnancy Identification	1	100.0	0.0	0.0	0	-	-	-
ANC Registration	2	100.0	0.0	0.0	3	100.0	0.0	0.0
Child Birth								
C-Section at facility	10	100.0	0.0	0.0	10	80.0	10.0	10.0
Reported institutional deliveries	15	60.0	40.0	0.0	15	86.7	13.3	0.0
Free referral transport (Home to Facility)	4	25.0	0.0	75.0	0	-	-	-
Complicated deliveries referred out	14	42.9	7.1	50.0	12	33.3	0.0	66.7
Proportion of Pre term deliveries	14	14.3	7.1	78.5	11	36.4	18.1	45.5
Postnatal, Maternal, & Newborn Care								
Newborns less than 2.5 kg	15	20.0	20.0	60.0	15	40.0	26.7	33.4
Newborns weighed at birth	15	20.0	40.0	40.0	14	57.1	28.6	14.3
Discharged less than 24 hours after delivery	11	27.3	0.0	72.8	9	22.2	11.1	66.6
Discharged less than 48 hours after delivery	7	28.6	0.0	71.5	7	14.3	28.6	57.2
Birth doses to newborn pre-discharge	6	0.0	16.7	83.3	6	66.7	16.6	16.7
Hep, OPV doses to newborn pre-discharge	11	0.0	72.7	27.3	11	63.6	27.3	9.1

Total live births	15	66.7	26.6	6.7	15	86.7	6.6	6.7
BCG1	2	0.0	50.0	50.0	2	50.0	0.0	50.0
Measles	4	75.0	0.0	25.0	2	50.0	0.0	50.0
Reproductive Age Group								
Post-partum sterilization	7	71.4	0.0	28.6	6	100.0	0.0	0.0
Total female sterilization	12	75.0	25.0	0.0	10	80.0	20.0	0.0
PPIUCD	14	57.1	0.0	42.9	13	84.6	7.7	7.7
Total IUCD	9	88.9	0.0	11.1	9	88.9	0.0	11.1
FRU Verifications	**215**	**42.8**	**15.8**	**41.4**	**196**	**62.8**	**12.8**	**24.5**

3.2.4 CHC Facilities

For CHC facilities in Round 1, comparison data was available for 22 of the 24 data elements included in the RDQA exercise and is presented in Table 6. The percentage of facilities with verifications in the acceptable range varied from zero percent (for Free Referral Transport and Post-Partum Sterilization) to 100 percent for four data elements. Half of the data elements were recorded and reported acceptably by 50 percent or less of the facilities reporting those data elements. Only five of the data elements had 75 percent or more of the facilities in the acceptable range. At an aggregate level, 46.7 percent of the 180 data element verifications matched between reported and recorded counts. Another 12.8 percent of the verifications showed reported counts within 10 percent of the recorded.

In Round 2, data for 22 data elements was again recorded and reported by CHC facilities and verified by the RDQA data collection team. The percentage of facilities in the acceptable range varies between 33.3 percent (Free Referral Transport, as in Round 1) and 100 (for 8 data elements). Seven additional indicators have 75 percent or more of facilities in the acceptable range. Only four indicators have 50 percent or less of facilities with verification falling within the acceptable range. For the 173 total data element verifications in Round 2, 67.1 percent had reported counts equal to recorded counts; another 10.4 percent were within 10 percent of the recorded amount. From Round 1 to Round 2, a distinct improvement can be observed in terms of the accuracy of the total number of verifications, as the percentage of unacceptable counts fell from 40.6 to 22.5.

For the data elements 'Blood transfusion' and 'C-section at facility', corresponding services are not typically provided at CHCs resulting in no data recorded for the verified months at facilities visited during the RDQA exercise.

TABLE 6: CHC COMPARISONS ACROSS ALL DISTRICTS, FOR ROUNDS 1 AND 2

Data Element	Round 1				Round 2			
	N	Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Over or Under-reported by >10%	N	Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Over or Under-reported by >10%
Pregnancy Care								
1st trimester ANC Registration	5	14.3	14.3	71.5	5	100.0	0.0	0.0
3rd ANC checkup	4	33.3	16.7	50.0	4	50.0	0.0	50.0
Injectable Iron supplement	9	28.6	0.0	71.5	9	44.4	11.2	44.4
Blood transfusion*	0	-	-	-	0	-	-	-
High Risk Pregnancy Identification	3	40.0	20.0	40.0	3	66.7	0.0	33.3
ANC Registration	6	100.0	0.0	0.0	6	83.3	16.7	0.0
Child Birth								
C-Section at facility*	0	-	-	-	0	-	-	-
Reported institutional deliveries	13	84.6	15.4	0.0	13	84.6	15.4	0.0
Free referral transport (Home to Facility)	3	0.0	0.0	100.0	3	33.3	0.0	66.7
Complicated deliveries referred out	12	38.5	15.3	46.2	12	58.3	0.0	41.6
Proportion of Pre term deliveries	13	50.0	0.0	50.0	13	46.2	0.0	53.9
Postnatal, Maternal, & Newborn Care								
Newborns less than 2.5 kg	13	38.5	0.0	61.6	13	69.2	7.7	23.1
Newborns weighed at birth	13	23.1	30.7	46.2	13	84.6	7.7	7.7
Discharged less than 24 hours after delivery	12	36.4	9.1	54.5	12	25.0	8.3	66.7
Discharged less than 48 hours after delivery	2	33.3	0.0	66.7	2	50.0	50.0	0.0
Birth doses to newborn pre-discharge	10	36.4	9.1	54.6	10	50.0	30.0	20.0
Hep, OPV doses to newborn pre-discharge	10	45.5	54.5	0.0	10	50.0	40.0	10.0
Total live births	12	83.3	16.7	0.0	12	100.0	0.0	0.0

BCG1	5	25.0	0.0	75.0	5	60.0	20.0	20.0
Measles	4	25.0	0.0	75.0	4	100.0	0.0	0.0
Reproductive Age Group								
Post-partum sterilization	1	0.0	0.0	100.0	1	100.0	0.0	0.0
Total female sterilization	2	50.0	0.0	50.0	2	100.0	0.0	0.0
PPIUCD	12	66.7	16.6	16.7	12	83.3	8.4	8.3
Total IUCD	9	60.0	0.0	40.0	9	77.8	11.1	11.1
CHC Verifications	**180**	**46.7**	**12.8**	**40.6**	**173**	**67.1**	**10.4**	**22.5**

* Corresponding services not typically delivered at CHC facilities

3.2.5 PHC/UHC Facilities

For PHC/UHC facilities in Round 1, comparison data was available for all 24 data elements. The percent of facilities in the acceptable range varies from 23.1 percent (for Injectable Iron supplement) to 100 percent for two data elements (C-section at facility and Total female sterilization). For 11 of the 24 data elements, at least 75 percent of facilities were verified to have an acceptable degree of variation between recorded and reported data. Verification counts for four of the data elements presented less than 50 percent of facilities within the range of acceptability. At an aggregate level, 59.6 percent of the 282 total verifications featured perfect matches between the reported and recorded counts. For another 7.8 percent of the total data verifications, the reported count fell within 10 percent of the recorded. Where discrepancies were identified, facilities trended toward over-reporting (18.1 percent) as opposed to under-reporting (14.5 percent) than what was identified in source documents.

For Round 2, data was available for 22 data elements in facilities at the PHC/UHC level. Reported vs. recorded comparisons falling within the acceptable range varied from 43.8 percent (Proportion of pre term deliveries) to 100 percent (5 data elements). More than three-quarters of the data elements were verified as acceptable in at least 75 percent of the facilities in the district. Only one data element, Proportion of pre term deliveries, presented less than 50 percent of acceptable variation. For the 237 total data element verifications in Round 2, 77.2 percent had the reported count equal to the recorded count; another 3.4 percent of observations were within 10 percent of the recorded. Similar to other facility levels, an improvement can be observed from Round 1 to Round 2, with reported counts in the unacceptable range falling from 32.6 percent of verifications to 19.4 percent. Among the four facility types, the PHC/UHC level was observed to have the greatest accuracy for the 24 data elements.

For the data elements 'Blood transfusion' and 'C-section at facility', data was recorded at the facility level during August 2014, though none was recorded during November 2014. As all occurrences of data for these elements were from an individual district (i.e. Panipat), appearance of data from one round to the next are likely a result of unique factors in the district. Such factors might include irregular availability of specialists (e.g. Obstetricians) and/or withdrawal of related services between rounds as per directions from the District Civil Surgeon.

TABLE 7: PHC/UHC COMPARISONS ACROSS ALL DISTRICTS, FOR ROUNDS 1 AND 2

Data Element	Round 1				Round 2			
	N	Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Over or Under-reported by >10%	N	Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Over or Under-reported by >10%
Pregnancy Care								
1st trimester ANC Registration	13	30.8	0.0	69.3	12	75.0	0.0	25.0
3rd ANC checkup	9	44.4	0.0	55.5	7	85.7	0.0	14.3
Injectable Iron supplement	13	23.1	0.0	76.9	10	80.0	0.0	20.0
Blood transfusion	3	33.3	0.0	66.6	0	-	-	-
High Risk Pregnancy Identification	9	55.6	0.0	44.4	7	71.4	0.0	28.6
ANC Registration	11	45.5	18.1	36.4	9	66.7	0.0	33.3
Child Birth								
C-Section at facility	1	100.0	0.0	0.0	0	-	-	-
Reported institutional deliveries	17	88.2	5.9	5.9	15	86.7	6.6	6.7
Free referral transport (Home to Facility)	6	83.3	0.0	16.7	2	100.0	0.0	0.0
Complicated deliveries referred out	16	43.8	6.3	50.1	16	75.0	0.0	25.0
Proportion of Pre term deliveries	18	50.0	0.0	50.0	16	43.8	0.0	56.3
Postnatal, Maternal, & Newborn Care								
Newborns less than 2.5 kg	21	61.9	4.8	33.3	19	78.9	5.3	15.8
Newborns weighed at birth	20	75.0	5.0	20.0	18	77.8	5.5	16.7
Discharged less than 24 hours after delivery	18	44.4	22.3	33.4	13	53.8	7.7	38.5
Discharged less than 48 hours after delivery	4	50.0	25.0	25.0	4	75.0	0.0	25.0
Birth doses to newborn pre-discharge	13	76.9	7.7	15.4	13	76.9	0.0	23.1
Hep, OPV doses to newborn pre-discharge	18	50.0	22.2	27.8	17	82.4	11.7	5.9

Total live births	20	70.0	10.0	20.0	19	89.5	5.2	5.3
BCG1	9	77.8	11.1	11.1	7	71.4	14.3	14.3
Measles	10	50.0	10.0	40.0	7	57.1	0.0	42.9
Reproductive Age Group								
Post-partum sterilization	3	66.7	0.0	33.3	2	100.0	0.0	0.0
Total female sterilization	3	100.0	0.0	0.0	1	100.0	0.0	0.0
PPIUCD	13	84.6	7.7	7.7	13	100.0	0.0	0.0
Total IUCD	14	71.4	7.2	21.4	10	100.0	0.0	0.0
PHC/UHC Verifications	**282**	**59.6**	**7.8**	**32.6**	**237**	**77.2**	**3.4**	**19.4**

3.2.6 SC Facilities

For SC facilities in Round 1, comparison data was available for 19 of the 24 data elements included in the exercise. The percentage of facilities in the acceptable range varied from 33.3 percent (for Newborns weighing less than 2.5 kgs) to 100 percent (for four indicators). Three of the 24 data elements were recorded and reported acceptably by 50 percent or less of the facilities reporting those data elements. Eight of the indicators have 75 percent or more of the facilities in the acceptable range. At an aggregate level, 49.3 percent of the 150 total verifications featured perfect matches between the reported and recorded counts. For another 14.7 percent of the total element verifications, the reported count fell within 10 percent of the recorded count.

In Round 2, data was available for 16 of the 24 data elements in facilities at the SC level. Reported vs. recorded comparisons falling within the acceptable range varied from 29.4 percent (3rd ANC checkup) to 100 percent (4 indicators). Seven of the data elements were verified as acceptable in at least 75 percent of the facilities in the district. One data element presented less than 50 percent of facilities reporting acceptably. For the 139 total data verifications in Round 2, 56.8 percent had a reported count equal to the recorded count; another 6.5 percent were within 10 percent of the recorded amount. From Round 1 to Round 2, therefore, there is actually a very small decline in accuracy, from 36.0 percent in the unacceptable range to 36.7 percent. All other facility types witnessed an improvement in accuracy over time.

