World Health Organization

ANALYSING AND USING ROUTINE DATA TO MONITOR THE EFFECTS OF COVID-19 ON ESSENTIAL HEALTH SERVICES

Practical guide for national and subnational decision-makers

Interim guidance
14 January 2021

Analysing and using routine data to monitor the effects of COVID-19 on essential health services: Practical guide for national and subnational decision-makers.

WHO continues to monitor the situation closely for any changes that may affect this interim guidance. Should any factors change, WHO will issue a further update. Otherwise, this interim guidance document will expire 2 years after the date of publication.

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Contents

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This guide was developed through a broad collaboration involving technical focal points from the World Health Organization (WHO), as well as in consultation with key partner stakeholders. The development and production of the guide were coordinated by Kathryn O'Neill, Theresa Diaz, Richard Cibulskis, Elizabeth Katwan and Briana Rivas Morello.

PART 1: Overview of methods

Part 1 of this guidance was developed under the technical leadership and coordination of Richard Cibulskis, Kathryn O'Neill, Briana Rivas-Morello and Ed Kelley (WHO), with technical contributions from Ties Boerma (University of Manitoba, Winnipeg, Canada), Leonard Cosmas (WHO Country Office, Kenya), Benson Droti (WHO Regional Office for Africa), Theresa Diaz (WHO) and Elizabeth Katwan (WHO).

MODULE 1: Life-course stages: reproductive, maternal, newborn, child and adolescent health, including immunization and nutrition

Part 2 – Module 1 was developed through a collaboration involving the organizations and individuals listed here.

Editors

Peter Gordon (external consultant), Elizabeth Katwan (WHO), Debra Jackson (London School of Hygiene and Tropical Medicine and United Nations Children's Fund [UNICEF]) and Lara M.E. Vaz (MOMENTUM Knowledge Accelerator – Population Reference Bureau).

Working group co-chairs

Theresa Diaz (WHO) and Debra Jackson (London School of Hygiene and Tropical Medicine and UNICEF).

Working groups

Indicators and guidance working group

Co-chairs: Lara M.E. Vaz (MOMENTUM Knowledge Accelerator – Population Reference Bureau) and Elevanie Nyankesha (UNICEF).
Members: Soumya Alva (MOMENTUM Knowledge Accelerator – JSI), Catherine Arsenault (Harvard T.H. Chan School of Public Health), Elaine Borghi (WHO), Michel Brun (United Nations Population Fund [UNFPA]), Nadine Cornier (UNFPA), Marc Cunningham (Public Health Institute – United States Agency for International Development [USAID] contractor), Karin Lane Gichuhi (Global Financing Facility [GFF]), Chika Hayashi (UNICEF), Debra Jackson (UNICEF), Guillhem Labadie (UNICEF), Claire-Helene Mershon (Bill & Melinda Gates Foundation), Ann-Beth Moller (WHO), Jean-Pierre Monet (UNFPA), Moise Muzigaba (WHO), Pavani Ram (USAID), Jennifer Requejo (UNICEF), Lale Say (WHO), Amani Selim (Social Solutions International – USAID contractor), Fouzia Shafique (UNICEF), Kathleen Strong (WHO) and Ahmadu Yakubo (UNICEF).

Data analysis and visualization working group

Co-chairs: Elizabeth Katwan (WHO) and Tyler Porth (UNICEF).
Members: Soumya Alva (MOMENTUM Knowledge Accelerator – JSI), Padraic Murphy (UNICEF), Remy Mwamba (UNICEF), Rocco Panciera (UNICEF), Jennifer Requejo (UNICEF), Jim Ricca (MOMENTUM Country and Global Leadership and Jhpiego), Jessica Shearer (PATH), Mara Nyawo (UNICEF Eastern and Southern Africa Regional Office), Monica Flores Urrutia (WHO), William Weiss (Johns Hopkins University and Public Health Institute – USAID contractor).

Data collection and collation working group

Co-chairs: Guilhem Labadie (UNICEF), Steve Ollis (MOMENTUM Knowledge Accelerator – JSI) and M. Carolina Danovaro (WHO).
Members: Catherine Arsenault (Harvard T.H. Chan School of Public Health), Kimberly Boer (GFF), Marc Cunningham (Public Health Institute – USAID contractor), Debra Jackson (UNICEF), Karin Källander (UNICEF), Vrinda Mehra (UNICEF), Claire-Helene Mershon (Bill & Melinda Gates Foundation), Imran Mirza (UNICEF), Alex Muhereza (UNICEF), Moise Muzigaba (WHO), Remy Mwamba (UNICEF), Lisa Rogers (WHO) and Kathleen Strong (WHO).

Modelling working group

Co-chairs: Theresa Diaz (WHO) and Danzhen You (UNICEF).
Members: John Borrazzo (GFF), Howard S. Friedman (UNFPA), Kate E. Gilroy (MOMENTUM Knowledge Accelerator – JSI), Ulla Griffiths (UNICEF), Chika Hayashi (UNICEF), Stefan Peterson (UNICEF), Jennifer Requejo (UNICEF), Alyssa Sharkey (UNICEF) and William Weiss (Johns Hopkins University and Public Health Institute – USAID contractor).

Reviewers

Tunde Adegboyega (WHO Regional Office for Africa), Anshu Banerjee (WHO), Betzabe Butron-Riveros (Pan American Health Organization/WHO Regional Office for the Americas), Cassandra Butu (WHO Country Office for Romania), Manuel Celestino Lavayen (UNICEF), Sarah Dalglish (WHO), Anoma Jayathalika (WHO Regional Office for South-East Asia), Priya Mannava (WHO Regional Office for the Western Pacific), Blerta Maliqi (WHO), Annie Portela (WHO), Khalid Siddeeg (WHO Regional Office for the Eastern Mediterranean), Laura Utemisova (WHO Country Office for Kazakhstan), Martin Weber (WHO Regional Office for Europe) and Teshome Desta Woldehanna (WHO Regional Office for Africa).

Introduction to this guide

WHO recently released *Maintaining essential health services: operational guidance for the COVID-19 context*, which provides an integrated framework to guide countries in their efforts to reorganize, adapt and maintain safe delivery of high-priority essential health services within the context of the pandemic *(1)*. One of the recommended operational strategies for maintaining essential health services is to strengthen monitoring, through regular tracking, analysis and reporting on health-care utilization and delivery of essential health services throughout the likely waxing and waning of the outbreak. In the above-referenced guidance, a set of high-level actions and sample indicators were provided for monitoring essential health services that should be regularly assessed and reported.

Purpose

The objective of this guide is to help countries monitor and analyse the impact of COVID-19 on essential health services to ultimately inform planning and decision-making. It provides practical recommendations on how to use key performance indicators to analyse changes in access to and delivery of essential health services within the context of the COVID-19 pandemic; how to visualize and interpret these data; and how to use the findings to guide modifications for safe delivery of services and transitioning towards restoration and recovery. The guide focuses on existing indicators and data that are captured in routine reporting systems (sometimes referred to as health management information systems [HMIS]) and how they could be used by national and subnational authorities to understand specific contexts, challenges and bottlenecks.

The guide is organized into two parts:

Part 1: Overview of methods provides introductory practical guidance on the essential concepts of health service monitoring using a small subset of core indicators. The indicators shown can be used to track and analyse changes in health service delivery and utilization. They do not represent a complete set of indicators to monitor services, but the principles described in their analysis can be adapted to the other indicators listed within this document in separate modules.

Part 2: Programme-specific modules provides a set of topic-specific modules, with guidance on indicators and analysis for specific health programmes. These include:

- **life-course stages**: including reproductive, maternal, newborn, child and adolescent health, including immunization and nutrition;
- **communicable diseases**; and
- **noncommunicable diseases and mental health**.

This interim guidance includes Part 1 and the first module of Part 2 on "Life-course stages". It will be updated as other modules are finalized.

Both parts provide practical tips for using routine data around three steps:

- **Step 1:** Selecting key indicators to detect and monitor changes in essential health services;
- **Step 2:** Analysing and interpreting data; and
- **Step 3:** Using data to inform action.

The indicators selected in Step 1 are recommended because they:

- are representative of key elements of service delivery and utilization;
- are recognized as valid standards with well-established definitions, numerators and denominators (based on already existing and agreed indicators and guidance);
- are commonly used in existing routine information systems in countries across income levels, and thus do not impose additional burdens;

- capture effects on the largest portion of populations (based on their availability for previous time periods or geographic locations) (relevance to Step 2); and
- can inform clear and responsive action (relevance to see Step 3).

The manual should be read in conjunction with *Maintaining essential health services: operational guidance for the COVID-19 context* and published guidance for *Analysis and use of health facility data (1, 2)*.

It expands on and complements the content and recommendations of the monitoring section of *Maintaining essential health services: operational guidance for the COVID-19 context (1)*. It aims to provide practical guidance to countries in the analysis, interpretation and use of routine (existing) data to guide strategic decisions and targeted actions with regard to reorganizing and assuring safe access to essential health services during the pandemic, while taking into account critical equity dimensions.

Audience

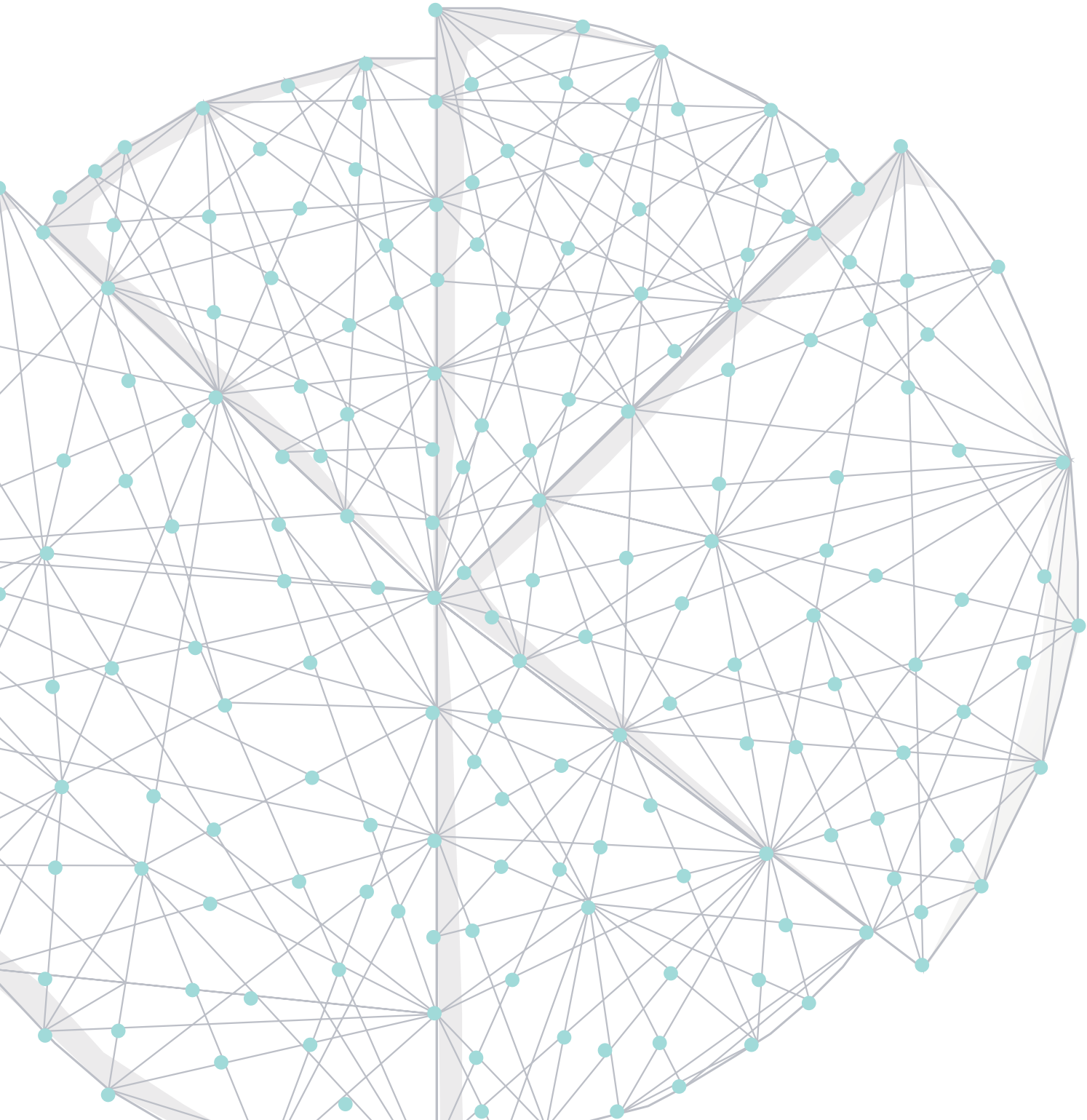
This guidance is written for managers of health services at national and subnational levels and for those working in other agencies supporting the delivery of essential health services during the COVID-19 pandemic. It is concerned with monitoring the delivery of essential health services on a monthly or quarterly basis using routinely collected data, based on HMIS.

References

1. Maintaining essential health services: operational guidance for the COVID-19 context. Geneva: World Health Organization; 2020 (https://www.who.int/publications/i/item/covid-19-operational-guidance-for-maintaining-essential-health-services-during-an-outbreak, accessed 22 October 2020).
2. Analysis and use of health facility data. Geneva: World Health Organization; 2020. (https://www.who.int/healthinfo/tools_data_analysis_routine_facility/en/, accessed 22 October 2020).

Part 1: Overview of methods

Monitoring health services during COVID-19



Introduction

Part 1 of this manual provides introductory practical guidance on the essential concepts of health service monitoring using a small subset of indicators. National and subnational managers should monitor the performance of these indicators alongside COVID-19 transmission, to alert challenges and bottlenecks in health service delivery and utilization throughout the course of the pandemic, and to ultimately better prepare for and respond to the evolving and acute needs of populations.

The indicators shown do not represent a complete set of indicators to monitor services, but the principles described in their analysis can be adapted to the other indicators listed within this document in separate modules.

Key concepts and data sources

Surveillance, monitoring, and evaluation are needed to monitor the progress, and results of, health programmes.

- **Surveillance** systems track changes in disease incidence and mortality over time and can help to identify populations in which the incidence of disease is highest (and to whom resources should be targeted).
- **Monitoring** can help to verify that interventions to improve health are being delivered as planned, and that targeted populations are benefiting from them, or if corrective action is necessary.
- **Evaluation** of outcomes and impact is needed to document periodically whether defined strategies and implemented interventions are leading to expected results in reducing disease incidence and mortality.

Surveillance and monitoring are continuous, while evaluations are conducted intermittently. This manual is primarily concerned with surveillance and monitoring.

Information for surveillance monitoring and evaluation is obtained from three main sources:

- **routine health information systems (RHIS)**: these may cover multiple programmes or be limited to specific activities (e.g. service utilization, communicable disease surveillance, laboratory services);
- **health facility surveys**: these usually consider the extent to which health facilities provide essential health services, and whether they have the necessary infrastructure, equipment, supplies and human resources to provide those services. They may also examine whether or not patients have received the services they need, as well as the quality of those services; and
- **household surveys**: these usually cover multiple health interventions, often with an emphasis on children aged under 5 years and women of reproductive age, but disease-specific surveys are also common. Socioeconomic household surveys are also sometimes commissioned to assess the impact of disease outbreaks such as COVID-19 on household economic status.

Civil registration and vital statistics may also be used; these systems register all birth and death statistics and a focus on mortality statistics can be used to assess excess mortality.

Data for programme surveillance and monitoring are usually obtained from routine health information systems, since programmes must be monitored continuously. Data from health facility and household surveys do, however, complement those from routine systems (e.g. to compare the values of indicators obtained from RHIS and health facility surveys). Table 1.1 summarizes the use of the three main sources of information.

Table 1.1 Data sources and uses

	Routine health information systems	Health facility surveys	Household surveys
Surveillance	X		
Monitoring	X	X	
Evaluation	X	X	X

When RHIS are working well, they provide information continuously from every district in a country and can detect changes in intervention coverage over time and space.

A major limitation of RHIS is that they present an incomplete picture of the services used by communities because reporting rates are often low and many private care facilities (including those run by nongovernmental or religious organizations) do not report data to RHIS. As such, in countries where a significant proportion of health services are delivered through the private sector, RHIS may not be able to capture the full impact of COVID-19 on services for those populations receiving that care. In addition, most countries do not have systems for routine assessment of data quality, and such routine systems are often beset with errors in data entry and inconsistent application of reporting definitions, due to lack of use of standards. Another challenge is related to varying denominators (e.g. in DHIS2 [District Health Information System 2] *(1)*); ideally, the denominators should be based on the most recent census data, but this is not always the case. Trends in intervention coverage indicators are therefore particularly prone to variations in reporting rates and it is important to track the completeness of reporting, not only as an indicator of the function of the information system, but also to help to interpret trends in other indicators.

Step 1: Selecting key indicators to detect and monitor changes in essential health services

It will be important for health authorities to collect and analyse routinely reported data on a core set of indicators that reflect overall service delivery and utilization during the pandemic and that can be monitored regularly. Collection and analysis should include assessment of trends in total outpatient attendance or primary care visits and total hospital discharges and deaths compared with reports from previous years. Where possible, data should be disaggregated by age, sex and population group, as relevant to the local context, to ensure that services are being delivered equitably and that no specific population (particularly the most vulnerable and at risk) is being left behind.

It is not possible, or useful, to obtain information on every event occurring throughout the process of health service delivery. Rather, it is necessary to be selective about what information is routinely collected. Often it is necessary to focus on a set of information that aims to be representative of a wider picture, known as indicators. Indicators can be raw numbers such as the number of patients treated or number of deaths. However, it is often useful to standardize information in the form of proportions or rates, using a standard formula that enables comparisons to be made between geographical areas and across time.

Indicators can provide an overview of a health programme's progress and can help to detect problems that need to be followed up by more detailed investigation. However, indicators will not summarize everything about a service, and they need to be interpreted with caution.

Recommended routine data indicators suggested for monitoring and use in analyses are included in Table 1.2. A small number of tracer services should also be monitored to detect any changes and trends, and the overall impact of the pandemic on specific health service provision and utilization, such as DTP3 (diphtheria–tetanus–pertussis) coverage, facility births, cancer screening, and the incidence or prevalence and treatment of HIV, malaria, tuberculosis, hypertension or diabetes, among others. These are not included in this section as they will be explored in Part 2 under programme-specific modules. A comprehensive list of recommended indicators is also included in Annex 2.

