

# Performance of Routine Health Information System Management in Liberia

## PRISM Assessment

October 2014



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## Table of Contents

ACRONYMS .....	4
AKNOWLEDGMENTS .....	5
EXECUTIVE SUMMARY .....	6
Background .....	10
Evaluation Framework.....	12
Survey Methodology.....	13
Results: Current Status of HMIS Performance.....	17
Results: Comparison between 2012 and 2014 .....	31
Discussions .....	37
Conclusion.....	<b>Error! Bookmark not defined.</b>
Recommendations .....	40

## ACRONYMS

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<b>AIDS</b>	Acquired immune deficiency syndrome
<b>ANC</b>	Antenatal care
<b>CHO</b>	County Health Officer
<b>CHDD</b>	Community Health Department Director
<b>CHT</b>	County Health Team
<b>CHV</b>	Community health volunteer
<b>CM</b>	Certified midwife
<b>DHIS</b>	District Health Information System
<b>EPI</b>	Expanded Program on Immunization
<b>FARA</b>	Fixed Amount Reimbursement Agreement
<b>FP</b>	Family planning
<b>GBV</b>	Gender-based violence
<b>gCHV</b>	General community health volunteer
<b>HIS</b>	Health information system
<b>HIV</b>	Human immunodeficiency virus
<b>HMER</b>	HMIS, M&E, and Research
<b>HMIS</b>	Health management information system
<b>iCCM</b>	Integrated Community Case Management
<b>IEC</b>	Information, Education and Communication
<b>iHRIS</b>	Integrated Human Resource Information System
<b>LMIS</b>	Logistics Management Information System
<b>M&amp;E</b>	Monitoring and evaluation
<b>MOHSW</b>	Ministry of Health and Social Welfare
<b>NGO</b>	Non-governmental organization
<b>NTD</b>	Non-tropical diseases
<b>OIC</b>	Officer in charge
<b>OPD</b>	Outpatient department
<b>PA</b>	Physician's assistant
<b>PBF</b>	Performance-based financing
<b>RBHS</b>	Rebuilding Basic Health Services
<b>SBA</b>	Skilled Birth Attendant
<b>TB</b>	Tuberculosis
<b>TOT</b>	Training of trainers
<b>TTM</b>	Trained traditional midwife
<b>USAID</b>	United States Agency for International Development

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## EXECUTIVE SUMMARY

Reliable and timely health information is one of the foundations of effective health service management and public health action. The routine health information system (aka HMIS) is an important mechanism to identify gaps in the management of the health system and to resolve them to maintain and improve performance. Considering the crucial role that Health Management Information System would play in the successful implementation of the national health policy, the Liberia Ministry of Health and Social Welfare (MOHSW) has placed rebuilding HMIS as a top priority. The 10 years National Health Policy and Plan has given high priority to the development of a decentralized Health Management Information system (HMIS) as an integral part of the national health system.

In April 2012, a baseline assessment of the HMIS performance, using the PRISM frameworks and tools was carried out by MOHSW with the technical support of RBHS. According to this evaluation, the quality of data was average (52%) and use of data for decision-making found to be poor (38%). The assessment informed the development of interventions for strengthening the HMIS in Liberia.

Following the baseline assessment, RBHS in collaboration with the MOHSW implemented various interventions to strengthen HMIS with regard to the production of quality data and the use of HMIS information for decision making. The interventions were focused on: improving individual staff capacity; creating organizational environment conducive to the use of information for decision making; and improving the system components required for HMIS functionality.

### **Interventions**

Enormous work in the past two year has gone into building individual staff capacity on HMIS and M&E both at HMER division of MOHSW and the county level. M&E staffs from 15 counties were trained in using DHIS 2, beyond data entry and transmission, to perform data verification, data analysis, and prepare graphs highlighting performance and trends in key indicators. The follow-up of the training was ensured on-site in the three project intervention counties (Bong, Lofa and Nimba) by the RBHS M&E officers assigned to each county, enabling county health teams (CHTs) to get on the spot assistance with data entry, verification and use. In addition, emphasis was given to build individual staff capacity to use information for decision making. Two rounds of workshops were organized for data producers and data users focused on data analysis, using indicators, developing M&E plans, problem identification and problem solving. These workshops responded to an urgent need of CHTs for methodological support to their day to day decision making processes, in providing them with systematic knowledge and skills to problem solving. Trainings were also provided to the central level MOHSW staff on new features of DHIS2 and its reporting functionalities including: iReport and HTML report to customize reporting; and MySQL PostgreSQL to import and export data from and to DHIS.

With the objective to build organizational capacity for information use and M&E, RBHS assisted county health teams to establish, organize and implement routine performance review forums at health facilities and county levels. This is seen as important forum to practice analysis, sharing and use information for performance improvement. RBHS field staff closely mentored CHTs by supporting them with analysis of HMIS data to be presented at county health review/coordination meetings. The project has also supported the CHTs in improving quality of data by setting up data quality assurance mechanisms such as desk review of data, data quality assessments in health facilities and organizing data review meetings. With this the CHTs are expected to perform data quality check on monthly basis, identify missing data, extreme, inconsistent and highly sensitive values such as deaths.

The interventions implemented under the umbrella of system building includes: facilitating migration of DHIS1.4 legacy data to DHIS2; uploading population data to DHIS2; and working on health indicator definitions using HMIS data for various programs.

In addition, the implementation of the performance based financing (PBF) provides the HMIS/M&E system the added opportunity to work toward improving and ensuring data quality. The scheme employs rigorous performance monitoring to ensure program accountability. The positive spin-off of the data verification conducted as part of the PBF is that health workers are paying more attention to the records and are taking steps to improve accuracy and completeness. The data verification exercise also expanded to non-PBF counties in an effort to promote data quality across the sector.

After these interventions a new PRISM assessment (2014) should make it possible to measure the progresses in improving the performance of HMIS and identify areas for further improvement. It is in this context that the MOHSW in collaboration with USAID funded RBHS Project conducted this second evaluation of the performance of the Liberia HMIS based on PRISM framework.

## **PRISM Assessment in 2014**

### **General Objective**

Evaluate the performance of the HMIS in terms of quality of data and use of information with a view to establish understanding on current status of HMSI performance and to measure the level of improvements made over the past two years.

### **Methodology**

An observational cross-section survey was carried out by applying quantitative as well as qualitative methods. The assessment was conducted in Bong, Nimba, Lofa and Grand Bassa counties. All of the four county health offices and a random sample of 76 health facilities (19 health facilities per county) were surveyed, and about 283 health managers and staff from these institutions were interviewed using the Performance of Routine Information System Management (PRISM) framework and tools. The PRISM framework promotes strengthening of HMIS performance (i.e., better data quality and improved information use by addressing technical, organizational, and behavioral factors affecting HMIS data quality and use for health service performance improvement).

### **Main Results**

The Liberia PRISM assessment result recorded improvements in HMIS performance in both production of quality data and use of information for decision making at county as well as health facility levels. Major strengths of the HMIS in Liberia included availability of standardized ledgers and integrated reporting forms, established reporting channels and timelines, and District Health Information System (DHIS) software installed and in use at the county health offices. In terms of HMIS process, the collection and transmission of data are proceeding very well with effective verification of data quality during inspections and desk reviews. Significant improvement is also observed at the CHTs in performing data analysis with increased skill level on using DHIS2. Nevertheless, weakness persisted in sending feedback to lower levels and processing and analyzing data at the health facilities.

Regarding behavioral determinants, the health facility staff capacity/skills to perform HMIS tasks have reached 22%, a marked improvement from 9% reported in 2012 PRISM assessment. Problem solving capacity among CHTs staffs also doubled. In all levels, the staff's confidence in the ability

to carry out HMIS tasks was not commensurate with the level of skills observed. The observed competence levels were insufficient in the areas of calculating indicators, data interpretation and use of information. The health workers surveyed felt motivated to carry out HMIS tasks, despite their perception of getting minimum rewards for a job well done. Respondents working at the health facilities (60%) and CHTs (65%) appreciated the efforts being taken by Ministry of Health and Social Welfare (MOHSW) in promoting a culture of information use. Also, most CHT staffs agreed that the MOHSW put more emphasis on data quality, promotion of problem solving and use of information.

Concerning the technical determinants, respondents from the CHTs felt that DHIS2 is a good platform of integrated information. It provides a comprehensive picture of performance of health systems despite absence of data warehouse/repository for capturing the other information systems (iRIS, LMIS etc). While more than half of respondents appreciated the user friendliness of HMIS forms and tally sheets, existence of parallel reports are still persistent (pertinent to nutrition, iCCM, NTDs, vaccine accountability, community health activities).

At the level of the organizational determinants, most HMIS support and critical management functions including governance, planning, supervision, training and financing are in place in Bong and Lofa CHTs. However, management indicators are low in Nimba and Grand Bassa CHTs with weak support for planning and financing functions of HMIS. The availability of resources such as computers, printers, CDMAAs, and generators was very good in all CHTs. Nevertheless, shortage of standard registers was reported by health facilities and CHTs. Some health facilities are using customized registers which does not follow the standard MOHSW recoding procedures. There were trained personnel in charge of the HMIS and M&E at the level of CHTs which was not the case at the health facility level.

Compared to 2012 assessment, the performance of HMIS in Liberia was better for the quality of data and use of information at health facilities and county levels. Various degree of improvements were also observed in HMIS processes, staff competence to carryout HMIS tasks, promotion of culture of information and HMIS management functions.



## Summary of Results

HMIS Performance Indicators	Facilities		Districts	
	2012	2014	2012	2014
<b><u>PERFORMANCE OF THE RHIS</u></b>				
<b>Quality of data</b>				
Overall accuracy	55%	84%	78%	88%
Data completeness in facilities monthly reports	52%	79%		
Completeness of monthly reports at county level			91%	98%
Timeliness of reports of health facilities at county level			74%	88%
<b>Use of information</b>	38%	58%		75%
<b><u>PROCESS</u></b>				
HMIS procedure manual		62%		
Verification of data quality	63%	79%		
Filling out of reports in full	72%	81%		
Sending of reports before the deadline	85%	87%		
<b>Feedback to health facilities</b>	20%	49%		50%
<b>Data analysis</b>				
Presence of performance targets	33%	55%		
Presence of performance monitoring plan	15%	33%		100%
Performing at least two types of data analysis	15%	39%		100%
<b>Display of data</b>	45%	68%		54%
<b>Supervision</b>				
Effective supervision	45%	73%		
Data quality control	82%	97%		
Feedback after supervision	22%	89%		
<b><u>DETERMINANTS OF HMIS PERFORMANCE</u></b>				
<b>Technical factors</b>				
Simplicity of the reporting form		58%		80%
Simplicity of the software package				100%
<b>Organisational factors</b>				
Governance documentation			75%	88%
Planning documentation			44%	69%
Financial documentation on the RHIS			33%	50%
Training schedule			0%	75%
Supervision schedule			8%	100%
Promotion of information culture			48%	58%
Trained personnel in charge of the HMIS				
<b>Behavioural factors</b>				
Awareness of the rationale for HMIS	28%	43%	54%	59%
Knowledge of data quality checking methods	10%	33%	29%	59%
Problem solving skills	8%	24%	27%	61%
Skills observed in performing HMIS tasks	9%	22%	45%	49%
Self-confidence declared in performing HMIS tasks	51%	68%	71%	80%
Motivation for carrying out HMIS tasks	62%	66%	60%	65%

# Background

## General overview and health status

Located on the west coast of Africa, with a land area of 110,080 sq. km, Liberia is a country that emerged from more than a decade of civil war and has a history of underdevelopment. Of the 15 administrative counties, the “big six” (Montserrado, Nimba, Bong, Lofa, Grand Bassa, and Margibi) account for 75 percent of the total population. Massive population displacement in rural areas during the war has led to accelerated urbanization. Close to half of the population (47%) lives in urban communities, with one-third of the entire population residing in the capital of Monrovia.



