

TOOLKIT FOR ANALYSIS AND USE OF ROUTINE HEALTH FACILITY DATA

Guidance for HIV programme managers

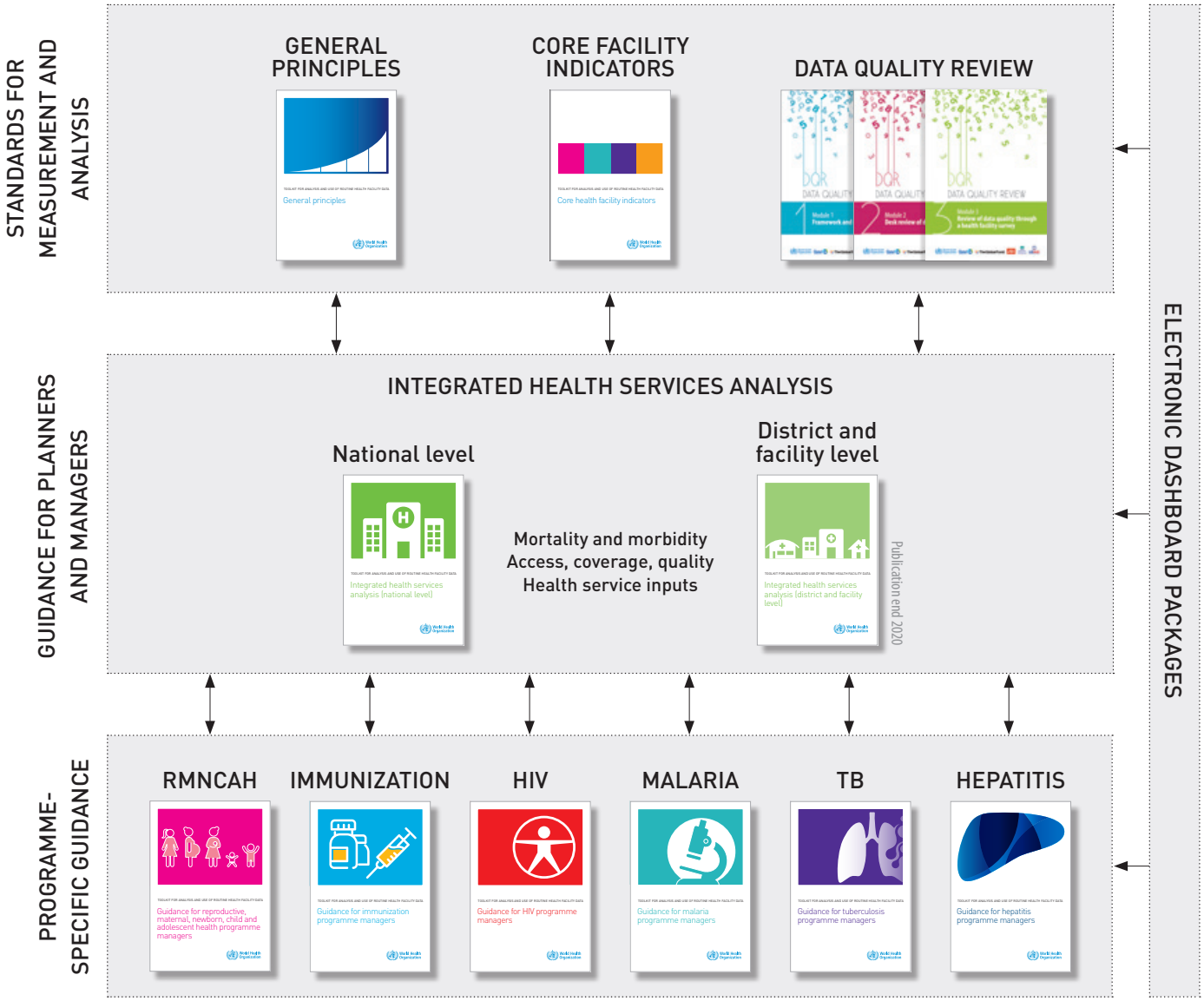
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World Health Organization

WHO TOOLKIT FOR ANALYSIS AND USE OF ROUTINE HEALTH FACILITY DATA

This document is part of the WHO *Toolkit for analysis and use of routine health facility data* – a set of capacity-building resources to optimize the analysis and use of data collected from health facilities through routine health information systems (RHIS).

The Toolkit is a collaborative effort by multiple WHO technical programmes and partners. It promotes an integrated, standards-based approach to facility data analysis, using a limited set of standardized core indicators with recommended analyses, visualizations and dashboards.



The Toolkit consists of a series of modules that can be used individually or together:

- *General principles* introduces key concepts in routine facility data analysis that are applicable to all modules.
- *Core facility indicators* is a compendium of the indicators from the various modules.
- The *Data quality review (DQR) toolkit* includes guidance and tools for systematic review of the quality of routine facility data.
- *Integrated health services analysis* targets general health service managers, providing a comprehensive, integrated analysis of tracer indicators across multiple health service components and programmes.
- The *programme-specific guidance* modules are customized according to the needs of the programme. Each module contains a guidance document, training materials and an electronic configuration package for automated dashboard production.

The materials within the Toolkit will be periodically updated and expanded.

Further details: https://www.who.int/healthinfo/tools_data_analysis_routine_facility/en/

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Abbreviations

AIDS	acquired immune deficiency syndrome
ANC	antenatal care
ART	antiretroviral therapy
DQR	data quality review
GAM	Global AIDS Monitoring
HIV	human immunodeficiency virus
HMIS	health management information system
KP	key population
M&E	monitoring and evaluation
PMTCT	prevention of mother-to-child transmission
SNU	subnational unit
TB	tuberculosis
VL	viral load
WHO	World Health Organization

Guidance overview and references

Learning objectives

The overall goal of this guidance document is to extend the existing guidance found in the *Consolidated strategic information guidelines for HIV in the health sector* (WHO, 2015); and familiarize human immunodeficiency virus (HIV) and health management information system (HMIS) programme managers with the tremendous potential of using standard dashboards to routinely analyse and use programme data to more effectively monitor and manage HIV programmes.

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

- Describe the essential (core) HMIS indicators recommended for use in routine programme management and how they relate to the recommended national and global indicators.
- Interpret each of the figures included in the reference HIV programme dashboard and apply them to improve programme management.
- Assess the quality of HIV programme HMIS data and understand implications for interpreting dashboard figures.

Audience

This document is relevant for the health workforce and end users of data working on HIV within the health system at both national (e.g. ministry of health) and subnational levels including:

- managers in charge of HIV service delivery at health facilities;
- HIV programme managers; and
- HMIS managers.

Suggested references

Consolidated guidance on person-centred HIV patient monitoring and case surveillance: guidelines. Geneva: World Health Organization; 2017 (http://www.who.int/hiv/pub/guidelines/person-centred-hiv-monitoring-guidelines/en/, accessed 11 November 2019).

Consolidated strategic information guidelines for HIV in the health sector. Geneva: World Health Organization; 2015 (https://www.who.int/hiv/pub/guidelines/strategic-information-guidelines/en/, accessed 11 November 2019).

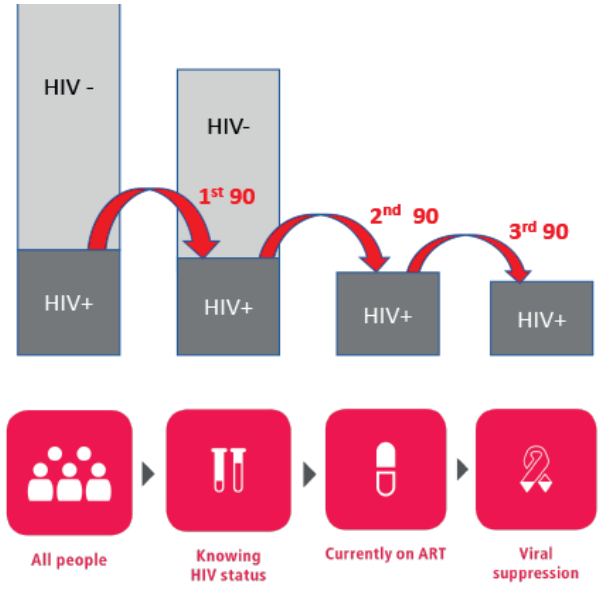
Indicator guidance sheet: HIV [website]. Geneva: The Global Fund; 2019 (https://www.theglobalfund.org/en/monitoring-evaluation/framework/, accessed 11 November 2019).