Data were not available for all elements during visits to SCs by the RDQA field teams. In some cases, this was a direct result of corresponding services not provided at SCs, such as with 'Blood transfusion,' and elements related to female sterilization and IUCDs. In others, the causes of missing data are less transparent. 'Injectable iron supplement,' for example, was identified and verified during Round 1 but not Round 2. As this is a service provided under the supervision of the Medical Officer, it is possible that the Medical Officer was not available at visited facilities during the verified month (i.e. November 2014). For 'Discharged less than 48 hours after delivery' and 'Birth doses to newborn pre-discharge', no data were available at facilities for at least one of the verification rounds.

TABLE 8: SC COMPARISONS ACROSS ALL DISTRICTS, FOR ROUNDS 1 AND 2

Data Element	Round 1				Round 2			
	N	Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Over or Under-reported by >10%	N	Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Over or Under-reported by >10%
Pregnancy Care								
1st trimester ANC Registration	18	38.9	11.1	50.0	19	47.4	5.2	47.4
3rd ANC checkup	17	29.4	17.7	52.9	17	29.4	0.0	70.6
Injectable Iron supplement	1	100.0	0.0	0.0	0	-	-	-
Blood transfusion*	0	-	-	-	0	-	-	-
High Risk Pregnancy Identification	13	46.2	0.0	53.9	14	71.4	7.2	21.4
ANC Registration	18	44.4	16.7	38.9	19	57.9	5.3	36.8
Child Birth								
C-Section at facility	0	-	-	-	0	-	-	-
Reported institutional deliveries	6	66.7	16.6	16.7	6	50.0	16.7	33.3
Free referral transport (Home to Facility)	4	50.0	0.0	50.0	2	100.0	0.0	0.0
Complicated deliveries referred out	5	80.0	0.0	20.0	4	100.0	0.0	0.0
Proportion of Pre term deliveries	3	33.3	33.4	33.3	3	100.0	0.0	0.0
Postnatal, Maternal, & Newborn Care								
Newborns less than 2.5 kg	6	33.3	0.0	66.7	5	80.0	0.0	20.0
Newborns weighed at birth	7	42.9	14.2	42.9	6	66.7	0.0	33.4
Discharged less than 24 hours after delivery	7	57.1	28.6	14.3	4	75.0	25.0	0.0
Discharged less than 48 hours after delivery	0	-	-	-	0	-	-	-
Birth doses to newborn pre-discharge	2	50.0	50.0	0.0	0	-	-	-
Hep, OPV doses to newborn pre-discharge	2	50.0	50.0	0.0	1	0.0	0.0	100.0

Total live births	7	57.1	42.9	0.0	6	50.0	16.7	33.3
BCG1	12	58.3	8.4	33.3	13	46.2	15.3	38.5
Measles	12	50.0	16.7	33.4	12	41.7	8.3	50.0
Reproductive Age Group								
Post-partum sterilization*	0	-	-	-	0	-	-	-
Total female sterilization*	0	-	-	-	0	-	-	-
PPIUCD*	0	-	-	-	0	-	-	-
Total IUCD*	10	80.0	10.0	10.0	8	87.5	0.0	12.5
SC Verifications	**150**	**49.3**	**14.7**	**36.0**	**139**	**56.8**	**6.5**	**36.7**

* Corresponding services not typically delivered at SC facilities

3.2.7 Bhiwani

Results from the trace and verify exercise for Rounds 1 and 2 in Bhiwani district are presented in Table 9. In Round 1, data was available and verified for all 24 data elements. Observations falling within the acceptable range varied from zero percent (Blood transfusion) to 100 percent (for six data elements). For slightly less than half of the 24 data elements, at least 75 percent of facilities were verified as having an acceptable degree of variation between recorded and reported data. Verification counts for six of the 24 data elements showed less than 50 percent of facilities with an acceptable degree of variation. At an aggregate level, 57.9 percent of the 126 data verifications matched perfectly between reported and recorded counts. For another 10.3 percent, the reported count fell within 10 percent of the recorded count.

In Round 2, data was available for all but one of the 24 data elements in Bhiwani district. Reported vs. recorded comparisons falling within the acceptable range varied from zero percent (Blood transfusion) to 100 percent (13 indicators). Fifteen of the data elements were confirmed as acceptable in at least 75 percent of the facilities in the district. Four of the 23 data elements were in acceptable range for 50 percent or less of facilities. For the 122 total verifications in Round 2, 74.6 percent had a reported count equal to the recorded count; another 3.3 percent of the total elements were within 10 percent of the recorded amount. From Round 1 to Round 2, an improvement can be observed in the overall accuracy of the verifications in Bhiwani, as the percentage of unacceptable counts dipped from 31.7 percent to 22.1.

For some data elements (e.g. complicated deliveries referred out, proportion of preterm deliveries, and discharged less than 24 and 48 hours of delivery) there was a noticeable increase in unacceptable variation between rounds. Although determining causality for differences from one round to another is a challenging task with myriad factors in play, in this case it may be due to the timing of interaction between RDQA data collectors and the district M&E and facility teams. To maintain uniformity across districts, August and November 2014 were the reporting months verified through the exercise

TABLE 9: BHIWANI COMPARISONS ACROSS ALL FACILITY TYPES, FOR ROUNDS 1 AND 2

Data Element	Round 1				Round 2			
	N	Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Over or Under-reported by >10%	N	Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Over or Under-reported by >10%
Pregnancy Care								
1st trimester ANC Registration	4	50.0	0.0	50.0	3	100.0	0.0	0.0
3rd ANC checkup	3	33.3	33.4	33.3	3	66.7	0.0	33.3
Injectable Iron supplement	5	20.0	0.0	80.0	6	33.3	0.0	66.7
Blood transfusion	2	0.0	0.0	100.0	1	100.0	0.0	0.0
High Risk Pregnancy Identification	4	100.0	0.0	0.0	2	50.0	0.0	50.0
ANC Registration	4	75.0	0.0	25.0	4	100.0	0.0	0.0
Child Birth								
C-Section at facility	1	100.0	0.0	0.0	1	100.0	0.0	0.0
Reported institutional deliveries	9	88.9	11.1	0.0	9	100.0	0.0	0.0
Free referral transport (Home to Facility)	2	50.0	0.0	50.0	0	-	-	-
Complicated deliveries referred out	8	50.0	12.5	37.5	7	28.6	0.0	71.4
Proportion of Pre term deliveries	9	33.3	11.1	11.1	9	55.6	0.0	44.4
Postnatal, Maternal, & Newborn Care								
Newborns less than 2.5 kg	9	66.7	22.2	11.1	9	66.7	0.0	33.3
Newborns weighed at birth	9	55.6	11.1	33.3	9	77.8	22.2	0.0
Discharged less than 24 hours after delivery	8	50.0	12.5	12.5	7	42.9	0.0	57.2
Discharged less than 48 hours after delivery	2	50.0	0.0	0.0	3	0.0	0.0	100.0
Birth doses to newborn pre-discharge	7	28.6	14.3	28.6	8	87.5	12.5	0.0

Hep, OPV doses to newborn pre-discharge	7	28.6	57.1	0.0	6	100.0	0.0	0.0
Total live births	8	100.0	0.0	0.0	8	100.0	0.0	0.0
BCG1	3	33.3	0.0	33.3	4	100.0	0.0	0.0
Measles	5	20.0	0.0	20.0	4	100.0	0.0	0.0
Reproductive Age Group								
Post-partum sterilization	1	100.0	0.0	0.0	1	100.0	0.0	0.0
Total female sterilization	2	100.0	0.0	0.0	2	100.0	0.0	0.0
PPIUCD	9	88.9	0.0	11.1	9	88.9	0.0	11.1
Total IUCD	5	80.0	0.0	20.0	7	71.4	14.3	14.3
Bhiwani Verifications	**126**	**57.9**	**10.3**	**31.7**	**122**	**74.6**	**3.3**	**22.1**

3.2.8 Faridabad

Results from the trace and verify exercise for Rounds 1 and 2 in Faridabad district are presented in Table 10. In Round 1, data was available and verified for all 24 data elements. Observations falling within the acceptable range varied from 14.3 percent (Proportion of pre-term deliveries) to 100 percent (seven data elements). For 13 of the 24 data elements, at least 75 percent of facilities were verified as having an acceptable degree of variation between recorded and reported data. Verification counts for three of the 24 data elements showed that 50 percent or fewer of the facilities had an acceptable degree of variation. At an aggregated level, 63.8 percent of the 127 total data verifications in Faridabad featured perfect matches between the reported and recorded counts. For another 9.4 percent, the reported count fell within 10 percent of the recorded count.

In Round 2, data was available for 23 of the 24 data elements. Reported vs. recorded comparisons falling within the acceptable range varied from zero percent (3rd ANC checkup) to 100 percent (for seven data elements). Fifteen of the data elements were confirmed as acceptable in 75 percent or more of the facilities in the district. Three of the 23 data elements had 50 percent or less of facilities accurately reporting. For the 117 total verifications in Round 2, 72.6 percent had the reported count equal to the recorded count; another 2.6 percent of the verifications were within 10 percent of the recorded amount. From Round 1 to Round 2, a small improvement can be observed in terms of the accuracy of the total data elements, as the percentage of inaccurate counts fell from 26.8 to 24.8.

An increase in unacceptable variation occurred for some data elements from Round 1 to Round 2. While the precise cause of such a change is difficult to discern, it should be noted that the District M&E Officer for Faridabad was unavailable for provision of feedback and action planning during Round 1 of data collection. Poor or nonexistent documentation of referrals may have led to non- or under-reporting of referrals between facilities as verified during Round 2.

TABLE 10: FARIDABAD COMPARISONS ACROSS ALL FACILITY TYPES, FOR ROUNDS 1 AND 2

Data Element	Round 1				Round 2			
	N	Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Over or Under-reported by >10%	N	Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Over or Under-reported by >10%
Pregnancy Care								
1st trimester ANC Registration	6	50.0	16.7	33.4	8	62.5	0.0	37.5
3rd ANC checkup	4	0.0	50.0	50.0	2	0.0	0.0	100.0
Injectable Iron supplement	6	50.0	0.0	50.0	5	40.0	20.0	40.0
Blood transfusion	3	33.3	0.0	66.7	2	100.0	0.0	0.0
High Risk Pregnancy Identification	5	60.0	0.0	40.0	4	75.0	0.0	25.0
ANC Registration	6	66.7	16.6	16.7	7	85.7	0.0	14.3
Child Birth								
C-Section at facility	3	100.0	0.0	0.0	3	100.0	0.0	0.0
Reported institutional deliveries	9	77.8	11.1	11.1	8	87.5	0.0	12.5
Free referral transport (Home to Facility)	3	66.7	0.0	33.3	0	-	-	-
Complicated deliveries referred out	7	42.9	0.0	57.2	5	60.0	0.0	40.0
Proportion of Pre term deliveries	7	14.3	0.0	85.8	8	37.5	0.0	62.5
Postnatal, Maternal, & Newborn Care								
Newborns less than 2.5 kg	8	50.0	0.0	50.0	8	62.5	12.5	25.0
Newborns weighed at birth	8	62.5	25.0	12.5	8	75.0	0.0	25.0
Discharged less than 24 hours after delivery	6	83.3	0.0	16.7	3	66.7	0.0	33.3
Discharged less than 48 hours after delivery	3	66.7	0.0	33.3	1	100.0	0.0	0.0
Birth doses to newborn pre-discharge	6	83.3	0.0	16.7	6	100.0	0.0	0.0

Hep, OPV doses to newborn pre-discharge	6	66.7	33.3	0.0	7	71.4	14.3	14.3
Total live births	9	100.0	0.0	0.0	9	88.9	0.0	11.1
BCG1	3	100.0	0.0	0.0	3	66.7	0.0	33.3
Measles	4	25.0	50.0	25.0	5	40.0	0.0	60.0
Reproductive Age Group								
Post-partum sterilization	2	100.0	0.0	0.0	2	100.0	0.0	0.0
Total female sterilization	3	66.7	33.3	0.0	3	100.0	0.0	0.0
PPIUCD	3	66.7	0.0	33.3	3	100.0	0.0	0.0
Total IUCD	7	100.0	0.0	0.0	7	85.7	0.0	14.3
Faridabad Verifications	**127**	**63.8**	**9.4**	**26.8**	**117**	**72.6**	**2.6**	**24.8**

3.2.9 Jind

Results from the trace and verify exercise for Rounds 1 and 2 in Jind district are displayed in Table 11. In Round 1, data was available and verified for 23 of the 24 data elements. Observations falling within the acceptable range varied from zero percent (Free referral transport and Discharged less than 48 hours) to 100 percent (six data elements). For 13 of the 24 data elements, at least 75 percent of facilities were verified as having an acceptable degree of variation between recorded and reported data. Verification counts for six of the 24 data elements showed 50 percent or less of facilities were in the acceptable range. At an aggregate level, 50.0 percent of the 120 total verifications perfectly matched between reported and recorded counts. For another 16.7 percent, the reported count fell within 10 percent of the recorded count.

