Routine Health Information Systems

A Curriculum on Basic Concepts and Practice

Syllabus

January 2017

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ACKNOWLEDGMENTS

CONTENTS

ABBREVIATIONS

AEDES	European Agency for Development and Health
DQR	data quality review
EA	enterprise architecture
HMN	Health Metrics Network
HS	health system(s)
HIS	health information system(s)
HISP	Health Information Systems Program
HMN	Health Metrics Network
ICT	information and communication technology
INSP	National Institute of Public Health in Mexico
JSI	John Snow, Inc.
LMIC	low- and middle-income country
MDG	Millennium Development Goal
M&E	monitoring and evaluation
MA4Health	Measurement and Accountability for Results in Health
OHIE	Open Health Information Exchange
PBF	performance-based financing
PHFI	Public Health Foundation of India
PRISM	Performance of Routine Health Information System Management
RDQA	routine data quality assessment
RHIS	routine health information system(s)
SDG	Sustainable Development Goal
SEARO	South-East Asia Regional Office
USAID	United States Agency for International Development
WHO	World Health Organization

INTRODUCTION

To ensure the delivery of good-quality health services to the people who need them, the World Health Organization (WHO) promotes strengthening the six building blocks of a health system: (1) governance and policy; (2) service delivery; (3) human resources; (4) health commodities; (5) health financing; and (6) health information systems (HIS). A strong HIS makes it possible to track progress on improving the other five health system building blocks and, ultimately, to monitor the achievement of the health-related Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs).

Strong health information systems that produce reliable, timely, and good-quality data are among several factors enabling health program managers to monitor, evaluate, and improve health system performance and make evidence-informed decisions. Since the 1990s, knowledge and understanding of the role of HIS development in global health systems have improved. Despite this, use of information for evidence-informed decision making—particularly data produced by routine health information systems (RHIS)—is still very weak in most low- and middle-income countries (LMICs). RHIS generate data collected at public and private health facilities and institutions, as well as at community-level healthcare posts and clinics. These data— generated at regular intervals of a year or less—cover health status, health services, and health resources. Some of the root causes of poor RHIS performance are ill-defined information needs; poor data quality; issues surrounding the use of information; limited human resource capacity; and the centralization and fragmentation of HIS.

At the Measurement and Accountability for Results in Health (MA4Health) Summit, in June 2015, the United States Agency for International Development (USAID), WHO, and the World Bank called for action "to improve health facility and community information systems including disease and risk surveillance and financial and health workforce accounts, empowering decision makers at all levels with real-time access to information."[1] Achieving this goal in 15 years—the deadline set by the global health agency leaders who attended the MA4Health Summit—will require building the capacity of developing countries to collect, manage, and interpret health data. And this, in turn, will require training on an unprecedented scale.

One focus of this training needs to be the RHIS—a main component of the broader HIS landscape. Many certificate, diploma, and degree programs related to clinical HIS and public health informatics are available, but relevant and well-structured courses on RHIS are few. The best of these are offered by the USAID-funded MEASURE Evaluation project, in the United States; the Free University of Brussels/European Agency for Development and Health (AEDES), in Belgium; the University of Oslo, in Norway; the National Institute of Public Health (INSP), in Mexico; the University of Queensland, in Australia; and Brandeis University, in the United States. But these courses are tailored to specific groups; to be useful for developing countries, they would have to be adapted.

In April 2015, RHIS curriculum experts from the institutions listed above gathered with other public health experts at MEASURE Evaluation's headquarters (in Chapel Hill, NC, USA) to explore the possibility of developing a standard but flexible RHIS curriculum that can enhance the RHIS-related knowledge and

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[1] Measurement and Accountability for Results in Health (MA4Health). (2015). Health measurement and accountability post 2015: Five-point call to action. Retrieved from http://ma4health.hsaccess.org/docs/support-document/5-point-call-to-action.pdf?sfvrsn=0.

competence of public health professionals in developing countries. Recognizing that the existing courses would be a good foundation on which to build such a curriculum, they discussed the feasibility of harmonizing these curricula to create a single one for use in diverse country contexts and accessible to all who can benefit from it. Through these conversations, an advisory committee (see Appendix 2) was established to plan, guide, and oversee the development and delivery of this core RHIS curriculum. Subsequently, a core technical team (Appendix 3) was formed to review the work of the groups (Appendix 4) charged with creating the new curriculum's 10 modules. Both the core team and the module group members benefited from the advisory committee's feedback as they refined the training materials. The result of these efforts is the curriculum on basic concepts and practice of RHIS presented here.

In this core RHIS course, the students will study the routine health facility-based and community-based information system (abbreviated as RHIS throughout this document), which is the most common source of information on health services management and programs. Using practical case studies, participants will learn how to improve the performance of RHIS, by producing reliable data to inform decisions at all levels of the health system. They will also come to understand the important contribution of information and communication technology.

