How Kenya Monitors Health Information System Performance

A Case Study

September 2017

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MEASURE Evaluation

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MEASURE Evaluation
University of North Carolina at Chapel Hill
400 Meadowmont Village Circle, 3rd Floor
Chapel Hill, North Carolina 27517
Phone: +1-919-445-9359
measure@unc.edu
www.measureevaluation.org

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ABBREVIATIONS

APHIA	AIDS, Population and Health Integrated Assistance
CHIS	community health information system
CHMT	county health management team
CHRIO	county-level health records information officer
CRD	Civil Registration Department
DATIM	Data for Accountability, Transparency, and Impact
DQA	data quality audit
EMR	electronic medical record
GOK	Government of Kenya
HIS	health information system
HISSM	Health Information System Strengthening Model
HMN	Health Metrics Network
ICD-10	International Classification of Diseases, Tenth Revision
ICT	information and communication technology
iHRIS	Integrated Human Resource Information System
LMIS	logistics management information system
M&E	monitoring and evaluation
MOH	Ministry of Health
NGO	nongovernmental organization
PRISM	Performance of Routine Information System and Monitoring
SCHMT	subcounty health management team
SOP	standard operating procedure
TB	tuberculosis
TIBU	Treatment Information from Basic Program
USAID	United States Agency for International Development
WHO	World Health Organization

CONTENTS

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INTRODUCTION

Since the 1990s, substantial investments in data collection have improved the knowledge and understanding of global health, but huge gaps remain between what health professionals do know and what they need to know to improve the health of the world's population. Reliable and timely health information is an essential foundation for public health action, particularly when resources are limited and funding decisions can mean the difference between life and death. In recent years, strong health systems have been recognized as central to achieving better health outcomes, and strong health information systems (HIS) are the backbone of strong health systems. A properly functioning HIS gets the right information into the right hands at the right time, enabling policymakers, managers, and individual service providers to make informed choices on decisions ranging from patient care to national budgets (MEASURE Evaluation, 2015). Monitoring HIS performance can help produce timely and high-quality data that can be used for evidence-informed decision making to plan, implement, and improve health programs and allocate resources effectively.

Kenya began developing its HIS in 1976 through a pilot program. With support from donors such as the United States Agency for International Development (USAID)/Kenya, the Ministry of Health (MOH) decentralized reporting activities, by establishing HIS offices in all districts where data from healthcare facilities are processed. Over the past several decades, the Government of Kenya (GOK) has developed strategic plans and frameworks to strengthen coordination between private facilities and nongovernmental organizations (NGOs), provided clear guidelines on HIS, integrated data collection and reporting tools, improved data flow, and improved feedback mechanisms at all levels (Health Metrics Network, 2008b; USAID/Kenya, 2014b).

The USAID-funded MEASURE Evaluation PIMA works with the MOH and its subdivisions to build monitoring and evaluation (M&E) capacity and identify and respond to information needs at the national and subnational levels, including with the Malaria Control Unit, Reproductive Health, Community Health Strategy, Disease Surveillance and Response, and Integrated Disease Surveillance and Strategy, as well as the country's 47 county health management teams (CHMTs). MEASURE Evaluation PIMA aims to improve the availability and use of high-quality health information at the national and subnational levels by strengthening community health information systems (CHIS), monitoring the referral system, and monitoring vital events systems (MEASURE Evaluation PIMA, n.d.).

As part of MEASURE Evaluation's Phase IV Learning Agenda to strengthen HIS, MEASURE Evaluation conducted a case study in Kenya to provide greater in-depth understanding of how different countries measure the performance of their HIS. Kenya was selected, because it has a national HIS system, is interested in and is actively improving its HIS, and is receiving funds from USAID/Kenya for this. This case study describes how HIS performance is currently monitored in Kenya based on interviews with the government and partners, review of documents, and review of HIS indicators. The goal of the case study is to inform a guidance document that will provide technical assistance in monitoring HIS performance in-country by stakeholders, HIS managers, and HIS implementers.

METHODS

In September 2015, two MEASURE Evaluation staff on the study team traveled to Kenya to explore how stakeholders monitor the performance of their HIS. The study team worked with in-country resident advisors to contact stakeholders to describe the purpose of the case study and developed a study protocol (see Appendix 1).

The study team conducted key informant interviews with 23 stakeholders from 20 organizations involved in the development and implementation of the HIS, which included representatives from the MOH; county-level health records information officers (CHRIOs); representatives from the World Health Organization (WHO); members of the Civil Registration Department (CRD); and health program managers and M&E advisors from HIV and AIDS, tuberculosis (TB), and malaria programs. Interviews followed the key informant interview guide (see Appendix 2). They lasted approximately one hour and were transcribed.

Key informants were asked to describe their experiences in and perceptions of four primary areas of HIS performance:

- What planning has been done to measure HIS performance?
- How is HIS performance currently measured: specifically data quality and data use?
- What are the opportunities to improve measurement of the HIS?
- What additional lessons or challenges are there in implementing the HIS?

The study team categorized and analyzed the interview notes based on these four questions. As part of the document review, informants were asked to provide relevant documents related to HIS performance and strengthening for analysis, including M&E plans, frameworks, standards, guidelines, and annual quarterly reports. The study team also conducted an Internet search to obtain relevant documents. Overall, we reviewed 24 country-specific documents from the national-level and county-level health programs.

The study team extracted, compiled, and mapped 160 HIS performance indicators from the documents reviewed, from DHIS 2 reports, and from CRD reports using Microsoft Excel. The team compared these to indicators reviewed and collected for a desk review of highly cited HIS literature. As described in the protocol in Appendix 1, MEASURE Evaluation staff conducted a desk review of literature on HIS performance and strengthening that included several often-cited sources, such as the WHO Health Metrics Network (HMN) Assessment (HMN, 2008a), WHO Health Systems Strengthening Building Blocks (WHO, 2010), and Performance of Routine Information System and Monitoring (PRISM) (MEASURE Evaluation, 2009), among others. These sources described key components of an HIS and indicators that measure strengthening performance that could be applied in-country.

The study team also compared the indicators extracted from the Kenya documents with MEASURE Evaluation's Health Information System Strengthening Model (HISSM), which is described in Appendix 3. The HISSM is divided into four areas: the enabling environment (the foundation for planning, implementing, and maintaining HIS), information generation (the operationalization of HIS), HIS performance measurement, and external factors (which can influence HIS positively or negatively). The HISSM defines HIS performance as the systematic improvement of data quality and use of information for decision making

(MEASURE Evaluation, 2016). This case study focuses on the monitoring of HIS performance—specifically measurements of data quality and data use—in Kenya.

This study has several limitations. The study team was not able to interview all key informants involved in the HIS in Kenya. Nor was the study team able to review all annual reports specified in the M&E plans to verify the information provided by key informants, and the team did not receive quarterly or annual reports or data quality audit (DQA) activity reports described by the key informants.

THE ENABLING ENVIRONMENT

To understand the enabling environment better, the study team asked key informants to describe the governance, leadership, and coordination structures operationalizing the HIS and the challenges that exist in the MOH and the GOK. The enabling environment in the HISSM looks at practices at the national and subnational levels that mandate improving data quality and data use from the HIS. The GOK has delegated units in the national MOH to provide guidelines to counties for improving the HIS at the national and county levels, including integrating disparate data sources in the national HIS platform. The governance structure, role of national government, role of county government, and role of health programs in monitoring HIS performance are described below.

National-Level Governance

In 2013, Kenya devolved most of its power from the national level to the county level. The national MOH is now responsible for assisting counties in developing their own HIS strategic plans and guidelines. The counties are charged with developing and implementing HIS policies, frameworks, and guidelines; developing electronic medical record (EMR) systems; allocating funds; developing human resources; and integrating health program information systems in a central HIS. External partners include the African Medical and Research Foundation; AIDS, Population and Health Integrated Assistance Plus (APHIA Plus); Centers for Disease Control and Prevention; Clinton Health Access Initiative; FHI 360; IntraHealth International; Management Sciences for Health; National AIDS Control Council; National AIDS and STI Control Programme; Palladium; and WHO. These partners provide technical assistance and mechanisms to support a harmonized HIS, by expanding information sharing and promoting data use for decision making.

At the national level, separate units in the MOH are involved in developing the HIS, collecting vital statistics, and improving information and communication technology (ICT). Four units in the MOH are involved in the management of the HIS: the HIS Unit, the e-Health Unit, the M&E Unit, and the Research and Development Unit. The CRD, under the Ministry of Immigration and Registration of Persons, processes, analyzes, and disseminates vital statistics from birth and death records, and the Kenya National Bureau of Statistics disseminates official vital statistics on births and deaths and computes annual vital event indicators by province (MEASURE Evaluation PIMA, 2013). In addition, separate units in charge of ICT assist in HIS processing, including the ICT Authority in the Ministry of Communication and Technology (ICT Authority, n.d.), the ICT unit in the MOH, and the e-Health unit in the Division of Health Informatics M&E. The ICT Authority works directly with the ICT unit in the MOH and drafts governance manuals that establish security, mobility, and web technology standards. The e-Health unit oversees the enterprise architecture of electronic health records and releases guidelines for the development of EMR systems (*Kenya National E-Health Strategy (2011–2017)*, 2011; MOH, 2015b).When the case study was conducted, there were no policies, standards, or guidelines for ICT at the county level; however, the ICT unit in the MOH reported that there are plans to review ICT standards at the county level.

Role of the National Government in Monitoring HIS Performance

The MOH and the GOK have developed several reports and strategies monitoring HIS performance, including the Health Sector M&E Framework to guide counties in developing their own HIS M&E plans and strategic guidelines (MOH, n.d.-b)

The Health Sector M&E Framework outlines the major components, strategies, and guidelines for a functioning HIS, including data quality, data-sharing roles and responsibilities at the county and national levels, coordination, and data use. The framework provides standard operating procedures (SOPs) to help counties operationalize and inform their own M&E frameworks. For example, the framework provides guidelines for when and how DQAs should be conducted, stating that national DQAs should be conducted every two years and that counties and facilities should conduct routine DQAs as needed. The framework stipulates that a rapid DQA should be carried out by the M&E Unit at the county and national levels, and that DQAs should be conducted for midterm and endterm evaluations based on the Kenya Health Sector Strategy Plan. A DQA will focus on the following:

- Completeness of reporting by community units, facilities, subcounties, and counties
- Accuracy of county population denominators (calculation of the denominators should follow the procedure highlighted in the DHIS 2)
- Accuracy of coverage estimates from reported data
- Systematic analysis of facility-based and household survey-based indicator values

The framework outlines HIS responsibilities for data use at both the national and county levels. According to the framework, data review and data use should be strengthened at all levels, and stakeholders should "discuss ways in which data had been used in the period preceding the meeting to aid in decision-making" (MOH, n.d.-b).The national level is responsible for analyzing national health data for decision making, publishing and publicizing annual reports on national health statistics, preparing an annual state of health report on progress made to fulfill international obligations, conducting surveillance and reporting on disease outbreaks and public health events, and sharing information with the global surveillance system. The county level is responsible for providing the county governor with the information required to meet his or her reporting duties to the county assembly, analyzing county data for decision making, and preparing quarterly county health reports for discussion and ratification by the county governor.

The framework also states that a quarterly performance report will be prepared by the national HIS Unit and presented by the national M&E Unit on national achievements on core input, process, output, and outcome indicators from the Kenya Health Sector Strategic and Investment Plan. The study team was not able to obtain this document for review. Regarding data use, the framework stipulated that information generated should be used for making decisions during routine monitoring, performance review, resource allocation, and policy development.

As stated in the framework, "Data and information generated at all levels of the sector and from different sources will be shared, translated and applied for decision-making during routine monitoring, periodic sector performance review, planning, resource mobilization and allocation, accountability, designing disease-specific interventions, policy dialogue, review and development" (MOH, n.d.-b).

The framework outlines several reports and the data that should be presented in those reports, including the *Annual Health Sector Performance Report (2013–2014),* a report compiled and disseminated by the Division of Health Informatics and M&E that provides health outcomes data, achievements against different health goals, and funding allocations for the past year. The report uses data from DHIS 2, CRD, the Service Readiness Availability and Assessment Mapping tool, the Master Facility List, National Health Accounts, and DQAs, and it presents health outcome indicators from surveys such as the Kenya Demographic and Health Survey and the Kenya AIDS Indicator Survey. Regarding data quality, the *Annual Health Sector Performance Report* provides reporting rates by counties and public and private facilities for 12 health forms collecting data on outpatient services, service delivery, HIV and AIDS, nutrition, and immunization services. The report described some challenges with the HIS, including incomplete reports, particularly reports in which not all indicators were reported, inadequate data collection tools, and data quality issues at the point of generation (MOH, 2014a).

The *Analysis of Performance (2013–2014)* report provides information on the status of the health sector to guide decision making on developing health strategies. The *Analysis of Performance (2013–2014)* report uses data from the *Annual Health Sector Performance Report (2013–2014),* the National Mortality Statistics (2013–2014) provided by CRD, and the National Service Availability and Readiness Assessment Mapping (2014). It also provides data from several surveys, including the Kenya Economic Survey (2014); Assessment of Impact of Free Maternity Service (2014), an assessment of status of delivery in primary care facilities and hospitals by the MOH; and the MOH employee, work environment, and client satisfaction survey (2014) (MOH, n.d.-c-a; USAID/Kenya, 2014a).

The study team could not obtain for review the *Annual Operating Plan Review Report* or the *Annual Workplan Performance Report,* which were mentioned in the framework as reports that should use data from the HIS (MOH, n.d.-c-b).

During the interviews, the HIS Unit in the MOH mentioned the development of an HIS performance scorecard. The scorecard will use select indicators from forms that are being used across counties and provide feedback to counties, including the following forms: outpatient form (MOH 705), integrated service delivery form (MOH 711), nutrition form (MOH 713), immunization form (MOH 710), and program form (MOH 731). The aim of this effort, supported by WHO, is to help the MOH assess the system. The HIS Unit wants the scorecards to automatically update and wants them to measure the elements of a system, including functions, interlinkages of hospitals, and performance HIS.

Role of County Governments in Measuring HIS Performance

Per the *Health Sector M&E Framework* and according to several key informants at the MOH and the county levels, counties are responsible for developing their own plans and frameworks for strengthening their HIS and for tailoring their specific strategy and M&E plan to their context. As described in the *Annual Health Congress Report,* counties are responsible for strengthening data quality assurance and for generating and using data for making decisions (MOH, 2015a). The MOH HIS Unit indicated in the interview that counties are responsible for conducting DQAs in hospitals and subcounties. The study team reviewed strategic plans for three counties: the *Bungoma County Strategic and Investment Plan*, the *Kakamega County Health Sector Strategic and*

Investment Plan, and the *Garissa County Health Sector M&E Plan.* These three strategic plans provided guidelines for monitoring data quality and data use for each county and are further described below.

In terms of monitoring data quality, all the county plans provided SOPs for DQAs. For example, the *Bungoma County Strategic and Investment Plan* mentions the need to conduct periodic DQAs and provide a work plan on HIS, including data collection, analysis, and promotion of data demand and use. It also describes how they want to conduct monthly and quarterly performance review meetings and develop comprehensive sector work plans annually, but it does not mention using HIS data specifically for performance review meetings (Bungoma County Ministry of Health, n.d.). The *Garissa County Health Sector M&E Plan* provides details on how CHMTs and the subcounty health management teams (SCHMTs) conduct DQAs. For example, both CHMTs and SCHMTs are responsible for conducting annual DQAs and providing quarterly support supervision. SCHMTs are responsible for conducting periodic DQAs. The CHMTs and SCHMTs will conduct joint biannual DQAs to verify data quality, and the findings of the audit should be shared with stakeholders (Garissa County Ministry of Health, n.d.).