Table 1.2 Recommended indicators from routine health information systems

	Indicator name	Definition	Purpose	Computation (numerator [N]/ denominator [D])
1	Outpatient attendance (number)	Total number of outpatient department attendances or primary care visits	To monitor provision of outpatient or primary care services; proxy for service availability and utilization	Number of outpatient department attendances or primary care visits
2	Hospital admissions OR discharges (number)	Total number of hospital admissions OR discharges (including deaths) both related and unrelated to COVID-19, disaggregated by age group and sex	To monitor provision of inpatient services; proxy for service availability and utilization	Number of hospital admissions OR discharges (including deaths both related and unrelated to COVID-19)
3	Bed occupancy rate (%)	Percentage of available beds that have been occupied over a given period	To monitor hospital bed occupancy during COVID-19 outbreak; proxy for capacity of beds to be diverted for COVID-19 care	N: Total number of hospital beds (excluding labour and delivery beds) occupied over a given period D: Total number of beds (excluding labour and delivery beds)
4	Institutional mortality (rate)	Total number of inpatient deaths per 1000 admissions, disaggregated by cause (related or unrelated to COVID-19), age group and sex	To monitor inpatient facility deaths related and unrelated to COVID-19; proxy for changes in quantities and main causes of deaths	N: Total number of inpatient deaths in health facilities/institutions D: Total number of admissions (or discharges including deaths)
5	Leading outpatient diagnoses (rate)	Diagnoses of first/new outpatient visits expressed as rate per 1000 population (only including curative visits, e.g. excluding preventive care visit such as antenatal care or immunization)	To assess the leading causes of morbidity in a population	N: Number of outpatient new/first visits by diagnosis D: Total population/1000
6	Emergency unit attendance by cause (number)	Total number of emergency unit attendances by cause, including injury, emergency surgery, noncommunicable disease-related acute conditions (e.g. myocardial infarction, arrhythmia, stroke, diabetic ketoacidosis, asthma, chronic obstructive pulmonary disease and cancer), urgent blood transfusion) and COVID-19-related services	To monitor provision of emergency services and leading causes of emergency unit visits	Number of emergency unit visits by cause
7	Stockouts of essential medicines or supplies (%)	Percentage of health facilities and/or community health workers with less than 2 months' inventory of essential medicines or supplies without confirmation of on-time replenishment, or with or without confirmation of replenishment	To monitor the availability of essential medicines or supplies; proxy for supply-chain disruptions	N: Number of health facilities and/or community health workers reporting stockouts of essential medicines or supplies D: Number of health facilities and/or community health workers that offer the tracer commodity reporting
8	Completeness of reporting (%)	Percentage of facilities that submit reports within the required deadline, disaggregated by facility type, geographic location, managing authority and programme	To monitor functioning of routine reporting; proxy for data availability and quality	N: Number of reports received D: Total number of expected reports

Source: references *(1–4)*.

Step 2: Analysing and interpreting data

Making comparisons

Regular review of indicators is necessary to assess whether programmes are proceeding to plan or adjustments are required. Managers at health facility and district level should ideally review indicators on a monthly basis (where timely information is available at the end of each month). Ordinarily, managers at national level should review indicators at least every quarter. In reviewing indicators, managers should ask specific questions about the progress of health programmes. The precise questions will depend on the local operational context, but are likely to include:

1. Are health service coverage targets being met or are particular interventions experiencing problems (e.g. are targets for the immunization coverage being met)?
2. Have there been important changes in the values of indicators over time (e.g. a fall or increase in the number of outpatients)?
3. Are particular health facilities or geographical areas experiencing problems or doing well?
4. Are there particular bottlenecks in the delivery of services?

These questions can be answered easily if data are presented in a way that allows for easy comparisons of indicators. Four comparisons are of specific interest: (i) against targets; (ii) across time; (iii) with other indicators; and (iv) between geographical areas. Other comparisons may also be informative, for example, between different types of facility or providers of services.

As noted earlier, RHIS data can only be reliably compared if reporting rates are high (e.g. 80% or higher); monthly reporting data are available for more than one previous year (to establish monthly trends); and no changes have been made to definitions, forms or processes that may affect reporting of events. When reporting, comparisons should be based on *expected* numbers that take into consideration factors that might affect indicator performance. For example, reported excess deficit in service utilization should take into account population growth. It should also take into consideration any monthly fluctuations, and where quarterly figures might be more valuable.

Considerations during the COVID-19 era

Four questions are noteworthy during the COVID-19 pandemic:

1. Have there been important changes in the values of indicators over time?
2. Are certain services more or less affected?
3. Which geographical areas are most affected? and
4. Is data reporting complete?

A challenge in using data from RHIS to detect recent change is that there are often delays in monthly reports being included in district or national databases. If there are many missing reports when assessing recent trends (or comparing attendance data for the latest month with the same month in a previous year), recent attendances will often look lower even if there has been no real change. It is therefore necessary to take into account health facility reporting rates when assessing trends. Ideally, the analysis would take into account data collected at health facility level. Several countries now have databases with monthly health facility data, especially with the increased adoption of DHIS2. Some countries aggregate data at district or higher level before entering them into a national database. For these countries, it will be necessary to work with district totals or similar and pay particular attention to reporting rates.

If this does not provide sufficiently reliable data, then alternative strategies may need to be found, such as focusing on a particular set of health facilities (e.g. hospitals) or a small selection of districts where more health facility data may be available. For example, it may be possible to confine analysis to health facilities with reporting rates above 90%, although facilities consistently reporting higher reporting rates are more likely to also be better resourced or managed, which may introduce bias. Alternatively, it may be possible to compare attendances for the same set of health facilities that have reported recently with the same set of health facilities a year before.

The aim is to determine whether there has been a decrease, no change or an increase in service utilization. Two comparisons can be made:

1. comparing recent data with previous months; and
2. comparing recent data with the same month(s) from the previous year(s).

Fig. 1.1 compares the actual total outpatient attendance in Kenya from January to June in 2020 with the expected number of visits based on historic data, allowing both of the above types of comparisons on the same chart. The trend in 2020 shows a marked decrease in outpatient attendance after March, the first month COVID-19 cases were reported in Kenya. While delays in reporting may exist and fluctuations in attendance may occur normally (e.g. due to seasonal factors), the difference from outpatient attendance numbers in January to March compared to April to June provides a sense of when a decrease in attendance began and the extent of its impact. In this case, a drop of more than 1.8 million outpatient visits overall is seen, suggesting a major change in service functioning. However, a slight increase in uptake is observed in June 2020, suggesting that any modifications or contextual factors during this time may be improving the situation.

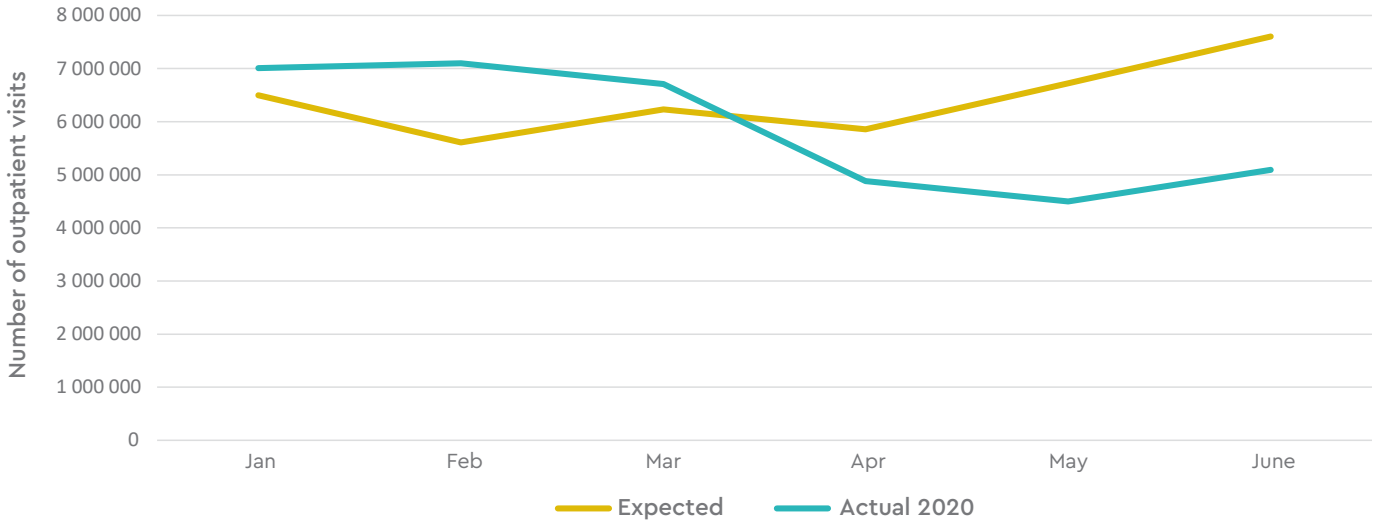
Comparing the trend for the same time period in 2018 and 2019 provides a sense of whether this decrease was due to normal fluctuations in attendance or to other factors. Using the average number of outpatient department visits in 2018 and 2019, an expected value can be calculated for 2020 (adjusting up by a factor of 2.5% to account for estimated population growth). Comparison of the expected versus actual number of outpatient visits is shown in Fig. 1.1. In the first 3 months of 2020, the number of outpatient visits was higher than expected (27% over the expected value in February). However, starting in March (when the pandemic began), the actual visits in 2020 were lower than expected, with both May and June seeing 33% fewer visits than expected.

Decision-makers can use these temporal comparisons to understand the moment certain changes occurred and consider the factors that may have contributed to such changes (including the COVID-19 outbreak, government directives and closure of facilities). These analyses can also be used to help estimate future changes and plan for adjustments to health service delivery to mitigate those disruptions.

Where available, it is important to determine which specific services are most affected (e.g. outpatient department, inpatients, emergency care, or programme specific). The cross-cutting nature of essential health services means that planning and delivery needs to account for the variation in changes across the services delivered.

It is important to note that year-to-year comparisons can only be reliably done when there are (i) high reporting rates (at least 80%) that are constant over time; (ii) at least 2 years of previous monthly reporting to establish expected trends; and (iii) no changes in definitions or forms that may affect the reporting of events. Given monthly fluctuations, comparisons of the quarterly variations may be more appropriate once enough data are collected.

Fig. 1.1 Analysis of monthly changes in outpatient department visits in Kenya, January to June 2020[a]



	January	February	March	April	May	June
Expected 2020 outpatient visits	6 493 802	5 608 894	6 228 246	5 856 332	6 725 047	7 603 263
Actual 2020 outpatient visits	7 007 950	7 099 342	6 709 046	4 882 187	4 497 669	5 094 975
% difference	8%	27%	8%	–17%	–33%	–33%

a. Expected values (yellow line) were calculated using data from 2018 and 2019 and adjusted up by a factor of 2.5% to account for estimated population growth.

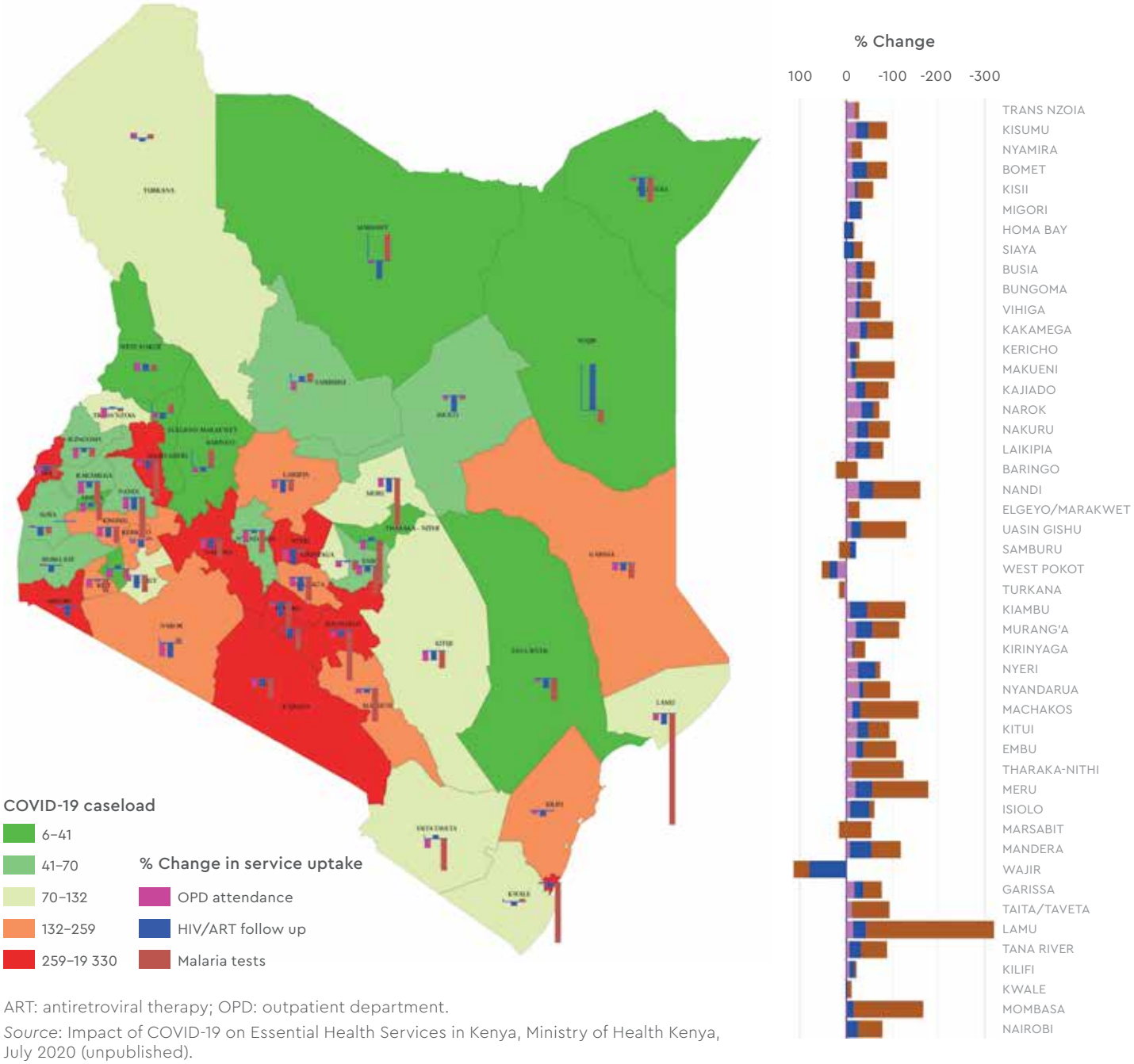
Source: Impact of COVID-19 on Essential Health Services in Kenya, Ministry of Health Kenya, July 2020 (unpublished).

Presenting indicators together

Mapping performance indicators in different geographical areas is another useful way to visualize the situation. Mapping changes in key indicators (e.g. utilization, morbidity, mortality, stockouts of medicines) throughout the course of the outbreak (both COVID-19 and non-COVID-19 related) can help to inform facility preparedness and provincial capacities to treat patients. Overlaying data related to COVID-19 cases or deaths reported by province helps to identify where the greatest pressures are occurring on the health system, and to plan and invest in resources accordingly. Such analyses can be applied to whole-country or regional maps as pertinent to the context. It can also be very helpful to bring together time and geographical comparisons.

Fig. 1.2 shows the effect of COVID-19 on key indicators by county on a map of Kenya. The bar graphs represent percentage changes in outpatient department attendance, malaria testing and HIV treatment, comparing the period of COVID-19 (March to June 2020) and the same months in 2019. A dip in the bar graph indicates a drop in the indicator value. The chart also overlays colour coding of COVID-19 cases by county. Bringing together COVID-19 transmission data with other key performance indicators helps visualization of the performance of other essential health services during the time of the COVID-19 outbreak, and how that performance might relate to COVID-19 transmissibility.

Fig. 1.2 Map of Kenya: COVID-19 cases and percentage changes in key performance indicators comparing March to June 2019 and March to June 2020

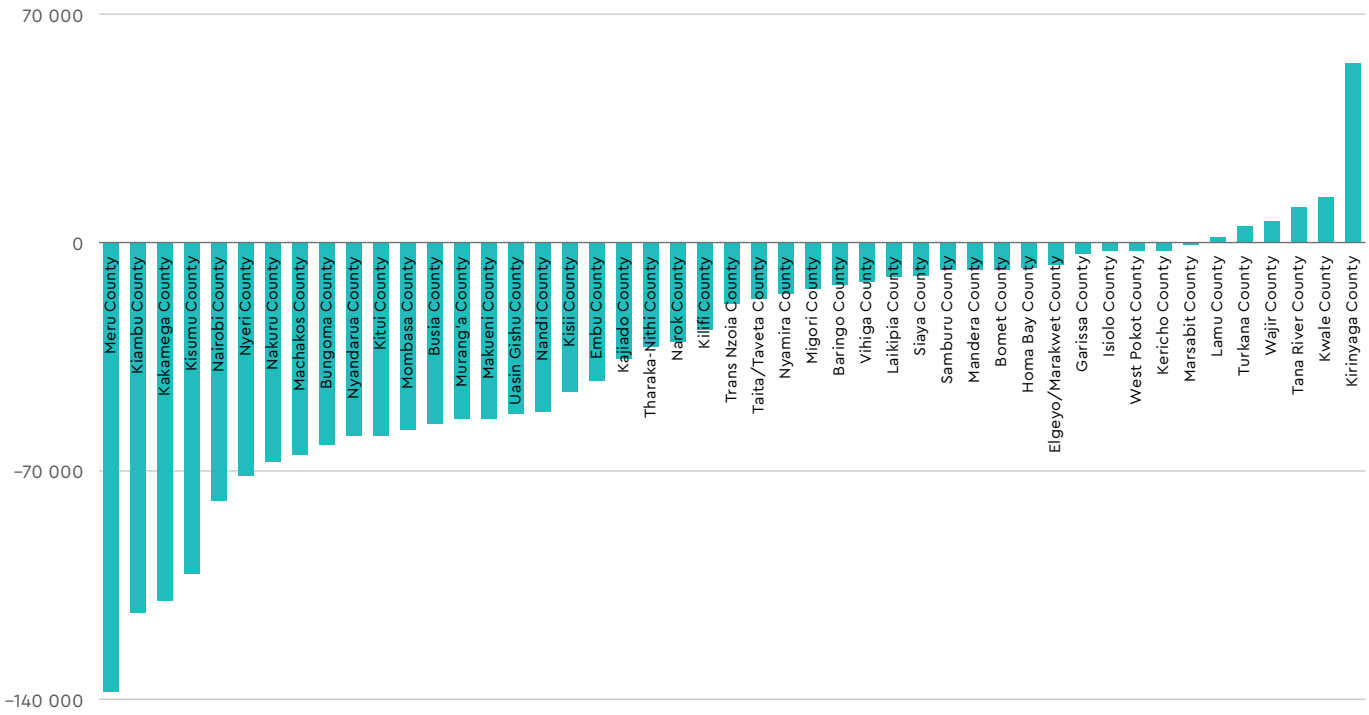


ART: antiretroviral therapy; OPD: outpatient department.

