

# Analysis and use of health facility data

## Guidance for maternal, newborn, child and adolescent health programme managers



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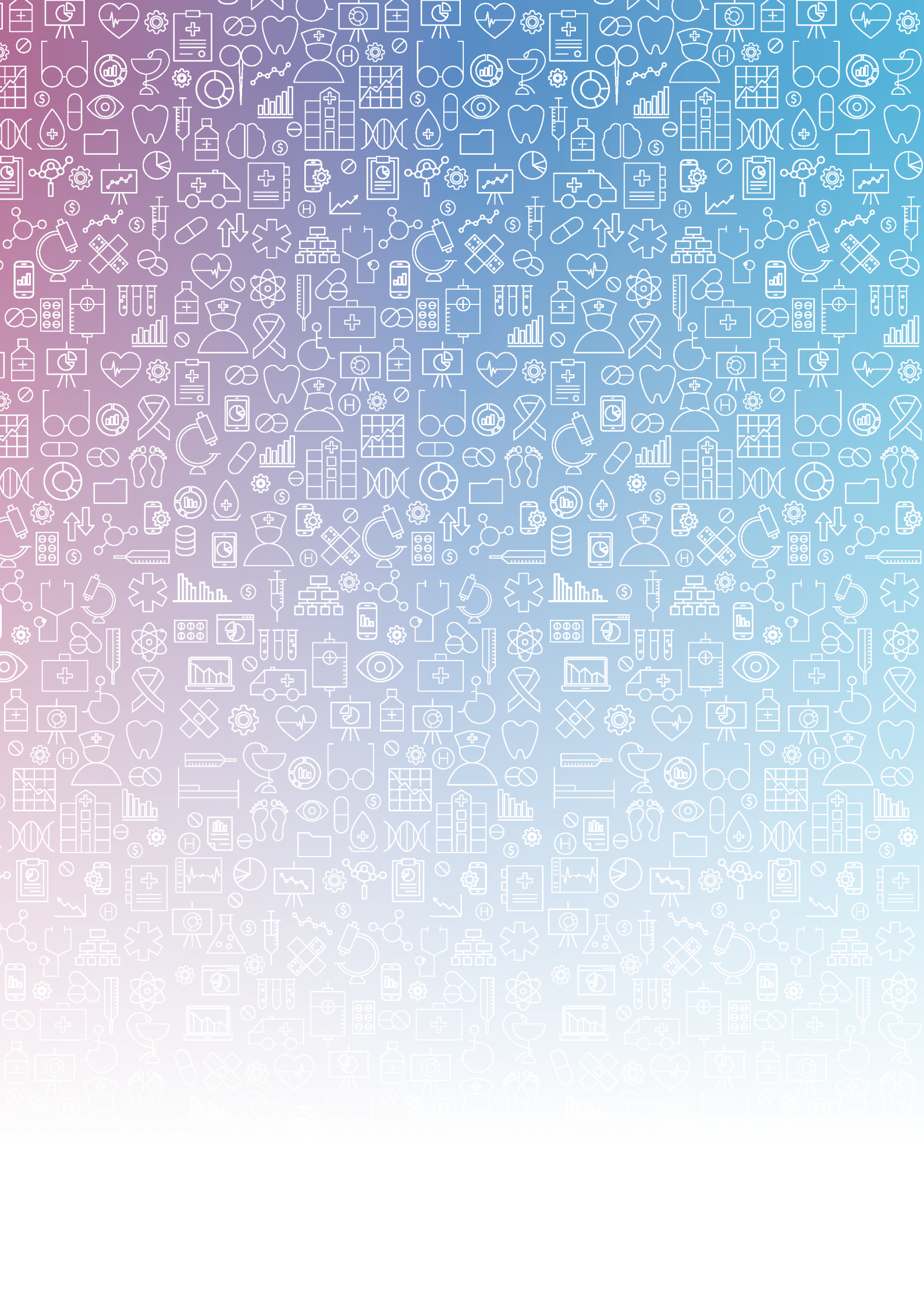
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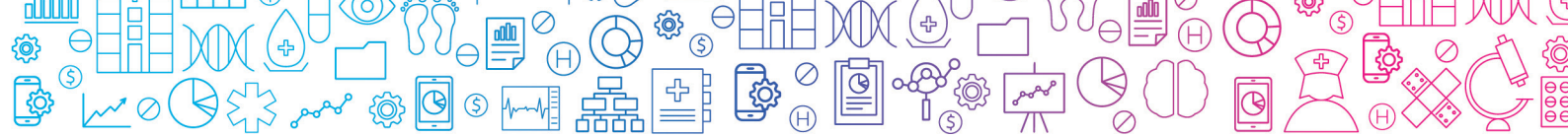
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# Contents

Acknowledgements.....	v
List of abbreviations .....	vi
Analysis and use of health facility data: guidance for maternal, newborn, child and adolescent health (MNCAH) programme managers .....	vii
1. About the data.....	1
Use of health facility data .....	2
Definitions of terms used in this document.....	3
Guiding principles of this document .....	4
2. Data quality .....	6
3. MNCAH facility indicator catalogue.....	8
Minimum set of MNCAH indicators for routine programme monitoring.....	15
4. Analysis of MNCAH facility indicators .....	17
Maternal and newborn health.....	17
Monitoring during the antenatal, childbirth and postnatal periods .....	18
Monitoring outcomes and facility-based maternal and newborn deaths and stillbirths ....	22
Contacts with health facilities across age groups.....	23
Child and adolescent health .....	26
Monitoring specific health interventions during childhood and adolescence.....	26
Monitoring outcomes and facility-based deaths during childhood and adolescence.....	28
5. Opportunities and challenges of facility-based data .....	31
References .....	32
Annex 1. Additional resources.....	35
Annex 2. Additional indicators.....	36
Annex 3. Data quality considerations for use of routine MNCAH facility data ..	41





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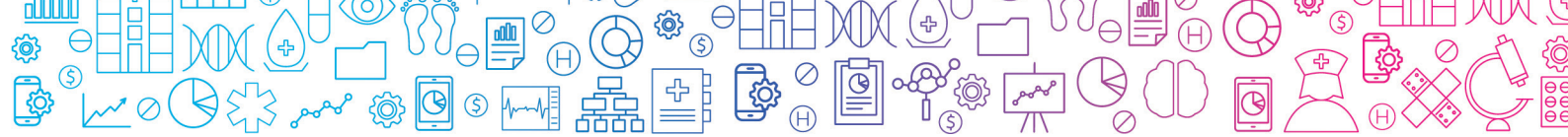
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# List of abbreviations

ACT	Artemisinin-based combination therapy
ANC	Antenatal care
ARI	Acute respiratory infection
ART	Antiretroviral therapy
CRVS	Civil registration and vital statistics
DHIS2	District Health Information System 2
DQA	Data Quality Assurance
DTP	Diphtheria–tetanus–pertussis
HMIS	Health management information system
HPV	Human papillomavirus
ICD	International classification of diseases
IPTp	Intermittent preventive treatment of malaria during pregnancy
MNCAH	Maternal, newborn, child and adolescent health
MPDSR	Maternal and perinatal death surveillance and response
MUAC	Mid-upper arm circumference
PNC	Postnatal care
PSBI	Possible serious bacterial infection
RHIS	Routine health information system
SD	Standard deviation
TTCV	Tetanus toxoid containing vaccine
WHO	World Health Organization





# Analysis and use of health facility data: guidance for maternal, newborn, child and adolescent health (MNCAH) programme managers

## Objectives

This guidance describes a catalogue of indicators for maternal, newborn, child and adolescent health (MNCAH) that can be reported through routine health information systems (RHIS). It includes possible analyses and visualizations of the indicators; references on how to assess the quality of the data; and considerations for using the data for decision-making. It is a module of the World Health Organization (WHO) [Toolkit for Routine Health Information Systems Data](#) (1). The objectives of this guidance are to assist MNCAH programme managers to:

- describe the core set of RHIS indicators for routine monitoring of MNCAH programmes;
- conduct basic analyses and data visualizations of these indicators to help monitor MNCAH programmes; and
- interpret the indicator values and their implications for MNCAH programme management.

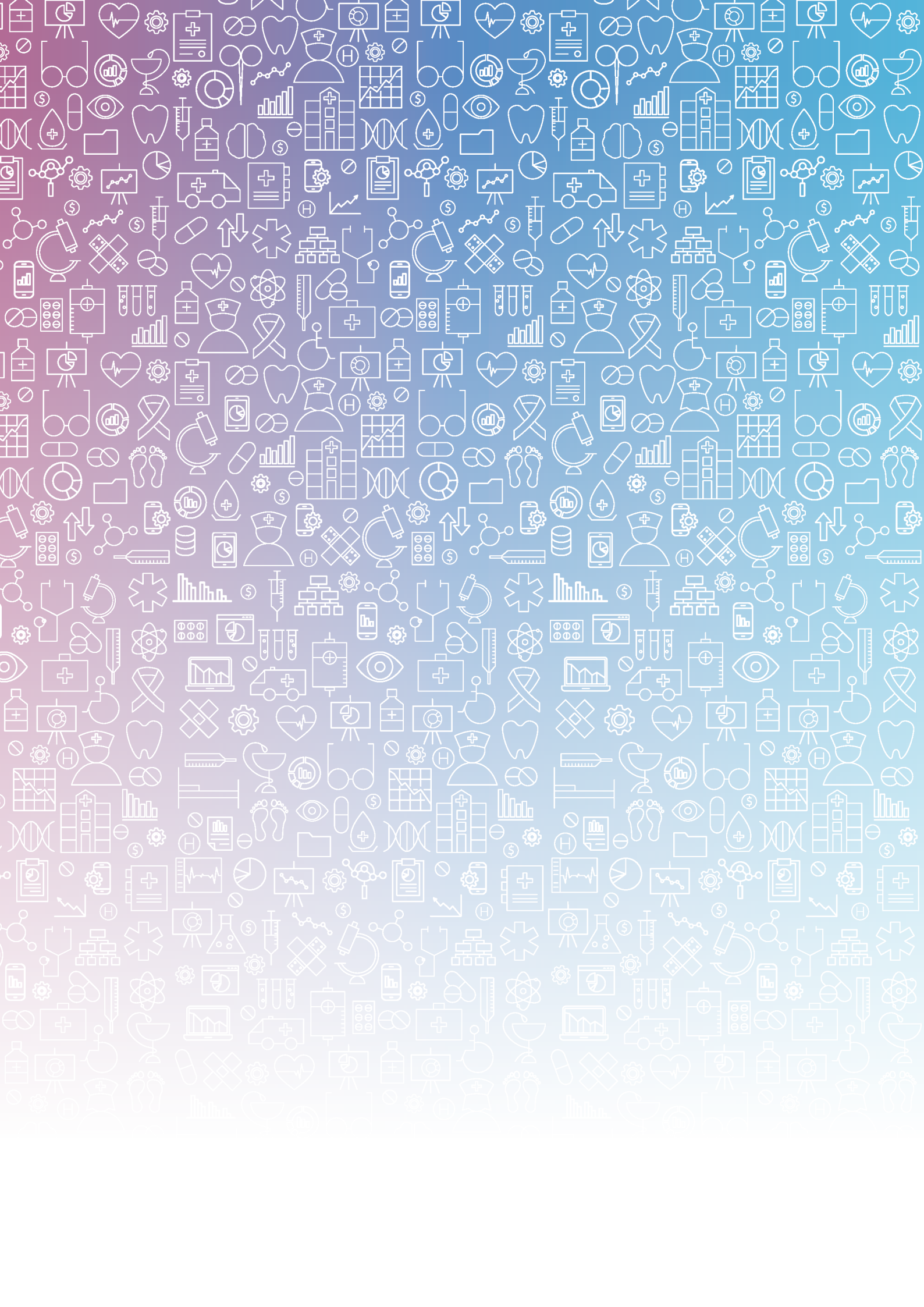
## Audience

This module is relevant for a range of stakeholders including:

- ministry of health staff working on MNCAH programme(s), monitoring, and evaluation activities, and the RHIS at national and subnational levels;
- staff of partner organizations involved with supporting MNCAH programme(s), monitoring, and evaluation, and/or health system strengthening; and
- consultants and staff working at research institutes involved with the analysis of MNCAH data and/or efforts to improve the quality of routine MNCAH data.

## Note on the document

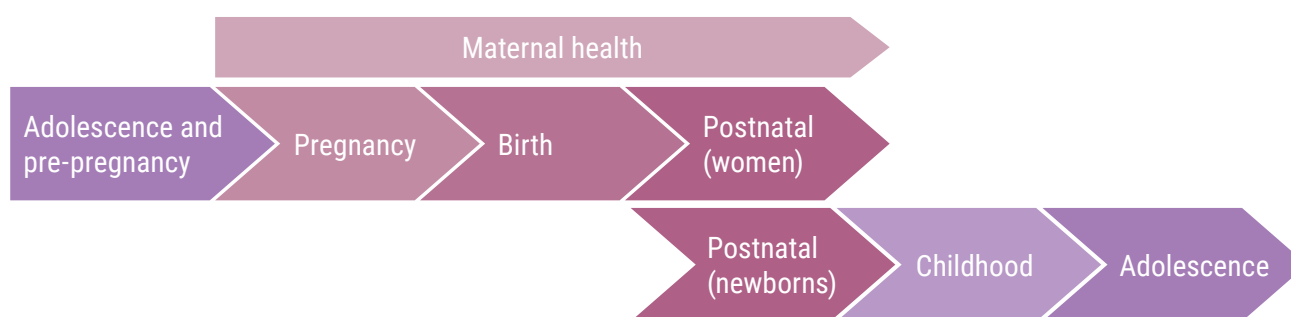
A draft working version of this document was circulated in October 2019, covering reproductive, maternal, newborn, child and adolescent health (2). This publication focuses on MNCAH and includes new recommended indicators across the MNCAH continuum of care. A similar document providing in-depth guidance on analysis of sexual and reproductive health data will be developed. This document will be reviewed periodically to ensure that it remains aligned with the most recent WHO guidelines and evidence.



# 1. About the data

Health service delivery for MNCAH follows a continuum of care from pre-pregnancy, pregnancy, and birth to the immediate postnatal period for women and newborns, through to childhood and adolescence (Fig. 1). The continuum of care approach recognizes that providing preventive, promotive, and treatment interventions throughout the life course is the most effective way to reduce preventable mortality and improve health outcomes for women, newborns, children, and adolescents. Within the scope of the continuum of care are interventions for normal and complicated pregnancies, and for well and sick newborns, children, and adolescents.

**Fig. 1. Continuum of care for MNCAH**



*Source: adapted from Partnership for Maternal, Newborn, and Child Health; 2006 (3).*

In September 2015, the Global strategy for women’s, children’s and adolescents’ health 2016–2030 was launched to stimulate action and accountability (4). The strategy includes a list of “survive, thrive, and transform” targets and a core set of indicators to track progress. These indicators align with those of the Sustainable Development Goals Framework (5).

The Indicator and monitoring framework for the global strategy for women’s, children’s and adolescents’ health (2016–2030) recognizes routine health facility data as an important source of information on the readiness of a facility to provide key MNCAH services (e.g. the availability of so-called inputs such as essential medicines and devices and human resources), utilization of services, and proxy measures for quality of care (6). However, in many settings, availability and quality of facility-based data still need considerable improvement.

An advantage of using routine data is that they are regularly available for programme monitoring and may provide a more granular level of information to better understand the performance of health programmes. However, there are limitations to routine health facility data, such as representativeness and quality concerns. For example, health facility data capture information on individuals that access care at the facility; they do not necessarily capture everyone who needs specific services in the catchment area and so are generally not representative of the population. Also, not all data captured in health facilities are recorded in the health management information system (HMIS). Other health service data, such as human resources or commodity stock levels, may be reported in separate systems with limited interoperability with the HMIS. Improving interoperability of different systems is an important goal that countries should consider. In countries where data are aggregated at higher levels of the health system prior to being entered into an electronic platform, the resulting loss of detail hinders understanding of health system performance and equity.



Data collected through household surveys and health facility assessments, such as behaviour, knowledge and attitudes, and socioeconomic variables are not typically integrated into the HMIS. Nevertheless, household survey data serve as an important source for estimating population-level intervention coverage. Integration of survey and routine data could provide additional benefits for data analysis and triangulation, validation of coverage and denominator estimates, and more. Similarly, there is growing interest in collecting and integrating community level data into the formal HMIS. Such efforts would help provide a more comprehensive assessment of the performance of the health system at all levels.

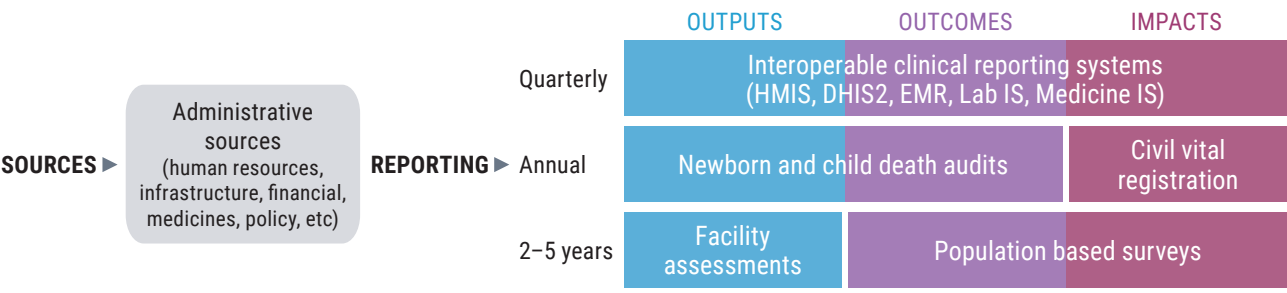
Programme managers need to be aware of these advantages and disadvantages when using health facility data to guide programming or adapting/changing action plans during implementation.

## Use of health facility data

Each country has a unique process and system for collecting data from health facilities and reporting on health service delivery indicators. Information can be recorded in paper-based registers (and/or individual case notes), electronic systems (aggregate or individual level), or a mix of both. Data can be collected, collated, and reported at all levels of the health system. Starting with the community and lowest level facilities, data may be aggregated and shared with the next geographical or administrative unit of the country, and then eventually aggregated up to the national level. In some settings, data may be entered directly into subnational or national (electronic) data systems. Data users and programme managers at each level of aggregation should assess data quality and trends. Feedback on indicator performance and data quality should also be provided to lower levels as data are aggregated.

Fig. 2 presents an example of how data from multiple sources can be triangulated and used for decision-making at each level. In this example, at district level, district and health facility managers may review data on a more routine basis (e.g. monthly, quarterly) than at national or regional levels (e.g. on an annual or semi-annual basis). If feasible, more frequent review of data is encouraged to monitor service utilization regularly and to help improve data quality.

**Fig. 2. Frequency of data sources and levels of data use**

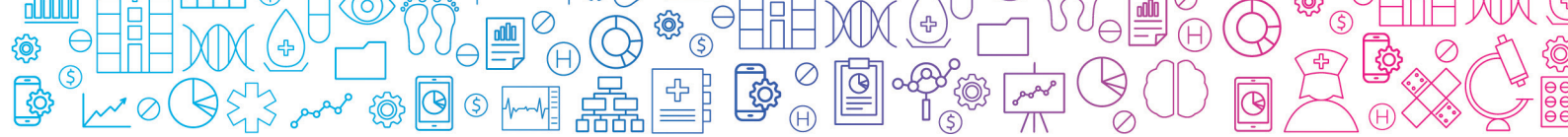


Compile, analyse, report, and disseminate results for review and action:

<b>REVIEW and ACT</b> Review data at all levels and various time periods to support managerial decisions and actions	<b>National:</b> annual review of data with MOH national steering committee (all indicators and data sources)
	<b>Regional:</b> semiannual review with regional and district health management teams
	<b>District:</b> quarterly review with district and health facility management including community participation

DHIS2: District Health Information System 2; EMR: electronic medical record; HMIS: health management information systems; Lab IS: laboratory information system; Medicine IS: medicine information system.

Source : Adapted from Diaz T et al, 2018 (7).



## Definitions of terms used in this document

**Health facility** – refers to any facility at which health services are provided, including but not limited to health posts, clinics, health centres, hospitals and other health service points (public/private/community based).

**Antenatal care (ANC) contact** – The 2016 WHO ANC model uses the term “contact” rather than “visit”, “as it implies an active connection between a pregnant woman and a health-care provider” (8). The WHO model “recommends a minimum of eight ANC contacts, with the first contact scheduled to take place in the first trimester (up to 12 weeks of gestation)” (8). The first ANC contact by a pregnant woman seeking pregnancy-related care in a health facility can be used as a proxy denominator for number of pregnant women accessing health facilities when the estimated number of pregnancies in the total population is not available.

**Delivery in facility** – refers to childbirth that has taken place in a health facility (9). To reduce maternal and newborn mortality, it is recommended that all births take place in health facilities in which obstetric complications can be managed when they arise. In this document, deliveries refer to number of women who give birth in the health facility and not the number of babies/ births (live and stillbirths).

**Live birth** – is the outcome of a pregnancy, irrespective of the duration/gestation, where the newborn breathes or shows any other evidence of life – e.g. beating of the heart, pulsation of the umbilical cord or definite movement of voluntary muscles – whether or not the umbilical cord has been cut or the placenta is attached.<sup>1</sup>

**Stillbirth** – is the outcome of a pregnancy that, is defined as an infant born with no signs of life, at 22 or more completed weeks of gestation. If information on gestational age is unavailable, a birthweight  $\geq 500$  g is used; or if missing, body length  $\geq 25$  cm.<sup>2</sup> An **early stillbirth** is a stillbirth of 22 to 27 completed weeks of gestation and a **late stillbirth** is a stillbirth of 28 or more completed weeks of gestation.

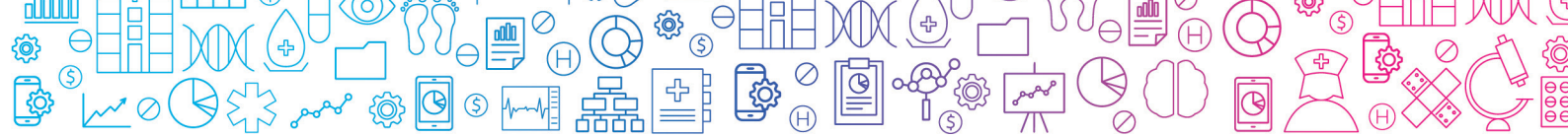
An **antepartum fetal death** (proxy measure: macerated stillbirth) refers to the intrauterine death of a fetus after the 28th week of gestation and before the onset of labour. An **intrapartum fetal death** (proxy measure: fresh stillbirth), refers to a baby that has died after the onset of labour and before birth. Maceration describes the degenerative changes that occur in stillbirths retained in the uterus after death, and the earliest signs are in the form of discolouration and peeling of the skin, leaving regions of raw tissue (11). Fresh stillbirths do not show any signs of maceration. Fresh or macerated skin appearance is often used to estimate intrapartum or antepartum stillbirths respectively, although these may not be accurate proxy measures.