COURSE OVERVIEW

Course Objectives

The purpose of this course is to build participants' knowledge of the basic core competencies to enhance their capacity to conceptualize, design, develop, govern, and manage an RHIS, and use the information generated to improve public health practice and service delivery.

The course is largely designed for classroom purposes, and therefore has no field experience component. If course participants are interested in building on the knowledge and skills they acquire in any of the course modules, they are encouraged to use the resource materials cited in each module and to pursue advanced courses.

RHIS Competencies Covered

At the end of this course, participants will have acquired the RHIS core competencies listed below. (Appendix 1 presents a detailed description of the core competencies across all health system levels.)

Core RHIS Competency Categories

- ☐ Data analysis, presentation, interpretation, and communication and reporting
- ☐ Data use, demand, and generation
- ☐ Data management
- ☐ Design, improvement, and implementation
- ☐ RHIS assessment and monitoring
- ☐ RHIS management
- ☐ Use of information and communication technology (ICT)
- ☐ HIS governance

Course Audience

This course addresses the health workforce at large: (1) policymakers and managers; (2) RHIS staff at national, intermediate, and facility levels; (3) care providers and health technicians; and (4) students in health sciences and practice. All participants should be engaged in or interested in performing tasks related to RHIS.

The course can be delivered to any one of these target audiences or a combination of them. We advise a facilitator who is training people in a particular personnel category to customize the course materials to the group's needs. Guidance for this is provided in the appendix of the *Facilitators' Guide*—another component of this curriculum.

Course Prerequisites

This course has no prerequisites. However, prior experience (academic or professional) with RHIS and/or strong interest in the RHIS domain can enhance the learning experience in the course. For example, it would be beneficial for participants to have already taken a basic course on monitoring and evaluation (M&E).

Course Summary

The course consists of 10 modules covering the key aspects of RHIS. The total duration of the course is 60 hours, which is equivalent to two weeks. A list of the modules with the duration of each appears below. Learning objectives and suggested references for each module can be found in Appendix 5. A generic agenda of the course is presented in Appendix 6.

Course Modules

INTRODUCTION TO RHIS

> Module 1: Health Systems and Health Information Systems (3 hours)

RHIS DATA GENERATION

> Module 2: Indicators and Data Collection and Reporting (6 hours)
> Module 3: Data Management Standards for Routine Health Information Systems (3 hours)
> Module 4: RHIS Data Quality (3 hours)
> Module 5: RHIS Data Analysis (9 hours)
> Module 6: RHIS Data Demand and Use (9 hours)

RHIS MANAGEMENT

> Module 7: RHIS Governance and Management of Resources (6 hours)
> Module 8: Information and Communication Technology for RHIS (6 hours)

RHIS STRENGTHENING AND REFORM

> Module 9: RHIS Performance Assessment (6 hours)
> Module 10: RHIS Design and Reform (9 hours)

Teaching Methods

Course delivery is based on adult learning principles. A range of teaching methods, such as lectures, discussions, case studies, exercises, and group work, will be used to address the varying learning styles of course participants. Each module has varied teaching approaches for its activities.

Course Materials

The course materials are the course syllabus, a facilitators' guide, PowerPoint presentations, and handouts (case studies, exercises, relevant RHIS tools, and additional reference materials).

Course Evaluation

The following evaluation methods are recommended:

- □ Pretests and posttests covering all 10 modules
- □ Simple daily participants' evaluation form on the following topics for facilitators to review:
  - Was the content clear?
    - ◆ Were the facilitators prepared and organized in conducting the session?
    - ◆ Overall impression of the day (create a form with ratings from 1 [dissatisfied] to 3 [satisfied])
- □ Daily group feedback focusing on take-home messages
- □ Final evaluation, covering the following topics:
  - Overall impressions
  - Comments on specific module presentation
  - Group comments and ranking
  - What worked best; what did not work
  - General and specific suggestions for improvement
- □ Assessment of facilitators

Certification

Give participants certificates confirming that they completed the course, if these are required by their affiliate institutions.

APPENDIX 1. CORE COMPETENCIES

Competency	Service Delivery Level	Intermediate Level	National Level
Data Analysis, Presentation, Interpretation, and Communication and Reporting			
Data Analysis			
Ability to make comparisons (across services, groups, geographic regions, and targets)	X	X	X
Ability to understand different ways to measure indicators (frequencies, means, proportions, rates, etc.)	X	X	X
Ability to conduct causal and process analysis	X	X	X
Knowledge of the e-system a country uses to analyze data	X	X	X
Data Presentation			
Data presentation (basic data visualization principles—tables, graphs, maps)	X	X	X
Ability to use basic chart, word processing, and presentation software	X	X	X
Data Interpretation			
Putting analysis together that tells you what happened and why	X	X	X
Ability to read a graph	X	X	X
Ability to synthesize results	X	X	X
Data Communication and Reporting			
Ability to develop messages and communicate results to appropriate audiences	X	X	X
Writing and verbal communication skills	X	X	X
Ability to write narrative reports		X	X
Ability to write a summary report (key bullets)	X		
Data Use, Demand, and Generation			
Data Use			
Problem identification	X	X	X
Ability to prioritize	X	X	X
Ability to identify solution (problem solving)	X	X	X
Advocacy: advocating solutions for identified issues	X	X	X
Action planning	X	X	X
Follow-up/monitoring	X	X	X
Identification of constraints on data use	X	X	X
Data Demand			
To value information	X	X	X
Communication for advocacy	X	X	X
Data Generation			
Make effective decisions about data collection tools		X	X