Source: Impact of COVID-19 on Essential Health Services in Kenya, Ministry of Health Kenya, July 2020 (unpublished).

Fig. 1.3 does so by demonstrating a breakdown by county of outpatient attendance in 2019 and 2020 for Kenya. The difference in outpatient numbers compared to the previous year shows the counties where outpatient attendance has dropped, remained steady, or increased, allowing planners to identify which counties have been most impacted and may require additional support. In Kenya, there has been a large drop in attendance to outpatient departments in most counties, with the largest drops in counties in Central Kenya. Adjusting these numbers for population growth, and examining the differences by county in rates of change in outpatient attendance, will help to provide a more accurate and detailed view of changes since the June 2019 baseline.

Fig. 1.3 Difference in outpatient department visits by county June 2019 compared to June 2020



Source: Impact of COVID-19 on Essential Health Services in Kenya, Ministry of Health Kenya, July 2020 (unpublished).

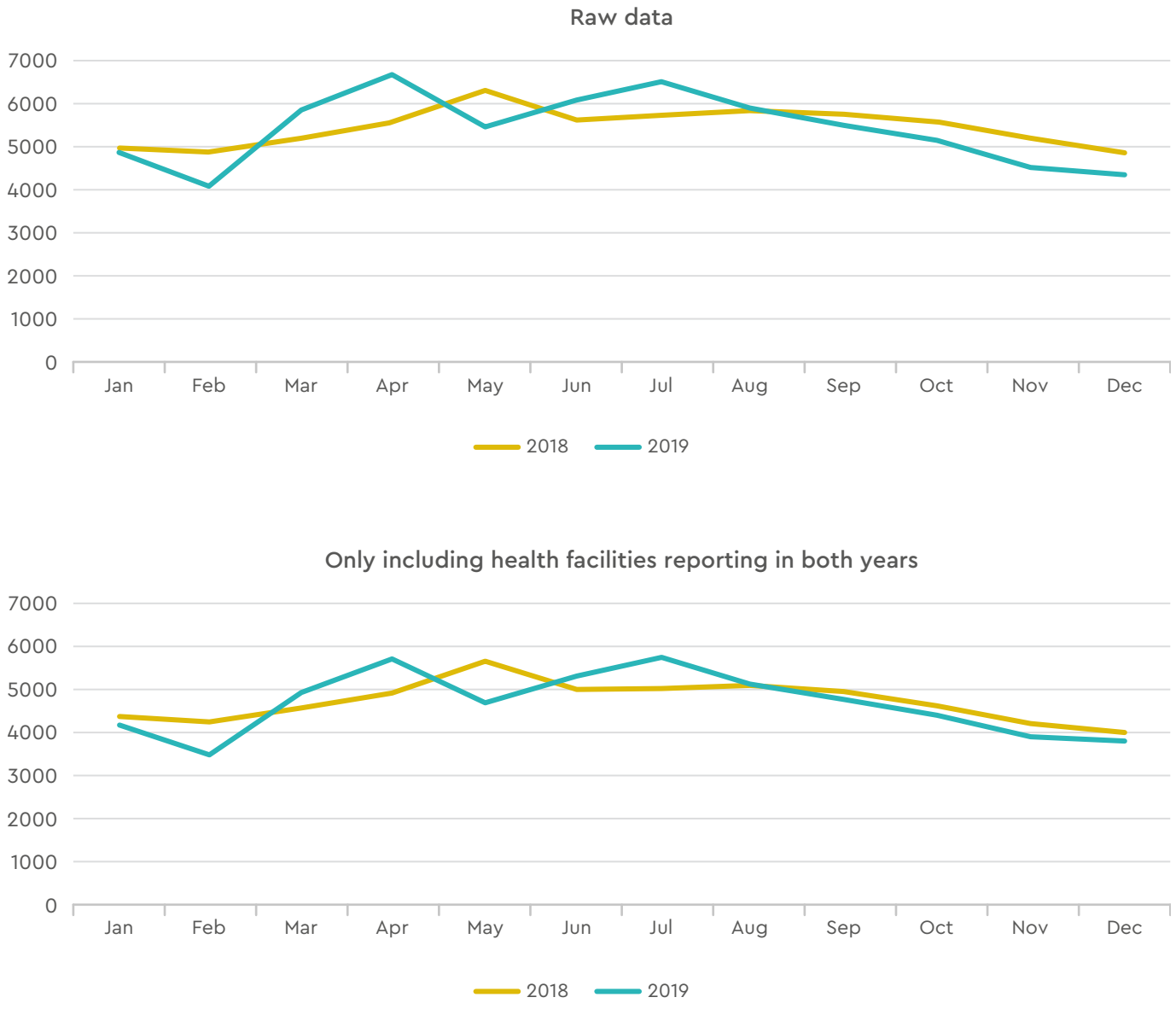
Throughout the course of the COVID-19 outbreak, it is also important to compare changes in utilization and delivery across different types of services at national and subnational levels. This includes comparing utilization of different service-delivery platforms (such as outpatient, inpatient, emergency care and outreach services) as well as programme-specific services (such as for reproductive, maternal, newborn, child, adolescent and ageing needs, nutrition, immunization, communicable diseases, noncommunicable diseases and mental health). The use of and capacity to deliver certain services may be affected differently throughout the course of the outbreak and may recover towards normalcy at different rates and points in time as the outbreak continues to wax and wane. A cross-cutting approach that tracks health service use across the health system provides necessary information to iterate and implement mitigation actions for the continuity of services that people will need over time.

Analysis and use of programme-specific indicators will be explored in further detail in the separate modules of Part 2.

Correcting for missing data

In the example shown in Fig. 1.4, using fabricated data, the top graph shows data for the number of institutional deliveries recorded in a national health information system. If no adjustment is made for missing reports, it appears that there has been a decline in institutional deliveries in the last 4 months. However, if the analysis is restricted to health facilities that have reported in the same months over the 2 years, then there is little evidence of a decline in deliveries. The difference between the graphs is small but the conclusions drawn are different (the yellow line in the top graph is more elevated because there are health facilities that reported in 2018 but not towards the end of 2019).

Fig. 1.4 Institutional deliveries recorded in a national health information system



Interpreting data

Interpretation of charts and tables requires managers to appreciate whether a finding reflects reliable data and other contextual factors that may have affected data around the time of collection.

Abnormalities in reported data

Potential issues with data, which are always likely to occur, should not stop a manager from using the available data to identify problems and successes in service delivery. However, managers and data analysts should learn how to identify and correct problems related to data quality prior to conducting analyses.

Overall assessment of data consistency, which can have implications for analyses, is required. For example, as noted earlier, it is important to consider the completeness and timeliness of reporting and errors in data entry when reviewing RHIS data, which can have implications for both temporal and geospatial analyses. Common data-related problems to be considered are summarized in Box 1.1.

Box 1.1 Common data-related problems

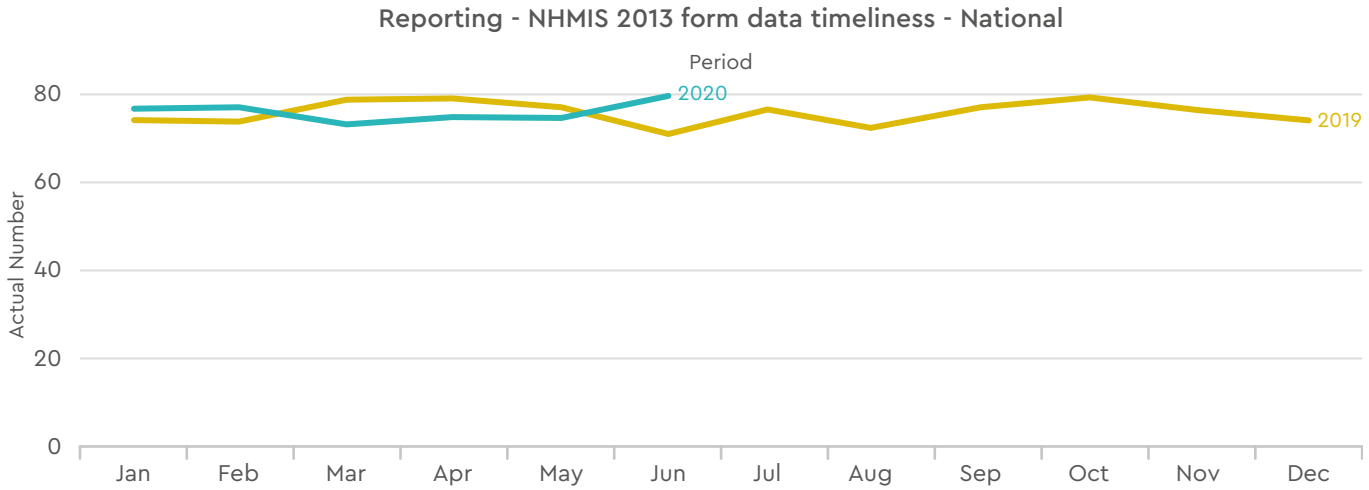
- **Recording or reporting errors**: the values of indicators may be affected if test results are misread, there are transcription errors, or there is falsification or double counting (e.g. at hospital and health centre). Depending on the magnitude of error and/or values being analysed, many recording errors may have a minor influence on aggregate statistics, or may introduce a bias in the value of an indicator; for example, if interventions delivered are not properly recorded when a clinic is busy, then programme coverage may be underestimated.
- **Recording bias**: the values of indicators may vary between health facilities or districts if there is an inconsistent definition of terms; for example, what is considered a new family planning acceptor?
- **Selection bias**: the indicators generated from routine information systems are limited to patients who use public health facilities, and reflect services in health facilities that report. The resulting indicators may therefore not be representative of the population as a whole, or of all health facilities.
- **Missing observations**: many indicators are highly sensitive to the number of reports received from health facilities and low values may be produced by missing or delayed reports.
- **Inaccurate estimation of some parameters (population-based denominator data)**: some indicators require parameters to be estimated, such as population size. Such estimations are prone to error. Population sizes are usually extrapolated from a national census, which is typically conducted once every 10 years. They become increasingly inaccurate the longer the period over which populations need to be projected, particularly at local level. Overestimation of target populations can result in lower values of intervention coverage indicators, while underestimation of target populations can result in higher values of coverage indicators (sometimes exceeding 100%).
- **Indicators based on small samples**: if the denominator in an indicator is a small number, then the indicator may fluctuate wildly from one reporting period to the next; for example, if a health facility reports fewer than five confirmed cases of malaria per month, then the percentage of confirmed cases receiving an antimalarial could easily change from 0% to 100%, depending on the availability of stocks.
- **Confounding**: other factors may explain the observations, for example, seasonal factors such as the hurricane/monsoon season may normally affect service utilization during a certain time period that overlaps with the COVID-19 outbreak.
- **Most statistics are averages**: when an indicator is calculated for a geographical area, it is an average that may conceal peaks and troughs. This information may not be available from routinely collected information but may sometimes be deduced from the results of household surveys; for example, a household survey may suggest that service uptake is low in a particular ethnic group that is known to comprise a large proportion of a district's population.

The timeliness of reporting may also affect the interpretation of recently reported data. Fig. 1.5 shows the timeliness of reporting in Nigeria comparing 2019 and 2020 data. While a slight variation is observed between 2019 and 2020 for the first 6 months of the year, changes of <5% in timeliness from year to year suggest that the timeliness of reporting does not seem to have been an issue in 2020. However, looking at the percentage of timely reporting by Nigerian state shows a different situation (see Fig. 1.6). While Kano State (left graph) seems to be consistent with the previous year in reporting timeliness, both Lagos State (middle graph) and Bayelsa State (right graph) have experienced substantial decreases in the percentage of timely reporting. In these states, current interpretation of recently reported indicators during this period must be considered with respect to how complete the data were at the time of reporting. For example, lower rates of utilization may reflect unreported visits rather than an actual decrease in the number of people utilizing services. For other indicators, such as institutional mortality rate, the results may be biased if the facilities that have submitted data are not representative of the country/region. However, incomplete reporting may also be a result of facilities intentionally not offering a service or offering the service to an intentionally limited extent.

The timeliness of reporting in Lagos State seems to have recovered to what would be expected in June 2020, which may increase the reliability of results moving forward. In Bayelsa State on the other hand, while timely reporting started to increase again in June, the reporting timeliness is still 40% lower than in both January 2020 (same year) and June 2019 (same month in previous year). As such, the performance of any indicator from March to June 2019 may not be demonstrating the reality of the situation. This example also shows why it is important to examine data at the subnational level wherever possible. Examination at the national level showed very little difference in the timeliness of reporting and hid the problematic situation in some counties.

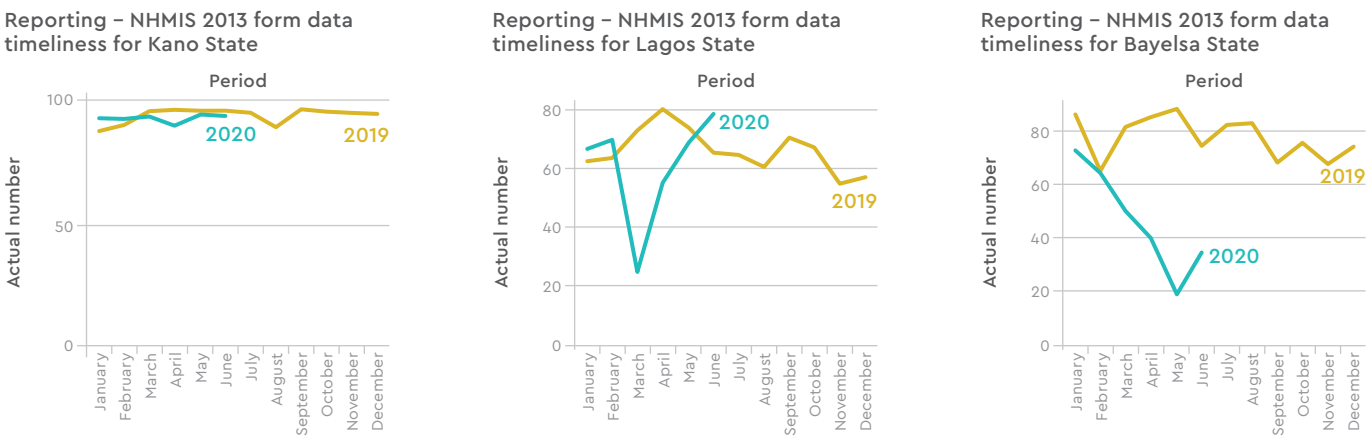
Of note, the performance over time of any indicators analysed during these periods may adjust as reporting becomes more complete, and so analyses and interpretation of trends moving forward will have to account for these changes retrospectively.

Figure 1.5 Reporting timeliness in Nigeria: 2019 and 2020



Source: Federal Ministry of Health Nigeria, accessed from: https://msdat.fmohconnect.gov.ng/covid/index.html *(5)*.

Fig. 1.6 Reporting timeliness in three Nigerian states: 2019 and 2020



Source: Federal Ministry of Health Nigeria, accessed from: https://msdat.fmohconnect.gov.ng/covid/index.html *(5)*.

Identifying real changes in programme coverage

A range of contextual factors (both related and unrelated to COVID-19) may cause disruptions to service delivery or utilization. Questions that planners can ask to help identify these causes are summarized in Box 1.2. The timing of these causes is of particular importance to help frame when and why certain changes occurred. Some insight might be gained by cross-checking the websites of partner organizations. If a link can be established between the results presented by the partner organization and those of the analyst, then it is possible that a causative relationship can be substantiated (e.g. survey results, mortality statistics). If real changes in utilization have been identified, then it may help communication of the findings if the chart is annotated with significant events, for example, shortage of staff, beginning of a lock-down, changes in care-seeking policies, service delivery modifications/mitigation strategies that have been introduced, etc.

Box 1.2 Common reasons for service disruptions

COVID-19

- Have there been disruptions to supply chains, including personal protective equipment?
- Have facilities struggled to implement infection prevention and control practices adequately?
- What are the dates of initial COVID-19 cases and outbreak peaks?
- Where is COVID-19 concentrated – urban or rural areas?
- Are any particular subpopulations adversely affected?

Health service supply

- Have health workers been deployed to other facilities or services (e.g. COVID-19 testing sites)?
- Have health workers been absent through illness, fear of infection or shielding or because of household duties?
- Have stockouts occurred?
- Have services been cancelled to avoid the spread of Covid-19? Have there been changes or reductions in facility/clinic opening hours?
- Have any mitigation strategies or service delivery modifications been implemented that may affect service delivery/utilization (e.g. a longer prescription period may result in decreases to outpatient visits that do not necessarily reflect a decrease in service utilization)?
- Have patients been sent home or discharged to maintain physical distancing?

Demand for health services

- Have there been gaps or weaknesses in messages about continuing to use essential health services?
- Have there been reports of misinformation or other efforts to undermine public health messaging about COVID-19?
- Has transportation (local and or emergency) been reduced?
- Have financial barriers increased because of the economic impact of COVID-19?
- Have there been regulations limiting the possibility of moving freely: for example, written civil authorizations required to be in public places, including health facilities?

Other factors

- Are there other sociopolitical events, such as elections, extreme weather, or seasonal migration, that would affect service delivery?

Step 3: Using data to inform action

Formal meetings

If the data generated by an information system are to be used to improve the operation of health services, programme managers must make sure there are regular opportunities for review. A schedule of meetings should be established to review health trends, such as the following:

- community with health facility staff: monthly or quarterly;
- health facility staff with district health managers: monthly; and
- district staff with national programme managers: quarterly; meetings might have to be held less frequently or held regionally in order to create opportunities for national staff to meet with all district staff during a year.

Data should be reviewed nationally at least once a year, in advance of preparing plans for the following year.

Supervision

Supervision from national and district level is needed to support building of the information system, ensure the completeness of reporting, ensure analysis and discussion of data and follow up on recommended actions. During visits to health facilities and district team offices, supervisors should check that registers are kept up to date, with all fields completed; that data on report forms correspond to the information in registers and tally sheets; that core analysis graphs and tables are up to date; and that discussions are held about interpretation of the trends and potential action.

Feedback

District managers should prepare feedback for health facilities, including private health facilities that provide data, on a monthly or quarterly basis. This should not simply reflect the data submitted by the health facility but should include comparisons with other health facilities in the district and summary statistics for the district as a whole. A regular bulletin can be produced in a standard format to present district results (based on control charts) and comparisons of health facilities.