The *Garissa County Health Sector M&E Plan* further defines responsibilities for data quality at the facility and community levels. The facility is responsible for following SOPs for ensuring data collection, availability, collation, accuracy, completeness, and transmission; encouraging data demand and information use; linking with communities through dialog and action; preparing health facility plans and summary reports to share with stakeholders; and preparing quarterly briefs for the CHMT. The community is responsible for ensuring the collection of accurate and complete data, by ensuring that community health extension workers and community health workers submit reports to the facility. The community is also responsible for improving the community-based HIS. The *Garissa County Health Sector M&E Plan* does not specify individuals at the facility and community levels who should be responsible for carrying out these tasks. It did specify that the County M&E Unit is in charge of ensuring that high-quality data are generated and uploaded into DHIS 2 and implementing mechanisms to facilitate data use at all levels (Garissa County Ministry of Health, n.d.).

Each of the three county plans outlines different strategies to improve data use. The *Bungoma County Strategic and Investment Plan* lists strategies to improve data use by improving DHIS 2 to enable stakeholders to access relevant data for managing and improving programs and disseminating and using data from the M&E system to guide policy, planning, and implementation (Bungoma County Ministry of Health, n.d.). The *Kakamega County Health Sector Strategic and Investment Plan* describes conducting a County Health Stakeholders Forum that will coordinate addressing priority health needs through joint planning, implementation, and M&E of activities. This plan describes how reporting will be conducted weekly, monthly, quarterly, and annually (County Government of Kakamega, n.d.). The *Garissa County Health Sector M&E Plan* describes the different responsibilities for data use for the CHMT and SCHMTs. CHMTs are responsible for sharing data and information regularly with county and national governments; developing appropriate information products for dissemination (e.g., quarterly bulletins); using ICT in information management; generating annual plans and performance reports and sharing them with stakeholders, by participating in the National Health Congress, creating forums for discussions of county health status reports; and sharing information annually; conducting training on data management and information use, using DHIS 2 data to generate a monthly performance report and disseminating the report to all stakeholders; and producing a quarterly performance bulletin. SCHMTs are responsible for conducting monthly data dissemination and feedback, developing quarterly summaries on health data and sharing them with stakeholders for planning and decision making,

conducting training on data management and information use, and generating annual plans and performance reports and sharing them with stakeholders. SCHMTs are also responsible for generating monthly and weekly reports and updates to DHIS 2 and using DHIS 2 to monitor target performance (Garissa County Ministry of Health, n.d.).

The *Garissa County Health Sector M&E Plan* describes the responsibilities for data use at the facility and community levels. Facilities are responsible for sharing data with the Facility Health Management Committee. The facility is expected to analyze the facility data, gauge performance, and implement mechanisms to improve performance. The community is responsible for preparing health facility plans and summary reports with stakeholders; holding quarterly and monthly community dialogue days; holding monthly community action days; and supporting and participating in monthly, quarterly, midterm, and endterm reviews and data auditing. The community is also responsible for providing feedback to the facility, the Community Unit, community opinion leaders, and religious leaders. As stated in the plan, the reports will be discussed at all levels (CHMTs, SCHMTs, and Community Unit) and with other health stakeholders at the quarterly performance review meetings. The County M&E Unit is in charge of promoting data use through monthly, quarterly, and annual reports and also providing bulletins and evaluation reports. Partners provide financial support to copy health forms; support training on data management and information use; and provide technical assistance in data analysis, presentation, dissemination, and sharing (Garissa County Ministry of Health, n.d.).

Health Program Plans for Monitoring HIS Performance

Health programs play an important role in planning for and ensuring the quality and use of health information. Key informants from malaria, HIV and AIDS, and TB health programs and from the National Public Health Laboratory Services said that they had M&E plans that included HIS monitoring. Below is a description of how the *Malaria M&E Plan*, *National Strategic Plan for Tuberculosis, Leprosy, and Lung Health,* and *Health Sector Referral Strategy* monitor HIS performance.

The *Malaria M&E Plan*, developed by the Malaria Control Unit, maps indicators to the Kenya Malaria Strategy (2014–2018) and provides guidance for monitoring data quality and using HIS data. The *Malaria M&E Plan* specifies monitoring data systems to assess the performance of their service delivery and mentions the following systems: surveillance systems, including sentinel surveillance such as the electronic Integrated Disease Surveillance and Response system; malaria-specific systems, such as the indoor residual spraying monitoring system and the insecticide-treated nets/long-lasting insecticide-treated nets tracking system; surveys, including school-based malaria surveys, the Kenya Demographic and Health Survey, and the Malaria Indicator Survey; and routine monitoring systems at the community level, such as the CHIS. Some of the information products to be generated based on the data include quarterly malaria surveillance bulletins, annual malaria reports, biannual quality of care survey reports, and technical reports for ongoing activities. The plan also mentions that the Malaria Control Unit will use data for policy briefs and commission research studies and evaluations relevant to the National Malaria Control Programme. The *Malaria M&E Plan* also indicates that they will work with the HIS Unit to ensure that routine DQAs are conducted and to build capacity for DQAs at the county level (MOH, 2014b).

The *National Strategic Plan for Tuberculosis, Leprosy, and Lung Health* outlines strategies for integrating the Treatment Information from Basic Program (TIBU) with DHIS 2, the logistics management information system (LMIS), and CHIS. The plan also includes activities specific to strengthening and measuring HIS performance, such as conducting routine DQAs at the county and national levels, conducting data validation meetings and monthly data review meetings at the subcounty level, strengthening the health infrastructure across the program for network data use, evaluating and communicating data use successes, and conducting DQAs at private health facilities. To strengthen the LMIS, the National Tuberculosis and Lung Disease program intends to conduct periodic DQAs and integrate stock-related data validation in quarterly review meetings and monitor monthly electronic reporting from all subcounties to assess stock status and reporting rates nationally and by county (MOH, 2014c).

The *Health Sector Referral Strategy* mentions data use activities, specifically describing how data will be collected, collated, and reported through the routine health information reporting system. Although the *Referral Strategy* states that it wants to improve the use of referral data, it does not specify how it will do this through the HIS (MOH, n.d.-a).

Other M&E plans were in the process of being developed at the time of the interview. The National AIDS Control Council said that it was revising its M&E plan, and the National Public Health Laboratory Services confirmed that it had a draft M&E plan that was not final owing to lack of support. The HIS Unit within the MOH and IntraHealth reported that there are no policies or guidelines for monitoring the Integrated Human Resource Information System (iHRIS), a system that monitors human resources for the health system, but they were in the process of developing those guidelines. The study team was not able to obtain these documents for review, but the team was able to review the *Malaria M&E Plan*, the *National Strategic Plan for Tuberculosis, Leprosy, and Lung Health*, and the *Health Sector Referral Strategy*.

INFORMATION GENERATION

Key informants were asked about the processes and challenges for cleaning and analyzing HIS data to understand how information is generated from the HIS. Key informants described activities they were conducting in their organizations to enhance data quality and data use, including reviewing data at multiple levels before submission and conducting supervision visits at health facilities and in subcounties. The National AIDS Control Council, the Kenya Medical Supplies Authority, CRD, and the African Medical and Research Foundation described how their higher-level program managers (e.g., M&E officers and CHRIOs) reviewed data submitted from lower-level program managers (e.g., SCHMTs) during data submission. Representatives from Management Sciences for Health and Palladium and the Nairobi CHRIO described how they ensured data quality when rolling out EMRs by conducting supervision visits at health facilities. Although several efforts focus on improving the HIS, four main activities focus on improving information generation: integrating HIS data sources, holding data quality review meetings, conducting DQAs, and encouraging data use through meetings. These activities are described in the following sections.

Integrating HIS Data Sources

The Kenya HIS has several data sources that are being integrated with DHIS 2, the national platform for the management of routine health data. Subcounties, community health workers, and health facilities submit data that are aggregated at the county and national levels to DHIS 2 (MOH, n.d.-c-b).

Stand-alone disease-specific databases for TB and HIV and AIDS are either already linked or in the process of being linked to DHIS 2. Data sources managed by the MOH, the National AIDS Control Council, and the National AIDS and STI Control Programme, such as EMRs at facilities with high HIV and AIDS caseloads, laboratory data on HIV and AIDS testing, and program-based data from 12,000 community-based organizations using the Community-Based Program Activity Reporting tool, are being linked with DHIS 2. TIBU, the stand-alone TB database implemented by the TB Unit, is currently being integrated in DHIS 2.

Other data sources linked to DHIS 2 are the CHIS, the iHRIS, and the LMIS. The CHIS provides data from communities and health facilities through community health workers. iHRIS was developed by IntraHealth and provides data on human resource management, including the number and categories of healthcare workers and providers. The LMIS, managed by Kenya Medical Supplies Authority with technical support from Management Sciences for Health and FHI 360, manages commodity requests submitted by counties and facilities.

Several key informants interviewed at the MOH expressed interest in potentially merging surveillance data and vital statistics data provided by the CRD in DHIS 2 (Civil Registration Services, 2015). Some data sources are not linked to DHIS 2 but are used for decision making to improve health outcomes, such as the National AIDS Control Council's government public-sector reporting tool, which describes government activities for HIV and AIDS; the electronic Integrated Disease Surveillance and Response system used by the Malaria Control Unit to generate quarterly surveillance bulletins on malaria (President's Malaria Initiative, n.d.); and the Census, which was last conducted in 2009.

Data Quality Activities

Data Review Meetings

The CRD, the National AIDS Control Council, Management Sciences for Health, APHIA Plus, IntraHealth, Palladium, and the TB Unit within the MOH stated that they conduct quarterly data review meetings to review data quality. The National AIDS and STI Control Programme reported conducting annual data review meetings, and the Malaria M&E Unit reported regional review meetings initiated by counties. The African Medical and Research Foundation reported conducting quarterly dialogue days with Community Units and monthly action days to review data. Some organizations reported holding multiple meetings to look at data quality. For example, IntraHealth mentioned that it holds quarterly interagency coordinated committee meetings, quarterly regional meetings, quarterly iHRIS forums, and quarterly national human resource interagency coordinating meetings.

DQA Activities

The MOH, counties, and health programs conduct separate DQAs varying in frequency, site selection, and sampling. During the interviews, key informants from the MOH described how, before devolution, DQAs were conducted annually at the national level. Following devolution, a national DQA is conducted every two years, and counties and facilities conduct routine DQAs as needed (MOH, 2014a). Key informants from the MOH mentioned that health facilities were responsible for publishing their own data quality reports annually. The National M&E Unit reported that it has developed protocols on DQAs that were launched at the Health Congress and are detailed in the *Health Sector M&E Framework*.

The study team interviewed the Nairobi CHRIO to better understand how DQAs are conducted at the county level. The Nairobi CHRIO described how she conducts DQAs based on the national guidelines. Her team reviews six indicators—first visit for antenatal care, fourth visit for antenatal care, preventing mother-to-child transmission, children diagnosed with malaria, children diagnosed with TB, and full immunization—across 18 facilities a week before data review meetings to assess their data quality. Her team also reviews the CHIS. The Nairobi CHRIO also reported that routine DQAs for nutrition programs at the subcounty level are conducted once per quarter, and findings are shared with the county during Nutrition Review Meetings. CHRIOs also conduct supervision visits to facilities quarterly and as needed.

During the interviews, staff from several health programs, including the National AIDS Control Council, the National AIDS and STI Control Programme, IntraHealth, Management Sciences for Health, and the TB Unit, said that they also conduct their own routine DQAs. For example, the National AIDS Control Council samples 5 percent of community-based organizations in the Community-Based Program Activity Reporting system for data quality and conducts DQAs every quarter. The National AIDS and STI Control Programme conducts external DQA activities, by sampling counties through multistage sampling, and supports counties in strengthening data reporting and focusing on indicators that need adjustments, although it did not indicate how often it conducts DQA activities. IntraHealth conducts DQAs for iHRIS but did not indicate the frequency of the DQAs. The TB Unit conducts DQAs of a sample of facilities quarterly and found reasonable variation of +/- 5 percent.

The National Public Health Laboratory Services, Management Sciences for Health, the African Medical and Research Foundation, and the Malaria M&E Unit reported that they were unable to conduct DQAs, because of funding issues, but that they could review data quality in other ways. Management Sciences for Health conducts supervision visits at the facilities every month and conducts data quality checks on the LMIS. African Medical and Research Foundation M&E officers spot-check their CHRIOs, by sampling a few follow-up patient cases. The Malaria M&E Unit reviews surveillance data quarterly and data managed by DHIS 2 monthly to identify outliers.

Data Use Activities

Disease-specific health programs, such as HIV and AIDS, TB, and malaria, report using their data to make decisions to improve health service delivery and allocate resources. Several organizations described how they use multiple data sources to inform their decisions. The sections that follow describe data use at the national level and within health programs.

National M&E Unit

The national M&E Unit is responsible for using information from the HIS to set budgets and make operational decisions. The national M&E Unit, working with technical members of the national MOH and county health departments, disseminated the *Annual Health Sector Performance (2013–2014)* report, which provides data quality and health outcomes information using data from DHIS 2. This report describes the tools with the highest reporting rates: forms for outpatient morbidity (90%; form MOH 705A and B), integrated tool (90%; form MOH 711), immunization (89%; form MOH 710), and service workload (88%, form MOH 717). The reporting index for public health facilities was 81 percent, with 77 percent for faith-based and NGO facilities, and 65 percent for private facilities. Hospitals had a higher reporting index (83%) than did primary care facilities (67%). DHIS 2 data were used to look at malaria morbidity, number of mothers seeking skilled birth attendants, and free maternity services provided by public health facilities. The report also extracted mortality data from in-patient data using DHIS 2; however, only 21 of the 600 hospitals reported to the system. Data from CRD were used to show the coverage of the number of births registered by region and county and the highest causes of death for children under five, with malaria reported as the leading cause of mortality (12%). The report also used CRD data to describe the proportion of deaths segregated by sex: 56 percent of deaths were males, and 44 percent were females (MOH, 2014a).

Selected National Health Programs

To understand how data were used in their organizations, the study team interviewed representatives from the National AIDS Control Council (the parastatal entity responsible for coordinating the National HIV/AIDS Strategy) and the national Malaria Control Unit (the MOH organization that coordinates and oversees the implementation of programs to eliminate malaria).

National AIDS Control Council

During quarterly review meetings, the National AIDS Control Council looks at data from various sources to assess HIV prevention services. During these regional meetings, the team reviews data from multiple sources

and uses them to understand the regional coverage of HIV prevention services, the organizations providing these services, and the geographic locations of these services and organizations. They also look at indicators crossing several areas, including orphans and vulnerable children, youth leadership, children and women's issues, and school enrollment.

During the organization's annual meetings, members of the National AIDS Control Council take the opportunity to look at all data sources and develop a report that describes national estimates for the HIV epidemic and key indicators that are further disaggregated by county. The organization also routinely reviews data coming from laboratory systems that are being managed by the national reference laboratory for HIV. The study team was unable to obtain these reports to verify this information. The organization's website contains a number of dashboards with routine and nonroutine data (MOH, n.d.-e).

Malaria Control Unit

The *National Malaria M&E Plan* describes in detail the data sources that are used for national malaria reports (MOH, 2014b). A key respondent from the Malaria Control Unit said that their M&E team uses survey data published from a sample of health facilities every six months to report the quality of care for case management and training-of-trainers events. Some of these data can be used by counties to target issues in improving case management. The survey data can also be used during health worker training and training of trainers. Data from surveys, such as the Malaria Indicator Survey, were used during the annual data meetings to review malaria coverage and help epidemic-prone areas with setting thresholds correctly.