With the end of the 14-year conflict, Liberia is on the road to recovery, but access to basic services remains limited. An estimated 60% of the population has access to basic health care (MOHSW 2013); 73% of households have access to safe water and 55% have access to sanitary facility. Literacy rates are low with only 43% of women and 71% of men are literate. Malnutrition is a major public health problem: 32% of children under-five are stunted, 15% of children are underweight and 6% are wasted (thin for their height). A country with an under-five mortality rate of 94/1,000 live birth and one of the highest maternal mortality rates in the world (1072/100,000), Liberia is currently taking action to transform and strengthen its

weakened health sector (Demographic and Health Survey 2013).

Although Liberia's long civil war left its health care service delivery system fragmented, severely damaged, and heavily dependent on international donors and NGOs, in only a few short years, Liberia has taken bold steps to transition from an emergency relief model of health service delivery to a functioning, decentralized health system. In 2011, Liberia released a new 10-year National Health and Social Welfare Policy and Plan (2011-2021) (NHSWPP). The policy vision is a healthy population with social protection for all, and the goal is to improve the health and social welfare status of all people in Liberia on an equitable basis. The ten-year plan adapts the WHO health systems framework and is based on the primary health care strategy.<sup>1</sup>

The national plan is founded on two distinct service packages to improve the health and social welfare of all people in Liberia: the Essential Package of Health Services (EPHS) and Essential Package of Social Services (EPSS). The components of the two packages are affordable, sustainable, high-impact interventions that have been chosen due to their effectiveness at preventing or treating the major causes of morbidity and mortality or improving social welfare. The EPHS defines the minimum package of standardized prevention and treatment services. The health system in Liberia is organized into three tiers of service delivery: primary,

secondary, and tertiary. The primary level of care consists of community-based services and clinics that provide health promotion, education, and basic curative care. The secondary level of service delivery is composed of health centers and county hospitals. The tertiary level has exclusively referral functions and is teaching and learning oriented.

### Basic Health Indicators for Liberia

<b>Program Area</b>	<b>Indicator</b>	<b>Rate</b>
Healthier population	Maternal mortality rate (per 100,000 live birth) <sup>2</sup>	1,072
	Infant Mortality rate (per 1,000 live birth) <sup>2</sup>	54
	Under 5 mortality rate (per 1,000 live birth) <sup>2</sup>	94
Access and utilization of health services	% of the population living within 5km from the nearest health facility <sup>3</sup>	72%
Service provision	% of deliveries assisted by skilled birth attendant <sup>2</sup>	61%
	Couple-years protection with family planning methods <sup>3</sup>	70,034
	% of children under 1 year who received DPT3/Petna3 vaccination <sup>2</sup>	68%
	OPD consultations per inhabitant per year <sup>3</sup>	1.04
	Number of pregnant women testing HIV+ and receiving ARV prophylaxis to reduce the risk of MTCT <sup>3</sup>	2,987

### Liberia HMIS overview (policies, strategies and stakeholders)

HMIS is an important mechanism to identify gaps in the management of the health system and to resolve them to maintain and improve performance. Fully transparent and improved evidence based decision making plays critical role for improving the quality and coverage of health services. With this conviction, the Liberia 10-Year National Health Policy and Plan has given high priority to the development of a decentralized Health Management Information System (HMIS) as integral part of the national health system. Accordingly, the health care system was to be based on evidence and monitored by regular information from health services so as to guide planning and management. Thus, the policy stated that HMIS will be strengthened in order to better collect, organize, and maintain relevant data in a timely fashion.<sup>1</sup>

In line with these principles, in 2009, the MOHSW has formulated the national health management information system (HMIS) policy as a framework to coordinate the management of health information from facility to national levels. The HMIS policy includes the people, procedures, datasets, hardware, and software that are essential to coordinate a functional information system and ensure that facilities use the information generated in decision-making. It intends to establish HMIS that have capacity to produce reports related to health sector development, including the analysis of trends, in order to understand the evolution of the health sector over time. The goal of the HMIS, as stated in the policy document, is to contribute to the evidence-based decision making in the health sector. The objectives are: 1) to generate quality information in a timely manner and 2) to ensure the use of information in planning and management of health services.

Significant progress has been reported in the rollout of the new HMIS policy and plan. In 2011, a division comprising three units (M&E, HMIS, and research) headed by a division

coordinator was created within MOHSW. This division is responsible for harmonizing the three units' activities; leading the development of HMIS and M&E policies, planning, issuing guidelines and standards; and mobilizing resources for routine health information and M&E. The division coordinator reports to the assistant minister for vital statistics. The management of the hardware and software of the routine health information system rests in the hands of the HMIS unit.

The MOHSW has also endorsed a set of 137 health indicators to be monitored through the integrated HMIS. This has formed a basis for harmonizing the fragmented information systems and tools into a coherent system with appropriate tools and guidelines. Committed to improving data quality, the MOHSW HMIS Unit developed, piloted, and printed harmonized health facility ledgers. The Ministry also developed and distributed a new integrated health sector reporting form in late 2011. Moreover, training and capacity building of MOHSW staff in the areas of data collection, analysis, and standardization at national and sub-national levels have been undertaken in order to strengthen reporting.

In late 2011, the MOHSW introduced DHIS2 web-based software to store, analyze and manage routine health service data. Under the HMIS framework, health workers record services in paper-based registers in real time as these services are provided. Health facilities aggregate register data on a monthly basis and transfer the information to the HMIS reporting form. The OIC verifies this data before submitting it to the County Health Team (CHT) M&E Officer. At the CHT level, the data is captured into electronic format (DHIS2). The CHO is mandated to analyze and approve all monthly report from CHT and facility staff before submission to MOHSW or other agencies.

Moreover, supported by the USAID FARA Project under the Performance Based Financing (PBF) Scheme the MOHSW initiated quarterly data quality verification at all levels to improve data quality.

The HMIS unit has been responsible for insuring the quality, completeness, and timeliness of data. The M&E/HMIS unit supports at the county level the data collection as well as improving the quality of data. The coverage of routine health facility reporting and data quality is expected to improve with the introduction of DHIS2 software, the National Health Information Strategy and Policy, and the standardization of reporting instruments.

## Evaluation Framework

This assessment was based on the conceptual framework developed to improve performance of the routine information system management (PRISM) which brings significant changes in the conception, strengthening, monitoring and evaluation of routine health information system. The rationale for using the PRISM framework is that the framework not only defines and measures information system performance but also explores determinants of performance.

First, it places attention on the performance of routine health information system that it defines as improved data quality and continuous use of information for decision-making. Secondly, the PRISM framework postulates that technical, behavioral and organizational determinants (inputs) influence data collection, transmission, processing, and presentation (processes), which in turn influence data quality and use (outputs). Improved HMIS performance leads to better health system

performance (outcomes) which consequently affect health status of the population (impact). Thirdly, by describing causal pathways of these determinants and how they affect systems, the PRISM framework encourages and guides the development of interventions for strengthening or reforming HMIS. The PRISM framework is founded on a ‘systems approach’ and continuous performance improvement principles.

Based on the framework, four survey instruments were developed to evaluate the performance, processes and determining factors of the HMIS; namely:

- HMIS performance diagnostic tool
- HMIS overview and facility/office checklist
- Organizational and behavioral tool
- HMIS management assessment tool

Annex 1 describes how these tools are related to one another. Collectively, these tools provide a comprehensive picture of HMIS performance and its contributing factors.

- Using the PRISM framework this assessment identifies strength and weaknesses of Liberia’s HMIS in the following areas:
- Presence and effectiveness of data collection, processes, and transmission systems, forms, and methods.
- The knowledge, skills, attitudes, values, and motivation of the people who collect and use data. Do the people responsible for data collection have the necessary skills? Do they understand and care about the importance of their work?
- Presence of information culture, structure, resources, roles, and responsibilities of the health system and key contributors at each level - Is the organization committed to a culture of using information? Do managers support staff with training, supervision and needed resources?

## Survey Methodology

### Type of survey

An observational cross-section survey was carried out applying quantitative as well as qualitative methods to collect data from key informants. The design of this study is largely similar to that of the 2012 PRISM baseline assessment in which the team visited three RBHS funded counties (Bong, Lofa and Nimba) as well as one MOHSW funded county (Grand Bassa). By comparing the results of this assessment with the results of the 2012 PRISM baseline assessment the analysis enables to monitor progresses, and ultimately seek to improve data quality and information use for decision-making by finding answers to the following questions:

- To what extent does the quality of HMIS data affect the level of information use?
- To what extent does HMIS processes (transmission, processing, and analysis) affect HMIS performance?
- To what extent do health managers’ problem-solving skills and level of understanding about how to use information lead to HMIS performance improvement?
- To what extent do behavioral factors (motivation, data demand, perceived confidence level and competence to perform HMIS related tasks) affect HMIS performance?

- To what extent do technical factors such as information technology, system design, complexity of forms, etc., affect HMIS performance?
- To what extent do organizational factors such as governance, finance, training, supervision, and a culture of information influence HMIS performance?

## Sampling

Sampling procedure similar to that of the baseline assessment was followed in this round PRISM assessment to facilitate comparability of the results between the two studies. Two levels of the health pyramid were covered by this assessment. At county level, the same four counties (Bong, Lofa, Nimba and Grand Bassa) that have been covered by the baseline assessment were purposively selected for the repeat study.