A national feedback bulletin should be produced each quarter, showing indicators by district. The bulletin should be widely circulated, not only as feedback to districts, but also as information for other government departments, institutions and implementing partners. Elected leaders should also be presented with the bulletin, possibly showing the health situation according to political boundaries, to instil understanding and support for the health sector at the highest level of leadership.

References

1. dhis2. Covid-19 Surveillance Digital Data Package [website] (https://www.dhis2.org/covid-19, accessed 22 October 2020).
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4. 2018 Global reference list of 100 core health indicators (plus health-related SDGs). Geneva: World Health Organization; 2018 (https://apps.who.int/iris/bitstream/handle/10665/259951/WHO-HIS-IER-GPM-2018.1-eng.pdf;jsessionid=BE2BFE30B24117306647FBD2E2A7320C?sequence=1, accessed 22 October 2020).
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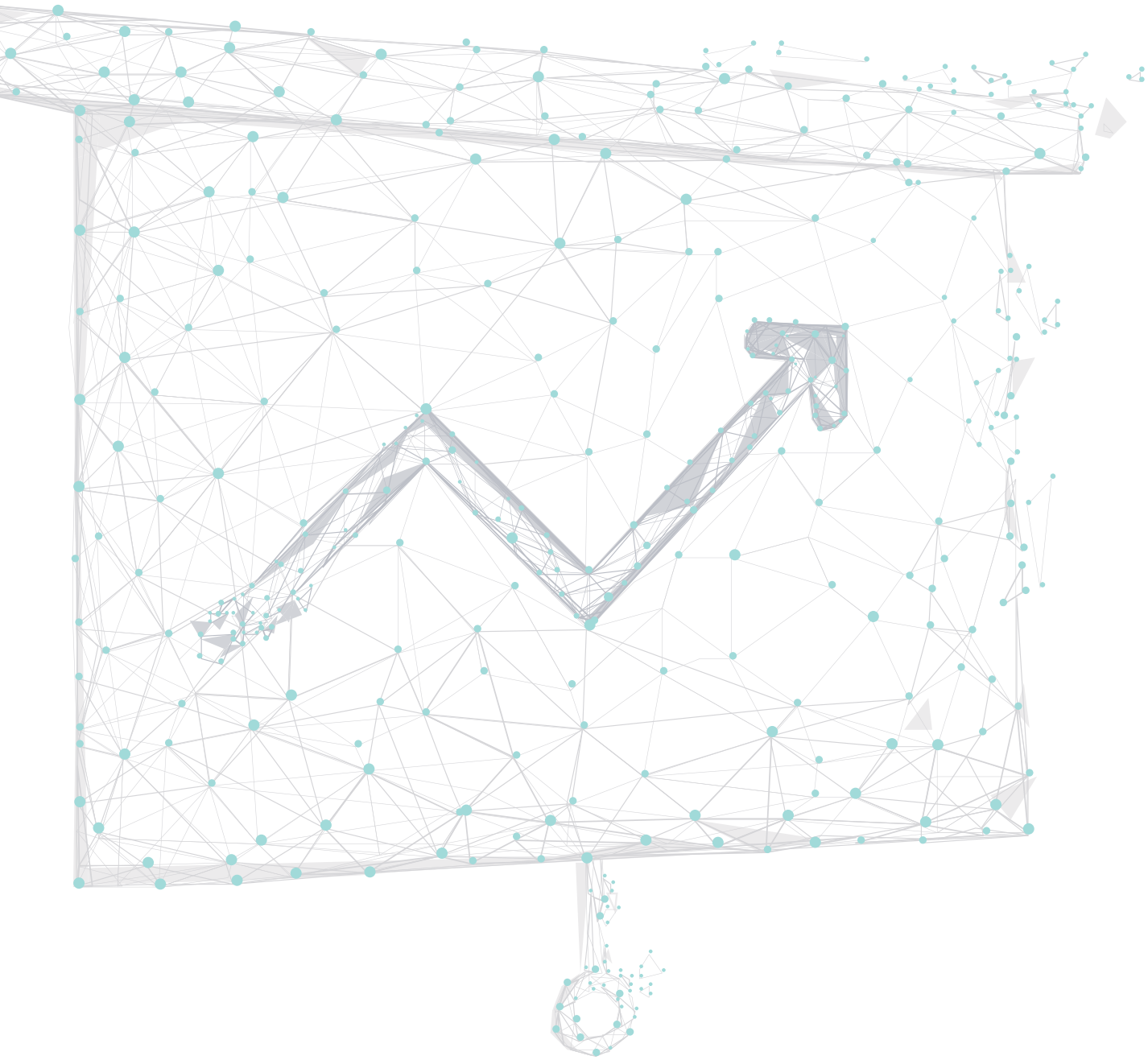
Part 2: Programme-specific modules

Monitoring health services during COVID-19



Module 1

Life-course stages: reproductive, maternal, newborn, child and adolescent health, including immunization and nutrition

Introduction

Experience of previous disease outbreaks teaches us the importance of anticipating the possibility of resource diversions and related challenges in the health sector. To prevent and address these efficiently and effectively, it is essential to track the progression of the pandemic, together with the coordination and distribution of efforts to continue delivering routine health and nutrition services across community and facility service platforms. Therefore, regular monitoring of recommended indicators for tracking the overall functioning and quality of reproductive, maternal, newborn, child and adolescent health, including immunization and nutrition (RMNCAH+N) should continue.

This guidance focuses specifically on RMNCAH+N, using a subset of routine health information system indicators to monitor the specific, potential impacts of COVID-19 on essential health services, including disruptions to provision or utilization of services.

Challenges to service delivery can include stockouts of key commodities, reassignment of staff and diversion of equipment and supplies. Disruptions to the provision of, and access to, services can also result from specific mitigation measures, such as lock-down and curfew, together with the effects of these in turn upon transportation, household resources and the availability of shelter. Changes may need to be made to service modalities, to opening times or to locations of delivery.

Demand for services may be adversely affected by the fear of infection or lack of trust in the health-care system. These issues are beyond the scope of this module.

To minimize the secondary impact of COVID-19-specific responses on essential health services, and in particular upon RMNCAH+N, it is essential to monitor any changes in mortality and morbidity among women and children that may result from reduced access to, or coverage of, services, and to understand what is driving such change. Should significant changes be identified, further information will be necessary to identify the causes and guide remedial action.

This module offers guidance on three steps:

- **Step 1:** Selecting indicators to identify COVID-19-related changes to delivery and utilization of RMNCAH+N services;
- **Step 2:** Analysing and interpreting data, including best practice analytical outputs and dashboards; and
- **Step 3:** Using data to inform action.

Publications that are relevant to the main text are referenced and listed at the end of the module in the usual way. Further references and links to additional resources are included in Annex 1.

Step 1: Selecting key indicators to detect and monitor COVID-19-related changes to delivery and utilization of RMNCAH+N services

Most of the data required to track the indicators in this guidance are available through existing routine information collection systems and mechanisms. In some circumstances, other data sources may help to contextualize the interpretation of trends in routine data. Recommended indicators are summarized in Table 2.1.[1,2] Further information and metadata, including the frequency of data collection and suggested disaggregation are to be found in Annex 3.

The World Health Organization (WHO) publication *Maintaining essential health services: operational guidance for the COVID-19 context (1)* (*EHS guide*) provides examples of a broader set of potential indicators for monitoring key services areas (see Annex 2). This module focuses on key indicators for tracking RMNCAH+N and is complementary to the *EHS guide*.

Selecting indicators and using data

It is important to review existing data sources, collection tools and processes, including data flows and reporting timelines, to establish the nature of available information and identify critical gaps and ways of addressing these. Data for every indicator listed in Table 2.1 may not be readily available and/or may not be relevant to the local context. Also, some indicators may be formulated or reported differently. The focus should be on monitoring *existing* indicators in their regular format, rather than developing new indicators or reporting. Close proxy indicators can and should be used.

It is also important to consider which data need to be reviewed at each level of service provision, together with the corresponding level of authority at which action can be taken. Particular events or trends that should trigger action, such as an upsurge in cases of measles requiring rapid case investigation, must be clearly identified. Disaggregation of data can shed light on areas requiring action.

Table 2.1. Recommended indicators for reproductive, maternal, newborn, child and adolescent health, including immunization and nutrition

More detail on recommended data sources, suggested disaggregation and other notes can be found in Annex 3.

	Indicator name	Definition	Purpose	Computation (numerator [N]/ denominator [D])
			Reproductive health	
1	Oral contraceptive distribution (number)	Number of clients who accept oral contraceptives at the facility or in the community	To monitor uptake of oral contraceptives; proxy for access to contraception	Number of women and girls receiving oral contraceptives
2	Injectable contraceptive distribution (number)	Number of clients who accept injectable contraceptives at the facility or in the community	To monitor uptake of injectable contraceptives; proxy for access to contraception	Number of women and girls receiving injectable contraceptives
			Maternal and newborn health	
3	ANC service provision (number)	Number of ANC visits/contacts provided in the reporting period by any trained provider	To monitor provision of ANC services; proxy for demand for services for pregnant women	Number of ANC contacts conducted regardless of provider
4	Pregnant women tested for HIV (number/%)	Number or percentage of pregnant women attending antenatal clinics and/or delivered in a facility who were tested for HIV during pregnancy	To monitor the number of pregnant women tested for HIV; proxy for functioning of the first step in the prevention of mother-to-child transmission cascade	N: Number of pregnant women attending ANC and/or giving birth at a facility who were tested for HIV during pregnancy, at labour and/or delivery, or those who already knew they were HIV positive at the first antenatal care visit D: Number of pregnant women who attended an antenatal clinic or delivered in facilities

1. The selection of indicators in this guide began with examples from the WHO *EHS guide (1)* and other guidance for monitoring essential RMNCAH+N service delivery during COVID-19 *(2, 3)*. Other existing global guidance documents were also consulted.
2. Existing guidance materials were considered, including references *(4, 5)*. This guidance is also aligned with global efforts, such as the *Every newborn* action plan *(6)*, the *Strategies towards ending preventable maternal mortality (EPPM) (7)* and *The global strategy for women's, children's and adolescents' health* monitoring plan *(8)*.

	Indicator name	Definition	Purpose	Computation (numerator [N]/ denominator [D])
5	Pregnant women living with HIV who received antiretroviral medicine to reduce the risk of mother-to-child transmission of HIV (number)	Number of pregnant women living with HIV who received antiretroviral medicines to reduce the risk of mother-to-child transmission of HIV	To monitor the number of pregnant women receiving antiretroviral medicine to reduce the risk of mother-to-child transmission of HIV; proxy for functioning HIV treatment programmes	Number of pregnant women living with HIV who received antiretroviral medicines to reduce the risk of mother-to-child transmission of HIV
6	Facility births (number)	Number of women who give birth in a health facility regardless of outcome	To monitor whether levels of facility-based deliveries are changing; proxy for access to childbirth services	Number of women who give birth in a health facility
7	Caesarean section prevalence (number/%)	Number or percentage of deliveries in health facilities by caesarean section	To monitor possible disruptions in access to delivery by caesarean section; proxy for surgical care access and functioning referral systems	N: Number of deliveries by caesarean section in health facilities D: Number of deliveries in health facilities
8	PNC for women (number/%)	Number or percentage of women receiving PNC within 2 days of delivery	To monitor provision of PNC for women; proxy for delivery of services for women who recently gave birth	N: Number of women receiving PNC D: Number of deliveries in health facilities
9	PNC for newborns (number/%)	Number or percentage of newborns receiving PNC within 2 days of delivery	To monitor provision of PNC for newborns	N: Number of newborns receiving PNC D: Number of live births in health facilities
10	Newborns admitted for inpatient care (number)	Number of newborns admitted for care for any cause (including premature birth, congenital anomalies, birth complications including asphyxia, and neonatal infections)	To monitor coverage of inpatient care for newborns; proxy for demand for treatment of severe illness in newborns	Number of newborns (0–28 days) admitted for inpatient care for any cause
			Child health and immunization	
11	DTP3 vaccine (number)	Number of children younger than 1 year receiving their third dose of DTP3	To monitor provision of DTP3 vaccine	Number of children younger than 1 year receiving their third dose of DTP3 vaccine
12	MCV1 (number)	Number of children younger than 1 year receiving their first dose of measles vaccine	To monitor provision of measles vaccine	Number of children younger than 1 year receiving their first dose of measles vaccine
13	Acute respiratory infection consultations (number)	Number of children presenting to a health facility with any sign of acute respiratory infection	To monitor consultations in health facilities for children with acute respiratory infection; proxy for possible outbreaks of e.g. flu/influenza which may present the same way with COVID-19	Number of children presenting to a health facility with any sign of acute respiratory infection
14	Treatment for children with diarrhoea (number/%)	Number or percentage of children with diarrhoea treated with ORS, ORS + zinc, or zinc	To monitor provision of diarrhoea treatment (case management for children); proxy for service availability	N: Number of children aged under 5 years treated for diarrhoea D: Number of children aged under than 5 years with diarrhoea
15	Treatment of children with malaria (number/%)	Number or percentage of children aged under 5 years with malaria treated with ACT	To monitor provision of malaria treatment (case management for children); proxy for service availability	N: Number of children aged under 5 years treated for malaria with ACT D: Number of children aged under 5 years with malaria
16	Consultations for child health (number)	Number of consultations for children aged under 5 years for any cause	To monitor provision of services for sick children; proxy for service availability	Number of consultations for children aged under 5 years for any cause
			Nutrition	
17	Iron supplementation for pregnant women (number/%)	Number and percentage of ANC contacts for which women were given/prescribed iron-containing supplements for the reporting period	To monitor provision of iron supplements to pregnant women; proxy for provision of key ANC services and commodities at each contact	N: Number of ANC contacts in the reporting period for which pregnant women were given/prescribed iron-containing supplements D: Total number of ANC contacts in the reporting period

	Indicator name	Definition	Purpose	Computation (numerator [N]/ denominator [D])
18	Screening of children for severe wasting and bilateral pitting oedema (number)	Number of children aged 6–59 months who were screened for severe wasting and bilateral pitting oedema Report the number for infants aged 0–5 months where practised	To monitor whether children are being screened for severe wasting and bilateral pitting oedema; proxy for malnutrition surveillance	Number of children aged 6–59 months who were screened for severe wasting and bilateral pitting oedema
19	Severe wasting and bilateral pitting oedema admissions (number)	Number of children aged 6–59 months admitted for severe wasting and bilateral pitting oedema Report the number for infants aged 0–5 months where practised	To monitor whether children with severe wasting and bilateral pitting oedema are being admitted for treatment; proxy for access and care-seeking for children	Number of children aged 6–59 months admitted for severe wasting and bilateral pitting oedema
20	Severe wasting and bilateral pitting oedema discharges recovered (%)	Percentage of children aged 6–59 months discharged from severe wasting and bilateral pitting oedema treatment programmes as recovered Report the number for infants aged 0–5 months where practised	To monitor the recovery of children admitted for severe wasting and bilateral pitting oedema	N: Number of children aged 6–59 months discharged from severe wasting and bilateral pitting oedema management programmes as recovered D: Total number of children aged 6–59 months discharged from severe wasting and bilateral pitting oedema management programmes
21	Early initiation of breastfeeding of newborns (number/%)	Number and percentage of newborns put to the breast within 1 hour of birth	To monitor early initiation of breastfeeding for newborns; proxy for quality of services to support breastfeeding	N: Number of newborns put to the breast within 1 hour of birth in the reporting period D: Total number of newborns delivered in the reporting period
22	Coverage of high-dose vitamin A supplementation (number/%)	Number and percentage of children aged 6–59 months who received an age-appropriate dose of vitamin A in each semester	To monitor provision of vitamin A for children	N: Number of children aged 6–59 months who received an age-appropriate dose of vitamin A through routine health system contacts during each semester D: Agreed-upon national level denominator for children aged 6–59 months for delivery of vitamin A through routine health system services
		Cross-cutting indicators		
23	Completeness of health management information system (HMIS) or community health information system (CHIS) reporting (%)	Percentage of completed reports received through either an HMIS or CHIS	To monitor the availability of HMIS or CHIS reports; proxy for data availability and quality	N: Number of complete HMIS or CHIS reports received, from all sources D: Number of expected HMIS or CHIS reports from all sources
24	Stockouts of RMNCAH+N commodities (number/%)	Number or percentage of health facilities and/or CHWs with stockouts of tracer RMNCAH+N essential medicines or supplies	To monitor the availability of essential medicines or supplies; proxy for supply-chain disruptions	N: Number of HF and/or CHWs reporting stockouts for RMNCAH+N commodities, drugs, diagnostic tests and equipment D: Number of health facilities and/or CHWs that offer the tracer commodity reporting
		Outcome and impact indicators		
25	Post-abortion complications (number)	Number of women presenting to a health facility for gynaecological indications related to [complications of] abortion	To monitor the need for and access to post-abortion care; proxy for prevention of complications	Number of women presenting to a health facility with abortion-related complications
26	Stillbirths (%)	Stillbirth as a percentage of all births in a health facility (stillbirths/stillbirths plus live births)	To monitor the proportion of births that are stillbirths; proxy for quality of care at delivery or during ANC	N: Number of stillbirths in the health facility D: Total number of births in the health facility
27	Low- birth weight (<2500 g) among newborns (number/%)	Number and percentage of live births that weigh less than 2500 g	To monitor the prevalence of low birth weight; proxy for maternal nutrition and premature birth	N: Number of live-born neonates who weigh less than 2500 g at birth D: Number of live births with a birth weight recorded

	Indicator name	Definition	Purpose	Computation (numerator [N]/ denominator [D])
28	Maternal deaths (number)	Number of deaths of woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from unintentional or incidental causes	To monitor deaths among pregnant women and new mothers; proxy for indirect effects of health pandemic/ emergency due to reduced availability and access to high-quality comprehensive maternal health services	Number of women who die in a health facility or in the community either while pregnant or within the first 42 days of the end of pregnancy
29	Suspected measles cases identified (number) and confirmed cases (number)	Number of children classified with measles in either a heath facility or the community	To monitor measles surveillance and measles incidence; indicator of potential disruptions in surveillance and of disease occurrence	Number of suspected measles cases identified and number of confirmed cases
			Additional indicators	
30	Violence against women and children reported to a health facility (number)	Number of cases of violence against women and children reported at a health facility	To monitor rates of violence against women and children	Number of cases of violence against women and children reported at a health facility
31	Maternal and infant consultations by CHWs (number)	Number of women and infants consulted by CHWs	To monitor provision of services and consultations in the community by CHWs; proxy for adjusted service models	Number of women and infants consulted by CHWs
32	Home-based deliveries (number)	Number of deliveries outside of a health facility	To monitor potential shifts in delivery location between a health facility and the community	Number of deliveries that take place at home, in transit, or in another non-health facility location
32	Coverage of KMC for low-birth weight newborns (%)	Percentage of newborns initiated on KMC in a health facility (or admitted to a KMC unit if a separate unit exists)	To monitor initiation of facility-based quality of care for low-birth-weight newborns; proxy for quality of care for newborns	N: Number of newborns initiated on KMC in a health facility (or admitted to a KMC unit if a separate unit exists) D: Number of live births in a health facility

ACT: artemisinin-based combination therapy; ANC: antenatal care; CHIS: community health information system; DTP3: diphtheria–tetanus–polio; HMIS: health management information system; KMC: kangaroo mother care; MCV1: first dose of measles-containing vaccine; ORS: oral rehydration salts; PNC: postnatal care; RMNCAH+N: reproductive, maternal, newborn, child and adolescent health, including immunization and nutrition.

