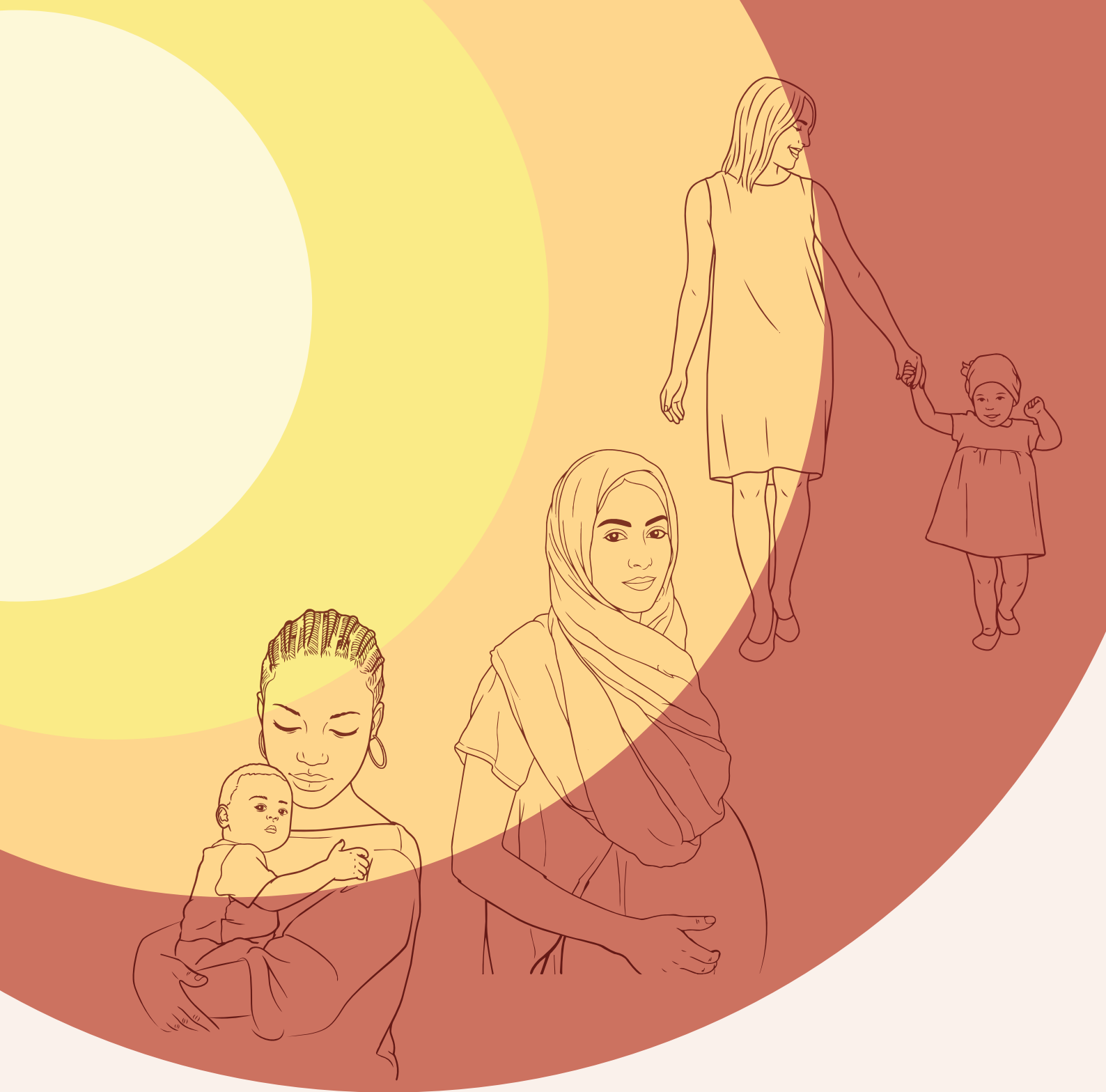




Priority indicators to monitor the impact of heat exposure on maternal, newborn and child health

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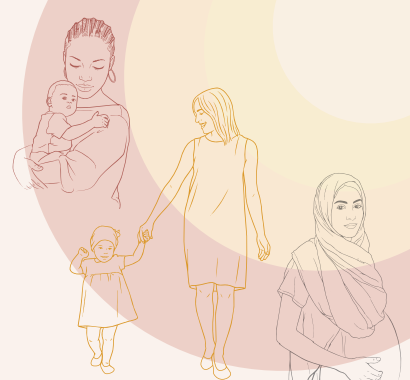
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Contents



Foreword	v
Acknowledgements	vii
Abbreviations	viii
Executive summary	ix
1. Introduction	1
1.1 Background	1
1.2 Scope and purpose	2
1.3 Audience	2
2. Methods for indicator selection	3
3. The priority indicators	7
3.1 Overview of the recommended priority indicators for each area	7
3.2 Indicators for routine monitoring of MNCH	9
3.3 Integration of MNCH considerations into public health and surveillance systems for monitoring heat impacts	16
3.4 Integration of MNCH considerations into questions included in global climate change and national health sector monitoring	19
3.5 Heat exposure data	21
4. Analysing health and heat exposure data	26
4.1 Examples of combined analysis	26
4.2 Considerations for interpretation	29
5. Conclusions	31
References	32
Annex. Contributors	34

Boxes

Box 1. Intended use of MNCH programme indicators.....	9
Box 2. Terminology to describe heat exposure data.....	21
Box 3. Steps for analysis of heat exposure and MNCH data.....	26

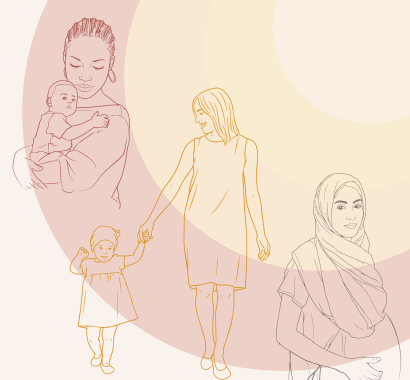
Figures

Fig. 1. Process for indicator selection.....	3
Fig. 2. Conceptual framework for extreme heat and MNCH.....	5
Fig. 3. Environmental and physiological pathways contributing to heat exposure and heat stress.....	22
Fig. 4. Outpatient attendance and maximum air temperature combination chart.....	27
Fig. 5. Preterm births in facilities and maximum UTCI, by month.....	28

Tables

Table 1. Overview of proposed indicators to monitor the impact of heat on MNCH.....	7
Table 2. Indicators for routine monitoring of MNCH.....	10
Table 3. Indicators for the integration of MNCH considerations into public health and surveillance systems, including disaggregation to monitor MNCH trends.....	17
Table 4. Integration of MNCH considerations into questions included in global climate change and national health sector monitoring.....	20
Table 5. Heat exposure data and sources.....	24
Table 6. Values for expected outpatient attendance, actual outpatient attendance, baseline maximum air temperature and calculations of change in outpatient attendance.....	28
Table 7. Expected and actual preterm births in facilities and maximum UTCI values and the percentage change in preterm births in facilities.....	29

Foreword



Climate change is one of the defining challenges of our time, and extreme heat is among its most direct and rapidly increasing threats to health. Across all regions of the world, heatwaves are becoming more frequent, longer lasting and more intense. As temperatures rise, so too do the risks to human health, livelihoods and well-being. Pregnant and postpartum women, newborns and children are among those most vulnerable to the impacts of heat exposure because of their unique physiological and developmental characteristics. Evidence increasingly links heat exposure to adverse maternal, fetal, newborn and child health outcomes, while also affecting health service utilization, learning environments and broader determinants of health.

Yet despite growing recognition of these risks, important gaps remain in our ability to monitor and respond to the impacts of heat on maternal, newborn and child health. Many countries lack practical guidance on which health indicators to track, how to interpret trends alongside heat exposure data, and how to integrate these considerations into routine monitoring systems, public health surveillance and climate and health policies.

This publication represents a collaborative effort by the World Health Organization (WHO), the World Meteorological Organization (WMO), the United Nations Children's Fund (UNICEF) and the United Nations Population Fund (UNFPA) to help address this gap. Drawing on the expertise of governments, researchers, public health specialists, meteorological experts, health professional associations and implementing partners from around the world, we have identified a priority set of indicators to support monitoring of the impact of heat exposure on maternal, newborn and child health. These indicators span four complementary domains: routine MNCH monitoring, public health and surveillance systems, climate and health monitoring, and measures of heat exposure.