1. The *International classification of diseases 11th revision (ICD-11)* defines live birth as “complete expulsion or extraction from a woman of a fetus, irrespective of the duration of the pregnancy, which, after such separation, shows signs of life” (10).
2. ICD-11 currently defines stillbirth as “the complete expulsion or extraction from a woman of a fetus, following its death prior to the complete expulsion or extraction, at 22 or more completed weeks of gestation. Stillbirths are distinct from cases of induced abortion. When information on gestational age is unavailable use birthweight less than 500 grams as the criteria”.



## Guiding principles of this document

- **Indicators are applicable to women, newborns, children, and adolescents seeking care in health facilities:** Indicators in this document are applicable to women, newborns, children, and adolescents who seek and/or receive care at a health facility.
- **Indicators measure evidence-based practices and interventions:** Indicators in this document are adapted from evidence-based guidelines and recommendations.
- **Indicators are relevant across all levels of the health system:** Indicators in this document are relevant for all levels of the health system, from the lowest level health facility to subnational (i.e. second administrative level), national, and global levels.
- **Indicators are based on aggregated facility-based data:** This document focuses on aggregate data rather than individual patient-based longitudinal data.
- **Denominators recommended for the indicators tend to be facility-based:** This document focuses primarily on information collected from health facilities; however, for some indicators it is also possible to calculate values that are more representative of the general population. As such, the default denominators provided for most indicators in this document are facility-based denominators, but population-based denominators have also been suggested where relevant. See Box 1 for considerations when using population-based denominators.
- **Relevance and reporting feasibility of indicators should be considered over time:** Some indicators in this document may not be relevant in all settings nor feasible for routine reporting through current health information system configurations. However, they serve to monitor utilization or provision of facility-based services for women, newborns, children and adolescents, including key interventions recommended for these populations through WHO guidelines, thus should be considered for future updates of data collection and reporting tools and/or information systems.
- **Disaggregations of indicators are recommended:** Within the list of indicators are recommended disaggregations (e.g. by age, sex, etc.), which may not be currently feasible for all settings depending on whether data collection tools, registers and social/political context allow for indicators to be reported or calculated this way. If it is not currently possible to disaggregate the indicators as recommended, these suggestions can help to guide future revision of data collection tools and systems (e.g. registers and electronic health management information systems).



### Box 1. Considerations for using population-based denominators

When using estimated population-based denominators, the following considerations should be noted.

- Determining the adequacy of population data used as a denominator for calculating health indicators should include evaluation of:
  - consistency of population projections,
  - consistency between related denominators, and
  - consistency of population trends.
- Use of population-based denominators should be limited to administrative areas with adequate corresponding population. Thus population-based indicators are not recommended at the health facility level as target population estimates are rarely accurate at this level. Note also that health facilities and their catchment areas often differ from administrative divisions.
- When using population-based denominators, reporting from health facilities that serve the target denominator population must:
  - have very high reporting rates (for example, the WHO Data quality assurance. Module 1: framework and metrics uses 90% as a benchmark for reporting completeness (12), and
  - reflect all facilities serving that population.
- The quality of the data reported must be high and consistent over time.



## 2. Data quality

High-quality data are complete, timely, and accurate. Many technical, organizational, and behavioural factors affect data quality. These include using the appropriate tools for collecting and reporting data, having adequately trained staff for data entry and compilation, and the ability of the person tasked with analysis to understand and interpret the analysed data. As for all data sources, in addition to establishing systems and protocols to enhance good data collection and reporting for health facility data as described in this document, any analysis must consider whether the results are affected by data quality issues.

WHO has developed a [Data Quality Assurance toolkit](#) to support both desk reviews and field investigations of data quality (13).

The toolkit includes an Excel-based tool which,<sup>3</sup> when populated with key data from health facilities and other sources, enables analysis of the completeness, internal consistency and external consistency of the data.<sup>4</sup> For countries using the District Health Information Software 2 (DHIS2) platform to manage their routine data, WHO has also developed an application that can be installed in the national DHIS2 platform. The [WHO Data Quality Tool for DHIS2](#) automatically generates findings from a data desk review at either national or subnational level (15).

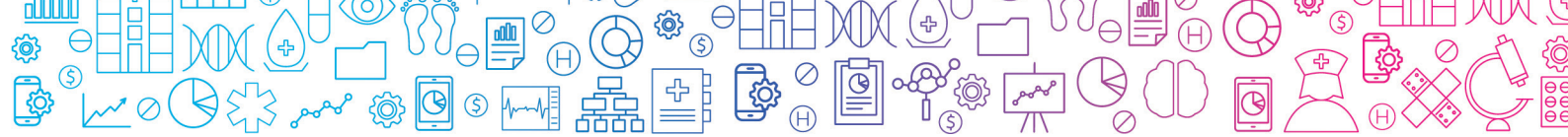
The WHO Data Quality Assurance toolkit outlines four dimensions of data quality for a desk review, which are presented in Table 1. Beyond discrete, in-depth desk reviews, monitoring, reviewing, and addressing data quality should be a continuous activity. These principles are discussed in more detail through an MNCAH lens in Annex 3.

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3. The Excel-based tool is available at: <https://www.measureevaluation.org/our-work/data-quality/data-quality-review-tool/view.html>, accessed 26 July 2023.

4. Instructions on using the Excel-based tool are in Session 9 of Module 2 of the online toolkit (14).





**Table 1. Dimensions of data quality**

DIMENSION	DEFINITION	DATA QUALITY METRICS
<b>Completeness and timeliness</b>	“The completeness of the data is assessed by measuring whether all the entities that are supposed to report actually do so. This applies to health-facility reporting to districts and to district reporting to the regional or provincial levels. Timeliness of data is assessed by measuring whether the entities which submitted reports did so before a predefined deadline” (12).	Completeness and timeliness of district reporting
		Completeness and timeliness of facility reporting
		Completeness of indicator data (data element)
		Consistency of reporting completeness
<b>Internal consistency of reported data</b>	“Internal consistency of the data relates to the coherence of the data being evaluated. Internal consistency metrics examine: 1) coherence between the same data items at different points in time; 2) coherence between related data items; and 3) comparison of data in source documents and in aggregated reports” (12).	Presence of outliers
		Consistency over time
		Consistency between indicators
		Consistency of reported data and original records
<b>External comparison/cross-checks (with other data sources)</b>	External comparison refers to the assessment of the “level of agreement between two sources of data measuring the same health indicator” (12).	Consistency between routine data from the HMIS and data from population-based surveys (or other alternative data sources)
<b>Consistency of population data</b>	Consistency of population data “involves determining the adequacy of the population data used in evaluating the performance of health indicators” (12).	Consistency of population trends and comparison of related population estimates (i.e. between the population data used for calculating health service coverage and other sources of population estimates)

HMIS: health management information system.

**Box 2. Facility reporting completeness indicator for routine monitoring**

In addition to intervention and/or outcome indicators reported through RHIS systems, it is important to routinely track reporting completeness of the HMIS and/or per indicator/area where feasible.

**Indicator: Completeness of facility reporting**

- Definition: Proportion of expected facility reports that are actually received
- Numerator: Number of reports received
- Denominator: Total number of expected reports
- Disaggregation by subnational area and/or facility is recommended to assist in investigating reporting completeness on a routine basis.

Disaggregations of reporting completeness by reporting form/facility type/health programme area (as configured and/or relevant to the national RHIS processes and tools) is recommended where feasible.



### 3. MNCAH facility indicator catalogue

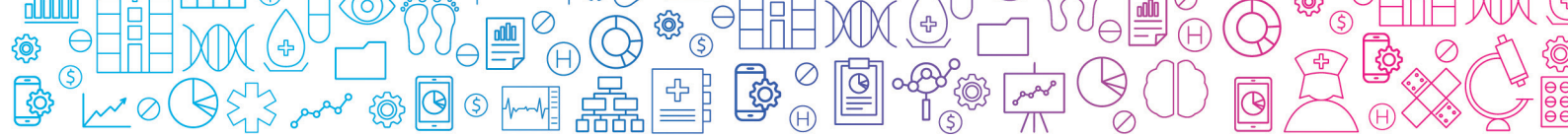
This section presents a **catalogue** of MNCAH indicators that are recommended for routine collection, aggregation, and reporting through RHIS. These indicators serve to monitor utilization or provision of facility-based services for pregnant women, newborns, children, and adolescents and also morbidity and facility-based mortality. The indicators are aligned with other monitoring frameworks for MNCAH. The indicators in Table 2 are organized by three categories: contacts with health facilities across MNCAH, content of care (i.e. specific, recommended interventions across MNCAH), and facility-based MNCAH deaths and stillbirths.

As the full catalogue of indicators listed in Table 2 may not be feasible or relevant for reporting in all settings, a minimum set of key MNCAH indicators, from this larger catalogue, is presented later in this document to support routine programme monitoring (Table 3).

While the indicator list was developed in accordance with the [Guiding principles of this document](#), focusing on aggregate facility data for numerators and facility-based denominators, some indicators can be calculated using estimated population-based denominators (e.g. estimated number of pregnant women), if such data are available to be linked. For a few indicators in Table 2, two denominators may be proposed as, in some settings or systems, certain indicators may be calculated using either a facility-based denominator or an estimated population-based denominator. See [Box 1](#) for considerations for using population-based denominators.

Indicators in Table 2 that are shaded in light blue have been taken from corresponding programmatic guidance documents (e.g. immunization, HIV, malaria) of the WHO [Toolkit for Routine Health Information Systems Data](#), using the numerators and denominators recommended in those modules. Any deviations from the indicators in the original guidance (i.e. recommended age disaggregations) are noted.

While not explicitly noted in the recommended disaggregation column in Table 2, analysis of these indicators at subnational level (e.g. by district, state, etc.) or by other equity markers is encouraged for all indicators.



**Table 2. MNCAH indicator catalogue – definitions, computation, and recommended disaggregation(s)**

INDICATOR	DEFINITION	COMPUTATION (e.g. numerator [N]/denominator [D])	RECOMMENDED DISAGGREGATION(S)
<b>MNCAH contacts in health facilities</b>			
<b>Monitoring contacts with the health facility across MNCAH</b>			
<b>ANC contact(s) in a facility</b>	Number or proportion of pregnant women with an ANC contact in a facility	N: Number of pregnant women with an ANC contact in a facility D: Estimated number of pregnant women	<ul style="list-style-type: none"> <li>• First contact (ANC1), at least four contacts (ANC4+), at least eight contacts (ANC8+)</li> <li>• Among adolescents (10–14, 15–19 years)               <ul style="list-style-type: none"> <li>– <i>Where feasible:</i> by 5-year age groups for all relevant ages (e.g. 10–14, 15–19, 20–24, 25–29, 30–34 years, etc.)</li> </ul> </li> </ul>
<b>Antenatal client first contact in first trimester</b>	Proportion of antenatal clients with first ANC contact in a facility in the first trimester (up to 12 weeks of gestation)	N: Number of antenatal clients first visit in the first trimester D: Number of antenatal clients first visit	
<b>Facility births</b>	Number or proportion of women who gave birth in a health facility	N: Number of deliveries in facility D: Estimated number of live births	<ul style="list-style-type: none"> <li>• Among adolescents (10–14, 15–19 years)               <ul style="list-style-type: none"> <li>– <i>Where feasible:</i> by 5-year age groups for all relevant ages (e.g. 10–14, 15–19, 20–24, 25–29, 30–34 years, etc.)</li> </ul> </li> </ul>
<b>Postnatal care for women</b>	Proportion of women receiving postnatal care (PNC) in a facility within a specified time period <sup>a</sup> after delivery	N: Number of women who received PNC in a facility within a specified time period after delivery D: Number of deliveries in facility	<ul style="list-style-type: none"> <li>• Timing of PNC in accordance with national policy</li> </ul>
<b>PNC for newborns</b>	Proportion of newborns receiving PNC in a facility within a specified time period <sup>a</sup> after delivery Note: timing of PNC may vary in accordance with national policy	N: Number of newborns who received PNC in a facility within a specified time period after delivery D: Number of live births in facility	<ul style="list-style-type: none"> <li>• Timing of PNC in accordance with national policy</li> </ul>

**Notes on timing of PNC for women and newborns**

<sup>a</sup> Timing of PNC may vary in accordance with national policy.

- The 2022 WHO recommendations on maternal and newborn care for a positive PNC experience recommend a minimum of four PNC contacts (16).
- The guideline also recommends that for births in health facilities, “healthy women and newborns should receive postnatal care in the facility for at least 24 hours after birth” (16).
  - For births at home, the guideline recommends that “the first postnatal contact should be as early as possible within 24 hours of birth” (16).
- For healthy women and newborns, the guideline recommends at least three additional PNC contacts: between 48 and 72 hours; between 7 and 14 days; and during week 6 after birth (16).



INDICATOR	DEFINITION	COMPUTATION (e.g. numerator [N]/denominator [D])	RECOMMENDED DISAGGREGATION(S)
<b>Outpatient attendance among newborns, children and adolescents</b>	Number or proportion of outpatient department visits per person per year, among newborns, children and adolescents, by age group <sup>b</sup>	N: Number of outpatient visits (new visits plus re-visits) in a specified age group D: Estimated total population of the specified age group	<ul style="list-style-type: none"> <li>• Age<sup>c</sup> <ul style="list-style-type: none"> <li>– Newborns (&lt;28 days)</li> <li>– Children (1 month -4 years, 5–9 years)</li> <li>– Adolescents (10–14 years, 15–19 years)</li> </ul> </li> <li>• Sex</li> <li>• New visits versus repeat visits</li> <li>• Preventive (e.g. well-child and adolescent visits) versus curative</li> </ul>
<b>Inpatient admissions among newborns, children and adolescents</b>	Number or proportion of inpatient admissions <sup>d</sup> among newborns, children and adolescents, by age group	N: Number of inpatient admissions x 100 in a specified age group D: Estimated total population of the specified age group	<ul style="list-style-type: none"> <li>• Age<sup>c</sup> <ul style="list-style-type: none"> <li>– Newborns (&lt;28 days)</li> <li>– Children (1 month – 4 years, 5–9 years)</li> <li>– Adolescents (10–14 years, 15–19 years)</li> </ul> </li> <li>• Sex</li> </ul>

#### Notes on outpatient and inpatient attendance

<sup>b</sup> Indicator adapted from WHO *Analysis and use of health facility data: core health facility indicators (17)*.

<sup>c</sup> Diaz et al, 2021 recommend the following age disaggregations relevant for newborn, child and adolescent health indicators: early neonates: 0–6 days; late neonates: 7–27 days; post-neonatal infants: 28–364 days; young children: 1–4 years; older children: 5–9 years; young adolescents: 10–14 years; older adolescents: 15–19 years (18). For the purpose of this guidance, these recommendations *should be considered where feasible* in current data collection and reporting systems. However, more commonly reported age groups are suggested in this document.

<sup>d</sup> To monitor inpatient service utilization, the hospital discharge rate may be monitored rather than inpatient admissions. If monitoring hospital discharges, this should include “authorized discharges, absconsions, transfers out and deaths; excludes discharges for delivery” (17).

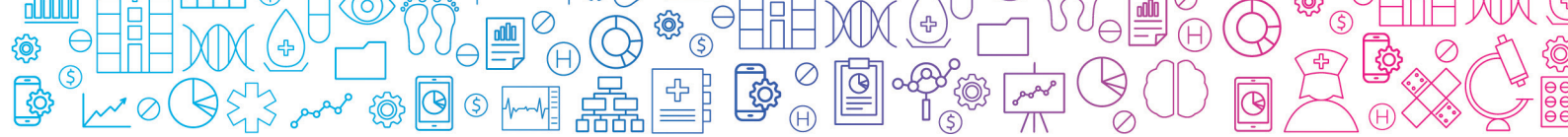
### Maternal and newborn health

#### Monitoring content of care during the antenatal, childbirth and postnatal periods for mothers and newborns

##### Key points on ANC indicators

- As the indicators in this guidance focus on aggregate level reporting, interventions that should take place more than once or at specific time points during a pregnancy may be difficult to track and have been noted below. Where available, systems that allow for tracking individual-level patient (longitudinal) data over time can help to monitor timing of interventions more accurately over a series of contacts at health facilities.
- Different denominators are used across the various ANC indicators in this table. For some indicators alternative denominators are suggested. While not listed as separate indicators here, tracking the total number of ANC visits provided within a reporting period may provide useful context for monitoring other MNCAH indicators and serve as recommended denominators for several indicators.

<b>Antenatal client syphilis screening</b>	Proportion of antenatal clients screened for syphilis <sup>e</sup>	N: Number of antenatal clients screened for syphilis D: Number of antenatal clients first visit
<b>Antenatal client haemoglobin measured</b>	Proportion of antenatal clients with haemoglobin level measured	N: Number of antenatal clients with haemoglobin level measured <sup>f</sup> D: Number of antenatal clients first visit



INDICATOR	DEFINITION	COMPUTATION (e.g. numerator [N]/denominator [D])	RECOMMENDED DISAGGREGATION(S)
<b>Antenatal client blood pressure measurement</b>	Proportion of antenatal clients with blood pressure measured <sup>g</sup>	N: Number of antenatal clients with blood pressure measured a) <u>Facility-based denominator</u> : Number of antenatal clients first visit b) <u>Population-based denominator</u> : Estimated number of pregnant women	
<b>Tetanus vaccination in antenatal client</b>	Proportion of pregnant women who received tetanus toxoid containing vaccine (TTCV) during ANC <sup>h,i</sup>	N: Number of TTCV doses administered during ANC D: Estimated number of pregnant women	
<b>Antiretroviral therapy (ART) coverage in pregnant women</b>	Proportion of HIV-positive pregnant women who received ART during pregnancy and/or at labour and delivery <sup>j</sup>	N: Number of HIV-positive pregnant women who delivered during the reporting period and received ART during pregnancy and/or at labour and delivery a) <u>Facility-based denominator</u> : Number of HIV-positive pregnant women who delivered during the reporting period and attended ANC or had a facility-based delivery b) <u>Population-based denominator</u> : Number of HIV-positive pregnant women who delivered during the reporting period	
<b>Intermittent preventive treatment of malaria during pregnancy (IPTp) coverage</b>	Proportion of pregnant women given sulfadoxine/pyrimethamine for IPTp <sup>k</sup>	N: Number of pregnant women given sulfadoxine/pyrimethamine for IPTp a) <u>Population-based denominator</u> : Estimated pregnancies in areas at risk b) <u>Facility-based denominator</u> : Number of antenatal clients first visit <sup>l</sup>	• By dose of sulfadoxine (IPTp1, IPTp2, IPTp3, IPTp4)
<b>Caesarean section</b>	Proportion of deliveries in health facilities by caesarean section <sup>m</sup>	N: Number of caesarean sections in a facility a) <u>Facility-based denominator</u> : Number of deliveries in facility b) <u>Population-based denominator</u> : Estimated number of births (live + stillbirth)	• Facility type
<b>Uterotonic for prevention of postpartum haemorrhage</b>	Proportion of women who gave birth in a facility who received a prophylactic uterotonic (e.g. oxytocin) immediately after birth for prevention of postpartum haemorrhage	N: Number of women who gave birth in a facility who received a prophylactic uterotonic immediately after birth D: Number of deliveries in a facility	



INDICATOR	DEFINITION	COMPUTATION (e.g. numerator [N]/denominator [D])	RECOMMENDED DISAGGREGATION(S)
<b>Preterm birth</b>	Proportion of births in facilities that are preterm (less than 37 weeks gestation)	N: Number of newborns born less than 37 weeks gestation D: Number of live births in facility	
<b>Low birthweight (&lt;2500 g)</b>	Proportion of live births in facilities with birthweight less than 2500 g	N: Number of newborns born alive in a facility with weight <2500 g at birth D: Number of live births in facility	• Subgroup of <2000 g
<b>Early initiation of breastfeeding</b>	Proportion of live births in facilities put to the breast within one hour of birth	N: Number of newborns born alive in a facility put to the breast within one hour of birth D: Number of live births in facility	

### Notes on monitoring content of care content of care during the antenatal, childbirth and postnatal periods for mothers and newborns

<sup>e</sup> It is recommended that “all pregnant women should be screened for syphilis at the first ANC visit in the first trimester and again in the third trimester of pregnancy” (8).

<sup>f</sup> In certain contexts, it is recommended that haemoglobin levels are measured once per trimester (8).

<sup>g</sup> As good clinical practice, blood pressure should be measured at each ANC contact (8).

<sup>h</sup> It is recommended that “if a pregnant woman has not previously been vaccinated, or if her immunization status is unknown, she should receive two doses of TTCV one month apart with the second dose given at least two weeks before delivery” (8).

<sup>i</sup> See Section C.5: Tetanus toxoid vaccination, *WHO recommendations on antenatal care for a positive pregnancy experience* (8).

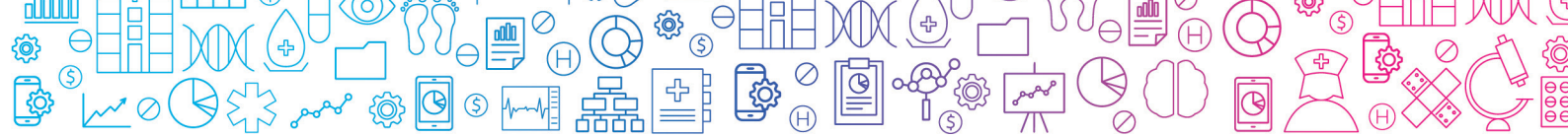
<sup>j</sup> Source of indicator and metadata: *WHO Consolidated guidelines on person-centred HIV strategic information: strengthening routine data for impact* (19).

<sup>k</sup> Source of indicator and metadata: *WHO Analysis and use of health facility data: guidance for malaria programme managers* (20).

<sup>l</sup> *Analysis and use of health facility data: guidance for malaria programme managers* notes that the first antenatal visit is sometimes used as the denominator for the IPTp indicator (20).