Understand data quality dimensions	X	X	X
Understand the different data sources	X	X	X
Understand the importance of reward and recognition in data generation	X	X	X
Understand the value of collecting the data	X	X	X
Ability to use an RHIS system to enter data	X	X	X
Data quality assurance	X	X	X
Data validation		X	X
Data Management			
Data storage: understanding data storage	X	X	X
Data cleaning: carrying out data cleaning techniques		X	X
Data quality: understanding data quality threats	X	X	X
Aggregating data by time, location, age, etc.	X	X	X
Identifying data and performing triangulation of data		X	X
Data sharing: understanding data sharing in an open environment	X	X	X
Data confidentiality: ability to carry out methods to protect confidentiality	X	X	X
Understanding basic concepts of interoperability		X	X
HIS platform maintenance		X	X
Design, Improvement, and Implementation			
Design a national list of essential indicators based on M&E framework			X
Design indicators and data collection reporting tools			X
Create needs assessment tools			X
Engage stakeholders	X	X	X
Develop organizational rules	X	X	X
Design indicators reference sheet			X
Design a master list of health facilities			X
Design a health system framework			X
Design enterprise architecture			X
RHIS Assessment and Monitoring			
Existing tools and methods: routine data quality assessment (RDQA), Performance of Routine Information System Management (PRISM) tool, data quality review (DQR), supervision tools		X	X
Assessment baseline		X	X
Midterm and end-point evaluation			X
Monitoring RHIS	X	X	X
RHIS for performance-based financing (PBF)	X	X	X

RHIS Management			
Financial Resources			
Budgeting, accounting		X	X
Outsourcing: record keeping			X
Contracting			X
Human Resources			
Planning	X	X	X
Recruitment		X	X
Retention	X	X	X
Monitoring	X	X	X
Job descriptions	X	X	X
Physical Resources			
Procurement		X	X
Maintenance		X	X
Utilities			
Requirements	X	X	
Hosting	X	X	
Monitoring	X	X	
Use of ICT			
ICT standards			X
Hardware devices/software	X	X	X
Appropriate/strategic use of ICT		X	X
Cost effectiveness			X
Development of applications			X
Interoperability			X
HIS Governance			
Leadership			X
Policy			X
Strategic planning		X	X
Rules, regulations, and operations	X	X	X
Accountability and transparency	X	X	X
Ethics	X	X	X

APPENDIX 2. ADVISORY COMMITTEE

Kathryn Patricia O'Neill, Co-Chair	World Health Organization (WHO), Switzerland
Theo Lippeveld, Co-Chair	MEASURE Evaluation, John Snow International (JSI), United States
Kavitha Viswanathan	WHO
Mark Landry	WHO/South-East Asia Regional Office (SEARO), India
Lisa Maniscalco	United States Agency for International Development (USAID)
Jørn Braa	University of Oslo, Norway
Petter Nielsen	University of Oslo, Norway
Maxine Whittaker	Queensland University, Australia
Jean-Pierre de La Malle	European Agency for Development and Health (AEDES), Belgium
Juan Eugenio Hernandez Ávila	National Institute of Public Health (INSP), Mexico
Sanjay Zodpey	Public Health Foundation of India (PHFI), India

APPENDIX 3. RHIS CURRICULUM CORE TECHNICAL TEAM

Mamadou Alimou Barry	MEASURE Evaluation/JSI
Kathryn Patricia O'Neil	WHO
Manish Kumar	MEASURE Evaluation, University of North Carolina at Chapel Hill (UNC)
Theo Lippeveld	MEASURE Evaluation/JSI
Hemali Kulatikala	MEASURE Evaluation/UNC
Tariq Azim	MEASURE Evaluation/JSI
Upama Khatri	MEASURE Evaluation/JSI
Evis Farka Haake	MEASURE Evaluation/JSI