The indicators presented here are not intended to provide definitive measures of causality. Rather, they offer a practical starting point for identifying trends, signalling potential impacts, and informing action. By combining health and heat exposure data, countries can strengthen their ability to anticipate risks, target interventions, guide programme adaptation, and build more climate-resilient health systems that respond to the needs of women, newborns and children.

No single organization can address the health impacts of climate change alone. Protecting maternal, newborn and child health in a warming world requires collaboration across sectors. It also requires investment in routine data systems, surveillance, research and local capacity to translate information into action.

We encourage countries, partners and stakeholders to use these indicators according to their context and needs, and to continue strengthening the evidence base that underpins effective action. As experience grows and new evidence emerges, these indicators should be reviewed and refined. What remains constant, however, is the need to ensure that women, newborns and children are visible in climate and health monitoring efforts and that their needs are reflected in policies and programmes.

Measurement drives action. By strengthening our ability to monitor the impacts of heat on maternal, newborn and child health, we can better protect those at greatest risk and support a healthier, more resilient future for all.



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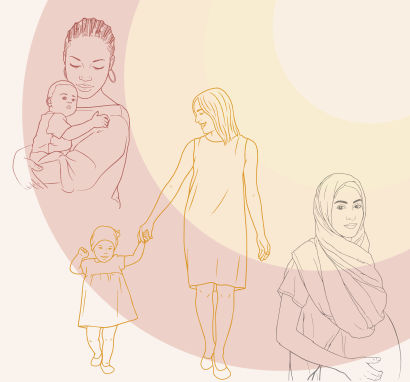
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The document was prepared under the overall coordination and technical guidance of Anayda Portela (Department of Sexual, Reproductive, Maternal, Child and Adolescent Health and Ageing, WHO headquarters). The lead writers for this document were Theresa Diaz (dataHEARD, Switzerland), Denise Soesilo (Outsight International, Switzerland) and Elizabeth Katwan and Anayda Portela (Department of Sexual, Reproductive, Maternal, Child and Adolescent Health and Ageing, WHO headquarters). Myer Glickman (United Kingdom Statistics Authority, United Kingdom of Great Britain and Northern Ireland) contributed to the sections on priority indicators, particularly the content of Tables 2 and 3; Armel Castellan (WMO) and Leonidas Ioannou (University of Cyprus, Cyprus) contributed to section 3.5 on heat exposure data.

An inter-agency group of contributors included from WHO headquarters: Jean-Pierre Monet and Kathleen Strong (Department of Sexual, Reproductive, Maternal, Child and Adolescent Health and Ageing), Christian Schweizer and Elena Villalobos (Department of Environment, Climate Change, One Health and Migration); from WMO: Armel Castellan and Alejandro Saez Reale; from UNICEF: Tashrik Ahmed and Gagan Gupta; from UNFPA: Kathleen Mitchell. Reviewers are listed in the Annex. The individuals involved throughout the process of indicator identification and selection are also listed in the Annex, the [report of the scoping meeting held in April 2023](#) and the [report of the final meeting held in January 2026](#). Special thanks are extended to the chairs of the expert meetings, Zulfiqar A. Bhutta and Caroline Homer.

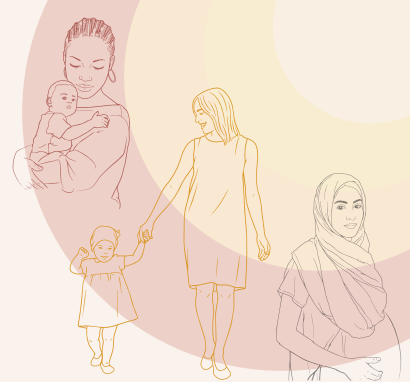
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Abbreviations

CRVS	civil registration and vital statistics
MNCH	maternal, newborn and child health
RHIS	routine health information system
UN	United Nations
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
UNSD	United Nations Statistics Division
UTCI	Universal Thermal Climate Index
WBGT	wet-bulb globe temperature
WHO	World Health Organization
WMO	World Meteorological Organization

Executive summary



Background

Climate change is intensifying the frequency, duration and severity of extreme heat events worldwide, posing an unprecedented threat to human health. Pregnant and postpartum women, newborns and children are among the populations most vulnerable to these risks, as anatomical, developmental, physiological and behavioural factors make them disproportionately susceptible to heat-related harm. Despite this recognized vulnerability, a significant information gap exists in monitoring the impact of extreme heat on maternal, newborn and child health (MNCH). To address this gap, the World Health Organization (WHO), in collaboration with the World Meteorological Organization (WMO), the United Nations Children's Fund (UNICEF) and the United Nations Population Fund (UNFPA) has identified a set of priority indicators designed to track and assess trends in MNCH outcomes and outputs associated with heat exposure.

Scope and purpose

This publication presents the indicators, the methodology used to select the indicators, their rationale, and their limitations. It also provides practical guidance for implementation.

The intended audience comprises a range of stakeholders involved in monitoring, analysing and responding to the impacts of heat on MNCH, including:

- managers of MNCH, public health and surveillance, and climate change and health programmes;
- staff within meteorological organizations responsible for producing environmental data;
- managers of nongovernmental organizations and implementing partners supporting MNCH programmes, monitoring and evaluation and climate change and health responses; and
- staff working in academia and research institutions studying the impact of heat on MNCH.

Methods for indicator selection

The indicators were selected through a structured process, adapted from methods previously used by WHO in indicator-prioritization exercises. The process engaged experts in MNCH programmes, monitoring and evaluation, climate epidemiology, thermal physiology, meteorology, and climate science, representing governments, nongovernmental organizations, research and academic institutions, public health, MNCH professional associations, WHO MNCH monitoring advisory groups, and UN agencies. Indicators were evaluated against defined criteria, including feasibility of data collection, relevance to MNCH outcomes in relation to heat, and importance for informing actions.

Priority indicators

The proposed indicators reflect critical associations between heat exposure and MNCH identified in the literature, and are intended to flag potential impacts and to trigger further investigation and response. These recommendations are based on currently available evidence and should be revisited in the coming years as new data and experience emerge.

The indicators were selected across four domains:

- routine monitoring of MNCH;
- integration of MNCH considerations into public health and surveillance systems for monitoring heat impacts;
- integration of MNCH considerations into global climate change and national health sector monitoring;
- measures of heat exposure (data on exposure to heat for analysis alongside health data).

Core and additional indicators are proposed to allow countries to address their specific contextual needs. Country programmes may choose to track alternative indicators that they consider more relevant to their context; however, use of common indicators will enable comparability and provide an overview at regional and global levels.

The priority indicators are as follows:

Domain	Priority	Life stage	Indicator name
Routine monitoring of MNCH ^a	Core	Maternal, newborn	Preterm birth
		Maternal, newborn, child	Outpatient attendance
	Additional	Maternal	Hypertension in pregnancy (antenatal care clients)
		Newborn	Late stillbirths in facilities
			Low birth weight
		Newborn, child	Under-five mortality rate in facilities
		Child	Average percentage daily attendance at (primary) school
Integration of MNCH considerations into public health and surveillance systems for monitoring heat impacts	Core	Maternal, newborn, child	Mortality rate disaggregated by age and sex
			Emergency room visits disaggregated by age and sex

Domain	Priority	Life stage	Indicator name
Integration of MNCH considerations into global climate change and national health sector monitoring	Core	Maternal, newborn, child	Ministries of health include MNCH in the health and climate change multistakeholder mechanism (e.g. task force or committee)
			Country considers children and women as specific population groups in the vulnerability and adaptation assessment
			Percentage of subnational health authorities that receive early warning system information on extreme heat
			Country provided MNCH programme with training on climate change and health in the past two years
			Country has a health surveillance system for heat-related illness and mortality that includes meteorological information (e.g. for risk mapping)
			Country integrates weather and climate information into the implementation/ service delivery of the MNCH programme
Heat exposure data	Core	Maternal, newborn, child	Air temperature
	Additional	Maternal, newborn, child	Heat Index Universal Thermal Climate Index Wet-bulb globe temperature

^a Routine facility-based data are proposed as the main data source; where available community-based data should also be used.

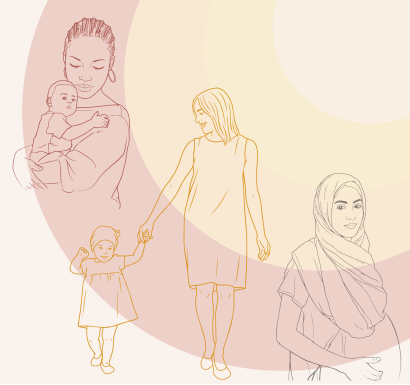
Detailed information is presented in tables in the main publication, including, where applicable, the indicator metadata (definitions, numerators and denominators, data sources) and implementation and measurement considerations.