<sup>m</sup> “At population level, caesarean section rates higher than 10% are not associated with reductions in maternal and newborn mortality rates” (21).levels are measured once per

Child and adolescent health			
Monitoring specific interventions during childhood and adolescence			
<b>Diphtheria-tetanus-pertussis (DTP) vaccination – third dose</b>	Proportion of target population of children who have received three doses of the combined DTP vaccine <sup>n</sup>	N: Number of children receiving the third dose of the combined DTP vaccine D: Estimated number of target population	
<b>Measles vaccination</b>	Proportion of target population of children who have received the measles vaccine <sup>n</sup>	N: Number of children receiving the measles vaccine D: Estimated number of target population	• By dose of vaccine (per national schedule)
<b>Acute respiratory infection (ARI) consultations</b>	Total number of children presenting to a health facility with any sign of ARI	Number of children presenting to a health facility with any sign of ARI	• Age (0–4, 5–9 years)



INDICATOR	DEFINITION	COMPUTATION (e.g. numerator [N]/denominator [D])	RECOMMENDED DISAGGREGATION(S)
<b>Childhood pneumonia cases treated with amoxicillin</b>	Proportion of childhood cases of pneumonia given/prescribed amoxicillin in health facilities	N: Number of children with pneumonia given/prescribed amoxicillin in facilities D: Number of children with pneumonia seen in facilities	<ul style="list-style-type: none"> <li>• Age (0–4, 5–9 years)</li> <li>• Treatment type (dispersible tablet, oral syrup; non-dispersible tablet)</li> </ul>
<b>Childhood diarrhoea cases treated</b>	Proportion of childhood cases of diarrhoea given/prescribed treatment for diarrhoea in health facilities	N: Number of children who received treatment for diarrhoea in facilities D: Number of children with diarrhoea seen in facilities	<ul style="list-style-type: none"> <li>• Age (0–4, 5–9 years)</li> <li>• Treatment type (oral rehydration solution and zinc, oral rehydration solution alone, zinc alone)</li> </ul>
<b>Childhood malaria cases given artemisinin-based combination therapy (ACT)</b>	Proportion of childhood malaria cases treated with ACT <sup>o</sup>	N: Number of childhood malaria cases treated with ACT D: Number of childhood malaria cases diagnosed	<ul style="list-style-type: none"> <li>• Age (0–4, 5–9 years)<sup>p</sup></li> </ul>
<b>Notification of childhood tuberculosis cases</b>	Number of childhood tuberculosis cases notified in a specified time period, usually 1 year <sup>q</sup>	Number of childhood tuberculosis cases notified in a specified time period, usually 1 year	<ul style="list-style-type: none"> <li>• Age (0–4, 5–9 years)<sup>r</sup></li> <li>• Treatment history (new and relapse (incident cases) or previously treated, excluding relapse)</li> </ul>
<b>Growth monitoring: anthropometric status of children<sup>s</sup></b>	<p>Proportion of children measured in a facility who are underweight/overweight/obese and/or stunted and/or wasted</p> <p>Underweight: children with weight for age <math>\leq -2</math> standard deviations (SD) Z-score</p> <p>Overweight: children with weight for height <math>&gt; +2</math> SD but <math>&lt; +3</math> SD Z-score</p> <p>Obese: children with weight for height <math>&gt; +3</math> SD Z-score</p> <p>Stunted: children with height/length for age <math>&lt; -2</math> SD Z-score</p> <p>Wasted: children with weight for height between <math>-2</math> SD and <math>-3</math> SD Z-score, or mid-upper arm circumference (MUAC) <math>&lt; 125</math> mm and <math>&gt; 115</math> mm (<i>moderate wasting</i>) or weight for height <math>&lt; -3</math> SD Z-score and/or MUAC <math>&lt; 115</math> mm and/or bilateral oedema (<i>severe wasting</i>)<sup>t</sup></p>	<p>N: Number of children who are underweight/overweight/obese and/or stunted, and/or wasted who were measured in a facility</p> <p>D: Number of children seen in a facility</p>	<ul style="list-style-type: none"> <li>• By underweight, overweight, obese, stunted, wasted</li> <li>• Sex</li> </ul>
<b>Human papillomavirus (HPV) vaccination programme coverage – last dose</b>	Proportion of target population who received the last dose <sup>u</sup> of the HPV vaccine <sup>v</sup>	N: Number of last doses of HPV vaccine administered D: Estimated number of target population	<ul style="list-style-type: none"> <li>• Sex</li> </ul>



INDICATOR	DEFINITION	COMPUTATION (e.g. numerator [N]/denominator [D])	RECOMMENDED DISAGGREGATION(S)
<b>Injury hospitalisation rate among adolescents</b>	Number of hospitalised cases of specific types of injuries (e.g. road traffic injuries, fire-related burns, poisonings, falls, and drowning) among adolescents (10-19 years) per 100 000 adolescent population during a year	N: Number of hospitalised cases of a specific type of injury among adolescents (10-19 years) during a given year x 100 000  D: Estimated number of adolescents (10–19 years) during the same year	<ul style="list-style-type: none"> <li>• Age (10–14, 15–19 years)</li> <li>• Sex</li> </ul>

**Notes on monitoring specific interventions during childhood and adolescence**

<sup>n</sup> Indicator adapted from: *Analysis and use of health facility data: guidance for immunization programme managers (22)*.

<sup>o</sup> Indicator adapted from: *Analysis and use of health facility data: guidance for malaria programme managers (20)*.

<sup>p</sup> *Analysis and use of health facility data: guidance for malaria programme managers* recommends age disaggregations of <5, 5–14, and 15+ years, however the disaggregations recommended here are consistent with all recommended age disaggregations in this document.

<sup>q</sup> Indicator adapted from: *Analysis and use of health facility data: guidance for tuberculosis programme managers (23)*.

<sup>r</sup> *Analysis and use of health facility data: guidance for tuberculosis programme managers* recommends age disaggregations of <5, 5–14, and 15+ years, however the disaggregations recommended here are consistent with all recommended age disaggregations in this document.

<sup>s</sup> *Analysis and use of nutrition data from routine health information systems: guidance for nutrition programme managers* lists five separate indicators on growth monitoring of children in facilities (child underweight, child overweight, child obese, child stunted, child wasted), which are presented here under one intervention for which the data can be disaggregated per the cutoffs to produce the specific measurements. The nutrition guidance document recommends disaggregation of these data by the following age groups: 0–5 months, 6–23 months, 24–59 months (24).

<sup>t</sup> Indicator adapted from: *Analysis and use of nutrition data from routine health information systems: guidance for nutrition programme managers (24)*.

<sup>u</sup> “The primary target group in most of the countries recommending HPV vaccination is young adolescent girls, aged 9-14. For all vaccines, the vaccination schedule depends on the age of the vaccine recipient” (25).

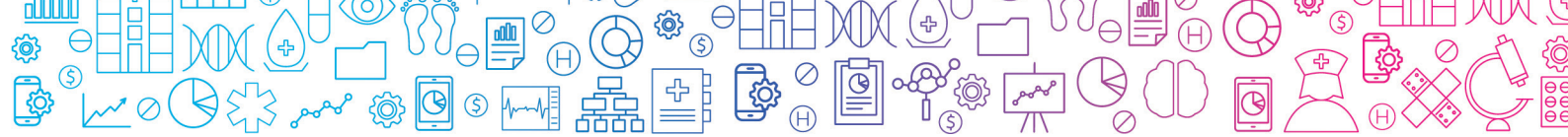
<sup>v</sup> See Reference tab of [HPV vaccination coverage](#) page of WHO Immunization dashboard (26).

**MNCAH facility-based deaths**

**Monitoring facility-based maternal, newborn child and adolescent deaths and stillbirths**

<b>Institutional maternal mortality</b>	Number or proportion of women who die in the health facility while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes. This can include women who gave birth outside a facility but who died in the health facility	Number of inpatient maternal deaths in health facilities  <i>If calculating this indicator as a proportion, the following formulation is recommended, disaggregated by age group:</i>  N: Number of inpatient maternal deaths x 100  D: Number of discharges (including deaths) among population of interest	<ul style="list-style-type: none"> <li>• Among adolescents (10–14, 15–19 years)</li> <li>– Where feasible: By 5-year age groups for all relevant ages (e.g. 10–14, 15–19, 20–24, 25–29, 30–34 years)</li> <li>• Facility type</li> <li>• By cause of death<sup>w,x</sup></li> </ul>
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INDICATOR	DEFINITION	COMPUTATION (e.g. numerator [N]/denominator [D])	RECOMMENDED DISAGGREGATION(S)
<b>Institutional stillbirths</b>	Number or proportion of babies born in a health facility with no signs of life (Baby delivered in a health facility with no signs of life and born after 28 weeks of gestation or weighing at least 1000 g)	Number of stillbirths in facility <i>If calculating this indicator as a proportion (per 100), the following formulation is recommended:</i> N: Number of stillbirths in facilities x 100 D: Total number of births in facility (live births and stillbirths)	<ul style="list-style-type: none"> <li>• Antepartum (macerated), intrapartum (fresh)<sup>y</sup></li> <li>• Facility type</li> </ul>
<b>Institutional mortality among newborns, children and adolescents</b>	Number or proportion of inpatient deaths in health facilities, by age group <sup>z</sup>	Number of inpatient deaths in health facilities, by age group <i>If calculating this indicator as a proportion, the following formulation is recommended, disaggregated by age group:</i> N: Number of inpatient deaths x 100 D: Number of discharges (including deaths) among population of interest (e.g. newborns, children of adolescents)	<ul style="list-style-type: none"> <li>• Age               <ul style="list-style-type: none"> <li>– Newborns (0–6 days, 7–28 days)</li> <li>– Children (1 month – 4 years, 5–9 years)</li> <li>– Adolescents (10–14 years, 15–19 years)</li> </ul> </li> <li>• Sex</li> <li>• Facility type</li> <li>• Cause of death<sup>aa</sup></li> </ul>

#### Notes on monitoring facility-based maternal, newborn child and adolescent deaths and stillbirths

<sup>w</sup> Accurate reporting of causes of death in aggregate RHIS may be difficult. Linkages between national civil registration and vital statistics (CRVS) and maternal and perinatal death surveillance and response (MPDSR) systems should be considered. Further information on these processes is provided in **Annex 2**.

<sup>x</sup> Classified by the *WHO Application of ICD-10 to deaths during pregnancy, childbirth, and the puerperium: ICD-Maternal Mortality (ICD-MM) (27)*.

<sup>y</sup> Fresh or macerated skin appearance is often used to estimate intrapartum or antepartum stillbirths. While these may not be accurate proxy measures, fresh and macerated may be more commonly reported in HMIS data.

<sup>z</sup> Indicator adapted from *WHO Analysis and use of health facility data: core health facility indicators (17)*.

<sup>aa</sup> Classified by ICD-10 or ICD-11 in accordance with country policy. For perinatal deaths, if a country uses an ICD version prior to ICD-11, perinatal causes of death should be aligned with the *WHO application of ICD-10 to deaths during the perinatal period: ICD-PM (28)*.

*ACT: artemisinin-based combination therapy; ANC: antenatal care; ARI: acute respiratory infection; ART: antiretroviral therapy; CRVS: civil registration and vital statistics; DTP: diphtheria–tetanus–pertussis; HPV: human papillomavirus (HPV); ICD: international classification of diseases; IPTp: intermittent preventive treatment of malaria during pregnancy; MPDSR: maternal and perinatal death surveillance and response; MUAC: mid-upper arm circumference; PNC: postnatal care; SD: standard deviation; TTCV tetanus toxoid containing vaccine.*

## Minimum set of MNCAH indicators for routine programme monitoring

From the catalogue of indicators in Table 2, a minimum subset of key, commonly available indicators has been identified to support routine programme monitoring, planning and modification across MNCAH. The minimum set of MNCAH indicators for routine programme monitoring was determined through an online consultation during March–April 2023.

A total of 147 respondents from 42 countries completed the consultation form that was disseminated by the WHO. The backgrounds of the respondents included national and subnational ministry of health personnel; UN personnel, national and subnational personnel from government agencies other than ministries of health; and a mix from donor organizations, implementing agencies, and academia.



The criteria for selection of the indicators in this minimum set were: representativity across the MNCAH continuum; actionability for MNCAH managers; and feasibility for monitoring through existing HMIS configurations. The indicators with the highest percentage of respondents ( $\geq 80\%$ ) who considered the indicator to be priority, actionable, and feasible for routine MNCAH programme monitoring are displayed in Table 3.

**Table 3. Minimum set of MNCAH indicators for routine programme monitoring<sup>a</sup>**

INDICATOR <sup>b</sup>
<b>1 Antenatal care contacts(s) in a facility</b> Proportion of pregnant women with an ANC contact in a facility, by contact (e.g. ANC1, ANC4+, ANC8+)
<b>2 ART coverage for pregnant women<sup>c</sup></b> Proportion of HIV-positive pregnant women who received ART during pregnancy and/or at labour and delivery
<b>3 Facility births</b> Proportion of women who gave birth in a health facility
<b>3 Caesarean sections</b> Proportion of deliveries in health facilities by caesarean section
<b>5 Low birthweight</b> Proportion of live births in facilities with birthweight <2500 g
<b>6 Early initiation of breastfeeding</b> Proportion of live births in facilities put to the breast within 1 hour of birth
<b>7 Postnatal care for women</b> Proportion of women receiving PNC in a facility within a specified time period after delivery
<b>8 Postnatal care for newborns</b> Proportion of newborns receiving PNC in a facility within a specified time period after delivery
<b>9 DTP vaccination – third dose</b> Proportion of target population of children who have received three doses of the combined DTP vaccine
<b>10 Growth monitoring: anthropometric status of children</b> Proportion of children measured in a facility who are underweight/overweight/obese and/or stunted and/or wasted (by each anthropometric status)
<b>11 ARI consultation</b> Total number of children presenting to a health facility with any sign of ARI
<b>12 HPV vaccination programme coverage – last dose</b> Proportion of target population who received the last dose of the HPV vaccine
<b>13 Contraceptive commodity distribution<sup>d</sup></b> Number of clients who accept contraceptives in facilities
<b>14 Institutional MNCAH mortality and stillbirths</b> Institutional maternal, newborn, child and adolescent mortality and stillbirths (by population group)
<b>15 Completeness of facility reporting<sup>e</sup></b> Proportion of expected facility reports that are actually received

ANC: antenatal care; ART: antiretroviral therapy; DTP: diphtheria–tetanus–pertussis; ARI: acute respiratory infection; HPV: human papillomavirus; MNCAH: maternal, newborn, child and adolescent health.

<sup>a</sup> Results of WHO online consultation (March–April 2023).

<sup>b</sup> Indicator names and definitions from Table 2, which includes computation details.

<sup>c</sup> Depending on the prevalence of HIV in the setting.

<sup>d</sup> Inclusion of this indicator (see Table A2.2) was not an outcome of the consultation but is recommended as a tracer indicator for family planning.

<sup>e</sup> While not included in the online consultation form, this indicator (see Box 2) is important for interpretation of trends in RHIS indicators over time.



## 4. Analysis of MNCAH facility indicators

Programme managers, analysts, policy-makers, and health care providers use routine health facility data to measure intervention coverage, monitor trends over time, and assess geographical (or facility) differences for a range of standard health indicators among pregnant women, newborns, children and adolescents attending health services. This section provides an overview of monitoring across MNCAH and examples of analyses for indicators recommended in the catalogue in Table 2.

There are a wider range of indicators and performance measures that can and should be used to ensure high-quality care for pregnant women, newborns, children and adolescents in health facilities, such as health facility or health worker density and distribution; availability of commodities and drugs in facilities; health expenditure; and population-based coverage of key interventions. However, these types of measures might be more accurately collected via health facility assessments or population-based surveys and may require interoperability with other information systems (e.g. human resources information systems, financial records, etc.) to enable use. Additionally, data and information regarding experience of care across MNCAH populations may not be available through RHIS data.

### Maternal and newborn health

#### Purpose

The antenatal, childbirth and postnatal periods are a crucial time for monitoring contacts with health facilities for women and newborns. For some women, ANC may be their first contact with the health system in many years, or ever, making ANC a platform for delivery of key health interventions. Aside from monitoring the number of ANC contacts pregnant women have in health facilities, understanding the timing of the first contact and which recommended interventions were delivered can be proxies for measuring quality of care. While it can be challenging to accurately measure certain ANC interventions using aggregated HMIS data, such as interventions that should be delivered at a specific time point or those that should be delivered at each visit, reporting on delivery of key interventions is critical for improving the outcomes of pregnancies and the health of women and newborns.

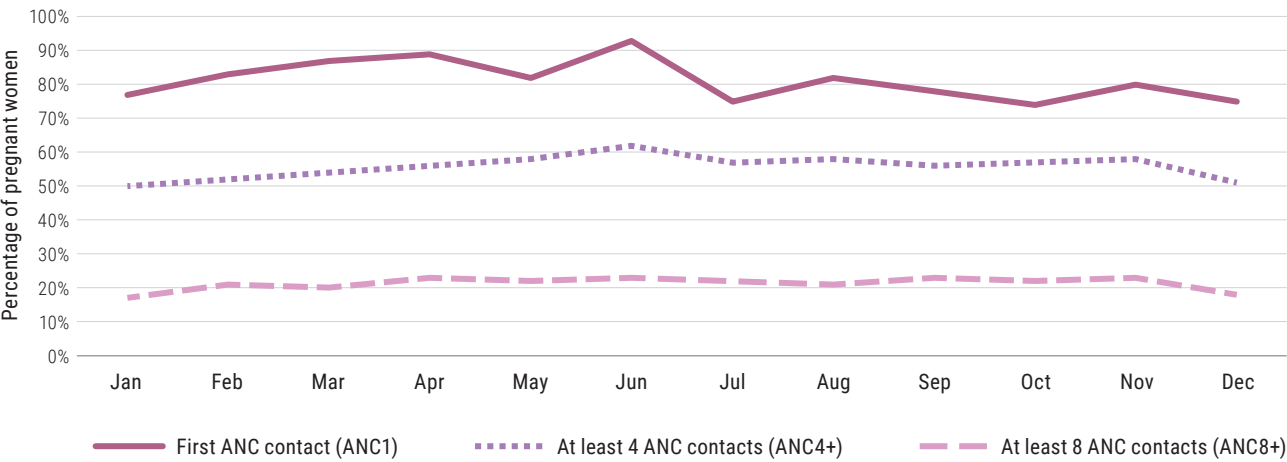


# Monitoring during the antenatal, childbirth and postnatal periods

## Analysis

Figs. 3–9 demonstrate different ways to display recommended maternal and newborn interventions over time, and in different geographical areas.

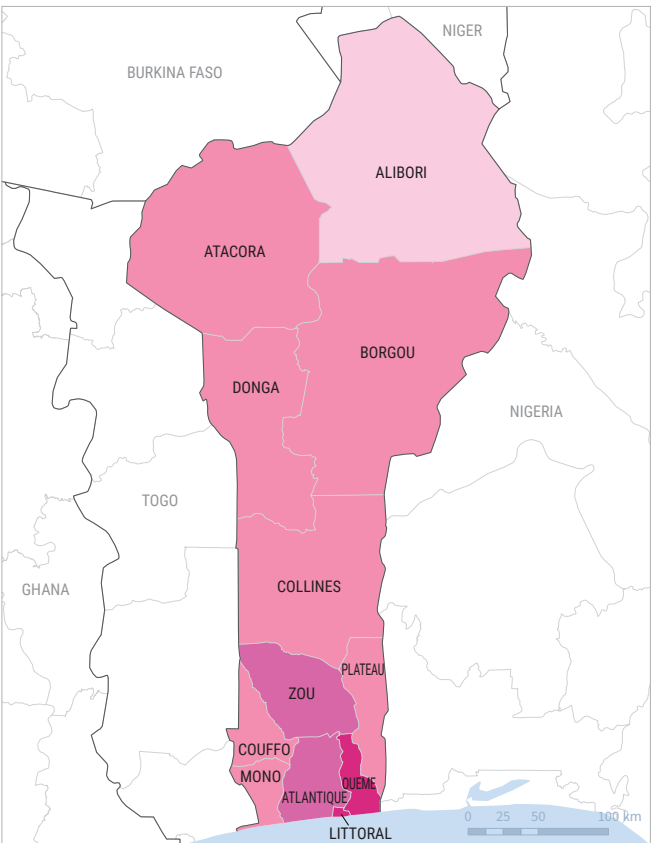
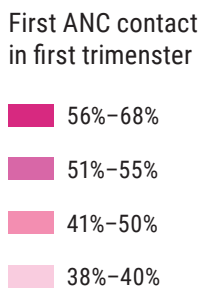
**Fig. 3. Proportion of pregnant women with ANC contact(s) in health facilities<sup>a</sup>**



ANC: antenatal care.

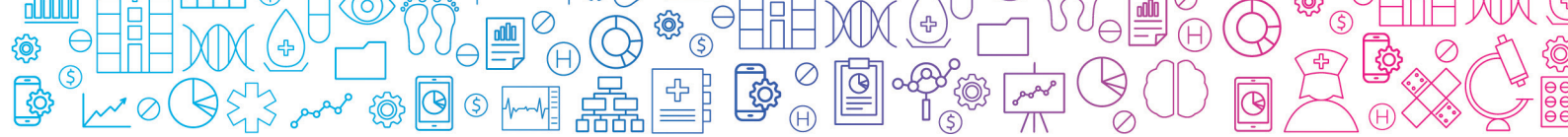
<sup>a</sup> By first, at least fourth, and at least eighth ANC contact. Monthly, 2022, Country X.

**Fig. 4. Annual proportion of antenatal clients with first ANC contact in the first trimester, by region, Benin, 2020<sup>a</sup>**

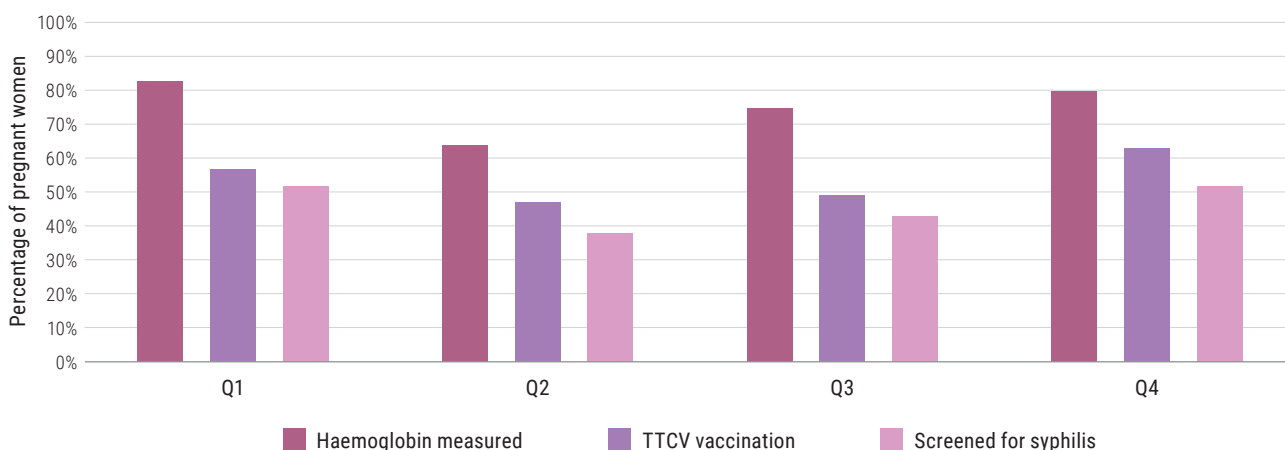


ANC: antenatal care.  
<sup>a</sup> Mock data for illustrative purposes.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of WHO concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.