In Round 2, data was available for 24 of the 24 data elements in Jind district. Reported vs. recorded comparisons falling within the acceptable range varied from zero percent (Free referral transport and Discharged less than 48 hours) to 100 percent (seven data elements). Fifteen of the 24 data elements were confirmed as acceptable in at least 75 percent of the facilities in the district. Five of the data elements had 50 percent or less of facilities with acceptable accuracy. For the 119 total verifications in Round 2, 64.7 percent had a reported count equal to the recorded; another 10.1 percent of the total verifications were within 10 percent of the recorded amount. From Round 1 to Round 2, an improvement can be observed in terms of the accuracy, as the percentage of unacceptable counts fell from 33.3 to 25.2 in Jind. For the missing values of 'Post-partum sterilization' for Round 1, there were no procedures documented during August 2014.

TABLE 11: JIND COMPARISONS ACROSS ALL FACILITY TYPES, FOR ROUNDS 1 AND 2

Data Element	Round 1				Round 2			
	N	Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Over or Under-reported by >10%	N	Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Over or Under-reported by >10%
Pregnancy Care								
1st trimester ANC Registration	6	33.3	16.7	50.0	6	66.7	0.0	33.3
3rd ANC checkup	6	16.7	0.0	83.3	5	60.0	0.0	40.0
Injectable Iron supplement	5	20.0	0.0	80.0	5	100.0	0.0	0.0
Blood transfusion	2	100.0	0.0	0.0	2	50.0	0.0	50.0
High Risk Pregnancy Identification	4	50.0	0.0	50.0	5	80.0	0.0	20.0
ANC Registration	6	83.3	0.0	16.7	6	83.3	0.0	16.7
Child Birth								
C-Section at facility	1	100.0	0.0	0.0	1	100.0	0.0	0.0
Reported institutional deliveries	8	62.5	37.5	0.0	8	87.5	12.5	0.0
Free referral transport (Home to Facility)	1	0.0	0.0	100.0	1	0.0	0.0	100.0
Complicated deliveries referred out	8	37.5	25.0	37.5	8	37.5	0.0	62.5
Proportion of Pre term deliveries	8	37.5	0.0	62.5	8	28.6	8.9	62.5
Postnatal, Maternal, & Newborn Care								
Newborns less than 2.5 kg	8	37.5	12.5	50.0	8	50.0	25.0	25.0
Newborns weighed at birth	8	50.0	25.0	25.0	8	62.5	25.0	12.5
Discharged less than 24 hours after delivery	6	16.7	16.6	66.7	6	16.7	16.6	66.6
Discharged less than 48 hours after delivery	1	0.0	0.0	100.0	1	0.0	0.0	100.0
Birth doses to newborn pre-discharge	1	100.0	0.0	0.0	2	0.0	50.0	50.0
Hep, OPV doses to newborn pre-discharge	7	0.0	85.7	14.3	7	71.4	28.6	0.0

Total live births	8	75.0	25.0	0.0	8	75.0	12.5	12.5
BCG I	5	80.0	0.0	20.0	6	66.7	16.6	16.7
Measles	5	80.0	0.0	20.0	5	80.0	0.0	20.0
Reproductive Age Group								
Post-partum sterilization	0	-	-	-	1	100.0	0.0	0.0
Total female sterilization	2	100.0	0.0	0.0	1	100.0	0.0	0.0
PPIUCD	7	71.4	14.3	14.3	6	100.0	0.0	0.0
Total IUCD	7	71.4	14.3	14.3	6	83.3	0.0	16.7
Jind Verifications	**120**	**50.0**	**16.7**	**33.3**	**119**	**64.7**	**10.1**	**25.2**

3.2.10 Mahendragarh

Results from the trace and verify exercise for Rounds 1 and 2 in Mahendragarh district are presented in Table 12. In Round 1, data was available and verified for 22 of 24 data elements. Observations falling within the acceptable range varied from zero percent (three data elements) to 100 percent (three data elements). For seven of the 24 data elements, at least 75 percent of facilities were verified as having an acceptable degree of variation between recorded and reported data. Verification counts for six of the 24 data elements showed 50 percent or less of facilities with acceptable accuracy. At an aggregate level, 42.3 percent of the 111 total data element verifications featured perfect matches between reported and recorded counts. For another 15.3 percent of the total data elements, the reported count fell within 10 percent of the recorded count.

In Round 2, data was available for 23 of the 24 data elements in Mahendragarh district. Reported vs. recorded comparisons falling within the acceptable range varied from 25 percent (3rd ANC checkup) to 100 percent (10 data elements). Fourteen of the data elements were confirmed as acceptable in at least 75 percent of the facilities in the district. Only two of the 23 data elements presented 50 percent or less of facilities with acceptable variation. For the 103 total data verifications in Round 2, 66.0 percent had a reported count equal to the recorded count; another 7.8 percent were within 10 percent of the recorded amount. From Round 1 to Round 2, a marked improvement can be observed in the accuracy in Mahendragarh, as the percentage of unacceptable counts fell from 42.3 to 26.2 percent. For elements within the table missing data between rounds, data were unavailable during facility visits by the RDQA collection teams.

TABLE 12: MAHENDRAGARH COMPARISONS ACROSS ALL FACILITY TYPES, FOR ROUNDS 1 AND 2

Data Element	Round 1				Round 2			
	N	Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Over or Under-reported by >10%	N	Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Over or Under-reported by >10%
Pregnancy Care								
1st trimester ANC Registration	6	0.0	0.0	100.0	7	42.9	14.2	42.9
3rd ANC checkup	5	20.0	20.0	60.0	4	25.0	0.0	75.0
Injectable Iron supplement	2	50.0	0.0	50.0	4	50.0	0.0	50.0
Blood transfusion	1	0.0	0.0	100.0	1	100.0	0.0	0.0
High Risk Pregnancy Identification	3	0.0	0.0	100.0	4	100.0	0.0	0.0
ANC Registration	6	50.0	16.7	33.3	6	50.0	0.0	50.0
Child Birth								
C-Section at facility	1	100.0	0.0	0.0	1	100.0	0.0	0.0
Reported institutional deliveries	8	50.0	37.5	12.5	8	62.5	25.0	12.5
Free referral transport (Home to Facility)	0	-	-	-	1	100.0	0.0	0.0
Complicated deliveries referred out	6	66.7	0.0	33.4	7	71.4	0.0	28.6
Proportion of Pre term deliveries	4	50.0	0.0	50.0	3	100.0	0.0	0.0
Postnatal, Maternal, & Newborn Care								
Newborns less than 2.5 kg	8	12.5	12.5	75.0	8	100.0	0.0	0.0
Newborns weighed at birth	8	25.0	37.5	37.5	7	85.7	0.0	14.3
Discharged less than 24 hours after delivery	7	14.3	14.3	71.4	7	57.1	14.3	28.6
Discharged less than 48 hours after delivery	0	-	-	-	1	0.0	100.0	0.0
Birth doses to newborn pre-discharge	4	75.0	0.0	25.0	2	50.0	0.0	50.0
Hep, OPV doses to	6	66.7	16.6	16.7	4	50.0	25.0	25.0

newborn pre-discharge								
Total live births	8	50.0	37.5	12.5	8	87.5	0.0	12.5
BCG I	6	50.0	16.7	33.4	6	16.7	33.3	50.0
Measles	6	50.0	16.7	33.3	5	20.0	20.0	60.0
Reproductive Age Group								
Post-partum sterilization	1	100.0	0.0	0.0	0	-	-	-
Total female sterilization	2	100.0	0.0	0.0	1	100.0	0.0	0.0
PPIUCD	6	33.3	16.7	50.0	6	100.0	0.0	0.0
Total IUCD	7	71.4	0.0	28.6	2	100.0	0.0	0.0
Mahendragarh Verifications	**111**	**42.3**	**15.3**	**42.3**	**103**	**66.0**	**7.8**	**26.2**

3.2.11 Mewat

Results from the trace and verify exercise for Rounds 1 and 2 in Mewat district are shown in Table 13. In Round 1, data was available and verified for all but one of the 24 data elements. Observations falling within the acceptable range varied from zero percent (Injectable Iron Supplement and Post-partum sterilization) to 100 percent (for four data elements). For seven of the 24 data elements, at least 75 percent of facilities were verified as having an acceptable degree of variation between recorded and reported data. Verification counts for seven of the 24 data elements showed 50 percent or less of facilities with an acceptable degree of variation. At an aggregated level, 35.3 percent of the 119 verifications featured perfect matches between reported and recorded counts. For another 16.8 percent of the total data elements, the reported count fell within 10 percent of the recorded.

Similar to Round 1, data for Round 2 was available for 23 of the 24 data elements in Mewat district. Reported vs. recorded comparisons falling within the acceptable range varied from 33.3 percent (Injectable Iron supplement and High risk pregnancy identification) to 100 percent (eight data elements). Twelve of the data elements were confirmed as acceptable in at least 75 percent of the facilities in the district. Four of the 23 data elements had 50 percent or less of facilities with acceptable variation. For the 100 total data element verifications in Round 2, 61.0 percent had a reported count equal to the recorded count; another 11.0 percent of the total data elements were within 10 percent of the recorded amount. From Round 1 to Round 2, a distinct improvement can be observed in the accuracy in Mewat, as the percentage of unacceptable counts dropped from 47.9 percent to 28.0.

TABLE 13: MEWAT COMPARISONS ACROSS ALL FACILITY TYPES, FOR ROUNDS 1 AND 2

Data Element	Round 1				Round 2			
	N	Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Over or Under-reported by >10%	N	Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Over or Under-reported by >10%
Pregnancy Care								
1st trimester ANC Registration	8	12.5	0.0	87.5	6	66.7	0.0	33.3
3rd ANC checkup	5	40.0	0.0	60.0	5	40.0	0.0	60.0
Injectable Iron supplement	4	0.0	0.0	100.0	3	0.0	33.3	66.7
Blood transfusion*	0	-	-	-	0	-	-	-
High Risk Pregnancy Identification	4	0.0	25.0	75.0	3	33.3	0.0	66.6
ANC Registration	5	20.0	60.0	20.0	6	50.0	16.7	33.3
Child Birth								
C-Section at facility	1	100.0	0.0	0.0	1	100.0	0.0	0.0
Reported institutional deliveries	7	85.7	14.3	0.0	6	66.7	33.3	0.0
Free referral transport (Home to Facility)	6	16.7	0.0	83.4	2	50.0	0.0	50.0
Complicated deliveries referred out	8	37.5	12.5	50.0	7	85.7	0.0	14.3
Proportion of Pre term deliveries	6	50.0	0.0	50.0	4	25.0	25.0	50.0
Postnatal, Maternal, & Newborn Care								
Newborns less than 2.5 kg	8	12.5	0.0	87.5	6	33.3	16.7	50.0
Newborns weighed at birth	8	12.5	37.5	50.0	6	66.7	16.6	16.7
Discharged less than 24 hours after delivery	5	40.0	40.0	20.0	6	50.0	0.0	50.0
Discharged less than 48 hours after delivery	4	25.0	25.0	50.0	3	66.7	33.3	0.0
Birth doses to newborn pre-discharge	5	20.0	20.0	60.0	4	50.0	25.0	25.0
Hep, OPV doses to newborn pre-discharge	5	20.0	40.0	40.0	5	40.0	40.0	20.0
Total live births	7	57.1	42.9	0.0	6	100.0	0.0	0.0

BCG I	4	50.0	25.0	25.0	3	33.3	0.0	66.7
Measles	4	50.0	0.0	50.0	4	50.0	0.0	50.0
Reproductive Age Group								
Post-partum sterilization	2	0.0	0.0	100.0	2	100.0	0.0	0.0
Total female sterilization	3	33.3	33.4	33.3	2	100.0	0.0	0.0
PPIUCD	3	100.0	0.0	0.0	4	100.0	0.0	0.0
Total IUCD	7	71.4	0.0	28.6	6	100.0	0.0	0.0
Mewat Verifications	**119**	**35.3**	**16.8**	**47.9**	**100**	**61.0**	**11.0**	**28.0**

* Corresponding services not typically available at facilities visited by the collection team

3.2.12 Palwal

Results from the trace and verify exercise for Rounds 1 and 2 in Palwal district are presented in Table 14. In Round 1, data was available and verified for all 24 data elements. Observations falling within the acceptable range varied from zero percent (Blood transfusion and BCG 1) to 100 percent (nine data elements). For 10 of the 24 data elements, at least 75 percent of facilities were verified as having an acceptable degree of variation between recorded and reported data. Verification counts for eight of the 24 data elements showed 50 percent or less of facilities with an acceptable degree of variation. For the 88 total verifications in Round 1, 53.4 percent had the same reported and recorded counts; another 9.1 percent of the verifications were within 10 percent.

