Analysis and Use of Routine Health Information Systems (RHIS) Data

TOOLKIT
Key contents of this session

- Introduce the work of WHO/DDI in the areas of strengthening HIS/RHIS data systems in countries
- Introduce a collaborative cross WHO product: the WHO Toolkit for RHIS data analysis and use
- Share key features of the global implementation of these toolkit using DHIS2 - a health data collaborative approach to support integrated HIS/RHIS in countries
Part 1
Introduction
Mapping the world of missing data

Percentage of indicators with recent primary or underlying data:

- <50%
- 50%-59%
- 60%-69%
- 70%-79%
- ≥80%
- Data not available
- Not applicable

Source: World Health Statistics 2020
SCORE for Health Data Technical Package

Represents the most effective strategies and interventions for strengthening country health data systems by encouraging stakeholders to invest in areas that have the greatest impact on the quality, availability, analysis, use and accessibility of data in countries.

Learn more: https://www.who.int/data/score
SCORE Results

**S:** There is much room for improvement for all six WHO regions in building capacity to survey populations and health risks, with the average score ranging from 2.9 to 3.6 out of a possible 5.

**C:** Overall, health information systems in the African and Southeast Asian regions face bigger challenges to accurately count births, deaths, and causes of death making this a priority area for investment.

**O:** All regions face the need to rapidly scale capacity to optimize routine health information systems to improve access to and quality of healthcare services.

**R:** All regions have good capacity to systematically review the progress and performance of their health sector. All countries need to invest in data and health information systems strengthening.

**E:** All regions need to take action to operationalize data governance and use disaggregated data for targeted policy action.

[https://www.who.int/data/data-collection-tools/score](https://www.who.int/data/data-collection-tools/score)
WHO Toolkit for RHIS Strengthening & DHIS2 Standard Package

UiO-WHO Collaboration
Learning Objectives

1. Become familiar with standards, guidance and tools of the WHO Toolkit for Analysis and Use of Routine Health Facility Data

2. Become aware of the rationales and potential roles of the toolkit in RHIS strengthening

3. Use visualization to inform programming, what is coming

4. Provide information on access to materials and technical support
Introduction

The RHIS provides frequent, up-to-date information on service performance at all levels of the health system, enabling regular analysis of progress and timely identification of problems.

Health facilities submit regular reports on health service activities and the conditions for which people seek care through the RHIS.

The Toolkit for Analysis and Use of RHIS Data provides standards and guidance for analysis of RHIS data for individual health programmes as well as integrated analysis for general health service management.

This effort is led by WHO and its Collaborating Centre on Innovation and Implementation Research for Health Information System Strengthening at the University of Oslo.

Additional support from Health Data Collaborative partners, including UNICEF, Global Fund, GAVI and PEPFAR.
What is RHIS data?

Regular reporting of RHIS data

National
Province
District
Primary healthcare
Health system

Analysis & Use RHIS data
### RHIS in the country HIS

#### Country Health Information Data Collection Systems (HIS)

<table>
<thead>
<tr>
<th>Population-based data</th>
<th>Birth and death data</th>
<th>Health Service Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population-based surveys</td>
<td>Birth and death registration</td>
<td>Routine Health Information Systems</td>
</tr>
<tr>
<td>Surveillance systems</td>
<td>Causes of death</td>
<td>Health facility assessments</td>
</tr>
<tr>
<td>Census</td>
<td></td>
<td>Health service resource data</td>
</tr>
</tbody>
</table>
Part 2
The Toolkit Modules
comprehensive integrated approach to HEALTH SERVICES ANALYSIS
Countries need reliable facility data to:

- Assess and prioritise to strengthen their programme and health services
- Assess the performance of health services towards monitoring of UHC & SDG targets

the toolkit is critical
Why the Toolkit?

1. To ensure RHIS indicators meet global standards
2. To improve the way RHIS data is analyzed & displayed
3. To build capacity in analysing & interpreting RHIS data
4. To improve data quality
6. To build capacity at all level of the health data systems
What kinds of data are reported?