Frequency of data collection and disaggregation

Indicators should be reviewed, at a minimum, on a monthly basis. The suggested frequency of review for each indicator is included in the metadata table (see Annex 3). These are suggestions and should be considered by each country in light of how often they are already reported, compared to what would be helpful or feasible for monitoring in the context of a pandemic or health emergency, such as COVID-19. The frequency needs to be sufficiently sensitive to capture significant change and allow timely action to address it, without imposing unnecessary reporting burdens on designated staff.

Disaggregation of data, when possible, can reveal significant differences and inequities in service provision or utilization and identify especially vulnerable locations or subpopulations, such as adolescents (see Annex 3 for more information).

Using existing systems and data

Most of the indicators above are commonly included in routine health management information systems (HMIS). Other potential sources and reporting tools include: national health registers or service delivery registers,[3] surveillance systems (e.g. Integrated Disease Surveillance and Response tool [IDSR]; community health information system [CHIS] tools in use by community health workers; logistics management information systems [LMIS] for commodities; human resource health information systems [HRHIS]); and rapid SMS (telephone texting) polls.

Potential sources of data also include:

- facility-level rapid assessments and surveys *(9)*;
- home-based records such as antenatal cards or immunization cards; and
- sample or sentinel registration systems and special surveys or studies.

While full information may be preferable, managers need to have access to the information that is essential to informing prompt action. It is also important that mechanisms, such as feedback loops, exist and allow health workers to see how the data they collect contribute to decisions and action.

Adapting existing resources

In a rapidly changing situation, it is possible, as well as potentially time-saving, to adapt tools and resources that are already used by other programmes, such as the WHO Expanded Programme on Immunization *(10)* or the WHO HIV/AIDS Programme *(11)*. Surveillance and data management tools and staff from polio programmes have been used to inform responses to Ebola outbreaks and other emergencies *(12)*. Existing software used by Global Goods can be adapted *(13)*.

When existing systems do not fulfil data reporting needs and there is neither the time nor possibility for adapting available resources, alternatives may need to be identified. Further guidance is included in Annex 1.

Step 2: Analysing and interpreting data

There are several key factors to consider in the analysis and visualization of routine RMNCAH+N data. This section provides recommendations on assessing disruptions to RMNCAH+N services, noting that these determinations are specific to both the context and indicator. To facilitate use of available data in its existing report format, the examples in this section include both counts and percentages. The choice of percentages versus numbers will also depend on the level of analysis and the availability of data for the denominator. Key principles for analysis and interpretation of data in order to identify disruptions are presented in Box 2.1.

Historical availability and the format of data (e.g. counts or percentages, disaggregations) determine which visualization and analysis methods will best illustrate trends and disruptions. For instance, the choice of percentages versus numbers will depend on the level of analysis, the availability of data for the denominator, and the format in which the data are routinely reported. At the beginning of a pandemic, the focus may be on tracking declines. However, an analysis plan should include continued monitoring for later rebounds or increases beyond baseline levels, in order to monitor response strategies.

Box 2.1 Identifying disruptions: key principles for analysis and interpretation

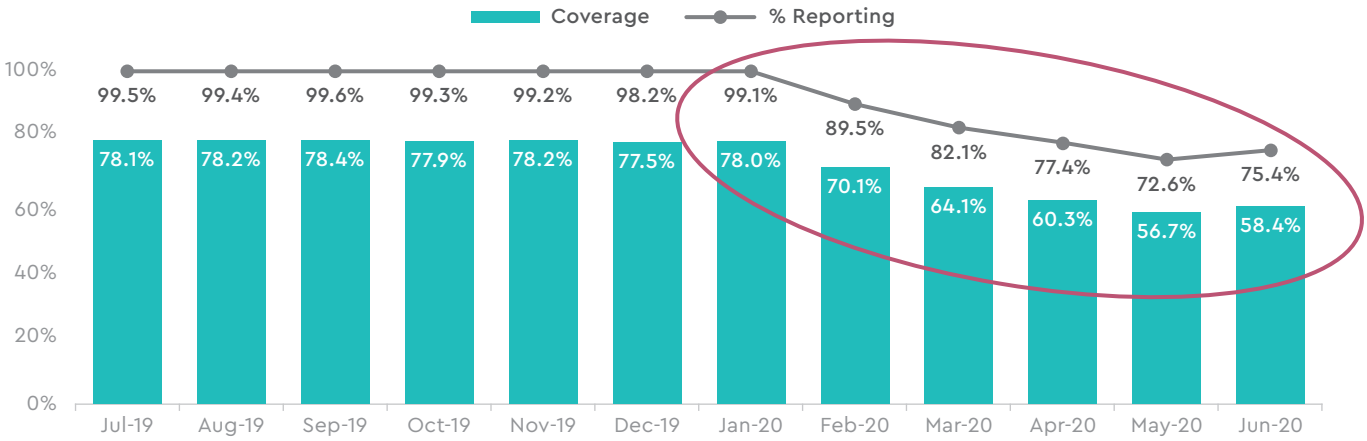
- Monitor indicators over time to compare trends for the same time periods over different years, quarters or months
- Review reporting completeness and timeliness as well as contextual information when interpreting trends and possible service disruptions

3. These may also be known as a delivery register or logbook, antenatal care (ANC) register or immunization register, to designate the clinic or service rather than a generic health or service delivery register.

Considering reporting completeness

It is critical to ensure that values identified as disruption are genuinely indicative of change in coverage or utilization, rather than a result of reporting incompleteness or delays. For example, in some health emergency settings, reallocation of resources has impacted adversely upon the ability of facilities and districts to gather and report routine data. Therefore, incorporating within dashboards indicators that capture reporting completeness and timeliness helps to identify genuine disruptions. The example illustrated in Fig. 2.1 demonstrates this issue.

Fig. 2.1 Effect of reporting completeness on interpretation of intervention coverage

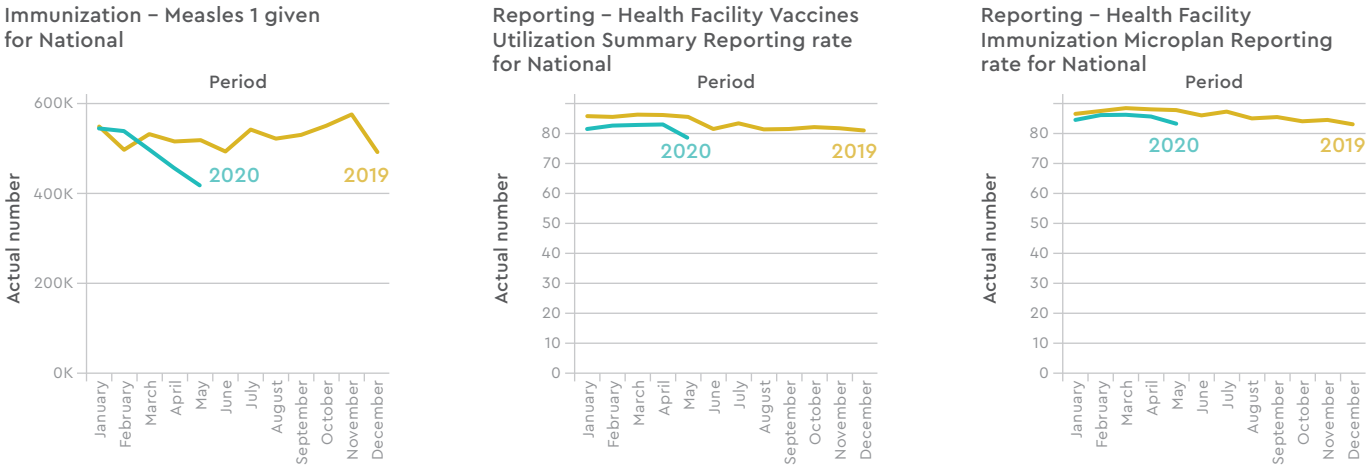


The chart in Fig. 2.1 shows that reported intervention coverage was steady at 78% from July 2019 to January 2020, but reduced after that, to a low of 57% in May 2020. However, the chart shows that the 5 months of apparent decline also correspond to a decline in reporting coverage (99.1% to 72.6%). In this case, the declining values are probably attributable to underreporting from facilities and districts. Had reporting not also been considered, this would most likely have been misinterpreted as a disruption in intervention coverage.

While the performance of RMNCAH+N indicators is unique to a given setting or time period, historical data or general trends provide an average range for what are considered to be normal or expected values.

Fig. 2.2 shows the number of first doses of measles vaccine given in Nigeria from January 2019 to May 2020, alongside rates for health facility vaccination utilization and immunization reporting rates *(14)*. The figure displays values from the same month in the previous year for both the coverage indicator and respective reporting rates. This allows for comparison of the number of vaccine doses between the normal value, without service disruptions arising from COVID-19, and the reporting completeness for the same time periods.

Fig. 2.2. Number of first doses of measles vaccine given nationally in Nigeria, 2019 and 2020[a]



a. Represents data updated on 18 June 2020.

Source: Federal Ministry of Health Nigeria; accessed from: https://msdat.fmohconnect.gov.ng/covid/index.html *(14)*.

All three reveal a significant drop in vaccine coverage but the timing of this drop varies by indicator. The first indicator depicts a steep decline because it combines all forms of immunization delivery, including health facilities and campaigns that, in March 2020, WHO recommended be suspended. The other indicators are health facility based and reveal a slower decline, suggesting nevertheless that the pandemic may also be disrupting facility immunization services.

Monitoring indicators over time

Understanding disruptions to routine delivery of RMNCAH+N services requires historical comparison of key indicator performance. Visualizing performance in this way, especially with the inclusion of data prior to the onset of the COVID-19 pandemic (or other health emergencies or adverse events) can shed light on the extent of its impact upon RMNCAH+N service delivery and utilization.

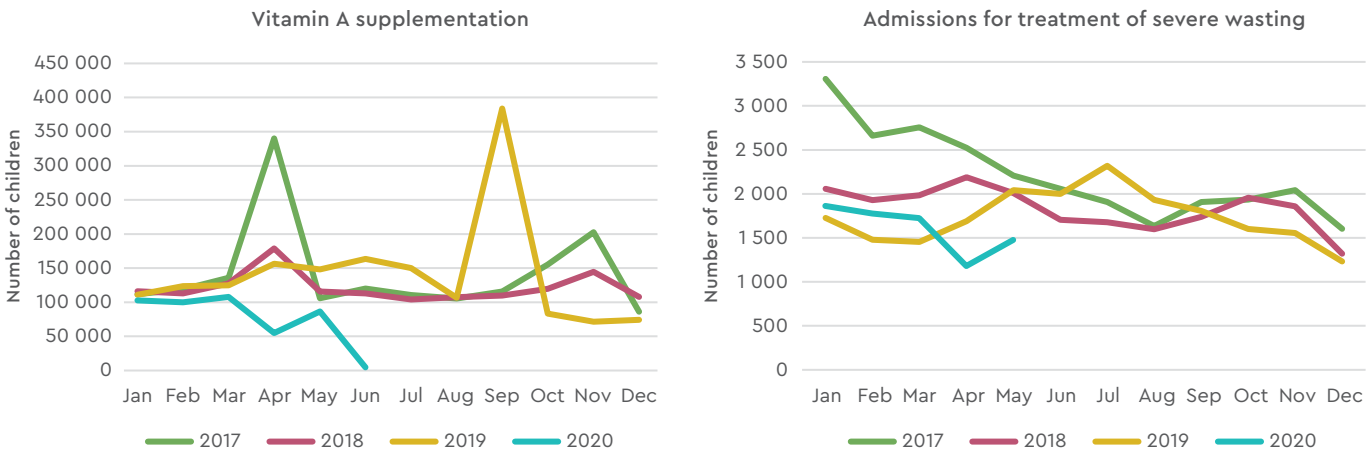
Assessing recent data values relative to a specified baseline period or reference point is likely to be the simplest option for visualizing and interpreting data. With this method, negative change in service delivery can be visualized. However, when brief reference periods (e.g. monthly) are considered, there may be confusion between seasonal factors or normal fluctuations and programme disruptions. For this reason, it is recommended to consider monthly, quarterly and annual differences. If the assessed value is significantly worse relative to each time period, it may reflect a service disruption. This method can be applied to both numbers and percentages, but it requires historical data for proper assessment, with at least three periods, and ideally 12 months of reported data.

In a setting with a prolonged COVID-19 outbreak, including multiple "waves" with corresponding changes in policy responses, a static baseline may not be an effective reference point. In this case, a *relative* (e.g. last month and last year) rather than an *absolute* (e.g. May 2020) baseline is recommended. With monthly reporting, a minimum of 3 months' data prior to the onset of an event should be included for visualizing performance, in order to reveal potential change. The performance of some indicators is subject to seasonality. Comparison should therefore be made with the same reporting period from the previous year.

Some indicators are reported as numbers rather than proportions. Without meaningful qualification (e.g. of trends over time), numbers alone cannot determine the direction of extent of change of performance. The definition of a substantial change in performance requiring attention is specific to the indicator and context. Comparative historical data can also help to clarify whether a disruption in service delivery has occurred.

In Fig. 2.3, data on vitamin A supplementation in Zimbabwe for three full previous calendar years are presented, along with the values for each month in 2020. This provides abundant historical context for determining whether the performance of the two nutrition indicators differs from what would otherwise be expected. Note the two peaks for supplementation in 2017 and 2019. These could be the result of vitamin A campaigns and therefore should not be considered as normal comparison values for routine supplementation. Even though trends in admissions of children for acute malnutrition varied across the 3 years, the value for April 2020 is noticeably below the average range of the indicator's performance.

Fig. 2.3 Vitamin A supplementation and children admitted for severe acute malnutrition (SAM) in Zimbabwe, January 2017 to May 2020[a]



a. Data provided on 22 July 2020.

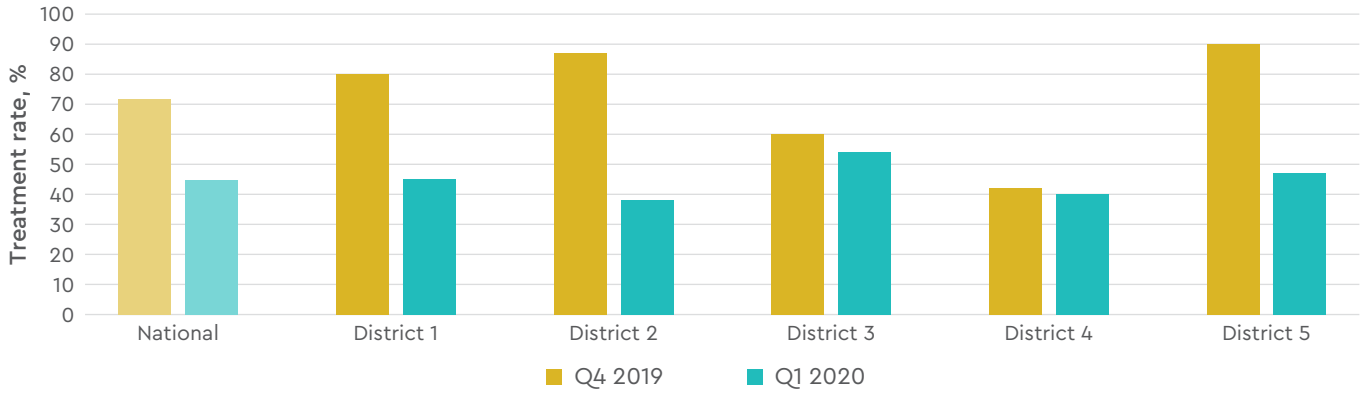
Source: Zimbabwe National Health Management Information System, Department of Nutrition, Ministry of Health and Child Care of Zimbabwe, July 2020 (unpublished).

Comparing subnational areas

Disruptions to service delivery and utilization may differ between locations, reflecting health facility, staff and population density, particular epidemic control measures and resource allocation. It is therefore important to know whether the COVID-19 outbreak (or other health emergency) is disproportionately impacting RMNCAH+N services in specific areas. Since populations differ between administrative or health districts, numerical comparison across areas is not recommended. To understand differences in the performance of a specified indicator between two areas, data should be reported and analysed as percentage changes, percentages or proportions. These can be clearly represented using bar charts disaggregated by subnational area, or on maps.

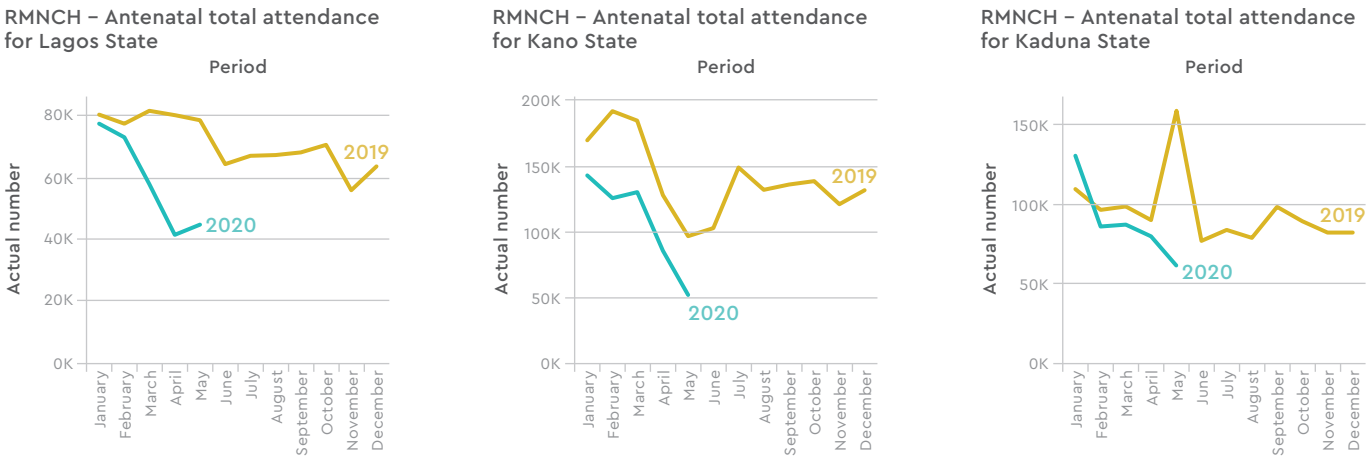
Fig. 2.4 shows an example data of the coverage rate for diarrhoea treatment in children in different districts, together with the national average over two quarters. While it is clear that in Q1 2020 coverage in District 4 is lower than most other districts, the rate was similar in Q4 2019, whereas in other districts the coverage rates decreased drastically. It is important to examine possible reasons. The completeness and timeliness of reporting in each district should be reviewed. If reporting rates in District 4 do not differ greatly from normal rates, the changes in coverage rates require more in-depth analysis to determine the cause of the change.