Note: This document will be reviewed and updated periodically to ensure that it remains aligned with the most recent guidelines and evidence. Feedback on the document will contribute to its evolution and improvement over time.

1. About the data

1.1 HIV cascade of services – data to identify and fill programme gaps

HIV health sector services can be depicted as a "cascade", encompassing prevention, diagnosis (testing), care and treatment, and patient and laboratory monitoring. The term "cascade" highlights how services must be linked to achieve desired impacts for patient- and programme-level success. The cascade illustrates the performance of an HIV response based on service coverage and quality. By focusing on the "90-90-90" coverage targets, whereby 90% of all persons living with HIV will have been diagnosed; 90% of all persons living with HIV diagnosed will receive antiretroviral therapy (ART); and 90% of all persons living with HIV on ART will have suppressed viral load (VL), national programmes can identify critical bottlenecks that slow a country's progress toward epidemic control. Fig. 1.1 shows the HIV cascade of services.



The "90-90-90" treatment targets

1st 90: 90% of all persons living with HIV will have been diagnosed

2nd 90: 90% of all persons diagnosed will receive ART

3rd 90: 90% of all persons on ART will have suppressed viral load

Fig. 1.1 HIV service cascade and "90-90-90" treatment targets

While Fig. 1.1 shows a complete cascade as a sequence of steps, in the real world, individuals may follow a nonlinear progression through services. For example, persons living with HIV on treatment may start and then drop out of ART and return to it months or years later. These variations naturally add complexity to the analysis and interpretation of these indicators. This is particularly true in the context of facility-based data reported in a cross-sectional, aggregate manner.

WHO HIV strategic information guidelines address multiple, interconnected use cases for routine HIV programme data, including: patient monitoring, programme monitoring and management, national reporting and global reporting. This guidance and toolkit package focuses on programme monitoring and management.

Monitoring and assessment of the cascade of services for real-time programme management require identification of a standardized set of essential indicators covering the entire service spectrum. The WHO *Consolidated strategic information guidelines for HIV in the health sector* recommends 92 "core" national indicators, including 10 identified for global monitoring, to gauge the health sector response to HIV.

The prioritized list of global indicators allows national HIV monitoring and evaluation (M&E) and programme teams to focus on the issues that require more extensive analysis, disaggregation and quality data to improve the impact of programmes.

The list of **10 global indicators** (Table 1.1) aims to offer focused, consistent information for all partners, in lieu of fragmented information resulting from many non-standardized indicators. This approach helps align national HIV programme managers and global partners on key issues in the health sector response and, thus, to improve dialogue toward improving service coverage and quality. The guidelines in the WHO *Consolidated strategic information guidelines for HIV in the health sector* are consistent with the Global AIDS Monitoring (GAM) system – the primary mechanism by which countries contribute to global tracking of the HIV epidemic and response.

Table 1.1 WHO 10 global indicators for HIV programmes

Short name	Short definition	Measured with facility-based data
1. People with HIV	Number and percentage of persons living with HIV	No
2. Domestic finance	Percentage of HIV resources financed domestically	No
3. Prevention	Percentage of condom use among key and general populations	No
4. Knowing HIV status	Percentage of people who have been diagnosed	Yes
5. Linkage to care[a]	Number and percentage of persons living with HIV on HIV care (including ART)	Yes
6. Currently on ART	Percentage of persons living with HIV on ART	Yes
7. ART retention	Percentage of persons living with HIV retained and surviving on ART	Yes
8. Viral suppression	Percentage on ART virally suppressed	Yes
9. AIDS deaths	Deaths per 100 000 population attributed to AIDS	No
10. New infections	Number and percentage of new HIV infections	No

Note:

[a] As countries move to a "treat all" policy this indicator will become redundant (covered by percentage currently on ART) and will likely no longer be collected separately. However, until countries reach that stage of programming, it may continue to be an important indicator.

Of the 10 global indicators shown, five are indicators which are measured using data **primarily provided by health facilities**, either directly or via linkages with community-based service delivery.

As such, these five indicators form the basis of core facility indicators that are recommended for routine collection by facilities and collated through HMIS. Some modifications of the global indicator definitions are necessary due to the cross-sectional, aggregate nature of most data collected through HMIS,[1] which is in contrast to the longitudinal or cumulative perspective inherent to the HIV cascade. But the primary advantage of routine facility data is that by routinely analysing these HMIS indicators, programme managers will have the essential information needed to track the effectiveness of the response and to trigger corrective actions to address bottlenecks in the HIV service cascade at national, district and health facility levels. At district and facility level, the ability to conduct routine analysis provides managers with a data-driven decision-making process and greater focus on access to and quality of care.

[1] In 2017, WHO published a guideline for HIV case surveillance and patient monitoring that promotes the use of routine data for patient care and to enable reporting on most programme, national and global indicators, including key global targets for HIV. These guidelines aim to improve the routine collection of HIV data from health facilities using a patient-level approach. Instead of collecting aggregated service-level data (e.g. the number of HIV tests provided), this approach follows individuals through a cascade of linked services to improve patient care and outcomes. As countries begin to adopt or, where existing, improve upon these types of routine facility data systems, guidance for the recommended HMIS data analysis will include options for analysing individual-level, longitudinal and cumulative data. The document and annexes with all the web annexes can be found at: http://www.who.int/hiv/pub/guidelines/person-centred-hiv-monitoring-guidelines/en/

2. Data quality

One of the challenges to interpreting HMIS data is that responsibility for data entry, cleaning and management is distributed across many individuals and facilities. Unlike special studies or surveys, there are often limited resources available for cleaning data, impacting the quality and usability of routine monitoring data. As for all data sources, in addition to establishing systems and protocols to enhance good data collection and reporting, any analysis must consider whether the results are affected by data quality issues.

The WHO *Data quality review (DQR) toolkit* provides guidance for defining measures of data quality, conducting a desk review to assess data quality, and conducting data verification of routine facility data systems.[2] The five domains used for periodic assessments of data quality, as recommended, by this toolkit are summarized here (see also Table 2.1).

Timeliness refers to whether reporting units submit their data according to the timeline set by national HMIS guidelines. **Completeness** measures the extent to which priority data elements are included in reports. Both timeliness and completeness of reporting can be assessed at national level and at any subnational (SNU) level (e.g. facility, district, regional, etc.). Both timeliness and completeness can also be assessed separately for specific data forms used in reporting. For example, if HIV testing sites submit reports separately from ART sites, then completeness of HIV testing reports can be assessed as distinct from completeness of ART reports.

Internal consistency takes multiple forms. Identifying outliers is important, i.e. pinpointing reported values which are unusually high or low compared with other reporting units or compared with historical performance. Indicators which are related to each other can also be used to develop internal consistency checks, e.g. if a country has a treat all policy and no backlog of patients, the number of people enrolled in ART in a given month should be a subset of the number of people who were diagnosed with HIV that month.

External consistency and **comparisons** provide useful validation of routinely collected data against data sources which may be more rigorous but are collected less frequently due to the high-resource requirements for that type of data collection. Such comparisons should be made as and when updated external data become available, e.g. annually or less frequently.

Table 2.1 describes example metrics for each domain. Note that metrics for each domain can be calculated using either "report" as the unit or "SNU" (e.g. percentage of reports submitted on time versus percentage of districts submitting 100% of reports on time).

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[2] Data quality review (DQR) toolkit. Module 1: Framework and metrics; Module 2: Desk review of data quality; Module 3: Data verification and system assessment. Geneva: World Health Organization; 2017 (https://www.who.int/healthinfo/tools_data_analysis/dqr_modules/en/, accessed 11 November 2019).

