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THE RWANDAN HEALTH MANAGEMENT INFORMATION SYSTEM:

Launched in 2009, the Integrated Health Systems Strengthening Project (IHSSP) expanded on work initiated by the HIV Performance-Based Financing project (2005 – 2009), also funded by the US Agency for International Development (USAID) and implemented by Management Sciences for Health (MSH). IHSSP's goal was to improve the health of all Rwandans through better access to quality health services. In its five years of implementation, IHSSP improved Rwanda's information management, health financing, human resources for health, and quality of health services, and helped decentralize the country's health services and management.

Improving Collection and Management of Health Service Data to Support Informed Decision Making

Defining the Need for Effective Data Management

Since the Declaration of Alma Ata in 1978, the World Health Organization (WHO) and its member states have worked to bridge the divide between knowledge and action in health services around the world. The global community has seen remarkable progress in some health indicators over the past 35 years—maternal and child mortality have decreased by more than half and life expectancy has increased in almost every country. But a gap remains between the health of citizens in low-resource environments and those in wealthier nations.

In April 2008, the WHO convened the second International Conference of Primary Health Care and Health Systems in Africa in Ouagadougou, Burkina Faso to examine the progress African health systems had made since the Alma Ata conference and discuss strategies for further improving global health. One of the

key recommendations put forth from the conference was to improve the systems used to gather, store, and analyze data about the health of populations. Without accurate, timely, and complete information about the delivery of health services and health indicators in a country, governments cannot properly plan for health system improvements, nor adapt to changes. Subsequently, African ministers of health agreed on a framework at the Ministerial Conference on Research for Health in the African Region in Algiers, Algeria, to guide the improvement of their health information management systems. Some of the specific recommendations included:

- Identify and integrate all existing sources of reliable information, including information from the private sector
- Improve access to existing global health information, evidence and knowledge
- Develop/strengthen web-based applications and databases
- Strengthen the management of databases, information, evidence and knowledge, particularly at district levels
- Enhance the use and reapplication of information, evidence and experiential knowledge
- Critically evaluate available technologies to identify those that meet local demands and ensure interoperability between various systems[1]

In this vein, the Rwandan Ministry of Health partnered with the Integrated Health Systems Strengthening Project (IHSSP) to strengthen and coordinate its health information system. In 2009, when IHSSP was launched, the ministry had multiple systems to gather data from the country's health services, but the systems used to aggregate and analyze the information were weak and were not interoperable.

As more facilities analyze their data and act on the findings—making changes that could have a profound impact on the health of their communities—the culture of data use will continue to grow.

1. World Health Organization Regional Office for Africa. *Framework for the Implementation of the Algiers Declaration on Research for Health in the African Region* June 15, 2009

Photo by PHILBERT RUGUMIRE

For example, the software used to house most of the data gathered from health facilities was not web-based. To aggregate data, each of the country's 450 health centers entered their information in local databases and sent a flash drive to one of the 40 district hospitals each month. The hospitals imported the health center data and used the same system to send district data to the central level.

Other systems existed to gather data on the country's 45,000 community health workers, HIV services, human resources, and other special programs—these data streams were separate and though the systems were web-based, none of the databases could interact. The Rwandan health system was collecting immense amounts of data, and spending considerable time and money doing so, but it was unable to effectively use that information for strategic planning or immediate action.

## The Rwandan Health Management Information System

The first step in improving the health sector's ability to use its information was to simplify the data collection process. IHSSP helped the ministry pare down the list of indicators requested from facilities, focusing on the most useful data points. The resulting Rwandan Minimum Indicator Set includes just 150 indicators and reduced the length of reporting forms from 26 pages to 12 for health centers and from 46 pages to 12 for district hospitals. By simplifying and standardizing the reporting indicators, IHSSP helped the ministry reduce facilities' reporting burden while still collecting the information necessary for analysis of service delivery, planning, and program monitoring.

But the country also needed a better system for entering, storing, and aggregating data and a user-friendly way for all health facilities to view and analyze their information onsite, in real time. To do this, IHSSP collaborated with the Ministry of Health to build the Rwandan Health Management Information System (R-HMIS) and rolled it out nationally in 2012. Using DHIS 2, a web-based software platform that is both free and customizable, the R-HMIS allows health centers to enter their information directly into the national database, and also, with the click of a mouse, view charts and graphs showing trends in their data over time. By simplifying and automating monthly reporting of service data, completeness of reporting increased from a national average of 88 percent in 2008 to 95 percent in 2012.[2]

But data are useless sitting idle in a computer system. To foster a culture of data use and informed decision-making, IHSSP trained data managers at all levels, not just on the mechanics of the R-HMIS but on how to use the system to analyze data and identify performance problems and possible interventions. Through group discussion of data trends, data managers saw how they could learn from their data and what actions their facilities could take to improve health services and outcomes.