The proposed indicators for routine MNCH data monitoring focus on real-time local monitoring of established health outcomes (e.g. increases in preterm births and facility-based deaths) and health outputs (e.g. changes in health-care utilization, school attendance) associated with heat events. Although not the primary focus of this document, national population-based modelled outcomes can also be used in conjunction with these local data to advocate for national actions and mobilize resources needed to prevent poor health outcomes during future heat-related events.

Way forward

The proposed indicators provide a starting point for countries to monitor heat-related risks to MNCH and to strengthen the integration of MNCH considerations into climate and health policies and programmes. Priorities for the coming years include improving data availability, strengthening surveillance systems, expanding the use of climate and health information for MNCH decision-making, and building the evidence base for action. The indicators should be reviewed and updated as experience and evidence accumulate.

1. Introduction



1.1 Background

Pregnant and postpartum women, newborns and children are uniquely vulnerable to climate risks owing to a range of anatomical, developmental, physiological and behavioural factors. Heat-related risks during pregnancy include preterm birth, stillbirth, congenital anomalies, small-for-gestational-age newborns, and cardiovascular events during labour (1). Infants and children are more susceptible to climate-related health burdens than adults, given their physiological and cognitive development and their dependence on parents and caregivers. Globally, 1.5 billion children face increasingly frequent, longer or more severe heatwaves, while 1.2 billion children are exposed to extreme heat. Beyond direct health impacts, heat and heatwaves disrupt daily life through school closures, strained energy and water systems, and service breakdowns (2).

Research on the impacts of heat exposure on maternal, newborn and child health (MNCH) is emerging, and has expanded in recent years. Monitoring of these impacts has been limited due to uncertainty about which outcomes are most affected and which measures of heat exposure best capture exposure risks. This has led to an important information gap.

In 2023, the World Health Organization (WHO) Department of Maternal, Newborn, Child and Adolescent Health and Ageing,¹ as part of the [HIGH Horizons](https://www.high-horizons.eu/)² project, initiated a process to identify priority indicators for monitoring the impact of extreme heat on MNCH. This work was carried out in collaboration with the WHO Department of Climate Change and Health² and the World Meteorological Organization (WMO). The final outcome of this process would be published jointly with the United Nations Children's Fund (UNICEF) and the United Nations Population Fund (UNFPA), with a commitment of these agencies to support actions and the monitoring of the impact of heat on MNCH.

The HIGH Horizons project addresses a number of key knowledge gaps around the quantification and monitoring of direct and indirect impacts of heat exposure on maternal, newborn and child health. In the project, pregnant women, infants, and health workers serve as sentinel populations for tracking climate change impacts, adaptations, and co-benefits. The project started in 2022 and will run over four years. It includes eleven partners across 10 countries in Africa and Europe and encompasses activities in both sub-Saharan Africa and the European Union. The project will quantify and monitor direct and indirect health impacts of extreme heat; test a personalized early warning system in Sweden, South Africa and Zimbabwe; and implement integrated adaptation-mitigation actions in health facilities in South Africa and Zimbabwe (see <https://www.high-horizons.eu/>).

¹ The grant partner and originator of this work was the WHO Department of Maternal, Newborn, Child and Adolescent Health and Ageing, which since 2026, is part of WHO Department of Sexual, Reproductive, Maternal, Child and Adolescent Health and Ageing. The WHO Department of Climate Change and Health is now the Department of Environment, Climate Change, One Health and Migration.

² Heat Indicators for Global Health (HIGH Horizons): monitoring, early warning systems and health facility interventions for pregnant and postpartum women, infants and young children and health workers.

1.2 Scope and purpose

This document provides a list of priority indicators for monitoring the impact of heat on MNCH, including among pregnant and postpartum women, newborns and children as well as progress in actions taken to reduce this impact. It also outlines the methods and processes used to identify these indicators.

The indicators are organized into four areas to facilitate their integration into MNCH programmes, routine health information systems (RHIS), public health and surveillance and the broader climate change and health sector response:

- Routine monitoring of MNCH.
- Integration of MNCH considerations into public health and surveillance systems for monitoring heat impacts.
- Integration of MNCH considerations into questions included in global climate change and national health sector monitoring.
- Measures of heat exposure (data on exposure to heat for analysis alongside health data).

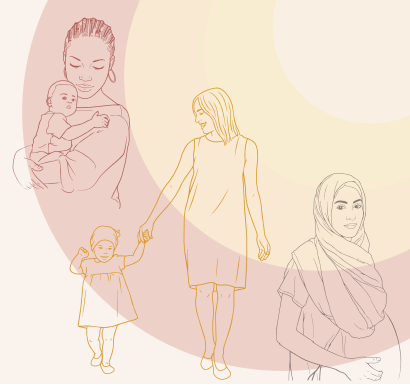
The proposed indicators reflect critical associations between heat exposure and MNCH identified in the literature and are intended to flag potential issues and trigger further investigation and response.

1.3 Audience

This document is intended to support a range of stakeholders involved in monitoring, analysing and responding to the impacts of heat on MNCH, including:

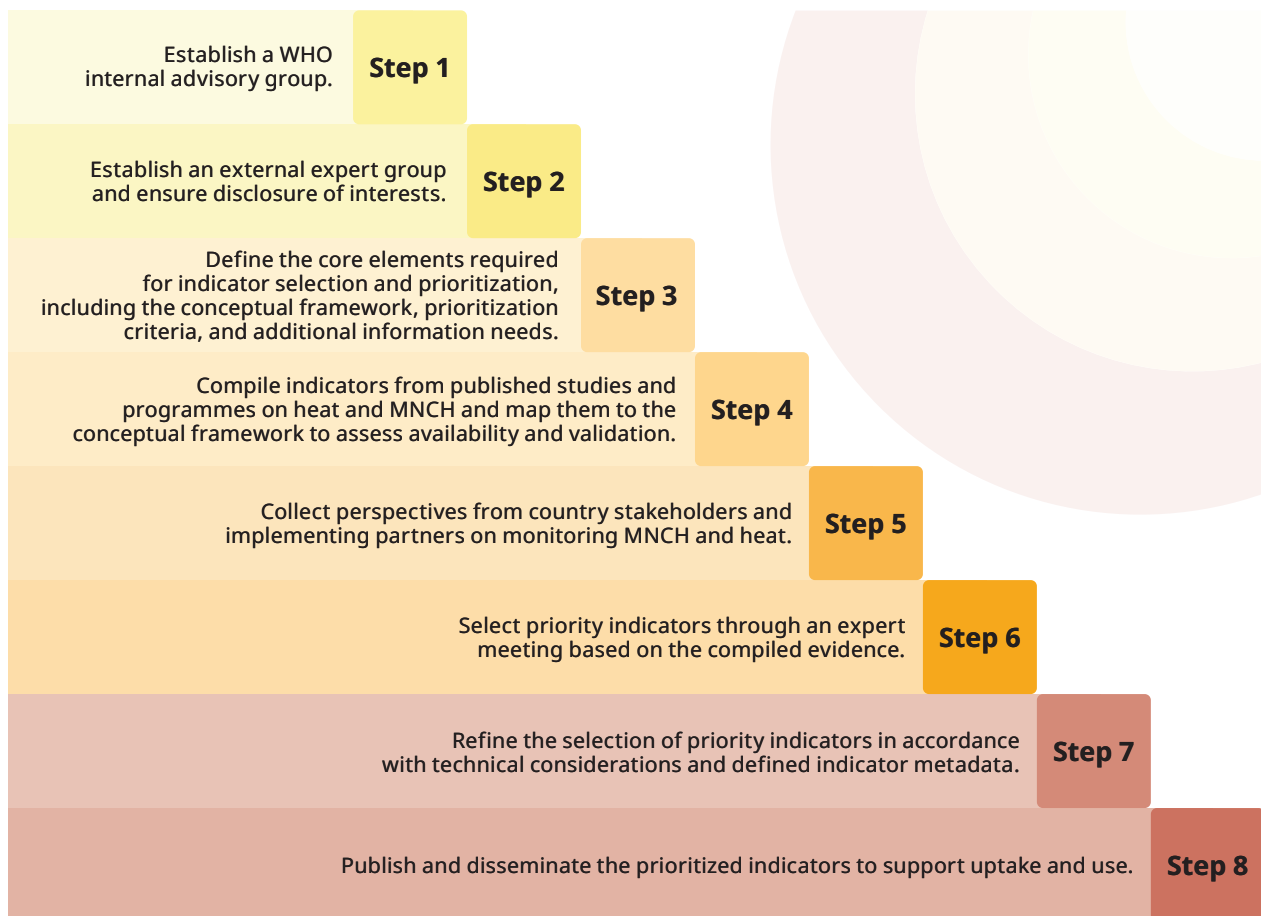
- managers of MNCH, public health and surveillance, and climate change and health programmes within ministries of health and environment, and other government agencies and national statistical offices;
- staff within meteorological organizations responsible for producing environmental data and indices that underpin heat exposure assessment;
- managers of nongovernmental organizations and implementing partners supporting MNCH programmes, monitoring and evaluation, and/or climate change and health responses; and
- staff working in academic and research institutions studying the impact of heat on MNCH.