A sample of 19 health facilities in each county was selected randomly using multiple-stage cluster sampling methodology. Health facilities within a county were clustered based on facility type, source of funding, and implementers (as shown in Table 1) to capture different aspects/characteristics of health facilities in Liberia. These include:

1. Health facility type: For the purpose of the assessment, the health facilities were classified into two broad categories. Clinics and health centers in one category (there is not much difference between the two in relation to HMIS rollout and implementation), and hospitals in the second category. Then they were weighted by size of health facility to determine how many in each of the two broad categories of health facilities should be assessed. In most cases one hospital and 18 clinics/health centers were selected per county.
2. The second stage of sample selection involved stratifying health facilities into four strata based on funding sources. The health facilities are aggregated by performance based financing (PBF), non-PBF (supported by GOL), other NGOs, and private facilities. The probability proportional to size method was used to randomly select the health facilities among the four categories. It assured that all health facilities are given an equal probability of being included in the assessment. Over the last two years, the coverage of the USAID funded performance based financing (FARA) has increased in the three counties (Bong, Lofa and Nimba). For instance, in Bong all the facilities are supported by FARA.

Overall, 4 county health teams, 4 hospitals, and 72 clinics or health centers were surveyed. Some of initially selected facilities were replaced because of inaccessibility (1 in Bong), staff unavailability (1 in Bong), and the selected services are not being provided by the facilities (3 in Nimba). In the first two cases the assessment team went to the next nearest facility. In the case of Nimba the issue was identified during data cleaning, then a team went back to assess another 3 randomly selected facilities from the same category (private sector).

**Table 1: Sample Size by County**

Source of Funding	Bong	Lofa	Nimba	Grand Bassa
FARA (USAID)	19	8	14	-
Other NGOs	-	5	-	-
Exclusively by the MOHSW (Non-FARA)	-	5	2	15
Private	-	1	3	4

Total Health Facilities	19	19	19	19
County Health Teams	1	1	1	1

## Data collection

Data were collected from 283 health personnel in 76 health facilities and 4 CHTs in June 2014, using the adapted version of the 4 PRISM tools described above. A total of 12 teams, each consisting of two interviewers, participated in the data collection, which was carried out over two weeks. Nine supervisors from central MOHSW and RBHS were responsible for coordinating and monitoring the data collection. RBHS and MOHSW organized a two-days training in Bomi for the supervisors and data collectors prior to the start of the fieldwork. Multiple data collection methods including semi-structured key informant interviews, written test, field observation, review of documents and computerized database (DHIS2) were used.

Using the PRISM Framework as a guide, the assessment took into account the expected roles and responsibilities in routine health information at each level. The HMIS overview tool is completed through national document reviews, interview with HMIS managers at the central MOHSW, and group discussion with county representatives during the two days PRISM training. HMIS performance and processes were also measured via observations at facilities and CHTs, including reviews of registers, tally sheets, monthly reports, and DHIS2 for selected 6 priority indicators. Interviews were also conducted, using the Diagnostic Tool, with County Health Officer, M&E Officer and Data Managers in the CHTs and with Officer In-Charge, hospital director and/or other staff involved in the management of facility data.

For the organizational and behavioral assessment, the OBAT was administered (via pencil and paper test) to 29 management and health staff in the CHTs (including County Health Officer, CHDD, Monitoring and Evaluation Officer, Data Managers, Clinical Supervisors, and DHOs) and 254 staff in health facilities (3-4 staff per facility including hospital director, Data Manager, OIC, CMs, Screener, Vaccinator, and Registrar). In addition, management indicators were measured using the MAT which was completed by CHT managers and M&E Officers from the four counties and through document reviews.

## Processing and analysis of the collected data

Data were captured into the PRISM's customized MS Excel data entry and analysis tool (DEAT) and descriptive analysis was conducted. The health facilities data was further analyzed using the LQAS decision table. During the baseline assessment, MOHSW and RBHS jointly set level of standards for 16 HMIS performance indicators. These were used as benchmarks to measure the HMIS performance status at county level. No standard or level of standard is absolute but should be considered relative and be used in given situation accordingly. It implies that level of standards could also be improved continuously as number of system strengthening interventions implemented. In view of the recent developments with the Liberia HMIS these targets were revised in joint discussion with MOHSW and CHTs (see annex 2). The assessment sought to determine whether these predetermined standards for HMIS performance in various areas were met by the health facilities.

Analysis of the HMIS performance was done in three ways:

1. County by county analysis: looks at whether each county met the predetermined HMIS performance target for each indicator. The analysis provided a binary result; a "yes" or "no" answer showing counties that met or exceeded the performance target and those that are performing below the target.

2. Overall performance estimates: looks at the average performance estimate for each indicator for all of the four counties combined. The performance estimates have a precision of  $\pm 10\%$ , and the aggregate measure is weighted by the total number of health facilities in the four counties. Given that the number of total health facilities varies across the counties, weighting helps to adjust for these differences and provides a more accurate overall estimate of HMIS performance for each indicator.
3. Comparative analysis of HMIS performance between 2012 and 2014: looks at the progress made in HMIS performance over the two years by comparing the average performance estimates for each indicator for all four counties combined against the baseline result.

For the Organizational and Behavioral Assessment (OBAT), there are many constructs such as self-confidence level for HMIS tasks, competence level of HMIS tasks, and a culture of information, which are a composite of many dimensions. Thus, the mean score of overall constructs and its dimensions are used to compare which dimension score is lower than the other, indicating interventions for improving them. In addition, comparisons were made between the constructs and the other HMIS performance variables such as data quality and use of information. The comparative analysis among various components of the PRISM framework illustrates the strengths and weaknesses of Liberia's HMIS. This information feeds into the MOHSW continuous efforts to improve the HMIS performance in Liberia.



## Results: Current Status of HMIS Performance

At the level of health facilities, the performance of the HMIS compared to the quality of data was considered good (83% for accuracy and 79% for data completeness) but average in terms of information use (58%). At the county level, the HMIS performance was found high in production of quality data (88% for data accuracy and report timeliness, and 98% for report completeness).

### Data Quality

Data quality is measured on dimensions of data accuracy, completeness, and timeliness.

#### Data Accuracy

Data accuracy check involves verification of the numerical consistency of the recoded data with the monthly report transmitted by the health facilities for selected indicators. For assessing the quality of HMIS data six indicators (antenatal care fourth visit, assisted delivery, penta3, family planning, malaria, and OPD service utilization) were selected. The reporting periods considered for the assessment were August 2013, November 2013, and February 2014.

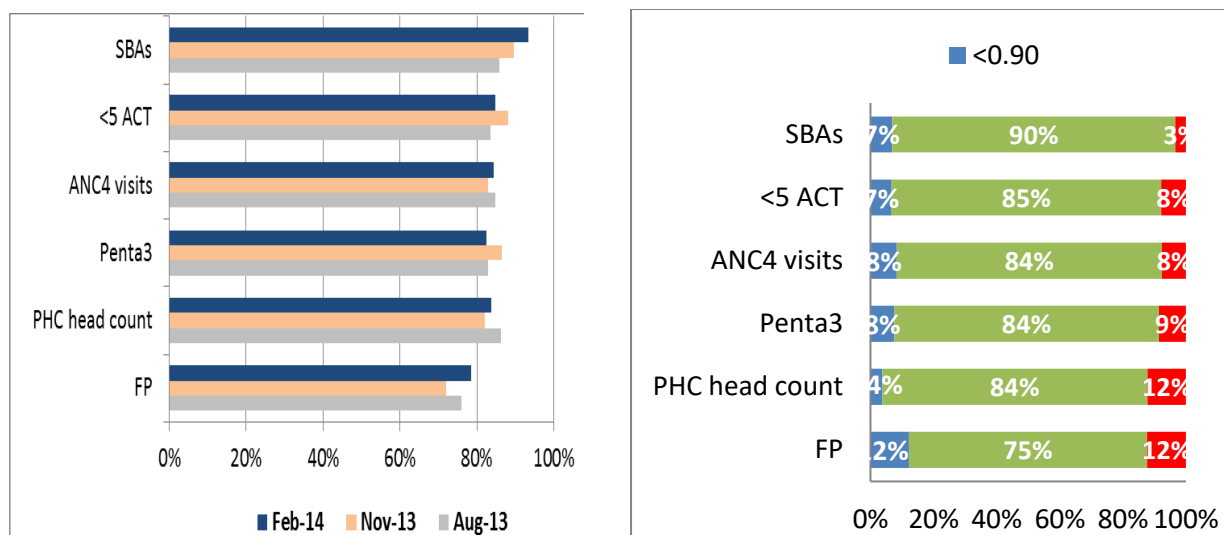


Related to availability of source documents the assessment showed that on average 2% of the health facilities are not maintaining certain service delivery registers. For instance, two of the assessed private health facilities in Nimba were not using delivery, family planning, OPD under-5 children and/or Master registers. In these facilities data were transferred from patient records directly to the monthly HMIS reports. Also two facilities in Nimba and Lofa (1 HF in each) counties were not providing ANC, delivery and/or family planning services, hence reported zero. Taking this situation into consideration facilities that are providing the selected services but not keeping registers are dropped from the data accuracy analysis.

The MOHSW expected a minimum of 90% data accuracy with a 10% tolerance range at health facility level. For the overall accuracy, one had to calculate the proportion of health facilities that met this predetermined criterion. Figure 1 shows the overall accuracy at health facility level was 84% with variation from month to month and among the six types of data elements covered in this assessment. Five of the six types of assessed data elements have scored over 80% data accuracy level.

**Figure 1a: Data quality at Health Facility level by reportign period (N=76)**

**Figure 1b: Proportion of helath facilities with verification factor (VF) within 10%**



The MOHSW also set a target of at least 80% of the surveyed facilities in a county (13 out of 19) should meet the data accuracy criterion. All four surveyed counties have met this predetermined target, except for family planning and penta3 in Bong and Nimba counties (see table 2).

**Table 2: Data accuracy at health facility level**

Data elements	# of health facilities with matched data items between register/ledgers and report Decision Rule = 13 (80%), Sample Size =19*											
	Bong			Nimba			Lofa			Grand Bassa		
	Aug-2013	Nov-2013	Feb-2014	Aug-2013	Nov-2013	Feb-2014	Aug-2013	Nov-2013	Feb-2014	Aug-2013	Nov-2013	Feb-2014
ANC4 visits	16	15	16	16	15	17	15	17	15	19	16	16
Deliveries in health facilities by SBAs	17	18	19	16	16	18	15	17	17	19	18	17
Family Planning pills dispensed	12	12	11	12	13	15	17	13	16	18	17	18
Penta3	12	13	14	15	15	14	18	19	17	18	19	19
Children Under 5 treated with ACT	14	16	16	16	16	15	16	17	16	18	19	19
PHC head count	15	16	18	15	14	15	17	16	15	18	18	17

\*the sample size for Nimba county fluctuates by month and data element (17-19 HF)

At the county level, with the introduction of DHIS2, county health teams are mandated to enter facility reports in the database, generate electronic report, and submit them to the central MOHSW. At this level data accuracy was measured by cross-checking the monthly electronic reports with the individual health facility monthly paper reports for the three months. The accuracy was considered good, if the data is matching between 90% and 110% with a 10% tolerance range. The overall data

accuracy at CHTs was estimated at 88%, with all except family planning and PHC head count data matching.