Table 2.1 Data quality review domains for routine facility data

Domain	Example metric	Metric using subnational level (SNU) as the unit
Timeliness	Percentage of submitted district monthly reports (previous 1 year) that are received on time (target: > 75%)	Number and percentage of SNU that submitted on time at least 75% of the monthly reports received at national level
Completeness	Percentage of expected district monthly reports (previous 1 year) that are actually received (target: > 75%)	Number and percentage of SNU that submitted 75% of expected monthly reports
	Percentage of: 1. non-zero values 2. non missing values (in the reporting period) per priority indicator	Number and percentage of SNU with > 90%: 1. non-zero values 2. non missing values for priority indicators
	Evaluate the trend in completeness of reporting over the past 3 years	
Internal consistency (outliers, consistency over time, consistency between indicators)	Percentage of reported values for priority indicators that are extreme outliers (> 3 SD from the mean)	Number and percentage of SNU where one or more reported value over the course of 1 year is an extreme outlier
	Ratio of current year value to the average of the 3 preceding years for indicators expected to remain constant (e.g. ART retention)	Number and percentage of SNU whose current year-to-average of the preceding 3 years is > 33% different from national ratio
	Ratio of number enrolled on treatment to the number tested positive in the previous reporting period < 1 in a treat all setting	Number and percentage of SNU meeting the test of consistency between testing and treatment indicators
External consistency with other data sources	Consistency between routinely reported data and population-based surveys of comparable populations	Number and percentage of SNU meeting test of consistency between routinely reported data and population-based surveys (among SNU with population-based survey data)
External comparison of population data	Consistency between the population data used for calculating coverage and other sources of population estimates	Number and percentage of SNU meeting test of consistency between population data used for calculating coverage and other sources of population data

Note: SD – standard deviation.

Every country's HMIS governance bodies will adopt their own specific data quality standards that are appropriate for their data flow, reporting frequency and supervisory structure. However, the standard should address each of the domains described above.

Quality assessments of timeliness/completeness and internal consistency of HMIS data for the core HIV indicators should be examined monthly by the reporting unit itself as well as for each supervisory level, e.g. districts should review percentage completeness of all facilities expected to report in their jurisdiction, regions should review percentage districts with reporting rates that meet targets, and the national level should review reporting rates of regions, etc.

Routine data review activities such as those described here should be complemented by periodic, intensive data quality assessments such as those characterized in the guidelines on *Data quality assessment of national and partner HIV treatment and patient monitoring systems* (WHO, 2018).

3. Core facility indicators

Below is a subset of the core facility indicators[3] for use in the recommended HIV programme dashboards. This list reflects a minimum set of data elements that can be analysed to produce figures to help HIV programme managers in assessing programme performance and taking actions to strengthen or accelerate service delivery. This set of indicators is aligned with global guidance developed by WHO and its partners including the *Global reference list of 100 core health indicators* (WHO, 2018) and the *Consolidated strategic information guidelines for HIV in the health sector* (WHO, 2015).

[3] Several tuberculosis (TB)/HIV and prevention of mother-to-child transmission (PMTCT) indicators are included in the core HMIS list but are integrated into the analyses of the other relevant programme areas.

Core indicators	Definition	Disaggregation[a]
HIV tests performed	Number of HIV tests	Age (< 15, 15+) Sex (M, F, TG) Special populations (KPs, ANC attendees) Geographic location
Persons living with HIV newly diagnosed	Number of confirmed HIV-positive tests	Age (< 15, 15+) Sex (M, F, TG) Special populations (KPs, ANC attendees) Geographic location
HIV test positivity	N: Number of confirmed HIV-positive tests D: Number of HIV tests	Age (< 15, 15+) Sex (M, F, TG) Special populations (KPs, ANC attendees) Geographic location
Newly on ART	Number of persons living with HIV who initiate ART	Age (< 15, 15+) Sex (M, F, TG) Special populations (KPs, ANC attendees) Geographic location
Crude ratio linkage to treatment[b]	N: Newly on ART D: Persons living with HIV newly diagnosed	Age (< 15, 15+) Sex (M, F, TG) Special populations (KPs, ANC attendees) Geographic location
Currently on ART	Number persons living with HIV currently receiving ART	Age (< 15, 15+) Sex (M, F, TG) Special populations (KPs) Geographic location

Core indicators	Definition	Disaggregation[a]
ART coverage rate (current)	N: Number persons living with HIV currently receiving ART D: Estimated number of persons living with HIV	Age (< 15, 15+) Sex (M, F, TG) Special populations (KPs) Geographic location
ART retention rate	N: Number of persons living with HIV retained on ART – for specified duration D: Number of persons living with HIV who initiated ART prior to (and during) the specified duration	Age (< 1, ≥ 1) Sex (M, F, TG) Special populations (KPs) Geographic location Specified duration (currently/ever, 12, 24, 36, 48, 60 months)[c]
Viral load (VL) testing coverage rate (annualized)[b]	N: Number of persons living with HIV tested for VL × 12 D: Number of persons living with HIV currently receiving ART	Age (< 15, 15+) Sex (M, F, TG) Special populations (KPs) Geographic location
HIV VL suppression rate	N: Number of persons living with HIV who are on ART who have suppressed VL (< 1000 copies/mL) D: Number of people receiving a VL test during reporting period	Age (< 15, 15+) Sex (M, F, TG) Special populations (KPs) Geographic location Time of initiation (currently/ever, 12 months)[a]
Persons living with HIV on newly enrolled in HIV care started on TB preventive therapy	N: Total number of persons living with HIV newly enrolled in HIV care who are started on treatment for latent TB infection D: Total number of persons newly enrolled in HIV care, i.e. registered in the pre-ART or ART register	Age (< 15, 15+) Sex (M, F, TG) Special populations (KPs) Geographic location
Prevention of mother-to-child transmission (PMTCT) testing coverage rate	N: Number of pregnant women attending ANC and/or who had a facility-based delivery who were tested for HIV during pregnancy or already knew they were HIV positive D: Number of ANC attendees or number of facility-based deliveries	HIV status/test results: 1. Known HIV infection at ANC entry 2. Tested HIV positive at ANC during current pregnancy 3. Tested HIV negative at ANC during current pregnancy Total identified HIV-positive women = 1 + 2 Optional disaggregation: ANC attendees who inject drugs

Notes:

[a] The age disaggregation recommended reflects a basic level of disaggregation that may be feasible for many countries reporting testing data in aggregate form. Finer levels of disaggregation are appropriate and recommended for countries with more robust routine information systems or where information systems receive support and have higher demands from funding partners.

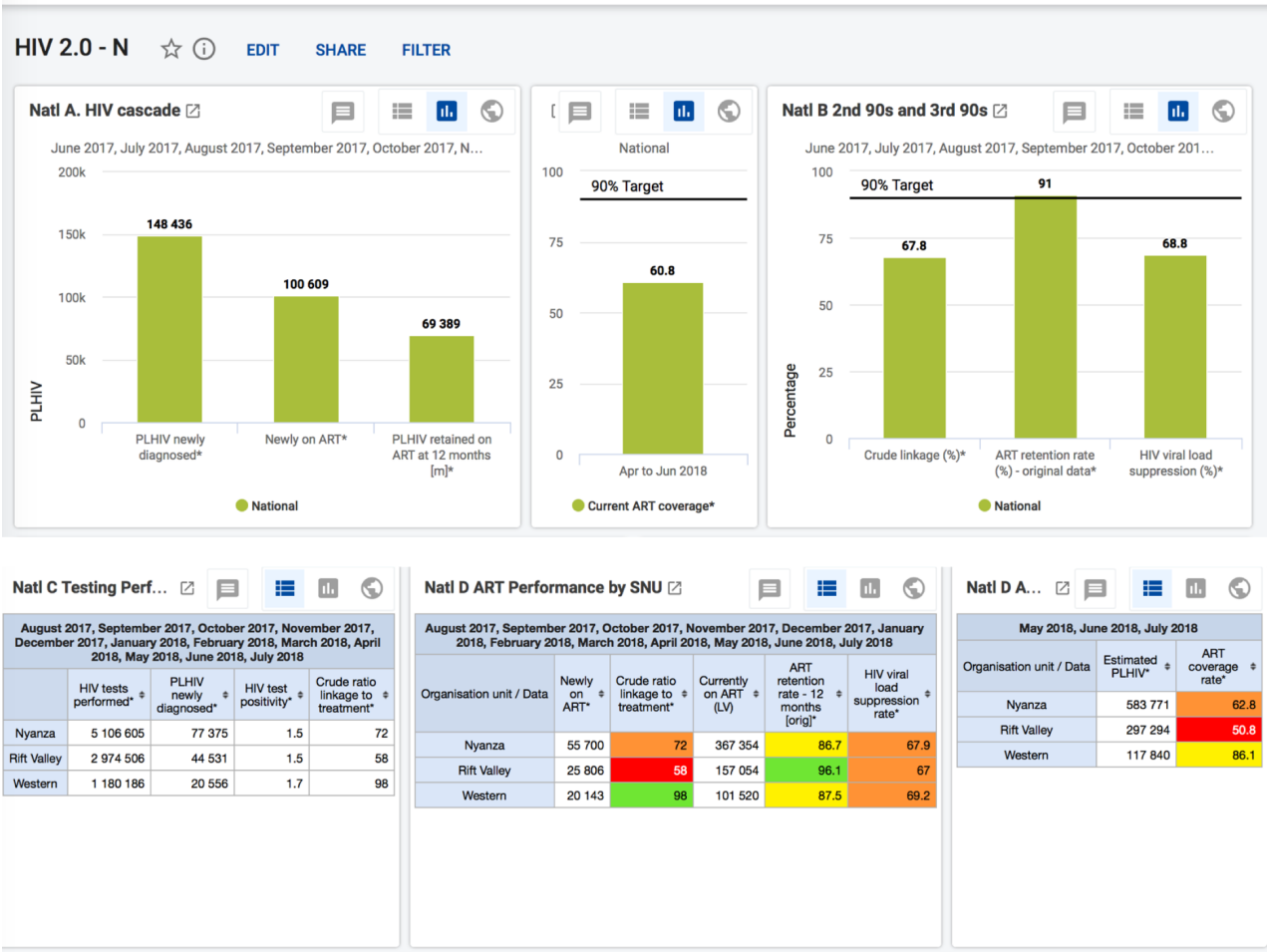
[b] These indicators are not part of the WHO *Global reference list of 100 core health indicators* or the WHO *Consolidated strategic information guidelines for HIV in the health sector*. Crude ratio linkage to treatment is an essential proxy for estimating the second 90 indicator: percentage of those diagnosed who initiate treatment using facility-based data; and VL testing coverage is an indicator necessary for interpretability of the VL suppression rate from facility-based data.