Health services and programmes data

- ACCESS
- NO. OF PEOPLE
- DEATHS
- COVERAGE
- DISEASES
- PROGRAMMES
WHO Toolkit for RHIS Data
Comprehensive integrated approach to health services analysis

Standards for Measurement and Analysis

Integrated Health Services Analysis

Programme specific Guidance

Electronic, automated packages for facility data e.g. DHIS2

Training materials
What is in a toolkit module?

1. Guidance manual
2. DHIS2 packages
3. Training materials

DHIS2 Packages and Tools:
- HIV Dashboard
- HIV Aggregate
- HIV Case Surveillance Tracker
Country Level Effect - screen only
Country Level Effect
WHO RHIS standard Toolkit - what are currently available
General Principles

Standards for Measurement and Analysis

Integrated Health Services Analysis

Programme specific Guidance

Electronic, automated packages for facility data e.g. DHIS2

Training materials
General Principles

Key concepts for RHIS data analysis

- Types of indicators
- Population estimates / denominators
- Overview of data quality
- Tips for presenting data
- Strengths and limitations of RHIS data
Core Indicators

Standards for Measurement and Analysis

Integrated Health Services Analysis

Programme specific Guidance

General principles

Integrated Health Services Analysis

Data Quality Assurance

National

District & Facility

RMNCAH  TB  HIV  Malaria  EPI  AEFI  VPDIDSR

Electronic, automated packages for facility data e.g. DHIS2

Training materials
Core Indicators

Offers a list of standardized health facility indicators that can be used/adapted as needed.

Recommended indicators
- Guide country selection
- Reflect program/service standards
- Promote alignment and reduce reporting
Core Indicators

List of standardized RHIS indicators that can be used or adapted by countries

Includes indicators from all the Toolkit modules

These recommended indicators:
- Reflect programme/service standards
- Can guide country selection
- Can promote alignment and reduce reporting
Data Quality Assurance

Standards for Measurement and Analysis

Integrated Health Services Analysis

Programme specific Guidance

Electronic, automated packages for facility data e.g. DHIS2

Training materials
Data Quality Assurance

- Standard methodology for assessing data quality
- Completeness/timeliness/consistency
- Integrated into DHIS2
- Scaling with support by GF, GAVI, USAID
- Time-intensive but ensures quality
- Adopt into annual SOPs and embed into quarterly review
Health Services Planning & Management

Standards for Measurement and Analysis

Integrated Health Services Analysis

Programme specific Guidance

Electronics, automated packages for facility data e.g. DHIS2

General principles

Core indicators

Data Quality Assurance

National Health Services Analysis

Integrated Health Services Analysis

District & Facility

RMNCAH

TB

HIV

Malaria

EPI

AEFI

VPD

IDSR

Training materials
Integrated Health Services Analysis

Tracer indicators

- Institutional mortality
- Morbidity (outpatient & inpatient)
- Utilization and access
- Coverage & quality
- Health service resources

Integrated data platform
Programme Specific Modules

- Global Reporting
- National Reporting
- Patient Care and Monitoring
- Program Monitoring and Management

DATA USE-CASES
Programme Specific Modules: HIV

Standards for Measurement and Analysis

Integrated Health Services Analysis

Programme specific Guidance

Electronic, automated packages for facility data e.g. DHIS2
Programme Specific Modules: HIV

- HIV 95-95-95 cascade
  - 95% diagnosis of PLHIV
  - 95% compliance on ART
  - 95% viral load suppression

- Strengthen individual level data
- Improve data quality
- Address programme data gaps
- Align with partners

- Meet global WHO reporting
- Align national indicators and contextualize
- Use HIV within DHIS2
Programme Specific Modules: Malaria

- Standards for Measurement and Analysis
  - General principles
  - Core indicators
  - Data Quality Assurance

- Integrated Health Services Analysis
  - National
  - Integrated Health Services Analysis
  - District & Facility