Data transmission error from the register to the reporting form and arithmetic errors were reported as main reasons for data discrepancies. Particularly, limited knowledge of how to count and record family planning pills dispensed was commonly observed issue at the health facilities. Use of customized registers, missing records and data not being collected from all relevant departments within health facilities had effect on the quality of the reported data. At the CHT levels data entry errors and missing reports were pointed out as main reasons for the observed miss-matches.

### Completeness of monthly reports

The completeness of the report at the county level was assessed by measuring how many facilities in the whole county that were supposed to report are actually reporting to the respective county health team (CHTs). Overall, 98% of facilities were observed to be reporting. The report completeness in Grand Bassa and Nimba reached 100% coverage in February 2014. While, less than 3% of the health facilities failed to report to the CHT in Lofa.

### Completeness of the data elements in monthly reports

The verification of the quality in filling out the monthly reports was also done by comparing the number of items which are expected to be reported and the number or items that were actually completed. The report was considered to be good if at least 90% of the items are filled out. The MOHSW expected 70% of the health facilities to meet the 90% data completeness criterion. Tables 3 shows overall completeness was 79% with slight variations from month to month and county to county. Bong, Lofa and Grand Bassa counties have met the target set by the MOHSW and Nimba County scored below the 70% target.

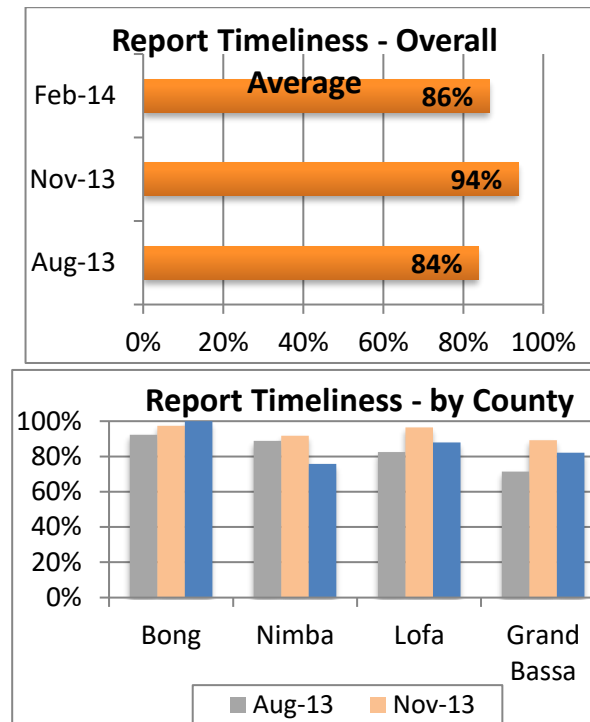
**Table 3: Monthly report data completeness**

Data Completeness	Weighted Average	# of facilities with ≥ 90% report completeness (as measured by reported data elements against expected)					
		Target	Sample size	Bong	Nimba	Lofa	Grand Bassa
August 2013	78%	11 (70%)	19	17	8	19	18
November 2013	78%			18	7	19	19
February 2014	81%			18	9	19	19
<b>Overall data completeness</b>	<b>79%</b>						

### Report timeliness

Timeliness is measured by the CHTs receiving facilities' reports by the predetermined deadline. In Liberia, facilities are expected to submit monthly reports to the county health team within five days after the reporting period. The assessment reviewed records of monthly report receipt dates that are kept at the CHTs. On average 88% of the expected monthly HMIS reports were submitted to the CHTs before or on the deadline.

**Figure 2: Report timeliness at CHTs (N=187 health facilities)**



## Use of Information

Use of information was assessed by observing feedback provided on facility performance and through review of documents that verifies whether and how HMIS data were used in decision making processes. The overall score for the use of information is measured by a series of dichotomous indicators, including: whether HMIS information was discussed in routine staff meetings; whether HMIS information was used to help make decisions; and whether updated information on various topics was displayed.

### Use of information at health facilities

Majority of the health facilities (96%) have monthly performance review meetings of which 94% maintained meeting minutes. The review of the meeting records showed that HMIS management issues had been brought up in 76% of health facilities and HMIS data (in terms of service utilization, disease surveillance, service coverage, logistics etc) discussed in 59% of the health facilities. Decisions based on these discussions were made in half of the health facilities.

Table 4 shows the level of HMIS information use for performance review and decision making at these health facilities. In Grand Bassa, health facilities demonstrated discussion on HMIS data and using findings to inform decision making which exceeded the 70% target. In Bong and Lofa, while HMIS data are used in discussions during staff meetings, evidence of use of data for decision-making is below 70%. Nimba did not meet the target for use of HMIS in performance review and decision-making. Examples of HMIS informed decision made by health facilities include: increasing EPI outreach services, organizing meetings with TTMs to encourage pregnant women

to go to the health facility for ANC and delivery, conducting more community education sessions on STIs and healthy behaviors, etc.

**Table 4: HMIS information use at health facilities**

County	Sample Size	Target	# of HFs with routine staff meeting	# of HFs maintaining meeting records	# of HFs with HMIS data discussed during staff meetings	# of HFs with decisions made based on HMIS data
Bong	19	11 (70%)	17	17	12	10
Nimba	19		18	17	7	6
Lofa	19		19	19	12	10
Grand Bassa	19		19	18	13	13
<b>Weighted Average</b>	<b>76</b>		<b>96%</b>	<b>94%</b>	<b>59%</b>	<b>51%</b>

### Use of information at County Health Teams (CHTs)

The county level showed a better use of data than the facility level when making decisions. Bong, Nimba and Grand Bassa CHTs declared holding quarterly performance review meetings. Over the last one year, the CHTs conducted a minimum of two review meetings. However, no routine performance review meeting took place in Lofa CHT in the last one year. Review of the meeting records showed that HMIS management (data quality, report completeness and timeliness) and summary of HMIS data (progress on service delivery, disease data, drug availability and consumption etc) were presented and discussed in those performance review meetings.

Some of the decisions taken by the CHTs based on HMIS data include organizing orientation on HMIS recording and reporting forms for data producers and users, strengthening supportive supervision to low performing health facilities, revising health facility targets, creating opportunities for the good performing health facilities to share their best practices, etc.

## HMIS Processes

The health management information system processes are crucial in the production of quality data and use of information. The HMIS processes measures included the availability of data collection and processing manuals/procedures, whether directives are given on data quality check and transmission, presence of data analysis, display of data, and feedback mechanisms.

### Data collection, verification and transmission at health facilities

Presence of data quality checking process was measured by asking whether the facility manager received a directive from the CHT in the quarter preceding the survey to check the accuracy of data at least once. Likewise the average response on whether the facility manager received directives to submit complete monthly report by a declared deadline were used to calculate presence of data completeness and report transmission checking mechanisms. The survey showed that the CHTs have been sending out reminders to the health facilities to follow procedures in data quality assurance and transmission of data. Respondents mentioned that the directives were mostly communicated orally either during supervision or through the phone.

**Table 5: Staff perception of presence of data quality assurance mechanisms in health facilities**

HMIS Processes	Weighted Average	Decision Rule	# of HFs reported receiving directives on checking data quality (Sample size = 19 HFs per county)			
			Bong	Nimba	Lofa	Grand Bassa
Presence of data accuracy check	79%	13 (80%)	16	16	13	16
Presence of report completeness check	81%		15	16	15	16
Presence of report timeliness check	87%		15	19	16	14
Average data processing	83%					

### Data processing and analysis

At health facilities, the existence of data collection, analysis and information use manual or guideline was moderate. About 62% of health facilities had HMIS reference manual and 55% had information use guide. In general, limited data analysis is performed at health facility level. With 55% of health facilities having performance targets, only 21% analyze facility performance against targets (table 6). The overall score for data analysis was 33%. When compared by county, health facilities in Bong and Grand Bassa have met the 50% benchmark set by MOHSW for data analysis.

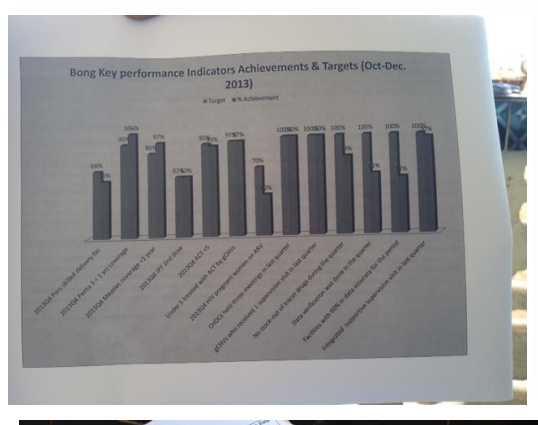
**Table 6: Analysis of data at health facilities**

Data Analysis	Weighted Average	Decision Rule	# of HFs conducting data analysis (Sample size = 19 HFs per county)			
			Bong	Nimba	Lofa	Grand Bassa
Presence of performance targets	55%	7 (50%)	17	10	7	10
Presence of performance monitoring plan	33%		11	6	3	7
<b>Type of data analysis performed</b>						
Calculate indicators	37%		8	5	6	12
Comparison against targets	21%		5	2	3	9
Comparison among services	38%		8	8	4	11
Comparison over time	39%		7	8	4	14
Conduct at least two types of data analysis	39%		8	8	5	11
Do not conduct data analysis	49%		8	10	12	4

At county level, Bong, Lofa and Nimba CHTs have copy of the national HMIS strategy and implementation plan, HMIS reference manual, and DHIS software user's guide. The HMIS reference manual provides indicator definition, data management procedures, and guide for information use.

All four CHTs were using DHIS2 and Excel application for analyzing data and producing summary tables and graphs for quarterly review meetings and annual reports. They were able to download data from the web interface into an Excel pivot table for further analysis. The CHTs

perform spatial comparison (between health facilities), benchmark comparisons (progress against targets), and trend analysis (monitoring over time).



### Feedback mechanism

Feedbacks on the monthly reports are expected to be provided to lower levels by the CHTs before the deadline for submitting the next report. About 49% of health facilities reported receiving any feedback on their performances from the county health teams. This limited flow of feedback was also confirmed by the CHTs where only Bong and Grand Bassa CHTs presented evidence of feedback being provided to the health facilities.

### Display of information

Data display was derived by observing whether the facility displayed updated information on maternal and child health services, facility utilization, disease surveillance, a map of the catchment area, and summary of demographic information.

Display of health service information was relatively poor and few of them were updated. Overall, 58% of the health facilities were displaying data, of them only 48% had updated data over the last three months period (Table 7). Maternal and child health information were more commonly displayed at health facilities. Demographic information such as population by target group was also displayed in most of the health facilities (89%)

At the CHTs majority displayed data on maternal and child health services and relatively few on disease surveillance and service utilization. Unlike the health facilities, demographic information

about target population were not displayed at the CHTs. Likewise, map of catchment area was only displayed in one CHT (Bong).