2. Methods for indicator selection



The set of priority indicators presented in this document was selected through a structured process, adapted from methods used by WHO in previous indicator-prioritization exercises (3–7). Fig. 1 summarizes the key steps in this process. Further details are available in the reports of the scoping meeting held in April 2023 (8) and the final meeting in January 2026 (9).

Fig. 1. Process for indicator selection



Step 1: Establish a WHO internal advisory group

The group included experts from WHO headquarters and regional offices, with representation in MNCH, climate change and health, and health information systems.

Step 2: Establish an external expert group and ensure disclosure of interests

Experts were selected based on their technical expertise in MNCH programmes, monitoring and evaluation, climate epidemiology, thermal physiology, meteorology, and climate science. The expert group included representatives from governments, nongovernmental organizations, research and academic institutions, public health, MNCH professional associations, WHO MNCH monitoring advisory groups, and UN agencies.

In accordance with WHO procedures for declaration of interests, all external collaborators declared in writing any competing interests (academic, financial, or other) using the standard WHO form, prior to participation in the indicator prioritization process. All declarations were reviewed and assessed for potential conflicts of interest. No declared conflicts of interest were considered sufficiently significant to affect the integrity of the process.

The expert group provided input and guidance throughout the indicator selection process. Two in-person meetings were held, in April 2023 (8) and January 2026 (9), with virtual discussions organized between these meetings. The resulting reports document in detail the deliberations and recommendations.

Step 3: Define the core elements required for indicator selection and prioritization, including the conceptual framework, prioritization criteria, and additional information needs

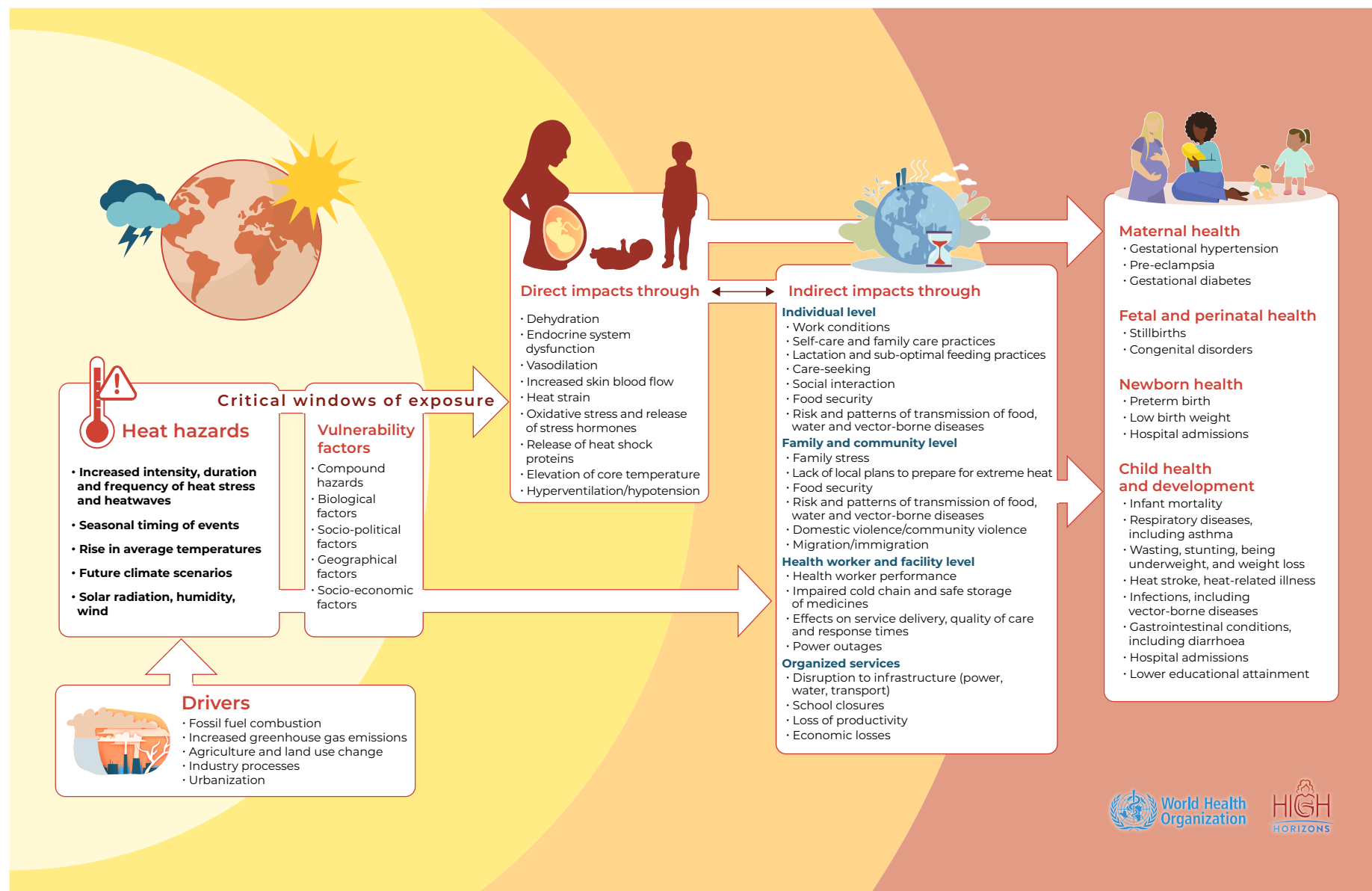
The first expert meeting was convened by WHO with WMO in Geneva in April 2023. During this meeting, a conceptual framework illustrating the pathways through which heat impacts MNCH was reviewed and finalized (see Fig. 2).

The following criteria were selected to guide the prioritization of indicators:

- Feasible: data required for the indicator should be readily available, or feasible to collect in relevant settings. Use of existing MNCH indicators that are already defined and routinely collected is recommended.
- Relevant: the indicator should measure a clear and specific construct in a priority area of interest, with a demonstrated relationship to MNCH outcomes.
- Important: the indicator should generate data that contributes meaningfully to informing actions to prevent and respond to heat-related MNCH outcomes.

Based on preliminary research findings presented during the meeting, the expert group identified additional information needs to support indicator prioritization. Specifically, they noted that available evidence was limited in geographic scope and requested that WHO work with partners to incorporate information from a broader range of settings, including low- and middle-income countries. They also highlighted gaps in information availability related to the impact of heat exposure on child health.

Fig. 2. Conceptual framework for extreme heat and MNCH



Step 4: Compile indicators from published studies and programmes on heat and MNCH and map them to the conceptual framework to assess availability and validation

Indicators were identified from existing literature and globally recommended MNCH indicator lists. They were mapped to the conceptual framework to determine which indicators are already collected, validated and feasible to use. Their data sources were also documented, including research studies, survey and RHIS.

Step 5: Collect perspectives from country stakeholders and implementing partners on monitoring MNCH and heat

Partners in the HIGH Horizons project, in collaboration with national authorities in Greece, South Africa and Zimbabwe, organized stakeholder meetings with health and climate change actors to discuss and prioritize indicators for integration into national routine monitoring systems.

In-depth interviews were also conducted with stakeholders in four Asian countries (Bangladesh, India, Pakistan, Thailand) and with global implementing partners to gather feedback on potential indicators and their relevance for monitoring the impact of heat exposure on MNCH (10).

Step 6: Select priority indicators through an expert meeting based on the compiled evidence

WHO, together with WMO, convened the final expert meeting in Geneva in January 2026 (9) to review findings and select priority indicators. The compiled evidence and information were presented to the expert group.

Working groups were organized around the four areas – MNCH, public health and surveillance, climate change and health sector response, and heat exposure data – to facilitate discussion and prioritization of indicators. Consensus on a final set of indicators was achieved through plenary discussions. Further details are provided in the January 2026 meeting report (9).