Now each facility, from the smallest health centers through the district hospitals, analyzes its data monthly using the DHIS 2 dashboard and reports this information to the next level. As this is a relatively new system and behavior change is a slow process, the amount of narrative analysis varies greatly at the lower levels of the system; however, the practice is trending upward. As more facilities analyze their data
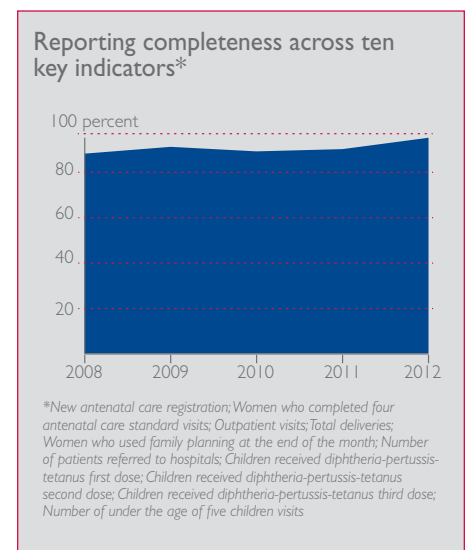
2. Marie Paul Nisingizwe, Hari Iyer, Modeste Gashayija, Lisa Hirschhorn, Cheryl Amoroso, Randy Wilson, Eric Rubyutsa, Eric Gaju, Paulin Basinga, Bethany Hedt Gauthier. *Data quality assessment to track changes and improve the quality of the Rwanda Health Management Information System* (HMIS) 4th Young African Statistician Conference. Pretoria, South Africa 9–11 July 2014

By simplifying and automating monthly reporting of service data, completeness of reporting increased from a national average of 88 percent in 2008 to 95 percent in 2012.

Reporting completeness across ten key indicators*

*New antenatal care registration; Women who completed four antenatal care standard visits; Outpatient visits; Total deliveries; Women who used family planning at the end of the month; Number of patients referred to hospitals; Children received diphtheria-pertussis-tetanus first dose; Children received diphtheria-pertussis-tetanus second dose; Children received diphtheria-pertussis-tetanus third dose; Number of under the age of five children visits

DATA ANALYSIS IMPROVES HEALTH CARE AT MAYANGE HEALTH CENTER

"We didn't have deep information. We had ideas about our situation [regarding the services they provide], but we weren't sure. But now," he said, "we have proof."

When Emmanuel Dushimana began work as Mayange Health Center's data manager in 2012, health center staff collected and sent their health service data to the district hospital, but never looked at it themselves. "We didn't have deep information. We had ideas about our situation [regarding the services they provide], but we weren't sure. But now," he said, "we have proof."

Soon after Emmanuel arrived at Mayange, the R-HMIS was introduced nationwide. IHSSP trained Emmanuel not just on how to use the system, but on the value of analyzing the data and how that analysis can drive the health center's performance.

Each month, Emmanuel creates a report using the R-HMIS that shows trends in the facility's service delivery. Mayange's Quality Assurance Committee uses this report to track progress and take corrective action as needed. For instance, in January and February of 2013, Emmanuel noted that several local women had given birth in their homes rather than at the health center. Emmanuel brought this to the attention of the head of the health center and the quality assurance committee, who worked with local leaders to reinforce messages on the importance of delivering at the health facility. Since March 2013, the number of women birthing at home in the facility's catchment area has been close to zero.

Similarly, in May and June of 2013, Emmanuel noticed a huge spike in malaria cases—more than would be expected from seasonal fluctuations—despite the fact that there was an active national campaign distributing bed nets (see graph). The health center staff asked their community health workers to go door-to-door in their villages to see if families were using their nets. The health workers found that many had been traded or sold. The health center redoubled its education efforts regarding the importance of sleeping under a mosquito net and soon the number of malaria cases dropped.