**Fig. 5. Proportion of pregnant women receiving specific ANC interventions in health facilities<sup>a</sup>**



ANC: antenatal care; Q: quarter; TTCV: tetanus toxoid containing vaccine.  
<sup>a</sup> Quarterly, 2022, Country X.

## Considerations/issues for interpretation

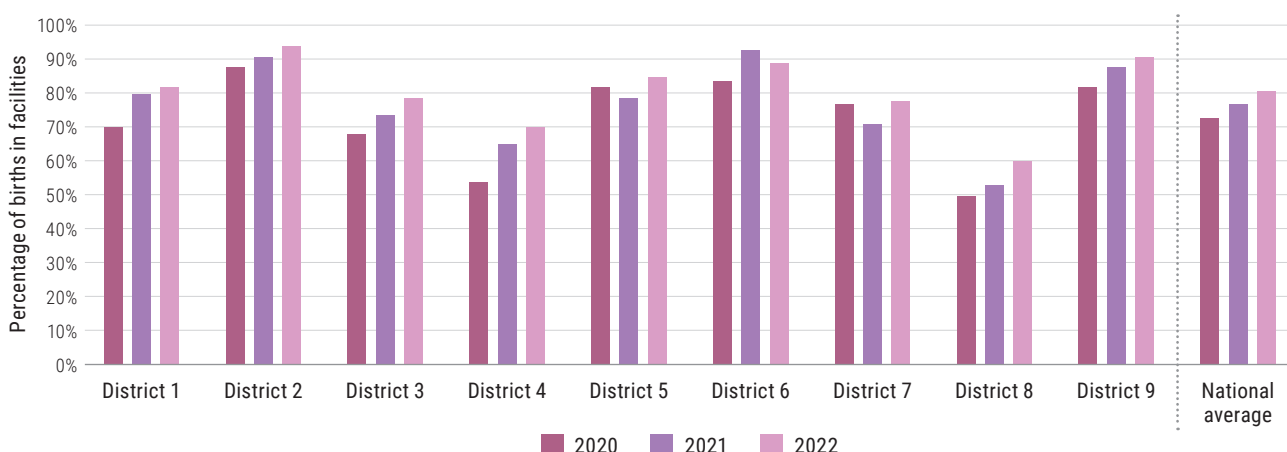
Figs. 3–5 demonstrate different ways to display core maternal and newborn interventions over time or at specific points in time across different geographical areas. Fig. 3 displays the proportion of pregnant women receiving ANC in health facilities by ANC contact each month in a given year. Such an analysis can assist programme managers in understanding whether pregnant women are receiving the recommended number of ANC contacts, in line with the national guidelines. In Fig. 3, the overall pattern shows a lower proportion of women receiving at least four or at least eight ANC contacts in facilities than those receiving their first ANC contact; the coverage of ANC4+ contacts and ANC8+ contacts are both steady over time. Reported coverage of first ANC seems to decrease from July to December, relative to January to June, which should be further investigated to understand if this is due to delayed reporting to the HMIS or represents a true decrease.

While the analysis in Fig. 3 shows a national overview, it could be replicated at the subnational and/or health facility level to help understand discrepancies across geographical areas or facilities in reported coverage of ANC. This could help in investigating the reason for the decrease in ANC1 in the latter half of the year. Visualizing data on a map, such as in Fig. 4, is another way to help MNCAH managers to quickly assess which subnational areas, or even facilities, may have poor coverage of a specific intervention or higher morbidity or mortality. However, using a map display does not allow for longitudinal analysis.

Figs. 4 and 5 display indicators related to timing and content of ANC, which can serve as proxy measures for quality care using aggregated HMIS data. Fig. 4 displays the annual average proportion of pregnant women receiving their first ANC contact in a health facility within the first trimester geographically using a map. Fig. 5 shows the national proportion of women receiving specific interventions during ANC by quarter. This analysis can assist MNCAH managers in understanding the delivery of various interventions during ANC, including whether there is a difference in reported coverage of the different interventions and whether this reported coverage changes over time. Such an analysis could be replicated at the subnational or facility level or with different periodicity. Interpretation of these data requires understanding of the delivery of specific interventions according to national clinical guidelines and with respect to the context of the setting. Further investigation of the differences in delivery of these interventions during ANC might also require data on stock levels of specific commodities or equipment required for each.

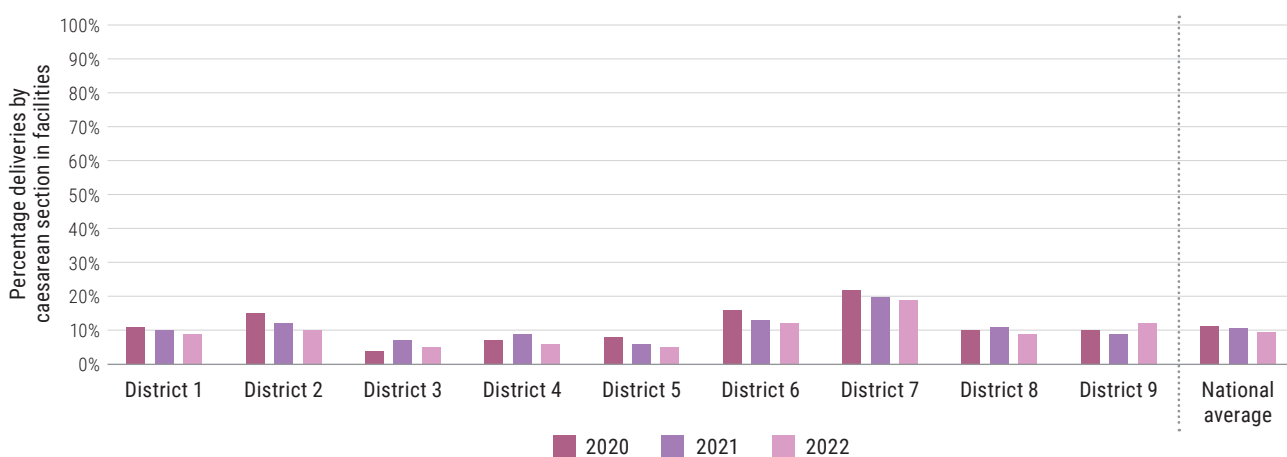


**Fig. 6. Annual average proportion of births in health facilities in 2022<sup>a</sup>**



<sup>a</sup> By district and nationally.

**Fig. 7. Annual average proportion of deliveries by caesarean section in health facilities in 2022<sup>a</sup>**

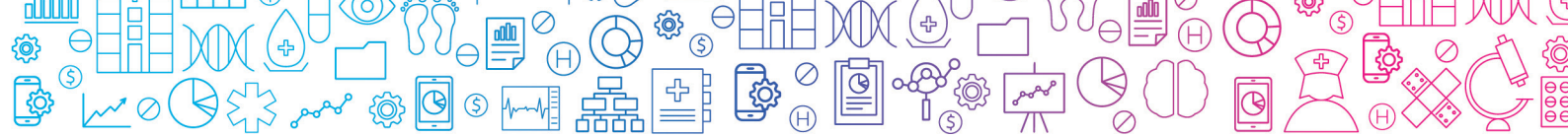


<sup>a</sup> By district and nationally.

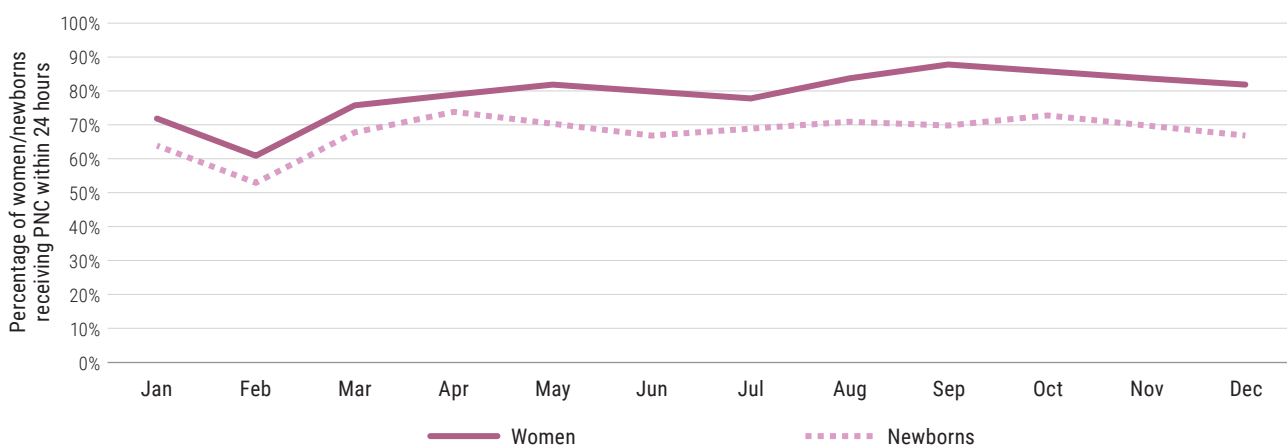
## Considerations/issues for interpretation

Figs. 6 and 7 display the reported coverage of births in health facilities and caesarean sections by district over 3 years. Such complementary analyses should ideally be reviewed together to help contextualize the patterns in utilization of these services. For example, if there was a large increase or decrease in the reported delivery of caesarean sections, this should be compared against any changes in the proportion of women giving birth in facilities. Displaying annual averages for 3 years can help MNCAH managers understand the expected range for delivery of these services, which is a helpful context for interpreting an indicator such as deliveries by caesarean section.

Additionally, comparing performances of these indicators in different districts can help national level programme managers understand the situation in specific subnational areas, allowing them to take into consideration the context of these districts (i.e. low facility density, lack of trained health workers to perform caesarean sections, location of referral hospital where women travel to give birth, etc.). In Fig. 7, for example, the proportion of deliveries by caesarean section is higher in District 7 than in other districts and the national average. If this district is the site of a main urban area, national capital, or large referral hospital, knowledge of this context helps to interpret the data.

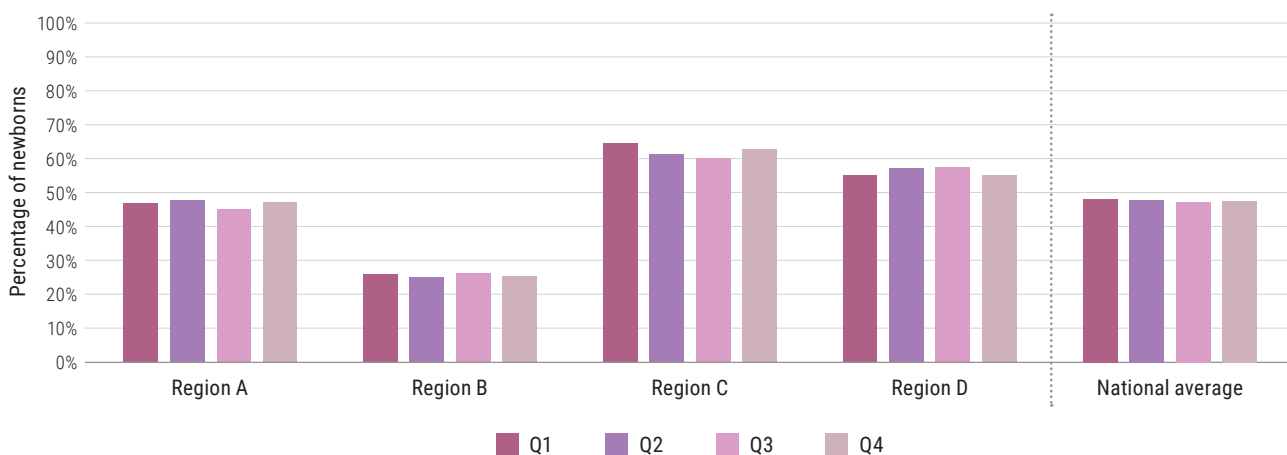


**Fig. 8. Proportions of women and newborns receiving PNC<sup>a</sup>**



<sup>a</sup> Within 24 hours of delivery in facilities. Monthly, 2022.

**Fig. 9. Proportion of newborns born in a facility put to the breast within 1 hour of birth**



<sup>a</sup> Quarterly, 2022, by region and nationally.

## Considerations/issues for interpretation

The analyses displayed in Figs. 8 and 9 relate to the reported coverage services in facilities during the postnatal period. In Fig. 8, the proportions of women and of newborns who received PNC within 24 hours of delivery is shown for each month of a given year. Such an analysis, which could be replicated at subnational or facility level, helps MNCAH managers monitor changes in delivery of PNC over time and whether reported delivery of PNC to women and to newborns differ. In Fig. 8, the reported coverage for PNC in facilities is consistently lower for women than for newborns, which might require further investigation to ensure that women are receiving timeline PNC.

In Fig. 9, the reported proportion of newborns born in a facility who are put to the breast within 1 hour of birth is depicted quarterly by region. Over the quarters of the year, there is little change within a given region, however when looking across the regions, an MNCAH manager might note that early initiation of breastfeeding in facilities is lower in Region B than in other regions. This should prompt an investigation of the reasons and development of a plan to improve performance (e.g. dissemination of guidelines to facilities, communication campaigns, etc.). Drilling down further to facility level could perhaps help to provide further insight into the poor performance of this indicator, which could prompt supportive supervision visits to specific facilities if needed.

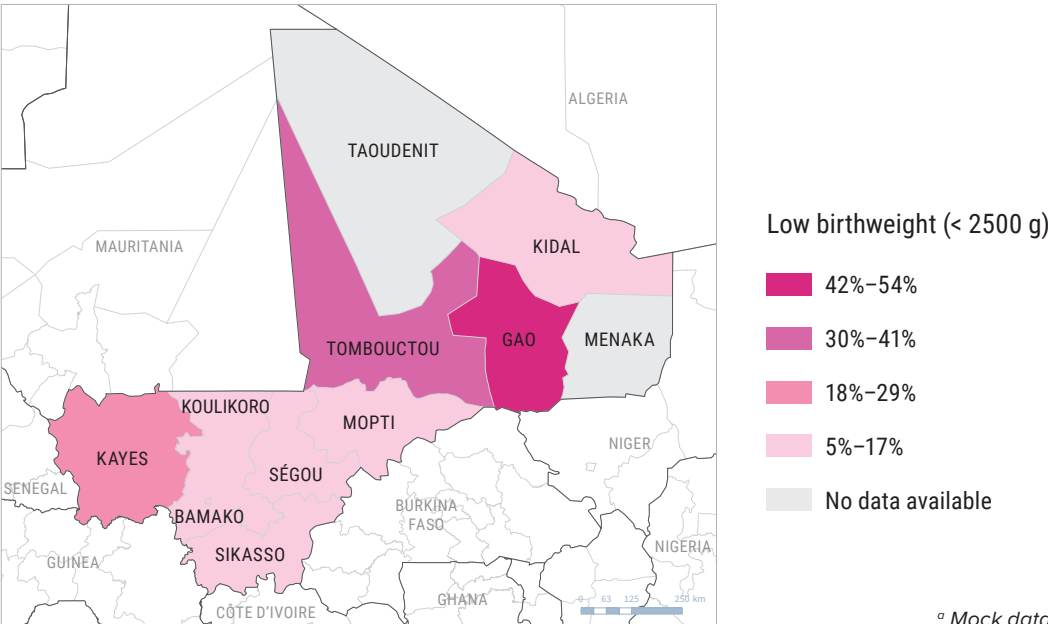


# Monitoring outcomes and facility-based maternal and newborn deaths and stillbirths

## Analysis

Figs. 10–12 demonstrate different ways to display low birthweight and facility-based maternal and newborn deaths and stillbirths over time, and in different geographical areas.

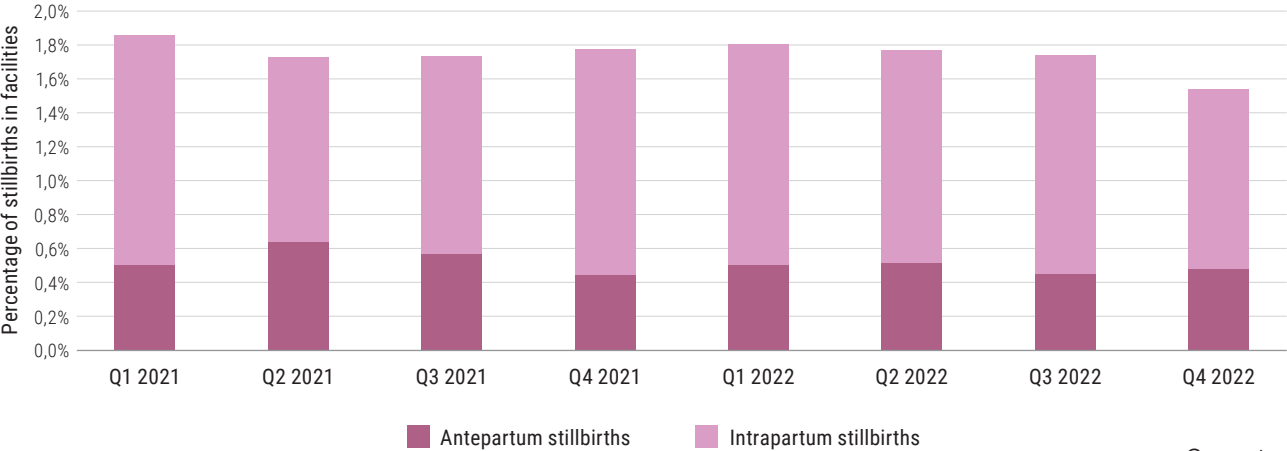
**Fig. 10.** Proportion of live births that weigh less than 2500 g, by region, Mali, 2021<sup>a</sup>



<sup>a</sup> Mock data for illustrative purposes.

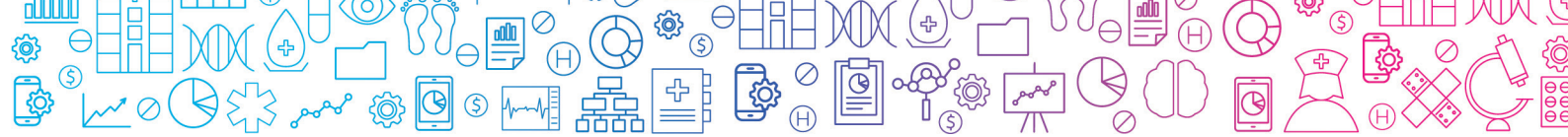
The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of WHO concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

**Fig. 11.** Stillbirths in facilities as a proportion of all births in facilities<sup>a</sup>



Q: quarter.  
<sup>a</sup> Quarterly, 2021–2022.





**Fig. 12. Maternal deaths in health facilities: number reported and proportion reviewed**

INDICATOR	2020	2021	2022
Total number of maternal deaths in health facilities reported in HMIS	1125	1150	1200
Proportion of maternal deaths in health facilities that were reviewed	60%	70%	65%

*HMIS: health management information system.*

## Considerations/issues for interpretation

In Fig. 10, the annual average proportion of live births weighing less than 2500 g is displayed on a map, which visualizes differences in proportions across regions. For regions with a higher reported proportion of low birthweights, it might be helpful for MNCAH managers to review this data against data for previous years. Comparing these reported values from facilities against population-based survey data, if relatively recent data are available, would provide important information on the rates of low birth weight in the larger population as well.

Displaying data such as in Figs. 11 and 12 helps managers assess progress in critical outcomes of maternal and newborn health occurring in the context of a delivery. Fig. 11 displays the proportion of stillbirths in facilities (out of all facility births) disaggregated by antepartum and intrapartum as an important proxy measure for quality of intrapartum care.

Fig. 12 reviews the total number of maternal deaths reported in the health facility as well as the proportion of those deaths that were reviewed each year over 3 years. In some countries, data captured in an HMIS may include community-based deaths, i.e. those that occur outside facilities; therefore, the number of maternal deaths in reported through the HMIS may be higher than the actual number of institutional maternal deaths. Additional reasons for discrepancies in maternal deaths reported through HMIS data include misclassification of these deaths at either then facility or community level or multiple (sometimes overlapping) sources being used to report mortality. The examples shown here provide a national overview on an annual basis, however all figures and tables can be presented at subnational level, and down to the facility level for more granular assessment of performance.

Fig. 12 also captures the proportion of facilities in the geographical area that conduct maternal death reviews. This indicator measures the extent to which facilities attempt to identify preventable factors contributing to deaths that can be addressed by the health system, for example through MPDSR. Among facilities that conduct maternal and/or perinatal death reviews, the median and range of numbers of deaths can be calculated. Over time, the number of deaths should decline or stabilize as a result of continuous improvements in quality of care stimulated by the recommendations identified in these reviews.

## Contacts with health facilities across age groups

### Purpose

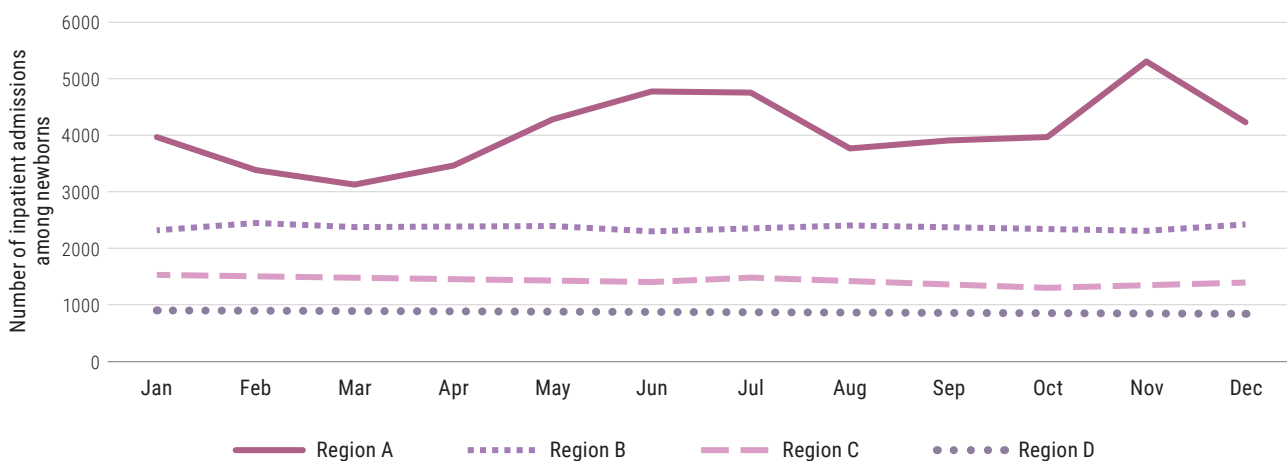
Monitoring delivery of outpatient and inpatient care can serve as a proxy for availability and utilization of health services. Analysing these data across key population groups, such as newborns, children and adolescents, help to understand patterns in service provision in these age groups. Outpatient visits in particular can provide MNCAH managers with information on trends in contacts with the health facility for promotive and preventive routine health interventions, rather than just a focus on provision of treatments for specific illnesses. Depending on the configuration of the HMIS, outpatient attendance and inpatient admissions might be able to be reported by purpose for visit, diagnosis, or outcome.