APPENDIX 4. RHIS CURRICULUM CONTRIBUTORS

Module 1: Health Systems and Health Information Systems	Tariq Azim	MEASURE Evaluation/JSI
	Jean-Pierre de La Malle	AEDES
	Stephen Sapirie	MEASURE Evaluation/ Management Sciences for Health (MSH)
Module 2: Indicators and Data Collection and Reporting	Kola Oyediran	MEASURE Evaluation/JSI
	Moussa Ly	MEASURE Evaluation/JSI
	Sangeeta Singh	PHFI
	Jean-Pierre de La Malle	AEDES
Module 3: Data Management Standards for Routine Health Information Systems	Sergio Lins	MEASURE Evaluation/JSI
	Upama Khatri	MEASURE Evaluation/JSI
	David Boone	MEASURE Evaluation/JSI
	Kavitha Viswanathan	WHO
Module 4: RHIS Data Quality	Sergio Lins	MEASURE Evaluation/JSI
	Upama Khatri	MEASURE Evaluation/JSI
	David Boone	MEASURE Evaluation/JSI
	Kavitha Viswanathan	WHO
	Bob Pond	WHO
Module 5: RHIS Data Analysis	Tara Nutley	MEASURE Evaluation/Palladium
	Bob Pond	WHO
	Anastasia Gage	MEASURE/Evaluation/Tulane University
Module 6: RHIS Data Demand and Use	Eric Geers	MEASURE Evaluation/Palladium
	Juan Eugenio Hernandez Ávila	INSP
	Stephen Sapirie	MEASURE Evaluation/MSH
	Kavitha Viswanathan	WHO
Module 7: RHIS Governance and Management of Resources	Kola Oyediran	MEASURE Evaluation/JSI
	David Boone	MEASURE Evaluation/JSI
	Stephen Sapirie	MEASURE Evaluation/MSH

	Juan Eugenio Hernandez Ávila	INSP
	Sangeeta Singh	PHFI
Module 8: Information and Communication Technology for RHIS	Sam Wambugu	MEASURE Evaluation/ICF
	Michael Edwards	MEASURE Evaluation/JSI
	Michael Mwebaze	MEASURE Evaluation/JSI
Module 9: RHIS Performance Assessment	Hiwot Belay	MEASURE Evaluation/JSI
	Sonja Venter	Health Information Systems Programs (HISP)/South Africa
	Sangeeta Singh	PHFI
	Kavitha Viswanathan	WHO
	David Boone	MEASURE Evaluation/JSI
Module 10: RHIS Design and Reform	Tariq Azim	MEASURE Evaluation/JSI
	Jean-Pierre de La Malle	AEDES
	Kavitha Viswanathan	WHO

APPENDIX 5. LEARNING OBJECTIVES AND SUGGESTED REFERENCES IN EACH MODULE

MODULE 1. **Health Systems and Health Information Systems** (3 hours)

Learning Objectives

By the end of this module, participants will be able to:

- Understand the essential link between the health system and the health information system
- Explain who needs health data, what type of data is needed, and how data could be used
- Describe the health data sources and give examples of each data source and its categories
- Describe the six components of a health information system, according to the Health Metrics Network (HMN) framework
- Define "RHIS" and its importance
- Describe what they will learn in the RHIS course

Suggested References

- International Health Partnership + Related Initiatives (IPH+) and World Health Organization (WHO). (2011). Monitoring, evaluation and review of national health strategies: A country-led platform for information and accountability. Geneva, Switzerland: WHO. Retrieved from http://www.who.int/healthinfo/country_monitoring_evaluation/documentation/en/

- Health Metrics Network. (2012). Framework and standards for country health information system development, 2nd edition. Geneva, Switzerland: World Health Organization. Retrieved from http://www.hrhresourcecenter.org/node/746

- World Health Organization (WHO). (2007). Everybody's business: Strengthening health systems to improve health outcomes: WHO's framework for action. Geneva, Switzerland: WHO. Retrieved from http://www.who.int/healthsystems/strategy/en/

- World Health Organization, United States Agency for International Development, & University of Oslo. Health facility and community data toolkit. (2014). Retrieved from http://www.who.int/healthinfo/facility_information_systems/en/

MODULE 2. **Indicators and Data Collection and Reporting** (6 hours)

Learning Objectives

By the end of this module, participants will be able to:

☐ Define and identify key health indicators
☐ Define key data-collection concepts
  • Data
  • Data elements
☐ Name major steps in planning data collection
☐ Map data flows and identify who is responsible for using different types of tools to collect data
☐ Identify several tools for data collection and reporting
☐ Identify methods of collecting routine health information and related data
☐ Identify challenges in collecting the data and how to overcome them
☐ Explain gender-sensitive data, sex- and age-disaggregated data, and their links to data-collection tools

Sessions

Session 1. Indicators (1 hour, 30 minutes)

Session 2. Data Collection and Reporting Tools (4 hours, 30 minutes)

Suggested References

• World Health Organization. (2015). Global reference list of 100 core health indicators. Retrieved from http://www.who.int/healthinfo/indicators/2015/en/

• Heywood, A. & Boone, D. (2015). Guidelines for data management standards in routine health information systems. Chapel Hill, NC, USA: MEASURE Evaluation, University of North Carolina. Retrieved from www.cpc.unc.edu/measure/publications/ms-15-99

• Lippeveld, T., Sauerborn, R., & Bodart, C. (2000). Design and implementation of health information systems (pp. 88–113). Geneva, Switzerland: World Health Organization. Retrieved from http://apps.who.int/iris/handle/10665/42289