- Programme specific Guidance
  - RMNCAH
  - TB
  - HIV
  - EPI
  - AEFI
  - VPD IDSR

Electronic, automated packages for facility data e.g. DHIS2
Programme Specific Modules: Malaria

Surveillance
- During burden reduction (control)
- For elimination
Commodities monitoring

Aggregate → Individual case surveillance

Meet global WHO reporting
Align national indicators and contextualize
Use Malaria within DHIS2
Programme Specific Modules: Tuberculosis

- General principles
- Core indicators
- Data Quality Assurance

Standards for Measurement and Analysis

Integrated Health Services Analysis

Programme specific Guidance

Training materials

RMNCAH
HIV
Malaria
EPI
AEFI
VPD
IDSR

Electronic, automated packages for facility data e.g. DHIS2
Programme Specific Modules: Tuberculosis (aggregate and case-based)

- Dashboards (TB, Drug Resistant-TB, TB-HIV), trends, indicators
- Standardized description and assessment (Historic) TB data
- Support country implementation
- Meet global WHO reporting
- Align national indicators and contextualize
- Use Tuberculosis Configuration within DHIS2
Programme Specific Modules: Immunization

Standards for Measurement and Analysis

Integrated Health Services Analysis

Programme specific Guidance

National

Integrated Health Services Analysis

District & Facility

RMNCAH  TB  HIV  Malaria

AEFI  VPD  IDSR

Electronic, automated packages for facility data e.g. DHIS2

Training materials
Programme Specific Modules: Immunization & AEFI

- National coverage
- Drop-out
- Supply/cold chain
- Links with other systems
- Country support
- Meet global WHO reporting
- Align national indicators and contextualize
- Use EPI Configuration package within DHIS2
Programme Specific Modules: RMNCAH

Standards for Measurement and Analysis

Integrated Health Services Analysis

Programme specific Guidance

General principles

Core indicators

Data Quality Assurance

National

Integrated Health Services Analysis

District & Facility

Electronically, automated packages for facility data e.g. DHIS2

TB

HIV

Malaria

EPI

AEFI

VPD

IDSR

Training materials
Programme Specific Modules: RMNCAH

Joint module with UNICEF
Sexual and reproductive health, maternal health, postnatal, childhood health

Indicators and data elements
Joint module with UNICEF
Analyses and data dashboards

Meet global WHO reporting
Align national indicators and contextualize
Use RMNCAH within DHIS2
Ambition for 2030

“By 2030... countries will own, sustainably fund and maintain high-quality surveillance systems and laboratory infrastructure... context of improved performance of their national immunization programmes to achieve their disease control objectives, leveraging reliable VPD surveillance data.”
# IDSR - Diseases currently included

<table>
<thead>
<tr>
<th>Aggregated surveillance (default list)</th>
<th>Case Based Surveillance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meningitis</td>
<td>Meningitis</td>
</tr>
<tr>
<td>Pertussis</td>
<td>IBVPD</td>
</tr>
<tr>
<td>Measles</td>
<td>Yellow Fever</td>
</tr>
<tr>
<td>Diphtheria</td>
<td>Yellow Fever</td>
</tr>
<tr>
<td>Rubella</td>
<td>Measles/rubella</td>
</tr>
<tr>
<td>Diarrhoea with blood</td>
<td>Viral hemorrhagic fever</td>
</tr>
<tr>
<td>Yellow Fever</td>
<td>Neonatal tetanus</td>
</tr>
<tr>
<td>Rabies</td>
<td>Polio (AFP)</td>
</tr>
<tr>
<td>Cholera</td>
<td>Rotavirus</td>
</tr>
<tr>
<td>Viral Hemorrhagic Fever</td>
<td>Congenital Rubella Syndrome</td>
</tr>
<tr>
<td>Acute watery diarrhoea</td>
<td></td>
</tr>
<tr>
<td>Dengue Fever</td>
<td></td>
</tr>
<tr>
<td>Acute Flaccid Paralysis</td>
<td></td>
</tr>
<tr>
<td>Neonatal Tetanus</td>
<td>Other diseases to be added</td>
</tr>
<tr>
<td>Non Neonatal tetanus</td>
<td></td>
</tr>
</tbody>
</table>