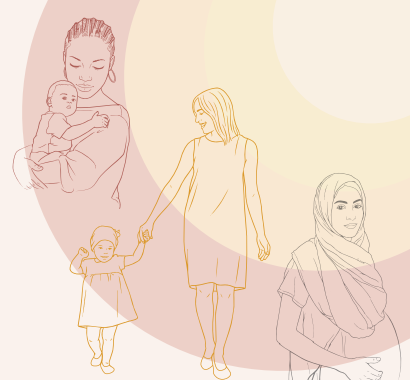
Step 7: Refine the selection of priority indicators in accordance with technical considerations and defined indicator metadata

Following the expert meeting, the working group leads and representatives of the UN agencies participated in several virtual meetings to refine the selected indicators and ensure consistency with established indicator definitions and metadata. A draft document was shared with selected meeting participants and external reviewers, including representatives of MNCH monitoring advisory groups, before finalization.

Step 8: Publish and disseminate the prioritized indicators to support uptake and use

The final set of indicators, as agreed through the process described, is presented in this document. Ongoing coordination efforts are in place to support country uptake, including through the “Every Woman, Every Newborn, Everywhere initiative”, and to promote harmonization with other climate change and health monitoring efforts, such as the Lancet Countdown on health and climate change and the Climate and Health Sub-Group of the UN Expert Group on Environment and Climate Change Statistics.

3. The priority indicators



3.1 Overview of the recommended priority indicators for each area

As mentioned, priority indicators were selected for the four domains:

- Routine monitoring of MNCH.
- Integration of MNCH considerations into public health and surveillance systems monitoring of heat impacts.
- Integration of MNCH considerations into global climate change and national health sector monitoring.
- Measures of heat exposure (data on exposure to heat for analysis alongside health data).

Table 1 provides an overview of all the priority indicators. Detailed information is presented in Tables 2 to 5, including, where applicable, the indicator metadata (definitions, numerators and denominators, data sources) and implementation and measurement considerations. For definitions, please refer to the *Glossary of health data, statistics and public health indicators* (11).

Table 1. Overview of proposed indicators to monitor the impact of heat on MNCH

Domain	Priority	Life stage	Indicator name
Routine monitoring of MNCH ^a	Core	Maternal, newborn	Preterm birth
		Maternal, newborn, child	Outpatient attendance
	Additional	Maternal	Hypertension in pregnancy (antenatal care clients)
		Newborn	Late stillbirths in facilities
			Low birth weight
		Newborn, child	Under-five mortality rate in facilities
		Child	Average percentage daily attendance at (primary) school
Integration of MNCH considerations into public health and surveillance systems for monitoring heat impacts	Core	Maternal, newborn, child	Mortality rate disaggregated by age and sex
			Emergency room visits disaggregated by age and sex

Domain	Priority	Life stage	Indicator name
Integration of MNCH considerations into global climate change and national health sector monitoring	Core	Maternal, newborn, child	Ministries of health include MNCH in the health and climate change multistakeholder mechanism (e.g. task force or committee)
			Country considers children and women as specific population groups in the vulnerability and adaptation assessment
			Percentage of subnational health authorities that receive early warning system information on extreme heat
			Country provided MNCH programme with training on climate change and health in the past two years
			Country has a health surveillance system for heat-related illness and mortality that includes meteorological information (e.g. for risk mapping)
			Country integrates weather and climate information into the implementation/ service delivery of the MNCH programme
Heat exposure data	Core	Maternal, newborn, child	Air temperature
	Additional	Maternal, newborn, child	Heat Index Universal Thermal Climate Index Wet-bulb globe temperature

^a Routine facility-based data are proposed as the main data source; where available community-based data should also be used.

Core and **additional** indicators have been identified to enable countries to consider their specific contextual needs. Given the association between heat exposure and a range of common conditions for which data are collected, countries may choose to track other indicators that they consider more relevant to their context.

These recommendations are based on the current available evidence and should be revisited in response to advances in research and in country implementation.

3.2 Indicators for routine monitoring of MNCH

Indicators for MNCH outputs and outcomes, summarized in Table 2, reflect data collected and reported through routine administrative information systems. Routine facility-based data are proposed as the main data source; where available, community-based data should also be used. Data should be assessed monthly, and where possible, more frequently (weekly or daily) during heat events. Data for these indicators should be examined together with data on heat exposure (see Table 5), such as observed air temperature, using spatial and temporal analyses. Examples are provided in section 4.

RHIS data are often not representative of the full population of a given catchment area³ as they do not capture individuals without health-system contact and frequently exclude private facilities or community health services. As a result, certain groups may be missed. Programme managers should therefore verify data availability and quality across relevant indicators before analysis, and transparently flag limitations in reporting. Additional guidance is provided in *Analysis and use of health facility data: guidance for maternal, newborn, child and adolescent health programme managers* (12).

The indicators reflect critical associations between heat exposure and MNCH outcomes, identified through the literature, and are intended to flag issues early and trigger further investigation and action (see Box 1).

Box 1. Intended use of MNCH programme indicators

The proposed MNCH programme indicators are intended for real-time local monitoring of established health outcomes (e.g. increases in preterm births and facility-based deaths) and outputs (e.g. changes in health-care utilization, school attendance) associated with heat exposure. They emphasize the use and visualization of routine health data in areas affected by heat-related events to prompt local action. These indicators are intended to flag issues early and trigger further investigation and action.

Although not the focus of this document, outcomes measured through national population-based survey data can be used in conjunction with local data to advocate for national actions and mobilize resources needed to prevent adverse health outcomes during future heat-related events.

³ The geographical area around an institution or business, such as a health facility, from which the population uses its services. A catchment area is often a key output of geographical accessibility analysis (11).

Table 2. Indicators for routine monitoring of MNCH^a

Indicator name	Indicator definition	Computation (numerator [N], denominator [D])	Suggested disaggregation	Data source	Rationale	Considerations	Global indicator frameworks ^b
Core indicators							
Maternal, newborn							
Preterm birth in facilities	Proportion of births in facilities that are preterm (<37 completed weeks gestation)	N: Number of newborns born in facilities <37 completed weeks gestation. D: Number of live births ^c in facilities in the same period (12).	• <28 weeks, • 28–31 weeks, • 32–36 weeks	Preferred: RHIS Other: medical records or maternity register	Odds of preterm birth increase with an increase in heat exposure particularly in the third trimester of pregnancy and during heatwaves (1).	Availability of reporting on this indicator in aggregated RHIS data varies greatly. Accurate assessment of gestational age is challenging in many settings. Where gestational age is not reliable, low birth weight, listed as an additional indicator below, can be used as a proxy. The hospital ICD-11^{d,e} coding may be available. While preterm birth is considered a perinatal health outcome, in this context, it reflects heat exposure of the mother during pregnancy. The rate of preterm births may be affected by other factors, such as maternal age, ethnicity, health behaviours and health and nutritional status.	Minimal set of indicators for routine programme monitoring – preterm birth rate (12).

Indicator name	Indicator definition	Computation (numerator [N], denominator [D])	Suggested disaggregation	Data source	Rationale	Considerations	Global indicator frameworks ^b
Maternal, newborn, child							
Outpatient attendance	Rate of outpatient department visits	N: Number of outpatient department visits in specified age groups in a specified period. D: Estimated total catchment population of the specified age group in the same period (12).	Age • Newborns (0–6 days, 7–<28 days) • Children (1 month–4 years, 5–9 years) • Women of reproductive age (15–49 years) Gender/sex Pregnancy or postpartum status Reason for visit	Preferred: RHIS Other: OPD register	Heat exposure is associated with a range of adverse MNCH outcomes and may lead to changes in health service utilization (1,13).	Reason for visit and whether it is a new or repeat visit may not be well documented, so additional research may be needed to understand any increase in health service utilization. Estimates of the catchment population for a specific health facility should include migrant populations, seasonal mobility, or the presence of alternative health services.	UNSD Indicator 45: Incidence of heat- and cold-related illnesses or excess mortality. Hospital admissions from all causes attributable to heat (14).