**Table 7: Display of data at health facilities**

Types of data displayed	Weighted Average	# of health facilities displaying data (Sample size = 19 HF's per county)				
		Target	Bong	Nimba	Lofa	Grand Bassa
Maternal health	52%	7 (50%)	15	6	9	13
Child health	68%		18	11	10	17
Disease surveillance	30%		8	1	4	17
Service utilization	25%		11	4	3	1
Display of demographic data	89%		19	15	17	18
A map of catchment area	65%		16	11	10	15

## Determinants of HMIS Performance

Most studies on assessing health information systems primarily focus on technical issues and fail to examine the determinants of HIS successes or failure in different settings. This chapter describes the technical, behavioral and organizational factors affecting HMIS performance in Liberia based on the experience in the four counties (Bong, Lofa, Nimba and Grand Bassa), using the PRISM Organizational and Behavioral Tool (OBAT), and Management Assessment Tool (MAT).

Behavioral factors were measured in terms of knowledge of checking data quality, knowledge of HMIS rationale, problem solving skills, competence in HMIS tasks, confidence levels for HMIS tasks, and motivation. Organizational factors were measured in terms of promotion of culture of information based on the following indicators: emphasis on data quality, use of information, evidence based decision making, feedback from staff and community, sense of responsibility, empowerment and accountability, promoting problem-solving and perceived reward from the department of health.



In addition, management indicators were also measured using the MAT which was completed by interviewing CHTs from the four counties. The indicators measured include RHIS governance, planning, training, availability of finance, and support for supervision.



## Technical Determinants

The PRISM assessment measures technical issues that can affect HMIS performance including: existence of integrated health information system; user friendliness of data collection forms, procedures and electronic database software; DHIS-2 capability to provide comprehensive picture of health system performance; and use of information technology to create access to information for senior managers.

The MOHSW has established common and core health indicators, standardized and integrated data collection and reporting tools. It was observed that standard registers developed by central MOHSW were used at health facilities except in few cases where staff had developed customized registers to incorporate more data. Overall, 21-24 registers were used to record patient data at a health facility (Table 8). Leprosy register was not included in this list because none of the surveyed health facilities were providing leprosy services. Also general inpatient, maternity inpatient and delivery, and community registers were not widely used by the health facilities. Majority of the respondents felt that the registrations were easy to fill and relatively few mentioned not enough space provided in the registration books.

**Table 8: Number of Registers at a Health Facility (24)**

Type of information (# of registers)	Type of registers
<b>General</b> (3)	Facility based “Master register” OPD register General inpatient register
<b>Malaria</b> (1)	RDT register
<b>Child Health</b> (3)	iMCI and Under 5 OPD register Immunization register TT register
<b>Maternal Health</b> (5)	Antenatal register Delivery register Maternity inpatient and delivery register* Postnatal register Family planning (temporary) register
<b>HIV/AIDS</b> (3)	PMTCT register HIV exposed infant register HCT register
<b>TB</b> (2)	TB treatment card TB treatment register
<b>Logistics / Pharmaceuticals</b> (4)	Vaccine stock register Stock ledger Daily consumption register Daily tally register Internal requisition form
<b>Others</b> (2)	Community health register

In addition, the MOHSW has prepared guidelines for data transmission between health system levels while adapting the district health information system (DHIS2) application for integrated data capture. The CHTs felt that the DHIS2 software was a good platform integrating the data issues of various programs. MOHSW provided to all users (national program managers and county health offices) with login passwords to grant access to the online output functionality of the DHIS2. This provided the end users on demand access to all data input into the system in order to produce the needed information. However, there is no integrated data repository (warehouse) that interlinks the various data sources, such as HMIS, logistics management system (LMIS), and integrated human resource information system (iHRIS), and finance.

While more than half of respondents appreciated the user friendliness of HMIS forms and tally sheets, existence of parallel reports are still persistent. Nutrition, iCCM, NTDs, mental health, vaccine accountability, and community health information are reported separately by the health facilities to the program focal persons at the CHTs. Some of these reportable data like iCCM, nutrition and mental health are already included in the integrated HMIS report which results duplication and burden of data on the health workers.

### **Behavioral Determinants**

Behavioral factors are important determinants of the routine health information systems because it influences the quality of the information generated by the system. These factors are categorized into two groups - perception and actual skills. Perceptions are measured in terms of level of knowledge of HMIS rationale, knowledge of checking data quality, confidence level for HMIS tasks, and Motivation; while actual skills were measured in terms of problem solving skills, and competence in HMIS tasks which include calculating indicators, plotting data, interpreting data and using data for management.

Figure 3 presents the health facility level overall average scores for each behavioral factor and by county. The overall levels of confidence (68%) among respondents were not commensurate with the overall levels of competence (22%); and the average levels of knowledge of HMIS rationale and knowledge of checking data quality were 43% and 33% respectively. Motivation and confidence levels were high across all respondents at 66% and 68% respectively.

Respondents in Bong County seem to have better knowledge in checking data quality (44%), perform better in problem solving skills (33%), better skill in performing HMIS tasks (31%), and are more confident in performing HMIS tasks (75%) compared to respondents in the other three counties. In Lofa, though there is better understanding of the rationale for HMIS, the health facility staff skills to perform HMIS tasks and use information for problem solving is limited. Since there is not much difference between the counties, the rest of the analyses are reported in aggregated format.

**Figure 3: Behavioral factors at health facility level (N=254)**

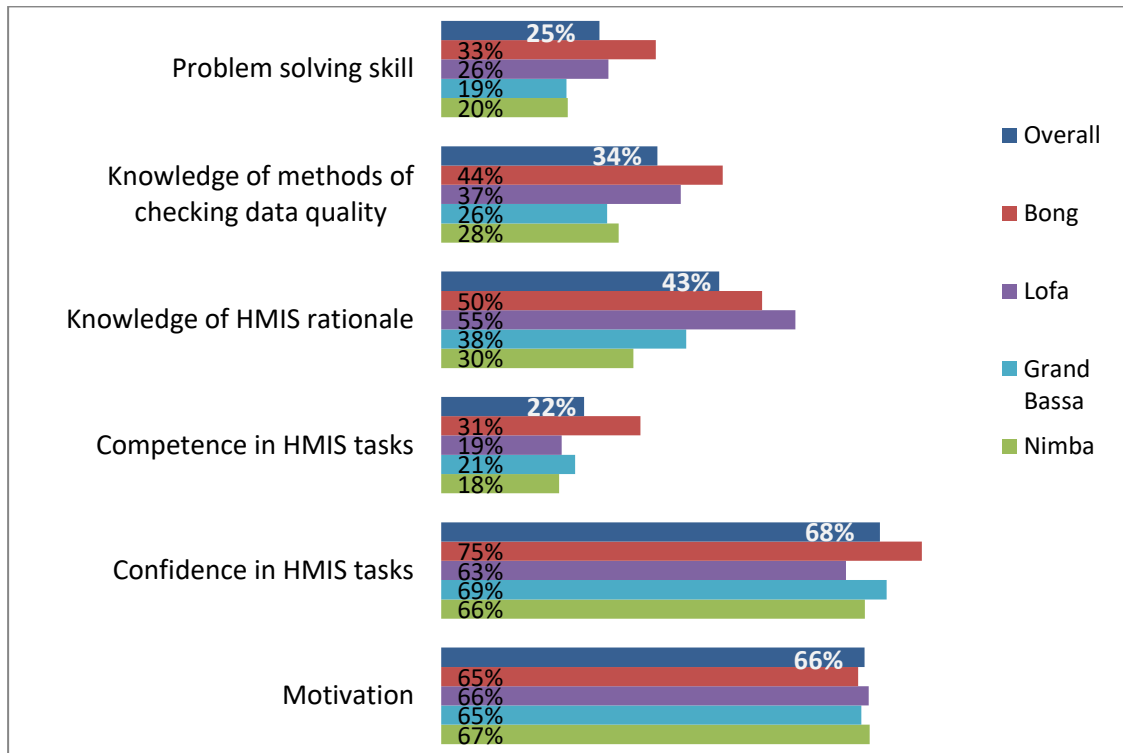
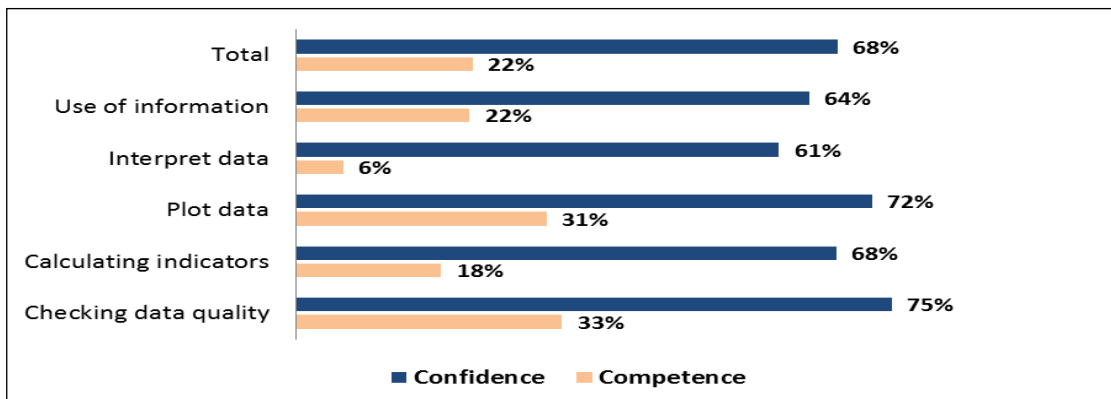


Figure 4 show elements assessed for measuring health facility staff HMIS tasks confidence and competence levels. 61% of respondents reported they can interpret findings but the assessment indicates that only 6% could do so. In addition, 64% reported that they can use information to identify actions but the competency assessment found that only 22% could actually do so.