In Round 2, data was available for 22 of the 24 data elements in Palwal district. Reported vs. recorded comparisons falling within the acceptable range varied from zero percent (3rd ANC checkup and Blood transfusion) to 100 percent (seven data elements). Twelve of the data elements were confirmed as acceptable in at least 75 percent of the facilities in the district. Three of the 22 data elements presented 50 percent or less of facilities with acceptable variation. At an aggregate level, 52.4 percent of the 82 total data elements had reported counts equal to recorded counts; another 17.1 percent of the verifications showed less than 10 percent variation. From Round 1 to Round 2, a modest improvement was observed in accuracy, as the percentage of unacceptable counts dropped from 37.5 percent in Round 1to 30.5 in Round 2.

For some data elements (i.e. High risk pregnancy identification and Free referral transport (Home to Facility), data were available for Round 1 of verification and not Round 2. Although determining causality for lack of data from one round to another is a difficult undertaking, this may be a result of data simply not being documented appropriately as is typically the case with referrals.

TABLE 14: PALWAL COMPARISONS ACROSS ALL FACILITY TYPES, FOR ROUNDS 1 AND 2

Data Element	Round 1				Round 2			
	N	Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Over or Under-reported by >10%	N	Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Over or Under-reported by >10%
Pregnancy Care								
1st trimester ANC Registration	3	0.0	33.3	66.7	3	66.7	0.0	33.3
3rd ANC checkup	3	100.0	0.0	0.0	2	0.0	0.0	100.0
Injectable Iron supplement	5	40.0	0.0	60.0	5	60.0	0.0	40.0
Blood transfusion	1	0.0	0.0	100.0	1	0.0	0.0	100.0
High Risk Pregnancy Identification	1	100.0	0.0	0.0	0	-	-	-
ANC Registration	3	33.3	0.0	66.6	2	50.0	50.0	0.0
Child Birth								
C-Section at facility	1	100.0	0.0	0.0	1	0.0	100.0	0.0
Reported institutional deliveries	7	85.7	14.3	0.0	7	57.1	28.6	14.3
Free referral transport (Home to Facility)	1	100.0	0.0	0.0	0	-	-	-
Complicated deliveries referred out	5	40.0	0.0	60.0	5	60.0	0.0	40.0
Proportion of Pre term deliveries	6	50.0	0.0	50.0	5	40.0	0.0	60.0
Postnatal, Maternal, & Newborn Care								
Newborns less than 2.5 kg	7	57.1	0.0	42.9	7	57.1	14.3	28.6
Newborns weighed at birth	7	42.9	14.2	42.9	7	57.1	14.3	28.6
Discharged less than 24 hours after delivery	7	28.6	14.3	57.2	6	16.7	33.3	50.0
Discharged less than 48 hours after delivery	3	33.3	0.0	66.7	4	50.0	25.0	25.0
Birth doses to newborn pre-discharge	2	50.0	0.0	50.0	4	50.0	0.0	50.0
Hep, OPV doses to newborn pre-discharge	4	50.0	50.0	0.0	5	40.0	40.0	20.0
Total live births	7	71.4	14.3	14.3	7	57.1	28.6	14.3

BCG	1	0.0	0.0	100.0	1	100.0	0.0	0.0
Measles	2	100.0	0.0	0.0	1	100.0	0.0	0.0
Reproductive Age Group								
Post-partum sterilization	1	100.0	0.0	0.0	1	100.0	0.0	0.0
Total female sterilization	2	50.0	50.0	0.0	1	100.0	0.0	0.0
PPIUCD	5	60.0	0.0	40.0	5	60.0	20.0	20.0
Total IUCD	4	50.0	0.0	50.0	2	100.0	0.0	0.0
Palwal Verifications	**88**	**53.4**	**9.1**	**37.5**	**82**	**52.4**	**17.1**	**30.5**

3.2.13 Panipat

Results from the trace and verify exercise for Rounds 1 and 2 in Panipat district are displayed in Table 15. In Round 1, data was available and verified for all 24 data elements. Observations falling within the acceptable range varied from zero percent (Discharged less than 48 hours) to 100 percent (three data elements). For five of the 24 data elements, at least 75 percent of facilities were verified as having an acceptable degree of variation between recorded and reported data. Verification counts for four of the 24 data elements showed that 50 percent or less of facilities had an acceptable degree of variation. At an aggregate level, 50.0 percent of the 136 total element verifications had a perfect match between reported and recorded counts. For another 8.1 percent, the reported count fell within 10 percent of the recorded count.

In Round 2, data was available for 23 of the 24 data elements. Reported vs. recorded comparisons falling within the acceptable range varied from zero percent (measles, and at only one facility) to 100 percent (twelve data elements). Sixteen of the data elements were confirmed as acceptable in at least 75 percent of the facilities in the district. Only two of the 23 data elements presented less than 50 percent of acceptability of variation. For the 102 data element verifications in Panipat in Round 2, 73.5 percent had a reported count equal to the recorded count; another 7.9 percent were within 10 percent of the recorded amount. From Round 1 to Round 2, a significant improvement was observed, as the percentage of unacceptable counts dropped sharply from 41.9 percent to 18.6. The improvement in accuracy from Round 1 to Round 2 was more pronounced in Panipat than in any other district. Data for 'Discharged less than 48 hours after delivery' were unavailable during Round 2.

TABLE 15: PANIPAT COMPARISONS ACROSS ALL FACILITY TYPES, FOR ROUNDS 1 AND 2

Data Element	Round 1				Round 2			
	N	Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Over or Under-reported by >10%	N	Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Over or Under-reported by >10%
Pregnancy Care								
1st trimester ANC Registration	8	62.5	0.0	37.5	8	62.5	0.0	37.5
3rd ANC checkup	8	37.5	0.0	62.5	8	75.0	0.0	25.0
Injectable Iron supplement	5	20.0	0.0	80.0	2	100.0	0.0	0.0
Blood transfusion	5	20.0	0.0	80.0	2	100.0	0.0	0.0
High Risk Pregnancy Identification	7	57.1	0.0	42.9	6	66.7	16.6	16.7
ANC Registration	7	57.1	0.0	42.9	6	50.0	0.0	50.0
Child Birth								
C-Section at facility	3	100.0	0.0	0.0	2	50.0	0.0	50.0
Reported institutional deliveries	3	100.0	0.0	0.0	3	100.0	0.0	0.0
Free referral transport (Home to Facility)	5	60.0	0.0	40.0	3	100.0	0.0	0.0
Complicated deliveries referred out	6	50.0	0.0	50.0	5	100.0	0.0	0.0
Proportion of Pre term deliveries	7	42.9	14.2	42.9	7	57.1	0.0	42.9
Postnatal, Maternal, & Newborn Care								
Newborns less than 2.5 kg	7	57.1	0.0	42.9	6	83.3	16.7	0.0
Newborns weighed at birth	7	57.1	0.0	42.9	6	83.3	0.0	16.7
Discharged less than 24 hours after delivery	8	50.0	12.5	37.5	3	33.3	0.0	66.6
Discharged less than 48 hours after delivery	1	0.0	0.0	100.0	0	-	-	-
Birth doses to newborn pre-discharge	7	28.6	28.5	42.9	3	33.3	33.4	33.3
Hep, OPV doses to newborn pre-discharge	7	28.6	28.5	42.9	5	80.0	20.0	0.0

Total live births	7	28.6	28.5	42.9	6	100.0	0.0	0.0
BCG I	5	40.0	20.0	40.0	4	50.0	25.0	25.0
Measles	4	50.0	0.0	50.0	1	0.0	0.0	100.0
Reproductive Age Group								
Post-partum sterilization	4	50.0	0.0	50.0	2	100.0	0.0	0.0
Total female sterilization	3	100.0	0.0	0.0	3	33.3	66.7	0.0
PPIUCD	6	66.7	16.6	16.7	5	80.0	20.0	0.0
Total IUCD	6	66.7	16.6	16.7	6	100.0	0.0	0.0
Panipat Verifications	**136**	**50.0**	**8.1**	**41.9**	**102**	**73.5**	**7.9**	**18.6**

4. FINDINGS

In collaboration with the NHM Haryana, HFG initiated the application of a modified RDQA methodology in select districts in the state in late 2014. The first two rounds of the RDQA, carried out in late 2014 and early 2015, gathered information designed to assess the quality of data collected and reported by select facilities, and to evaluate the underlying components of the state, district, and facility-level HMIS. The exercise, implemented in seven districts in the state, covered data collected during August and November of 2014.

4.1 Protocol 1

The application of Protocol 1, carried out during Round 2 of the RDQA exercise, was intended to assess the underlying systems and structures that supported the flow of health data through the routine NHM reporting system in Haryana. The process involved the analysis of M&E structures, functions, and capabilities; indicator definitions and reporting guidelines; data collection and reporting forms/tools, data management processes, and links with the national reporting system. The application of Protocol 1 yielded relatively uniform results across the select districts related to the HMIS' various component areas. In several areas, the system is well-equipped with appropriate resources and performing admirably. In others, there is an opening for efforts designed to facilitate improvements in data quality through well-targeted systems strengthening.

Throughout the seven districts, as well as at the district and state levels in Haryana, the appropriate personnel and organizational structures are largely in place to ensure high quality data across the continuum from production to use. With a few rare exceptions, most M&E- and HMIS-related posts are filled and the individuals occupying those posts are sufficiently skilled and knowledge to effectively carry out their job functions. Job descriptions are clear, and roles and responsibilities are appropriately assigned among those that operate within the system. There is, however, room for improvement. No systematic mechanism currently exists to orient newly hired information assistants despite high levels of attrition. Moreover, evidence suggests that at the facility level, the responsibility for data verification and authentication, typically conducted by senior clinical staff, is not occurring as regularly as necessary to ensure data quality.

In terms of reporting guidelines, formats, and tools, the locations visited by the collection team have most of the elements in place to produce and report accurate, reliable, timely, and complete data. There is a comprehensive English-language data definition manual that has been disseminated to various levels of the health system; staff are clear on what needs to be reported; reporting formats are standardized, widely found, and understood; DHIS 2 is regularly used; and, aside from one outlier, data is submitted on time. Conversely, interpretation of indicators and data elements varies, which may be due to a lack of reference materials in more prevalent local languages. In seven of the 72 facilities visited, staff were using non-standard formats to report data. At the PHC/UHC and FRU facility levels, multiple registers were often in use. While neither prompts an immediate decrease in data quality, the risk of collection errors typically increases when staff deviate from standard collection procedures.

Similar to the results of an HFG-led DQA exercise in Haryana conducted in December, 2013, the domain for data management processes was found to be the weakest. In some aspects, the steps and procedures related to the collection, aggregation, and manipulation of data are clear, in use, and well-functioning. Double-counting of individuals and services, for example, does not seem to be an issue.

Validation rules are working well to limit errors when paper forms are digitized. Database administration and backup and recovery procedures are clearly documented and well-executed. At the same time, there is no procedure for addressing discrepancies identified when reviewing reports, and little communication exists between reporting levels with respect to management of incomplete, inaccurate, or missing submissions. While supervisory visits by state and district M&E staff are commonplace, evidence to suggest a data quality review was not found.

DHIS 2 is uniformly used for recording and reporting data across the seven districts, which serves to streamline and simplify data aggregation processes within districts and across the state. A clear link to the national level exists in terms of unique identification numbers for service sites, required data elements, and reporting timelines. On the other hand, there is no interoperability between the Haryana DHIS 2 system and the national web portal. This prompts the regular undertaking of a complex array of data management processes for the state to comply with national-level reporting requirements.

4.2 Protocol 2

Protocol 2 was administered across the seven districts during both rounds of the RDQA in Haryana, and assessed the accuracy of data collected for services delivered in August and November of 2014. The collection team visited 72 and 69 facilities respectively during Rounds 1 and 2, reviewing source documents and summary reports pertaining to 16 indicators comprised of 24 data elements. It should be noted that the districts, facilities, and data elements utilized for the exercise were purposively selected in close collaboration with the NHM Haryana and not obtained through a randomized or rigorous scientific method. Moreover, the RDQA methodology is, by name, meant to be applied on a *routine* basis and over a significant period of time to monitor data quality and identify system components in need of strengthening. As such, drawing profound conclusions from the two-time application of Protocol 2 should be approached reservedly. Analysis of the results, however, does indicate trends from one round to the next, as well as themes across districts and facility levels.

4.2.1 Comparison between Rounds

A key trend that emerged in comparing verifications undertaken in Round 1 and Round 2 of the Haryana exercise was the overall improvement in the accuracy of data reporting from one round to the next. Matches between recorded and reported values jumped from 50.5 to 67.4 percent, and acceptable variation went from 62.7 to 75.5 percent.