Human Resource Management

IntraHealth supports the MOH in deploying and managing iHRIS, a package of open-source software used to manage health workforce information in Kenya. Data from this system are used to assess health worker training. The representative from IntraHealth described how the data are used to validate payroll information:

> [We link the county] *and other leaders to challenge them to be able to use data to make informed decisions. Some of the decisions they have made in hiring, clearing up the payroll; for example, one of the counties someone just asked questions. For example, this is a letter from a Chief Officer of Health to the payroll and managers instructing them to delete these people from the payroll because they are no longer a part of the health workforce (due to death). This is a process that is done each month.*

National Public Health Laboratory Services

The National Public Health Laboratory Services uses data to assess trends and inform policies, including those provided in annual reports. The organization also shares reports with counties quarterly and as needed to receive feedback on how they are performing. Some of the reports are quarterly laboratory county reports, which show the reporting completeness and reporting trends by county, tests completed, specimen referral, positivity rates and total tests of selected conditions, and bacterial cultures conducted (National Public Health Laboratories, 2015a); the *MOH Laboratory Summit Report*, which is a monthly report describing the number of actual reports received, percentage reported for each month, number of reports sent on time, and percentage of reports sent on time (National Public Health Laboratories, 2015b); and the *Annual Laboratory Tests Report*,

which provides reporting rates and trends, general workload for selected tests, and the epidemiology of selected health conditions (National Public Health Laboratories, 2015a).

Commodities

The Kenya Medical Supplies Authority uses its data systems to look at trends in ordering medicines and supplies through the LMIS. County management teams are able to access and review which commodities are available. The organization also reviews the demand for commodities to make decisions on procurement, review distribution and stocks, inform budgets, and identify consumption trends.

Vital Statistics

CRD provides information on the number births and deaths and causes of deaths in the *Kenya Annual Vital Statistics Report*. The report highlights this information and shows vital statistics data disaggregated by sex, region, and place of occurrence (home or facility) (Civil Registration Services, 2015). For births, data are further stratified by age of mother and marital status. Deaths and causes of deaths are further stratified by age. Cause of death examines the top 10 leading causes of death for all ages, for those under five years of age, and by disease condition according to the definition used by registration assistants; International Classification of Diseases, Tenth Revision (ICD-10) coding is not widely used by clinicians in Kenya. Key informants from CRD shared the *Annual Vital Statistics Report* with the MOH, the Kenya National Bureau of Statistics, and others as requested, including the media. The data are shared quarterly at the county and subcounty levels and annually at the national level. CRD described how the data are used at the subnational level to set performance targets and by the MOH for decision making, including setting targets for how many deliveries are being conducted in facilities by county:

> *I was also told it was used at that level for planning for health. We have free maternity services, we use that (the data) to see how much of an allocation needs to be to each facility. They are looking at the community births that are happening outside the facility in which they need to support to encourage mothers to come and deliver at hospital.*

The representatives from CRD also described how they use data quality review meetings to review annual work plans. As one representative reported:

> [The participants] *look at partners' plans and they look at strategic objectives and achievements in the quarter. They do that during the annual plan. Now they are planning a midterm review of the strategic plan. During that review, they may be looking at those indicators. These are areas on where we need to work on. We have pulled in MEASURE Evaluation PIMA to help with this specifically and this is what we have been able to achieve. So, for even for partners, we want to see how they have been supporting us and how far have we gone, in terms of achievement of targets we set out to do.*

CRD also conducts a midterm review of the strategic plan to assess progress against strategic objectives and achievements. CRD representatives said that one of the goals of the quarterly meetings with the county stakeholder forums is to assess how to use the data at the facility and county levels.

Electronic Medical Records

Following the implementation of EMRs in health facilities with high HIV and AIDS burden, Palladium shared how the EMR system is used for collecting billing information, scheduling patient appointments, and enabling clinicians to conduct ad hoc queries. For example, Palladium shared how one facility is using EMRs to improve its billing system:

> *The* [county's] *priority is how much money they get from the facility. So, you really want to get their buy-in to get their system and get their priority area and support health information. One very good example is [at one facility], they used to collect 5 million* [Kenya Shillings] *in a month, they insisted on having a billing component which we give them. Now they are collecting 17–22 million* [Kenya Shillings].

Challenges in Data Use

Key informants described challenges regarding data use, such as counties not using the information for planning purposes. For example, the representatives from the National Public Health Laboratory Services reported that they believed many laboratories think that data are collected for the purpose of reporting to the national level, rather than also being used to make decisions locally. Some counties may not even be aware that certain data exist. The CRD representative said that although their current report includes data from the county and subcounty levels, the county government was not aware that data were disaggregated to those levels:

> *About three months ago, our director was invited to present a paper of the role of data at the intergovernmental summit in Mombasa. She used that opportunity to disseminate the* [Annual Vital Statistics Report] *and the county governments were so shocked that we had that kind of data that they actually need for planning purposes. So, I think we really need to start conversation with the counties so they can buy-in for supporting us, even to improve this data.*

Some key informants said that counties do not review data submitted by facilities. For example, APHIA Plus reported that data were used by the facilities but not by counties: "About 90 percent of the facilities send the reports to the countries. But unfortunately, a report now stays several days at the CHRIO's office before it's keyed in."

Key informants also reported that, at times, data usage at the facility level was low, and many facilities did not review their own reports. The National AIDS and STI Control Programme shared how facilities will forward data without reviewing them:

> *The service delivery points will only forward the reports without necessarily looking for them. It should be the other way around. They should be interrogating the data, asking themselves questions what this data means to us. As it is now, they are doing that to fulfill a reporting requirement without necessarily using it for program improvement.*

APHIA Plus and the National AIDS and STI Control Programme indicated that they are trying to train counties to use the data through meetings, capacity-building exercises, and data quality trainings.

MEASURES OF HIS PERFORMANCE

To understand how Kenya measures HIS performance, the study team reviewed previous HIS assessments, documents containing data quality and use indicators, and DHIS 2. The study team identified and extracted data quality and data use indicators from the documents sent by the MOH and partners and compared them to a list of HIS performance indicators compiled through desk review of the HIS global literature. The purpose of this comparison was to determine which indicators are currently being collected in Kenya and how they compare with recommended indicators that should be collected according to the HIS literature. The findings are presented in the sections that follow.

Previous HIS Assessments

The study team reviewed three past assessments that assessed the HIS at the national level: the HMN Assessment of HIS, conducted in 2008; the USAID/Kenya Assessment of National Monitoring and Evaluation and Health Management Information Systems, conducted in 2010; and the MOH Data Quality Report of the HIS, conducted in 2014.

In 2008, with support from HMN, the MOH conducted a self-assessment of the national HIS, using the HMN assessment tool and focus group discussions to assess six areas of the HIS: resources, core indicators, data sources, data management, information products, and dissemination and use. Data management—defined as the availability of written procedures, an integrated data warehouse, a metadata dictionary, and identifier codes for health facilities and administrative geographic units—was the weakest, with a score of 31 percent. Dissemination and use—defined as the analysis and use of information, policy and advocacy, planning and priority setting, resource allocation, and implementation and action—scored 51 percent. Data dissemination was weakest for routinely collected data. The recommendation for this finding was regular data review meetings at all levels of the health system. In addition, the performance of each health data source was ranked, with census ranking as "highly adequate" and health and disease records ranking as "not adequate at all levels" (HMN, 2008b).

In 2010, USAID/Kenya and the Global Health Technical Assistance project conducted an external mixed-methods assessment, interviewing more than 100 people, reviewing documents, and visiting 40 facilities in three provinces—Nyanza, Western, and Nairobi—to assess the national M&E system; the national HIS, which was a file transfer protocol-based system; and the HIS subsystems. The Global Health Technical Assistance team documented data quality weaknesses associated with the file transfer protocol-based system, including a parallel system of data entry, manual aggregation and analysis of data, and summation errors. Regarding data use, the assessment found that the file transfer protocol-based system lacked features to facilitate the analysis and use of information for decision making. Recommendations to improve data quality included establishing and mandating DQAs both by manual methods (e.g., using error-checking tools and reviewing tally sheets) and by automated methods (e.g., instituting automated e-validation). Recommendations to improve data use were that all levels conduct workshops and forums to strengthen information demand, conduct data needs assessments, prepare data use plans, and conduct team workshops to teach staff how to manage data (Dexis Consulting Group, 2010).

The nationwide *DQA Report (2014*), adapted from the global DQA tool developed by the Global Fund and in partnership with MEASURE Evaluation, was conducted by the MOH and used both quantitative and qualitative methods to asses 178 facilities to verify data accuracy of the DHIS 2 against facility-based summary tools, source documents, and another HIS system (the Kenya HIV/AIDS Program Monitoring System) (Government of Kenya, 2014). The DQA looked at availability, completeness, missing data, and missing values for select national health indicators at each level of the health system and nine health indicators selected in consultation with different program service delivery areas of the MOH. The DQA reported high reporting rates for summary sheets on integrated reproductive health, HIV and AIDS, malaria, TB, and nutrition (form MOH 711) and outpatient morbidity (form MOH 705 A and B). The community health extension worker summary (form MOH 515) and immunization summary (form MOH 710) had the lowest reporting rates. The DQA provided results disaggregated by facility type (e.g., faith-based organizations, private facilities, and public facilities at different care levels). Private facilities had the highest rate of missing documents. Based on the results, the MOH recommended that national and county leadership invest in data quality at the national and county levels, develop comprehensive DQA plans, invest in technology to minimize repetitive and tedious data that contribute to data errors, promote data use, institutionalize data quality checks regularly at the facility level, and encourage counties to provide regular supervision for subcounty and county health records information officers to provide technical support (Government of Kenya, 2014).

HIS Performance Indicators from Kenya Documents

To further understand the practices in place in Kenya for measuring HIS performance, the study team extracted indicators from the reviewed documents based on the following criteria: (1) the indicator explicitly stated that it measured the HIS, and (2) the narrative hinted that the indicator measured HIS performance. The study team reviewed the following documents: two county strategic and investment plans (*Kakamega County Health Sector Strategic and Investment Plan, Bungoma County Strategic and Investment Plan*); one county-level health sector M&E plan (*Garissa County Health Sector M&E Plan*); the *Health Sector M&E Framework*; the *Annual Health Sector Performance Report*; the *Kenya Vital Statistics Report*; strategic M&E plans for the National Public Health Laboratory Services (*Division of National Public Health Laboratory Services M&E Plan*), the National Tuberculosis, Leprosy, and Lung Health Program (*National Strategic Plan for Tuberculosis, Leprosy, and Lung Health*), and the Malaria Control Unit (*Malaria M&E Plan*); and the *Kenya National Guidelines for Patient Referral.* Table 1 shows the number of HIS indicators that were extracted from each of these documents.

Table 1. Total number and proportion of indicators compiled from documents (n=171)

Kenya HIS document name	Number of indicators	Proportion of indicators
Kakamega County Health Sector Strategic and Investment Plan	37	22%
Malaria M&E Plan	31	18%
Bungoma County Strategic and Investment Plan	25	15%
Garissa County Health Sector M&E Plan	18	11%
National Strategic Plan for Tuberculosis, Leprosy, and Lung Health	13	8%
Annual Health Sector Performance Report	12	7%
Health Sector M&E Framework	11	6%
Referral Strategy	10	6%
Division of National Public Health Laboratory Services M&E Plan	5	3%
Health Sector M&E Framework	4	2%
Kenya National Guidelines for Patient Referral	4	2%
Total	**171**	

Across the documents, the study team extracted a total of 171 indicators. The *Kakamega County Health Sector Strategic and Investment Plan* provided the greatest percentage of indicators (22%), followed by the *Malaria M&E Plan* (18%) and the *Bungoma County Strategic and Investment Plan* (15%). Of these 171 indicators, 160 were unique indicators, 10 indicators overlapped between the Bungoma and the Kakamega county plans, and one indicator overlapped between the *Health Sector M&E Framework* and the *Garissa County Health Sector M&E Plan* (see Table 2).

The study team noted how the documents defined the frequency of data collection for each of the indicators to understand how often HIS performance was monitored. Table 2 shows the frequency of collection among the unique indicators (n=160). Most indicators (80%) had no documented information on how frequently they were to be collected; 13 percent of indicators were documented as being collected annually. Other indicators specified being collected monthly, quarterly, as needed, or every three years.

Table 2. Frequency of data collection for unique indicators (n= 160)

Frequency of data collection	Number of indicators	Proportion of indicators (%)
Not reported	126	79%
Annually	20	13%
Quarterly	7	4%
Monthly	3	2%
Once	1	1%
The reports are submitted at different frequencies (weekly, monthly, annually, and yearly), depending on reporting needs	1	1%
3 years	1	1%
Monthly or quarterly	1	1%
Total	**160**	

Comparison of Kenya HIS Performance Indicators to Global HIS Indicators

The study team compared the 160 unique indicators from country-specific documents with the indicators from 26 documents that were identified in the desk review of global HIS literature and references (see Appendix 5 for a complete list of references). Table 3 shows which HIS global indicators most closely matched the indicators extracted from the Kenya documents. When comparing the extracted indicators to those found in the HIS global literature, 46 percent closely matched indicators from USAID's Health System Assessment Approach (Health Systems 20/20 Project, 2012), and 34 percent of closely matched indicators found in the WHO HMN Framework (HMN, 2008a).

Table 3. Number and proportion of unique indicators found in Kenya documents mapped to global HIS indicators by source (n=160)

HIS global sources	Number of Kenya indicators	Proportion (%)
USAID. (2012). The Heath System Assessment Approach: A How-to Manual. Version 2.0. Health Systems 20/20.	73	46%
WHO. (2008). Health Metrics Network.	55	34%
WHO. (2010). Monitoring the Building Blocks of Health Systems: A Handbook of Indicators and their Measurement Strategies. Geneva: World Health Organization.	9	6%
WHO. (2008). Health Information Systems: Toolkit on Monitoring Health Systems and Strengthening.	6	4%
Alva, S., Kleinau, E., Pomeroy, A., & Rowan, K. (2009). Measuring the Impact of Health Systems Strengthening: A Review of the Literature. USAID.	5	3%
MEASURE Evaluation (2009). PRISM Tools for Assessing, Monitoring, and Evaluating RHIS Performance.	5	3%
MEASURE Evaluation Tanzania Sustainability Framework (2015).	4	3%
WHO. (2012). Assessment of Health Facility Data Quality. Data Quality Report Card: Cambodia, 2012.	2	1%
AbouZahr, Carla. (2013) Assessing and Monitoring the Performance of Health Information Systems: Metrics and Models. Health Information Systems Knowledge Hub.	1	1%
Total	**160**	

The study team mapped the 160 unique indicators to the HIS global literature to identify data quality and data use indicators. The study team identified 46 indicators that measured data quality, two of which matched exactly with the global HIS data quality indicators Data quality indicators looked at coverage of deaths, births, institution charged with analyzing and collecting health statistics, submitting weekly or monthly surveillance reports to the district on time, ICD-10 coding used in hospitals to report causes of death, and facilities submitting monthly HIS information to DHIS 2 (see Appendix 7).

The study team found 24 indicators from the Kenya documents that partially matched data use indicators from the HIS global literature (see Appendix 8). Fourteen of the 24 indicators described monitoring stakeholder meetings held annually or quarterly, and 12 indicators focused on disseminating reports, including monitoring the number of reports that were produced and disseminated either quarterly or every six months,

monitoring the number of bulletins produced or publications from surveys, or developing an annual operational plan within the past year. Two indicators measured number of staff trained in data demand and use. In addition, there were single indicators that measured the following: proportion of targeted healthcare workers trained in data demand and use (MOH, 2014c).; proportion of Malaria Control Unit staff using a data source for planning and budgeting (MOH, 2014b); number of data demand; and data use guidelines and training materials developed (MOH, 2014c).

Most of the data use indicators that partially matched the indicators from the HIS global literature were modified versions specific to the Kenya HIS. For example, the WHO HMN has an indicator for data dissemination and use that measures the number of districts or similar administrative units that compile their own monthly or quarterly and annual summary reports, disaggregated by health facility (HMN, 2008a). The indicator found in the *Garissa County Health Sector M&E Plan* measures the number of sector quarterly reports produced and disseminated (Garissa County Ministry of Health, n.d.). Another example is an indicator in the HMN for HIS infrastructure, measuring the availability of ICT equipment maintenance support available at national and subnational levels to ensure that data and information reporting requirements are met and on time (HMN, 2008a). The matching modified indicator in the *Bungoma County Strategic and Investment Plan* outlined the cost of EMR and server installation, including purchasing computers and networks for all health facilities and CHMT and SCHMT offices (Bungoma County Ministry of Health, n.d.). These modified indicators are further refined compared to indicators found in the HIS literature review to discretely measure activities related to HIS performance.