## Analysis

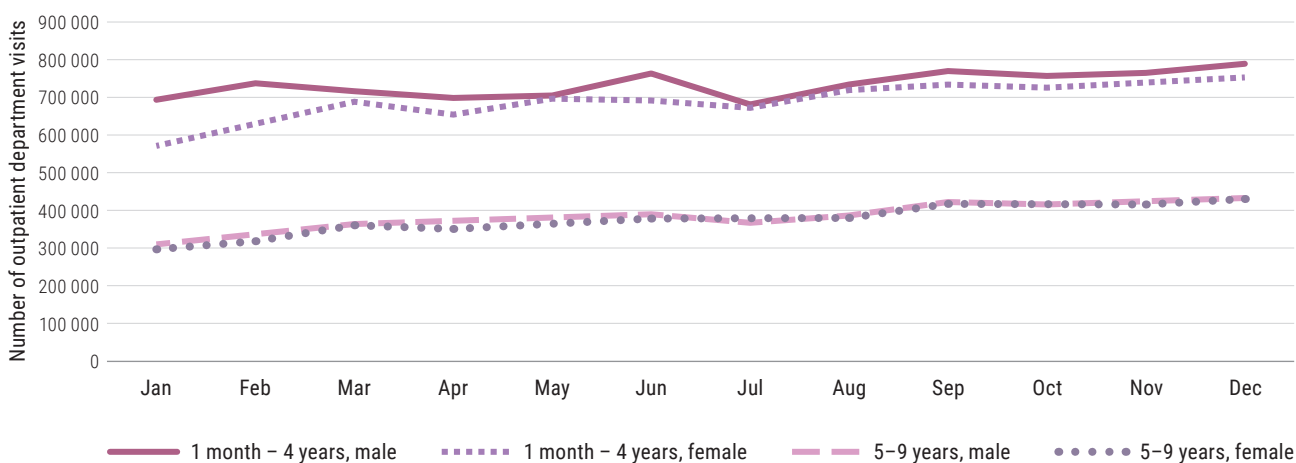
Figs. 13–15 display utilization of health services across newborns, children and adolescents to monitor trends and changes across time, subnational level and/or specific subgroups.

**Fig. 13.** Inpatient admissions among newborns <28 days<sup>a</sup>

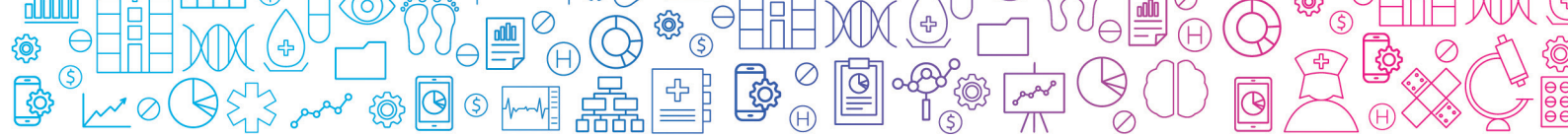


<sup>a</sup> By region, monthly, 2022.

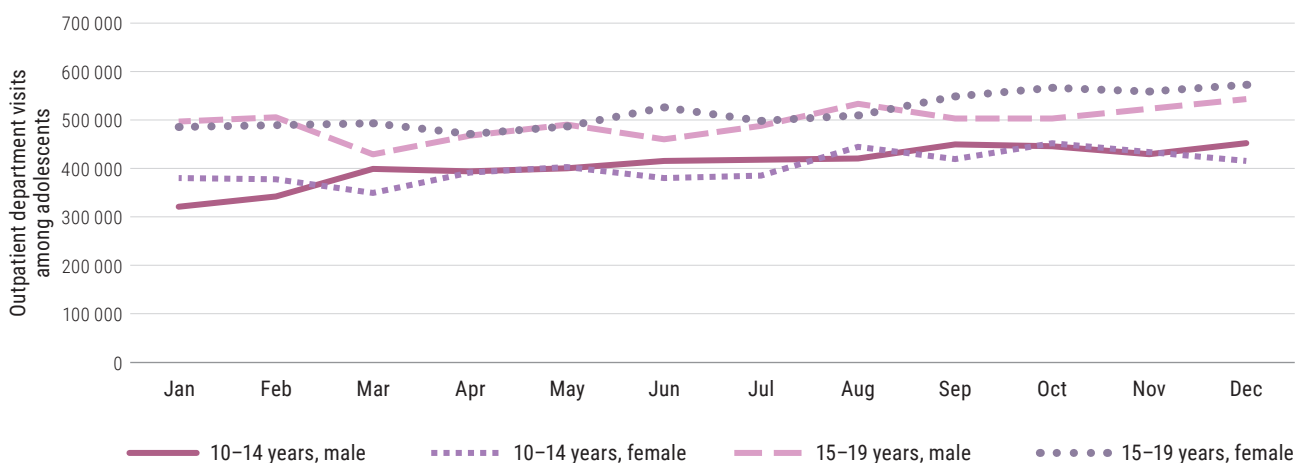
**Fig. 14.** Outpatient department visits among younger and older children



<sup>a</sup> By sex, monthly, 2022.



**Fig. 15. Outpatient department visits among younger and older adolescents<sup>a</sup>**



<sup>a</sup> By sex, monthly, 2022.

## Considerations/issues for interpretation

In some cases, routine facility-based indicators might be reported as absolute numbers (e.g. counts) instead of proportions. Reviewing numbers alone may not provide sufficient information on the performance of indicator. In such cases, sufficient historical data, ideally from the same facilities each reporting period, is needed to interpret the indicators (i.e. consistency of the data over time).

In Fig. 13, the number of inpatient admissions among newborns is displayed by region, for each month of a given year. This indicator provides MNCAH managers with a sense of the delivery of treatment for severe illness in newborns. In this figure, the reported numbers of inpatient admissions in Regions A, B, and C are stable over the year. By contrast, the reported data for Region D show variability from month to month. In addition, the number of admissions is higher in this region than in other regions. However, as the analysis focuses on numerical data rather than proportions, this could be explained by understanding the context of Region D. For example, it could be the location of a large referral hospital. For a national MNCAH programme manager, checking the quality of the data in Region D may be a necessary first step to understand the trend and further investigate the reasons for the changes from month to month.

Figs. 14 and 15 depict the numbers of outpatient department visits among children and adolescents respectively. In both charts, the data are disaggregated by sex and 5-year age groups, providing helpful information on patterns in health-seeking behaviours in these groups. For example, in Fig. 14, there are more outpatient visits among children under 5 years of age than in children 5–9 years of age. This could be due to routine visits for immunizations in the first 2 years of children’s lives but could also represent higher rates of illness in younger children. In Fig. 15, the number of outpatient visits among older adolescents (15–19 years) is higher than among young adolescents (10–14 years), although the difference between the two age groups is smaller than between younger and older children in Fig. 14. In both populations, there is no major difference in the number of visits for males and females.

Reviewing such data by purpose or outcome of visit, where this is available, would be helpful. Additionally, understanding the rates of illness in the larger population of children and adolescents, for example from recently conducted population-based surveys, would provide helpful context for these interpreting these data.



# Child and adolescent health

## Purpose

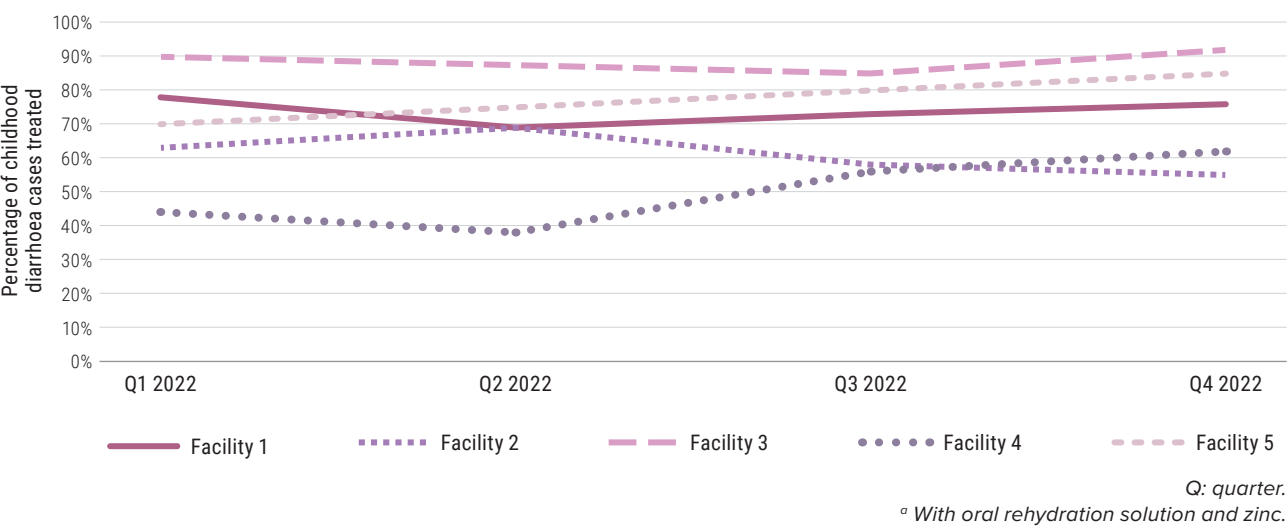
To review progress towards coverage of critical interventions that will reduce the burden of disease and prevent avoidable deaths among children and adolescents. Where relevant and feasible, the indicators presented here could be disaggregated by 5-year age groups (0–4, 5–9, 10–14, 15–19 years) and by sex to identify more specific patterns in causes of illness and death in children and adolescents that would help MNCAH target interventions for these subgroups.

## Monitoring specific health interventions during childhood and adolescence

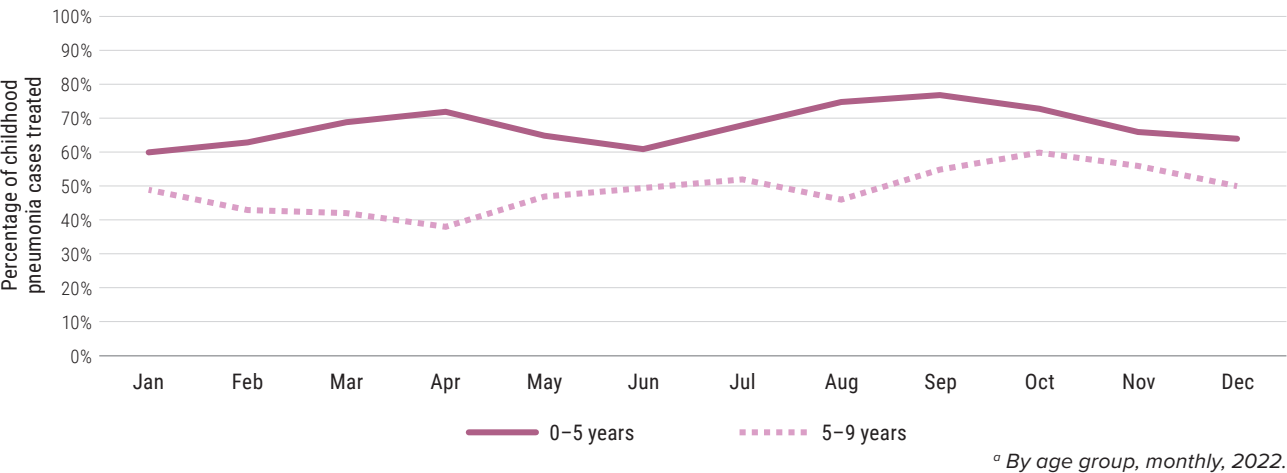
## Analysis

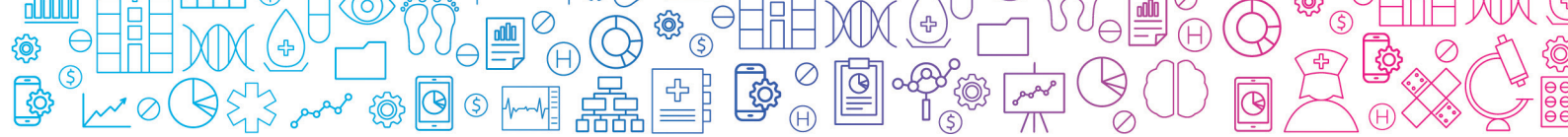
Figs. 16–18 display trends and patterns in specific interventions for preventive and curative purposes among children and adolescents.

**Fig. 16.** Proportion of cases of diarrhoea among children 0–9 years treated, by facility<sup>a</sup>

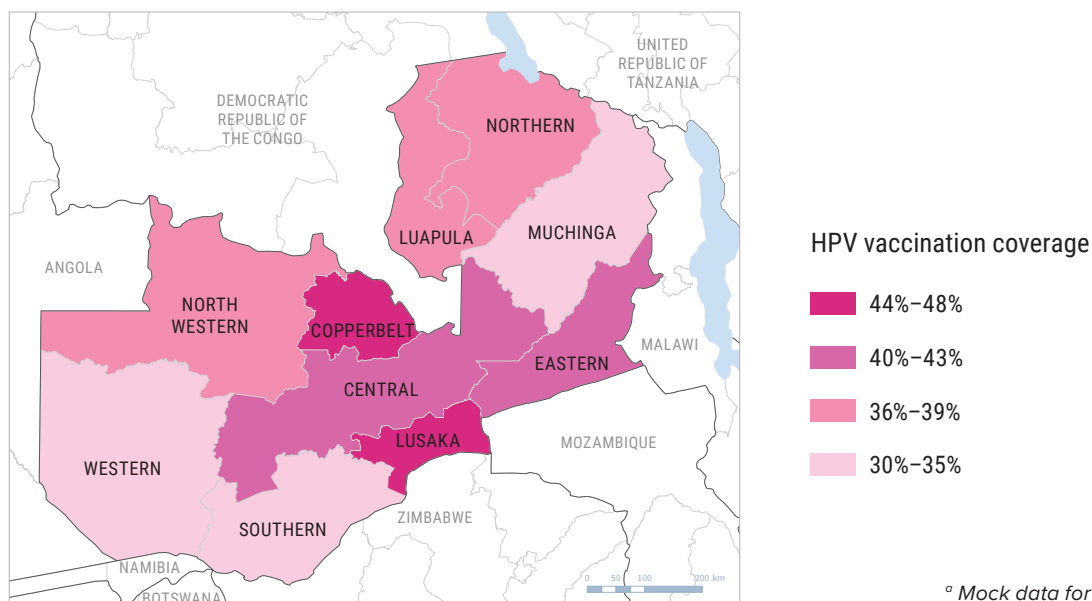


**Fig. 17.** Proportion of childhood pneumonia cases treated with amoxicillin in facilities<sup>a</sup>





**Fig. 18.** Human papillomavirus vaccination programme coverage – last dose, by region, Zambia, 2021<sup>a</sup>



<sup>a</sup> Mock data for illustrative purposes.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of WHO concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

## Considerations/issues for interpretation

While treatment for childhood diarrhoea may occur outside of health facilities, the indicator visualized in Fig. 16 focuses on the reported proportion of cases of diarrhoea among children up to 9 years of age treated with oral rehydration solution and zinc within facilities. Across the facilities in Fig. 16, an MNCAH manager might note that in Facility 4, the proportion of cases treated was lower than 50% for the first half of the year, although this increased in the latter half of the year. This could have been due to a stock-out of oral rehydration solution and/or zinc during this time and requires further investigation and sustained monitoring. Additionally, an MNCAH manager might closely monitor Facility 2 as the reported proportion of cases treated decreased in the second half of the year. In this case, the decline could be due to delayed reporting from the facility and should be followed up to ensure the downward trend does not continue.

Fig. 17 displays the proportion of childhood pneumonia cases that were treated with amoxicillin, by 5-year age groups (0–4 and 5–9 years). Measurement of treatment for pneumonia should be handled with caution as the accuracy depends on correct diagnoses. Nevertheless, reviewing the monthly data for the year allows an MNCAH manager to have a sense of any changes in reported coverage of the intervention in facilities. Analysing the data disaggregated by age group shows a lower proportion of cases treated among older children than among children under 5 years. It would be helpful to examine these data against patterns in incidence of childhood illness and care-seeking behaviours for ARI from recent population-level surveys, where available.

Displaying HPV vaccination programme coverage among adolescents for a specific year on a map, such as in Fig. 18, helps MNCAH managers quickly identify high performing and low performing areas. In this figure, each region is shaded by ranges of the indicator value to show the relative performances geographically. Other information (e.g. population size) could be reviewed to give further insight into areas that require greater support or supervision.

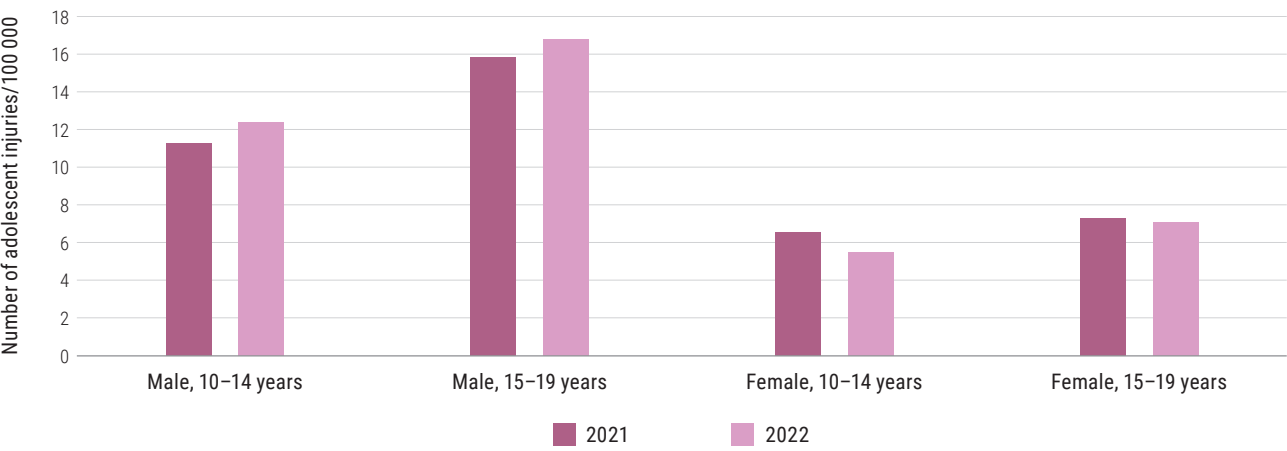


# Monitoring outcomes and facility-based deaths during childhood and adolescence

## Analysis

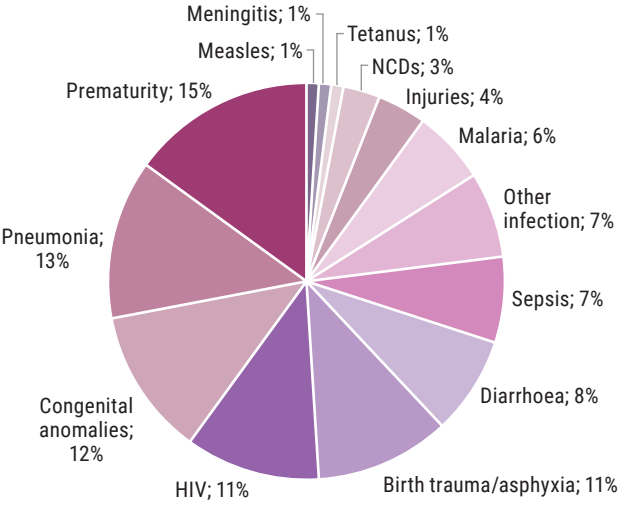
Figs. 19–23 demonstrate different ways to visualize hospitalised injuries and facility-based child and adolescent deaths over time, by cause, by sex, and/or across geographical areas to monitor trends and help determine patterns to support data-driven decision-making to prevent avertable injuries and deaths.

**Fig. 19.** Hospitalised cases of injuries among adolescents per 100 000 adolescent population<sup>a</sup>



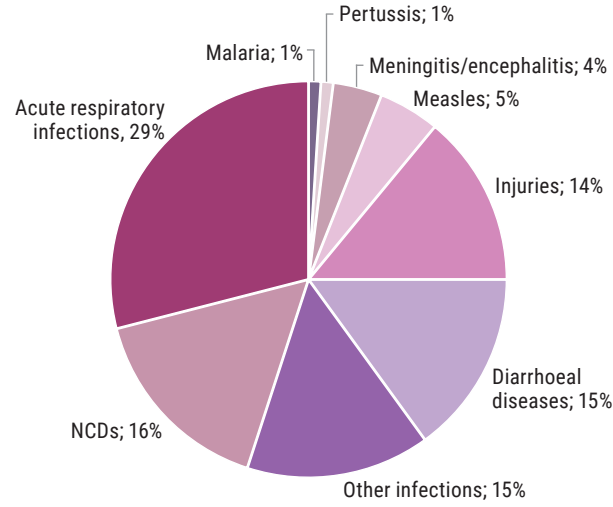
<sup>a</sup> Annual rate by sex and age group.

**Fig. 20.** Distribution of deaths in children 0–4 years by cause<sup>a</sup>

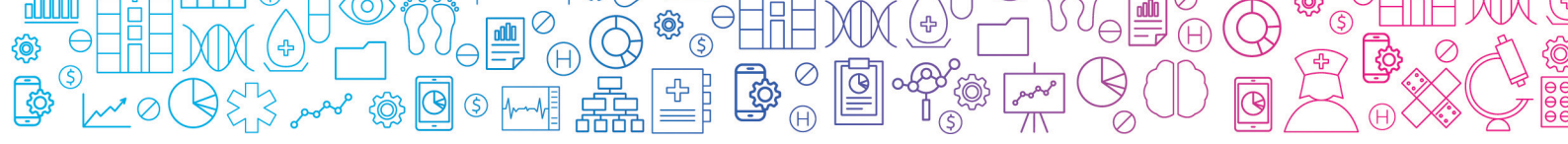


<sup>a</sup> % under-5 years deaths in facilities in a given year.