[c] Specified duration refers to both numerator and denominator, e.g. number retained on ART at 12 months/number initiated on ART 12 months prior to the reporting period; number currently retained on ART/number ever initiated on ART.

ANC – antenatal care; ART – antiretroviral therapy; F – female; KP – key population; m – male; PMTCT – prevention of mother-to-child transmission; TG – transgender; VL – viral load.

4. Analysis of core set of indicators

4.1 HIV dashboard



August 2017, September 2017, October 2017, November 2017, December 2017, January 2018, February 2018, March 2018, April 2018, May 2018, June 2018, July 2018

	HIV tests performed*	PLHIV newly diagnosed*	HIV test positivity*	Crude ratio linkage to treatment*
Nyanza	5 106 605	77 375	1.5	72
Rift Valley	2 974 506	44 531	1.5	58
Western	1 180 186	20 556	1.7	98

August 2017, September 2017, October 2017, November 2017, December 2017, January 2018, February 2018, March 2018, April 2018, May 2018, June 2018, July 2018

Organisation unit / Data	Newly on ART*	Crude ratio linkage to treatment*	Currently on ART (LV)	ART retention rate - 12 months [orig]*	HIV viral load suppression rate*
Nyanza	55 700	72	367 354	86.7	67.9
Rift Valley	25 806	58	157 054	96.1	67
Western	20 143	98	101 520	87.5	69.2

May 2018, June 2018, July 2018

Organisation unit / Data	Estimated PLHIV*	ART coverage rate*
Nyanza	583 771	62.8
Rift Valley	297 294	50.8
Western	117 840	86.1

Fig. 4.1 Main HIV dashboard

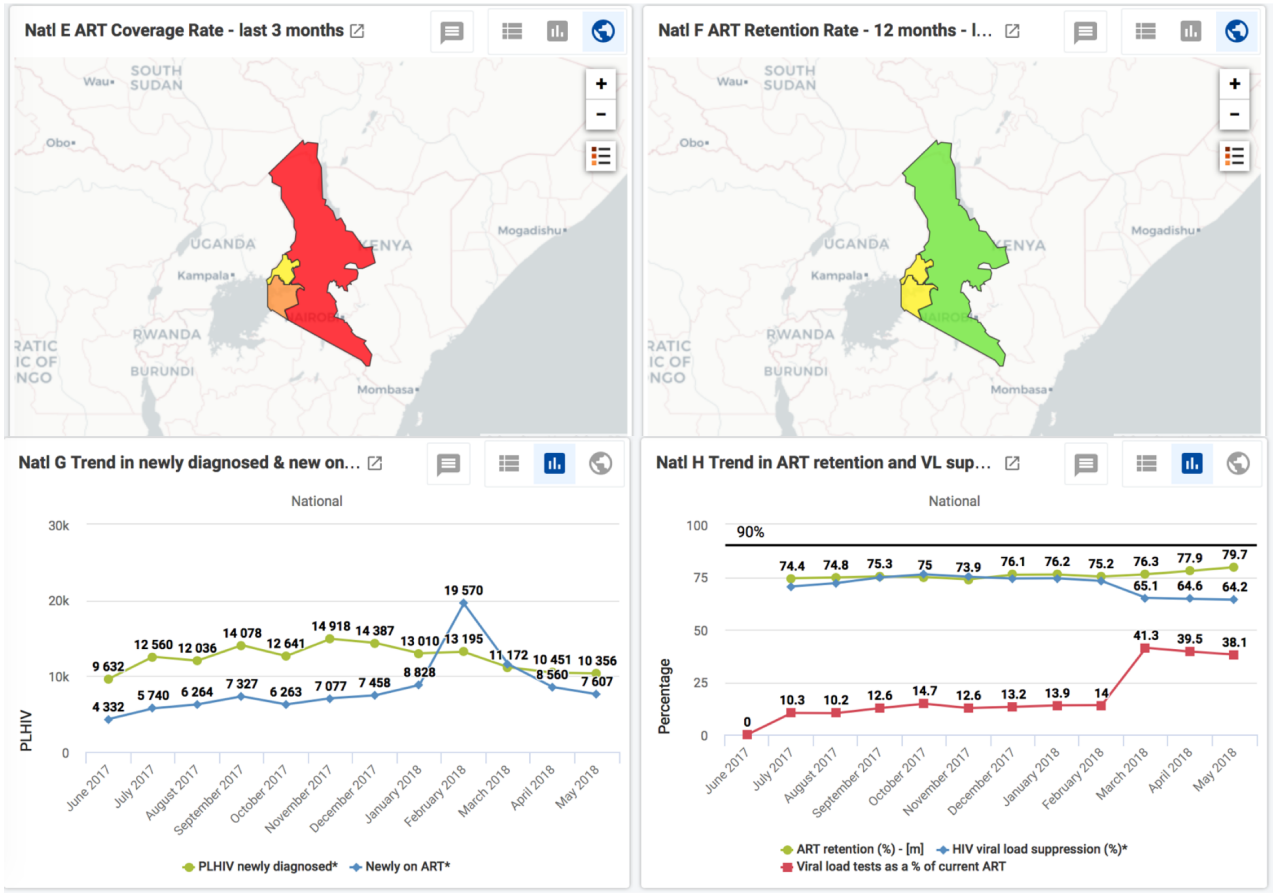


Fig. 4.1 Main HIV dashboard (continued)

To provide managers with an overview of key areas of programme performance, an HIV dashboard, i.e. standardized presentation of the core indicator data, is described in this document. One of the key advantages of integrating a standardized dashboard into the routine reports generated by the HMIS is that it can be made immediately available to the many different users of the HMIS at different levels of the health system. Alternatively, the dashboard can be sent routinely to groups of non-HMIS users on a periodic basis (e.g. monthly or quarterly), to further encourage use of the information.

The main HIV dashboard (Fig. 4.1) recommended has four types of figures:

- bar charts showing the HIV clinical cascade and three "90s" indicators;
- tables for showing SNU performance against key indicators in ranked order;
- maps for key indicators to identify which geographic areas are performing well and which are falling below expectations; and
- line charts showing time trends of performance for key indicators.