MODULE 3. **Data Management Standards for Routine Health Information Systems** (3 hours)

Learning Objectives

By the end of this module, participants will be able to:

- ☐ Appreciate the importance of good RHIS data management practices
- ☐ Describe data management needs for the three management levels of a health system
- ☐ Understand what structures and processes allow for good data management
- ☐ Understand when and how data management standards are to be applied to local systems
- ☐ Explain the harmonized standards for health facility-based and community-based information systems and their different domains and subdomains
- ☐ Understand how the harmonized standards can improve data quality and use
- ☐ Understand the causes of RHIS data fragmentation
- ☐ Understand the key principles of RHIS data integration and interoperability

Sessions

Session 1. Introduction to RHIS Data Management (30 minutes)

Session 2. Standards for RHIS Data Management (1 hour, 45 minutes)

Session 3. Data Integration and Interoperability (45 minutes)

Suggested References

- Heywood, A. & Boone, D. (2015). Guidelines for data management standards in routine health information systems. Chapel Hill, NC, USA: MEASURE Evaluation, University of North Carolina. Retrieved from www.cpc.unc.edu/measure/publications/ms-15-99

- World Health Organization (WHO), United States Agency for International Development, & University of Oslo. (2015). Analysis of health facility data: Guidance for managers and analysts [Draft]. Geneva, Switzerland: WHO. Retrieved from http://www.measureevaluation.org/his-strengthening-resource-center/resources/health-facility-data-analysis-guidance-who

MODULE 4. **RHIS Data Quality** (3 hours)

Learning Objectives

By the end of this module, participants will be able to:

- ☐ Identify the main causes of poor data quality
- ☐ Understand the data-quality conceptual framework
- ☐ Explain different dimensions of data quality
- ☐ Identify the roles and responsibilities of the three RHIS management levels in maintaining data quality
- ☐ Define, calculate, and interpret data-quality metrics
- ☐ Understand what data triangulation is and how it can strengthen analysis and information use
- ☐ Differentiate the commonly used tools and methods for assessing data quality
- ☐ Understand how to integrate data-quality assurance with routine supportive supervision
- ☐ Understand the value of monitoring and using data-quality assessment results over time

Sessions

Session 1. Introduction to Data Quality (40 minutes)

Session 2. Data Quality Metrics (1 hour, 30 minutes)

Session 3. Data Quality Assurance (50 minutes)

Suggested References

- Heywood, A. & Boone, D. (2015). Guidelines for data management standards in routine health information systems. Chapel Hill, NC, USA: MEASURE Evaluation, University of North Carolina. Retrieved from www.cpc.unc.edu/measure/publications/ms-15-99
- MEASURE Evaluation. (n.d.) PRISM: Performance of routine information system management framework [Website]. Retrieved from http://www.cpc.unc.edu/measure/tools/monitoring-evaluation-systems/prism
- MEASURE Evaluation. Routine data quality assessment tool (RDQA) [Website]. Retrieved from http://www.cpc.unc.edu/measure/tools/monitoring-evaluation-systems/data-quality-assurance-tools
- World Health Organization (WHO). (2015). Data quality review (DQR): A toolkit for facility data quality assessment, Version 1.0. Geneva, Switzerland: WHO.

MODULE 5. **RHIS Data Analysis** (9 hours)

Learning Objectives

By the end of this module, participants will be able to:

- ☐ Define the basic concepts and terminology of data analysis
- ☐ Select appropriate charts
- ☐ Select appropriate indicators to be measured with routine data: the indicators that will be the focus of analysis
- ☐ Understand the link between data analysis and data quality and also the need to adjust the data, if necessary, prior to analysis
- ☐ Select appropriate denominators for the calculation of indicators
- ☐ Compare findings from routine data with findings from other data sources
- ☐ Analyze routine data to produce information products: tables, graphs, and maps
- ☐ Communicate key findings of data analysis

Sessions

Session 1. Key Concepts of Data Analysis (65 minutes)

Session 2. Overview of Steps 1–4 of Data Analysis (2 hours, 55 minutes)

Session 3. Overview of Step 5 of Data Analysis (5 hours)

Suggested References

- World Health Organization (WHO) & United States Agency for International Development. (2014). Analysis of health facility data: Methodological issues and solutions. Guidance for managers and analysts of health facility data. Geneva, Switzerland: WHO.
- World Health Organization. (2015). Global reference list of 100 core health indicators. Retrieved from http://www.who.int/healthinfo/indicators/2015/en/
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- Abela, A. (2009). Chart suggestions: A thought starter. Retrieved from http://www.infographicsblog.com/chart-suggestions-a-thought-starter-andrew-abela/
- Evergreen, S. (2014). Presenting data effectively: Communicating your findings for maximum impact. Thousand Oaks, CA, USA: Sage Publications.
- DHIS 2 Documentation Team. *DHIS 2 user manual.* (2016). Retrieved from https://ci.dhis2.org/docs/2.24/en/user/dhis2_user_manual_en.pdf
- Excelcentral.com. Online tutorial on using Excel to create charts. Retrieved from http://excelcentral.com/excel2007/essential/lessons/05010-create-a-simple-chart-with-two-clicks.html
- MEASURE Evaluation. (2009). Making research findings actionable: A quick reference to communicating health information for decision-makers. Retrieved from http://www.cpc.unc.edu/measure/resources/publications/ms-09-39