Indicator name	Indicator definition	Computation (numerator [N], denominator [D])	Suggested disaggregation	Data source	Rationale	Considerations	Global indicator frameworks ^b
Additional indicators							
Maternal							
Hypertension in pregnancy in antenatal clinic clients	Proportion of antenatal clients with elevated blood pressure	N: Number of antenatal clients with measured elevated blood pressure (systolic blood pressure ≥ 140 mmHg and/or a diastolic blood pressure ≥ 90 mmHg on two occasions), in the specified period (counting each individual client only once in each period). D: Number of antenatal clients with blood pressure measured in the same period.		Preferred: RHIS Other: medical records, antenatal register	Heat exposure is associated with hypertensive disorders of pregnancy, such as pre-eclampsia and gestational hypertension (1).	This is an aspirational indicator. Ability to report on this indicator using aggregated facility data will vary by setting. Routine assessment and accuracy of assessment of blood pressure in antenatal contacts is challenging in many settings. Aggregated RHIS data may not accurately measure the delivery of repeated services provided to individuals across multiple visits. In settings with RHIS that have the capacity to track individual clients over time, this approach would be more feasible. The hospital ICD-11 coding may be available.^f	

Indicator name	Indicator definition	Computation (numerator [N], denominator [D])	Suggested disaggregation	Data source	Rationale	Considerations	Global indicator frameworks ^b
Newborn							
Late stillbirths in facilities	Proportion of babies born in facilities with no signs of life, ≥28 weeks gestation or weighing ≥1000 g	N: Number of stillbirths in facilities in the specified period. D: Number of total births (live births and stillbirths) in facilities in the same period (12).	Antepartum (death of a fetus before the onset of labour). Intrapartum (death of a fetus after the onset of labour and before birth).	Preferred: RHIS Other: medical records, birth register, stillbirth registrations	Heat exposure during pregnancy is associated with adverse fetal and perinatal outcomes, including stillbirths (1).	Reporting challenges exist at the facility level given data quality issues, including incomplete, inaccurate or lack of timely data. The definition of a stillbirth varies by country and context, such as differences in inclusion for gestational age (e.g. 20–28 weeks) and birth weight (e.g. ≥500 g). The hospital ICD-11 coding may be available, ^g but data recorded for stillbirths may be limited.	The Global Strategy for Women's Children's and Adolescents' Health (2016–2030) (15). • Institutional stillbirths.
Live births with low birth weight (<2500 g) in facilities	Proportion of live births in facilities with birth weight <2500 g	N: Number of newborns born alive in facilities with weight <2500 g at birth in a specified period. D: Number of live births in facilities in the same period (12).	Subgroups of: • <2000 g • <1500 g	Preferred: RHIS Other: medical records	Heat exposure is associated with increased odds of low birth weight (1).	The quality of data may be impacted due to the lack of digital scales or, in some countries, health workers may round up birth weight. The hospital ICD-11 coding may be available. ^h	The Global Strategy for Women's Children's and Adolescents' Health (2016–2030) (15). • Measurement of prevalence of low birth weight and small-for-gestational age.

Indicator name	Indicator definition	Computation (numerator [N], denominator [D])	Suggested disaggregation	Data source	Rationale	Considerations	Global indicator frameworks ^b
Newborn, child							
Under-five mortality rate in facilities	Proportion of inpatient deaths in facilities by age group	N: Number of inpatient deaths in facilities, in a specified period, by age. D: Number of discharges (including deaths) in the same period, by age (12).	Age • Newborns (0–6 days and 7–<28 days) • Children (1 month –4 years) Gender/sex All-cause and cause-specific deaths	RHIS	Excess mortality is linked to heat exposure; with evidence for heat-related mortality on every continent (16).	Accurate reporting of causes of death in aggregate RHIS may be difficult. Linkages between national CRVS and MPDSR systems should be considered. RHIS often may not include deaths that occurred after discharge; in some settings, hospital mortality is often counted up to 30 days after discharge. In many settings, extreme heat is often underreported as a cause of an adverse outcome.	SDG Indicators: • Neonatal mortality rate (3.2.2). • Under-five mortality rate (3.2.1).
Child							
Average percentage daily attendance at (primary) school	Overall percentage of enrolled students who attend class every day	N: Total number of days attended by students (attended student days) in school in a specific period. D: Total number of enrolled student days in the same period (17,18).	Age/school year Gender/sex	School attendance records	Increased heat may lead to more days of school missed among children, either due to absenteeism or decisions by authorities to close schools.	Although some schools opt for end-of-year attendance analysis, these data should be monitored continuously. Ongoing analysis allows for the identification of attendance issues in real time.	SDG Indicators: • Participation rate in organized learning (4.2.2).

Indicator name	Indicator definition	Computation (numerator [N], denominator [D])	Suggested disaggregation	Data source	Rationale	Considerations	Global indicator frameworks ^b
Child (contd.)							
		Note: • One attended student day is one day attended by one student • Total enrolled student days is the sum of the number of enrolled students on each day in the period					

CRVS: civil registration and vital statistics; ICD-11: International Classification of Diseases, 11th revision; MPDSR: maternal and perinatal death surveillance and response; OPD: outpatient department; RHIS: routine health information system; SDG: Sustainable Development Goal; UNSD: United Nations Statistics Division.

^a Routine facility-based data are proposed as the main data source; where available, community-based data should also be used.

^b Reference to agreed-upon indicators in globally established frameworks, e.g. Sustainable Development Goals, The Global Strategy for Women's, Children's and Adolescents' Health, Minimum set of MNCH indicators for routine programme monitoring.

^c Live birth – the outcome of a pregnancy, irrespective of its duration or gestation, in which 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 (14).

^d ICD-10 codes can be converted to ICD-11 using this tool on the WHO ICD webpage (19).

^e See e.g. ICD-11 KA21.3 Extreme prematurity of newborn, KA21.4 Preterm newborn ICD-11 <https://icd.who.int/browse/2026-01/mms/en#1726201225> (19).

^f See e.g. ICD-11 JA23 Gestational hypertension <https://icd.who.int/browse/2026-01/mms/en#2118553363> (19).

^g See e.g. ICD-11 KD3B Fetal death, cause not specified <https://icd.who.int/browse/2026-01/mms/en#505744734> (19).

^h See e.g. ICD-11 KA21.0 Extremely low birth weight of newborn, KA21.1 Very low birth weight of newborn, KA21.2 Low birth weight of newborn <https://icd.who.int/browse/2026-01/mms/en#1950379483> (19).

3.3 Integration of MNCH considerations into public health and surveillance systems for monitoring heat impacts

The recommended indicators for public health and surveillance are summarized in Table 3. Mortality and emergency room visits are currently the most commonly used measures for assessing the health impacts of heat and are generally considered the most reliable and readily available data. Table 3 illustrates how MNCH considerations can be integrated into the analysis of these indicators through age and gender/sex disaggregation, supporting the identification and interpretation of MNCH-specific vulnerabilities associated with heat exposure. Health data for these indicators should be examined together with heat-exposure data, such as observed air temperature, using spatial and temporal analyses. See Table 5 and examples provided in section 4.

Heat-related cardiovascular outcomes were also prioritized in the January 2026 meeting (9), reflecting that hypertensive disorders among pregnant women could potentially be identified. This could be considered in settings with robust health surveillance systems and where ICD-10 or ICD-11 (19) coding standards are adhered to.

Table 3. Indicators for the integration of MNCH considerations into public health and surveillance systems, including disaggregation to monitor MNCH trends

Indicator name and definition	Computation (numerator [N], denominator [D])	Suggested disaggregation	Data source	Rationale	Considerations	Global Indicator frameworks
Core indicators						
Maternal, newborn, child						
Rate of deaths	N: Number of deaths in the district in a specified period. D: Total population in district (or age-specific population).	Gender/sex Age • Newborns (0–6 days and 7–<28 days). • Children (1 month–4 years and 5–9 years). • Women of reproductive age (15–49 years). All cause and cause-specific deaths	CRVS or death registers or national/ subnational surveillance systems	Extreme heat is associated with a range of adverse health outcomes. Excess mortality is linked to heat exposure; with evidence for heat-related mortality on every continent (16).	In many settings, extreme heat is often underreported as a cause of adverse outcomes – thus the excess burden for either all-cause or cause-specific outcomes may need to be statistically estimated, based on spatial and temporal linkage with observed temperature. Linkages between national CRVS and MPDSR systems should be considered.	SDG Indicators: • Maternal mortality ratio (3.1.1). • Neonatal mortality rate (3.2.2). • Under-five mortality rate (3.2.1). UNSD Indicator 45: Incidence of heat- and cold-related illnesses or excess mortality: • Mortality from all causes attributable to heat (14).

Indicator name and definition	Computation (numerator [N], denominator [D])	Suggested disaggregation	Data source	Rationale	Considerations	Global Indicator frameworks
Maternal, newborn, child (contd.)						
Rate of emergency room visits	N: Number of emergency room visits in a specified period. D: Total district population (if by age group, then respective population denominators should be used).	- Age • Newborns (0–6 days and 7–<28 days). • Children (1 month–4 years, 5–9 years). • Women of reproductive age (15–49 years). Pregnant or postpartum women. All-cause and specific causes of visits.	Hospital records	Extreme heat is associated with a range of adverse health outcomes and may lead to changes in health service utilization. Emergency room visits are among the most commonly tracked indicators in heat health surveillance along with mortality, hospital admission, ambulance calls and physician visits.	Cause of visit and heat-related morbidities are often not reported. Emergency room visits are not relevant to all contexts. Outpatient visits may be used instead (<i>see Table 2</i>).	UNSD Indicator 45: Incidence of heat- and cold-related illnesses or excess mortality. Hospital admissions from all causes attributable to heat (14).