Fig. 2.4 Diarrhoea treatment rate for children aged under 5 years nationally and by district



While comparison across subnational areas with percentages or proportions is preferable to account for population or health facility density, numeric values can be visualized as several subnational areas or facilities on separate charts, as in Fig. 2.5. While this example does not necessarily compare antenatal attendance between the different states, it does show those states where provision of services was immediately affected by COVID-19. As with all analyses, the timeliness of reporting needs to be considered, as there may be a lag, sometimes of several months, between data collection and its incorporation within the reporting system. Good practice requires time-stamping of visualizations (either within the title or on the visualization itself) so that when data are updated, differences in performance can be explained.

Fig. 2.5 Monthly total antenatal attendance (numbers) for three states in Nigeria as of 18 June 2020[a]



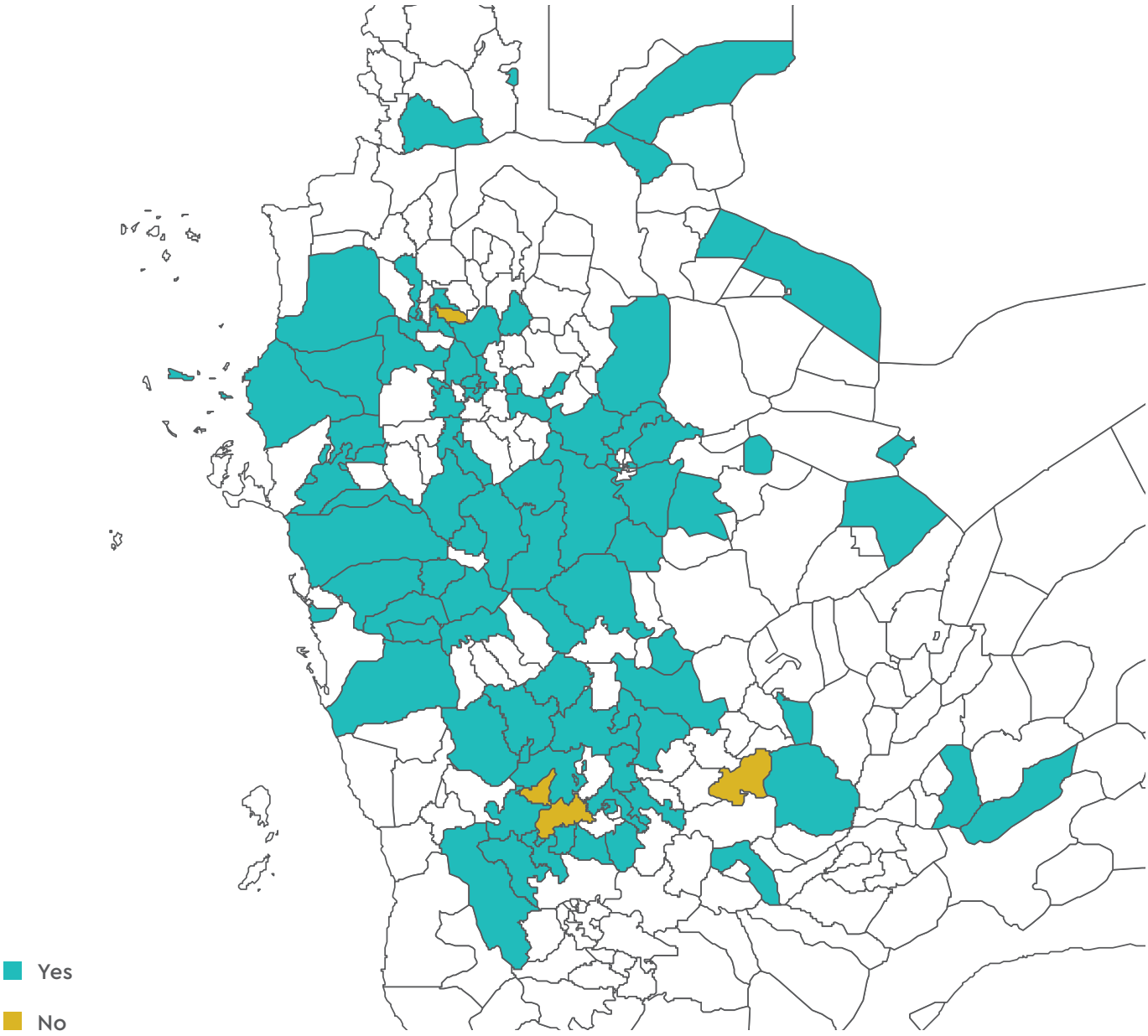
RMNCH: reproductive, maternal, newborn and child health.

a. Represents data updated on 18 June 2020.

Source: Federal Ministry of Health Nigeria; accessed from: https://msdat.fmohconnect.gov.ng/covid/index.html *(14)*.

When the effects of COVID-19 vary geographically, visualization of differences by percentage or proportion can be enhanced through use of GIS maps, which facilitate assessment of patterns of disruption within countries (see Fig. 2.6). This could be a concentration of disruption within particular regions, or a relationship between disruption and other contextual factors, such as the burden of COVID-19, specific physical barriers, or areas of conflict. More detailed information about using GIS maps, together with examples, can be found in Annex 1.

Fig. 2.6 Filled map showing comparison of availability of Nutrition Surveillance Services (NSS) in Yemen districts[a]



a. This map provides an *example of visualization* and should not be considered as actual data. The boundaries and names shown, and the designations used on the maps do not imply the expression of any opinion whatsoever on the part of WHO concerning the legal status of any country.

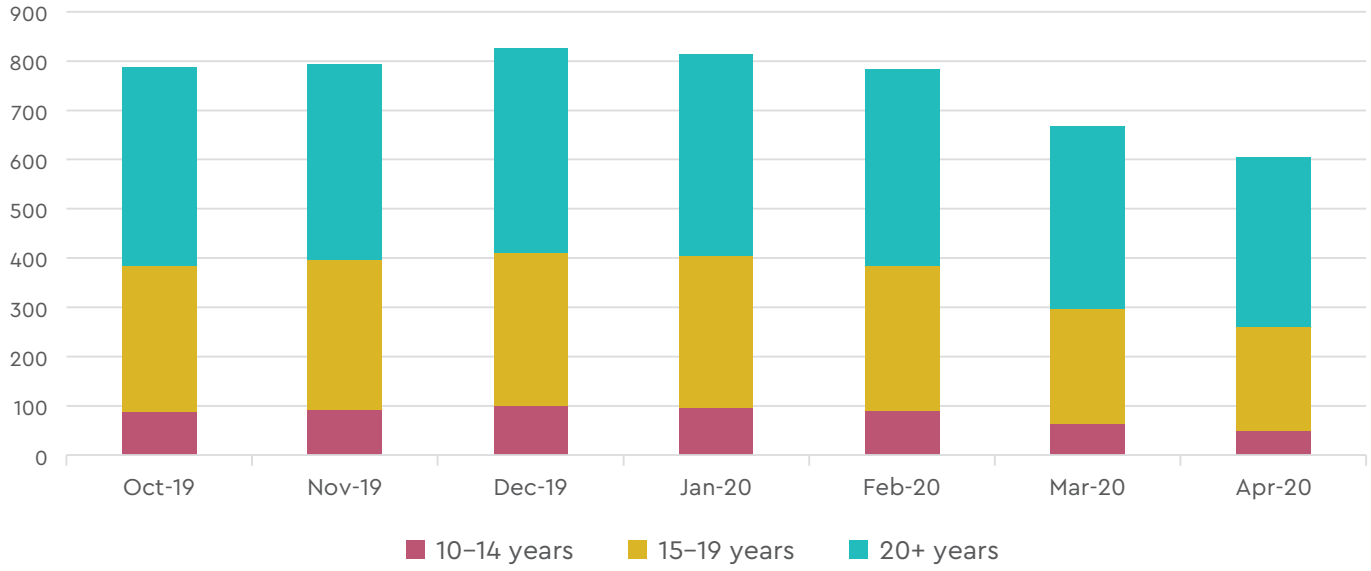
Source: Tracking tool for nutrition surveillance services: impact of COVID on service continuity, Department of Nutrition and Information Management Unit, WHO Country Office for Yemen (15).

Comparing population groups

Accessing RMNCAH+N services may be more challenging for some groups than others. When data allows for disaggregation, for example by age group, sex, income group, race/ethnicity, or urban versus rural area, this can assist in determining the vulnerability of specific groups, such as adolescents, and the related potential impact of disruption to services.

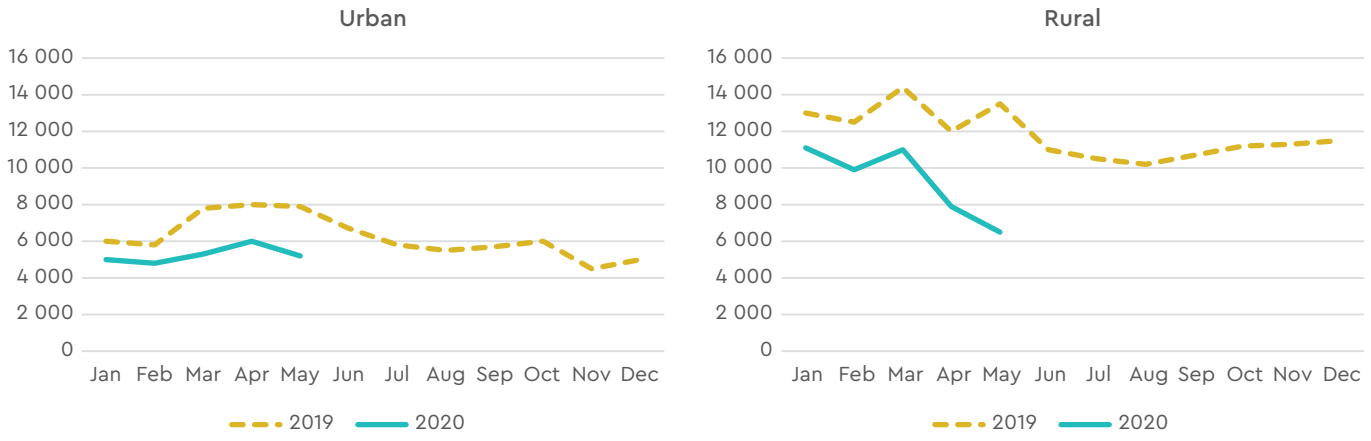
Fig. 2.7 presents example data that visualize by age group the number of female clients receiving oral contraceptives in health facilities. While the total number of adolescents and women receiving contraceptives began decreasing in February 2020, those aged 10–14 years and 15–19 years were disproportionately affected. This could be the result of challenges resulting from reduced facility hours or repurposed facility use, fewer transportation options, or the requirement to be accompanied by a guardian or partner.

Fig. 2.7. Age-disaggregated counts of female clients accepting oral contraceptives in health facilities



Similarly, Fig. 2.8 displays example data of the number of facility births by urban and rural residence area types. Since the data are presented numerically, comparison should focus on the performance of the indicator for each area against the corresponding month of the previous year, rather than differences between rural and urban areas. While the number of births in health facilities has decreased in both urban and rural areas since 2019, the change is greater in rural areas.

Fig. 2.8 Number of births in health facilities in urban and rural areas



Presenting indicators together

Presenting multiple indicators in a single visual display can offer a broader picture of RMNCAH+N service delivery and utilization, or else highlight the performance of one indicator in comparison to others. When more than one indicator is presented on the same chart as a proportion, all indicators must use the same denominator. Dashboards or scorecards combining multiple indicators, independent of scales, are not subject to this rule to the same extent, but should include clearly labelled, related indicators and consistent time periods.

In a further example shown in Fig. 2.9, four indicators are presented to show the change in several districts from a common baseline. These show a decline in delivery in antenatal care, facility births, measles vaccination, and treatment for children with malaria, thereby providing a snapshot of the performance of key RMNCAH+N tracer indicators in a single dashboard.

Fig. 2.9 Changes in RMNCH indicators from baseline to current reporting period

Region	District	ANC sevices	Facility births	MCV1	Treatment for children with malaria
Region 1	District 1	−20%	−15%	−22%	−25%
	District 2	−40%	−50%	−30%	−48%
	District 3	−30%	−25%	−35%	−50%
	District 4	−22%	−20%	−25%	−40%
Region 2	District 5	−10%	−11%	−8%	−15%
	District 6	−7%	−5%	7%	−12%
	District 7	−9%	−9%	−7%	−15%
	District 8	−11%	−8%	−12%	−10%
Region 3	District 9	−31%	−27%	−15%	−47%
	District 10	−25%	−30%	−28%	−45%
	District 11	−30%	−35%	−32%	−47%
	District 12	−35%	−40%	−30%	−38%
National		−25%	−28%	−22%	−33%

ANC: antenatal care; MCV1: measles-containing vaccine first dose.

The relationship between different indicators displayed in a single graph needs to be clear. One option is to show time trends for the same service, broken into separate graphs by relevant disaggregations (e.g. age group, region, sex). When most of the data comprise numerators, time charts (line and/or bar over time) may be appropriate. Another option is to compare related logistics and human resource information to the service depicted.

Fig. 2.10 illustrates how reductions in several areas combine to result in an overall reduction of service coverage.

Fig. 2.10 Factors contributing to reduction in service coverage

Monitoring assists in determining whether a programme is functioning as planned and in identifying when changes may be necessary *(16)*. It is particularly important when programme disruptions are expected, such as during the COVID-19 pandemic. It is essential that there is effective communication between RMNCAH+N programme managers, monitoring and evaluation and emergency response teams, in order to ensure that data needs are clearly articulated; collection is coordinated; and analysis undertaken, shared and used for decision-making.

While this module does not provide specific guidance on modelling the impact of different service options, some background on the use of modelling in the context of health services during a pandemic is provided in Box 2.2.

Accurate interpretation of data depends upon appreciation of context: i.e. the events (including COVID-19) that affect demand and care-seeking, service availability and quality, as well as data reporting. These should be documented within HMIS systems, dashboards or other appropriate tools. It may be possible to add contextual information to existing data visualizations, for example by adding COVID-related dates or policy changes to charts that show service utilization over time.

Box 2.2 What is modelling in the context of health services during a pandemic?

Modelling is a methodology to bring together data on past health outcome trends, coverage of health and nutrition interventions and their evidence-based effectiveness, and apply assumptions (or actual data if available) on changes in intervention coverage to create future projections of the impact on health outcomes. Modelling can serve as an additional method to examine the potential impact of disruptions in service provision. The findings from modelling *(17)* can be used for advocacy purposes to raise awareness of the importance of maintaining key, life-saving interventions for women and children. These estimations can inform decisions about the prioritization of modifications to essential services. Assumptions and inputs to each model should be aligned with the context and scope of model outputs, contextualized to the local situation, consider the epidemic projections, and, as far as possible, use real data on health service use and coverage. Nonetheless, all models have limitations and are dependent upon the data and the assumptions used. A more detailed explanatory note on the use of modelling is under development.

Table 2.2 considers common causes of likely disruption, together with questions for investigation. Further, nuanced (i.e. qualitative) enquiries may also be necessary to shed light on the contextual aspects of disruption *(18)*. Such discussions are most productive when they involve implementers, community members, service users and others who can explain why the situation exists, together with managers who can take appropriate remedial action.

Table 2.2 Common reasons for observed disruptions and questions for investigation

Type of disruption	Guiding questions
COVID-19	What are the dates of initial COVID-19 cases and outbreak peaks?
	Where is COVID-19 concentrated – urban or rural areas?
	Are any particular subpopulations adversely affected?
	If so, for what reasons?
	Has service delivery been adapted (e.g. digital platforms) but not captured in reporting?
	Are COVID-19 symptoms and cases reported under acute respiratory infection (ARI)/pneumonia, fever, etc.?
Data reporting	Is the completeness of reporting lower than expected?
	Are there known disruptions in reporting?
	Are data typically subject to seasonal variations?
Supply	Have there been disruptions to supply chains, including personal protective equipment?
	Have stockouts occurred?
	Have facilities struggled to implement infection prevention and control practices adequately?
Workforce	Have health workers been deployed to other facilities (e.g. COVID-19 testing sites)?
	Have health workers been absent through illness or fear of infection?
	What decisions have been made about use of resources?
	Have shifts been made to different service platforms?
Access and demand	Have there been gaps or weaknesses in messages about continuing to use essential health services?
	Have there been reports of misinformation or other efforts to undermine public health messaging about COVID-19?
	Has transportation (local and or emergency) been reduced?
	Have financial barriers to access increased because of the economic impact of COVID-19?
	Have there been regulations limiting freedom of movement: e.g. are written civil
	authorizations required to be in public places, including health facilities?
Coverage and quality	Have there been changes or reductions in facility/clinic opening hours?
	Have patients been sent home or discharged to maintain physical distancing?
Other contextual factors	Are there other sociopolitical events, such as elections, extreme weather or seasonal migration, that would affect service delivery?

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Annexes

Annex 1: Additional resources for data collection, collation and use

Countries should review their existing data sources and data collection tools, as well as current processes, including data flows and reporting timelines, to establish what is available and, if needed, modify these parameters or explore additional solutions to meet current data needs.

It is important to consider how data sources may have changed or expanded during the COVID-19 response. For example, the level of data collection may have moved from being facility based to virtual and this needs to be captured in routine health information systems.

In the context of a systemic public health emergency, several key questions need to be considered.

1. What are the data needs? What is the adequate reporting frequency? What levels of disaggregation are needed and possible?