HIS Performance Indicators Mapped to the HISSM

The study team also mapped the 160 unique indicators according to the HISSM (MEASURE Evaluation, 2016). Fifty-five percent of the indicators were categorized to enabling environment, 24.4 percent to information generation, and 20.6 percent to HIS performance (see Table 4).

Table 4. Number and proportion of unique indicators by HISSM area

HISSM area	Number of indicators	Proportion of indicators (%)
Enabling environment	**88**	**55.0%**
HIS leadership and governance	4	2.5%
HIS management	84	52.5%
Information generation	**39**	**24.4%**
Data sources	3	1.9%
Information products and dissemination	8	5.0%
Data management	28	17.5%
HIS performance	**33**	**20.6%**
Data quality	32	20.0%
Data use	1	0.6%
Total	**160**	

The study team was especially interested in understanding HIS indicators that are used to measure HIS strengthening outcomes such as improved data quality and use of data for decision making. Of the 46 data indicators that mapped to data quality in the HIS global literature, the study team found that based on the HISSM, 32 of these indicators measured data quality outcomes, 11 measured data management outcomes, three measured data source outcomes, and one measured HIS management outcomes. When reviewing the 32 data quality indicators, 29 measured timeliness and completeness of report submission and three indicators addressed accuracy of information. Single indicators measured availability of data (Civil Registration Services, 2015), proportion of facilities reporting mortality statistics using ICD-10 (MOH, 2014c), and number of DQAs conducted (Garissa County Ministry of Health, n.d.). All of these 32 indicators are considered part of HIS performance, because they measure the outcomes of a functional HIS. The table comparing Kenya-specific data quality indicators and the HISSM is provided in Appendix 9.

Of the 24 unique data dissemination and use indicators mapped to the HIS global literature, the study team found that according to the HISSM, one indicator measured a data use outcome: proportion of Malaria Control Unit staff using Malaria Information Acquisition System for planning and budgeting (MOH, 2014b). The other indicators measured inputs and activities contributing to evidence-informed decision making but were part of HIS management (n=14), HIS leadership and governance (n=1), and information products and dissemination (n=8). The comparison between Kenya-specific indicators and their relation to data use according to the HISSM can be found in Appendix 10.

DISCUSSION AND CONCLUSION

Kenya has shown a strong interest in improving HIS performance, including mandating units in the MOH and the GOK to improve the HIS, providing standards and guidelines to counties through the *Health Sector M&E Framework*, and showing a keen interest in developing a scorecard to measure HIS performance. However, gaps and opportunities remain in which HIS performance monitoring can be improved in policies and practices at the national and subnational levels. This section provides recommendations to improve policies and practices, as follows:

- **State more precisely how to carry out data quality and data use activities within national, county, and health program M&E plans.** Although the study team found written strategies to improve data quality and data use in the documents reviewed, these strategies often lacked details on carrying out these activities.
    - **Data quality:** For example, although the county plans contained SOPs for conducting DQAs, counties have an opportunity to define the sample size of facilities and community sites and determine what data sources will be audited and how often DQAs will be conducted.
    - **Data use:** Counties can improve their data use guidelines within their M&E plans by specifying data sources and health indicators that will feed into specific reports, how often data will be included in reports and bulletins, and which reports will be reviewed at specific meetings. Other than the *Malaria M&E Plan* and the *Kenya Vital Statistics Report,* the documents did not describe the data sources required to generate program reports. National, county, and health program plans can be more specific in documenting the data sources that will be used for reporting.
- **Combine HIS performance indicators in a single document.** The study team found HIS performance indicators across documents managed by specific health programs, instead of being available in a single document. For example, indicators on data quality and data use of malaria indicator data were found in the *Malaria M&E Plan,* and indicators on data quality and data use of TB data were found in the *National Strategic Plan for Tuberculosis, Leprosy, and Lung Health*. This example shows there is an opportunity to combine or harmonize the indicators into one document so that health and HIS managers have access to a complete list of HIS performance indicators across the sector.
- **Develop an assessment tool to quickly assess HIS performance across multiple data sources.** The HIS assessments that were discussed only assessed national-level data and did not consider all of the data sources necessary to support health sector decision making. These national-level assessments included the following: the HMN assessment conducted in 2008 was used by the MOH to assess the HIS using a self-assessment approach (HMN, 2008b); the USAID/Kenya and Global Health Technical Assistance Project was an external assessment using a mixed-methods assessment with key informant interviews, document review, and health facility visits (Dexis Consulting Group, 2010); and the DQA conducted by the MOH in 2014 assessed data quality of indicators using a cross-sectional study design of the national HMIS (Government of Kenya, 2014). At the time of this case study, the study team was not informed or made aware of any HIS assessments conducted at the county level. Because these past assessments used varying methods, including different sampling

methods and indicators, to assess HIS performance of select health data sources, there remains a need for an approach that takes into consideration all the health sector data sources and considers the subnational HIS performance measurement needs.

- **Improve data quality and data use indicators to measure HIS performance.** Thirty-two of the extracted indicators measured data quality outcomes, and only one indicator measured a data use outcome based on the HISSM definition of performance measurement. Most of the data quality indicators measured timeliness of report submission and excluded accuracy and completion. Although the study team documented one indicator that measured data use, several indicators monitored input and output activities for data use, including holding data review meetings and disseminating key reports. To improve the measurement of data quality, indicators can be incorporated in county and national M&E strategies that include completion and accuracy of specific data sources. To improve the measurement of data use, indicators can be incorporated in county and national M&E strategies that capture the use of specific data sources by health program managers to inform policy, program management, resource allocation, and additional health system decisions.

Countries such as Kenya that have infrastructure, processes, and governance in place to support HIS are in a position to strengthen and improve their HIS performance. The development of HIS performance measurement tools for HIS managers and implementers will address the opportunities raised through this case study and will help countries like Kenya monitor HIS performance for health systems strengthening.

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Republic of Kenya. (2008). *Report for the assessment of health information system of Kenya. Health Metrics Network*. Retrieved from http://www.who.int/healthmetrics/library/countries/HMN_KEN_Assess_Final_2008_06_en.pdf

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United States Agency for International Development (USAID)/Kenya. (2014b). *Country development cooperation strategy (2014–2018)*. Nairobi, Kenya: USAID/Kenya. Retrieved from https://www.usaid.gov/sites/default/files/documents/1860/CDCS-w%20Annexes%20Lo.pdf

World Health Organization (WHO). (2010). *Monitoring the building blocks of health systems: A handbook of indicators and their measurement strategies*. Geneva, Switzerland: WHO. Retrieved from http://www.who.int/healthinfo/systems/monitoring/en/

APPENDIX 1. PROTOCOL FOR CASE STUDIES TO DOCUMENT M&E OF HIS PERFORMANCE (4BWP-037)

Protocol

Case Studies to Document Performance of Monitoring and Evaluation of Health Information Systems

(4BWP-037)

Version Date	July 6, 2016
Activity Lead	Shannon Salentine, ICF
Lead Consultant	Tajrina Hai, ICF

Summary

Since the 1990s, many countries and organizations have made substantial investments in data collection and analysis to improve the knowledge and understanding of global health. However, large gaps remain between what health professionals *actually* know and what they *need* to know to improve the health of the world's population. Strong health information systems (HIS) are the backbone of strong health systems. A properly functioning HIS gets the right information into the right hands at the right time and enables policymakers, managers, and service providers to make informed choices on decisions ranging from national budgets to individual patient care.[1]

MEASURE Evaluation seeks to document the progress in the strengthening of HIS through its Learning Agenda for HIS Strengthening. One approach to documenting progress is through monitoring and evaluation (M&E) of HIS performance by measuring data quality and integrity and tracking data use. However, many countries lack documentation on how HIS performance is measured. MEASURE Evaluation will conduct case studies to understand and assess how countries measure their HIS performance. These case studies will use mixed methods—interviews with key informants, a desk review of HIS literature, and an analysis of HIS data quality and use of the data produced on preselected indicators—to document HIS performance in various countries.

This study, *Case Study to Document M&E of HIS Performance (4BWP-037)*, will be implemented between September 2015 and December 2016. MEASURE Evaluation will conduct case studies in two to three countries to assess and understand the M&E of HIS performance. MEASURE Evaluation resident advisors in selected countries and various U.S.-based MEASURE Evaluation technical advisors will coordinate technical input for the case studies.

The case studies will address four main questions on measuring HIS performance: (1) What planning has occurred in measuring HIS performance? (2) How is HIS performance measured? (3) What opportunities

[1] MEASURE Evaluation. (2015). Health information systems. Retrieved from http://www.cpc.unc.edumeasureevaluation.org/measure/our-work/health-information-systems

exist to improve HIS performance? (4) What additional challenges or lessons learned can come from implementing HIS?

Findings from the case studies will be published as a guidance document on methods of measuring HIS performance. The document will be for HIS implementers, stakeholders, and donors invested in HIS in the countries studied and globally.

Background

Since the 1990s, substantial investments in data collection and analyses have improved the knowledge and understanding of global health. Despite this progress, large gaps remain between what health professionals actually *know* and what they *need to know* to improve the health of the world's population. Reliable, timely health information is an essential foundation for making decisions and taking action in public health, particularly when resources are limited and funding decisions can mean the difference between life and death. The need for quality information—rapid awareness, analysis of investigation results, and decisions on response actions—is especially urgent in emerging diseases and other acute health threats.[2]

Strong health systems are central to achieving better health outcomes, and a strong HIS is the backbone of a strong health system. The need for a coherent HIS has emerged in response to the perceived dysfunctionality and inefficiency of separate and often duplicative information systems, each existing because of the demands of disease-focused programs, donor reporting requirements, and international M&E initiatives focused on specific health topics. This redundancy creates an undue burden on and adds to the workload of healthcare workers.[3] The HIS should be an interlinked system comprising not only data generated through the health sector, but also data produced by other agencies, such as the national statistics office, census bureau, civil registration, and other sectors.[4] A properly functioning HIS gets the right information into the right hands at the right time, enabling policymakers, managers, and individual service providers to make informed choices on decisions ranging from patient care to national budgets. Nations and stakeholders have invested substantially in strengthening HIS and developing tools for HIS assessment and monitoring. Although progress has been made, a number of opportunities remain to further understand, strengthen, and improve HIS using objective and rapid approaches.[5] Under MEASURE Evaluation Phase III, case studies conducted in Nigeria and Côte d'Ivoire documented improvements in M&E systems for information on HIV and AIDS

[2] MEASURE Evaluation. (2015). Health information systems. Retrieved from http://www.measureevaluation.org.cpc.unc.edu/measure/our-work/health-information-systems

[3] AbouZahr, C. (2013). *Assessing and monitoring the performance of health information systems: Metrics and models*. Health Information Systems Knowledge Hub Working Paper 29. Herston, Australia: Health Information Systems Knowledge Hub, University of Queensland. Retrieved from https://hingx.org/Share/Attachment/2391?fileName=WP29_health%20information%20systems_web2.pdf.

[4] Health Metrics Network. (2008). *Assessing the national health information system, an assessment tool (version 4.0)* Geneva, Switzerland: Health Metrics Network, World Health Organization. Retrieved from http://www.who.int/healthinfo/country_monitoring_evaluation/documentation/en/

[5] Health Metrics Network. (2008). *Assessing the national health information system, an assessment tool (version 4.0)* Geneva, Switzerland: Health Metrics Network, World Health Organization. Retrieved from http://www.who.int/healthinfo/country_monitoring_evaluation/documentation/en/

over the past seven years. Although stakeholders reported positive changes as a result of increased availability of high-quality data, they had difficulty in articulating the progress of these outcomes. The study concluded that a standard methodology in HIS M&E is needed.[6,7]

As part of the Learning Agenda in Phase IV, MEASURE Evaluation seeks to document progress toward achieving stronger HIS. Countries and donors acknowledge that strengthening HIS strengthens health systems overall, and to strengthen their HIS, countries need guidance on measuring and assessing HIS performance.

Need for HIS Guidance on Performance Measurement

Several tools have been developed to guide countries in strengthening their HIS, particularly to improve data quality and subsequent use of HIS data. Many of these tools, however, are limited because the methods have varying degrees of subjectivity, the tools target particular components of the HIS, sampling is often nonrepresentative, measures implemented lack repeatability, and the evaluation requires involving an external party.[8] Countries also lack an M&E guide to improve the performance of their HIS. MEASURE Evaluation is working on developing the tools and guidance that enable countries to systematically assess their own HIS performance and then provide best practices for HIS strengthening.

Definition of Performance

Performance in the context of HIS is defined as the ability to generate high-quality data for decision making. To assess HIS performance, MEASURE Evaluation has developed a Health Information System Strengthening model (HISSM) to describe the process of learning that is involved in strengthening HIS. Based on this model, data quality and data use are the most important indicators to assess HIS achievement of performance objectives.[9]

The Learning Agenda

The MEASURE Evaluation Learning Agenda objective—documenting progress toward strengthening HIS—is an iterative process. Activities in this process include building an HISSM model to describe how HIS strengthening occurs, conducting case studies in two to three countries to understand how different countries monitor HIS performance, developing a guidance document that describes technical approaches and provides

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[6] MEASURE Evaluation. (2014). *A case study to measure national HIV M&E system strengthening: Nigeria*. Chapel Hill, NC: MEASURE Evaluation, University of North Carolina. Retrieved from http://www.measureevaluation.orggc pc.unc.edu/measure/publications/sr-14-104

[7] MEASURE Evaluation. (2014). *A case study to measure national HIV monitoring and evaluation system strengthening: Cȏte d'Ivoire*. Retrieved from Chapel Hill, North Carolina: http://www.measureevaluation.org.cpc.unc.edu/measure/publications/sr-14-102

[8] AbouZahr, C. (2013). *Assessing and monitoring the performance of health information systems: Metrics and models*. Health Information Systems Knowledge Hub Working Paper 29. Herston, Australia: Health Information Systems Knowledge Hub, University of Queensland. Retrieved from https://hingx.org/Share/Attachment/2391?fileName=WP29_health%20information%20systems_web2.pdf.

[9] AbouZahr, C. (2013). *Assessing and monitoring the performance of health information systems: Metrics and models*. Health Information Systems Knowledge Hub Working Paper 29. Herston, Australia: Health Information Systems Knowledge Hub, University of Queensland. Retrieved from https://hingx.org/Share/Attachment/2391?fileName=WP29_health%20information%20systems_web2.pdf.

tools to monitor and evaluate HIS performance, and developing a web-based repository for global access and information sharing on HIS strengthening and performance monitoring.

Case Study Rationale

Many countries lack documentation of HIS performance monitoring. In the case studies, MEASURE Evaluation will gain understanding of the processes countries use to monitor and evaluate HIS performance. The case studies will look at ways different countries produce high-quality data that can be used for planning, program management, and internal national-level and external global-level reporting.

Goal

At the country level, countries participating in the case studies will benefit from evidence-based recommendations. At the global level, the case studies will contribute to the growing body of knowledge on HIS strengthening for future investments, including technical assistance and capacity development interventions.

Objective

These case studies will document experiences that individuals and organizations have had in measuring HIS performance at national, subnational, and community levels and identify documents that describe HIS performance and monitoring in-country.

Desk Review and Development of HIS Indicators

To prepare for the case study, MEASURE Evaluation (1) undertook a desk review of relevant literature that describes how to measure the performance of HIS, (2) identified key components and performance indicators, and (3) compiled performance indicators into an Indicator Bank.