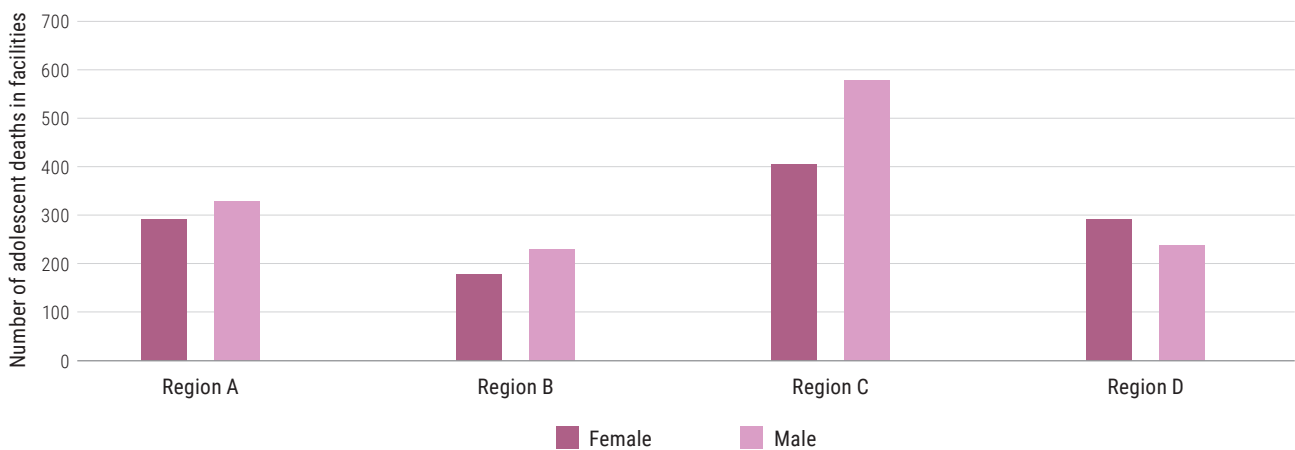
**Fig. 21.** Distribution of deaths in children aged 5–9 years by cause<sup>a</sup>



NCDs: Noncommunicable diseases.  
<sup>a</sup> % age 5–9 years deaths in facilities in a given year.

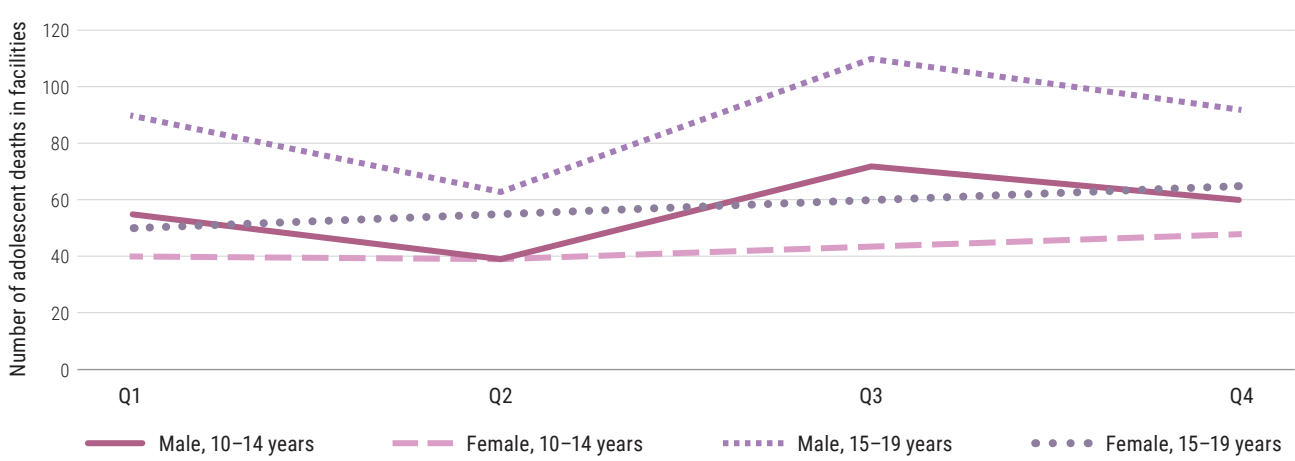


**Fig. 22.** Number of deaths in facilities among adolescents, by region<sup>a</sup>



<sup>a</sup> Annual number of deaths among those aged 10–19 years, by sex, 2022.

**Fig. 23.** Number of deaths in facilities among adolescents in Region C<sup>a</sup>



Q: quarter.  
<sup>a</sup> Quarterly in 2022, by age and sex

### Considerations/issues for interpretation

Fig. 19 depicts the rate of hospitalised cases of injuries among adolescents per 100 000 by sex and age group (10–14 and 15–19 years). The bar chart enables comparison of the annual rates of hospitalised injuries for 2 years in these subgroups of adolescents. An MNCAH manager would note that injury rates for males are higher than for females and higher among older adolescents than young adolescents. It is worth further investigating and closely monitoring the slightly increased rate of injuries among male adolescents from 2021 to 2022. This might require reviewing the quality of the data (i.e. reporting completeness, accuracy of population denominators, etc.). Additionally, an MNCAH manager might want to drill down the analysis of these data, for example across geographical regions or by cause of injury, to plan how to reduce and prevent further injuries among adolescents.

Figs. 20 and 21 summarize the causes of deaths among children under 5 years and older children (5–9 years) in health facilities during a given year. These pie charts should be interpreted along with data on numbers of facility-based deaths in these age groups and on population-level reporting on deaths among children outside of facilities (e.g. from CRVS data or other national data sources).



While coding for causes of death with accuracy can be a challenge, having such information can be invaluable for an MNCAH manager to plan focused interventions to prevent additional avoidable deaths among children.

Figs. 22 and 23 are complementary analyses to help an MNCAH manager understand patterns in deaths among adolescents. In Fig. 22, the total number of deaths among male and female adolescents in 2022 are presented by region. It is noted that the numbers of reported deaths are higher in Region C than in other regions. Fig. 23 presents the drilled down numbers of adolescent deaths in Region C by sex and 5-year age group for each quarter of 2022. This drill down analysis shows an increase in deaths in all adolescents in the third quarter of the year, especially among older male adolescents. For further information, an MNCAH manager might need to review the data by cause of death or to investigate whether there had been a specific potential causal event in Region C during the third quarter of 2022. Additionally, reviewing trends in reported numbers of deaths in facilities in previous years would help to understand whether this is a repeated trend. Finally, since many adolescent deaths might occur outside of facilities, an MNCAH manager would need to compare these data with trends in deaths among adolescents outside of facilities. By bringing these pieces of information together, an MNCAH manager would have a clearer understanding of the deaths among adolescents to determine how to reduce and prevent additional avoidable deaths through public health interventions and policy recommendations.





## 5. Opportunities and challenges of facility-based data

A key limitation to analysis of aggregated data on MNCAH from HMIS is that the data are representative of only services provided through the health facility and/or individuals who seek care in facilities. This may lead to underreported or biased coverage data. An example of this would be the absence of outcome data on births and deaths in non-facility settings. Similarly, pregnant women who receive no ANC and children who receive no child health services are at higher risk for poor health outcomes but are not captured by HMIS.

A related limitation of health facility data is that they often collect and report only indicators for service utilization but are commonly unable to provide key information on health facility and health worker distribution/density, accessibility, commodity availability, knowledge, attitudes, and practices. For these reasons, periodic triangulation between analysis from HMIS sources and information from recent population-based household surveys and health facility assessments is recommended. Household surveys provide information on coverage and outcomes, and facility health assessments can quantify service availability and readiness. It is also recommended to work towards an interoperable health information system, which can allow the exchange of data between otherwise disparate systems (e.g. logistics management information systems, human resources management information systems, CRVS, etc.).

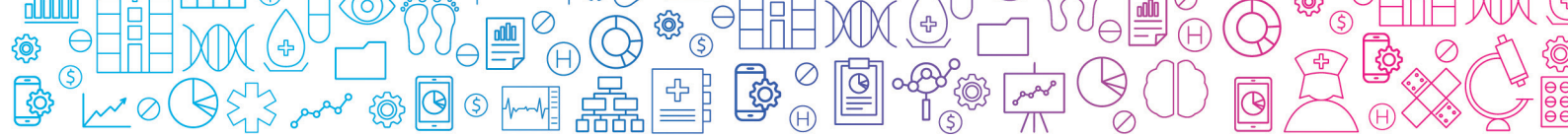
The indicators related to mortality in this document consider only deaths that occur within health facilities. To capture all MNCAH mortality and improve accuracy of reporting, strengthening CRVS and reviewing causes of deaths are critical processes. Different facility types provide different levels of care, so any analysis of data in terms of service delivery or performance must be based on an understanding of the population served. For example, a referral facility in a large urban centre will service a different population from a district-level facility. Also important are changes in population catchment areas and other demographic shifts.

There are other indicators that capture important information about the health facilities and the quality and/or experience of care provided to women, newborns, children and adolescents. Because these indicators capture the details of care provided, they may be reported through health facility assessments, records of supervisory visits, and/or other sources of data. They can be used in conjunction with the routine data collected by the health facilities to triangulate results and provide nuanced insight into the performance of the health service delivery at facility level.

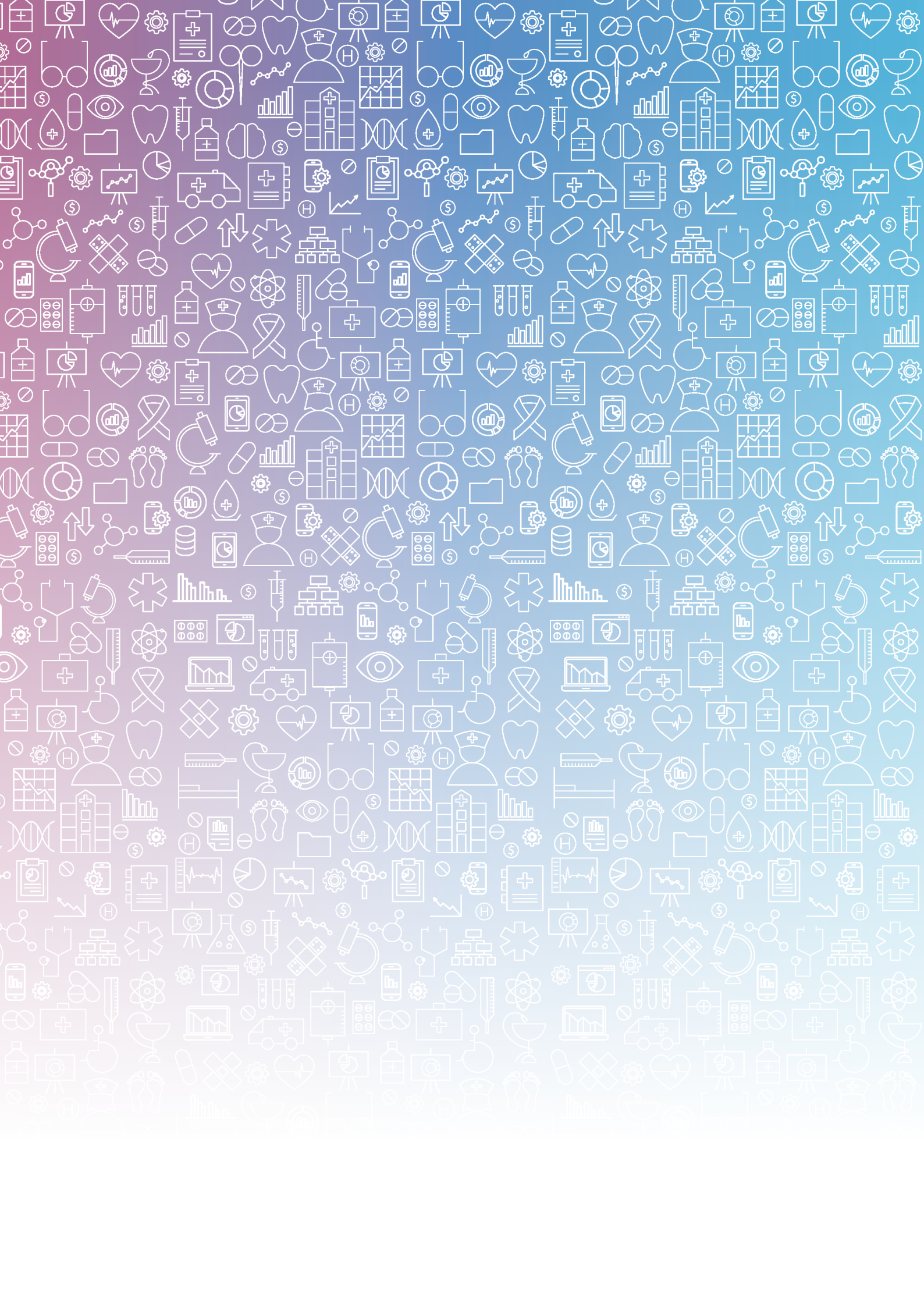


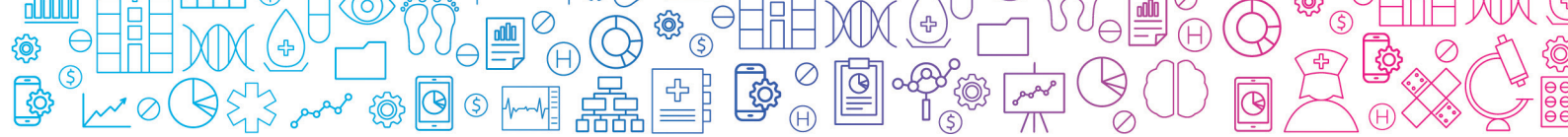
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## Annex 1. Additional resources

In addition to the references cited in this guidance and annexes, the following resources were either consulted in development of this module or provide supplementary information.

- Maternal and Child Survival Program. Visualizing and using routine reproductive, maternal, neonatal, and child health data at health facilities: a resource package for health providers and district managers. Washington, DC: United States Agency for International Development; 2018 (<https://mcsprogram.org/resource/visualizing-and-using-routine-rmnch-data-at-health-facilities-a-resource-package-for-health-providers-and-district-managers/>, accessed 1 August 2023).
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- Standards for improving the quality of care for children and young adolescents in health facilities. Geneva: World Health Organization; 2018 (<https://www.who.int/publications-detail-redirect/9789241565554>, accessed 1 August 2023).
- Standards for improving the quality of care for small and sick newborns in health facilities. Geneva: World Health Organization; 2020 (<https://www.who.int/publications-detail-redirect/9789240010765>, accessed 1 August 2023).



## Annex 2. Additional indicators

Table 2 in the main body of this guidance presents a catalogue of indicators recommended for MNCAH monitoring. This annex discusses additional indicators that countries may wish to track, depending on their priority interventions and programmes and/or data collection tools and RHIS configuration. In addition, this annex highlights processes and systems for review of MNCAH deaths and stillbirths in facilities and recommended indicators for monitoring the role of the health system in these processes (Table A2.1).

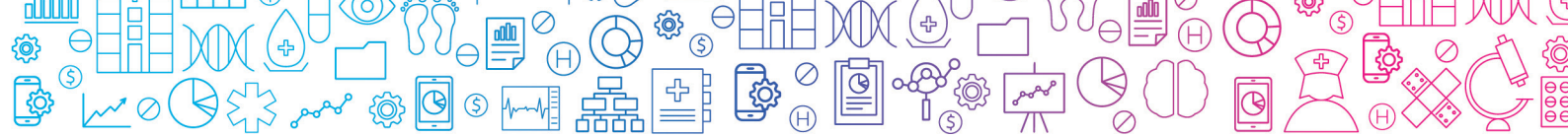
### Monitoring interlinked processes and systems for review of MNCAH deaths and stillbirths

#### **Civil registration of births and deaths**

Civil registration of births and deaths “represents the legal recognition of a person’s existence, from the start of life until death, and implies an acknowledgement of the responsibilities of the state towards the individual. The civil registration of a birth or death, including a stillbirth, within days of its occurrence helps to enable individuals and their families to access essential resources and health care” (1). Records of civil registration contribute to generating a regular source of vital statistics, which in turn inform the calculation of key demographic indicators, which are sometimes used to formulate denominators for facility-based indicators (1). In some settings, the CRVS system “does not capture all births and deaths or assign a cause of death. Many births remain unregistered, and most stillbirths and half of all neonatal deaths neither receive a birth certificate nor are counted as part of official statistics” (2).

#### **Maternal and perinatal death surveillance and response**

Reporting causes of deaths through RHIS assumes these causes are accurately recorded in facility registers, patient records, or other existing tools. As causes of death are often not coded accurately or at all, using reported RHIS data on maternal and perinatal deaths and stillbirths to inform programmatic adjustments may lead to erroneous conclusions. Reliable information about the cause and circumstances of these deaths is needed to improve quality of care and reduce mortality (3).



MPDSR is a continuous system of surveillance, connecting the health information system with quality improvement processes (4). “MPDSR involves qualitative, in-depth investigations of the causes and circumstances surrounding maternal and perinatal deaths” (2).

**Table A2.1. Civil registration of births and deaths and MPDSR: related indicators of interest**

INDICATORS	DEFINITION	COMPUTATION (e.g. numerator [N]/denominator [D])	DISAGGREGATION(S)
<b>Notification of live births in health facilities</b>	Proportion of live births in the health facility notified/declared to the civil registrar, in a given reference period <sup>a,b</sup>	N: Number of live births in the health facility notified/declared to the civil registrar, in a given reference period  D: Total live births in the health facility, in a given reference period  Note: The specified number of days after birth should be aligned with national policy/guidelines	• Sex
<b>Notification of stillbirths in health facilities</b>	Proportion of stillbirths in the health facility notified to the civil registrar, in a given reference period <sup>a,b</sup>	N: Number of stillbirths in the health facility notified to the civil registrar, in a given reference period  D: Total live births in the health facility, in a given reference period  Note: The specified number of days after birth should be aligned with national policy/guidelines	• Sex  • Antepartum (macerated), intrapartum (fresh)
<b>Notification of deaths in health facilities</b>	Proportion of deaths in the health facility notified to the civil registrar, within a defined period <sup>a,b</sup>	N: Number of deaths in the health facility notified to the civil registrar, within a defined period  D: Total number of deaths in the health facility, within a defined period	• Sex  • Age at death
<b>Maternal deaths reviewed</b>	Proportion of maternal deaths reviewed	N: Number of maternal deaths in facility that were reviewed  D: Number of maternal deaths in facility	• Facility type
<b>Perinatal deaths reviewed</b>	Proportion of perinatal deaths reviewed  Note: Perinatal deaths include stillbirths and early newborn deaths up to 7 days after birth	N: Number of perinatal deaths in facility that were reviewed  D: Number of perinatal deaths in facility	• Facility type

<sup>a</sup> In some countries the health system has the obligation to notify births and/or deaths in facilities to the civil registry or to provide documentation to parents for registration.

<sup>b</sup> Adapted from: Health sector contributions towards improving the civil registration of births and deaths in low-income countries: guidance for health sector managers, civil registrars and development partners (1).

## MNCAH facility indicators for consideration, where relevant and feasible

Table A2.2 presents additional MNCAH indicators for consideration. Please note that some of these indicators require further feasibility testing and may not be able to be accurately calculated or routinely reported using current HMIS configurations or existing patient registers.

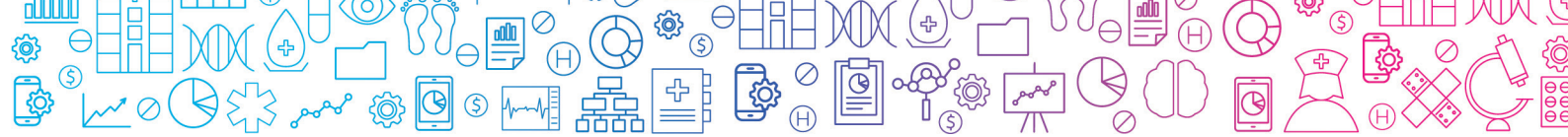


Indicators related to interventions that are recommended at specific times, or are repeated several times for the same individual, throughout pregnancy for example, may be difficult to calculate and report accurately using aggregated facility-based data. They might nevertheless be of interest to countries that have the capacity and desire to report on a wider range of indicators.