MODULE 6. **RHIS Data Demand and Use** (9 hours)

Learning Objectives

By the end of this module, participants will be able to:

- ☐ Raise awareness of the importance of using data to inform program planning, policy development, service delivery, and resource management
- ☐ Appreciate how data-use interventions can improve an HIS
- ☐ Demonstrate skills to manage team meetings for RHIS data review that result in action plans linking data to specific program questions, upcoming decisions, and service performance improvement
- ☐ Demonstrate knowledge of how to use RHIS data for decision making at all levels of the health system:
  - Patient/client level and community management level, focusing on improving quality of care, continuity of care, and impact on behavioral change
  - Facility management level: focusing on service delivery coverage and quality of care, as wells as on resource management
  - District management level: focusing on management of health services and resources and on service delivery coverage and quality
  - Regional and national levels: focusing on program management and policy development
- ☐ Demonstrate problem-solving skills to move from data analysis and problem identification to action

Sessions

Session 1. Using Data to Inform Policy, Program Planning, and Service Delivery (1 hour, 30 minutes)

Session 2. Linking Data with Action (3 hours)

Session 3. Using Data to Inform Facility-level Management (2 hours, 30 minutes)

Session 4. Using Data to Inform Community-level Management (2 hours)

Suggested References

- Chewicha, K. & Azim, T. (2013). Community health information system for family-centered health care: Scale-up in Southern Nations, Nationalities and People's Region (SNNPR), Ethiopia. *Ethiopia Ministry of Health Quarterly Health Bulletin*, 5(1):49–53. Retrieved from http://www.cpc.unc.edu/measure/resources/publications/ja-13-161

- Judice, N. (2009). Seven steps to use routine information to improve HIV/AIDS programs: A guide for HIV/AIDS program managers and providers. Chapel Hill, NC, USA: MEASURE Evaluation, University of North Carolina. Retrieved from http://www.cpc.unc.edu/measure/our-work/data-demand-and-use/7-steps-to-improve-hiv-aids-programs

- LaFond, A., et al. (2003). Using data to improve service delivery: A self-evaluation approach. Retrieved from http://www.cpc.unc.edu/measure/resources/publications/sr-03-12/

- Marsh, D. (2000). Population-based community health information systems. In T. Lippeveld, R. Sauerborn, & C. Bodart. (Eds.), *Design and implementation of health information systems* (pp. 146–175). Geneva, Switzerland: World Health Organization. Retrieved from http://apps.who.int/iris/handle/10665/42289

- MEASURE Evaluation. (2011). Tools for data demand and use in the health sector: Framework for linking data with action. Chapel Hill, NC, USA: MEASURE Evaluation, University of North Carolina. Retrieved from http://www.cpc.unc.edu/measure/resources/publications/ms-11-46-b

MODULE 7. **RHIS Governance and Management of Resources** (6 hours)

Learning Objectives

By the end of this module, participants will be able to:

- ☐ Define and understand the importance of RHIS governance
- ☐ Understand the functions of RHIS governance and how to use the tools to help facilitate the performance of these functions
- ☐ Define and understand the importance of managing RHIS resources
- ☐ Understand key concepts, approaches, and procedures for the effective management of RHIS resources (human, financial, and material: for example, commodities and information and communication technology)
- ☐ Distinguish between RHIS governance and RHIS management, leadership, and organization, and recognize where they may overlap

Sessions

Session 1. RHIS Governance (4 hours)

Session 2. Management of RHIS Resources (2 hours)

Suggested References

- Barbazza, E. & Tello, J. (2014). A review of health governance: Definitions, dimensions, and tools to govern. *Health Policy*, 116(1):1–11. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/24485914

- Heywood, A. & Boone, D. (2015). Guidelines for data management standards in routine health information systems. Chapel Hill, NC, USA: MEASURE Evaluation, University of North Carolina. Retrieved from www.cpc.unc.edu/measure/publications/ms-15-99

MODULE 8. **Information and Communication Technology for RHIS** (6 hours)

Learning Objectives

By the end of this module, participants will be able to:

- ☐ Explain key terms used in eHealth, defined as the use of information and communication technology (ICT) in health systems
- ☐ Discuss how application architecture fits in the overall enterprise architecture (EA)
- ☐ Describe the role of ICT in integration and interoperability of RHIS
- ☐ Explain the importance and application of patient-centered information systems
- ☐ Demonstrate competency in the use of ICT standards for RHIS

Session

Session 1. eHealth, mHealth, and Health Information System Architecture (2 hours)