**Figure 4: Overall Confidence and Competence levels for HMIS tasks in health facilities (N=254)**



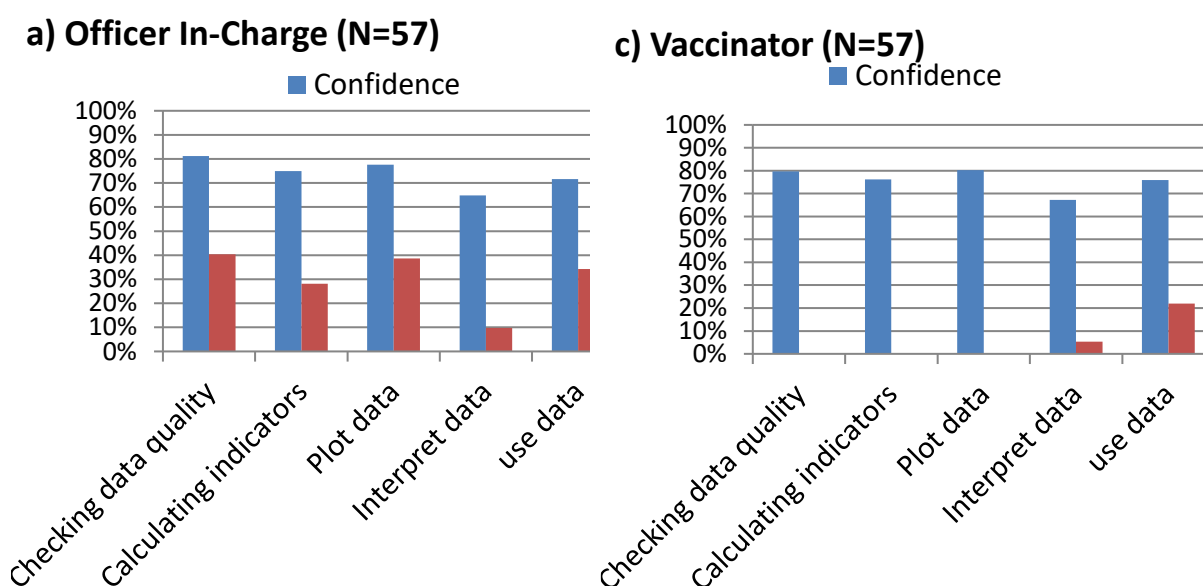
Health facility respondents from Bong County seem to perform better in plotting data (51%) and use of information (31%) compared to those in Nimba, Lofa and Grand Bassa (Table 9).

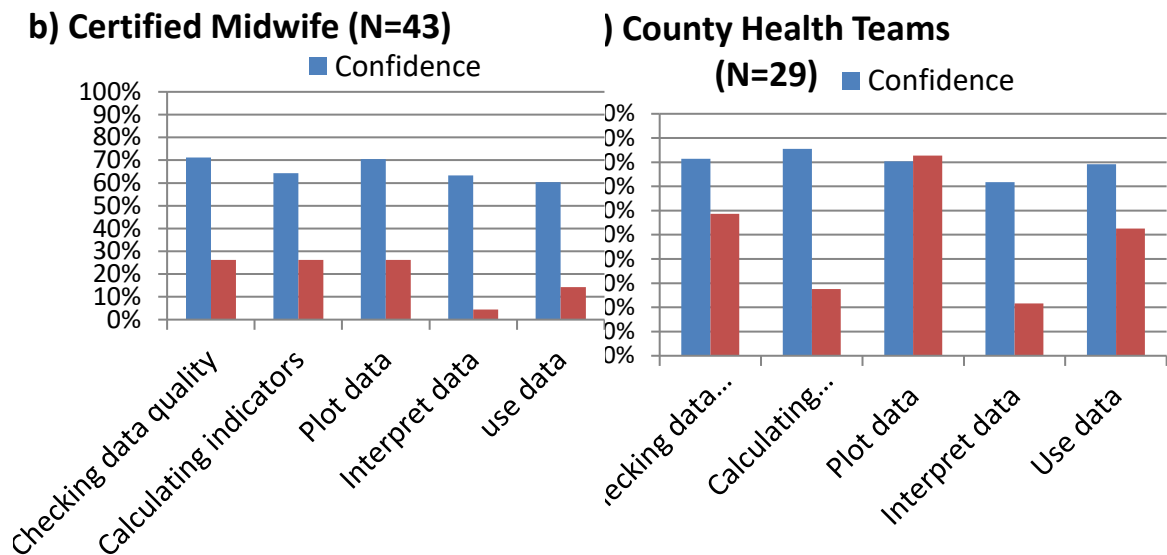
**Table 9: Health facility staff skill level to perform HIS task (N=254)**

	Overall	Bong	Nimba	Lofa	Grand Bassa
Calculating indicators	18%	20%	15%	17%	20%
Plot data	31%	51%	25%	18%	32%
Interpret data	6%	9%	6%	2%	7%
use of information	22%	31%	19%	18%	19%
<b>Overall competence in HMIS task</b>	<b>22%</b>	<b>31%</b>	<b>18%</b>	<b>19%</b>	<b>21%</b>

When the average scores for each behavioral factors were assessed by job category (Figure 5), the Officer In-charges (OICs) have a better knowledge in checking data quality (40%), plotting data and more ability to use data for problem solving (34%) compared to others at health facility level. Both OICs and CMs however had lower scores in interpretation and analysis of data (10% and 4%). Higher numbers of CHT staffs were able to plot the given data, 83%. The CHT respondents however had lower scores in, calculating indicator and interpretation of data. These are the skills that are necessary to process data, use information and take action.

**Figure 5: Health Workers' skill level to perform HMIS tasks by job category**





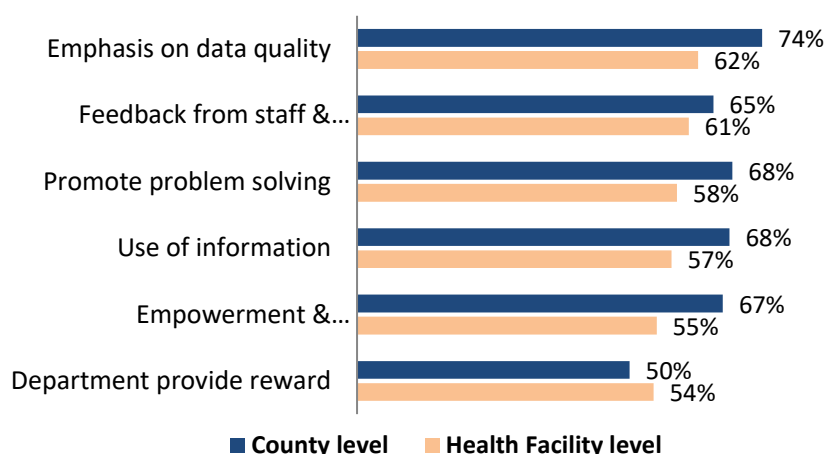
### Organizational Determinants

The PRISM framework postulates that HMIS performance is affected directly or indirectly by organizational factors such as organizational structures, resources, procedures, support services, and culture to develop, manage and improve HMIS processes and performance. These factors were measured in terms of the promotion of culture of information using values that relate to organizational processes emphasizing on data quality, use of information, evidence based decision making, feedback from staff and community, sense of responsibility, empowerment and accountability, promoting problem-solving and perceived reward from the department of health. In addition, management functions at the county health offices were also measured.

### Promotion of culture of information

The promotion of culture of information has been defined as “the capacity and control to promote values and beliefs among members of an organization for collection, analysis and use of information to accomplish its goals and missions”<sup>4</sup> Figure 6 show health worker’s perception of the MOHSW promoting a culture of information is high in the CHTs (65%) compared to health facilities (58%). The health workers in the CHTs as well as the health facilities thought that the MOHSW put emphasis on data quality, problem solving, use of information, and provision of feedback from staff and community. However, only half of them felt that the organization rewards good performance.

**Figure 6: Perceived culture of information at health facility (N=254) and county health office levels (N=29)**



### HMIS management functions at county level

Management functions as defined by Aqil et al. (2010)<sup>1</sup> is “the presence of mechanisms for effectively managing HMIS function and resources for better performance”. The indicators assessed to measure HMIS management functions include HMIS governance, planning, training, availability of finance, and supervision. Table 10 shows items taken into account in the evaluation of the HMIS management at the CHTs.

Table 10: HMIS Management Functions	
<b>Governance</b>	Presence of CHT organizational chart showing HMIS related functions and staffing and documentation of HMIS supplies and reports distribution.
<b>Planning</b>	Presence of HMIS situation analysis report, national HMIS strategic plan document, CHT HMIS/M&E 2 years plan and HMIS performance targets.
<b>Quality standards</b>	Presence of documents on the HMIS standards and performance improvement tools
<b>Training</b>	Existence of HMIS training manual and training schedule at the CHT.
<b>Supervision</b>	Availability of HMIS supervisory checklist, schedule for supervisory visit, and supervisory reports.
<b>Finance</b>	Presence of budget for HMIS supplies, HMIS supervision and long term financial plan to support HMIS activities.

Overall scoring for HMIS management functions criteria is high in Lofa and Bong CHTs and it is moderate in Nimba and Grand Bassa. In 2010, the MOHSW has developed and disseminated national HMIS strategic policy to guide the implementation of the integrated HMIS throughout the country. During the assessment the national planning document was present in all CHTs except Nimba. However, only Lofa and Bong CHTs have documented evidence of further developing county level two-year HMIS/M&E implementation plan and targets. HMIS operating standards like indicator definition and DHIS software user guide are also available in the three CHTs except in Grand Bassa.

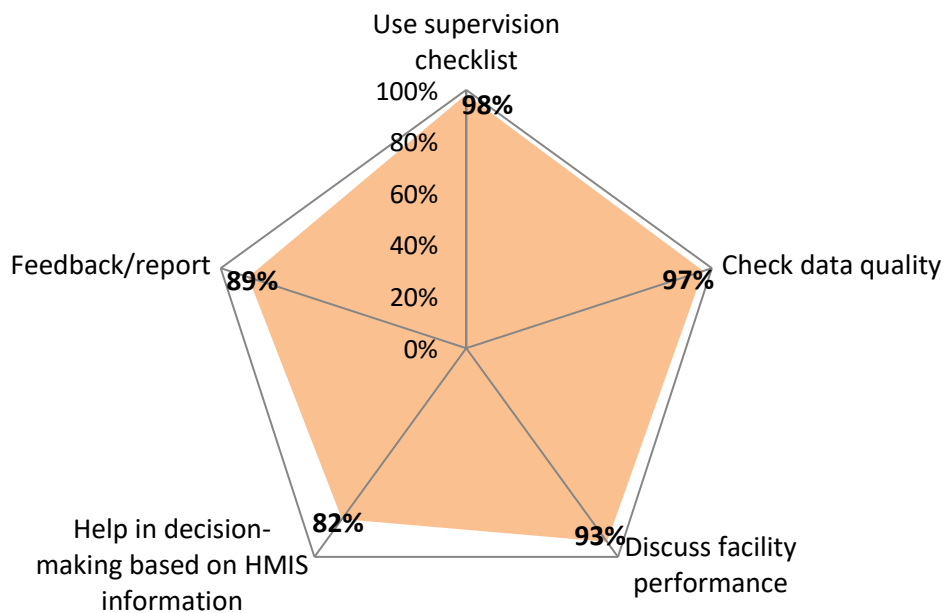
Related to Governance the study showed that except for Lofa all the CHTs have management organizational chart that reflects HMIS related functions. Also documentation for distribution of HMIS reports was found in all the CHTs. Whereas, criteria for HMIS finance are scored low across the board with only Lofa and Bong CHTs indicating presence of long term (more than one year) financial plan to carry out HMIS activities and budget for HMIS supplies (like registers and forms).

### HMIS Supervision

The assessment showed that 94% of health facilities received at least one supervision visit in the first quarter of 2014. Of these, 63% health facilities were visited more than three times by supervisors from district and higher levels. The quality of the supervision was reported good with 97% of the health facilities claim supervisors performed data quality check and 82% felt that supervisors assisted to make decision based on data from HMIS.