The culture of data use and quality improvement fostered by the Ministry of Health through IHSSP interventions is ingrained in Mayange Health Center. Emmanuel continues to review Mayange's data each month, and the center's leadership is committed to improving their services based on his reports.
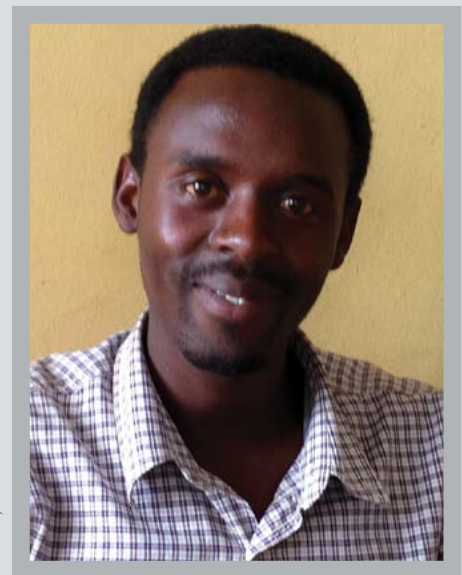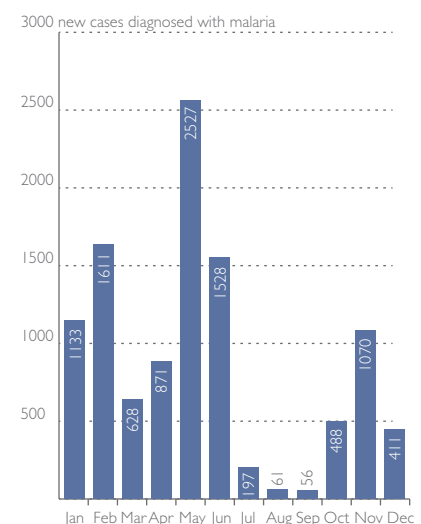
Photo by MARY K. BURKET

Emanuel Dushimana noticed a spike in 2013 malaria cases.

3000 new cases diagnosed with malaria

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1133	1611	628	871	2527	1528	197	61	56	488	1070	411

and act on the findings—making changes that could have a profound impact on the health of their communities—the culture of data use will continue to grow.

Since the successful launch of the R-HMIS, many new reporting modules have been integrated into the DHIS 2 platform. These include:

- Annual health facility infrastructure reporting

- Quarterly tuberculosis program reporting

- Monthly HIV program reporting

- Quarterly reporting from nongovernmental organizations working with most-at-risk populations for HIV prevention

- Case-based reporting on neonatal, child, and maternal death audits

- Case-based tracking of multidrug resistant patients

- Weekly and monthly reporting of community-based health insurance indicators

- Community health worker information system

In addition, in its final months, the project transitioned all of the performance-based financing databases and the national disease surveillance and response system to the DHIS 2 platform.
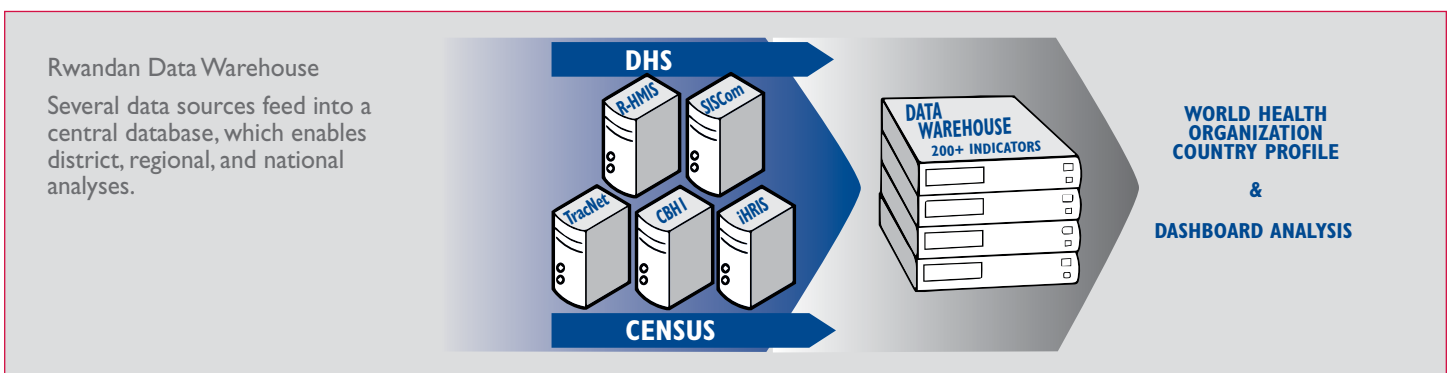
The National Data Warehouse

As the Ministry of Health began to use the R-HMIS database, they realized that without a way to better integrate several other health databases, the country couldn't fully realize the power of their data. To track, for instance, the number of children treated for malaria throughout the country over time, the ministry would have to pull data from three separate databases and tabulate them by hand. This process might be relatively easy for a simple query, but more complex requests containing multiple indicators were excessively burdensome.