1. HIS Strengthening Desk Review

MEASURE Evaluation staff conducted a desk review of literature on HIS performance and strengthening that included several often-cited sources such as the World Health Organization Health Metrics Network Assessment[10] and Health Systems Strengthening Building Blocks,[11] Performance of Routine Information System and Monitoring,[12] and others listed in Appendix 5. These sources described the key components of an HIS and the indicators that measure performance for strengthening that could be applied in-country.

[10] Health Metrics Network. (2008). *Assessing the national health information system, an assessment tool (version 4.0)* Geneva, Switzerland: Health Metrics Network, World Health Organization. Retrieved from http://www.who.int/healthinfo/country_monitoring_evaluation/documentation/en/

[11] World Health Organization. (2010). *Monitoring the building blocks of health systems: A handbook of indicators and their measurement strategies*. Geneva, Switzerland: World Health Organization. Retrieved from http://www.who.int/healthinfo/systems/monitoring/en/

[12] MEASURE Evaluation. (2009). *PRISM tools for assessing, monitoring, and evaluating RHIS performance.* Chapel Hill, NC: MEASURE Evaluation, University of North Carolina. Retrieved from http://www.cpc.unc.edu/measuremeasureevalution.org/publications/ms-09-34

2. Key Components Identification

The descriptions of the following components are based on the desk review of often-cited literature on strengthening HIS:

- Enabling environment
  - HIS governance and leadership
  - HIS management
- Information generation
  - Data sources
  - Information products and dissemination
  - Data management
- HIS performance
  - Data quality
  - Data use

3. Indicator Bank Establishment

Based on the HIS literature review, MEASURE Evaluation compiled a list of performance indicators with the following information in an Indicator Bank: measurement, data source, collection frequency, literature source, and category. The Indicator Bank, which includes more than 1,100 indicators, was categorized based on descriptions gleaned from the literature.

Case Study Methodology

The case study methodology uses a mixed-methods approach that applies quantitative and qualitative methods to analyze the performance of the HIS in a selected country. The methodology includes (1) country selection, (2) stakeholder engagement and interviews, (3) a document review, and (4) indicator mapping and compilation.

1. Country Selection

MEASURE Evaluation staff will select countries with a developed HIS that can provide performance monitoring and strengthening information. The following selection criteria will determine the countries that are eligible:

- Countries known to have a national HIS system
- Countries interested in improving the performance of their HIS
- Countries known to be working to improve their HIS and receiving internal or external funding

2. Stakeholder Engagement and Key Informant Interviews

Stakeholders invested in developing, improving, and using the information in the HIS will include representatives from the ministries of health, M&E units, divisions of health informatics, bureaus of statistics, and other selected donor partners. Resident advisors in-country will identify and contact candidate stakeholders for interviews. These stakeholders will receive briefings on the case study purpose and debriefings to provide an opportunity to share and validate initial findings.

MEASURE Evaluation plans to interview, with the help of resident advisors, at least 10 stakeholders in-country, or as many as possible, using the Key Informant Interview Guide provided in Appendix 2. The Key Informant Interview Guide was developed based on the HIS desk review. The questions in the guide

focus on key informant experiences, perceptions, and understanding of HIS performance monitoring and strengthening in context.

Before conducting the interviews, MEASURE Evaluation staff will request consent from each key informant. Each interview will last approximately one hour, and the interview will be transcribed.

MEASURE Evaluation will compile and categorize responses to the interviews. An analysis of the findings from the key informant interviews will focus on four key questions:

- What planning set up HIS performance measurements?
- How is HIS performance measured?
- Where are opportunities to improve HIS performance?
- Does the HIS face additional challenges? What lessons have been learned from implementing the HIS?

3. Document Review

As part of this case study, key informants will be asked to share specific documents they used in-country to monitor their HIS performance. Examples of these documents are strategic guidelines at the national and subnational levels, M&E frameworks and plans, and HIS reports and other reports that show the quality of HIS data and the subsequent use of those data. The documents will be analyzed based on the focus questions, and additional questions will be considered for background and contextual information. Examples of additional questions include the following:

- What was the original purpose of the document?
- What is the information source? What are the source's credentials? What is the potential level of bias? Is the material well referenced?
- Is the information relevant to the current context or is it out of date? Who is the intended audience, such as researchers or the general public?
- What components of HIS strengthening does the document address?
- How does this document specifically present an approach to ensure data quality and use?
- How does this document specifically assess the performance of the HIS?

4. Indicator Mapping and Compilation

Indicators will be compiled from desk review of in-country resources such as M&E plans, frameworks, strategic guidelines, reports, and HIS databases. These indicators will be analyzed based on the description provided in the document. The analysis will include stated values, collection frequency, specified data sources, and how closely the indicator matches to an indicator from the Indicator Bank based on the information available. The analysis and results will be shared in the case study report and will inform the guidance document.

Timeline

The case studies will be conducted between September 2015 and December 2016.

Deliverables

All case study materials, such as training manuals and questionnaires, and the study findings will be shared through a case study report and webinar. The case study team will produce a report that will describe the methods used and the findings from each country. This report will be shared with local, national, and international stakeholders, including in-country counterparts, HIS implementers, and the larger global audience. All material will be archived through MEASURE Evaluation staff in accordance with MEASURE Evaluation policy.

APPENDIX 2. KEY INFORMANT INTERVIEW GUIDE QUESTIONS

Health Information System Performance Measurement, Qualitative Component

Interviewer name: _____

Time and location of the interview:

Date of interview	
Start time	
Place of interview	

The focus of our discussion today will be to understand the performance of your health information system (HIS). MEASURE Evaluation, which is funded by the U.S. Agency for International Development (USAID), is a global project to strengthen the HIS in several countries. USAID has a Learning Agenda to generate new knowledge and share existing practices in HIS strengthening, including the performance of HIS. We are undertaking this activity to develop a global guidance that countries can use to measure their HIS performance.

To develop this guidance, we are meeting with stakeholders in-country to understand how the HIS performance is measured. We have spoken to stakeholders who manage various components of the system. We want to hear from you how the HIS is implemented, what the challenges are, and if you can suggest opportunities for strengthening. We want to understand the HIS from different perspectives: how it is coordinated and what partnerships are involved; legislation that affects the HIS; Kenya's policies, procedures, standards, and guidelines on the HIS; what financial and human resources are used to manage the HIS; how data management works; which data sources are used; how good is the quality of the data being collected; and how do stakeholders use the data generated from the HIS. We also want to understand what tools help monitor HIS performance and the challenges you face as you try to strengthen the HIS.

Now, let's begin with some questions about you and your role.

1. What is your role in implementing the HIS or M&E system?
2. What part of the system do you work with and what do you do?

Person interviewed:

Name	
Job title and role	

[Note to Interviewer you don't lead the responses. Let the interviewee respond, and then probe when necessary.]

Now let's explore how the system works.

Part 1. Introduction to HIS Implementation

1. What planning has been done to measure HIS performance?
   (Note to Interviewer: If you need to ask probing questions, continue in Part 2.)

2. How is the HIS performance measured?
   (Note to Interviewer: If you need to ask probing questions, continue in Part 5.)

Part 2. HIS Governance and Leadership

Part 2a. HIS Champions

1. Are there individuals in your organization who are responsible for advocating a strengthened HIS to provide better data quality and integrity?

Part 2b. HIS Legislation

2. Do you have legislation and regulations that cover your specific data source?
3. Does [country] have legislation and regulations to help ensure data integrity and transparency and that sets ethical standards that affect how data are collected, processed, and disseminated?
4. Does [country] have national health goals and objectives?
5. Has [country] developed an official strategy that directs how the HIS will support the national health goals? How was this strategy developed? Did it incorporate advice from an expert advisor, a stakeholder committee, or the WHO-ITU Toolkit?
6. Does [country] have up-to-date legislation and policy frameworks that guide the HIS?

Part 2c. HIS Policies, Standards, and Guidelines

7. Does [country] have policies, standards, and guidelines that apply to the HIS in your organization? If so, are they publicly available or posted on your website?
8. Does the HIS have reporting guidelines or protocols? Are they detailed?
9. What is the status on the interoperability standards for your HIS? What has been done and what are the next steps?

Part 2d. Coordination and Partnership

10. How is the HIS implementation coordinated?
11. Do you work with other partners in the HIS implementation?
12. Do the partners attend regular meetings to discuss data needs and quality?
13. How often do these meetings occur?

Part 3. HIS Financial and Human Resource Management

Part 3a. Financial and Human Resources

1. What financial resources support the maintenance of Kenya's HIS?
2. Do members of the staff have clearly assigned responsibilities?
3. Do staff members adequately understand the data collection tools, the protocol, and the forms?
4. Are staff members adequately trained to complete the data collection tools?
5. Are staff members comfortable with the data collection tools?
6. Do staff understand why the information is collected and how it is used?
7. Is the staff workload manageable? Can staff provide the services and record the data?

Part 3b. Information and Communication Technology (ICT) Infrastructure

8. Is there ICT infrastructure in place to support data flow from the lowest level to the highest level?
9. What are some of the barriers to maintaining ICT infrastructure at the different government levels?

Part 4. Data Sources

1. What data sources do you use?
2. Do you integrate several data sources in the HIS? Which ones?
3. Do you feel that data are recorded with precision and detail? Are the data sufficient to measure the indicators?
4. How often are data fed into the electronic system?
5. What are the specific challenges you see in each of these data sources?

Part 5. Data Management

1. What HIS have been implemented in the country to date?
2. What are the interoperability challenges and successes you've seen so far?
3. What indicators are being used? Do you use specific indicators or metrics developed to track progress against these goals?
4. Are there clearly defined procedures to verify source data periodically? Are these procedures followed?
5. Is there a clear data flow? Who completes the forms? How are they recorded? When the forms are completed, how are they transmitted? Who transmits the forms? What is the dataflow?
6. What is the data entry process? Who does the data entry? What software is used to enter data? What equipment is used for data entry? Does the process include double entry?
7. How are data archived? How long are they retained? Who decides what data to archive? Where is the archive stored?

Part 6. Data Quality

1. What do you think of the quality of the data that you receive?
2. What are the major problems with quality that you notice?
3. How are these problems addressed?
4. What are some of the barriers to getting high-quality data? How do you address those barriers?
5. What is the deadline for completing the forms?
6. What happens if data are not complete or if they are incorrect or have missing information?
7. Do you think the quality of the data that you report can be improved?
8. How are data quality issues addressed?

Part 7. Data Use

1. How are data generated in the HIS used to make programmatic decisions? Can you give an example of a programmatic decision you've made based on these data?
2. How are HIS performance indicators reported? Are the data shared routinely and ad hoc? Beyond your reporting obligations, do you share or discuss these data with others involved in implementing other data sources, including supervisors, health facility staff, community health workers, or community members? If you do, how do you discuss the subject? How often?
3. Do you conduct or attend interagency data review meetings? If so, how often?
4. Do health facilities or community health workers share with their communities the data they collect and report? If so, please describe what they do. Are community members interested in the data? How can you tell?

Part 8. Opportunities for Improving Measurement of HIS

1. Can you suggest opportunities to improve the measurement?
2. Do you want to describe lessons learned or challenges you've faced in implementing the HIS?

Part 9. Recommendations and Ending the interview

Thank you, you've given us a lot of valuable information about the data collection and reporting process from your perspective. Now I'd like to ask you about your recommendations. If you could change things in the HIS process, what would you change or do differently? What would you focus on first?

Closing

That covers the prepared questions for the interview. We will analyze the information you and others gave me. Your responses will help as we prepare a draft for the case study report and guide on HIS performance measurement. All of your responses will be anonymous. We will group all the responses together before we analyze them.

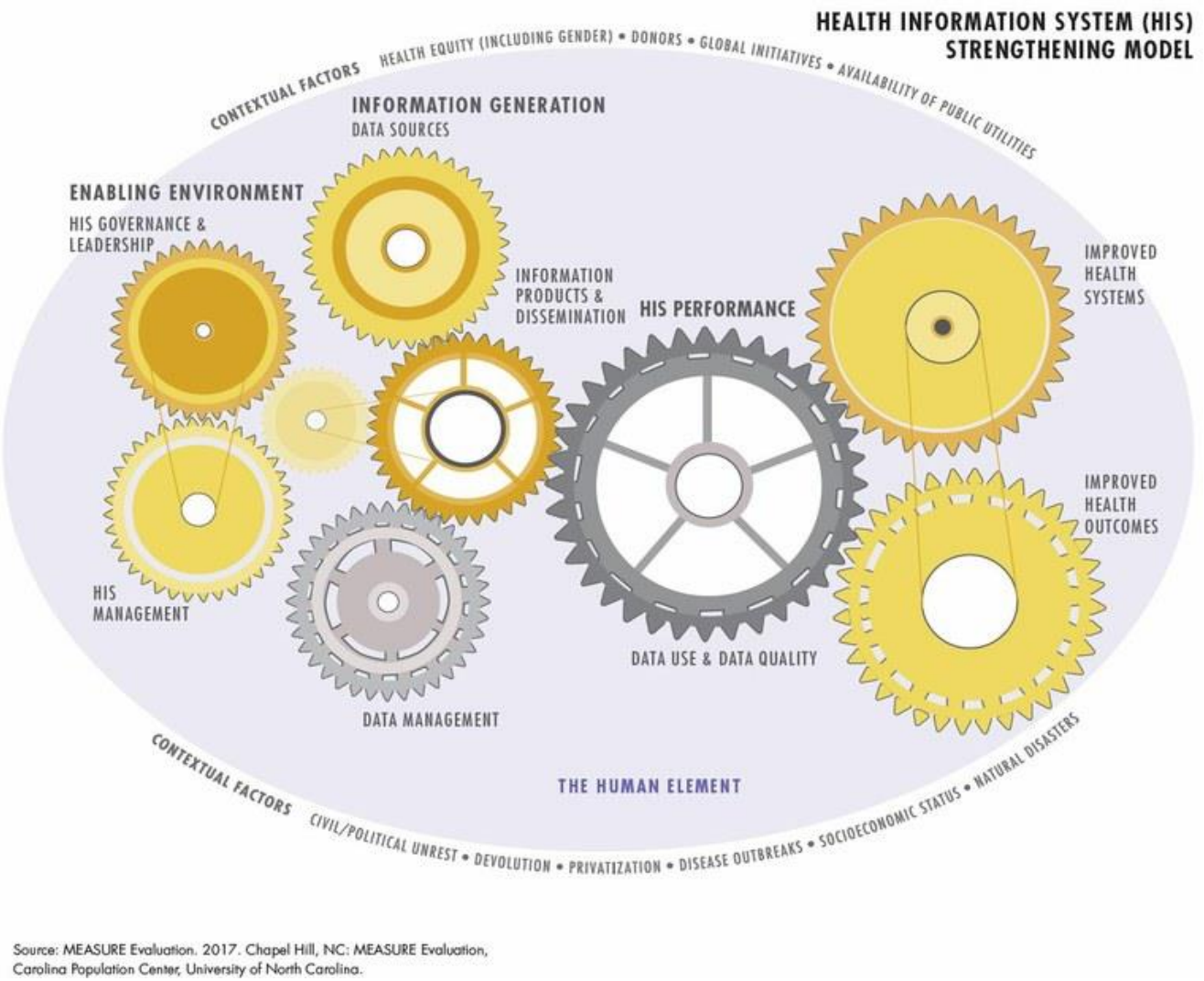
Do you have something you want to add?

Thank you for your time. I've learned a lot from you today, and I really appreciate your insights.

END

End date of interview	
End time	

APPENDIX 3. HEALTH INFORMATION SYSTEM STRENGTHENING MODEL



Source: MEASURE Evaluation. 2017. Chapel Hill, NC: MEASURE Evaluation, Carolina Population Center, University of North Carolina.