The most useful analysis of HIV data in an HMIS helps managers identify: the type of **person** who is and is not receiving services; the **places** where programmes are most or less effectively provided; and whether performance is improving over **time**.

This document provides a description of each figure in the main HIV dashboard, including the recommended disaggregation by **person, place** and **time**, and the alternative views for managers conducting more in-depth analysis of performance. This guidance focuses on a version of the main dashboard appropriate for managers at the national level. Variations of the main dashboard appropriate for SNU use, e.g. at regional, district and facility level, are also described briefly.

Analysing performance with disaggregated data

The most powerful form of disaggregation of these core indicators is by place. Using maps or tables to show performance of these indicators by SNU is critical for managers to identify high-performing and low-performing areas, whether defined by relative disease burden or programmatic targets. Through this type of analysis, managers can determine where to put more supervision and resources and from where lessons can be drawn to strengthen performance in other areas.

In order to use HMIS data to identify who may be underserved, disaggregation by demographic characteristics is important. In line with the principle of focusing on a few core indicators, this guidance recommends a limited set of other variables for standard disaggregation, including gender; special populations, such as pregnant women and key populations (KPs); and age (i.e. distinguishing between paediatric and adult populations). Having more and more fine-grained disaggregation would make both collection and management of the data more burdensome. However, countries with robust systems, already collecting data disaggregated by additional variables, can incorporate these variables into their customized dashboards.[4] In addition, implementation of case-based surveillance functionality with national HMIS should enable such disaggregated analyses to be performed more expediently.

In many contexts, HMIS can disaggregate data by service type (e.g. antenatal care [ANC]/ PMTCT, TB, other), facility level (e.g. hospital, health centre, dispensary, etc.), ownership (public, nongovernmental, private, etc.) or programme/funding source (e.g. President's Emergency Plan for AIDS Relief, The Global Fund, etc.). These variables are easy to include in HMIS because they reflect characteristics of the reporting unit and need only be entered at the time the unit is registered in the HMIS or updated with a new planning cycle (e.g. every 5 years, if changes in funding occur). Programme managers may find these types of disaggregation of the data helpful for examining the impact of different operational models, management structures; or necessary to produce reports consistent with funders' reporting requirements.

[4] Considerations for which finer level age disaggregations to introduce should include:
- the multiplicative burden of reporting disaggregation by more than one variable, e.g. age by sex (< 15 M; 15+ M; < 15 F; 15+ F);
- limitations in age disaggregation available for modelled denominators (i.e. spectrum estimates only available by < 15, 15+ age groups);
- ensuring the compatibility of age disaggregation when analysing related indicators that may be reported from different sources (e.g. ability to age disaggregate all cascade indicators in the same age categories).

Compared with non-routine data sources, a critical advantage of HMIS data is the ability to review and display data over different time periods to assess performance trends. This guidance document assumes data are collected monthly, i.e. that the value of each indicator is known for each month. Doing so allows each indicator to be calculated cumulatively for different time periods (e.g. last month, last quarter, last year, etc.) and for indicators to be displayed as a trend to show progress or drop off in services. The analytic approach in this guidance assumes that managers may want to review the most recent performance. For this reason, charts and tables are presented for relative time periods, e.g. the 12 months or 3 months prior to the time the chart was generated. In practice, managers may also need access to dashboards which show data for fixed time periods corresponding to the planning and review cycle or reporting cycle, e.g. January – December 2016 or June – August 2016. Each user group of the dashboards will need to identify the timeframes that are most useful for their context – dashboards can be modified to serve those needs.

4.2 Incorporating targets into the dashboard

Charts and figures used for performance monitoring should ideally incorporate the targets set for each indicator for each SNU. For some indicators, the target is a threshold percentage, e.g. 90% ART retention rate – 12 months. These types of targets are easily incorporated into standard dashboard figures through colour coding table cells or maps or as a line appearing across a figure showing bar charts or trends. For other indicators, specific targets have been set using a formula applied to a local area or service provider's context. These types of targets can also be visualized in standardized dashboard figures but require countries to routinely import targets for local SNUs into the HMIS as and when they are updated in planning documents. This document details how absolute level targets can be incorporated into some figures and notes regarding area/facility-specific targets can be visualized.

4.3 Tips for dashboard customization

As mentioned earlier, the recommended dashboard in this guidance provides a standardized approach to considering key programme performance questions managers typically need to answer. The main dashboard can be further customized for users at national/SNU1, SNU2 and facility levels. Many of the same indicators are used but the style of visualization has been adapted to reflect the perspectives of different users. In a few cases, some figures are not meaningful at the facility or SNU2 level.

Table 4.1 Dashboard types

Types of dashboards	Primary user	Recommended frequency of use	Number of figures
HIV 2.0 N/SNU1 level (national or regional)	National/SNU1 programme manager	Quarterly/annually	10
HIV 2.0 SNU2 level (district)	SNU2 programme manager	Month to month	8
HIV 2.0 F level (facility)	Facility programme manager	Month to month	6

Even the "standard" dashboards used by a country may need to be further adapted for the acquired immune deficiency syndrome (AIDS) control programme organizational structure, package of service, data availability and differences in epidemic conditions. Customization of standard dashboards should include the following key steps:

1. Map recommended core indicators and data elements (and disaggregation variables) to what is collected in the country-specific HMIS.

2. Identify indicator definition modifications and implications for adopting the recommended HIV main dashboard figures. *Note:* In some cases, an indicator cannot be disaggregated to the lowest level, e.g. ART coverage rate requires the estimated number of persons living with HIV, but in most countries estimates are not available below district level.

3. Identify critical indicators or base on routine facility data that are included in the national strategic plan but not in the recommended HIV main dashboard.

4. Identify the different groups of users at national and subnational level.

5. Determine the frequency and main uses of the dashboard for each user group (e.g. quarterly review, annual reporting, semi-annual supervisory site visits, monthly staff meeting, etc.); and identify uses that require additional or different dashboard figures for specific groups.

6. Modify dashboard configuration according to different user groups and main uses, including figures displaying critical country-specific indicators not included in the standard dashboard.

Sometimes customization of a dashboard for a specific user group is simply creating the same dashboard figure but at a different level of granularity or different type of disaggregation. For example, maps which show the performance of specific facilities within a district, or that limit the dataset to only pregnant women. Or, for some users, trend analysis may be more informative when displaying monthly changes, while other levels of managers may find quarterly or annual changes more useful for the same indicator.

As greater granularity or disaggregation is applied, the number of service events (e.g. tests performed, persons living with HIV newly on ART, number of VL tests performed, etc.) becomes smaller. Caution should be taken when interpreting trends or comparing geographic areas when the number of events is small (e.g. < 50). Often analysts must make a trade-off between geographic granularity and time period granularity to enable meaningful analysis and comparison.

Analysis done in specific geographic units may also pose challenges in interpretation of cascade figures if there are large differences in the geographic accessibility between testing and ART sites. For example, if there is only one ART facility in a district, but five or six testing sites, meaningful cascade analysis may not be possible below district level. Similarly, if VL testing is only readily available to patients who seek care at a limited number of places (e.g. tertiary treatment sites), comparing VL suppression rates at district level may not be meaningful.

Another key aspect of dashboard customization relates to the categories chosen for colour coding SNUs on maps. Because the use of maps in a dashboard is to distinguish geographic areas by high and low performance, the colour coding of the map should correspond to meaningful levels of performance for a given indicator. Indicators that have an absolute level of good performance, e.g. 90% ART retention rate – 12 months, often use this threshold for the highest level of performance, while the categories for lower levels of performance can be modified to reflect values that trigger management action, e.g. supervisory visits, follow-up phone calls, intensified monitoring, etc.