TABLE 16: VERIFICATION COMPARISON BETWEEN ROUNDS 1 AND 2

Rounds	N	Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Under-reported by >10%	Over-reported by >10%
Round 1	827	50.5%	12.2%	17.4%	19.8%
Round 2	745	67.4%	8.1%	9.8%	14.8%

Of the 24 data elements verified, more than half showed a marked increase in the percent of facilities with acceptable verification levels. For example, for newborns weighing less than 2.5 kilograms, the percentage of facilities within the acceptable range (i.e. ±10 percent) of recorded to reported figures improves from 49.1 percent in Round 1 to 76.9 percent in Round 2. Only three of the 24 data elements displayed a decline in the percentage of facilities in the acceptable verification category from Round 1 to Round 2: (1) C-sections at facility declined from 100 percent of facilities with acceptable accuracy to 90 percent; (2) Women discharged less than 24 hours after delivery fell from 55.3 to 50.0 percent; and (3) Reported institutional deliveries dropped from 96.1 to 93.9 percent. For the remaining 21 data elements, the results show matching figures at a minimum from Round 1 to Round 2 or display a slight improvement.

4.2.2 Comparison across Facility Types

Analyzing the trace and verify results across the four target facility types yields a number of salient themes. For one, PHC/UHCs displayed better accuracy in both Rounds, as displayed in Tables 17 and 18. In Round 1, the second highest overall verification score was found in SCs, CHCs, and then in FRUs; for Round 2, PHC/UHCs were followed by CHCs, FRUs, and then SCs in terms of overall quality at the facilities visited. Similarly, with respect to perfect matches, PHC/UHCs notched a percent sizably higher than the other levels for both rounds. Where discrepancies were discovered, all levels but SCs tended to over-report in Round 1. In Round 2, SCs over-reported in 29.5 percent of verifications, a good deal higher than the other levels which ranged from 10.5 to 12.7 percent.

TABLE 17: VERIFICATION COMPARISON BETWEEN FACILITIES, ROUND 1

Facility Level	N	Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Under-reported by >10%	Over-reported by >10%
FRUs	215	42.8	15.8	17.2	24.2
CHCs	180	46.7	12.8	19.4	21.1
PHC/UHCs	282	59.6	7.8	14.5	18.1
SCs	150	49.3	14.7	20.7	15.3
ALL	**827**	**50.5%**	**12.2%**	**17.4%**	**19.8%**

TABLE 18: VERIFICATION COMPARISON BETWEEN FACILITIES, ROUND 2

Facility Level	N	Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Under-reported by >10%	Over-reported by >10%
FRUs	196	62.8	12.8	13.3	11.2
CHCs	173	67.1	10.4	9.8	12.7
PHC/UHCs	237	77.2	3.4	8.9	10.5
SCs	139	56.8	6.5	7.2	29.5
ALL	**745**	**67.4%**	**8.1%**	**9.8%**	**14.8%**

4.2.3 Comparison across Districts

The data verifications from Round 1 of the RDQA exercise posit a baseline of sorts on which to measure future progress. For all districts, 62.7 percent of verifications found an acceptable degree of variation between recorded and reported. Disaggregating to the district level, Faridabad was the most accurate in Round 1 with 73.2 percent of acceptable variation through 127 data verifications. Next highest quality fell to Bhiwani (68.2), followed by Jind (66.7), Palwal (62.5), Panipat (58.1), Mahendragarh (57.6), and ultimately Mewat (52.1).

The trend in verification results from Round 1 to Round 2 displayed a promising trajectory in the select districts with respect to data quality. The percent of verifications of acceptable variation rose to 75.5 percent in Round 2, an increase of 12.8 percent. Panipat, in particular, showed a drastic improvement to become the highest quality district at 81.4 percent, up 23.3 percent. After Panipat, came Bhiwani, Faridabad, Jind, Mahedragarh, Mewat, and Palwal. Mewat and Mahendragarh also attained notable gains in acceptable verifications, rising 19.9 and 16.1 percent respectively.

TABLE 19: VERIFICATION COMPARISON ACROSS DISTRICTS, ROUND 1

District	N	Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Under-reported by >10%	Over-reported by >10%
Bhiwani	126	57.9	10.3	19.8	11.9
Faridabad	127	63.8	9.4	15.7	11.0
Jind	120	50.0	16.7	14.2	19.2
Mahendragarh	111	42.3	15.3	14.4	27.9
Mewat	119	35.3	16.8	21.8	26.1
Palwal	88	53.4	9.1	21.6	15.9
Panipat	136	50.0	8.1	15.4	26.5
ALL	**827**	**50.5%**	**12.2%**	**17.4%**	**19.8%**

TABLE 20: VERIFICATION COMPARISON ACROSS DISTRICTS, ROUND 2

District	N	Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Under-reported by >10%	Over-reported by >10%
Bhiwani	122	74.6	3.3	11.5	10.7
Faridabad	117	72.6	2.6	9.4	15.4
Jind	119	64.7	10.1	16.0	9.2
Mahendragarh	103	66.0	7.8	2.9	23.3
Mewat	100	61.0	11.0	6.0	22.0
Palwal	82	52.4	17.1	14.6	15.9
Panipat	102	73.5	7.9	9.8	8.8
ALL	**745**	**67.4%**	**8.1%**	**9.8%**	**14.8%**

5. CONCLUSIONS

The role of the HMIS at the state, district, and facility levels is to allow health system stakeholders to answer two fundamental questions: "am I doing the right thing?" and "am I doing those things right"? Undoubtedly, the quality of data (and information) found in the HMIS will have an impact on the ability of such stakeholders to answer those questions correctly, and to base their answers on a read of the actual performance of the health system. Without high quality data, a health system runs a high risk of sub-optimal performance, and an even higher risk of underperforming without knowing to what extent.

Numerous stakeholders, including at the Ministry of Health and Family Welfare and the NHM Haryana, have expressed concerns about the quality of routine health data within the HMIS in Haryana. These concerns were initially explored by the HFG project during a DQA exercise conducted in four districts of the state in 2013, and later through application of the RDQA in 2014 and 2015. The purpose of these data reviews was to assess data quality as part of a systematic approach to improve the continuum of data, and thus information, from production through to use. Given its acceptance internationally as a best practice for such an undertaking, the RDQA methodology was used to complete two rounds of reviews in seven high-priority districts in Haryana in 2014 and 2015.

The purpose of the RDQA application was to assess the quality of data collected and reported by select facilities, and to evaluate the underlying components of the state, district, and facility-level HMIS. Regarding the system-level review (i.e. Protocol 1), carried out during Round 2 of the RDQA, the results illuminated numerous strengths of the Haryana state HMIS, including state-developed guidelines and tools to produce and report high quality data, as well as adequate human resources to put those materials to solid use. Conversely, there exist areas for improvement that impede the system from reaching its full potential. These include limited verification of reported data, weak data management processes, and inconsistent use of standardized formats in some locations. Although it is difficult to discern the precise cause of each data error uncovered in Protocol 2, it is safe to say that the systemic issues identified in Protocol 1 impact the accuracy and reliability of data within the system.

While it poses risks to draw direct conclusions from a purposive sample employed during two rounds of the RDQA, it would also be difficult to ignore data trends that have begun to emerge and that merit a fair consideration at present and additional monitoring in the future. For one, perfect matches between recorded and reported values rose from 50.5 to 67.4 percent from Round 1 to Round 2, and verifications within acceptable limits of variation rose from 62.7 to 75.5 percent. This improvement was observed widely across the facilities assessed, with matches increasing for all facility types from the first to second round: FRUs (42.8 to 62.8), CHCs (46.7 to 67.1), PHCs/UHCs (59.6 to 77.2) and SCs (49.3 to 56.8). A similar trend holds across districts, with all districts improving the percent of matches, aside from Palwal which exhibited a minor drop from 53.4 to 52.4 percent. Mewat, for example, jumped 19.9 percent from 35.3 to 61.0; Mahendragarh also posted an impressive gain, up 16.1 percent. It should be noted that these improvements were obtained without any broad scale systemic interventions.

In absence of any large-scale systemic adjustments, one possible cause for changes observed in data quality from Round 1 to Round 2 may be shifts in the procedures and processes undertaken by NHM Haryana staff around the recording and reporting of data. Interaction between RDQA assessors and personnel within the HMIS may have led to a better understanding of the appropriate processes and procedures. Moreover, application of the RDQA methodology may have indirectly built a stronger

appreciation among NHM facility- and district-level staff around the value of good data, or at least the perceived necessity to improve it.

On the other hand, there are notable quality differences between the different data element groups. During Round 1, the four elements in the 'Reproductive Age Group' ranged from 63.6 percent matches (post-partum sterilization) to 76.5 (total female sterilization). By Round 2, total female sterilization was up to 84.6 percent and post-partum sterilization rose to 100.0. Similarly, under 'Pregnancy Care', injectable iron supplement rose from 28.1 percent of acceptable verifications in Round 1 to 60.0 percent in Round 2, while 3rd ANC checkup went from 44.1 to only 48.3. Although improvements can be observed, the accuracy of Round 2 verifications still raises flags.

The process of conducting the exercise, and the results therein, have also shown that the regular application of RDQA in Haryana is a viable and valuable undertaking in the state, and that the quality of data could be improved through routine assessments. It must be noted, however, that the RDQA methodology is but a diagnostic tool and its application does not in and of itself bring about improvements in HMIS information quality or the decisions made based upon that information. The RDQA should be seen as a key element in a more comprehensive approach to improve data quality, data utilization, and evidence-based decision making.

To facilitate a more comprehensive and sustained improvement in the quality of HMIS data, a two-pronged approach is required – RDQA application coupled with broader scale HMIS system strengthening. Routine assessments would provide regular data with which to monitor progress of data quality, identify systemic gaps, and ensure compliance by relevant HMIS personnel (i.e. service providers, information assistants, M&E officers and supervisors) to the appropriate processes. Systems strengthening would work to address the root causes of data quality issues, whether through tool development, capacity building, and/or enhanced supervision, among other potential interventions.

Support from HFG helped to introduce the RDQA methodology and its application in Haryana. In order to maintain a concentrated focus on data quality issues and to foster sustainability beyond the life of the project, HFG has been working closely with the NHM Haryana to institutionalize the RDQA in the state. An essential element in institutionalizing any activity, including the RDQA, is building the capacity of the appropriate personnel to progressively assume responsibility for implementation and operation. Forty-two district officials (two from each of the 21 districts in the state) were trained by the project on the methodology through didactic sessions, group discussions, and field-based practice. Furthermore, district-level M&E Officers were incorporated into the HFG team to carry out data collection during Round 2 of the exercise. The next step for the RDQA would be for the state to develop a strategy for institutionalization to ensure regular visits by district M&E Officers to apply the methodology.

The state should also seek to prioritize system strengthening initiatives that tend toward a broader and more sustained impact. Various systemic issues were identified through Protocol 1 that, if addressed, could bring about improvements to the HMIS and ultimately contribute to positive outcomes in data quality. These include:

- Strengthen data management processes and procedures, particularly the verification and authentication of data prior to submission, and the provision of feedback from one reporting level to another;
- Increase the availability of data collection tools to capture data at the moment of service delivery and avoid use of unstructured and/or customized alternatives;
- Make data definitions available in local languages and ensure they are present at all locations where collection, compilation, or use of data take place;
- Install a competency-based training plan to improve the skills of existing staff and ensure refresher

trainings.

The DQA and RDQA exercises have left little debate about the need to improve the quality and availability of data across Haryana, especially for high-priority programs such as the RMNCH+A initiative. The debate that remains is around identifying the most efficient and effective means to improve the quality of data, and about how the NHM Haryana leads the process going forward. Poor quality information handicaps the accurate tracking of system performance and inhibits an informed and appropriate allocation of available resources. Addressing data quality issues, particularly now that they are at the forefront of NHM Haryana discussions, would be an important step toward enhancing the state's ability to plan and monitor the delivery of health services.