Source: MEASURE Evaluation. (2017). HIS Strengthening Model, Health Information Systems Strengthening Resource Center. Retrieved from https://www.measureevaluation.org/his-strengthening-resource-center/his-strengthening-model

APPENDIX 4. COUNTRY SELECTION

Kenya established a pilot health information system (HIS) in 1976. In 2008, the Health Metrics Network assessed Kenya's HIS and identified several gaps, such as a lack of HIS policy guidelines, weak data linkages and sharing from subsystems, inadequate capacity in data management, a lack of HIS scientists at all levels, a lack of operating guidelines at all levels, an inadequate infrastructure, incomplete data, a lack of a data warehouse, and a lack of integrated standardized data collection and reporting tools (Republic of Kenya, 2008).

Since 2005, MEASURE Evaluation has worked with the Kenya Ministry of Health to helps integrate the country's health data. Through the PIMA project, which started in 2012, MEASURE Evaluation is working with Kenya to build monitoring and evaluation capacity, which will help identify information needs at the national and subnational levels and devise ways to fill those needs. PIMA focuses on the Ministry of Health Divisions of Malaria Control, Reproductive Health, Community Health Strategy, Disease Surveillance and Response, and Integrated Disease Surveillance and Strategy. The project also helps Kenya's 47 CHMTs. One part of the U.S. Agency for International Development/Kenya strategy, through the Country Development Cooperation Strategy, is to support the national HIS, including building a strong HIS at all levels. These efforts include procuring essential medical commodities, improving supply chains, setting up information systems, and developing innovative financing mechanisms to improve the well-being of Kenyans (U.S. Agency for International Development/Kenya, 2014a).

APPENDIX 5. HIS INDICATOR BANK LITERATURE SOURCES

AbouZahr, C. (2013). *Assessing and monitoring the performance of health information systems: Metrics and models.* Health Information Systems Knowledge Hub Working Paper 29. Brisbane, Australia: University of Queensland.

Alva, S., Kleinau, E., Pomeroy, A., & Rowan, K. (2009). *Measuring the impact of health systems strengthening: A review of the literature.* Washington, DC, USA: United States Agency for International Development.

Aqil, A., & Lippeveld, T. (2009). *PRISM tools for assessing, monitoring, and evaluating RHIS performance.* Chapel Hill, NC, USA: MEASURE Evaluation, University of North Carolina. Retrieved from http://www.cpc.unc.edu/measure/publications/ms-09-34.

Boerma, T., Abou-Zahr, C., Bos, E., Hansen, P., Addai, E., & Low-Beer, D. (2010). *Monitoring and evaluation of health systems strengthening: An operational framework.* Geneva, Switzerland: World Health Organization.

DeZalia, Mark. (2015, March). *Master facility lists: Why is PEPFAR interested?* Opening remarks at Master Facility List meeting, March 23, 2015.

The Global Fund to Fight AIDS, Tuberculosis and Malaria. (2011). *Monitoring and evaluation toolkit: HIV/AIDS, tuberculosis, malaria and health and community systems strengthening.* (4th ed.). Geneva, Switzerland: The Global Fund to Fight AIDS, Tuberculosis and Malaria.

Grun, R. E. (2006). *Monitoring and evaluating projects: A step-by-step primer on monitoring, benchmarking, and impact evaluation, draft health nutrition and population.* Washington, DC, USA: The World Bank Human Development Network.

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Hutchinson, P. L., & LaFond, A. K. (2004). *Monitoring and evaluation of decentralization reforms in developing country health sectors.* Bethesda, MD, USA: The Partners for Health Reform Plus.

International Health Partnership. (2014). Data dashboard. Retrieved from https://www.internationalhealthpartnership.net/en/pages-to-check/2014-monitoring-round/data-dashboard/

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Knowles, J., Leighton, C., & Stinson, W. (1997). *Measuring results of health sector reform for system performance: A handbook of indicators.* Bethesda, MD, USA: Partnerships for Health Reform.

LaFond, A., & Brown, L. (2003). A guide to monitoring and evaluation of capacity-building interventions in the health sector in developing countries. In MEASURE Evaluation (Ed.), *MEASURE Evaluation Manual Series, No. 7*. Chapel Hill, NC, USA: University of North Carolina at Chapel Hill, Carolina Population Center.

Liu, X., Hotchkiss, D. R., Bose, S., Bitran, R., & Giedion, U. (2004). *Contracting for primary health services: Evidence on its effects and a framework for evaluation*. Bethesda, MD, USA: Partners for Health Reform Plus.

Management Sciences for Health. (2006). *Menu of indicators on management and leadership capacity development*. Washington, DC: United States Agency for International Development.

U.S. President's Emergency Plan for AIDS Relief. (2011). *Capacity building and strengthening framework*. Washington, DC, USA: United States President's Emergency Plan for AIDS Relief.

World Health Organization. (2003). *Tools for assessing the operationality of district health systems*. Retrieved from http://www.who.int/management/district/assessment/assessment_tool.pdf

World Health Organization. (2008). *Health information systems: Toolkit on monitoring health systems and strengthening*. Retrieved from http://www.who.int/healthinfo/statistics/toolkit_hss/EN_PDF_Toolkit_HSS_InformationSystems.pdf

World Health Organization. (2008). Health Metrics Network Framework. Retrieved from http://www.who.int/healthinfo/country_monitoring_evaluation/documentation/en/

World Health Organization. (2009). *Handbook on monitoring and evaluation of human resources for health: With special applications for low- and middle-income countries*. Geneva, Switzerland: World Health Organization.

World Health Organization. (2010). *Monitoring the building blocks of health systems: A handbook of indicators and their measurement strategies*. Geneva, Switzerland: World Health Organization.

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APPENDIX 6. CHALLENGES IN THE ENABLING ENVIRONMENT AND INFORMATION GENERATION OF THE HEALTH INFORMATION SYSTEM IN KENYA

1. Challenges in the Enabling Environment

The enabling environment of the Health Information Systems Strengthening Model focuses on governance and leadership and health information system (HIS) management. HIS governance and leadership involves legislation, partnerships and coalition building, policies and standards, and the presence of HIS champions. HIS management covers activities such as HIS financing, human resources for HIS, training and continuous education, information management, and infrastructure development. For the Kenya case study, MEASURE Evaluation staff interviewed key informants about challenges they faced in the enabling environment (MEASURE Evaluation, 2017). Respondents expressed challenges in the following: communication and coordination; training, staffing, and financial investment; and information communication and technology (ICT) infrastructure for HIS management.

1.1 Communication and Coordination

Although governance and coordination structures are in place to coordinate the HIS at the national level, several respondents mentioned issues in communication and coordination, particularly between the national and county levels. Multiple respondents said that although the government developed guidelines and protocols at the national level, these guidelines were not communicated to the county level. As one respondent reported, "the information we have up there doesn't go down there." In addition, some respondents shared that there may not be enough oversight of the counties in data collection. The Tuberculosis Unit reported that since devolution, "I don't think they have been providing adequate oversight to ensure data collection is up to standard. So, in a way, this to me, yes it has affected, but it's something that can get better." Respondents also mentioned issues with partner coordination. One respondent commented, "There is a lot of duplication in partnerships. So, we gave partner A supporting something, but partner X, Z, W doing almost the same thing. [It's] very uncoordinated."

1.2 HIS Management

Several respondents described challenges in maintaining staff, having adequate training, and ensuring financial investment in the HIS. For staffing, several respondents reported limited staffing in both monitoring and evaluation and ICT to support the HIS, particularly at the facility and county levels. One respondent from the National Public Health Laboratory Services mentioned, "Sometimes, we are not enough, especially when we go to the counties. The information system [cannot] cope with the amount of work expected." Several respondents also described how facility staff are double-tasked and overburdened with their clinic duties and reporting demands. One respondent from AIDS, Population and Health Integrated Assistance (APHIA) Plus said, "If you look at the data demand and the reporting demand of a facility the number of tools that are there in a facility, they're quite many. There are so many registers that capture data…two or three people in these facilities can't handle data verification."

Several respondents noted the lack of training at the facility, county, and national levels, including the lack of training in ICT; technologists and clinicians not adequately trained in data collection, monitoring and evaluation, and reporting; and clinicians double-tasked with reporting in addition to their clinical duties. One representative from the National AIDS and STI Control Programme described in terms of HIV and AIDS testing and counseling reporting, "This has become a huge problem with devolution and healthcare workers being moved around. So, you'll find a set proportion of healthcare workers failing their quality checks simply because they have not been trained, the counties have less people, and how little they have due regard with the trainings and you see that a lot with devolution. But we are correcting that now by training more people with the support that we have from Global Fund and CDC." There was also mention of training not conducted at the correct time, as in the case of electronic medical records (EMRs). One respondent from APHIA Plus shared, "You were trained, for example in January, but rollout will come somewhere after 6 months. So, when they were trying to implement the system, when they were now bringing the infrastructure, the guys have now forgotten about already what they were trained on." He also mentioned that facilities did not appreciate the reporting capabilities of the EMR system. He stated, "So really because one, they were not appreciating the outputs they were getting from the system, they were using the system when they want. Most sites use the system when they want and when they wish. And that has been a big problem. That's why you can't rely on any data now that streams in from our facilities for EMRs."

Respondents also noted that systems supported by donors had higher data quality and data that were more likely to be used. For example, a representative from APHIA Plus shared, "…if you go to HIV data, I'll say somehow the HIV data is not perfect but cleaner than the other data. Because the donor has tried as much as possible to rely on that data for their planning." Several individuals reported that there is a question of sustainability due to the limited support from the government in financing the HIS and the reliance on partners for financial support. Respondents also reported difficulties in getting investments for HIS from partners.

1.3 ICT Infrastructure

Having reliable and updated ICT infrastructure affects HIS data quality and use. Some respondents at the NPHL reported having outdated equipment and the lack of an Internet connection, which prevent them from producing health information. They stated, "Because we lack the kind of computers, they are not high-speed computers, they've been used for 5-6 years. Some of them are not working." An APHIA Plus respondent reported optimism with the ICT infrastructure in Kenya: "With Internet being nearly available to everyone, and mobile telephone being cheap, I think there'll be convergence of technology and we will be able to move astride. Previously, 4 years ago Internet was a very big issue. Now in Nairobi, we have five bar nearly everywhere. Several counties have free Wi-Fi, so even implementing systems cannot be a problem. The cost of hardware is going down and down." Other respondents shared the potential of ICT infrastructure to improve reporting levels. For example, an APHIA Plus respondent shared how ICT can improve low reporting rate at the community-level: "Partners have tried to use m-health to combat the low reporting rate by community-level."

Other respondents said that even though the ICT infrastructure may be in place, it is not being used properly. A Palladium staff member commented that there are multiple computers at health facilities that are being used for different purposes, creating inefficiencies. He stated, "If you have this computer here, we are maybe

using 10% of that computer. Then the next day you here, they are coming with another set of computers. We've gotten into scenarios where you go to a facility where you have a computer put here and it's only being used for logistics and nothing else. And it's locked. Others have gone to facilities and lock the system to use some particular software and nothing else. So, the computer is there."

2. Challenges in Information Generation

Information generation involves collecting, cleaning, processing, managing, and analyzing health and health-related data from data sources (MEASURE Evaluation, 2016). Although DHIS 2 is a national platform for Kenya, there are challenges in integrating, collecting, and processing data from disparate data sources. The study team obtained the Kenya National E-Health Strategy (Ministry of Medical Services & Ministry of Public Health and Sanitation, 2011) and the Health Sector Referral Strategy (Ministry of Health, n.d.-a), although the team was not able to interview a representative from the eHealth unit or the referral unit. The Kenya National E-Health Strategy mentioned HIS as a key strategic area of intervention. The Strategy addresses the need to explore the use of enterprise architecture for the deployment of HIS and outlines a phased approach for e-health and HIS. Kenya's Health Sector Referral Strategy outlines an approach for improving HIS by developing standard referral forms, referral registers, and referral indicators in DHIS 2 and linking the e-referral system to the HIS (Ministry of Health, n.d.-a). Respondents shared challenges associated with automating data entry, interoperability of data sources, parallel systems, and shortage of HIS tools.

2.1 Automating Data Entry

Data quality can improve by automating data entry at the lowest levels to reduce redundancy and errors when transferring data from the lower level, such as the facility or community level, to a higher level, such as the county level or the national health management information system. The Integrated Human Resource Information System and the Kenya Medical Supplies Authority reported that they have automated or are in the process of automating data entry at the facility and county levels, reducing manual paper-based data entry. A representative from the Kenya Medical Supplies Authority reported, "If a facility has the technology and systems, they either upload into the LMIS or punch it themselves. They don't need to submit a manual document to the county." Other organizations such as the National AIDS Control Council and the Civil Registration Department reported wanting to automate data at the lowest level to improve data quality and ensure that the county and national levels will be primarily responsible for data verification.

2.2 Interoperability

Several health programs have integrated their data sources into DHIS 2, including the Malaria, HIV/AIDS, and Tuberculosis programs. The Kenya Medical Supplies Authority has developed a central platform for the electronic supply chain management system for all users from facilities, counties, and health programs so they can order, procure, and distribute drugs to facilities. However, other organizations, such as the NPHL, reported difficulties in integrating their data, particularly with EMR. The NPHL representative said that they have seen interoperability issues, particularly with EMR. He stated, "People are forced, especially in the counties with different systems of data collection, but they don't communicate with each other. The interoperability is not there. [There] are different EMRs. But so far, anybody [from] any facility, [can use a

different software], whether it is standard or not standard. There is no ability to communicate to other systems."

2.3 Parallel Systems

Parallel systems increase errors resulting from duplicate entry or in transferring data from paper to electronic forms, and they reduce overall data quality. The NPHL shared that there are parallel reporting systems for laboratory commodities, with the Ministry of Health reporting data to DHIS 2 and the Clinton Health Access Initiative reporting HIV and AIDS laboratory commodity data to a separate system. The system used by the Clinton Health Access Initiative is not available in all counties, only in the areas where the donor is supporting activities. A representative from Palladium described parallel systems in facilities implementing EMR with facilities using both paper and electronic forms. APHIA Plus staff shared how Data for Accountability, Transparency, and Impact (DATIM) is being used over DHIS 2, particularly for HIV and AIDS activities and indicators. He stated, "For us, now, we need to report through DATIM for HIV indicators." The NPHL representative also indicated using DATIM for President's Emergency Plan for AIDS Relief reporting and sometimes needing to double-enter data: "For DATIM, there are some indicators that we are supposed to report for laboratory…we print out data and then re-enter instead of DATIM pulling from DHIS 2. Part of this is to do with data exchange for this platform."

2.4 Shortage of Tools

The shortage of tools to enter and compile health information prevents data from being entered, hindering data quality and ultimately data use. NPHL staff reported that they experienced a shortage of tools, stating, "Sometimes when there are not enough tools then people fail to report. So that can also affect the reporting rate." For EMR, some facilities are missing components in the system, such as the laboratory component. Palladium staff noted, "…when you do support supervision, you find lab component is missing…The lab is still left behind in terms of EMR." In another instance, the tool may not be appropriate to capture the activities. Staff from the African Medical and Research Foundation said that their daily activity registers were not adequately captured in DHIS 2.

3. Discussion

Improving the enabling environment and information generation of the HIS positively affects the data quality and use of the HIS. Increasing communication among the national and county levels, coordinating among partners, improving training of HIS staff to ensure better data quality, and improving ICT infrastructure to increase the efficiency of equipment use and Internet connectivity will enable organizations to better access data to enter and use for making decisions. Improving the information generation components by automating data entry, improving interoperability, reducing parallel systems, and addressing the shortage of tools will also improve data quality. Automating data entry at the lowest levels will help reduce errors that come from transferring data from one level to another. Increasing interoperability of disparate data systems will enable decision makers to access the information they need. Reducing parallel systems involving both electronic and paper-based systems can improve data quality and reduce redundancy caused by entering data twice. Reducing the shortage of tools will enable facility and county staff to enter the data accurately and correctly,

improving data quality. By improving these aspects and addressing these challenges, Kenya will strengthen the data quality and data use of the HIS.