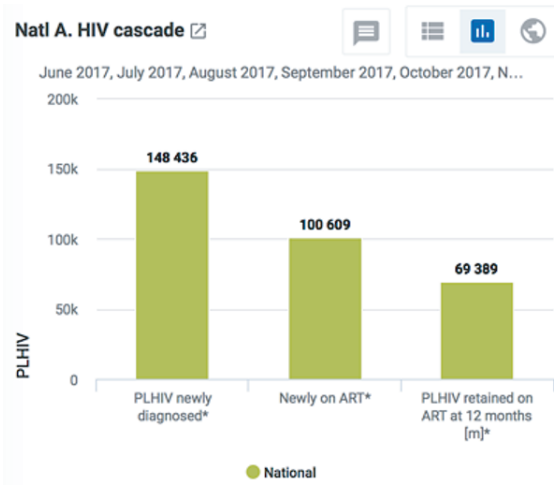
Finally, when modifying how recent a time period to look at, consider the time lag between providing services and entering/cleaning data in the HMIS. Systems which allow "real-time" analysis of routinely collected data may not indicate when reporting is incomplete for the last month's data. For example, if a country gives reporting units a 2-week period after the last day of the month to submit reports, a chart generated before that window has closed showing the last month's data may show lower numbers in automatically generated dashboards and be misinterpreted as declining performance.

4.4 HIV cascade bar charts

Purpose

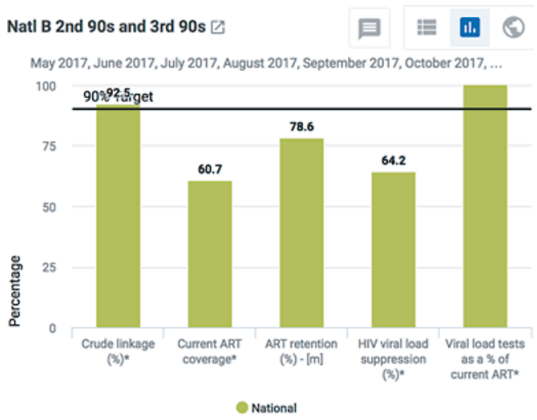
Cascade charts provide managers with a summary of the HIV care cascade (Fig. 4.2) and the 90-90-90 targets (Fig. 4.3) using routine monitoring data.

Analysis

<table>
<tr>
<td rowspan="2">
</td>
<td>Data elements and indicators[a]
Persons living with HIV newly diagnosed
Newly on ART
Number of persons living with HIV retained on ART – 12 months[b]</td>
<td>How managers use
Summary of performance against three key cascade measures; gender comparison identifies inequity in linkage between services</td>
</tr>
<tr>
<td>Person, place, time disaggregation
All and by sex
National
Last 12 months (relative to date dashboard generated)</td>
<td>Alternate views
Generated for specific SNUs, especially low-performing areas
Useful to generate for fixed periods corresponding to planning/budget cycle or for more recent time periods (e.g. last 3 months)
Cascades can be constructed for specific subgroups, such as paediatric, ANC/PMTCT, KPs, or by implementation partners</td>
</tr>
<tr>
<td colspan="3">Targets
Chart can appear as stacked columns showing achievements as a portion of targets or as a set of “shadow” columns side by side, if they are colour coded in a corresponding way, e.g. same coloured outlines but not filled in.</td>
</tr>
</table>

[a] In these tables, the term “data element” refers to a single variable directly entered into an HMIS database, while an “indicator” refers to a measure calculated from multiple data elements in an HMIS database.
[b] See the Considerations/issues for interpretation section to understand why VL suppression is not used as the last bar in this cascade figure.

Fig. 4.2 A: National HIV cascade



	Indicators Crude ratio linkage to treatment ART coverage rate ART retention rate – 12 months HIV VL suppression rate VL testing coverage rate – annualized	**How managers use** Measures for 2nd 90 (linkage to ART and ART coverage); and for 3rd 90 (percentage VL suppression or ART retention – 12 months as a proxy) (Countries with less reliable VL testing data will use ART retention – 12 months) To interpret VL suppression data, managers must know whether a majority of patients on ART are getting VL testing every year
	Person, place, time disaggregation National Last 12 months (relative to date dashboard generated) – for crude ratio, ART retention rate – 12 months, HIV VL suppression and VL testing coverage rate Last month (relative to date dashboard generated) – for ART coverage rate	**Alternate views** Generated for specific SNUs, especially low-performing areas or for specific facility types Useful to generate for fixed periods corresponding to planning/budget cycle or for more recent time periods (e.g. last 3 months). Figure can be constructed for specific subgroups, such as paediatric, ANC/PMTCT, KPs, or by implementation partners
Targets Target of 90% can be shown as a line running across the figure.		

Fig. 4.2 B: 2nd 90 and 3rd 90

Considerations/issues for interpretation

- Cascade analysis using facility-based data is limited to cross-sectional views of patient experience.
- Data from countries transitioning to a "treat all" policy may result in atypical cascades.
- Countries where VL testing is not routine in all areas should rely on ART retention data rather than VL suppression data for cascade analysis based on facility-based data.

The bar chart showing cascade indicators as absolute numbers replicates the ideal HIV care cascade using data available from routine monitoring data. In a mature, well-functioning "treat all" ART programme, the number of newly on ART would be expected to be 90% or more of those persons living with HIV newly diagnosed. And the number retained on ART for 12 months should be 90% or more of the number newly on ART (i.e. assuming the rate of diagnoses is similar from one year to the next).

However, the cross-sectional, unlinked way that data are captured in most HMIS means that using these indicators may not always result in a typical cascade. This is due to inclusion of different groups of persons living with HIV in each bar. For example, some patients newly starting ART in the year represented by the figure may have been diagnosed more than a year earlier and been waiting to enrol in treatment. Individuals included in the measure for ART retention for 12 months (third bar), by definition, would have been diagnosed and initiated on ART in the year prior to those people included in the second bar.

Fig. 4.4, illustrates how the time lag mismatch can be masked because the bars shown in the cascade have a relationship that looks as expected. However, in many countries these anomalies can result in cascade charts where the second or third bars are higher than the previous bars. As ART programmes stabilize and reduce the backlog of diagnosed patients waiting to initiate treatment (expanding same-day ART initiation, etc.), the cascade figures will become more interpretable. End users of the dashboard can be assisted by adding notations about programmatic transitions or shifts to dashboard figures, when the information is critical to interpreting the results.

Data mismatches can be hidden in the cascade bar chart

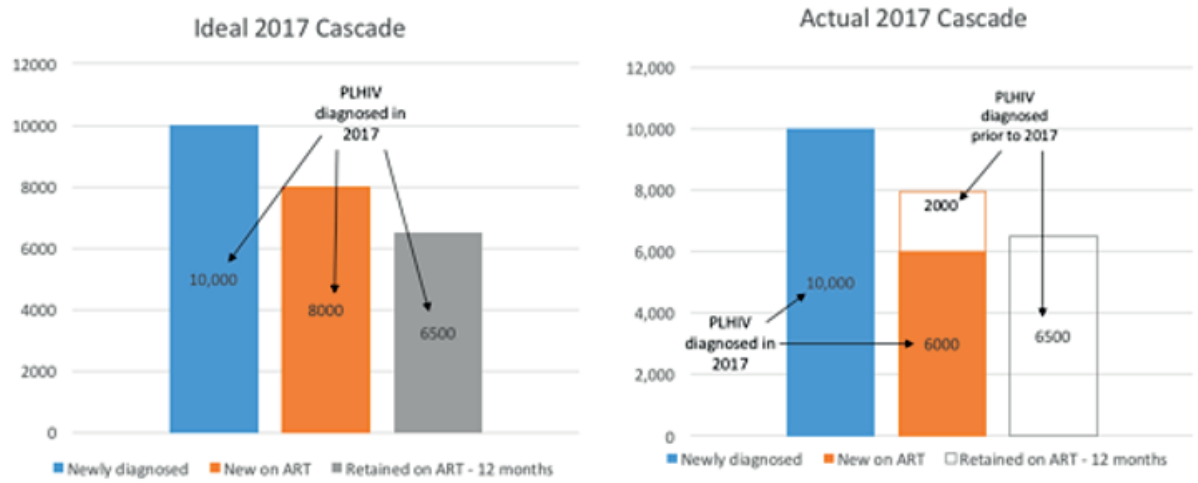


Fig. 4.4 Anomalies in cascade charts

The cascade ratios (Fig. 4.3) display the coverage indicators related to the 2nd 90 and 3rd 90 indicators: a crude linkage measure for percentage of those diagnosed linked to care; the percentage of estimated persons living with HIV on ART; the percentage retained on ART for 12 months; and the percentage of ART patients with VL suppression among those who had a VL test. Because VL testing is not yet universal among all ART patients in most countries, the VL testing coverage is also shown in this figure to help interpret the generalizability of the 3rd 90.