**Table A2.2. Additional MNCAH indicators for consideration**

ADDITIONAL INDICATORS	DEFINITION	COMPUTATION (e.g. numerator [N]/denominator [D])	DISAGGREGATION
<b>Contraceptive commodity distribution</b>	Number of clients who accept contraceptives in facilities	Number of clients who accept contraceptives in facilities	<ul style="list-style-type: none"> <li>• Oral, injectable</li> <li>• Sex</li> <li>• Among adolescents (10–14, 15–19 years)</li> </ul>
<b>Iron supplementation for pregnant women</b>	Proportion of ANC contacts in a facility during which pregnant women were given/prescribed iron-containing supplements <sup>a</sup>	N: Number of ANC contacts during which pregnant women were given/prescribed iron-containing supplements. D: Total number of antenatal contacts.	–
<b>Women with pre-eclampsia/eclampsia treated with initial (loading) dose of MgSO<sub>4</sub></b>	Proportion of women with severe pre-eclampsia/eclampsia who received the initial (loading) dose of magnesium sulfate (MgSO <sub>4</sub> ) in a health facility	N: Number of woman with severe pre-eclampsia/eclampsia who received the initial (loading) dose of MgSO <sub>4</sub> in a health facility D: Number of deliveries in facility	–
<b>Antenatal corticosteroids<sup>b</sup></b>	Proportion of women who delivered between 24 and 34 weeks gestational age who received at least one dose of antenatal corticosteroids <sup>c</sup>	N: Number of women who delivered between 24 and 34 weeks gestational age and received at least one dose of antenatal corticosteroids <sup>d</sup> D: Number of women who delivered between 24 and 34 weeks gestational age <sup>d</sup>	–
<b>Fetal heart monitoring on admission</b>	Proportion of women whose baby's fetal heart rate was documented on admission to the labour ward	N: Number of women who had their baby's fetal heart rate documented on admission in labour to a health facility. D: Number of deliveries in a health facility (total women)	–
<b>Postpartum family planning acceptor</b>	Proportion of women who deliver in a facility and initiate or leave with a modern contraceptive method prior to discharge	N: Number of women who deliver in a facility and initiate or leave with a modern contraceptive method prior to discharge D: Number of deliveries in facility	–
<b>Newborns with birthweight documented</b>	Proportion of babies born (live births and stillbirths) in a health facility with birthweight documented	N: Number of babies born (live births and stillbirths) in a health facility with documented birthweight. D: Total number of babies born (live births and stillbirths) in a health facility	–





ADDITIONAL INDICATORS	DEFINITION	COMPUTATION (e.g. numerator [N]/denominator [D])	DISAGGREGATION
<b>Newborns on kangaroo mother care</b>	Proportion of newborns weighing <2500 g initiated on kangaroo mother care <sup>e</sup>	N: Number of newborns weighing <2500 g initiated on kangaroo mother care D: Number of admitted newborns with birthweight <2500 g	• <i>Where feasible:</i> Subgroup of <2000 g
<b>Newborn resuscitation</b>	Proportion of newborns who received any positive pressure ventilation via any device (most commonly with bag and mask) <sup>g</sup>	N: Number of newborns who received any positive pressure ventilation via any device (e.g. bag and mask) in the delivery room D: Number of live births and stillbirths in the health facility	• Facility type
<b>Newborns treated for neonatal infection<sup>b</sup></b>	Proportion of neonates (0–28 days) identified as: • cases of possible serious bacterial infection (PSBI), critical illness, or clinical severe infection in outpatient settings <sup>h</sup> or • clinically suspected sepsis (serious bacterial infection) <sup>i</sup> in inpatient settings initiated with appropriate injectable antibiotics	N: Number of neonates (0–28 days) identified as: • cases of possible serious bacterial infection PSBI, critical illness, or clinical severe infection in outpatient settings or • clinically suspected sepsis (serious bacterial infection) in inpatient settings receiving at least 2 days of appropriate injectable antibiotics D: Number of neonates (0–28 days) identified as: • cases of possible serious bacterial infection PSBI, critical illness, or clinical severe infection in outpatient settings or • clinically suspected sepsis (serious bacterial infection) in inpatient settings	

<sup>a</sup> Indicator adapted from: *Analysis and use of nutrition data from routine health information systems: guidance for nutrition programme managers* (5).

<sup>b</sup> These indicators require feasibility testing. Existing data sources need to be modified or new sources developed depending on context and existing health information system: Testing would be beneficial especially around gestational age/documentation and case definitions.

<sup>c</sup> Depending on the configurations of the HMIS to calculate aggregate indicators, it can be difficult to link the provision of an intervention to a specific point in time. However the time points in this indicator are in accordance with the WHO Recommendations on antenatal corticosteroids for improving preterm birth outcomes, which states that antenatal corticosteroid therapy is recommended for women with a high likelihood of preterm birth from 24 to 34 weeks of gestation under specified conditions (6).

<sup>d</sup> For this indicator, gestational age refers to gestational age estimate at the time of birth using best obstetric estimates; it does not refer to postnatal gestational age.

<sup>f</sup> Kangaroo mother care is defined by WHO as early, continuous, and prolonged skin-to-skin contact between the mother (or other caregiver) and the baby, and exclusive breastfeeding (7).

<sup>g</sup> In some neonatal resuscitation studies conducted in Africa and Asia, the proportion of infants requiring bag and mask ventilation at birth ranged between 2% and 7% (8–13). A systematic review of the incidence in all income settings will be required to develop a benchmark for infants requiring bag and mask ventilation at birth.

<sup>h</sup> PSBI: when any one or more of the following signs is present. Not able to feed since birth or stopped feeding well (confirmed by observation); convulsions; fast breathing ( $\geq 60$  breaths per minute) among infants less than 7 days old; severe chest in-drawing; fever ( $\geq 38$  °C); low body temperature ( $< 35.5$  °C); movement only when stimulated or no movement at all. Clinical severe infection: at least one sign of severe infection, i.e. movement only when stimulated; not feeding well on observation; temperature  $\geq 38$  °C or  $< 35.5$  °C; severe chest in-drawing. Critical illness: presence of any of the following signs: unconscious, convulsions, unable to feed at all, apnoea, unable to cry, cyanosis, bulging fontanelle, major congenital malformations inhibiting oral antibiotic intake, active bleeding requiring transfusion, surgical conditions needing hospital referral, persistent vomiting (defined as vomiting following three attempts to feed the infant within 30 minutes, and the infant vomits after each attempt) (14, 15).

<sup>i</sup> Clinically suspected sepsis (serious bacterial infection). Danger signs include: not feeding well, convulsions, drowsy or unconscious, movement only when stimulated or no movement at all, fast breathing (60 breaths per minute), grunting, severe chest in-drawing, raised temperature:  $> 38$  °C, hypothermia:  $< 35.5$  °C, central cyanosis; and also: severe jaundice, severe abdominal distension. Localizing signs of infection are: signs of pneumonia, many or severe skin pustules, umbilical redness extending to the peri-umbilical skin, umbilicus draining pus, bulging fontanelle, painful joints, joint swelling, reduced movement and irritability if these parts are handled (16).



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## Annex 3. Data quality considerations for use of routine MNCAH facility data

MNCAH managers use routine data to inform programme planning, monitoring, evaluation, and modification. However, there are often concerns with the quality of data reported through RHIS. Although undertaking data quality reviews and assessments might fall within the scope of HMIS officers or data managers and analysts, MNCAH programme managers and decision-makers at all levels need to be familiar with data quality problems so they can be identified and rectified in routine review of data. This annex presents dimensions for reviewing the quality of routine facility data for MNCAH, identifying potential data quality problems, understanding what might need to be done to investigate these issues, and how to factor in these issues when interpreting data to use for decision-making.

### Reviewing and interpreting MNCAH data through a quality lens

MNCAH managers should review programmatic data routinely (e.g. monthly or quarterly based on the specific indicator). Although data should be checked for quality prior to routine analysis, data quality issues are often identified through review of analysed data. Data quality checks may involve comparing current data with data reported in previous time periods (e.g. trends over time or comparison of data reported in a specific reporting period to a previous reporting period) or comparing the performance of indicators in different geographical areas.

Where inconsistencies are identified, the programme manager should investigate the data in more detail by drilling down to the most granular level possible. This is the level at which the data are entered into the HMIS software, i.e. the health facility, district, etc. Often data anomalies can be masked by aggregation to higher levels and the problems may not become apparent unless the entry-level data are inspected.

Anomalies in the data may not always be the result of data quality issues; they can occur because of actual, but expected, changes in service utilization. For example, we often see seasonal increases in the incidence of certain illnesses such as malaria, or a spikes in the delivery of interventions,



such as vaccination campaigns, which sometimes appears as a spike in the trend over time for the indicator. Sometimes service delivery is interrupted by stock-outs of commodities or events in the country or community, such as a health worker strike or extreme weather event, which results in a decline in service delivery. These events will often affect the consistency of trends in service delivery indicators, thus when potential data quality issues are identified (i.e. notable decline or increase in utilization of a health service), MNCAH managers should consider the context (e.g. timing, setting) to guide further investigation of the reported data.

When evaluating the data, an MNCAH manager might ask the following questions.

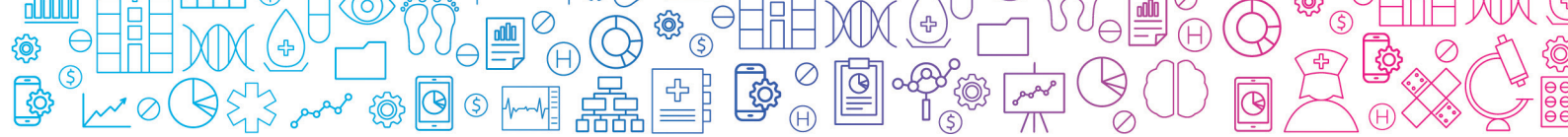
1. Are the changes in reported utilization of MNCAH services due to actual changes in service utilization? Are the changes in reported cases of illnesses or deaths due to real increases or decreases in these outcomes?
  - a. Was there a marked increase or decrease in reported utilization of any MNCAH service?
  - b. Was there a health worker strike, commodity stock-out, or another reason why health facilities could not provide a specific MNCAH service?
  - c. Was there an intervention campaign or intensification effort that could have increased the delivery of any MNCAH service?
  - d. Is there a seasonal event that could impact access to health facilities (e.g. roads blocked due to flooding) or expected increases or decreases in an illness (e.g. seasonality of malaria)?
2. Could the changes in reported utilization of MNCAH services be due to data quality problems?
  - a. What is the reporting completeness? Have all relevant units, particularly high-volume sites, submitted reports?
  - b. Are the same number of health facilities reporting each period? Are the same facilities reporting each period?
  - c. Was there a facility/were there facilities that reported extreme values (i.e., outliers)? If we remove the values reported by those facilities, does the trend look the same?

The priority is to consider and investigate what could be causing the changes in trends in MNCAH indicators. We should always be alert to the potential for data quality issues, such as incomplete reporting or the reporting of erroneous values. Errors can result from computer keystroke/typographical mistakes, or they can be related to how the indicator value is aggregated at health facilities. If the person compiling the monthly report has not had the appropriate training, or the indicator definition has changed, errors could be introduced when aggregating the client-level data at the facility.

## Quality assurance for MNCAH data: concepts and practice

### WHO data quality assurance tools and methodology

The [WHO Data Quality Assurance toolkit](#) focuses on methods for assessing the quality for HMIS data routinely reported from health facilities (1). The suite of tools includes guidance on conducting periodic health facility assessments on a representative sample of facilities to understand data quality for the entire HMIS or for specific health programme areas. The toolkit includes a desk review of data quality, which is an analysis of previously reported aggregate data in the HMIS to look for gaps, inconsistencies, and outliers in the reported data.



The WHO guidance identifies four dimensions of data quality and recommends the following analyses be conducted for each.

1. Assess the completeness and timeliness of reporting and data elements.
2. Assess the internal consistency of reported data.
3. Compare HMIS data to other sources of data, for example population-based surveys.
4. Evaluate the consistency of population data from different sources.

While the WHO tools offer comprehensive guidance on conducting a data quality review, this annex highlights key concepts related to data quality to help MNCAH managers and decision-makers at various levels understand data quality issues that arise from routine data from health facilities. Not all the steps of the data quality review methodology are the responsibility of MNCAH managers; some analyses might be conducted by HMIS officers or data managers, such as assessing the consistency of population data used as denominators for various MNCAH indicators. This annex focuses on simple checks, based on the data quality review metrics, that managers should understand prior to using MNCAH data for decision-making.

## Data quality review in practice for MNCAH managers

When reviewing routine facility data, MNCAH managers should review the data as follows.

### 1. Completeness and timeliness of reporting

Completeness and timeliness of reporting are important metrics for understanding the performance of the health information system. Incomplete or untimely data can hinder our ability to understand health system performance and make appropriate decisions for health system management. Table A3.1 describes metrics for measuring timeliness and completeness of reporting.

**Table A3.1. Completeness and timeliness data quality metrics**

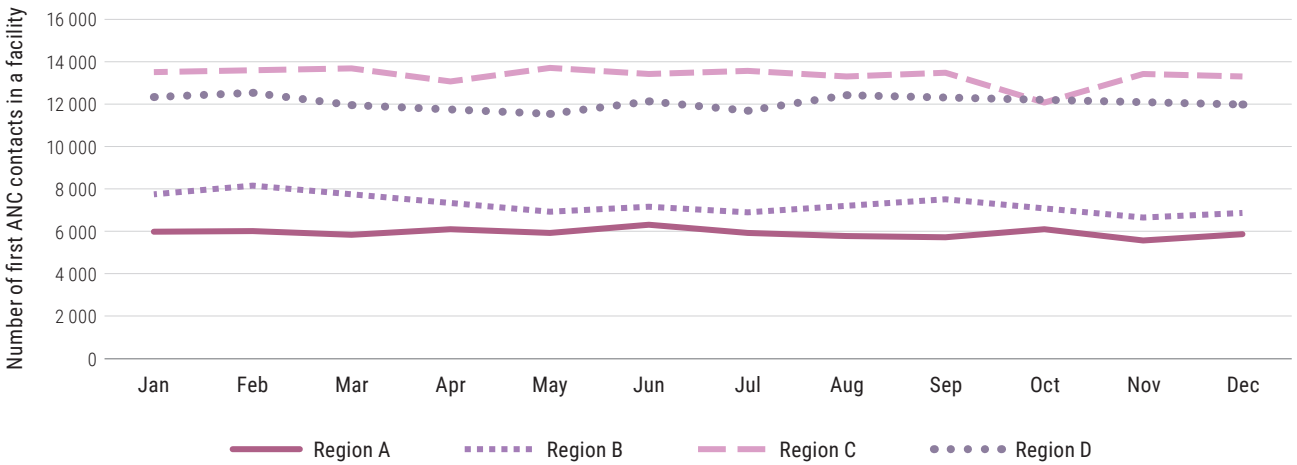
METRIC AND DEFINITION
<b>Completeness of reporting</b> is “assessed by measuring whether all the entities that are supposed to report actually do so” and can be measured at subnational or facility level (i.e. percentage of expected subnational or facility reports that are actually received) (2).
<b>Timeliness of reporting</b> is “assessed by measuring whether the entities which submitted reports did so before a predefined deadline”, and can be measured at subnational or facility level (i.e. percentage of submitted subnational or facility reports that are received by the deadline for reporting) (2).
<b>Completeness of indicator (or data element) data</b> “measures the extent to which facilities that are supposed to report data on the selected indicators are in fact doing so. This is different from overall reporting completeness in that it looks at completeness of specific data elements and not only at the receipt of the monthly reporting form” (2).
<b>Consistency of reporting completeness</b> “examines trends in reporting completeness” (2).

### Example: Review the trend in reporting completeness for first ANC contact in a year

In the example of Fig. A3.1, first ANC contacts in facilities are plotted by month and region for 2022. The trend lines for the regions appear to be steady over the course of the year, except for a slight dip in Region C during the month of October.



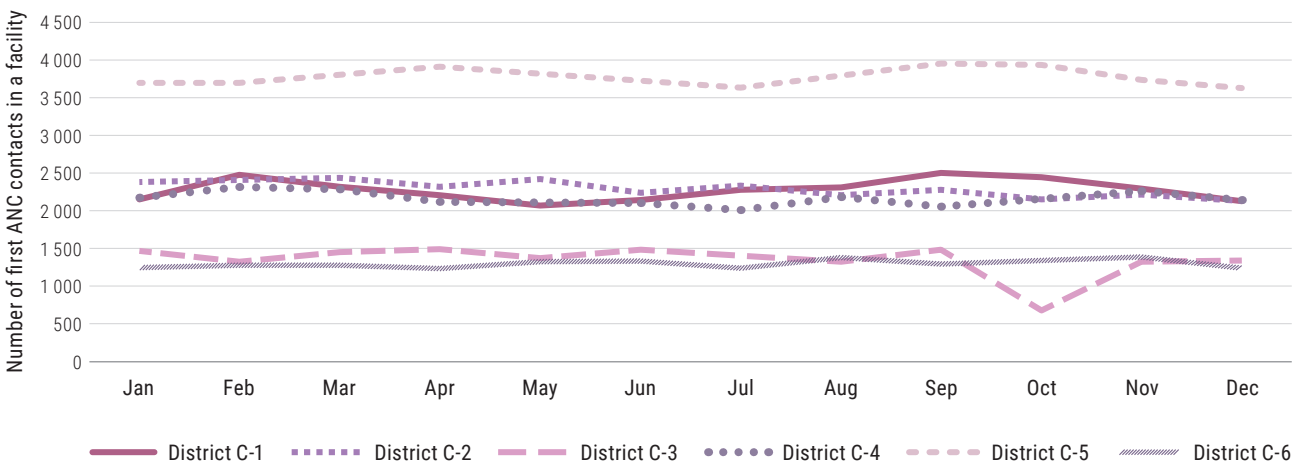
**Fig. A3.1. Number of first ANC contacts in facilities, by month and region, 2022**



ANC: antenatal care.

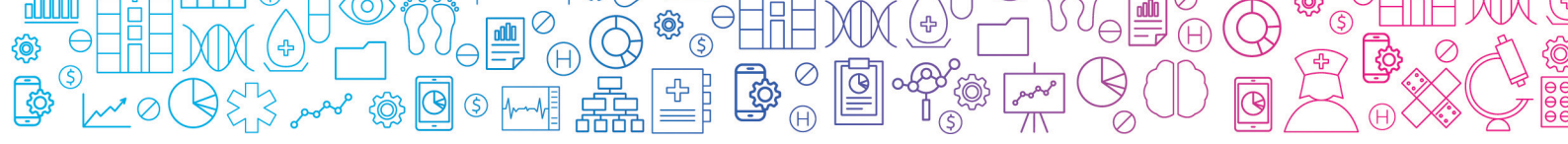
By drilling down to the district level within Region C, we learn more about the source of the drop in ANC contacts in facilities. Fig. A3.2 displays the number of first ANC contacts in facilities by month in each district for Region C during 2022. This allows us to see that dip in the number of first ANC contacts in facilities in Region C in October was mostly occurring in District C-3.

**Fig. A3.2. First ANC contacts in facilities in Region C, by month and district, 2022**

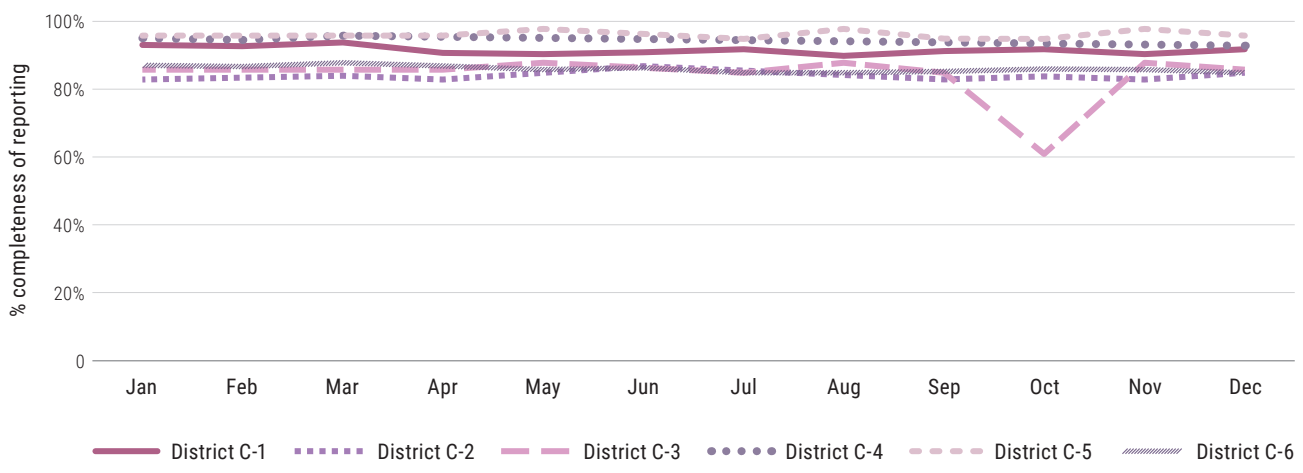


ANC: antenatal care.

As the trend in the number of first ANC contacts in a facility seems to return to levels reported in District C-3 in previous months, we need to determine whether the reported number is real or reflective of a data quality problem. One possibility when we are looking at results that appear less than we expect is whether all available data have been reported (i.e. whether all the facilities expected to report have, in fact, reported). To determine whether we have all the data for specific periods we can look at the completeness of reporting. Fig. A3.3 shows the completeness of reporting for the districts in Region C. Notice that completeness of reporting falls from a consistent 85% to about 60% in the month of October before climbing back to more than 80% thereafter.

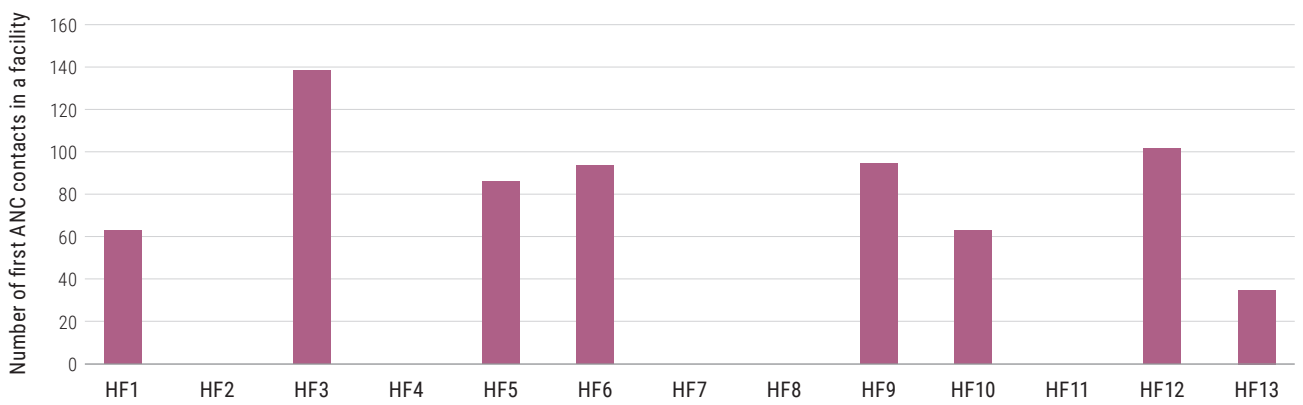


**Fig. A3.3. Completeness of reporting in Region C, by month and district, 2022**



To understand the change in reporting completeness further we can examine the first ANC contacts for facilities within District C-3 for the month of October 2022 (Fig. A3.4). Notice that five health facilities have not reported that month, the reports are late, or for some reason the data have not been entered into the database at the district level.

**Fig. A3.4. First ANC visits in District C-3, by facility, October 2022**



ANC: antenatal care; HF: health facility.

Thus, the decline in first ANC contacts in facilities appears to be a reporting issue, rather than a true decline in service utilization. However, an MNCAH manager should verify this by examining what happened to the reports from these five facilities. To do this, a national programme manager might contact the district manager to determine if the reports from those five facilities were submitted to the district HMIS office and, if they were, whether they were not entered into the database. If the problem is not resolved through this query, the five facilities should be contacted to see whether they failed to submit a monthly report for the month of October.

Timeliness of reporting impacts on the completeness of reporting. If reports are submitted late the data are not available for monitoring or decision-making. Gaps in completeness of reporting at the end of specific periods (e.g. quarter, semester, year, etc.) should first be considered a problem of timeliness as this is the most probable cause. Contacting the district HMIS officer to understand the situation or contacting health facilities to remind them to report could be a first recourse in improving incompleteness of reporting due to a problem with timeliness.