To enable interaction between the ministry's databases, IHSSP turned once again to DHIS 2 and, in collaboration with the ministry, built the Rwandan Data Warehouse, a one-stop-shop for key health sector indicators. The Data Warehouse pulls a set of about 200 indicators from the R-HMIS and four other databases. Corresponding census and Demographic and Health Survey data are pulled in as available. Through the Data Warehouse, the ministry has a clear overview of the health care situation
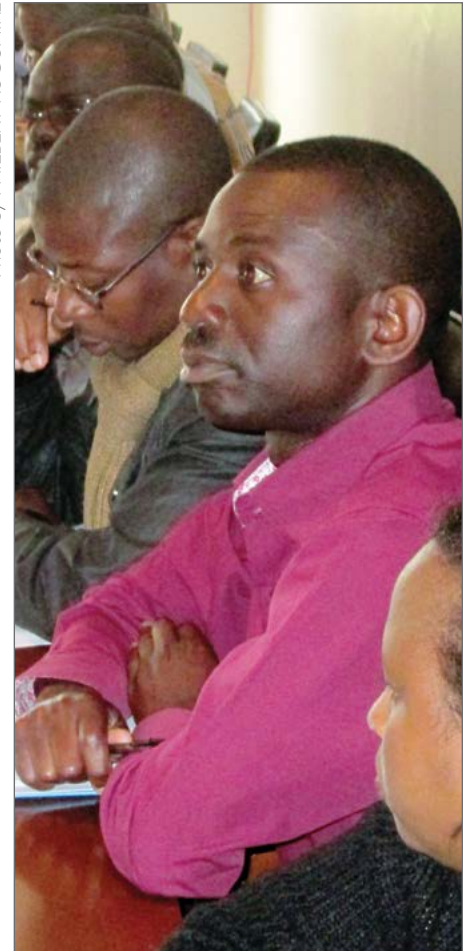
By enabling interaction between the Ministry of Health's many databases, IHSSP helped Rwanda fully realize the power of their data.

Rwandan Data Warehouse

Several data sources feed into a central database, which enables district, regional, and national analyses.

DHS

R-HMIS   SISCom

TracNet   CBHI   iHRIS

CENSUS

DATA WAREHOUSE 200+ INDICATORS

WORLD HEALTH ORGANIZATION COUNTRY PROFILE

&

DASHBOARD ANALYSIS

throughout Rwanda. Even before its official launch, ministry officials were eager to use the Data Warehouse. The minister requested training for herself and the heads of each Ministry of Health department on the use of the database's analytic tools that enable them to quickly produce maps, graphs, and pivot tables from any data in the system. Each user can create their own custom dashboards combining any of these outputs. For commonly viewed data sets, such as the key indicators used to monitor the progress of Rwanda's Third Health Sector Strategic Plan or the 20 indicators selected to monitor districts' performance, the system administrators have preconfigured dashboards.
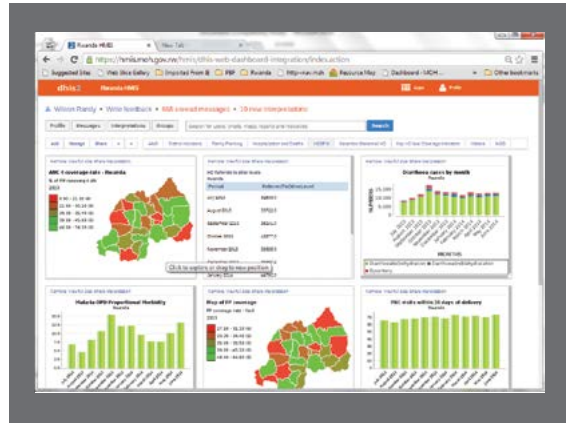
Sample dashboard

Now, with a clear, efficient system to gather, view, and analyze health data at every level, the Rwandan health system has the information it needs to adapt and quickly react to changes or stressors in its environment. It also has a more complete set of data to use for strategic planning and policy development. Relying on these data, IHSSP assisted the government in the development of strategic plans and policies that will guide the Rwandan health system for years to come. IHSSP assisted the ministry in the development of the Third Health Sector Strategic Plan (July 2012–June 2018) and the situational analysis that informed the plan, which defines the strategies the government is using to improve health services. Likewise, IHSSP spearheaded the development of the Health Care Financing Strategic Plan and the Human Resources for Health Sustainability Plan, both of which will be validated in 2014.

Now, with a clear, efficient system to gather, view, and analyze health data at every level, the Rwandan health system has the information it needs to adapt and quickly react to changes or stressors in its environment. Reporting completeness has improved and data managers are partnering with management teams and clinicians to use this data to assess their facilities' performance and the health status of their populations. Facilities are using this information to adjust their services to better address their clients' needs and in that process, creating a stronger, more resilient health system and a healthier population.

Photo by TODD SHAPERA