APPENDIX 7. EXTRACTED DATA QUALITY INDICATORS THAT PARTIALLY OR EXACTLY MATCHED HIS GLOBAL INDICATORS

Indicator from Kenya document review	Kenya source	Description	Match	Indicator	Source of Indicator match
1. % of facilities with submitting timely, complete and accurate information	Garissa County Health Sector M&E Plan	Baseline (2012), Mid-term (2015), Target (2018)	Partially	Percentage of districts that submit timely, complete, accurate reports to national level	WHO. (2010). Monitoring the Building Blocks of Health Systems: A Handbook of Indicators and their Measurement Strategies. Geneva: World Health Organization.
2. % of health facilities with DQA	Garissa County Health Sector M&E Plan	Baseline (2012), Mid-term (2015), Target (2018)	Partially	Data quality assessments carried out and published within past three years	WHO. (2010). Monitoring the Building Blocks of Health Systems: A Handbook of Indicators and their Measurement Strategies. Geneva: World Health Organization.
3. % of planning units submitting timely, complete, and accurate information	Health Sector M&E Framework, Garissa County Health Sector M&E Plan	Baseline (2012), Mid-term (2015), Target (2017)	Partially	WHO (2008): Percentage of districts that submit timely, complete, accurate reports to national level	WHO (2008). Health Information Systems: Toolkit on monitoring health systems and strengthening. Available at: http://www.who.int/healthinfo/statistics/toolkit_hss/EN_PDF_Toolkit_HSS_Information Systems.pdf
4. % of facilities submitting timely, complete, and accurate information	Health Sector M&E Framework	Baseline (2012), Mid-term (2015), Target (2017)	Partially	Percentage of districts that submit timely, complete, accurate reports to national level	WHO (2008). Health Information Systems: Toolkit on monitoring health systems and strengthening. Available at: http://www.who.int/healthinfo/statistics/toolkit_hss/EN_PDF_Toolkit_HSS_Information Systems.pdf

Indicator from Kenya document review	Kenya source	Description	Match	Indicator	Source of Indicator match
5. Proportion of planned annual DQA activities conducted at all levels	National Strategic Plan for Tuberculosis, Leprosy, and Lung Health	Year 1–Year 4 targets	Partially	National DQA SOP and tools are routinely used at subnational levels	MEASURE Evaluation Tanzania Sustainability Framework (2015).
6. Proportion of subcounties conducting monthly data review meetings	National Strategic Plan for Tuberculosis, Leprosy, and Lung Health	Year 1–Year 4 targets	Partially	3.1 Surveillance data are disseminated and fed back through regularly published weekly, monthly or quarterly bulletins	WHO (2008). Health Metrics Network (HMN Framework) Available at: http://www.who.int/healthmetrics/tools/en/
7. % of national and counties submitting timely data (disaggregated by source)	Division of National Public Health Laboratory Services M&E Plan	NR	Partially	Timeliness of reporting specified indicators†	USAID. (2012). Health System 20/20 Final Project Report
8. % of reports submitted segregated by reporting levels (national, county, MOH, and partners)	Division of National Public Health Laboratory Services M&E Plan	NR	Partially	3.2 Districts or similar administrative units compile their own monthly/quarterly and annual summary reports, disaggregated by health facility	WHO (2008). Health Information Systems: Toolkit on monitoring health systems and strengthening. Available at: http://www.who.int/healthinfo/statistics/toolkit_hss/EN_PDF_Toolkit_HSS_InformationSystems.pdf
9. No. of RDQA visits per national/counties	Division of National Public Health Laboratory Services M&E Plan	NR	Partially	Data quality assessments carried out and published within the past three years, using internationally agreed quality criteria, such as Data Quality Assessment Framework	WHO. (2010). Monitoring the Building Blocks of Health Systems: A Handbook of Indicators and their Measurement Strategies. Geneva: World Health Organization.
10. Proportion of facilities with monthly reports on TB/MDR-TB	National Strategic Plan for Tuberculosis, Leprosy, and Lung Health	Year 1–Year 4 targets	Partially	Completeness of facility reporting	WHO. (2012). Assessment of health facility data quality. Data Quality Report Card: Cambodia, 2012. Available at: http://www.who.int/healthinfo/KH_DataQualityReportCard_2012.pdf?ua=1

Indicator from Kenya document review	Kenya source	Description	Match	Indicator	Source of Indicator match
11. Proportion of subcounties with timely reports and monthly returns	National Strategic Plan for Tuberculosis, Leprosy, and Lung Health	Year 1–Year 4 targets	Partially	2.4 Percentage of districts submitting weekly or monthly surveillance reports on time to the next-higher level	WHO (2008). Health Metrics Network (HMN Framework) Available at: http://www.who.int/healthmetrics/tools/en/
12. Proportion of facilities reporting on all TB/HIV indicators monthly through the national reporting system (DHIS)	National Strategic Plan for Tuberculosis, Leprosy, and Lung Health	Year 1–Year 4 targets	Partially	2.3 Percentage of health facilities submitting weekly or monthly surveillance reports on time to the district level	WHO (2008). Health Metrics Network (HMN Framework) Available at: http://www.who.int/healthmetrics/tools/en/
13. Proportion of facilities using the integrated tool to report through DHIS	National Strategic Plan for Tuberculosis, Leprosy, and Lung Health	Year 1–Year 4 targets	Partially	2.3 Percentage of health facilities submitting weekly or monthly surveillance reports on time to the district level	WHO (2008). Health Metrics Network (HMN Framework) Available at: http://www.who.int/healthmetrics/tools/en/
14. Proportion of registered CUs reporting community TB activities through DHIS/TIBU	National Strategic Plan for Tuberculosis, Leprosy, and Lung Health	Year 1–Year 4 targets	Partially	2.3 Percentage of health facilities submitting weekly or monthly surveillance reports on time to the district level	WHO (2008). Health Metrics Network (HMN Framework) Available at: http://www.who.int/healthmetrics/tools/en/
15. Facilities submitting monthly HMIS information in DHIS	Bungoma County Strategic and Investment Plan	Previous year total, previous year targets, performance (targets/actual)	Partially	2.3 Percentage of health facilities submitting weekly or monthly surveillance reports on time to the district level	WHO (2008). Health Metrics Network (HMN Framework) Available at: http://www.who.int/healthmetrics/tools/en/
16. Community deaths certified using verbal autopsies	Bungoma County Strategic and Investment Plan	Previous year total, previous year targets, performance (targets/actual)	Partially	2.8 Verbal autopsy tool Note: Skip this item if there is no DSS or SRS; 2.4 Proportion of all deaths coded to ill-defined causes (%) (garbage codes) Note: Skip this item if there is no cause-of-death registration	WHO (2008). Health Metrics Network (HMN Framework) Available at: http://www.who.int/healthmetrics/tools/en/

Indicator from Kenya document review	Kenya source	Description	Match	Indicator	Source of Indicator match
17. Proportion of facilities reporting mortality statistics using ICD-10	National Strategic Plan for Tuberculosis, Leprosy, and Lung Health	Year 1–Year 4 targets	Partially	2.4 Proportion of all deaths coded to ill-defined causes (%) (garbage codes) Note: Skip this item if there is no cause-of-death registration	WHO (2008). Health Metrics Network (HMN Framework) Available at: http://www.who.int/healthmetrics/tools/en/
18. Facility deaths certified using ICD-10 coding	Bungoma County Strategic and Investment Plan	Previous year total, previous year targets, performance (targets/actual)	Partially	ICD-10 used in district hospitals and causes of death reported to a national level	WHO. (2010). Monitoring the Building Blocks of Health Systems: A Handbook of Indicators and their Measurement Strategies. Geneva: World Health Organization.
19. Number of health facilities reporting	Kakamega County Health Sector Strategic and Investment Plan	Previous year total, previous year targets, performance (targets/actual)	Partially	2.3 Percentage of health facilities submitting weekly or monthly surveillance reports on time to the district level	WHO (2008). Health Metrics Network (HMN Framework) Available at: http://www.who.int/healthmetrics/tools/en/
20. % reporting timely	Kakamega County Health Sector Strategic and Investment Plan	Previous year total, previous year targets, performance (targets/actual)	Partially	2.3 Percentage of health facilities submitting weekly or monthly surveillance reports on time to the district level	WHO (2008). Health Metrics Network (HMN Framework) Available at: http://www.who.int/healthmetrics/tools/en/
21. % sub counties reporting on DHIS	Kakamega County Health Sector Strategic and Investment Plan	Previous year total, previous year targets, performance (targets/actual)	Partially	2.3 Percentage of health facilities submitting weekly or monthly surveillance reports on time to the district level	WHO (2008). Health Metrics Network (HMN Framework) Available at: http://www.who.int/healthmetrics/tools/en/
22. Data collection: routine health information—monthly submission of data from all the facilities in the 12 subcounties	Kakamega County Health Sector Strategic and Investment Plan	Baseline and annual targets for each year from Year 1 to Year 5	Partially	2.3 Percentage of health facilities submitting weekly or monthly surveillance reports on time to the district level	WHO (2008). Health Metrics Network (HMN Framework) Available at: http://www.who.int/healthmetrics/tools/en/

Indicator from Kenya document review	Kenya source	Description	Match	Indicator	Source of Indicator match
23. Data collection: vital events (births, deaths): subcounty health records information officers to collect all data from registrar of births and deaths	Kakamega County Health Sector Strategic and Investment Plan	Baseline and annual targets for each year from Year 1 to Year 5	Partially	2.3 Percentage of health facilities submitting weekly or monthly surveillance reports on time to the district level	WHO (2008). Health Metrics Network (HMN Framework) Available at: http://www.who.int/healthmetrics/tools/en/
24. Data collection: health-related sectors: subcounty health records information officers to collect relevant data from other sectors	Kakamega County Health Sector Strategic and Investment Plan	Baseline and annual targets for each year from Year 1 to Year 5	Partially	2.3 Percentage of health facilities submitting weekly or monthly surveillance reports on time to the district level	WHO (2008). Health Metrics Network (HMN Framework) Available at: http://www.who.int/healthmetrics/tools/en/
25. Data collection: surveillance—routine disease surveillance data collection in all subcounties	Kakamega County Health Sector Strategic and Investment Plan	Baseline and annual targets for each year from Year 1 to Year 5	Partially	2.3 Percentage of health facilities submitting weekly or monthly surveillance reports on time to the district level	WHO (2008). Health Metrics Network (HMN Framework) Available at: http://www.who.int/healthmetrics/tools/en/
26. Data collection: research—surveys and research by the county every year	Kakamega County Health Sector Strategic and Investment Plan	Baseline and annual targets for each year from Year 1 to Year 5	Partially	2.3 Percentage of health facilities submitting weekly or monthly surveillance reports on time to the district level	WHO (2008). Health Metrics Network (HMN Framework) Available at: http://www.who.int/healthmetrics/tools/en/
27. Data analysis—monthly data analysis at all administrative levels, i.e., HMT, subcounty health teams, and county health management teams	Kakamega County Health Sector Strategic and Investment Plan	Baseline and annual targets for each year from Year 1 to Year 5	Partially	A designated and functioning institutional mechanism charged with analysis of health statistics, synthesis of data from different sources, and validation of data from population-based and facility-based sources. Body should be administratively separate from programmes	WHO. (2010). Monitoring the Building Blocks of Health Systems: A Handbook of Indicators and their Measurement Strategies. Geneva: World Health Organization.

Indicator from Kenya document review	Kenya source	Description	Match	Indicator	Source of Indicator match
				responsible for delivery of interventions. Should adhere to fundamental principles of official statistics.	
28. Information dissemination—upload all reports from 12 subcounties monthly on DHIS	Kakamega County Health Sector Strategic and Investment Plan	Baseline and annual targets for each year from Year 1 to Year 5	Partially	Completeness of facility reporting	USAID. (2012). Health System 20/20 Final Project Report
29. Number of DQAs done	Garissa County Health Sector M&E Plan	Not reported	Partially	Data quality assessments carried out and published within the past three years, using internationally agreed quality criteria, such as Data Quality Assessment Framework	WHO. (2010). Monitoring the Building Blocks of Health Systems: A Handbook of Indicators and their Measurement Strategies. Geneva: World Health Organization.
30. Timeliness of data received from the source	Garissa County Health Sector M&E Plan	Not reported	Partially	Timeliness of reporting specified indicators†	USAID. (2012). Health System 20/20 Final Project Report
31. % of NPHLS units/counties submitting timely data	Division of National Public Health Laboratory Services M&E Plan	Not reported	Partially	Timeliness of reporting specified indicators†	USAID. (2012). Health System 20/20 Final Project Report
32. No. of quarterly reports submitted to MOH	Division of National Public Health Laboratory Services M&E Plan	Not reported	Partially	3.2 Districts or similar administrative units compile their own monthly/ quarterly and annual summary reports, disaggregated by health facility	WHO (2008). Health Information Systems: Toolkit on monitoring health systems and strengthening. Available at: http://www.who.int/healthinfo/statistics/toolkit_hss/EN_PDF_Toolkit_HSS_Information Systems.pdf

Indicator from Kenya document review	Kenya source	Description	Match	Indicator	Source of Indicator match
33. Number of facilities reporting on malaria surveillance monthly	Malaria M&E Plan	Number	Partially	Percentage of health facilities submitting weekly or monthly surveillance reports on time to the district level	AbouZahr, Carla. (2013) Assessing and monitoring the performance of health information systems: metrics and models. Health Information Systems Knowledge Hub. Australia: University of Queensland.
34. Number of DQAs conducted	Malaria M&E Plan	Number	Partially	Data quality assessments carried out and published within the past three years, using internationally agreed quality criteria, such as Data Quality Assessment Framework	WHO. (2010). Monitoring the Building Blocks of Health Systems: A Handbook of Indicators and their Measurement Strategies. Geneva: World Health Organization.
35. Number of counties conducting DQAs	Malaria M&E Plan	Number	Partially	National DQA SOP and tools are routinely used at subnational levels	MEASURE Evaluation Tanzania Sustainability Framework (2015).
36. Proportion of facilities reporting monthly	Malaria M&E Plan	Percentage	Partially	2.3 Percentage of health facilities submitting weekly or monthly surveillance reports on time to the district level	WHO (2008). Health Metrics Network (HMN Framework) Available at: http://www.who.int/healthmetrics/tools/en/
37. Proportion of counties conducting DQAs	Malaria M&E Plan	Percentage	Partially	National DQA SOP and tools are routinely used at subnational levels	MEASURE Evaluation Tanzania Sustainability Framework (2015).
38. Number of facilities reporting through DHIS, IDSR	Malaria M&E Plan	Number	Partially	Completeness of facility reporting	WHO. (2012). Assessment of health facility data quality. Data Quality Report Card: Cambodia, 2012. Available at: http://www.who.int/healthinfo/KH_DataQualityReportCard_2012.pdf?ua=1
39. Availability of data	Kenya Vital Statistics Report	Percentage	Partially	Availability and accessibility of data sources	USAID. (2012). Health System 20/20 Final Project Report