Session 2. RHIS Integration and Interoperability (1 hour, 30 minutes)

Session 3. Patient-Centered Information Systems (1 hour)

Session 4. Data Repository/Data Warehouse (1 hour, 30 minutes)

Suggested References

- Digital Development Principles Working Group. (n.d.) Principles for digital development [Website]. Retrieved from http://digitalprinciples.org/
- Healthcare Information and Management Systems Society (HIMSS). (2013). HIMSS board-approved definition of interoperability [Website]. Retrieved from http://www.himss.org/ResourceLibrary/genResourceFAQReg.aspx?ItemNumber=23990
- Ritz, D., Althauser, C., & Wilson, K. (2014). Connecting health information systems for better health: Leveraging interoperability standards to link patient, provider, payer, and policymaker data. Seattle, WA, USA: PATH and Joint Learning Network for Universal Health Coverage. Retrieved from http://www.jointlearningnetwork.org/resources/connecting-health-information-systems-for-better-health
- Sandeep, R. (2016). An introduction to user centered design [Website]. Retrieved from http://www.slideshare.net/rohansandeep/anintroductiontoucd
- Stansfield, S., Orobaton, N., Lubinski, D., Uggowitzer, S., & Mwanyika, H. The case for a national health information system architecture: A missing link to guiding national development and implementation. Retrieved from https://www.hingx.org/Share/Details/986
- Usability First. (n.d.) Introduction to user-centered design [Website]. Retrieved from http://www.usabilityfirst.com/about-usability/introduction-to-user-centered-design/
- Usability.gov. (2016). What and why of usability: User-centered design basics. Retrieved from http://www.usability.gov/what-and-why/user-centered-design.html
- Web Accessibility Initiative. (n.d.). WAI website redesign project. Retrieved from https://www.w3.org/WAI/redesign/project.html

MODULE 9. **RHIS Performance Assessment** (6 hours)

Learning Objectives

By the end of this session, participants will be able to:

- ☐ Explain frameworks for assessing RHIS
- ☐ Demonstrate understanding of the RHIS standards across the four domains
- ☐ Demonstrate understanding of the three categories of determinants of RHIS performance
- ☐ Diagnose RHIS performance (to measure production, management, and use of high-quality data)
- ☐ Describe the RHIS Rapid Assessment Tool and the purpose of its implementation
- ☐ Apply the PRISM tools to identify and analyze possible constraints on successful implementation of an RHIS

Sessions

Session 1. Introduction to Frameworks for Assessing RHIS (1 hour)

Session 2. Overview of RHIS Rapid Assessment Tool (2 hours)

Session 3. Overview of PRISM Assessment Tools (3 hours)

Suggested References

- Aqil, A., Lippeveld, T., & Hozumi, D. (2009). PRISM framework: A paradigm shift for designing, strengthening and evaluating routine health information systems. *Health Policy and Planning*, 24(3):217–228. Retrieved from http://www.cpc.unc.edu/measure/publications/ja-09-99

- Aqil, A., Lippeveld, T., Moussa, T., & Barry, A. (2012). Performance of Routine Information Systems Management (PRISM) tools user guide. Chapel Hill, NC, USA: MEASURE Evaluation, University of North Carolina. Retrieved from http://www.cpc.unc.edu/measure/publications/ms-12-51

- Belay, H. & Lippeveld, T. (2013). Inventory of PRISM framework and tools: Application of PRISM tools and interventions for strengthening routine health information system performance. Chapel Hill, NC, USA: MEASURE Evaluation, University of North Carolina. Retrieved from http://www.cpc.unc.edu/measure/publications/wp-13-138?searchterm=PRISM+invent

- Heywood, A. & Boone, D. (2015). Guidelines for data management standards in routine health information systems. Chapel Hill, NC, USA: MEASURE Evaluation, University of North Carolina. Retrieved from www.cpc.unc.edu/measure/publications/ms-15-99

- Hotchkiss, D., Aqil, A., Lippeveld, T., & Mukooyo, E. (2010). Evaluation of the Performance of Routine Information System Management (PRISM) framework: Evidence from Uganda. *BMC Health Services Research*, 10:188. Retrieved from http://www.biomedcentral.com/1472-6963/10/188

- International Health Partnership + Related Initiatives (IPH+) and World Health Organization (WHO). (2011). Monitoring, evaluation and review of national health strategies: A country-led platform for information and accountability. Geneva, Switzerland: WHO. Retrieved from http://www.who.int/healthinfo/country_monitoring_evaluation/documentation/en/

- MEASURE Evaluation. (2016). RHIS Rapid Assessment Tool (RAT). Chapel Hill, NC, USA: MEASURE Evaluation, University of North Carolina.