All four assessed county health teams (CHTs) indicated provision of written supervisory feedback to the health facilities. This is also backed by 89% of the health facilities that received supervision visit in the first quarter of 2014.

**Figure 7: Quality of supervision at health facilities (N=76)**



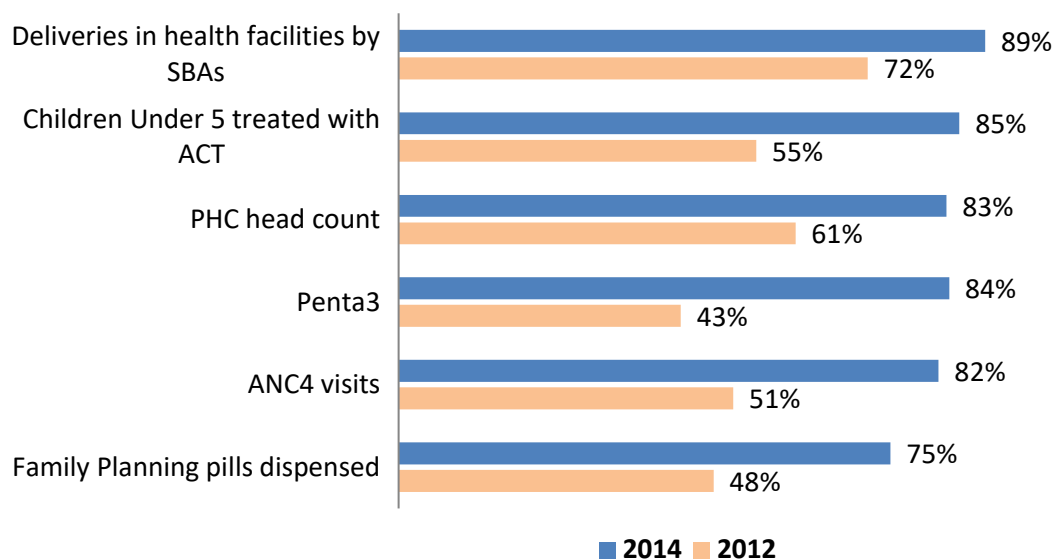
## Results: Comparison between 2012 and 2014

### HMIS Performance

The performance of HMIS in Liberia has improved both at health facility and county health team (CHT) levels over time. Data quality and the use of information were measured through review of existing records and reports.

**Data quality:** Figure 8 compares the data accuracy level of key service delivery indicators in health facilities between 2012 and 2014. The results show that the overall accuracy of data for these selected health service indicators improved substantially (from 55% to 83%) over time.

**Figure 8: Comparison of data accuracy at health facilities by selected services, 2012 and 2014**



A CHT is classified as having timely data if at least 75 percent of facilities under their authority submitted the monthly report on time, and as having complete report if at least 80 percent of facilities under their authority submitted the monthly report for a pre-specified month. The results indicate that the percent of facilities submitting timely data increased (from 74% in 2012 to 88% in 2014) and all four surveyed CHTs scored above the 75% benchmark. The report turnout has also increased from 91% of the facilities reporting in 2012 to 98% in 2014.

Good data quality is also influenced by the degree to which the health workers complete the reported data as per the guideline. Substantial Improvement was also observed in the coverage of reported data. A CHT is considered as having complete data if 70% of surveyed health facilities in the catchment area submitted report with at least 90% of data items filled. The number of CHTs that has met this data completeness criterion increased from one to three (Bong, Lofa and Grand Bassa).

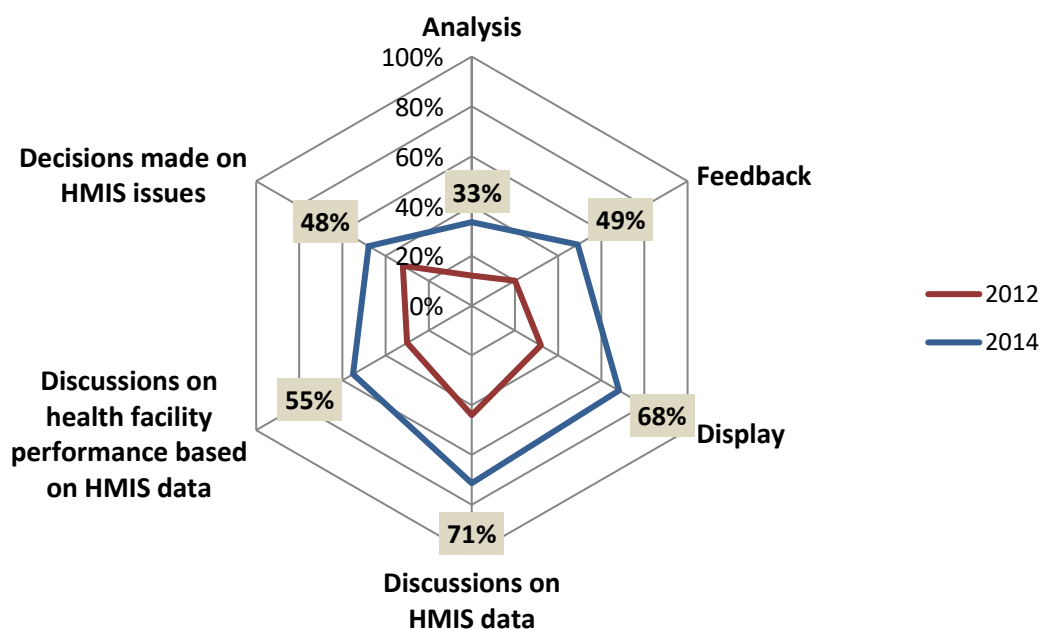
**Progress in information use:** In 2014, the overall score of HMIS information use for performance review and decision making at the health facilities has reached 55% from 38% in 2012. This finding is consistent with the improvements in percentage of health facilities with monthly, quarterly, and/or annual performance targets (31% vs. 55%), which shows health facilities understanding of the link between use of data and health service performance improvement. As a key part of data use, the analysis and dissemination of health information is vital to show the performance of health information. The assessment shows only 39% of health facilities can conduct at least two types of data analysis. Nevertheless, this is an improvement from two years ago when only 15% performed



two types of data analysis. Figure 9 presents the observed improvements in overall score of analysis, display, feedback and use of data at health facilities.

The 2012 PRISM assessment had shown that necessary skills on data analysis were lacking at the county level and use of information was therefore not practiced. By comparison, the 2014 PRISM assessment shows better use of HMIS data for performance monitoring and decision-making at CHTs especially in Bong, Nimba and Grand Bassa counties.

**Figure 9: Comparison use of information at health facilities, 2012 and 2014**



## Technical Factors

The technical factors which assessed the overall appreciation of the system were rated high by the health workers. More health workers found the recording and reporting forms simple and user friendly. Respondents from the CHTs felt that DHIS2 is a good platform of integrated information. It provides a comprehensive picture of performance of health systems despite absence of data warehouse/repository for capturing the other information systems (iHRIS, LMIS etc). However, more health workers reported the existence of program specific parallel reporting pertinent to nutrition, iCCM, NTDs, and vaccine accountability. Since the community health information system is under construction the data coming from gCHVs are also reported separately to the community health focal persons at all levels.

## Behavioral Factors

Qualified and competent personnel are necessary to make the HMIS operate efficiently. In health facilities as well as CHTs, the scores of knowledge, skills, self-confidence and even motivation for

carrying out the HMIS tasks were higher in 2014 than those of 2012 (Table 11). Substantial improvements were shown in health worker's capacity to identify and solve problems based on data at health facility and CHT levels. At health facilities, health workers' understanding of the rationale for including diseases, immunization and population data in the information systems has increased (28% vs. 43%). While, a slight increase observed in the level of CHTs' staff knowledge of the rationale for collecting these data.

**Table 11: Level of confidence and competence to perform HMIS tasks**

Indicators	Health Facility Level		CHT Level	
	2012	2014	2012	2014
Knowledge of HMIS rationale	28%	43%	54%	59%
Knowledge of data quality checking methods	10%	33%	29%	59%
Problem solving skills	8%	24%	27%	61%
Skills in performing HMIS tasks	9%	22%	45%	49%
Self-confidence in performing HMIS tasks	51%	68%	71%	80%
Motivation for carrying out HMIS tasks	62%	66%	60%	65%

## Organizational Factors

The PRISM assessment further looked at the presence of mechanisms for managing HMIS functions and resources in the four county health teams (CHTs). MoHSW made HMIS and M&E units functional by recruiting and training staff both at central and county level. At the CHTs, all four counties have the necessary staffing level to perform the HMIS tasks including M&E Officer, Data Manager and Registrar. Enormous work in the past two year has gone into building individual staff capacity on HMIS and M&E both at HMER division of MOHSW and the county level. M&E staffs from 15 counties were trained in using DHIS 2, for data entry, transmission, and to perform data verification, data analysis, and prepare graphs highlighting performance and trends in key indicators. The follow-up of the training was ensured on-site in the three project intervention counties (Bong, Lofa and Nimba) by the RBHS M&E Officers assigned to each county, enabling county health teams (CHTs) to get on the spot assistance with data entry, verification and use.

The CHTs are mandated to further cascade the training of HMIS instruments, data quality assurance and information use to the health facilities. All except Bong CHT have training plan or schedule to build capacities of the staff to effectively perform HMIS tasks. At the moment only Lofa CHT has a manual to guide the HMIS trainings.

Other aspect of HMIS management is use of HMIS in the regular monitoring of annual health plans. Subsequent to the development of the national HMIS/M&E 2 years plan, the CHTs were expected to develop a two year monitoring operational plan and performance targets. During the baseline

PRISM assessment, Nimba and Grand Bassa CHTs completed the development of their M&E plan. However, in the 2014 assessment documentation of the county level 2 year M&E plan were present in Lofa and Grand Bassa. Despite absence of monitoring plans, all the four CHTs have performance targets to measure progress.

The CHTs' supportive supervision is the other HMIS management functions where a marked improvements seen both in quantity and quality. All four CHTs are providing frequent supervision to the health facilities using supervisory checklist. The overall supervision quality score at health facilities has reached 73%. Supportive supervision schedule is put in place at the CHTs; supervisors emphasized on data quality, use HMIS data for performance monitoring and are also providing written supervision feedback to the health facilities (Figure 10).