Countries can identify the data most suited to their needs by focusing on the analysis of secondary impacts of the emergency and the recommended indicator list. This includes determining whether the data typically available in routine information systems need to be collected more frequently or urgently.

Depending on data needs and the evolution of the situation, "real-time" or near real-time, weekly, bi-weekly and monthly reporting frequencies can be considered. In the same way, data flow and related processes can help to determine the reporting frequency from one level to the next. It is important to consider the needs at each level, together with the phases of the epidemic, and whether quickly detecting certain events would trigger action or prioritization of services, such as a local upsurge of measles cases that would require rapid case investigations.

To support data use and targeted action, it is important to consider which level of geographic disaggregation, such as health facility catchment area or district level, will best capture disruption to routine essential services.

Digital health tools with geolocation capabilities (e.g. ODK Collect *(1)*, OpenSRP *(2)*, DHIS2 COVID-19 tracker *(3)*, medic-collect *(4)*) can provide more flexibility in terms of data disaggregation, since location data can be aggregated to any desired geographical unit. When data are collected through SMS-based polls (e.g. RapidPro *(5)*), the availability of geolocation will depend on the self-reported location information included in the poll, or on linkages with existing "master" lists that contain geolocation information for health facility, community health worker (CHW) registries, etc.

2. What existing data sources, collection and reporting tools and processes are already in place that can be used?

The country's health management information systems (HMIS) are the primary data source to consider when assessing how to meet current data needs. The HMIS should already be the main existing source for assisting managers and decision-makers to monitor the provision of health-care services and interventions, providing the data for decision-making.

- In addition to the HMIS, countries should review other existing data sources and collection and reporting tools, including surveillance systems (such as the Integrated Disease Surveillance and Response tool [IDSR]; community health information system [CHIS] tools in use by community health workers; logistics management information systems [LMIS] for commodities; and human resource health information systems [HRHIS]).
- If already available, digital health tools can be leveraged at all levels to monitor proper functioning of disease surveillance, including laboratory diagnosis, monitoring of service provision in the community, continuity of the supply chain and detection of stockouts, etc.
- Other data sources can be considered, such as current registers of health workforces or of master health facilities. Facility assessments and surveys can provide data that are not available through routine data collection systems. Other possible sources include sample or sentinel registration systems, national surveillance systems or special studies.

Existing data flows, procedures and mechanisms for data processing, including standard operating procedures for managing delayed reporting, should be reviewed. This helps determine what data should be submitted to whom and for what purpose, in terms of decision-making and action.

- Coordination among health programmes, monitoring and evaluation (M&E) officers and emergency response teams is important to ensure that data needs are clear, and data collection and collation are coordinated and regularly shared.
- If necessary, existing data dissemination/feedback mechanisms should be created or reinforced and a review carried out of how summary reports should be generated and used.

3. If necessary, what existing resources/tools can be adapted to meet evolving data needs? Are there other digital platforms in place that could be repurposed for data collection and reporting?

Existing tools and related human resources from vertical programmes can be adapted in an emerging situation. In emergencies, existing platforms can be adapted, saving the time that might otherwise be needed to familiarize staff with a new platform.

Countries without reliable, routine health information systems, where rapid deployment of a digital health reporting solution is not realistic, can consider the feasibility of in-person or phone-based data collection from a sample of facilities. Such a decision needs to consider the relative costs and availability of human resources over a 12–24-month period, as well as the possibility that this method of data collection may be compromised by changes in mobility, transport and physical distancing. Should in-person data collection be necessary, it may help to reduce the frequency of facility surveying, for example, to a quarterly basis. Box A1.1 includes links to repositories of existing digital tools and platforms.

Box A1.1 Links to repositories of existing tools

- Digital platform mapping *(6)*
- Partnership mapping *(7)*
- WHO Digital Health Atlas *(8)*
- WHO – COVID-19 innovations *(9)*
- ICT Works listing *(10)*
- WHO Digital Health publications *(11)*

3a. Does sufficient capacity exist within government to adapt, adopt or repurpose alternative solutions?

The most likely scenarios and timeline for the evolution of the public health emergency should be considered, together with the capacity development that would be required by any changes to data collection. The following should be taken into account:

- cost;
- hardware and procurement;
- availability and capacity of personnel;
- training and technical support;
- timing; and
- how summary reports will be generated and used (particularly when adapting tools or using alternative solutions, such as rapid polls *(12)*).

3b. When and how should additional tools and procedures be considered?

When existing systems do not meet the requirements for data reporting, and if time or resource constraints preclude the possibility of adapting existing resources, alternatives need to be found. This should take into consideration the following steps:

- define clearly the key data needed before proposing collection solutions, timelines, data management procedures, human resources and the anticipated level of effort. Decide whether or not it is important to consider time trends, since comparison will not be available with new tools;
- consider short SMS or phone polls based on facility or community registers;
- consider adapting existing software used by Global Goods *(13)* rather than developing a new solution on a new platform;
- ensure that the proposed solution complies with country eHealth or health HMIS strategies and policies;
- consider using an assessment tool, such as the Digital Health Investment Review Tool *(14)*, Digital Investment Tool *(15)* or Digital Principles Maturity Matrix *(16)*, Digital implementation investment guide *(17)* to guide the selection process and align with best practice in digital development; and
- consider leveraging platforms beyond the health sector, such as agriculture or education *(18)*.

Examples of tools for data collection for analysis of indirect effects of service disruption resulting from the COVID-19 outbreak are presented in Table A1.1.

Table A1.1 Data collection tools for analysis of indirect effects of service disruptions resulting from the COVID-19 outbreak

Data collection tool	Source/link
Health facility assessment	https://www.who.int/teams/integrated-health-services/monitoring-health-services *(19)*
Rapid mortality surveillance	https://www.who.int/publications/i/item/revealing-the-toll-of-covid-19 *(20)*
CommCare	https://www.dimagi.com/blog/covid-19-response-template-apps/ *(21)*
Community Health Toolkit	https://communityhealthtoolkit.org/ *(22)*
DHIS2	https://www.dhis2.org/covid-19 *(3)*
RapidPro	https://community.rapidpro.io/ *(5)*

Considerations for data use

4a. What data quality control measures are in place? Is the quality of the data good enough to use to address the data needs?

All data have limitations that affect their reliability and interpretation. Examples include missing values, biases, measurement and human errors in data entry and computation *(23)*.

Existing systems for data quality should be used as much as possible, providing a review of the completeness, timeliness and consistency of reported data *(24)*. In quickly changing situations, when the emphasis is on service delivery, data may be more difficult to obtain or may be less complete. Triangulation of different data sources is another way of assessing data quality. Under all conditions, and particularly in changing situations, data quality should be assessed as frequently as necessary.

4b. Can and should data be disaggregated?

When systems make it possible to disaggregate data, this can also reveal significant differences and inequities and identify especially vulnerable locations or subpopulations.

For example, what is the most appropriate geographic disaggregation (health facility catchment, district) to capture potential or actual disruption of routine essential services? At least in part, this will depend upon the level or mechanism through which monitoring occurs. Digital health tools with geolocation capabilities[1] can provide flexibility in terms of data disaggregation. Maps can help to visualize discrepancies between geographic areas (see Box A1.2).

Box A1.2 Using GIS maps

The most common visualizations for area data are *choropleth* ("filled") and *proportional symbol* maps. In filled maps, the value of the indicator of interest determines the colour with which each area is visualized. These thresholds should be selected on the basis of programmatic consideration of the anticipated levels of reduction and of interest to response.

Proportional symbol maps allow visualization of indicators based on variation in symbol size. These are generally suitable for showing more subtle differences between areas that might otherwise be merged within a single colour in a filled map. Because of the difficulty in distinguishing between the positive and negative values, proportional symbol maps are not recommended when indicators range between positive and negative numbers.

To provide richer context for interpretation, additional information can be overlaid with labels (e.g. place name, number of confirmed cases, date of first recorded case) or textural patterns, to highlight factors that cannot be represented quantitatively, such as conflict locations, or areas with known community transmission.

All indicators should be represented using the same geographic level of detail (e.g. administrative unit). The ability to perceive pattern visually is highly subjective and influenced by the choice of colour ramp and symbols. For this reason, it is generally recommended that maps are coupled with bar charts that show similar information.

1. Examples include: ODK Collect *(1)*, OpenSRP *(2)*, DHIS2 Covid-19 tracker *(3)*, Medic Collect *(4)*.

Disaggregation can help consideration of characteristics of specific populations such as sex, age, rural/urban and race/ethnicity. The WHO HEAT Plus toolkit *(25)* allows countries to input their own data, including subnational levels for equity analyses.

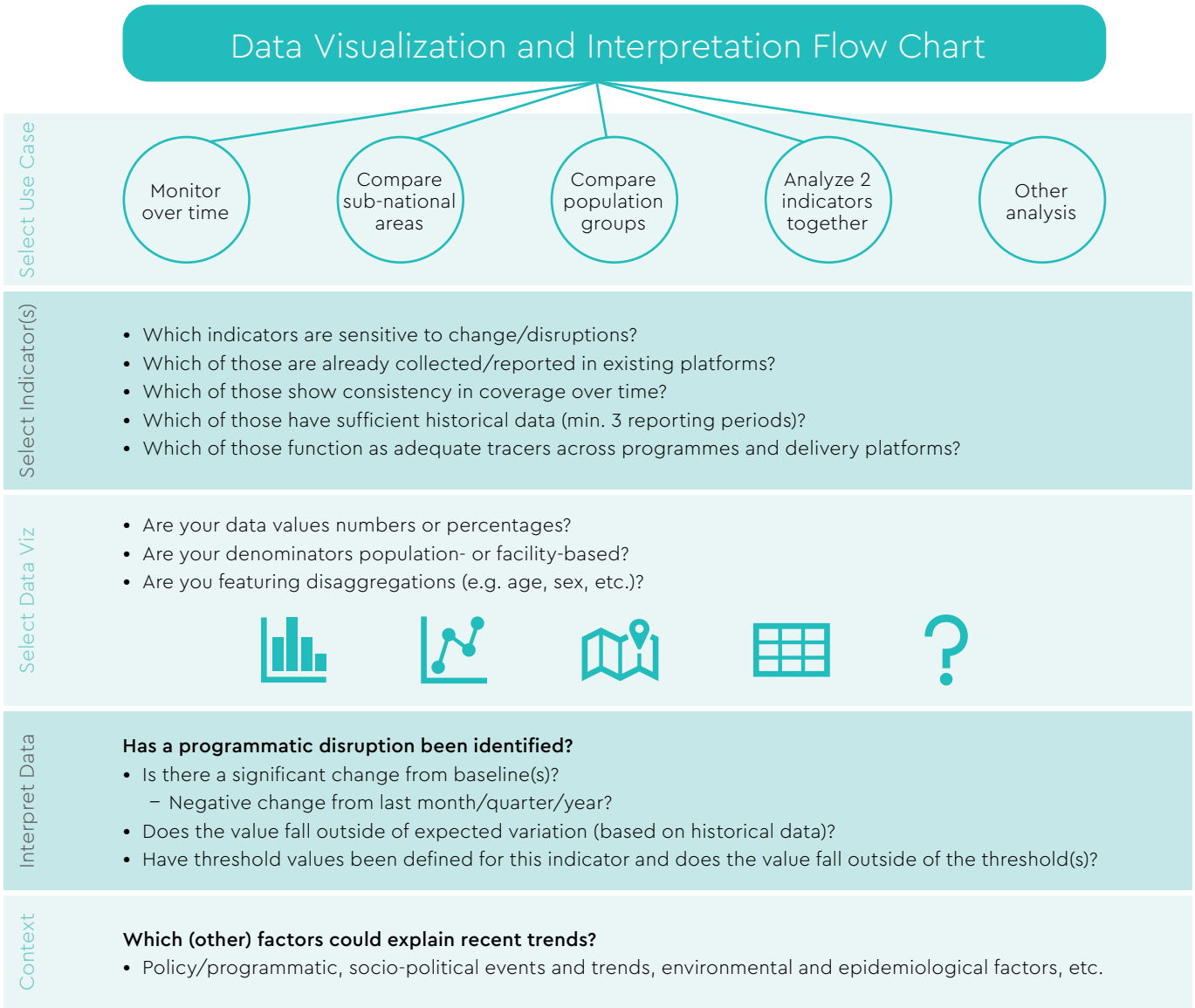
4c. What considerations should be made in visualizing and interpreting data?

The following should be considered when visualizing and interpreting data:

- identify the purpose of analysis/visualization;
- assess data availability and format;
- select data visualization type;
- choose indicator(s); and
- identify contextual factors for proper interpretation.

The flowchart in Fig. A1.1 outlines the process to be followed for visualizing and interpreting data.

Fig. A1.1 Data visualization and interpretation flowchart



For additional decision support on selecting data visualizations, see Figure 3 in *Analysis and use of health facility data. General principles (23).*

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Annex 2: Sample indicators for monitoring essential health services during the COVID-19 pandemic

This extended list of sample indicators presented below is taken from *Maintaining essential health services: operational guidance for the COVID-19 context (1).*

- Total number of outpatient attendances or primary care visits
- Total number of hospital discharges, including deaths (both related and unrelated to COVID-19)
- Number of health workers available, disaggregated by occupational group (i.e. by the International Standard Classification of Occupations, or ISCO-8 classification)
- Number of health workers infected by COVID-19, disaggregated by occupational group, including health or care workers in nursing homes and long-term care facilities
- Percentage of hospital emergency units with a validated triage tool in place
- Ratio of hospital-based deaths from acute injury to overall deaths from acute injury
- Number of inpatient admissions for acute cardiovascular and cerebrovascular emergencies
- Percentage of COVID-19 patients with an existing underlying noncommunicable disease
- Number of hospital admissions and discharges (including deaths) due to hypoglycaemia and hyperglycaemia
- Essential medicines or supplies for which there is less than 2 months' inventory without confirmation of on-time replenishment or with or without confirmation of replenishment
- Number of women and girls receiving (a) oral and (b) injectable contraceptives
- Number of women presenting to the facility with abortion-related complications
- Number of pregnant women with at least one antenatal care visit
- Number of antenatal care contacts for which pregnant women were given/prescribed iron-containing supplements
- Number of facility births
- Number of births by caesarean section
- Incidence of low birth weight (<2500 g) among newborns
- Number of term infants who were put to the breast within 1 hour after birth
- Number of women receiving postnatal care (PNC) within 2 days of delivery
- Number of newborns receiving PNC within 2 days of delivery
- Number of newborns weighing ≤2000 g receiving kangaroo mother care
- Number of newborns admitted to the neonatal intensive care unit
- Number of children presenting to facility with any sign of acute respiratory infection
- Number of children younger than 1 year receiving their third dose of diphtheria–tetanus–pertussis (DPT3) or their first dose of measles vaccine
- Immunization coverage rate by vaccine for each vaccine in the national schedule
- Number of children 0–59 months of age admitted to health facility for treatment of severe wasting and bilateral pitting oedema
- Number of children 0–59 months of age who were screened for severe wasting and bilateral pitting oedema
- Number of children 0–59 months of age who were discharged/recovered/treated for severe wasting and bilateral pitting oedema
- Number of children 0–59 months of age who received an age-appropriate dose of vitamin A in each semester
- Percentage of confirmed malaria cases treated with artemisinin-based combination therapies
- Number of new and relapse tuberculosis cases notified
- Percentage of adults living with HIV currently receiving antiretroviral therapy who are affected by treatment disruptions

- Percentage of people living with hepatitis B and on long-term treatment who are affected by treatment disruptions
- Number of women screened for cervical cancer
- Number of cases of violence against women and girls (physical, sexual, other), by type of perpetrator, recorded at the health facility level
- Number of persons with severe mental health conditions (e.g. moderate to severe depression, psychosis, bipolar affective disorder, substance abuse disorders) who are using consultative services
- Suicide rate
- Number of new cancer diagnoses
- Number of COVID-19 patients and patients without COVID-19 in need of palliative care
- Number of older people presenting to facility with any sign of acute respiratory infection
- Number of deaths in adults older than 60 due to conditions unrelated to COVID-19

Reference

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Annex 3: RMNCAH+N indicator metadata

Note: Using percentages versus numbers will depend on the level of analysis and the availability of data for the denominator. It may be more useful to use numerators when interpreting fewer cases, and percentages when looking at data from more inputs, i.e. national level data. For additional information on denominators, please refer to reference *(1)*.