With respect to interpreting possible inequity in service utilization through separate male and female cascades, analysts should also consider reviewing the data separately for ANC/PMTCT clients. Because PMTCT programmes follow a different set of guidelines and often have separate management, budgets and infrastructure for providing testing and treatment services, there

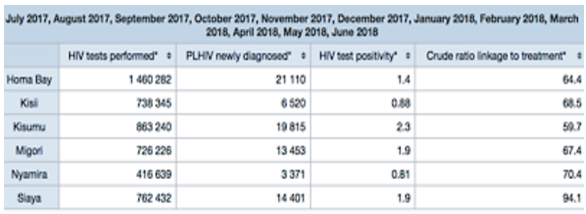
may be a difference in HIV care cascades for women who are diagnosed in ANC settings and those who are diagnosed in non-ANC settings. At the same time, for programme managers it may be useful to compare HIV testing services across different service venues and modalities, including ANC/PMTCT, TB, outpatient, inpatient and other provider-initiated testing and counselling-focused settings.

4.5 HIV testing and ART performance tables

Purpose

These tables (Figs 4.5 and 4.6) display SNUs ranked in order for the key indicators for testing performance and ART performance.

Analysis



July 2017, August 2017, September 2017, October 2017, November 2017, December 2017, January 2018, February 2018, March 2018, April 2018, May 2018, June 2018

	HIV tests performed*	PLHIV newly diagnosed*	HIV test positivity*	Crude ratio linkage to treatment*
Homa Bay	1 460 282	21 110	1.4	64.4
Kisii	738 345	6 520	0.88	68.5
Kisumu	863 240	19 815	2.3	59.7
Migori	726 226	13 453	1.9	67.4
Nyamira	416 639	3 371	0.81	70.4
Siaya	762 432	14 401	1.9	94.1

Indicators needed

HIV tests performed

Persons living with HIV newly diagnosed

HIV test positivity

Crude ratio linkage to treatment

How managers use

Allows manager to sort by any testing indicator in the table to identify high and low SNU2 performers

Side-by-side data on number of tests and test positivity allow managers to better assess efficiency of case finding

Person, place, time

All

SNU1 (regional

Last 12 month (relative to date dashboard generated)

Alternate views

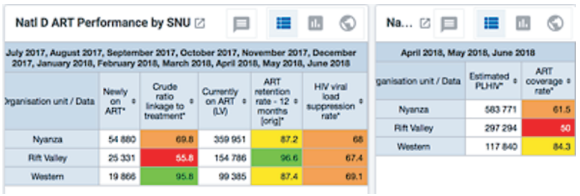
Generated by sex or age by district level or specific facility types

Useful to generate for fixed periods corresponding to planning/budget cycle or for more recent time periods (e.g. last 3 months)

Targets

Table can be expanded to have separate column for percentage achievement against testing targets, then colour coded according to which areas achieved or surpassed their targets.

Fig. 4.5 C: Testing performance by SNU1



Indicators needed

Newly on ART

Crude ratio linkage to treatment

Currently on ART

ART retention rate – 12 months

HIV VL suppression rate

VL testing coverage rate – annualized

Estimated persons living with HIV

ART coverage rate

How managers use

Allows manager to sort by any ART indicator in the table to identify high and low SNU2 performers

Achieved percentages are colour coded by standard measures of performance (< 60%, 60–75%, 75–89%, > 90%)

Person, place, time disaggregation

All

SNU1

Last 12 months (relative to date dashboard generated) – for all indicators except ART coverage

Last month (relative to date dashboard generated) – for estimated persons living with HIV and ART coverage rate

Alternate views

Generated by sex or age at sub-district level or for specific facility types

Useful to generate for fixed periods corresponding to planning/budget cycle or for more recent time periods (e.g. last 3 months)

Targets

Percentage achieved against target can be calculated and added as columns to the table, then colour coded by performance using the standard HIV legend (< 60%, 60–75%, 75–89%, > 90%).

Fig. 4.6 D: ART performance by SNU1

Considerations/issues for interpretation

- Tables of indicators display programme performance in a score card format, which is helpful for ranking geographic areas or reporting units.
- Different managers may benefit from sorting high- and low-performing areas according to different indicators.

These tables function as a type of score card, presenting a summary view of programme performance across geographic areas (i.e. SNU) for the key indicators of the HIV testing programme and the ART programme. These lists can be sorted by any variable shown in the table. Colour coding values in the table according to expected performance helps managers to easily scan for high- and low-performing geographic areas. It is also possible to determine which aspect of a testing programme or the ART programme creates challenges for large groups of SNUs; or to see patterns in low performance across multiple dimensions of the programme.

Score cards made available to SNU-level managers or facilities can see how their facility/SNU performs compared with other sites. The generation of these tables for specific subgroups (e.g. by gender, for KPs, for specific types of facilities, or those funded using a specific service delivery model) can also be helpful in exploring inequity or underperformance.

The indicators selected for the tables reflect the key questions managers may have. Where is HIV testing promotion and service expansion working and where are testing resources being used (i.e. number of tests performed)? Where is case finding highest and most efficient (i.e. number of persons living with HIV newly diagnosed, test positivity)? Where are the greatest number of new ART patients (i.e. number newly on ART)? Where is ART linkage to care poor (i.e. crude ratio of newly on ART to newly diagnosed)? Where is ART enrolment highest (i.e. number currently on ART, ART coverage rate)? Where is ART quality high (e.g. ART retention rate > 90%, VL suppression rate > 90%)?

Note: Assessment of testing performance relies on the number of tests performed, which is only a proxy for the number of individuals tested for HIV. Facility-based testing data that are reported in aggregate cannot distinguish repeat testers in different time periods. Managers may need to adjust their testing coverage estimates based on the average number of times a person may get tested for HIV over a given period.

4.6 Currently on ART and retention on ART maps

Purpose

These maps summarize the size and quality of ART service provision by SNU across the country.

Analysis

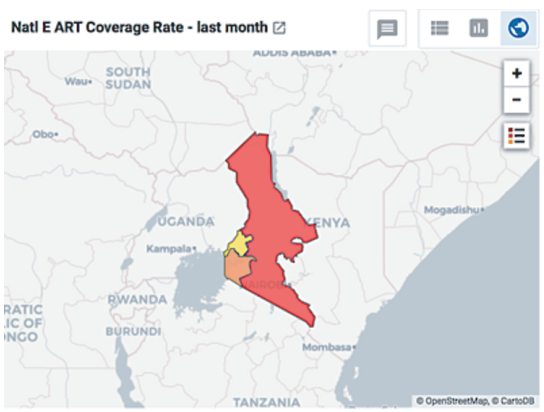
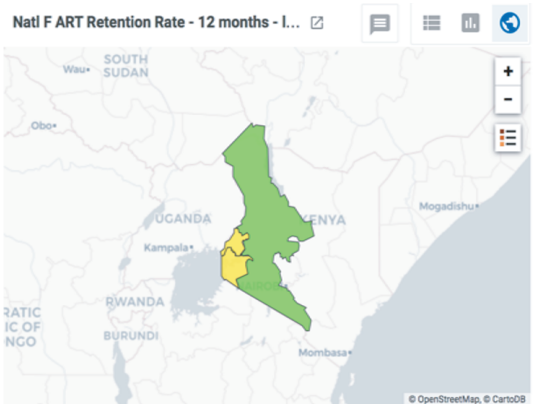
<table>
<tr>
<td rowspan="2">
</td>
<td>Indicators needed
ART coverage rate</td>
<td>How managers use
Identifies underperforming areas on ART coverage, assuming estimates for persons living with HIV are reliable
Managers can reference broader ART performance in parallel table (Fig. 4.6)</td>
</tr>
<tr>
<td>Person, place, time disaggregation
All and by sex
National
Last 12 months (relative to date dashboard generated)</td>
<td>Alternate views
Generated by sex or age</td>
</tr>
<tr>
<td colspan="3">Targets
Currently on ART targets are shown through the colour coding of areas (> 90%, 75–89%, < 75%, etc.); the lowest level of coverage can be indicated in red, highlighting where performance is low.
These targets are set at an absolute level.</td>
</tr>
</table>

Fig. 4.7 E: ART coverage map by SNU1



Indicators needed

ART retention rate – 12 months

How managers use

Identifies districts where ART retention at 12 months is lower than expected and where VL suppression may be jeopardized

Managers can reference broader ART performance in parallel table (Fig. 4.6)

Countries with good VL testing utilization/access can substitute percentage VL suppression indicator for ART retention – 12 months

Person, place, time disaggregation

All

SNU1

Last 12 months (relative to date dashboard generated)

Alternate views

Countries may be able to superimpose facility level retention rates through spot maps

Useful to generate for fixed periods corresponding to the planning/budget cycle or for more recent time periods (e.g. last 3 months) to look for changes in retention

Targets

Current targets are shown through the colour coding of areas (> 90%, 75–89%, < 75%, etc.); the lowest level of coverage can be indicated in red highlighting where performance is low.