Other diseases to be added

Cholera (when new standards will be defined)
Development of a set of standard indicators and metadata for HMIS:

- serve as a global standard to guide Member States to capture information from health facilities that reflect the status of rehabilitation services in the country.
- facilitate the development of national priorities and a strategy for rehabilitation as part of overall integrated health services, to ensure UHC is reached.
- strengthen and standardize country facility data collection for rehabilitation.
COVID-19 Surveillance

Covid-19 Vaccine

Public health surveillance for COVID-19

Interim guidance
16 December 2020

World Health Organization

Background
This document summarizes current WHO guidance for the public health surveillance of coronavirus disease 2019 (COVID-19) in humans caused by SARS-CoV-2, a novel corona-avirus. The Alliance for Global Health, led by the World Health Organization (WHO) and the World Health Organization (WHO) Regional Office for South East Asia, has been working closely with the European Commission (EC) to develop and implement a global strategy for COVID-19 surveillance. The strategy has been developed by member states with technical guidance from the World Health Organization (WHO) Regional Office for South East Asia and the European Commission (EC).

This document is intended to provide a general overview of the principles and practices of COVID-19 surveillance and to highlight key considerations for countries in the current context of the COVID-19 pandemic. It is not a detailed technical manual and should be used in conjunction with other guidance and tools available from the World Health Organization (WHO) and other relevant organizations.

Purpose of this document
This document provides guidance to Member States on the implementation of surveillance for COVID-19 disease and the SARS-CoV-2 virus that causes it, and the reporting requirements for WHO.

Definitions for surveillance

1. Case definition
The case definitions for suspected and probable cases below have been revised to account for the new classification of cases as defined by the World Health Organization (WHO) and the European Commission (EC). The case definitions for suspected and probable cases above have been updated to reflect the new classification of cases as defined by the World Health Organization (WHO) and the European Commission (EC).
How to use these modules

1. Recommended approach (software agnostic)
   - Revise and adapt the indicators as recommended by the modules to the national RHIS data systems
   - Provide training to build capacity for concerned staff and data managers
   - Plan and implement data quality assurance and data quality review
   - Adapt to national software where appropriate to promote the use of integrated approach.

2. Countries that use DHIS2:
   See more details below.
Part 3 - DHIS2 Health Data Toolkit

Collaborative work between WHO and UiO / WHO CC for HIS Strengthening and to promote WHO’s guidelines & standards
What is DHIS2?

- Web-based, open source software platform, first developed in South Africa for district health data use strengthening in
- Used to collect, analyze and display health data (from facilities, community, and other points) in 73 countries
- Developed & governed by University of Oslo

[link to dhis2.org/about]

Guiding principles

- Governed open source
- Dynamic embrace of technology
- Designed for integration & interoperability
- In-country ownership
- Capacity building
- Collaboration with global health institutions (WHO Collaborating Centre)
- Active community of practice and community-driven software roadmap
- Global guidance and local innovation
- Benefits of scale (national scale)
- Flexible across sectors
- Sustainability
Dynamic embrace of technology: Global adoption of DHIS2 products

Growth in DHIS2 MoH implementations by Product 2006-2020

- National scale - Aggregate data
- Pilot - Aggregate data
- Tracker
- Android
Why DHIS2?

Overview features

Free, Open source
Data ownership by countries
Database in countries
Sustained country system support
70+ countries implementing
14 programme data collection systems
Joint technical support to countries by UiO, WHO, partners
UiO a WHO collaborating centre for HIS strengthening

Operational Features

A to Z of HIS from data collection to use
Integrated systems approach
Country led, country focused for system strengthening
National and sub national
Dissemination of standards and data quality practices
Monitoring programme performance at facility/community
Key indicators and disaggregations for health sector and programme specific
Harmonized analysis
Global adoption of WHO standard packages in national DHIS2

40 countries & counting

Packages adopted
- HIV
- TB
- Malaria
- EPI
- Cause of Death/Mortality
- COVID-19 Surveillance
- IDSR & VPD case-based surveillance

https://dhis2.org/in-action
WHO-approved DHIS2 metadata packages

**Analytics Package:** Dashboards, data visualizations, standard indicators, and data use & analysis guidance; be installed and mapped to inputs in a country’s existing routine program or HMIS; or used in combination with an aggregate full package.