ANNEX A: FACILITIES VISITED BY RDQA DATA COLLECTION TEAM

Facility Level	District						
	Bhiwani	Faridabad	Jind	Mahendragarh	Mewat	Palwal	Panipat
FRU	GH-Bhiwani SDH-Dadri	BK Hospital Ballabhgarh SDH FRU-II, SEC-3	GH-Jind SDH-Narwana Safidon	GH Narnaul SDH Mahendragarh	Al Afia Hospital Mandi Khera-DH Medical College Nalhad	GH-Palwal	BSSGH CHC Samalkha-FRU
CHC	Tosham Kairu Manheru Boundkalan	Palla-U Tigaon Mohana Chhainssa	Khendela Jullana	Nangal Choudhary Ateli Nagal Choudhary	Nuh Firozepur Jhirka Punhana	Hodal Hathin*	
PHC/UHC	Jui Chang Ranila		Chatter Dhanauri	Madhogarh Balaha Kalan	Tauru Ghasera	Kasba Mohalla* Hassanpur Mandkola Rasoolpur Uttawar	Kabri Kawi Ujha Seenk Rajnagar (Urban)
SC	GH-Bhiwani	Tilpat Badkal	PPC GH PPC Narwana Napewala	PPC Narnaul PPC SDH Mahendragarh Shyampura Khatodra SC	Rawali Singar Nuh-PPC	Prithla-Delivery Hut PPC-DH Hassanpur*	BSSGH Atwala Sutana Garisikenderpur
Number of Facilities visited in Round 1	10	9	10	11	10	11	11
Number of Facilities visited in Round 2	10	9	10	11	10	8	11

* Denotes facilities included in Round 1 of the RDQA, but not Round 2

ANNEX B: DATA COMPARISONS, FULL TABLES (BY FACILITY TYPE)

TABLE B.1: FRU VERIFICATIONS (ROUNDS 1 & 2, ALL DISTRICTS): RECORDED VS. REPORTED (IN % OF FACILITIES)

Data Element	Round 1					Round 2				
	N	*Acceptable variation*		*Unacceptable variation*		N	*Acceptable variation*		*Unacceptable variation*	
		Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Under-reported by >10%	Over-reported by >10%		Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Under-reported by >10%	Over-reported by >10%
Pregnancy Care										
1st trimester ANC registration	3	33.3	0.0	0.0	66.7	5	60.0	0.0	0.0	40.0
3rd ANC checkup	2	0.0	0.0	0.0	100.0	1	100.0	0.0	0.0	0.0
Injectable Iron supplement	11	27.3	0.0	54.5	18.2	11	36.4	9.1	18.2	36.4
Blood transfusion	11	27.3	0.0	45.5	27.3	9	77.8	0.0	22.2	0.0
High risk pregnancy identification	1	100.0	0.0	0.0	0.0	0	-	-	-	-
ANC registration	2	100.0	0.0	0.0	0.0	3	100.0	0.0	0.0	0.0
Child Birth										
C-Section at facility	10	100.0	0.0	0.0	0.0	10	80.0	10.0	0.0	10.0
Reported institutional deliveries	15	60.0	40.0	0.0	0.0	15	86.7	13.3	0.0	0.0
Free referral transport (home to facility)	4	25.0	0.0	0.0	75.0	0	-	-	-	-
Complicated deliveries referred out	14	42.9	7.1	28.6	21.4	12	33.3	0.0	50.0	16.7
Proportion of pre-term deliveries	14	14.3	7.1	21.4	57.1	11	36.4	18.1	36.4	9.1
Postnatal, Maternal, & Newborn Care										
Newborns less than 2.5 kg	15	20.0	20.0	20.0	40.0	15	40.0	26.7	6.7	26.7

Newborns weighed at birth	15	20.0	40.0	26.7	13.3	14	57.1	28.6	14.3	0.0
Discharged less than 24 hours after delivery	11	27.3	0.0	27.3	45.5	9	22.2	11.1	33.3	33.3
Discharged less than 48 hours after delivery	7	28.6	0.0	28.6	42.9	7	14.3	28.6	28.6	28.6
Birth doses to newborn pre-discharge	6	0.0	16.7	33.3	50.0	6	66.7	16.6	16.7	0.0
Hep, OPV doses to newbom pre-discharge	11	0.0	72.7	0.0	27.3	11	63.6	27.3	9.1	0.0
Total live births	15	66.7	26.6	0.0	6.7	15	86.7	6.6	6.7	0.0
BCG1	2	0.0	50.0	0.0	50.0	2	50.0	0.0	0.0	50.0
Measles	4	75.0	0.0	0.0	25.0	2	50.0	0.0	50.0	0.0
Reproductive Age Group										
Post-partum sterilization	7	71.4	0.0	14.3	14.3	6	100.0	0.0	0.0	0.0
Total female sterilization	12	75.0	25.0	0.0	0.0	10	80.0	20.0	0.0	0.0
PPIUCD	14	57.1	0.0	28.6	14.3	13	84.6	7.7	0.0	7.7
Total IUCD	9	88.9	0.0	0.0	11.1	9	88.9	0.0	0.0	11.1
FRU Verifications	**215**	**42.8**	**15.8**	**17.2**	**24.2**	**196**	**62.8**	**12.8**	**13.3**	**11.2**

TABLE B.2: CHC VERIFICATIONS (ROUNDS 1 & 2, ALL DISTRICTS): RECORDED VS. REPORTED (IN % OF FACILITIES)

Data Element	Round 1					Round 2				
	N	*Acceptable variation*		*Unacceptable variation*		N	*Acceptable variation*		*Unacceptable variation*	
		Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Under-reported by >10%	Over-reported by >10%		Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Under-reported by >10%	Over-reported by >10%
Pregnancy Care										
1st trimester ANC registration	5	14.3	14.3	42.9	28.6	5	100.0	0.0	0.0	0.0
3rd ANC checkup	4	33.3	16.7	33.3	16.7	4	50.0	0.0	25.0	25.0
Injectable Iron supplement	9	28.6	0.0	28.6	42.9	9	44.4	11.2	22.2	22.2
Blood transfusion	0	-	-	-	-	0	-	-	-	-
High risk pregnancy identification	3	40.0	20.0	20.0	20.0	3	66.7	0.0	33.3	0.0
ANC registration	6	100.0	0.0	0.0	0.0	6	83.3	16.7	0.0	0.0
Child Birth										
C-Section at facility	0	-	-	-	-	0	-	-	-	-
Reported institutional deliveries	13	84.6	15.4	0.0	0.0	13	84.6	15.4	0.0	0.0
Free referral transport (home to facility)	3	0.0	0.0	25.0	75.0	3	33.3	0.0	0.0	66.7
Complicated deliveries referred out	12	38.5	15.3	46.2	0.0	12	58.3	0.0	33.3	8.3
Proportion of pre-term deliveries	13	50.0	0.0	25.0	25.0	13	46.2	0.0	30.8	23.1
Postnatal, Maternal, & Newborn Care										
Newborns less than 2.5 kg	13	38.5	0.0	15.4	46.2	13	69.2	7.7	23.1	0.0
Newborns weighed at birth	13	23.1	30.7	38.5	7.7	13	84.6	7.7	7.7	0.0
Discharged less than 24 hours after delivery	12	36.4	9.1	0.0	54.5	12	25.0	8.3	0.0	66.7
Discharged less than 48 hours after delivery	2	33.3	0.0	0.0	66.7	2	50.0	50.0	0.0	0.0
Birth doses to newborn pre-discharge	10	36.4	9.1	36.4	18.2	10	50.0	30.0	0.0	20.0

Hep, OPV doses to newborn pre-discharge	10	45.5	54.5	0.0	0.0	10	50.0	40.0	0.0	10.0
Total live births	12	83.3	16.7	0.0	0.0	12	100.0	0.0	0.0	0.0
BCG I	5	25.0	0.0	50.0	25.0	5	60.0	20.0	0.0	20.0
Measles	4	25.0	0.0	0.0	75.0	4	100.0	0.0	0.0	0.0
Reproductive Age Group										
Post-partum sterilization	1	0.0	0.0	0.0	100.0	1	100.0	0.0	0.0	0.0
Total female sterilization	2	50.0	0.0	0.0	50.0	2	100.0	0.0	0.0	0.0
PPIUCD	12	66.7	16.6	16.7	0.0	12	83.3	8.4	0.0	8.3
Total IUCD	9	60.0	0.0	20.0	20.0	9	77.8	11.1	0.0	11.1
CHC Verifications	**180**	**46.7**	**12.8**	**19.4**	**21.1**	**173**	**67.1**	**10.4**	**9.8**	**12.7**

TABLE B.3: PHC/CHC VERIFICATIONS (ROUNDS 1 & 2, ALL DISTRICTS): RECORDED VS. REPORTED (IN % OF FACILITIES)

Data Element	Round 1					Round 2				
	N	*Acceptable variation*		*Unacceptable variation*		N	*Acceptable variation*		*Unacceptable variation*	
		Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Under-reported by >10%	Over-reported by >10%		Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Under-reported by >10%	Over-reported by >10%
Pregnancy Care										
1st trimester ANC registration	13	30.8	0.0	23.100	46.200	12	75.0	0.0	8.3	16.7
3rd ANC checkup	9	44.4	0.0	22.2	33.3	7	85.7	0.0	0.0	14.3
Injectable Iron supplement	13	23.1	0.0	69.2	7.7	10	80.0	0.0	20.0	0.0
Blood transfusion	3	33.3	0.0	33.3	33.3	0	-	-	-	-
High risk pregnancy identification	9	55.6	0.0	44.4	0.0	7	71.4	0.0	28.6	0.0
ANC registration	11	45.5	18.1	18.2	18.2	9	66.7	0.0	0.0	33.3
Child Birth										
C-Section at facility	1	100.0	0.0	0.0	0.0	0	-	-	-	-
Reported institutional deliveries	17	88.2	5.9	0.0	5.9	15	86.7	6.6	0.0	6.7
Free referral transport (home to facility)	6	83.3	0.0	0.0	16.7	2	100.0	0.0	0.0	0.0
Complicated deliveries referred out	16	43.8	6.3	31.3	18.8	16	75.0	0.0	25.0	0.0
Proportion of pre-term deliveries	18	50.0	0.0	16.7	33.3	16	43.8	0.0	25.0	31.3
Postnatal, Maternal, & Newborn Care										
Newborns less than 2.5 kg	21	61.9	4.8	14.3	19.0	19	78.9	5.3	10.5	5.3
Newborns weighed at birth	20	75.0	5.0	0.0	20.0	18	77.8	5.5	11.1	5.6
Discharged less than 24 hours after delivery	18	44.4	22.3	5.6	27.8	13	53.8	7.7	15.4	23.1
Discharged less than 48 hours after delivery	4	50.0	25.0	0.0	25.0	4	75.0	0.0	0.0	25.0
Birth doses to newborn pre-discharge	13	76.9	7.7	7.7	7.7	13	76.9	0.0	15.4	7.7

Hep, OPV doses to newborn pre-discharge	18	50.0	22.2	5.6	22.2	17	82.4	11.7	0.0	5.9
Total live births	20	70.0	10.0	10.0	10.0	19	89.5	5.2	0.0	5.3
BCG1	9	77.8	11.1	0.0	11.1	7	71.4	14.3	0.0	14.3
Measles	10	50.0	10.0	20.0	20.0	7	57.1	0.0	0.0	42.9
Reproductive Age Group										
Post-partum sterilization	3	66.7	0.0	33.3	0.0	2	100.0	0.0	0.0	0.0
Total female sterilization	3	100.0	0.0	0.0	0.0	1	100.0	0.0	0.0	0.0
PPIUCD	13	84.6	7.7	0.0	7.7	13	100.0	0.0	0.0	0.0
Total IUCD	14	71.4	7.2	7.1	14.3	10	100.0	0.0	0.0	0.0
PHC/UHC Verifications	**282**	**59.6**	**7.8**	**14.5**	**18.1**	**237**	**77.2**	**3.4**	**8.9**	**10.5**

TABLE B.4: SC VERIFICATIONS (ROUNDS 1 & 2, ALL DISTRICTS): RECORDED VS. REPORTED (IN % OF FACILITIES)

Data Element	Round 1					Round 2				
	N	*Acceptable variation*		*Unacceptable variation*		N	*Acceptable variation*		*Unacceptable variation*	
		Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Under-reported by >10%	Over-reported by >10%		Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Under-reported by >10%	Over-reported by >10%
Pregnancy Care										
1st trimester ANC registration	18	38.9	11.1	27.8	22.2	19	47.4	5.2	5.3	42.1
3rd ANC checkup	17	29.4	17.7	17.6	35.3	17	29.4	0.0	29.4	41.2
Injectable Iron supplement	1	100.0	0.0	0	0	0	-	-	-	-
Blood transfusion	0	-	-	-	-	0	-	-	-	-
High risk pregnancy identification	13	46.2	0.0	46.2	7.7	14	71.4	7.2	7.1	14.3
ANC registration	18	44.4	16.7	16.7	22.2	19	57.9	5.3	0	36.8
Child Birth										
C-Section at facility	0	-	-	-	-	0	-	-	-	-
Reported institutional deliveries	6	66.7	16.6	16.7	0.0	6	50.0	16.7	0	33.3
Free referral transport (home to facility)	4	50.0	0.0	25.0	25.0	2	100.0	0.0	0	0
Complicated deliveries referred out	5	80.0	0.0	20.0	0.0	4	100.0	0.0	0	0
Proportion of pre-term deliveries	3	33.3	33.4	33.3	0.0	3	100.0	0.0	0	0
Postnatal, Maternal, & Newborn Care										
Newborns less than 2.5 kg	6	33.3	0.0	50.0	16.7	5	80.0	0.0	20	0
Newborns weighed at birth	7	42.9	14.2	28.6	14.3	6	66.7	0.0	16.7	16.7
Discharged less than 24 hours after delivery	7	57.1	28.6	0.0	14.3	4	75.0	25.0	0	0
Discharged less than 48 hours after delivery	0	-	-	-	-	0	-	-	-	-
Birth doses to newborn pre-discharge	2	50.0	50.0	0.0	0.0	0	-	-	-	-