CRVS: civil registration and vital statistics; RHIS: routine health information system; MPDSR: maternal and perinatal death surveillance and response; SDG: Sustainable Development Goal; UNSD: United Nations Statistics Division.

3.4 Integration of MNCH considerations into questions included in global climate change and national health sector monitoring

Monitoring of national health sector response to climate change is tracked through the WHO Health and Climate Change Global Survey (20). The survey is sent to national health authorities and completed in collaboration with other relevant ministries and stakeholders. It collects information on efforts to protect populations from the most devastating health impacts of climate change and to build climate-resilient and sustainable health systems. The survey is conducted every three years; the most recent round was in 2025, and the results are yet to be released. In addition to tracking global progress, national data are presented in the health and climate change country profiles.

Key indicators focus on national health and climate change policies and plans; vulnerability and adaptation assessments; implementation; capacity-building; finance; and decarbonization and sustainability of health systems. Regular updates on these indicators provide a vital snapshot of the overall progress made by governments, as well as the challenges they face in achieving their health adaptation and mitigation priorities.

To monitor the inclusion of MNCH in national health sector responses, revised survey questions (see Table 4) that incorporate MNCH considerations are recommended. WHO and its partners will lead efforts to ensure the integration of these indicators in the next round of the survey planned for 2028. In the meantime, discussions will be held in other fora to promote MNCH integration in other global and regional efforts to track the impact of climate change on health.

Table 4. Integration of MNCH considerations into questions included in global climate change and national health sector monitoring

Indicator type	Survey subcomponent	Indicator name	Indicator definition	Data source
Input	Leadership and governance	Existence of a multistakeholder mechanism on health and climate change that includes MNCH.	Ministries of health include MNCH in the health and climate change multistakeholder mechanism (e.g. task force or committee).	WHO Health and Climate Change Global Survey (20) or national review processes. If the WHO survey was not conducted in the country, information may be available through national sources.
Input	Evidence for decision-making	Inclusion of MNCH in climate change and health vulnerability and adaptation assessment.	Country considers children and women as specific population groups in the vulnerability and adaptation assessment.	
Input	Implementation	Climate change and health surveillance system provides a heat warning to the ministry of health/district authorities.	Percentage of subnational health authorities that receive early warning system information on extreme heat. N: Number of subnational health authorities that receive early warning system information on extreme heat. D: Total number of subnational health authorities.	
Output	Implementation	Training of MNCH programme health workers on impact of heat.	Country provided MNCH programme with training on climate change and health in the past two years.	
Output	Implementation	Climate change and health surveillance system includes coordination with meteorological services.	Country has a health surveillance system for heat-related illness and mortality that includes meteorological information (e.g. for risk mapping). or Country integrates weather and climate information into the implementation/service delivery of the MNCH programme.	

3.5 Heat exposure data

The proposed data on heat exposure, along with their sources, to be analysed with MNCH and public health indicators, are summarized in Table 5. These include air temperature and composite heat indices that combine temperature, humidity, wind speed and solar radiation to approximate environmental heat stress. Composite indices can better reflect the thermal load imposed on the human body than air temperature alone, although their relevance for MNCH populations requires careful interpretation. For example, under certain environmental conditions, a humid 25°C day with direct solar radiation may impose greater physiological heat strain than a dry 40°C day in the shade. Box 2 provides an overview of the terminology used to describe measures of heat exposure (21).

Box 2. Terminology to describe heat exposure data

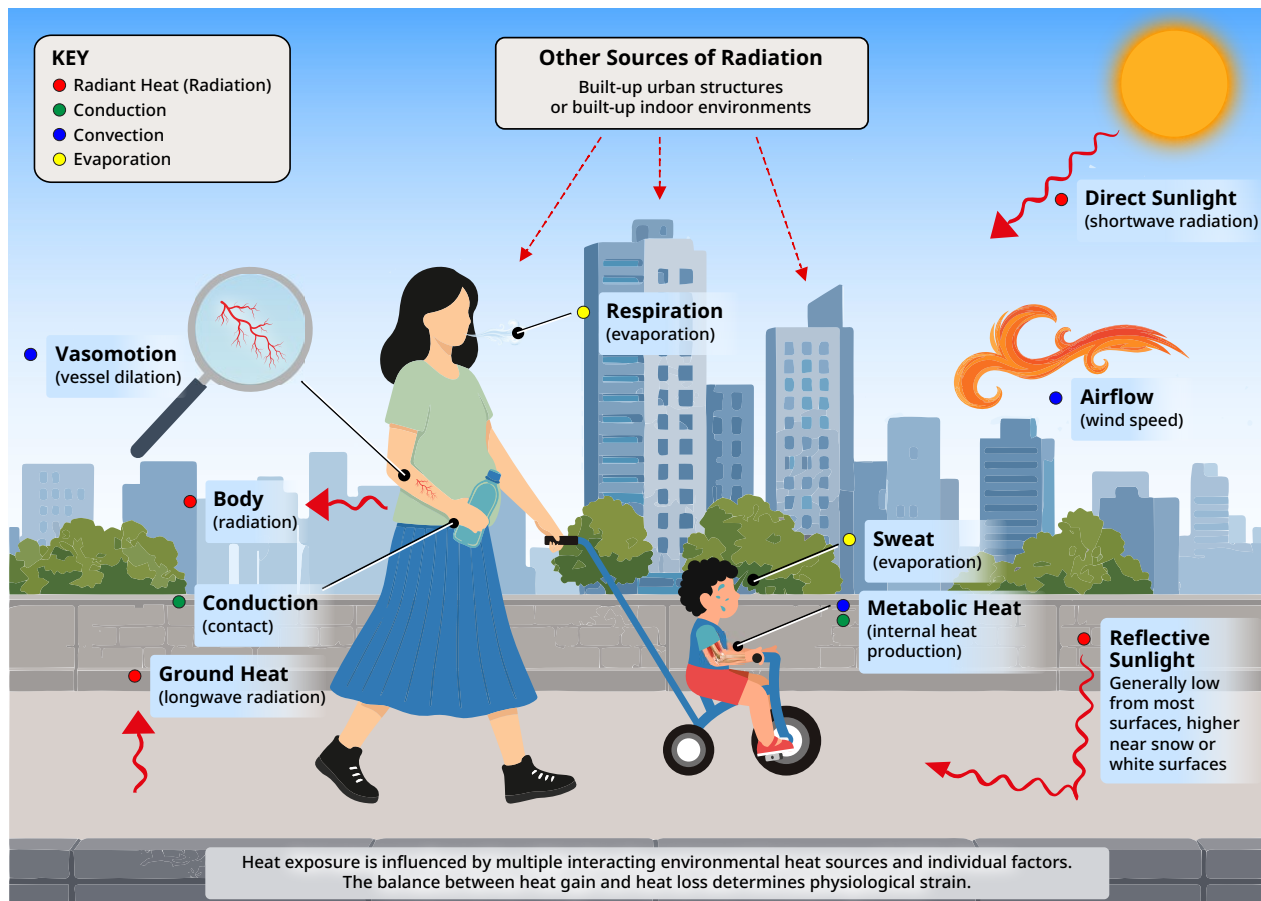
Heat-health monitoring involves analysing heat exposure data together with health data to identify potential associations between heat exposure and health outcomes and outputs.

- **Temperatures** are individual meteorological measurements used to characterize heat conditions. Examples include air temperature and wet-bulb temperature. Temperature is one type of environmental variable. Temperature, combined with other environmental variables such as relative humidity, solar radiation, and wind speed, can be used to construct more complex indices. Daily maximum and minimum temperatures are commonly used to track and forecast the scale of extreme heat events.
- **Indices** combine one or more meteorological variables (including temperatures) into a numerical measure that helps characterize heat stress experienced by people or the intensity of extreme heat events. More complex indices, such as the Universal Thermal Climate Index and wet-bulb globe temperature, integrate environmental variables and thermophysiological assumptions, including temperature, humidity, wind speed, radiation, clothing and metabolic rate.
- **Statistics** (sometimes referred to as heat indicators in the public health literature) are summaries derived from temperature or index records. They describe characteristics of heat events, seasonal patterns and longer-term trends, and are used to support monitoring, forecasting and warning systems.

Note: The terminology used to describe heat exposure data is not yet applied consistently across the climate, meteorological and public health literature. The definitions presented here are intended to support consistent use within this document and may differ from those used in other publications. WMO is currently developing guidance on heat-related terminology that may further support harmonization across sectors.