**Aggregate data collection package**
Data input forms, standard data elements and disaggregation to support the collection of aggregate data. Aggregate data input packages are assured to produce the indicators and dashboards included in the analytics package.

**Tracker (individual-level) data packages**
Individual-level data capture modules to enhance a patient-centered approach for program management. Tracker is used to uniquely identify and track a person or entity over time. These packages can be used to support clinical-level decision-making and generate highly granular data for enhanced analysis, while mapping to standard outputs in the analytics packages.
What's in the DHIS2 toolkit?

1. Metadata package(s)
   - Installable .json files containing complete configuration
   - Dashboards, indicators, tracker programs/data sets, data elements
   - Coded to WHO data dictionary where available, opportunities for integration of data standards like SNOMED, ICD-11, FHIR, LOINC
   - Modular: for example, case-based surveillance, POE, contact tracing, aggregate reporting
   - Translated into multiple languages

2. Documentation (technical & programmatic)
   - Installation guides
   - Metadata reference files
   - System design guides (linking information system design decisions with WHO technical guidance)
   - Implementation & customization guidance
   - Programmatic guidance developed by partners, software agnostic materials like WHO Health Facility Data Analysis Guides

3. Training materials
   - End user training templates: for data entry (web & Android), analytics; Templates based on standard metadata can be easily adapted for countries
   - Training and demo database
**DHIS2: Capacity in countries & regions**

The key elements of the HISP/DHIS2 approach

Build on *established* approaches and partnerships

Strengthen *existing* systems, tools and capacity

Leverage *local* expertise and innovation

Regional and *local* technical support

Network of 13 HISP groups with regional hubs:
- Eastern Africa
- West & Central Africa
- Southern Africa
- Asia & the Pacific
- Latin America & Carribbean
DHIS2 Capacity

Functions

Collect data from lowest levels, integrate data across systems, analyse and use information products at all levels to inform programmatic and national health decisions

• Aggregate; individual data capture for disaggregation
• Connect with Lab
• Connect with infrastructure and logistics
• Community data package
• Score cards; bottle neck analysis
• SMS and mobile app
• Data quality
• Communication
Rapid deployment of DHIS2 Toolkit to support COVID-19 surveillance (using WHO case-based designs & package approach)

Rapid data-driven response

COVID-19 Surveillance Dashboards

- Case-based surveillance + laboratory
- Contact Tracing
- Daily Reporting (aggregate)
- Port of Entry Screening & Follow-Up
- Outbreak Line Listing

Optimized data collection and field-based workflows
DHIS2 Toolkit to support COVID-19 NDVPs based on WHO EPI package development efforts since 2017

<table>
<thead>
<tr>
<th>Optimized</th>
<th>Developing</th>
<th>Defined</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHO-approved DHIS2 solution that has been replicated at national scale in many countries and optimized to become fit-for-purpose</td>
<td>DHIS2 solutions that are WHO-approved, meet global standards, but are still in the process of being rolled out or scaled up in countries</td>
<td>DHIS2 solutions applied with success in some contexts, but not enough information about replicability &amp; scale. These include novel uses and local innovations.</td>
</tr>
</tbody>
</table>

- **Measure uptake, coverage & equitable distribution over time**
  - **WHO EPI module**: installed in 30 national HMIS; 45 countries in total use DHIS2 for routine immunization program data management

- **Supply chain readiness & traceability of vaccines**
  - **Facility & last-mile logistics data module**: 20 countries using DHIS2 for facility-level vaccine logistics & cold chain equipment registry; DRC, Mali, Yemen use DHIS2 for some eLMIS functions