Hep, OPV doses to newborn pre-discharge	2	50.0	50.0	0.0	0.0	1	0.0	0.0	0.0	100.0
Total live births	7	57.1	42.9	0.0	0.0	6	50.0	16.7	0.0	33.3
BCG1	12	58.3	8.4	25.0	8.3	13	46.2	15.3	7.7	30.8
Measles	12	50.0	16.7	16.7	16.7	12	41.7	8.3	0.0	50.0
Reproductive Age Group										
Post-partum sterilization	0	-	-	-	-	0	-	-	-	-
Total female sterilization	0	-	-	-	-	0	-	-	-	-
PPIUCD	0	-	-	-	-	0	-	-	-	-
Total IUCD	10	80.0	10.0	0	10	8	87.5	0.0	0.0	12.5
SC Verifications	**150**	**49.3**	**14.7**	**20.7**	**15.3**	**139**	**56.8**	**6.5**	**7.2**	**29.5**

ANNEX C: DATA COMPARISONS, FULL TABLES (BY DISTRICT)

TABLE C.1: BHIWANI VERIFICATIONS (ROUNDS 1 & 2, ALL FACILITIES): RECORDED VS. REPORTED (IN % OF FACILITIES)

Data Element	Round 1					Round 2				
	N	Acceptable variation		Unacceptable variation		N	Acceptable variation		Unacceptable variation	
		Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Under-reported by >10%	Over-reported by >10%		Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Under-reported by >10%	Over-reported by >10%
Pregnancy Care										
1st trimester ANC registration	4	50.0	0.0	50.0	0.0	3	100.0	0.0	0.0	0.0
3rd ANC checkup	3	33.3	33.4	33.3	0.0	3	66.7	0.0	33.3	0.0
Injectable Iron supplement	5	20.0	0.0	80.0	0.0	6	33.3	0.0	50.0	16.7
Blood transfusion	2	0.0	0.0	50.0	50.0	1	100.0	0.0	0.0	0.0
High risk pregnancy identification	4	100.0	0.0	0.0	0.0	2	50.0	0.0	50.0	0.0
ANC registration	4	75.0	0.0	25.0	0.0	4	100.0	0.0	0.0	0.0
Child Birth										
C-Section at facility	1	100.0	0.0	0.0	0.0	1	100.0	0.0	0.0	0.0
Reported institutional deliveries	9	88.9	11.1	0.0	0.0	9	100.0	0.0	0.0	0.0
Free referral transport (home to facility)	2	50.0	0.0	50.0	0.0	0	-	-	-	-
Complicated deliveries referred out	8	50.0	12.5	37.5	0.0	7	28.6	0.0	57.1	14.3
Proportion of pre-term deliveries	9	33.3	11.1	11.1	44.4	9	55.6	0.0	22.2	22.2

Postnatal, Maternal, & Newborn Care										
Newborns less than 2.5 kg	9	66.7	22.2	11.1	0.0	9	66.7	0.0	11.1	22.2
Newborns weighed at birth	9	55.6	11.1	33.3	0.0	9	77.8	22.2	0.0	0.0
Discharged less than 24 hours after delivery	8	50.0	12.5	12.5	25.0	7	42.9	0.0	14.3	42.9
Discharged less than 48 hours after delivery	2	50.0	0.0	0.0	50.0	3	0.0	0.0	33.3	66.7
Birth doses to newborn pre-discharge	7	28.6	14.3	28.6	28.6	8	87.5	12.5	0.0	0.0
Hep, OPV doses to newbom pre-discharge	7	28.6	57.1	0.0	14.3	6	100.0	0.0	0.0	0.0
Total live births	8	100.0	0.0	0.0	0.0	8	100.0	0.0	0.0	0.0
BCG I	3	33.3	0.0	33.3	33.3	4	100.0	0.0	0.0	0.0
Measles	5	20.0	0.0	20.0	60.0	4	100.0	0.0	0.0	0.0
Reproductive Age Group										
Post-partum sterilization	1	100.0	0.0	0.0	0.0	1	100.0	0.0	0.0	0.0
Total female sterilization	2	100.0	0.0	0.0	0.0	2	100.0	0.0	0.0	0.0
PPIUCD	9	88.9	0.0	11.1	0.0	9	88.9	0.0	0.0	11.1
Total IUCD	5	80.0	0.0	20.0	0.0	7	71.4	14.3	0.0	14.3
Bhiwani Verifications	**126**	**57.9**	**10.3**	**19.8**	**11.9**	**122**	**74.6**	**3.3**	**11.5**	**10.7**

TABLE C.2: FARIDABAD VERIFICATIONS (ROUNDS 1 & 2, ALL FACILITIES): RECORDED VS. REPORTED (IN % OF FACILITIES)

Data Element	Round 1					Round 2				
	N	Acceptable variation		Unacceptable variation		N	Acceptable variation		Unacceptable variation	
		Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Under-reported by >10%	Over-reported by >10%		Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Under-reported by >10%	Over-reported by >10%
Pregnancy Care										
1st trimester ANC registration	6	50.0	16.7	16.7	16.7	8	62.5	0.0	0.0	37.5
3rd ANC checkup	4	0.0	50.0	0.0	50.0	2	0.0	0.0	50.0	50.0
Injectable Iron supplement	6	50.0	0.0	33.3	16.7	5	40.0	20.0	20.0	20.0
Blood transfusion	3	33.3	0.0	66.7	0.0	2	100.0	0.0	0.0	0.0
High risk pregnancy identification	5	60.0	0.0	40.0	0.0	4	75.0	0.0	25.0	0.0
ANC registration	6	66.7	16.6	16.7	0.0	7	85.7	0.0	0.0	14.3
Child Birth										
C-Section at facility	3	100.0	0.0	0.0	0.0	3	100.0	0.0	0.0	0.0
Reported institutional deliveries	9	77.8	11.1	11.1	0.0	8	87.5	0.0	0.0	12.5
Free referral transport (home to facility)	3	66.7	0.0	0.0	33.3	0	-	-	-	-
Complicated deliveries referred out	7	42.9	0.0	14.3	42.9	5	60.0	0.0	40.0	0.0
Proportion of pre-term deliveries	7	14.3	0.0	42.9	42.9	8	37.5	0.0	25.0	37.5
Postnatal, Maternal, & Newborn Care										
Newborns less than 2.5 kg	8	50.0	0.0	37.5	12.5	8	62.5	12.5	12.5	12.5
Newborns weighed at birth	8	62.5	25.0	12.5	0.0	8	75.0	0.0	25.0	0.0
Discharged less than 24 hours after delivery	6	83.3	0.0	0.0	16.7	3	66.7	0.0	0.0	33.3
Discharged less than 48 hours after delivery	3	66.7	0.0	33.3	0.0	1	100.0	0.0	0.0	0.0
Birth doses to newborn pre-discharge	6	83.3	0.0	16.7	0.0	6	100.0	0.0	0.0	0.0

Hep, OPV doses to newborn pre-discharge	6	66.7	33.3	0.0	0.0	7	71.4	14.3	0.0	14.3
Total live births	9	100.0	0.0	0.0	0.0	9	88.9	0.0	0.0	11.1
BCG I	3	100.0	0.0	0.0	0.0	3	66.7	0.0	0.0	33.3
Measles	4	25.0	50.0	0.0	25.0	5	40.0	0.0	20.0	40.0
Reproductive Age Group										
Post-partum sterilization	2	100.0	0.0	0.0	0.0	2	100.0	0.0	0.0	0.0
Total female sterilization	3	66.7	33.3	0.0	0.0	3	100.0	0.0	0.0	0.0
PPIUCD	3	66.7	0.0	33.3	0.0	3	100.0	0.0	0.0	0.0
Total IUCD	7	100.0	0.0	0.0	0.0	7	85.7	0.0	0.0	14.3
Faridabad Verifications	**127**	**63.8**	**9.4**	**15.7**	**11.0**	**117**	**72.6**	**2.6**	**9.4**	**15.4**

TABLE C.3: JIND VERIFICATIONS (ROUNDS 1 & 2, ALL FACILITIES): RECORDED VS. REPORTED (IN % OF FACILITIES)

Data Element	Round 1					Round 2				
	N	*Acceptable variation*		*Unacceptable variation*		N	*Acceptable variation*		*Unacceptable variation*	
		Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Under-reported by >10%	Over-reported by >10%		Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Under-reported by >10%	Over-reported by >10%
Pregnancy Care										
1st trimester ANC registration	6	33.3	16.7	33.3	16.7	6	66.7	0.0	0.0	33.3
3rd ANC checkup	6	16.7	0.0	33.3	50.0	5	60.0	0.0	20.0	20.0
Injectable Iron supplement	5	20.0	0.0	60.0	20.0	5	100.0	0.0	0.0	0.0
Blood transfusion	2	100.0	0.0	0.0	0.0	2	50.0	0.0	50.0	0.0
High risk pregnancy identification	4	50.0	0.0	25.0	25.0	5	80.0	0.0	0.0	20.0
ANC registration	6	83.3	0.0	0.0	16.7	6	83.3	0.0	0.0	16.7
Child Birth										
C-Section at facility	1	100.0	0.0	0.0	0.0	1	100.0	0.0	0.0	0.0
Reported institutional deliveries	8	62.5	37.5	0.0	0.0	8	87.5	12.5	0.0	0.0
Free referral transport (home to facility)	1	0.0	0.0	0.0	100.0	1	0.0	0.0	0.0	100.0
Complicated deliveries referred out	8	37.5	25.0	25.0	12.5	8	37.5	0.0	62.5	0.0
Proportion of pre-term deliveries	8	37.5	0.0	25.0	37.5	8	28.6	8.9	62.5	0.0
Postnatal, Maternal, & Newborn Care										
Newborns less than 2.5 kg	8	37.5	12.5	25.0	25.0	8	50.0	25.0	25.0	0.0
Newborns weighed at birth	8	50.0	25.0	12.5	12.5	8	62.5	25.0	12.5	0.0
Discharged less than 24 hours after delivery	6	16.7	16.6	0.0	66.7	6	16.7	16.6	33.3	33.3
Discharged less than 48 hours after delivery	1	0.0	0.0	0.0	100.0	1	0.0	0.0	100.0	0.0
Birth doses to newborn pre-discharge	1	100.0	0.0	0.0	0.0	2	0.0	50.0	50.0	0.0

Hep, OPV doses to newborn pre-discharge	7	0.0	85.7	0.0	14.3	7	71.4	28.6	0.0	0.0
Total live births	8	75.0	25.0	0.0	0.0	8	75.0	12.5	12.5	0.0
BCG I	5	80.0	0.0	20.0	0.0	6	66.7	16.6	0.0	16.7
Measles	5	80.0	0.0	0.0	20.0	5	80.0	0.0	0.0	20.0
Reproductive Age Group										
Post-partum sterilization	0	-	-	-	-	1	100.0	0.0	0.0	0.0
Total female sterilization	2	100.0	0.0	0.0	0.0	1	100.0	0.0	0.0	0.0
PPIUCD	7	71.4	14.3	0.0	14.3	6	100.0	0.0	0.0	0.0
Total IUCD	7	71.4	14.3	14.3	0.0	6	83.3	0.0	0.0	16.7
Jind Verifications	**120**	**50.0**	**16.7**	**14.2**	**19.2**	**119**	**64.7**	**10.1**	**16.0**	**9.2**

TABLE C.4: MAHENDRAGARH VERIFICATIONS (ROUNDS 1 & 2, ALL FACILITIES): RECORDED VS. REPORTED (IN % OF FACILITIES)