- MEASURE Evaluation. PRISM: Performance of Routine Information System Management Framework [Website]. Retrieved from http://www.cpc.unc.edu/measure/resources/tools/monitoring-evaluation-systems/prism

- World Health Organization (WHO). (2014). Health facility and community data toolkit. Geneva, Switzerland: WHO. Retrieved from http://www.who.int/healthinfo/facility_information_systems/en/

MODULE 10. **RHIS Design and Reform**

Learning Objectives

By the end of this module, participants will be able to:

- Describe the six components of an RHIS, categorized as inputs, processes, and outputs
- Explain the guiding principles of RHIS reform and strengthening
- Understand the roadmap to RHIS reform and strengthening
- Describe the process of RHIS design
    - Illustrate the rationale of selecting core RHIS indicators
    - Illustrate the types of data collection and reporting tools required for RHIS indicators
    - Explain the core elements of an RHIS strengthening or scale-up plan

Sessions

Session 1. RHIS Design and Reform: Guiding Principles and Roadmap (3 hours)

Session 2. RHIS Design and Reform Process (3 hours)

Session 3. RHIS Reform in the Context of Scalability and Sustainability (3 hours)

Suggested References

- International Health Partnership + Related Initiatives (IPH+) and World Health Organization (WHO). (2011). Monitoring, evaluation and review of national health strategies: A country-led platform for information and accountability. Geneva, Switzerland: WHO. Retrieved from http://www.who.int/healthinfo/country_monitoring_evaluation/documentation/en/

- Health Metrics Network. (2012). *Framework and standards for country health information systems*, 2nd edition. (2012). Geneva, Switzerland: World Health Organization. Retrieved from https://www.measureevaluation.org/his-strengthening-resource-center/resources/hmn-framework-and-standards-for-country-health-information-systems

- Lippeveld, T., Sauerborn, R., & Bodart, C. (Eds.) (2000). Design and implementation of health information systems. Geneva, Switzerland: World Health Organization. Retrieved from http://apps.who.int/iris/handle/10665/42289

- Wodon A., Lecharlier, F., Greindl, I., De Lamalle, J., De Caluwe, P., & D'Altilia, J. (2010). *Health information system*, 2nd edition. Paris, France: L'Harmattan.

APPENDIX 6. GENERIC AGENDA

Agenda for Week 1

	MONDAY	**TUESDAY**	**WEDNESDAY**	**THURSDAY**	**FRIDAY**
8:30–9:00	Introduction	Daily Recap	Daily Recap	Daily Recap	Daily Recap
9:00–9:30	Orientation to Course Pretest	Indicators and Data Collection and Reporting		RHIS Data Analysis	RHIS Data Analysis
9:30–10:30	Health Systems and Health Information Systems		RHIS Data Quality	RHIS Data Analysis	RHIS Data Demand and Use
10:30–11:00	*Coffee Break*				
11:00–12:00	Health Systems and Health Information Systems	Indicators and Data Collection and Reporting	RHIS Data Quality	RHIS DATA Analysis	RHIS Data Demand and Use
12:00–13:00	*Lunch*				
13:00–15:00	Health Systems and Health Information Systems	Indicators and Data Collection and Reporting	RHIS Data Quality	RHIS Data Analysis	RHIS Data Demand and Use
	Indicators and Data Collection and Reporting	RHIS Data Management Standards	RHIS Data Analysis		
15:00–15:15	*Coffee Break*				
15:15–16:15	Indicators and Data Collection and Reporting	RHIS Data Management Standards	RHIS Data Analysis	RHIS Data Analysis	RHIS Data Demand and Use
16:15–17:15	Indicators and Data Collection and Reporting	RHIS Data Management Standards	RHIS Data Analysis (30 minutes)	RHIS Data Analysis	RHIS Demand and Use (30 minutes
	Daily Evaluation	*Daily Evaluation*	*Daily Evaluation*	*Daily Evaluation*	*Daily Evaluation*

Agenda for Week 2

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
8:30–9:00	Daily Recap	Daily Recap	Daily Recap	Daily Recap	Daily Recap
9:00–9:30	RHIS Data Demand and Use	RHIS Governance and Management of Resources	ICT for RHIS	RHIS Performance Assessment	RHIS Design and Reform
9:30–10:30	RHIS Data Demand and Use	RHIS Governance and Management of Resources	ICT for RHIS	RHIS Performance Assessment	RHIS Design and Reform
10:30–11:00	*Coffee Break*				
11:00–12:00	RHIS Data Demand and Use	RHIS Governance and Management of Resources	ICT for RHIS	RHIS Performance Assessment	RHIS Design and Reform
12:00–13:00	*Lunch*				
13:00–15:00	RHIS Governance and Management of Resources	ICT for RHIS	RHIS Performance Assessment	RHIS Design and Reform	RHIS Design and Reform
15:00–15:15	*Coffee Break*				
15:15–16:45	RHIS Governance and Management of Resources	ICT for RHIS	RHIS Performance Assessment	RHIS Design and Reform	RHIS Design and Reform Posttest
	Daily Evaluation	*Daily Evaluation*	*Daily Evaluation*	*Daily Evaluation*	*Daily Evaluation*