**Figure 10: Comparison of quality of supervision at health facilities, 2012 and 2014**

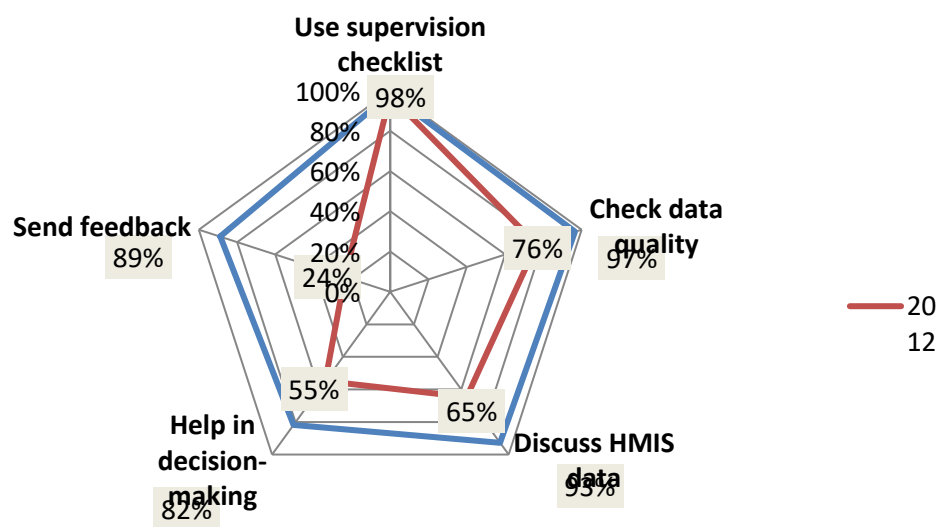


Figure 11 shows the efforts to promote an information culture in order to produce and use quality information for decision-making were better received by the health workers in 2014 than 2012 at the level of health facility. For instance, a 10% increase reported on staff's perception of their management giving emphasis to data quality and use of information. Similar trend of increased perception of the organization promoting culture of information also observed among CHTs' staff. These findings are consistent with the observed improvements in the quality of the data at health facility level and the slight increment in the use of information for problem solving and decision making at all levels.

**Figure 11: Comparison of promotion of information culture at health facilities, 2012 and 2014**



## Discussions

For consistent information use to occur, data need to be of high quality so that data users are confident the data they are consulting are accurate, complete, and timely. Without quality data, demand for data drops, evidence based decision -making does not occur, and program efficiency and effectiveness will suffer. The PRISM assessment revealed that all data quality indicators increased and reached above 80% within the two-year intervention period. All four surveyed counties have met the data quality targets set by the MOHSW except Nimba in the case of reported data completeness.

To improve data quality in Liberia, efforts were made to set up data quality assurance mechanisms such as desk review of data by CHTs, data quality assessments in health facilities and organizing routine data review meetings at county levels. In addition, the implementation of the performance based financing (PBF) provides the HMIS/M&E system the added opportunity to work toward improving and ensuring data quality. The positive spin-off of the data verification conducted as part of the PBF is that health workers are paying more attention to the records and are taking steps to improve accuracy and completeness. These interventions succeeded in improving quality of data at health facilities, as measured by the data accuracy, completeness and report timeliness.

The use of information at the level of health facilities has also shown improvement in 2014 compared to 2012 (38% vs. 55%). The HMIS processes are also crucial in the production of quality data and use of information. The assessment revealed some HMIS processes, such as mechanisms for data quality checks and data transmission, are in place at the facility and CHT levels. For facility managers to effectively utilize data for daily planning and management of primary health care delivery, data generated from the facilities must be processed into a usable format, through analyzing and making meaningful sense of the data. Despite the observed improvements in HMIS process, there still seems to be an issue with the process for data analysis and feedback. The assessment has shown that data analysis is not encouraged at health facility level especially in Nimba and Lofa counties. This finding is consistent with the observed limited competence in data analysis, interpretation and problem solving at health facility level, which also hinders use of information.

The display of information is another important tool in the management of the health information systems which signifies the use of information in monitoring performance through visual presentation of data, strengthening transparency and others. It is influenced by data analysis, availability of tools (charts, computer, printers, etc) and skills that may facilitate both the processing and display of data. The overall score of display of information has increased both at lower level of the organization and at CHTs. Maternal and child health information are more widely displayed both at facility level and CHTs. Despite the observed improvements, of those facilities that displayed the data, less than half were showing figures updated by the past three months, indicating that limited continuous use of data to monitor their progress.

The picture is a little different at the CHTs where staffs have developed capacity to use DHIS2 for data entry, analysis and producing various reports. The 2012 PRISM assessment documented that the county HMIS and M&E team lacked adequate skill to use DHIS2 software beyond the data entry. In the last two years, in order to improve the skill of central HMIS unit and the county teams,

MOHSW in collaboration with RBHS has provided numerous trainings on using Pivot tables in managing DHIS data. The training included how to export DHIS2 data into Excel spreadsheets to prepare program-specific summary tables and analyze service delivery performance against target and monitor progress overtime (performing trend analysis). The 2014 PRISM assessment showed that use of information at the CHT level meetings (except in Lofa) was higher than found at the facility level, indicating that more information use for decision making occurs at the county level. The PRISM assessment also found evidence of data analysis taking place in the CHTs from written documents such as quarterly review reports, monthly desk reviews and displays. What is interesting to note is that only 22% of CHTs staff were able to demonstrate data interpretation skill, indicating that data analysis are performed by few, mainly M&E Officers and Data Managers at the CHTs.

The culture of feedback is also necessary to support decision making at all levels of the health system and to promote data quality. Even though the feedback mechanism was found to be inadequate at all levels (49%), there has been remarkable progress in the last two years from 20% in 2011. Most of the information flows are still flowing in an upward direction with little feedback to the care providers and support them in solving the problems identified. Cross program data sharing is also limited between specific programs/information systems which contribute to ongoing fragmentation of the health system. Program/disease specific parallel reporting is still persisting at all levels of the system.

Demand for data and actual use of data for decision making among managers at both facility and county level relies heavily on their understanding of the importance of HMIS data. In the 2014 PRISM assessment, respondents from health facility and CHTs have shown relatively better knowledge of rationale for collecting diseases, immunization and population data. Nevertheless, the observed knowledge of HMIS and its use are still low particularly among health facility staff. Problem identification and solving are other skills that are necessary to use information and take action. MOHSW in collaboration with RBHS have provided training for CHT staff focused on data analysis, using indicators, developing M&E plans, problem identification and problem solving. These workshops responded to an urgent need of CHTs for methodological support to their day to day decision making processes, in providing them with systematic knowledge and skills to problem solving. This PRISM assessment highlighted improved staff ability for problem identification, problem solving and use of information at the CHTs. Ninety seven percent of the CHTs staff that participated in the self-assessment were able to demonstrate problem identification skills of which 61% showed capacity for solving problem using HMIS data. But this improvement is not adequate at the health facility level, as only 44% of the health workers were able to identify problems using data and 20% demonstrated problem solving skills.

Qualified and competent personnel are necessary to make the HMIS operate efficiently. The PRISM assessment did not bring to light any major problems in terms of availability of human resources, but rather in terms of training. The skills required for tasks, such as the calculation, the production of the data, the interpretation and use of the information are essential for a better performance of the HMIS. If the outcome of the training were to be seen only through the skills observed during the written exercises, there is no question that more needs to be done at health facility level. The skills were particularly poor in terms of the calculating indicators, data interpretation, use, problem identification and solving, as well as in terms of awareness of the rationale of the HMIS.

Generally speaking the Liberia HMIS performance has shown improvement in different aspects of technical, organizational and behavioural measurements over time. The 2014 assessment revealed that the system has come a long way from the very low performance levels observed during the baseline assessment. The increased knowledge about importance of HMIS for performance monitoring is encouraging as a starting point for demand and use of quality data. The recorded upward progresses, however, are not sufficient especially in data analysis, feedback, problem solving and evidence based decision-making at the point of data production (health facility level). These aspects should be the points of focus during future trainings and supervisions.

## Conclusion

The performance of the Liberia HMIS in terms of data quality was good. However, in terms of information use for decision-making there is still room for improvement, especially at health facility level.

In regard to the HMIS process, it can be said that the collection and transmission of data were proceeding very well, with data quality verification carried out systematically during desk reviews and quarterly supervisions. However, weakness persisted in the processing, analysis and display of updated data, as well as in providing regular feedback to the lower levels.

In terms of technical determinants, the health workers and managers felt that the HMIS gave them a good understanding of the health system performance, and that DHIS2 was a good platform of integration of information. Existence of program specific parallel reporting systems and lack of internet connectivity for information sharing were highlighted.

With regard to behavioral determinants, health workers appear to be reasonably motivated and feel confident about HMIS tasks, but lack skills and knowledge about HMIS and its use. The assessment revealed a considerable deficiency in respondents' competence to use and interpret information.

At the level of the organizational determinants, lack of M&E operation plan and financial documentation and training manuals pertaining to HMIS, as well as training and supervision schedules were noted at the CHTs. Health facility staff highly appreciated the frequency and quality supervision provided by the higher levels. Evidence of written supervision feedbacks were also observed during the assessment. At the CHTs there trained personnel in charge of the HMIS/M&E were observed, which was not the case at the level the health facilities.

Compared to the PRISM assessment of 2012, the HMIS has shown improvement in data quality and information use, as well as in various aspects of technical, behavioral and organizational measurements of HMIS performance.



## Recommendations

- Ensure that aggregated data are assessed for accuracy and completeness prior to transfer and timely transmission.
- Establish standardized feedback mechanism between levels - Provide feedback systematically to all reporting units on the quality of their reporting (i.e., accuracy, completeness and timeliness) and use of data for decision-making based on their submitted report.
- Develop standard data management and information use training material
- Widely disseminate (to the health facilities) the national HMIS Reference Manual developed in 2010 for data management.
- Strengthen CHTs' capacities to do data validation and analysis and use information for planning, health services management and supporting system strengthening.
- Conduct targeted training for health facility staff on data analysis, problem solving and continues use of information.
- Regular publication of a newsletter to show success stories of where information was used to improve health facility performance.
- Institutionalize regular monthly review meetings to monitor health facilities' and CHT's performance against objectives using HMIS data. Make the performance review meetings more regular at CHTs level.
- Better integration of various data sources via the establishment of an integrated data warehouse.
- Develop mechanism to integrate data need by different programs to accommodate new interventions - ensure HMIS data are used to generate reports for vertical programs (iCCM, nutrition, disease specific reporting, etc). Revise the HMIS indicator set by integrating some program related indicators to avoid parallel reporting.

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<sup>1</sup> MOHSW, 2011. *National Health and Social Welfare Policy and Plan 2011-2021*.

<sup>2</sup> Liberia Institute of Statistics and Geo-Information Services (LISGIS), Ministry of Health and Social Welfare, National AIDS Control Program, and ICF International. 2014. *Liberia demographic and health survey 2013*, Monrovia, Liberia.

<sup>3</sup> MOHSW, 2013. *Annual review report, National Health and Social Welfare Plan Implementation*. Monrovia, Liberia

<sup>4</sup> Aqil A, Avila JE, Mejia LSP, Plaza B, Wilson N, Martinez JA, Lippeveld T, 2010. *Guanajuato RHIS assessment*. RHINO/Measure Evaluation/SALUD/GTO/USAID.



UiO : University of Oslo