These targets are set at an absolute level.

Fig. 4.8 F: ART retention map – 12 months by SNU1

Considerations/issues for interpretation

- Colour-coded maps provide an important tool for managers to quickly identify geographic areas performing well and poorly.
- Use of the ART coverage indicator in maps is limited to the level of granularity for which estimates of persons living with HIV are available in a country.
- Maps can highlight performance at multiple SNU levels simultaneously using a combination of choropleth and spot maps.

The map of current ART coverage (Fig. 4.7) shows which SNUs have done a good or poor job in diagnosing and linking persons living with HIV to ART. Unlike most other indicators used in these dashboards, the current number on ART refers to the cumulative number of patients on ART at a specific point in time (i.e. by the end of the month for which the number is generated). It is not meaningful when summed over different periods of time, such as a quarter, a year or multiple years. When the indicator is "calculated over a period of time," the HMIS should be taking an average value across the time period. Calculating the coverage rate requires estimates

of persons living with HIV for different SNUs, e.g. district estimates from Spectrum, need to be available and imported into the HMIS. In addition to being critical programme performance data, ART coverage at SNU level help programme managers to define relative geographic and sociodemographic gaps in service access, which may be addressed by operational and financial adjustments.

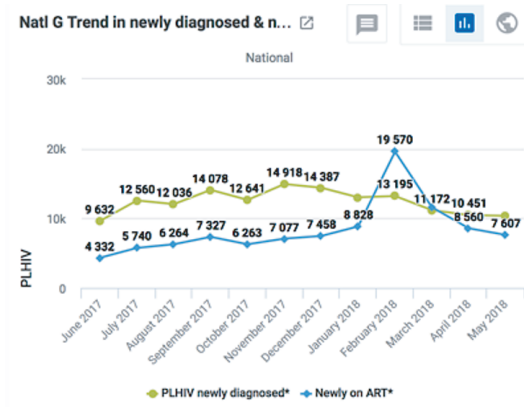
The map of ART retention (Fig. 4.8) is designed to show ART retention rates at two SNU levels simultaneously (i.e. SNU2 and facility level). The map can summarize which parts of the country have high retention and which are underperforming. The map can also identify specific facilities which disproportionately contribute to the SNU2 retention rate. For example, a low-performing facility will have a very different marker colour (red) than the background colour of the SNU2 that is performing well (green).

4.7 Case finding, linkage and ART quality trends

Purpose

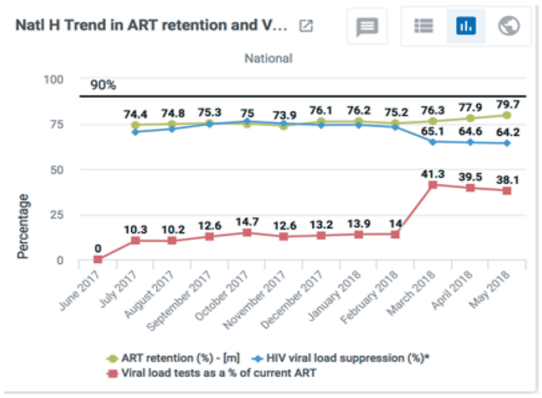
These trends show changes in performance for case finding, linkage to treatment and ART retention/VL suppression over time. They identifies unusual activity or interruption in service.

Analysis



Indicators needed Persons living with HIV newly diagnosed Newly on ART	**How managers use** Shows whether case finding and new ART enrolment are steady and the month-to-month pattern of linkage to treatment
Person, place, time disaggregation All National Monthly	**Alternate views** Generated by gender, age, KPs, service delivery modes (e.g. PMTCT, TB) or specific SNUs, especially those identified as underperforming through maps or tables Time periods can be calculated to show values by quarterly performance for fixed periods corresponding to budget or planning cycles

Fig. 4.9 G: National trend in newly diagnosed and newly on ART



Indicators needed

ART retention rate – 12 months

HIV VL suppression rate

VL testing coverage rate – annualized

How managers use

Shows whether ART retention and VL suppression rates remain high or fall below expected thresholds (90% target line is shown to identify gaps in performance)

VL testing coverage rate line indicates whether percentage VL suppression is likely to be generalizable to all ART patients; 90% target line is shown to identify gaps in performance for ART retention – 12 months and VL suppression rates

Person, place, time disaggregation

All

National

Monthly

Alternate views

Generated by sex, age, KPs, or for specific SNUs, especially those identified as underperforming through maps or tables

Time periods can be calculated to show values by quarterly performance for fixed periods corresponding to budget or planning cycles

Targets

In this figure the assumption is that both retention and VL suppression should be at 90%.

Fig. 4.10 H: National trend in ART retention and VL suppression

Considerations/issues for interpretation

- Trend analysis helps managers identify anomalies in performance or reporting that can trigger timely investigation or intervention.
- Specific areas of poor performance can be identified by observing divergence in trends between indicators which are expected to track together, such as ART retention and VL suppression.

These two figures (Figs 4.9 and 4.10) provide useful side-by-side comparison of indicators that are expected to have a relationship to each other. In well-functioning programmes, trends in newly on ART should shadow trends in newly diagnosed, especially in countries with a "treat all" policy in place. Large deviations between the lines or cross-overs (i.e. where the number newly on ART is much larger than the newly diagnosed) should have programmatic explanations that are incorporated as notes into the figure to aid interpretation. For example, in Fig. 4.9, the number newly on ART exceeds the number of cases diagnosed in February 2018. This occurred due to a concerted campaign in February to reduce the list of patients waiting to enrol in ART as this country completed its transition to implementing a "treat all" programme.

Similarly, at any level, programmes with consistently low crude linkage should have a clear explanation (e.g. inadequate ART service coverage within the SNU), or prompt management follow-up to ascertain the root causes and solutions to improve linkage. Similarly, ART retention and VL suppression should follow similar trends. However, when discrepancies between these two lines are identified, managers and analysts must further investigate whether the issue is related to data quality, low levels of VL testing coverage or a substantive issue with non-adherence or drug resistance.

Another useful aspect of trend analysis that builds on score card type rankings is to determine whether areas that are underperforming against targets show consistent underachievement, or whether a recent programmatic event or barrier occurred. Facilities or geographic areas which are able to bounce back from underperformance in a single reporting period indicate a functioning system that can identify problems and respond independently. Consistent lags or declining levels of performance suggest that local managers are unable to diagnose and respond on their own. In this way, trend analysis provides insights into whether supervisory intervention is needed and what type of follow up may be effective.

5. Data limitations

The key advantage of using HMIS data over survey or special study data to measure programme performance is that these data are systematically captured for all patients receiving services resulting in a comprehensive view of services provided. A common limitation of HMIS data based on aggregate reporting is the tendency for data to be collected in a cross-sectional manner. Especially when used for cascade analysis, the important insights gained by a longitudinal view of patient experience are not easily displayed using routine facility-based HMIS data. *Note:* In many settings, health facilities will have HIV electronic medical records or reporting systems that contain individual-level, longitudinal data; however, the data reported into the HMIS are usually aggregate. The unlinked nature of cross-sectional data makes interpretation of some figures complex, especially in settings where patients access services at different facilities over time.

The figures recommended in the main dashboard presented in this document attempt to represent the most useful ways to display the data which are typically available (based on global and national core indicator standards) and given the most common limitations of most HMIS used by HIV programmes. To account for these limitations in data interpretation, country-level analysts and managers must contextualize expectations of performance in terms of how services are actually provided and choose the appropriate level of disaggregation used for the standard charts they adopt.

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