Data Element	Round 1					Round 2				
	N	Acceptable variation		Unacceptable variation		N	Acceptable variation		Unacceptable variation	
		Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Under-reported by >10%	Over-reported by >10%		Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Under-reported by >10%	Over-reported by >10%
Pregnancy Care										
1st trimester ANC registration	6	0.0	0.0	0.0	100.0	7	42.9	14.2	0.0	42.9
3rd ANC checkup	5	20.0	20.0	20.0	40.0	4	25.0	0.0	25.0	50.0
Injectable Iron supplement	2	50.0	0.0	0.0	50.0	4	50.0	0.0	0.0	50.0
Blood transfusion	1	0.0	0.0	0.0	100.0	1	100.0	0.0	0.0	0.0
High risk pregnancy identification	3	0.0	0.0	100.0	0.0	4	100.0	0.0	0.0	0.0
ANC registration	6	50.0	16.7	0.0	33.3	6	50.0	0.0	0.0	50.0
Child Birth										
C-Section at facility	1	100.0	0.0	0.0	0.0	1	100.0	0.0	0.0	0.0
Reported institutional deliveries	8	50.0	37.5	0.0	12.5	8	62.5	25.0	0.0	12.5
Free referral transport (home to facility)	0	-	-	-	-	1	100.0	0.0	0.0	0.0
Complicated deliveries referred out	6	66.7	0.0	16.7	16.7	7	71.4	0.0	14.3	14.3
Proportion of pre-term deliveries	4	50.0	0.0	0.0	50.0	3	100.0	0.0	0.0	0.0
Postnatal, Maternal, & Newborn Care										
Newborns less than 2.5 kg	8	12.5	12.5	37.5	37.5	8	100.0	0.0	0.0	0.0
Newborns weighed at birth	8	25.0	37.5	12.5	25.0	7	85.7	0.0	0.0	14.3
Discharged less than 24 hours after delivery	7	14.3	14.3	14.3	57.1	7	57.1	14.3	0.0	28.6
Discharged less than 48 hours after delivery	0	-	-	-	-	1	0.0	100.0	0.0	0.0

Birth doses to newborn pre-discharge	4	75.0	0.0	25.0	0.0	2	50.0	0.0	0.0	50.0
Hep, OPV doses to newborn pre-discharge	6	66.7	16.6	0.0	16.7	4	50.0	25.0	0.0	25.0
Total live births	8	50.0	37.5	0.0	12.5	8	87.5	0.0	0.0	12.5
BCG1	6	50.0	16.7	16.7	16.7	6	16.7	33.3	0.0	50.0
Measles	6	50.0	16.7	33.3	0.0	5	20.0	20.0	0.0	60.0
Reproductive Age Group										
Post-partum sterilization	1	100.0	0.0	0.0	0.0	0	-	-	-	-
Total female sterilization	2	100.0	0.0	0.0	0.0	1	100.0	0.0	0.0	0.0
PPIUCD	6	33.3	16.7	33.3	16.7	6	100.0	0.0	0.0	0.0
Total IUCD	7	71.4	0.0	0.0	28.6	2	100.0	0.0	0.0	0.0
Mahendragarh Verifications	**111**	**42.3**	**15.3**	**14.4**	**27.9**	**103**	**66.0**	**7.8**	**2.9**	**23.3**

TABLE C.5: MEWAT VERIFICATIONS (ROUNDS 1 & 2, ALL FACILITIES): RECORDED VS. REPORTED (IN % OF FACILITIES)

Data Element	Round 1					Round 2				
	N	*Acceptable variation*		*Unacceptable variation*		N	*Acceptable variation*		*Unacceptable variation*	
		Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Under-reported by >10%	Over-reported by >10%		Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Under-reported by >10%	Over-reported by >10%
Pregnancy Care										
1st trimester ANC registration	8	12.5	0.0	37.5	50.0	6	66.7	0.0	0.0	33.3
3rd ANC checkup	5	40.0	0.0	20.0	40.0	5	40.0	0.0	0.0	60.0
Injectable Iron supplement	4	0.0	0.0	75.0	25.0	3	0.0	33.3	0.0	66.7
Blood transfusion	0	-	-	-	-	0	-	-	-	-
High risk pregnancy identification	4	0.0	25.0	75.0	0.0	3	33.3	0.0	33.3	33.3
ANC registration	5	20.0	60.0	0.0	20.0	6	50.0	16.7	0.0	33.3
Child Birth										
C-Section at facility	1	100.0	0.0	0.0	0.0	1	100.0	0.0	0.0	0.0
Reported institutional deliveries	7	85.7	14.3	0.0	0.0	6	66.7	33.3	0.0	0.0
Free referral transport (home to facility)	6	16.7	0.0	16.7	66.7	2	50.0	0.0	0.0	50.0
Complicated deliveries referred out	8	37.5	12.5	37.5	12.5	7	85.7	0.0	0.0	14.3
Proportion of pre-term deliveries	6	50.0	0.0	33.3	16.7	4	25.0	25.0	0.0	50.0
Postnatal, Maternal, & Newborn Care										
Newborns less than 2.5 kg	8	12.5	0.0	12.5	75.0	6	33.3	16.7	33.3	16.7
Newborns weighed at birth	8	12.5	37.5	37.5	12.5	6	66.7	16.6	16.7	0.0
Discharged less than 24 hours after delivery	5	40.0	40.0	20.0	0.0	6	50.0	0.0	0.0	50.0
Discharged less than 48 hours after delivery	4	25.0	25.0	25.0	25.0	3	66.7	33.3	0.0	0.0
Birth doses to newborn pre-discharge	5	20.0	20.0	40.0	20.0	4	50.0	25.0	25.0	0.0

Hep, OPV doses to newborn pre-discharge	5	20.0	40.0	0.0	40.0	5	40.0	40.0	20.0	0.0
Total live births	7	57.1	42.9	0.0	0.0	6	100.0	0.0	0.0	0.0
BCG I	4	50.0	25.0	0.0	25.0	3	33.3	0.0	0.0	66.7
Measles	4	50.0	0.0	0.0	50.0	4	50.0	0.0	0.0	50.0
Reproductive Age Group										
Post-partum sterilization	2	0.0	0.0	50.0	50.0	2	100.0	0.0	0.0	0.0
Total female sterilization	3	33.3	33.4	0.0	33.3	2	100.0	0.0	0.0	0.0
PPIUCD	3	100.0	0.0	0.0	0.0	4	100.0	0.0	0.0	0.0
Total IUCD	7	71.4	0.0	14.3	14.3	6	100.0	0.0	0.0	0.0
Mewat Verifications	**119**	**35.3**	**16.8**	**21.8**	**26.1**	**100**	**61.0**	**11.0**	**6.0**	**22.0**

TABLE C.6: PALWAL VERIFICATIONS (ROUNDS 1 & 2, ALL FACILITIES): RECORDED VS. REPORTED (IN % OF FACILITIES)

Data Element	Round 1					Round 2				
	N	*Acceptable variation*		*Unacceptable variation*		N	*Acceptable variation*		*Unacceptable variation*	
		Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Under-reported by >10%	Over-reported by >10%		Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Under-reported by >10%	Over-reported by >10%
Pregnancy Care										
1st trimester ANC registration	3	0.0	33.3	66.7	0.0	3	66.7	0.0	33.3	0.0
3rd ANC checkup	3	100.0	0.0	0.0	0.0	2	0.0	0.0	100.0	0.0
Injectable Iron supplement	5	40.0	0.0	60.0	0.0	5	60.0	0.0	40.0	0.0
Blood transfusion	1	0.0	0.0	100.0	0.0	1	0.0	0.0	100.0	0.0
High risk pregnancy identification	1	100.0	0.0	0.0	0.0	0	-	-	-	-
ANC registration	3	33.3	0.0	33.3	33.3	2	50.0	50.0	0.0	0.0
Child Birth										
C-Section at facility	1	100.0	0.0	0.0	0.0	1	0.0	100.0	0.0	0.0
Reported institutional deliveries	7	85.7	14.3	0.0	0.0	7	57.1	28.6	0.0	14.3
Free referral transport (home to facility)	1	100.0	0.0	0.0	0.0	0	-	-	-	-
Complicated deliveries referred out	5	40.0	0.0	60.0	0.0	5	60.0	0.0	40.0	0.0
Proportion of pre-term deliveries	6	50.0	0.0	16.7	33.3	5	40.0	0.0	20.0	40.0
Postnatal, Maternal, & Newborn Care										
Newborns less than 2.5 kg	7	57.1	0.0	14.3	28.6	7	57.1	14.3	14.3	14.3
Newborns weighed at birth	7	42.9	14.2	28.6	14.3	7	57.1	14.3	14.3	14.3
Discharged less than 24 hours after delivery	7	28.6	14.3	14.3	42.9	6	16.7	33.3	16.7	33.3
Discharged less than 48 hours after delivery	3	33.3	0.0	0.0	66.7	4	50.0	25.0	0.0	25.0
Birth doses to newborn pre-discharge	2	50.0	0.0	0.0	50.0	4	50.0	0.0	0.0	50.0

Hep, OPV doses to newborn pre-discharge	4	50.0	50.0	0.0	0.0	5	40.0	40.0	0.0	20.0
Total live births	7	71.4	14.3	14.3	0.0	7	57.1	28.6	0.0	14.3
BCG1	1	0.0	0.0	100.0	0.0	1	100.0	0.0	0.0	0.0
Measles	2	100.0	0.0	0.0	0.0	1	100.0	0.0	0.0	0.0
Reproductive Age Group										
Post-partum sterilization	1	100.0	0.0	0.0	0.0	1	100.0	0.0	0.0	0.0
Total female sterilization	2	50.0	50.0	0.0	0.0	1	100.0	0.0	0.0	0.0
PPIUCD	5	60.0	0.0	40.0	0.0	5	60.0	20.0	0.0	20.0
Total IUCD	4	50.0	0.0	0.0	50.0	2	100.0	0.0	0.0	0.0
Palwal Verifications	**88**	**53.4**	**9.1**	**21.6**	**15.9**	**82**	**52.4**	**17.1**	**14.6**	**15.9**

TABLE C.7: PANIPAT VERIFICATIONS (ROUNDS 1 & 2, ALL FACILITIES): RECORDED VS. REPORTED (IN % OF FACILITIES)

Data Element	Round 1					Round 2				
	N	*Acceptable variation*		*Unacceptable variation*		N	*Acceptable variation*		*Unacceptable variation*	
		Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Under-reported by >10%	Over-reported by >10%		Reported and recorded values match	Excluding matches, reported within 10% of recorded value	Under-reported by >10%	Over-reported by >10%
Pregnancy Care										
1st trimester ANC registration	8	62.5	0.0	12.5	25.0	8	62.5	0.0	12.5	25.0
3rd ANC checkup	8	37.5	0.0	25.0	37.5	8	75.0	0.0	12.5	12.5
Injectable Iron supplement	5	20.0	0.0	40.0	40.0	2	100.0	0.0	0.0	0.0
Blood transfusion	5	20.0	0.0	40.0	40.0	2	100.0	0.0	0.0	0.0
High risk pregnancy identification	7	57.1	0.0	28.6	14.3	6	66.7	16.6	16.7	0.0
ANC registration	7	57.1	0.0	28.6	14.3	6	50.0	0.0	0.0	50.0
Child Birth										
C-Section at facility	3	100.0	0.0	0.0	0.0	2	50.0	0.0	0.0	50.0
Reported institutional deliveries	3	100.0	0.0	0.0	0.0	3	100.0	0.0	0.0	0.0
Free referral transport (home to facility)	5	60.0	0.0	0.0	40.0	3	100.0	0.0	0.0	0.0
Complicated deliveries referred out	6	50.0	0.0	50.0	0.0	5	100.0	0.0	0.0	0.0
Proportion of pre-term deliveries	7	42.9	14.2	14.3	28.6	7	57.1	0.0	42.9	0.0
Postnatal, Maternal, & Newborn Care										
Newborns less than 2.5 kg	7	57.1	0.0	0.0	42.9	6	83.3	16.7	0.0	0.0
Newborns weighed at birth	7	57.1	0.0	0.0	42.9	6	83.3	0.0	16.7	0.0
Discharged less than 24 hours after delivery	8	50.0	12.5	0.0	37.5	3	33.3	0.0	33.3	33.3
Discharged less than 48 hours after delivery	1	0.0	0.0	0.0	100.0	0	-	-	-	-
Birth doses to newborn pre-discharge	7	28.6	28.5	14.3	28.6	3	33.3	33.4	33.3	0.0

Hep, OPV doses to newborn pre-discharge	7	28.6	28.5	14.3	28.6	5	80.0	20.0	0.0	0.0
Total live births	7	28.6	28.5	14.3	28.6	6	100.0	0.0	0.0	0.0
BCG I	5	40.0	20.0	20.0	20.0	4	50.0	25.0	25.0	0.0
Measles	4	50.0	0.0	25.0	25.0	1	0.0	0.0	0.0	100.0
Reproductive Age Group										
Post-partum sterilization	4	50.0	0.0	25.0	25.0	2	100.0	0.0	0.0	0.0
Total female sterilization	3	100.0	0.0	0.0	0.0	3	33.3	66.7	0.0	0.0
PPIUCD	6	66.7	16.6	0.0	16.7	5	80.0	20.0	0.0	0.0
Total IUCD	6	66.7	16.6	0.0	16.7	6	100.0	0.0	0.0	0.0
Panipat Verifications	**136**	**50.0**	**8.1**	**15.4**	**26.5**	**102**	**73.5**	**7.9**	**9.8**	**8.8**

BOLD THINKERS DRIVING
REAL-WORLD IMPACT