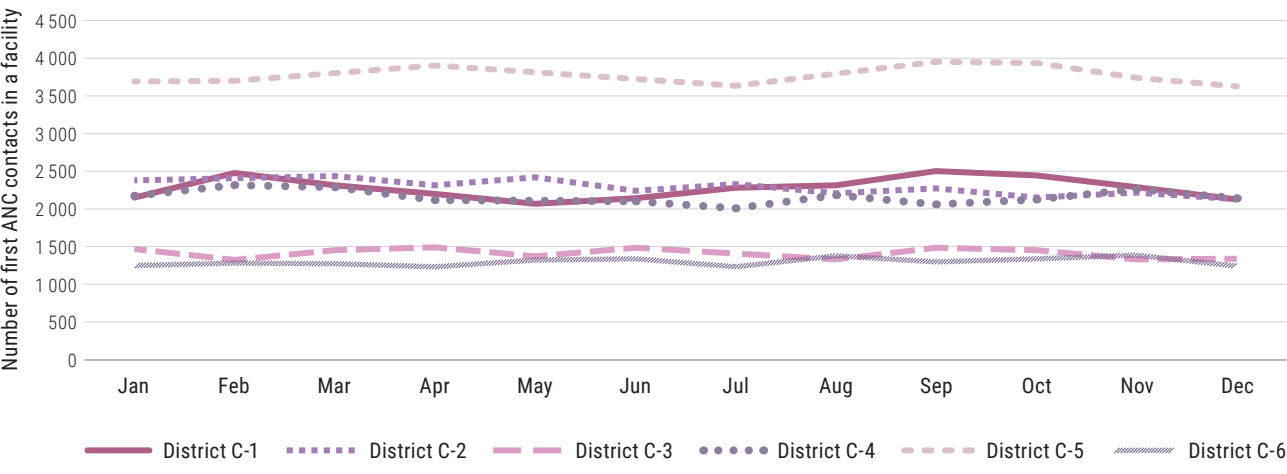


Fig. A3.5 shows the trend in first ANC contacts by month and district for Region C in 2022 after locating and adding the missing data from the five facilities identified previously as not reporting. Notice that the trend for District C-3 is now more consistent. A good rule of thumb when analysing data for MNCAH is to first ensure that we have access to all the available data before drawing conclusions.

If we had not been able to find the missing data and complete the dataset we would be faced with other problems, such as how to interpret the data in light of the gaps. When gaps cannot be filled, the following actions can be taken.

- Impute values based on previous results. Assume consistent levels of service delivery in the affected facilities and fill in the missing monthly values with an average value from the preceding 3 months. Confirm there is no reason to believe that service delivery has changed, such as a worker strike or a natural disaster that prevented clients from accessing care. Ensure that the assumptions made and changes to the data are noted on the programme reports.
- Limit conclusions to the available data. If the missing data do not represent a significant proportion of the data expected from the subnational unit (e.g. no greater than 20%), analyse the available data and note the extent of missing data in programme reports. At all times, conclusions drawn should reflect the data analysed and should not be extrapolated beyond what has been measured.

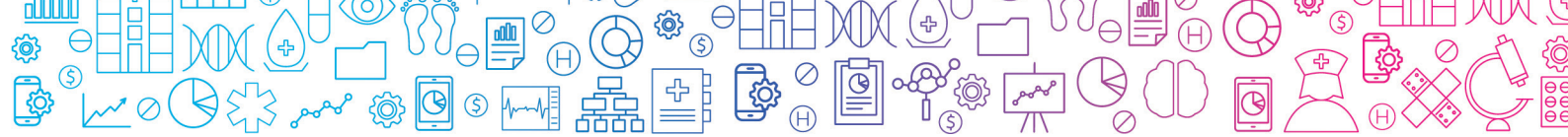
**Fig. A3.5.** First ANC contacts in facilities in Region C, by month and district, 2022 (with missing data now included)



ANC: antenatal care.

As data quality improve (i.e. through additional reports being received or data anomalies being corrected), analyses and other outputs from the data will also change. It is good practice to include timestamps or other explanatory notes as part of the visualizations or interpretations of the data to explain why versions of reports, dashboards, or other products may appear differently.





## 2. Internal consistency of reporting

### 2a. Outliers

Most inconsistencies in reported data can be attributed to gaps or outliers in the data. An outlier is defined as a value in a series of values that is extreme in relation to the other values in the series, i.e. an obviously anomalous value (3). Small anomalous values (e.g. keypunch errors in data entry, or an arithmetic error in manual data compilation) are nearly impossible to detect in aggregated data. If these errors are randomly distributed across all health facilities (i.e. there is no systematic overreporting or underreporting), they do not significantly impair our understanding of the performance of the system. Larger errors should be detectable through simple analyses to find values that are much bigger or smaller than the others in the series. Often the median, or the standard deviation (SD) of the mean, of a series of values is used as a benchmark to identify anomalies (see Table A3.2) (3). Whatever the criterion used, a search for outliers in the data is a good idea prior to data analysis.

**Table A3.2. Monthly values for tetanus vaccination in antenatal clients, 2022, with moderate and extreme outliers**

Region	District	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Total	Average	SD
A	A-1	3 455	3 410	3 205	3 271	3 455	3 522	3 282	3 253	3 290	3 316	3 331	3 053	39 843	3 320	128
A	A-2	10 378	9 216	9 432	9 562	9 843	10 107	10 380	10 445	10 382	10 378	10 668	10 772	121 563	10 130	503
A	A-3	19 247	19 970	19 677	20 138	20 606	20 741	20 836	20 757	20 736	21 140	21 292	20 347	245 487	20 457	603
A	A-4	28 519	28 416	28 943	28 528	28 297	29 639	26 674	30 264	31 052	31 024	30 764	30 784	352 904	29 409	1 392
B	B-1	2 091	2 181	2 156	2 207	2 232	2 380	2 264	2 535	2 519	2 674	2 620	2 396	28 255	2 355	195
B	B-2	8 949	8 966	9 172	9 172	8 216	8 162	8 161	8 154	8 270	7 874	7 943	7 627	100 666	8 389	533
B	B-3	1 231	1 207	1 210	1 240	1 261	1 169	1 214	1 221	1 188	1 198	1 189	1 187	14 515	1 210	26
C	C-1	92 013	90 394	92 252	92 838	95 188	96 414	96 409	96 676	93 854	94 928	94 425	93 046	1 128 437	94 036	1 989
C	C-2	1 994	737	2 130	2 156	1 841	2 066	2 121	2 141	2 206	2 166	2 219	2 057	23 834	1 986	407
C	C-3	10 376	10 055	10 951	10 117	9 138	10 761	10 692	11 421	11 417	10 843	11 201	10 435	127 407	10 617	651
D	D-1	33 652	33 951	34 539	34 930	34 818	35 652	35 238	35 850	36 172	35 750	32 520	36 951	420 023	35 002	1 216
D	D-2	18 853	19 020	19 217	19 631	19 570	28 830	20 186	16 066	16 564	16 758	16 638	15 994	227 327	18 944	3 477
D	D-3	30 148	30 576	31 913	32 071	32 652	33 381	31 716	32 729	33 841	33 364	32 257	32 895	387 543	32 295	1 107

Moderate outlier:  $\pm 2-3$  SD from the mean

Extreme outlier:  $> \pm 3$  SD from the mean

SD: standard deviation.

### 2b. Consistency over time

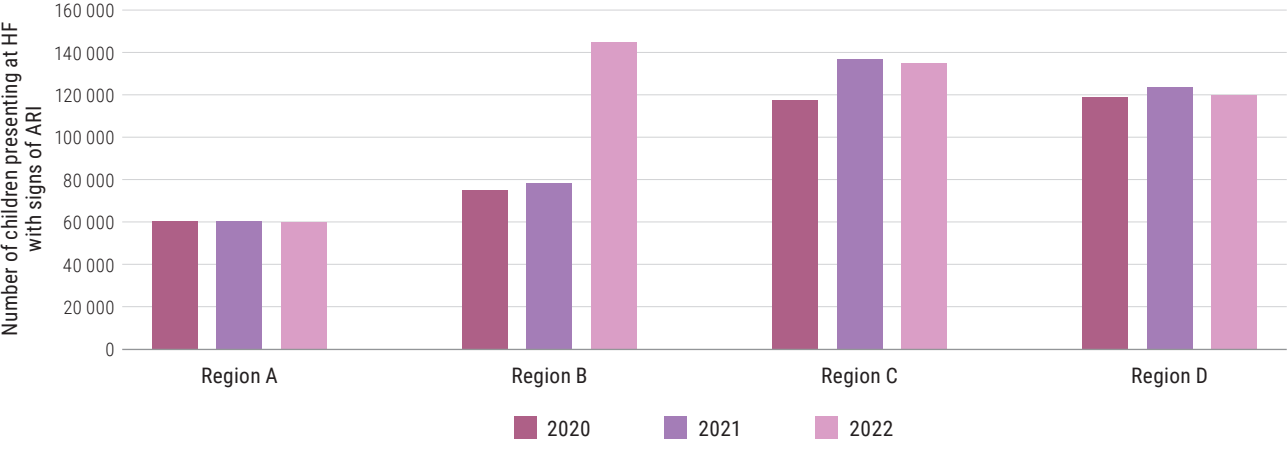
MNCAH managers should be able to identify any unexpected changes in reported data over time. The utilization of some MNCAH services or incidence of specific illnesses may increase or decrease over time due to seasonal changes or patterns in behaviour, while indicators are expected to reflect relatively constant service delivery. Additionally, the ideal direction of performance of an indicator should be considered. For example, an MNCAH manager would hope to find consistent increases in, or stable delivery, of key MNCAH interventions over time and decreases in, or consistent trends, in the incidence of illnesses.

Looking at trends over time can help us identify data quality problems. A deviation from what is considered normal indicates that there may be quality problems in the reported data. We should always look to validate changes we see and determine whether they are real changes in service delivery patterns and not problems with the data. Again, we are most often looking for anomalies, like gaps and outliers, in the data, or values that are significantly different from the normal, or consistent, trend.



For example, Fig. A3.6 shows the number of children who visited a health facility for an ARI by region and year for the period 2020 to 2022. The reported number of children who visited a facility for an ARI in Region B is noticeably higher in 2022 than in the previous years. We need to examine the data from 2022 in more detail to determine where the value originates.

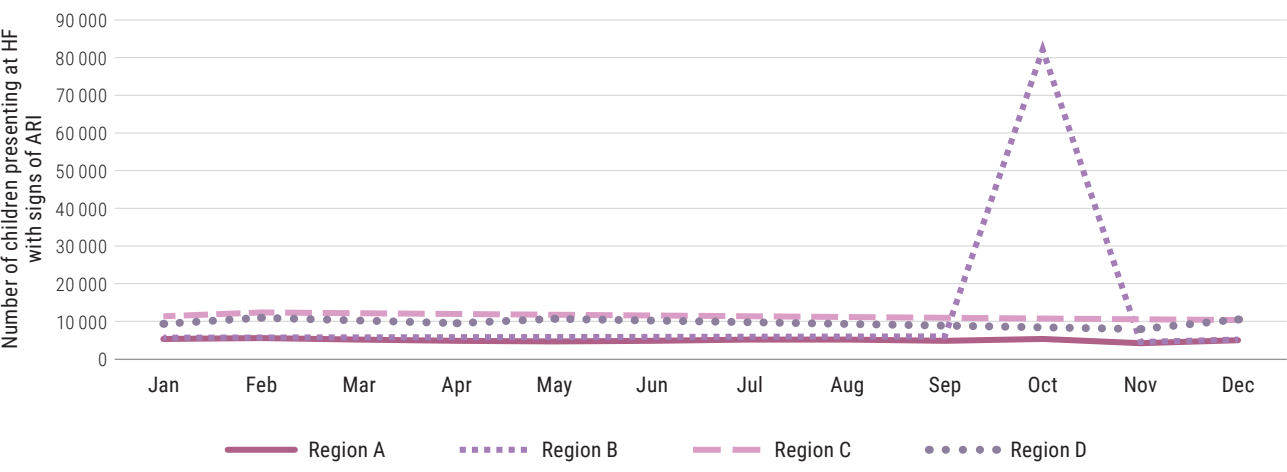
**Fig. A3.6.** Number of children who visited a health facility for an ARI, by region and year, 2020–2022



*ARI: acute respiratory infection; HF: health facility.*

Fig. A3.7 shows the number of children who visited a facility for an ARI by region and month for 2022. Notice a large spike in October 2022 in Region B. We can look at districts within Region B for the month of October 2022 drill down the analysis.

**Fig. A3.7.** Number of children who visited a health facility for an ARI, by region and month, 2022



*ARI: acute respiratory infection; HF: health facility.*

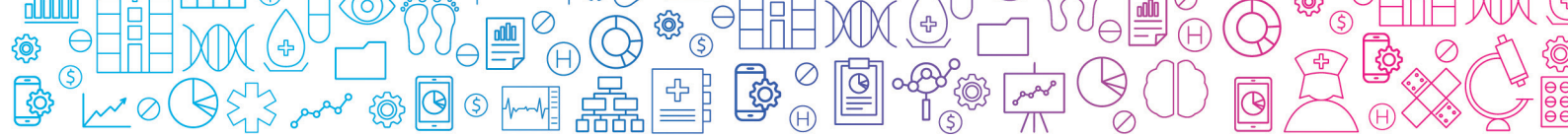
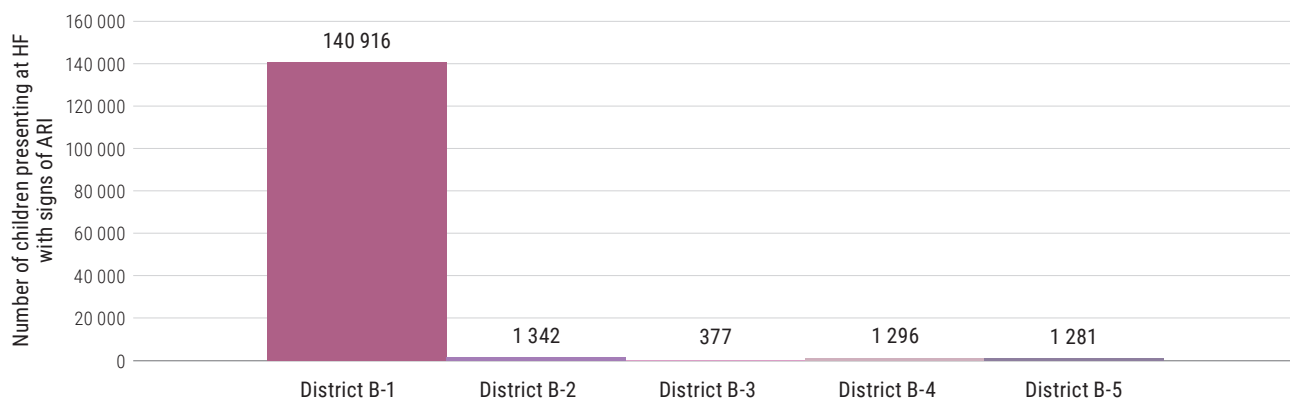


Fig. A3.8 shows the number of children who visited a facility for an ARI by district for Region B in October 2022. Notice that most of the reported service utilization is occurring in District B-1. Let's look at facilities in B-1 to see what is happening.

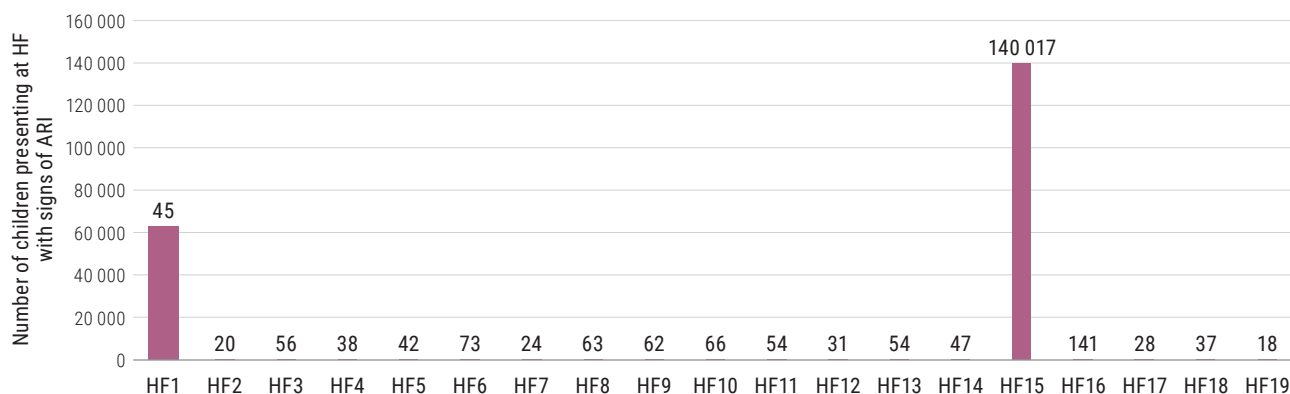
**Fig. A3.8. Number of children who visited a health facility for an ARI in Region B, October 2022**



ARI: acute respiratory infection; HF: health facility.

Fig. A3.9 shows the number of children who visited a facility for an ARI by facility for District B-1 in October of 2022. One facility (HF15) has reported an extreme value relative to other facilities in the district. This is an obvious data quality problem, quite likely a keystroke error, which might have been missed if we had not investigated the data.

**Fig. A3.9. Number of children who visited a facility for an ARI**



ARI: acute respiratory infection; HF: health facility.

In the case of an obvious outlier in the data, notify the HMIS manager to have the extreme value investigated and changed or removed. Until the value is corrected you can replace the value in your analysis by the average for the facility over the preceding 3 months.



## 2c. Consistency between related indicators

When reviewing trends in MNCAH indicators, it is often informative to check whether a predictable relationship between indicators is present in the observed data. For example, in the same cohort of pregnant women, coverage of fourth ANC visits should be lower than or similar to coverage of first ANC visits, since women coming for a fourth visit should have also attended the first (and second and third) visits. Similarly, coverage of the third dose of intermittent preventive treatment of malaria during pregnancy (IPTp3) should always be less than that of the first dose (IPTp1). The absence of a predictable relationship between indicators in the observed data is a good indication of a data quality problem.

## Data management

MNCAH programme managers without a dedicated data manager or statistician to help conduct these analyses should acquire appropriate software tools. Often, country-specific and proprietary dashboards exist that can be configured to show the same metrics each month with refreshed data, minimizing the data management steps required each time the analysis is performed.

If the country HMIS is using DHIS2 as the database management system for the HMIS (and MNCAH data are being reported into this system) the MNCAH programme manager can benefit from existing tools to help evaluate the routine data for quality. The [WHO Data Quality Tool](#) is a web application that can be downloaded and installed on a local instance of the DHIS2. It was developed to facilitate data quality checks on routinely reported aggregate data in the HMIS.

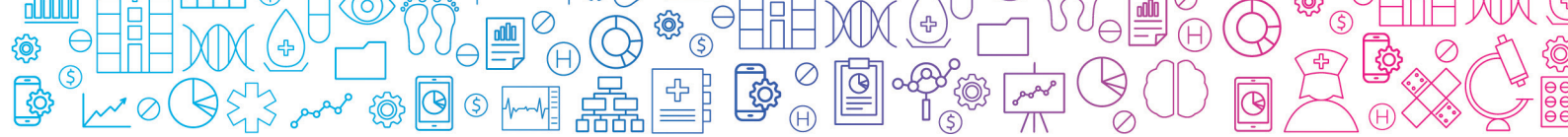
## Correcting data quality problems

Once a data quality problem has been identified a determination should be made about what to do about it. At a minimum the relevant office of the HMIS should be alerted so they can put into effect standard procedures for filling gaps and changing values in the database. Often, a question about the data can be answered with a simple phone call or email to a facility or district to alert them to the data quality problem.

Depending on the size of the problem, the data may still be usable in the current form. For example, if the error does not change the overall conclusions regarding coverage, quality, equity, or performance of the MNCAH programme. If the error is large and does change your conclusions, the problematic value can be excluded from the analysis and note made in the interpretation to be mindful of the exclusion. The value can be replaced with an average value taken from previous reporting periods (e.g. the preceding 3 months), although careful note should be made to alert any consumers of an analysis to the presence of replacement values. There should be a country-specific and standard approach to handling significant erroneous value in the database. HMIS management should be alerted so that they can correct and update to the erroneous value.

## Summary of data quality best practices

For MNCAH managers, addressing data quality is a continuous activity. They also need to understand the principles and metrics for assessing data quality and be able to consider how data quality impacts the understanding of MNCAH coverage and outcome indicators. MNCAH managers need these skills to ensure use of data for regular decision-making, periodic programme planning and review, and evaluation.



MNCAH managers should understand what questions to ask when interpreting data on key MNCAH indicators and also the actions that can be taken to examine data quality issues (e.g. through following up with facilities or HMIS officers or requesting analyses from data managers and statisticians). Ideally, data quality issues should be addressed prior to analysis and review. In addition, regular review and use of data can help to improve both data quality and MNCAH interventions and outcomes.

### Box A3.1. Examples of data quality good practices

- Review trends in reported data.
- Compare performance in priority indicators among subnational units (e.g. regions and districts).
- Drill down to lower reporting levels to investigate apparent anomalies.
- Determine if the trend is real – is it a valid change in service delivery, or something else?
- Try to fix the data – if the change looks like a data quality problem, reach out to the facility or district to try to understand what happened, and why.
- Alert the HMIS officer of the problem so a solution can be developed to avoid recurrence.
- Judge severity of the problem and the usability of data.
- Use available tools (e.g. the [WHO Data Quality Tool for DHIS2](#)) to facilitate the analysis. If such tools are not available, utilize available data managers or statisticians to help conduct the analysis.
- Develop a protocol for routine use that itemizes what to analyse, and how.



## References for Annex 3

1. Data quality assurance (DQA). Geneva: World Health Organization; 2023 (<https://www.who.int/data/data-collection-tools/health-service-data/data-quality-assurance-dqa>, accessed 1 August 2023). accessed 1 August 2023).
2. Data quality assurance. Module 1: framework and metrics. Geneva: World Health Organization; 2023 (<https://www.who.int/publications/i/item/9789240047365>, accessed 1 August 2023).
3. Data quality assurance. Module 2: discrete desk review of data quality. Geneva: World Health Organization; 2023 (<https://www.who.int/data/data-collection-tools/health-service-data/data-quality-assurance-dqa/module-2-desk-review>, accessed 1 August 2023).



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