	Indicator name	Definition	Purpose	Computation (numerator [N]/ denominator [D])	Data source(s)[a]	Recommended frequency[b]	Suggested disaggregation[c]	Notes	Alignment with *Maintaining essential health services: operational guidance for the COVID-19 context (2)*
				Reproductive health					
1	Oral contraceptive distribution (number)	Number of clients who accept oral contraceptives at the facility or in the community	To monitor uptake of oral contraceptives; proxy for access to contraception	Number of women and girls receiving oral contraceptives	HMIS: service delivery registers	Monthly	Point of service: health facility/ community; new/ returning users; age (e.g. 10–14 years, 15–19 years, 20+ years, as feasible in country reporting system)	Definitions of new/returning users in HMIS are not always consistent. Definitions from your system should be used. "New" clients may be: new case, new, new acceptor, acceptor, new user, new client. Returning or "old" clients could include: readmittance, old, renewal, repeat acceptor, revisit, regular user, continuer, old case, or follow-up clients.	Aligned
2	Injectable contraceptive distribution (number)	Number of clients who accept injectable contraceptives at the facility or in the community	To monitor uptake of injectable contraceptives; proxy for access to contraception	Number of women and girls receiving injectable contraceptives	HMIS: service delivery registers	Monthly	Point of service: health facility/ community; new/ returning users; age (e.g. 10–14 years, 15–19 years, 20+ years, as feasible in country reporting system)	Definitions of new/returning users in HMIS are not always consistent. Definitions from your system should be used. "New" clients may be: new case, new, new acceptor, acceptor, new user, new client. Returning or "old" clients could include: readmittance, old, renewal, repeat acceptor, revisit, regular user, continuer, old case, or follow-up clients.	Aligned
				Maternal and newborn health					
3	ANC service provision (number)	Number of ANC visits/ contacts provided in the reporting period by any trained provider	To monitor provision of ANC services; proxy for demand for services for pregnant women	Number of ANC contacts conducted, regardless of provider	HMIS: service delivery registers	Monthly	Location of service delivery (health facility or community); age (e.g. 10–14 years, 15–19 years, 20+ years, as feasible in country reporting system)	Contacts or visits should be defined by national standards. Countries may not collect or tally this indicator in this way, but may report on number of first ANC visits, number of fourth visits, etc., and should continue to monitor the indicator in the format in which it is already routinely reported.	Aligned

	Indicator name	Definition	Purpose	Computation (numerator [N]/ denominator [D])	Data source(s)[a]	Recommended frequency[b]	Suggested disaggregation[c]	Notes	Alignment with *Maintaining essential health services: operational guidance for the COVID-19 context (2)*
4	Pregnant women tested for HIV (number/%)	Number or percentage of pregnant women attending antenatal clinics and/or delivered in a facility who were tested for HIV during pregnancy	To monitor the number of pregnant women tested for HIV; proxy for functioning of the first step in the prevention of mother-to-child transmission cascade	N: Number of pregnant women attending ANC and/or giving birth at a facility who were tested for HIV during pregnancy, at labour and/or delivery, or those who already knew they were HIV positive at the first antenatal care visit D: Number of pregnant women who attended an antenatal clinic or delivered in facilities	HMIS: service delivery registers	Monthly			
5	Pregnant women living with HIV who received antiretroviral medicine to reduce the risk of mother-to-child transmission of HIV (number)	Number of pregnant women living with HIV who received antiretroviral medicines to reduce the risk of mother-to-child transmission of HIV	To monitor the number of pregnant women receiving antiretroviral medicine to reduce the risk of mother-to-child transmission of HIV; proxy for functioning HIV treatment programmes	Number of pregnant women living with HIV who received antiretroviral medicines to reduce the risk of mother-to-child transmission of HIV	HMIS: service delivery registers	Monthly	Community/facility treatment distribution	If women are provided with treatment for multiple months at a visit, they should be counted as treated for each month for which they have treatment.	
6	Facility births (number)	Number of women who give birth in a health facility regardless of outcome	To monitor whether levels of facility-based deliveries are changing; proxy for access to childbirth services	Number of women who give birth in a health facility	HMIS/ facility records	Monthly or weekly	Facility type; age (e.g. 10–14 years, 15–19 years, 20+ years, as feasible in country reporting system)		Aligned
7	Caesarean section prevalence (number/%)	Number or percentage of deliveries in health facilities by caesarean section	To monitor possible disruptions in access to delivery by caesarean section; proxy for surgical care access and functioning referral systems	N: Number of deliveries by caesarean section in health facilities D: Number of deliveries in health facilities	HMIS/ facility records	Monthly or weekly	Rural/urban (for national level)		Aligned
8	PNC for women (number/%)	Number or percentage of women receiving PNC within 2 days of delivery	To monitor provision of PNC for women; proxy for delivery of services for women who recently gave birth	N: Number of women receiving PNC D: Number of deliveries in health facilities	HMIS/ facility records	Monthly		The numerator includes both women who gave birth in a facility and those who gave birth outside a facility. The timing of PNC may vary in accordance with national policy.	Aligned
9	PNC for newborns (number/%)	Number or percentage of newborns receiving PNC within 2 days of delivery	To monitor provision of PNC for newborns	N: Number of newborns receiving PNC D: Number of live births in health facilities	HMIS/ facility records	Monthly		The numerator includes both newborns who were born in a facility and those who were born outside a facility. The timing of PNC may vary in accordance with national policy.	Aligned

	Indicator name	Definition	Purpose	Computation (numerator [N]/ denominator [D])	Data source(s)[a]	Recommended frequency[b]	Suggested disaggregation[c]	Notes	Alignment with *Maintaining essential health services: operational guidance for the COVID-19 context (2)*
10	Newborns admitted for inpatient care (number)	Number of newborns admitted for care for any cause (including premature birth, congenital anomalies, birth complications including asphyxia, and neonatal infections)	To monitor coverage of inpatient care for newborns; proxy for demand for treatment of severe illness in newborns	Number of newborns (0–28 days) admitted for inpatient care for any cause	HMIS/ facility records	Monthly		This indicator includes newborns admitted for inpatient care either directly after birth or within the period up to 28 days after birth.	Aligned
				Child health and immunization					
11	DTP3 vaccine (number)	Number of children younger than 1 year receiving their third dose of DTP3	To monitor provision of DTP3 vaccine	Number of children younger than 1 year receiving their third dose of DTP3 vaccine	HMIS: service delivery registers	Monthly			Aligned
12	MCV1 (number)	Number of children younger than 1 year receiving their first dose of measles vaccine	To monitor provision of measles vaccine	Number of children younger than 1 year receiving their first dose of measles vaccine	HMIS: service delivery registers	Monthly		As some countries recommend measles vaccination at 12 months of age, when the recommended schedule is 12 months, this indicator may indicate vaccination by 2 years of age.	Aligned
13	Acute respiratory infection consultations (number)	Number of children presenting to a health facility with any sign of acute respiratory infection)	To monitor consultations in health facilities for children with acute respiratory infection; proxy for possible outbreaks of e.g. flu/ influenza which may present in the same way as COVID-19	Number of children presenting to a health facility with any sign of acute respiratory infection	HMIS: service delivery registers	Monthly			Aligned
14	Treatment for children with diarrhoea (number/%)	Number or percentage of children with diarrhoea treated with oral rehydration salts (ORS), ORS + zinc, or zinc	To monitor provision of diarrhoea treatment (case management for children); proxy for service availability	N: Number of children aged under 5 years treated for diarrhoea D: Number of children aged under 5 years with diarrhoea	HMIS: service delivery registers	Monthly			
15	Treatment of children with malaria (number/%)	Number or percentage of children aged under 5 years with malaria treated with ACT	To monitor provision of malaria treatment (case management for children); proxy for service availability	N: Number of children aged under 5 years treated for malaria with ACT D: Number of children aged under 5 years with malaria	HMIS: service delivery registers	Monthly	Facility (outpatient department) or community		Aligned
16	Consultations for child health (number)	Number of consultations for children aged under 5 years for any cause	To monitor provision of services for sick children; proxy for service availability	Number of consultations for children aged under 5 years for any cause	HMIS: service delivery registers	Monthly	Facility (outpatient department) or community	This indicator focuses on service provision for sick children; however, some country reporting systems may be able to monitor well-child visits as a separate indicator.	Aligned

	Indicator name	Definition	Purpose	Computation (numerator [N]/ denominator [D])	Data source(s)[a]	Recommended frequency[b]	Suggested disaggregation[c]	Notes	Alignment with *Maintaining essential health services: operational guidance for the COVID-19 context (2)*
				Nutrition					
17	Iron supplementation for pregnant women (number/%) *(3)*	Number and percentage of ANC contacts for which women were given/prescribed iron-containing supplements for the reporting period	To monitor provision of iron-supplements to pregnant women; proxy for provision of key ANC services and commodities at each contact	N: Number of ANC contacts in the reporting period for which pregnant women were given/ prescribed iron-containing supplements D: Total number of ANC contacts in the reporting period	HMIS: service delivery registers	Monthly	Facility, community		Aligned
18	Screening of children for severe wasting and bilateral pitting oedema (number)[1] *(4,5)*	Number of children aged 6–59 months who were screened[2] for severe wasting and bilateral pitting oedema Report the number for infants aged 0–5 months where practised	To monitor whether children are being screened for severe wasting and bilateral pitting oedema; proxy for malnutrition surveillance	Number of children aged 6–59 months who were screened for severe wasting and bilateral pitting oedema	HMIS: service delivery registers	Monthly	Facility, community, home screening[2]	If infants aged 0–5 months are screened for severe wasting and bilateral pitting oedema, they should be included in the reporting. [1]This is the same indicator as the standard indicator on screening for severe acute malnutrition, where severe wasting can be identified by mid-upper arm circumference, bilateral pitting oedema or weight-for-height. The terminology of severe acute malnutrition is evolving to severe wasting and bilateral pitting oedema. [2]Children can be screened using MUAC and/or weight-for-height and/or bilateral pitting oedema. [3]Note that screening at home with mid-upper arm circumference tapes provided to households is being considered, as regular community screening activities (gathering people together or going house to house) are not aligned with social distancing.	Aligned

	Indicator name	Definition	Purpose	Computation (numerator [N]/ denominator [D])	Data source(s)[a]	Recommended frequency[b]	Suggested disaggregation[c]	Notes	Alignment with *Maintaining essential health services: operational guidance for the COVID-19 context (2)*
19	Severe wasting and bilateral pitting oedema admissions (number)[4] *(4,5)*	Number of children aged 6–59 months admitted[5] for severe wasting and bilateral pitting oedema Report the number for infants aged 0–5 months where practised	To monitor whether children with severe wasting and bilateral pitting oedema are being admitted for treatment; proxy for access and care-seeking for children	Number of children aged 6–59 months admitted for severe wasting and bilateral pitting oedema	HMIS: service delivery registers	Twice a month (or weekly)	Inpatient, community	If infants aged 0–5 months are treated for severe wasting and bilateral pitting oedema, they should be included in the reporting [4]This is the same indicator as the standard indicator on admissions for severe acute malnutrition, where severe wasting can be identified by mid-upper arm circumference, bilateral pitting oedema or weight-for-height. The terminology of severe acute malnutrition is evolving to severe wasting and bilateral pitting oedema. [5]Includes new admissions, readmissions (optional), beneficiaries moved in from another programme and "other", category required to capture small numbers that do not fit in any given category.	Aligned
20	Severe wasting and bilateral pitting oedema discharges recovered (%)[6] *(4,5)*	Percentage of children aged 6–59 months discharged from severe wasting and bilateral pitting oedema treatment programmes as recovered Report the number for infants aged 0–5 months where practised	To monitor the recovery of children admitted for severe wasting and bilateral pitting oedema	N: Number of children aged 6–59 months discharged from severe wasting and bilateral pitting oedema management programmes as recovered D: Total number of children aged 6–59 months discharged from severe wasting and bilateral pitting oedema management programmes	HMIS: service delivery registers	Twice a month	Inpatient, community	If infants aged 0–5 months are treated for severe wasting and bilateral pitting oedema, they should be included in the reporting. [6]This is the same indicator as the standard indicator on discharges from severe acute malnutrition, where severe wasting can be identified by mid-upper arm circumference, bilateral pitting oedema or weight-for-height. The terminology of severe acute malnutrition is evolving to severe wasting and bilateral pitting oedema.	Aligned
21	Early initiation of breastfeeding of newborns (number/%) *(3)*	Number and percentage of newborns put to the breast within 1 hour of birth	To monitor early initiation of breastfeeding for newborns; proxy for quality of services to support breastfeeding	N: Number of newborns put to the breast within 1 hour of birth in the reporting period D: Total number of newborns delivered in the reporting period	HMIS: service delivery registers or rapid facility assessment	Monthly	Facility, community		Aligned

	Indicator name	Definition	Purpose	Computation (numerator [N]/ denominator [D])	Data source(s)[a]	Recommended frequency[b]	Suggested disaggregation[c]	Notes	Alignment with *Maintaining essential health services: operational guidance for the COVID-19 context (2)*
22	Coverage of high-dose vitamin A supplementation (number/%) *(6)*	Number and percentage of children aged 6–59 months who received an age-appropriate dose of vitamin A in each semester	To monitor provision of vitamin A for children	N: Number of children aged 6–59 months who received an age-appropriate dose of vitamin A through routine health system contacts[7] during each semester[8] D: Agreed-upon national level denominator for children aged 6–59 months for delivery of vitamin A through routine health system services[9]	HMIS: service delivery registers	Monthly (at minimum, for each semester)	Facility, community; children reached by events and children reached via routine services; Semester 1 (January to June), Semester 2 (July to December)	[7]Make a duplicate indicator for distribution via events, as the number of children reached in events and via routine contacts should not be added to together, to avoid double counting the same children being reached in one semester via different mechanisms. The GAVA guide *(6)* lists separate indicators for events and routine contacts but only one is listed here for brevity. [8]Semester 1 (January to June) and Semester 2 (July to December) need to be separate indicators reported on independently. [9]For duplicate indicator on events, use the agreed-upon national level denominator for events, which is often different from the one for routine contacts.	Aligned
	Cross-cutting indicators								
23	Completeness of HMIS or CHIS reporting (%)	Percentage of completed reports received through either an HMIS or CHIS	To monitor the availability of HMIS or CHIS reports; proxy for data availability and quality	N: Number of complete HMIS or CHIS reports received, from all sources D: Number of expected HMIS or CHIS reports from all sources	HMIS or CHIS	Monthly	Reporting location (health facility or CHWs)	The type of reports should be the same for the numerator and denominator (e.g. main monthly reports, all reports, CHW reports).	

	Indicator name	Definition	Purpose	Computation (numerator [N]/ denominator [D])	Data source(s)[a]	Recommended frequency[b]	Suggested disaggregation[c]	Notes	Alignment with *Maintaining essential health services: operational guidance for the COVID-19 context (2)*
24	Stockouts of RMNCAH+N commodities (number/%)	Number or percentage of health facilities and/ or CHWs with stockouts of tracer RMNCAH+N essential medicines or supplies	To monitor the availability of essential medicines or supplies; proxy for supply chain disruptions	N: Number of HFs and/or CHWs reporting stockouts for RMNCAH+N commodities, drugs, diagnostic tests and equipment D: Number of health facilities and/or CHWs that offer the tracer commodity reporting	LMIS/SMS poll	Weekly	Point of service (health facility, CHWs); commodities	This should include essential medicines or supplies for which there is less than 2 months' inventory without confirmation of on-time replenishment or with or without confirmation of replenishment: • family planning: male condoms, oral contraceptives, injectable contraceptives, emergency contraception; • ANC: tetanus toxoid vaccination; • delivery: uterotonics (oxytocin, misoprostol), antibiotics; • neonatal care: injectable antibiotics for neonatal sepsis; • child illness: ACT, malaria diagnostic tests, amoxicillin; ORS, zinc; • HIV: HIV and syphilis testing; • nutrition: iron and folic acid supplements, vitamin A, F-75 therapeutic milk, F-100 therapeutic milk, ready-to-use therapeutic food Countries should monitor a few commodities from the suggested list above, based on what is already being collected and reported in the country.	Aligned
	Outcome and impact indicators								
25	Post-abortion complications (number)	Number of women presenting to a health facility for gynaecological indications related to [complications of] abortion	To monitor the need for and access to post-abortion care; proxy for prevention of complications	Number of women presenting to a health facility with abortion-related complications	HMIS/ facility records	Monthly	Age (10–14 years, 15–19 years, 20+ years); inpatient or outpatient		Aligned
26	Stillbirths (%)	Stillbirth as a percentage of all births in a health facility (stillbirths/ stillbirths plus live births)	To monitor the proportion of births that are stillbirths; proxy for quality of care at delivery or during ANC	N: Number of stillbirths in the health facility D: Total number of births in the health facility	HMIS/ facility records	Monthly	Fresh or macerated		
27	Low- birth weight (<2500 g) among newborns (number/%) *(7)*	Number and percentage of live births that weigh less than 2500 g	To monitor the prevalence of low-birth weight; proxy for maternal nutrition and premature birth	N: Number of live-born neonates who weigh less than 2500 g at birth D: Number of live births with a birth weight recorded[10]	HMIS/ facility records	Monthly	Facility, community	[10]In areas where many live-born neonates do not have a birth weight recorded, this indicator should be viewed alongside an estimate for the percentage of live-born neonates with a birth weight.	Aligned

	Indicator name	Definition	Purpose	Computation (numerator [N]/ denominator [D])	Data source(s)[a]	Recommended frequency[b]	Suggested disaggregation[c]	Notes	Alignment with *Maintaining essential health services: operational guidance for the COVID-19 context (2)*
28	Maternal deaths (number)	Number of deaths of woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from unintentional or incidental causes *(8)*	To monitor deaths among pregnant women and new mothers; proxy for indirect effects of health pandemic/ emergency due to reduced availability and access to high-quality comprehensive maternal health services	Number of women who die in a health facility or in the community either while pregnant or within the first 42 days of the end of pregnancy	HMIS/ facility records/ CHIS	Monthly	Reporting location (health facility or CHWs); facility type; age (10–14 years, 15–19 years, 20–34 years, 35+ years)		
29	Suspected measles cases identified (number) and confirmed cases (number)	Number of children classified with measles in either a health facility or the community	To monitor measles surveillance and measles incidence; indicator of potential disruptions in surveillance and on disease occurrence	Number of suspected measles cases identified and number of confirmed cases	HMIS/SMS poll	Weekly	Point of identification (health facility or CHWs)	Cases identified in the community and sent to a health facility should be identified only once. This indicator might be reported separately by number of identified cases and number of confirmed cases.	
				Additional indicators					
30	Violence against women and children reported to health facility (number)	Number of cases of violence against women and children reported at a health facility	To monitor rates of violence against women and children	Number of cases of violence against women and children reported at a health facility	HMIS/ facility records	Monthly	Age (<15 years; ≥15 years); sex (<15 years); type of violence reported (sexual, physical); type of perpetrator reported		Aligned
31	Maternal and infant consultations by CHWs (number)	Number of women and infants consulted by CHWs	To monitor provision of services and consultations in the community by CHWs; proxy for adjusted service models	Number of women and infants consulted by CHWs	CHIS	Monthly			
32	Home-based deliveries (number)	Number of deliveries outside of a health facility	To monitor potential shifts in delivery location between a health facility and the community	Number of deliveries that take place at home, in transit, or in another non-health facility location	HMIS/CHIS service delivery records or rapid facility assessment	Monthly	Age (10–14 years, 15–19 years, 20+ years)		
33	Coverage of KMC for low-birth-weight newborns (%)	Percentage of newborns initiated on KMC in a health facility (or admitted to a KMC unit if a separate unit exists)	To monitor initiation of facility-based quality of care for low-birth-weight newborns; proxy for quality of care for newborns	N: Number of newborns initiated on KMC in a health facility (or admitted to a KMC unit if a separate unit exists) D: Number of live births in a health facility	HMIS/ facility records or rapid facility assessment	Monthly	Birth weight (<2000 g; ≥2000 g)		Aligned

ACT: artemisinin-based combination therapy; ANC: antenatal care; CHIS: community health information systems; DTP3: diphtheria–tetanus–polio; HMIS: health management information systems; KMC: kangaroo mother care; LMIS: logistics management information systems; MCV1: first dose of measles-containing vaccine; ORS: oral rehydration salts; PNC: postnatal care; RMNCAH+N: reproductive, maternal, newborn, child and adolescent health, including immunization and nutrition.

a. Data source: HMIS – service delivery registers refers to all registers for service provision, regardless of point of service. These may be facility registers, community registers, logbooks, or delivery, ANC or immunization registers that designate a particular clinic or service.

b. All indicators should use the same reporting period for both numerators and denominators.

c. All disaggregations are suggestions for consideration, based on what is feasible in the country reporting system.

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World Health Organization
Avenue Appia 20
1211 Geneva 27
Switzerland

WHO in Emergencies:
www.who.int/emergencies/en