- **Ensure that individuals can be monitored for the full course of multi-dose regimen**
  - **Immunization eRegistry**: DHIS2-based IER deployed at national scale in Rwanda and Ghana

- **Provide a personal vaccination record/certificate**
  - **Electronic Health Certificates**: Local innovations for DHIS2-based generation of COVID-19 negative test certificates & travel passes in Uganda, Guinea Bissau & Rwanda

- **Multiple distribution strategies; novel & innovative distribution approaches**
  - **Mass campaigns**: Uganda national MR campaign (2019); Bangladesh MR campaign (ongoing)

- **Vaccine safety monitoring**
  - **Adverse Events Following Immunization (AEFI) Tracker**: Buy-in from AFRO to support national system strengthening for vaccine safety with DHIS2; well-tested data model for case-based reporting & investigation
DHIS2 Standard Package

How to use

1. To ensure RHIS indicators meet global standards
2. To improve the way RHIS data is analyzed & displayed
3. To build capacity in analysing & interpreting RHIS data
4. To improve data quality
5. To use the DHIS2 packages
6. To build capacity in use of DHIS2

As routinely as any HIS
Standardize national core indicators
Generic standards for countries
What have we learnt from the implementation so far?

• More agile development with much shorter cycles (e.g. COVID19) and stronger field implementation feedback loops
• Underestimation of the time and complexity of generating and translating health requirements into information system designs; opportunities to make these requirements & designs even more software agnostic for broader applicability
• WHO Dashboard Installations (35+ countries): improved access and analysis of data, but 'mapping the gap' reveals limitations in country data collection tools that need to be systematically addressed
• Country coordination and leadership amongst programs and partners to support integration; need to strengthen linkages from global, regional to country offices & MOH & partners
• Need for standardized and improved requirements gathering processes with content and subject matters experts to translate global health guidance into information system design
• Need for more robust implementation guidance, tailored to use cases covered by the toolkit; no "one size fits all"
• Need to learn more about country adoption, customization & localization: what should remain standard vs. what components are most critical to country adaptation?
• Integrated HMIS architecture: how to connect HMIS with other in-country systems, mapping data flows, linking individual level data to aggregated analysis
**Key messages**

- **Partnership WHO/HISP: Key channel for dissemination and application of the standards**

- The structure is flexible with a strong system as base which enable extension and inclusion of new programme (exp. COVID surveillance package)

- Feedback loops “Global → country → implementation → global” to improve the tools and implementation

- Allow information exchange and sharing experience amongst countries and regions and with partners
QUESTIONS?
In the upcoming series on RHIS standard & DHIS2 packages

1. Aggregated programmes and integrated RHIS system for analysis and data use at national and sub-national level

2. Data Quality Assurance and DHIS2 -WHO DQ apps for data quality review

3. Surveillance and the use of DHIS2 for case-based surveillance
   
   Covid-19 surveillance with DHIS2: lessons learnt

4. Immunization and use of DHIS2

5. Use of DHIS2 as a digital tool to support country RHIS strengthening and monitoring of GPW1/UHC targets
Where to get materials:
https://www.who.int/healthinfo/tools_data_analysis_routine_facility/en/Modules (who.int)

To get DHIS2 Configuration & User Guide: https://www.dhis2.org/who

Extended training for implementers, support staff DHIS2: https://academy.dhis2.org/courses/course-v1

The toolkit remains working versions as data requirements evolve;
For questions or comments, please contact chuh@who.int
Acknowledgement

The following teams in WHO for technical inputs and country implementation support:
- DDI/DNA/Health Service Data team for inputs in RHIS, Mortality/Cause of Death
- UHL: HIV, Malaria, Immunization, RMNCAH, TB, WHE/Surveillance, NCD/Rehabilitation

Partners:
- The Global Funds to fight against TB, HIV, Malaria
- The Gavi Alliance
- University of Oslo/HISP Programme
- Other HDC partners