Indicator from Kenya document review	Kenya source	Description	Match	Indicator	Source of Indicator match
40. Birth registration coverage	Kenya Vital Statistics Report	Percentage disaggregated by counties, region, place of occurrence (health facility or home), age of mother, marital status	Yes, Completely	Percentage of births registered	WHO. (2010). Monitoring the Building Blocks of Health Systems: A Handbook of Indicators and their Measurement Strategies. Geneva: World Health Organization.
41. Death coverage rate	Kenya Vital Statistics Report	Percentage disaggregated by counties, region, place of occurrence (health facility or home), sex, age	Yes, Completely	Percentage of deaths registered	WHO. (2010). Monitoring the Building Blocks of Health Systems: A Handbook of Indicators and their Measurement Strategies. Geneva: World Health Organization.
42. Causes of death coverage	Kenya Vital Statistics Report	Looks at top 10 leading causes of death by sex, age, disease, under 5 years of age, and overall	Partially	1. Under-5 mortality (all causes) V.A.1.1 Data-collection method: Data-collection method used for most recent data 2. Adult mortality (all causes) V.A.2.1 Data-collection method: Data-collection method used for most recent data	WHO (2008). Health Metrics Network (HMN Framework) Available at: http://www.who.int/healthmetrics/tools/en/
43. Reporting rate	The Annual Health Sector Performance Report	Percentage	Partially	Completeness of reporting (%)	USAID. (2012). Health System 20/20 Final Project Report
44. Reporting rate, by tool	The Annual Health Sector Performance Report	Percentage	Partially	Completeness of reporting (%)	USAID. (2012). Health System 20/20 Final Project Report
45. Reporting rate, by county	The Annual Health Sector Performance Report	Percentage	Partially	Completeness of reporting (%)	USAID. (2012). Health System 20/20 Final Project Report
46. Reporting rate by type of care and tier of care, by county	The Annual Health Sector Performance Report	Reporting Index	Partially	Completeness of reporting (%)	USAID. (2012). Health System 20/20 Final Project Report

APPENDIX 8. EXTRACTED DATA USE INDICATORS THAT PARTIALLY MATCHED HIS GLOBAL INDICATORS

Indicator	Kenya report	Description	Indicator as described in global source	Global source of indicator match
1. Facility management committee meetings held in past 12 months	Bungoma County Strategic and Investment Plan, Kakamega County Health Sector Strategic and Investment Plan	Previous year total, previous year targets, performance (targets/actual)	Does the district office have routine meetings for reviewing managerial or administrative matters?	MEASURE Evaluation (2009). PRISM Tools for Assessing, Monitoring, and Evaluating RHIS Performance.
2. # of sector quarterly reports produced and disseminated	Garissa County Health Sector M&E Plan	Baseline (2012), Midterm (2015), Target (2018)	3.2 Districts or similar administrative units compile their own monthly/quarterly and annual summary reports, disaggregated by health facility	WHO. (2008). Health Information Systems: Toolkit on monitoring health systems and strengthening
3. # of sector quarterly reports produced and disseminate information	Health Sector M&E Framework	Baseline (2012), Midterm (2015), Target (2017)	3.2 Districts or similar administrative units compile their own monthly/quarterly and annual summary reports, disaggregated by health facility	WHO. (2008). Health Information Systems: Toolkit on monitoring health systems and strengthening
4. Number of data demand and use guideline and training materials developed	National Strategic Plan for Tuberculosis, Leprosy, and Lung Health	Year 1–Year 4 targets	Presence of mechanisms to review the utility of current HIS indicators for planning, management, and evaluation process, and existence of process by which to adapt and modify accordingly	USAID. (2012). The Heath System Assessment Approach: A How-to Manual. Version 2.0. Health Systems 20/20.

Indicator	Kenya report	Description	Indicator as described in global source	Global source of indicator match
5. Proportion of targeted HCW trained on data demand and use	National Strategic Plan for Tuberculosis, Leprosy, and Lung Health	Year 1–Year 4 targets	Presence of mechanisms to review the utility of current HIS indicators for planning, management, and evaluation process, and existence of process by which to adapt and modify accordingly	USAID. (2012). The Heath System Assessment Approach: A How-to Manual. Version 2.0. Health Systems 20/20.
6. Proportion of counties developing and disseminating data products at least once every 6 months	National Strategic Plan for Tuberculosis, Leprosy, and Lung Health	Year 1–Year 4 targets	3.1 Surveillance data are disseminated and fed back through regularly-published weekly, monthly or quarterly bulletins	WHO. (2008). Health Metrics Network
7. Annual operational plan available for past year	Bungoma County Strategic and Investment Plan, Kakamega County Health Sector Strategic and Investment Plan	Previous year total, previous year targets, performance (targets/actual)	Availability of timely data analysis, as defined by stakeholders and users	USAID. (2012). The Heath System Assessment Approach: A How-to Manual. Version 2.0. Health Systems 20/20.
8. Annual stakeholders meeting held for past year	Bungoma County Strategic and Investment Plan, Kakamega County Health Sector Strategic and Investment Plan	Previous year total, previous year targets, performance (targets/actual)	Availability of timely data analysis, as defined by stakeholders and users	USAID. (2012). The Heath System Assessment Approach: A How-to Manual. Version 2.0. Health Systems 20/20.
9. Board meetings held in past 12 months	Bungoma County Strategic and Investment Plan, Kakamega County Health Sector Strategic and Investment Plan	Previous year total, previous year targets, performance (targets/actual)	Availability of timely data analysis, as defined by stakeholders and users	USAID. (2012). The Heath System Assessment Approach: A How-to Manual. Version 2.0. Health Systems 20/20.
10. Annual health stakeholders forum	Kakamega County Health Sector Strategic and Investment Plan	Baseline and annual targets for each year from Year 1 to Year 5	Availability of timely data analysis, as defined by stakeholders and users	USAID. (2012). The Heath System Assessment Approach: A How-to Manual. Version 2.0. Health Systems 20/20.

Indicator	Kenya report	Description	Indicator as described in global source	Global source of indicator match
11. Quarterly coordination meetings	Kakamega County Health Sector Strategic and Investment Plan	Baseline and annual targets for each year from Year 1 to Year 5	Availability of timely data analysis, as defined by stakeholders and users	USAID. (2012). The Heath System Assessment Approach: A How-to Manual. Version 2.0. Health Systems 20/20.
12. Monthly management meetings	Kakamega County Health Sector Strategic and Investment Plan	Baseline and annual targets for each year from Year 1 to Year 5	Availability of timely data analysis, as defined by stakeholders and users	USAID. (2012). The Heath System Assessment Approach: A How-to Manual. Version 2.0. Health Systems 20/20.
13. Gender mainstreaming—conduct quarterly meetings	Kakamega County Health Sector Strategic and Investment Plan	Baseline and annual targets for each year from Year 1 to Year 5	Availability of timely data analysis, as defined by stakeholders and users	USAID. (2012). The Heath System Assessment Approach: A How-to Manual. Version 2.0. Health Systems 20/20.
14. Annual work planning and reporting	Kakamega County Health Sector Strategic and Investment Plan	Baseline and annual targets for each year from Year 1 to Year 5	Availability of timely data analysis, as defined by stakeholders and users	USAID. (2012). The Heath System Assessment Approach: A How-to Manual. Version 2.0. Health Systems 20/20.
15. Quarterly stakeholder meetings held in past 12 months	Bungoma County Strategic and Investment Plan, Kakamega County Health Sector Strategic and Investment Plan	Previous year total, previous year targets, performance (targets/actual)	Availability of timely data analysis, as defined by stakeholders and users	USAID. (2012). The Heath System Assessment Approach: A How-to Manual. Version 2.0. Health Systems 20/20.
16. Number of quarterly review meetings conducted	Garissa County Health Sector M&E Plan	Not reported	Does the district office have routine meetings for reviewing managerial or administrative matters?	MEASURE Evaluation (2009). PRISM Tools for Assessing, Monitoring, and Evaluating RHIS Performance.
17. Number of quarterly stakeholders meeting held	Garissa County Health Sector M&E Plan	Not reported	Does the district office have routine meetings for reviewing managerial or administrative matters?	MEASURE Evaluation (2009). PRISM Tools for Assessing, Monitoring, and Evaluating RHIS Performance.
18. Number of reports and bulletin produced	Garissa County Health Sector M&E Plan	Not reported	Number of reports a typical health facility submits monthly, quarterly, or annually	USAID. (2012). The Heath System Assessment Approach: A How-to Manual. Version 2.0. Health Systems 20/20.

Indicator	Kenya report	Description	Indicator as described in global source	Global source of indicator match
19. Number of surveillance e-bulletins produced	Malaria M&E Plan	Number	3.1 Surveillance data are disseminated and fed back through regularly published weekly, monthly, or quarterly bulletins	WHO. (2008). Health Metrics Network
20. Number of publications resulting from the surveys	Malaria M&E Plan	Number	Did district/national RHIS office publish newsletter/report in past three months showing examples of use of information	MEASURE Evaluation (2009). PRISM Tools for Assessing, Monitoring, and Evaluating RHIS Performance.
21. Number of policy briefs resulting from the surveys	Malaria M&E Plan	Number	Policymakers and decision makers regularly use health information to evaluate performance and set health policies	WHO. (2008). Health Metrics Network
22. Proportion of Malaria Control Unit staff using Malaria Information Acquisition System for planning and budgeting	Malaria M&E Plan	Percentage	Use of data for planning, budgeting, or fundraising activities in the past year	USAID. (2012). The Heath System Assessment Approach: A How-to Manual. Version 2.0. Health Systems 20/20.
23. Number of dissemination meetings held	Malaria M&E Plan	Number	3.1 Surveillance data are disseminated and fed back through regularly published weekly, monthly, or quarterly bulletins	WHO. (2008). Health Metrics Network
24. Annual quantification reports completed	Malaria M&E Plan	Not reported	HIS information is readily available in a written annual (or biannual) report that pulls together and analyzes critical health information from all subsystems	WHO. (2008). Health Metrics Network

APPENDIX 9. EXTRACTED INDICATORS MAPPED TO DATA QUALITY ACCORDING TO THE HISSM

Indicator	Source
1. % of facilities submitting timely, complete, and accurate information	Garissa County Health Sector M&E Plan
2. % of planning units submitting timely, complete, and accurate information	Garissa County Health Sector M&E Plan, Health Sector M&E Framework
3. % of facilities submitting timely, complete, and accurate information	Health Sector M&E Framework
4. % of national and counties submitting timely data (disaggregated by source)	Division of National Public Health Laboratory Services M&E Plan
5. % of reports submitted segregated by reporting levels (national, county, MOH, and partners)	Division of National Public Health Laboratory Services M&E Plan
6. Proportion of facilities with monthly reports on TB/MDR-TB	National Strategic Plan for Tuberculosis, Leprosy, and Lung Health
7. Proportion of subcounties with timely reports and monthly returns	National Strategic Plan for Tuberculosis, Leprosy, and Lung Health
8. Proportion of facilities reporting on all TB/HIV indicators monthly through the national reporting system (DHIS)	National Strategic Plan for Tuberculosis, Leprosy, and Lung Health
9. Proportion of registered CUs reporting community TB activities through DHIS/TIBU	National Strategic Plan for Tuberculosis, Leprosy, and Lung Health
10. Facilities submitting monthly HMIS information in DHIS	Bungoma County Strategic and Investment Plan
11. Proportion of facilities reporting mortality statistics using ICD-10	National Strategic Plan for Tuberculosis, Leprosy, and Lung Health
12. Number of health facilities reporting	Kakamega County Health Sector Strategic and Investment Plan
13. % reporting timely	Kakamega County Health Sector Strategic and Investment Plan
14. % sub counties reporting on DHIS	Kakamega County Health Sector Strategic and Investment Plan
15. Data collection: routine health information—monthly submission of data from all the facilities in the 12 subcounties	Kakamega County Health Sector Strategic and Investment Plan
16. Data collection: vital events (births, deaths): subcounty HRIOs to collect all data from registrar of births and deaths	Kakamega County Health Sector Strategic and Investment Plan
17. Number of DQAs done	Garissa County Health Sector M&E Plan
18. Timeliness of data received from the source	Garissa County Health Sector M&E Plan
19. % of NPHLS units/counties submitting timely data	Division of National Public Health Laboratory Services M&E Plan
20. Number of quarterly reports submitted to MOH	Division of National Public Health Laboratory Services M&E Plan
21. Number of facilities reporting on malaria surveillance monthly	Malaria M&E Plan
22. Proportion of facilities reporting monthly	Malaria M&E Plan
23. Number of facilities reporting through DHIS, IDSR	Malaria M&E Plan

Indicator	Source
24. Proportion of Malaria Control Unit staff reporting through Malaria Acquisition Information System	Malaria M&E Plan
25. Availability of data	Kenya Vital Statistics Report
26. Birth registration coverage	Kenya Vital Statistics Report
27. Death coverage rate	Kenya Vital Statistics Report
28. Causes of death coverage	Kenya Vital Statistics Report
29. Reporting rate	The Annual Health Sector Performance Report
30. Reporting rate, by tool	The Annual Health Sector Performance Report
31. Reporting rate, by county	The Annual Health Sector Performance Report
32. Reporting rate by type of care and tier of care, by county	The Annual Health Sector Performance Report

APPENDIX 10. KENYA-SPECIFIC INDICATORS MAPPED TO THE HISSM, BY INDICATOR TYPE AND RELATION TO DATA USE

Indicators	Data source	HISSM area	Relation to data use
1. Proportion of Malaria Control Unit staff using Malaria Information Acquisition System for planning and budgeting	Malaria M&E Plan	Data use	Outcome
2. # of sector quarterly reports produced and disseminated	Garissa County Health Sector M&E Plan	Information products and disseminations	Output
3. # of sector quarterly reports produced and disseminated	Health Sector M&E Framework	Information products and disseminations	Output
4. Proportion of counties developing and disseminating data products at least once every 6 months	National Strategic Plan for Tuberculosis, Leprosy, and Lung Health	Information products and disseminations	Output
5. Annual operational plan available for past year	Bungoma County Strategic and Investment Plan, Kakamega County Health Sector Strategic and Investment Plan	HIS management	Output
6. Number of reports and bulletin produced	Garissa County Health Sector M&E Plan	Information products and disseminations	Output
7. Number of surveillance e-bulletins produced	Malaria M&E Plan	Information products and disseminations	Output
8. Number of publications resulting from the surveys	Malaria M&E Plan	Information products and disseminations	Output
9. Number of policy briefs resulting from the surveys	Malaria M&E Plan	Information products and disseminations	Output
10. Annual quantification reports completed	Malaria M&E Plan	Information products and disseminations	Output
11. Facility management committee meetings held in past 12 months	Bungoma County Strategic and Investment Plan, Kakamega County Health Sector Strategic and Investment Plan	HIS management	Input
12. Number of data demand and use guideline and training materials developed	National Strategic Plan for Tuberculosis, Leprosy, and Lung Health	HIS leadership and governance	Input

Indicators	Data source	HISSM area	Relation to data use
13. Proportion of targeted HCW trained on data demand and use	National Strategic Plan for Tuberculosis, Leprosy, and Lung Health	HIS management	Input
14. Annual stakeholders meeting held for past year	Bungoma County Strategic and Investment Plan, Kakamega County Health Sector Strategic and Investment Plan	HIS management	Input
15. Board meetings held in past 12 months	Bungoma County Strategic and Investment Plan, Kakamega County Health Sector Strategic and Investment Plan	HIS management	Input
16. Annual health stakeholders forum	Kakamega County Health Sector Strategic and Investment Plan	HIS management	Input
17. Quarterly coordination meetings	Kakamega County Health Sector Strategic and Investment Plan	HIS management	Input
18. Monthly management meetings	Kakamega County Health Sector Strategic and Investment Plan	HIS management	Input
19. Gender mainstreaming—conduct quarterly meetings	Kakamega County Health Sector Strategic and Investment Plan	HIS management	Input
20. Annual work planning and reporting	Kakamega County Health Sector Strategic and Investment Plan	HIS management	Input
21. Quarterly stakeholder meetings held in past 12 months	Bungoma County Strategic and Investment Plan, Kakamega County Health Sector Strategic and Investment Plan	HIS management	Input
22. Number of quarterly review meetings conducted	Garissa County Health Sector M&E Plan	HIS management	Input
23. Number of quarterly stakeholders meetings held	Garissa County Health Sector M&E Plan	HIS management	Input

Indicators	Data source	HISSM area	Relation to data use
24. Number of dissemination meetings held	Malaria M&E Plan	HIS management	Input

MEASURE Evaluation

University of North Carolina at Chapel Hill

400 Meadowmont Village Circle, 3rd Floor

Chapel Hill, North Carolina 27517

Phone: +1-919-445-9359 • measure@unc.edu

www.measureevaluation.org

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