Fig. 3 illustrates how air temperature, humidity, solar radiation, wind, ground heat, clothing, activity and other contextual factors can influence thermal load.

Fig. 3. Environmental and physiological pathways contributing to heat exposure and heat stress



Note: this figure is illustrative and not specific to MNCH populations.

Source: Illustration with technical contribution provided by Leonidas Ioannou, University of Cyprus, Cyprus.

International guidance on measuring heat exposure is still emerging, and the choice of an appropriate measure will depend on practicality, data availability and local heat exposure patterns. In many settings, particularly where other observational data are limited, air temperature remains the most widely used measure of heat exposure and can be applied to set thresholds for heat warning systems (22). Thermal stress indices such as the Universal Thermal Climate Index (UTCI) may better reflect the thermal load imposed on the human body than air temperature alone (23). However, early work suggests that different measures – including ambient temperature, Heat Index, UTCI and wet-bulb globe temperature (WBGT) – may produce broadly similar associations with MNCH outcomes in many settings, with maximum UTCI showing greater sensitivity in humid regions (22,24,25).

The suitability of these composite indices for MNCH monitoring requires careful consideration. For example, UTCI incorporates assumptions about adaptive clothing behaviour that may not apply to infants and young children, who depend on caregivers to adjust their clothing. Neither UTCI, WBGT nor other commonly used composite heat stress indices were developed or validated specifically for pregnant women, newborns, infants or children (25). Their use in MNCH monitoring should therefore be clearly acknowledged as provisional, and population-specific validation is needed.

Country experience will also inform the choice of how heat exposure is measured. Experiences shared from Zimbabwe at the WHO 2026 meeting indicated that measuring air temperature and counting heatwave days based on air temperature were most suitable for routine MNCH surveillance, given Zimbabwe's heat exposure patterns and the functionality of its RHIS software.

Data such as air temperature and humidity, based on physical measurements, can be accessed through national meteorological and hydrological services. Where reanalysis products are used to supplement observational data, their strengths and limitations should be considered. These datasets can provide useful information where local observations are unavailable or incomplete, but they may not fully reflect local conditions in all settings. Consultation with national meteorological and hydrological services can help assess their suitability for the intended use and support interpretation of results.

In some countries, data-sharing agreements may be required. Certain health management information systems, such as District Health Information Software 2 (DHIS2), directly integrate selected climate data products, including UTCI from the Copernicus Climate Change Service's ERA5-HEAT reanalysis dataset.⁴

In some settings, challenges exist regarding cross-sectoral sharing of meteorological and health data. Dialogue between the ministry of health and national meteorological and hydrological services is important to clarify available data sources, data-sharing arrangements, mandates, technical capacity and the appropriate use of climate and weather products. Such collaboration can support interpretation of weather and climate information used for heat–health monitoring and help ensure that selected data products are appropriate for local conditions and intended use. The *Extreme heat risk governance framework and toolkit, second edition* provides additional guidance and tools (26).

⁴ ERA5-HEAT is a specialized fifth generation dataset derived from the European Centre for Medium-Range Weather Forecasts (ECMWF) Reanalysis v5 (ERA5). It is the climate-health extension of ECMWF's ERA5 reanalysis, tailored to measure heat stress and its impacts on populations.

Table 5. Heat exposure data and sources

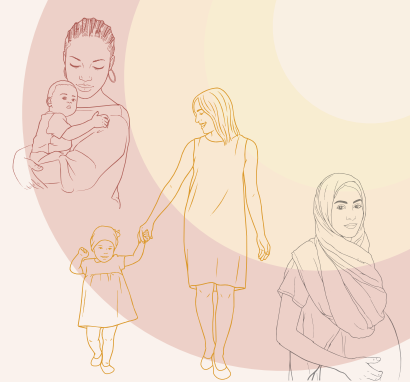
Measures of heat exposure	Data source	Definition	Considerations
Core			
Air temperature	National meteorological and hydrological services are the preferred source. Where suitable, observational data are unavailable or incomplete, ERA5^a may provide supplementary gridded temperature estimates.	Air temperature is a measure of how hot or cold the air is. Standard measurements are taken 1.25–2.0 m above the ground in shaded, well-ventilated conditions to ensure consistency and comparability of observations (27).	Air temperature (dry-bulb) is simple and widely available, and remains the most commonly used heat exposure measure for routine monitoring and heat warnings. However, it does not capture humidity, solar radiation or wind, and therefore may not fully reflect the thermal load imposed on the body. The density and location of temperature monitoring stations may limit representativeness, particularly in urban areas where stations are not located near population centres or may not capture urban heat island effects.
Additional			
Heat Index	National meteorological and hydrological services are the preferred source. Where observational data are unavailable or incomplete, Heat Index may be calculated from ERA5 temperature and humidity estimates.	The Heat Index is an apparent temperature index that estimates how hot conditions feel to the human body by combining air temperature and relative humidity, reflecting the reduced effectiveness of evaporative cooling from sweating as humidity rises (28).	Heat Index is relatively simple to calculate because it uses widely available variables. However, it does not account for solar radiation or wind and is therefore less suitable for assessing heat stress where direct sun exposure, outdoor work, or air movement strongly influence thermal load.

Measures of heat exposure	Data source	Definition	Considerations
Additional (contd.)			
Universal Thermal Climate Index (UTCI)	National meteorological and hydrological services are the preferred source where UTCI is operationally available. Where observational data are unavailable or incomplete, ERA5-HEAT^b may provide supplementary UTCI estimates.	UTCI is a bioclimatic equivalent-temperature index that estimates outdoor thermal stress using air temperature, humidity, wind speed and mean radiant temperature (29). It is based on a thermophysiological model of the human body and is expressed as the air temperature of a reference environment that would produce a comparable physiological response.	UTCI was developed for a reference person under specified outdoor activity and clothing assumptions. Physiological responses to heat may differ in pregnant women, newborns, infants and young children. In addition, infants and young children rely on caregivers for clothing and behavioural adaptations assumed in the model. UTCI was not developed or validated specifically for MNCH populations.
Wet-bulb globe temperature (WBGT)	National meteorological and hydrological services are the preferred source where the required observations are available. Where observational data are unavailable or incomplete, WBGT may be estimated using ERA5-derived variables (30).	WBGT is an internationally standardized heat-stress index that combines humidity, radiant heat, air temperature and air movement to estimate environmental heat stress (30).	WBGT is widely used for occupational and sports heat-stress assessment. It was not developed specifically for MNCH populations, and interpretation for pregnant women, newborns, infants and children should therefore be cautious.

^a ERA5 is the fifth-generation global atmospheric reanalysis produced by the European Centre for Medium-Range Weather Forecasts. It provides hourly estimates of climate and weather variables from 1940 to near real time. Reanalysis data can support analysis where local station data are unavailable, but may not fully capture local extremes, microclimates or complex terrain effects. Where local observations are available, comparison with station data can improve interpretation and confidence in results.

^b ERA5-HEAT is a dataset derived from ERA5 that provides modelled thermal comfort indices, including UTCI and mean radiant temperature, based on air temperature, humidity, wind speed and radiation variables. Where local station data are available, comparison with local observations can improve confidence in interpretation and help assess whether gridded products are suitable for the intended application.

4. Analysing health and heat exposure data



4.1 Examples of combined analysis

Identifying the impacts of heat exposure on health outcomes and outputs, including MNCH, requires combined analysis of health indicators and heat exposure data. A signal of extreme heat, or a heat advisory issued by authorities, should trigger additional analysis of MNCH data. This involves aligning datasets with appropriate spatial resolution (e.g. facility or district level) and temporal resolution (e.g. daily, monthly or yearly) and comparing observed indicator values over time.

Establishing a baseline is essential for interpreting changes. For heat exposure, climatological normals can be used as the reference. For MNCH indicators, baseline values may be derived from recent years in which temperatures did not exceed climatological normals. Where data availability allows, baseline periods should ideally include multiple years of data to account for seasonal variation and underlying trends (see Box 3).

Box 3. Steps for analysis of heat exposure and MNCH data

A typical analysis involves:

- Selecting MNCH indicators and heat exposure data.
- Aligning data temporally and spatially.
- Defining a baseline period.
- Comparing observed and expected values.
- Identifying periods of concurrent deviations.
- Interpreting findings as potential signals requiring further investigation.

Both Fig. 4 and Fig. 5 provide example analyses with fictitious data. Fig. 4 shows outpatient department attendance alongside monthly maximum air temperature, while Fig. 5 presents a combination chart overlaying preterm birth rates with monthly maximum UTCI values. Table 6 and Table 7 provide the corresponding input data and percentage-change calculations for each indicator.

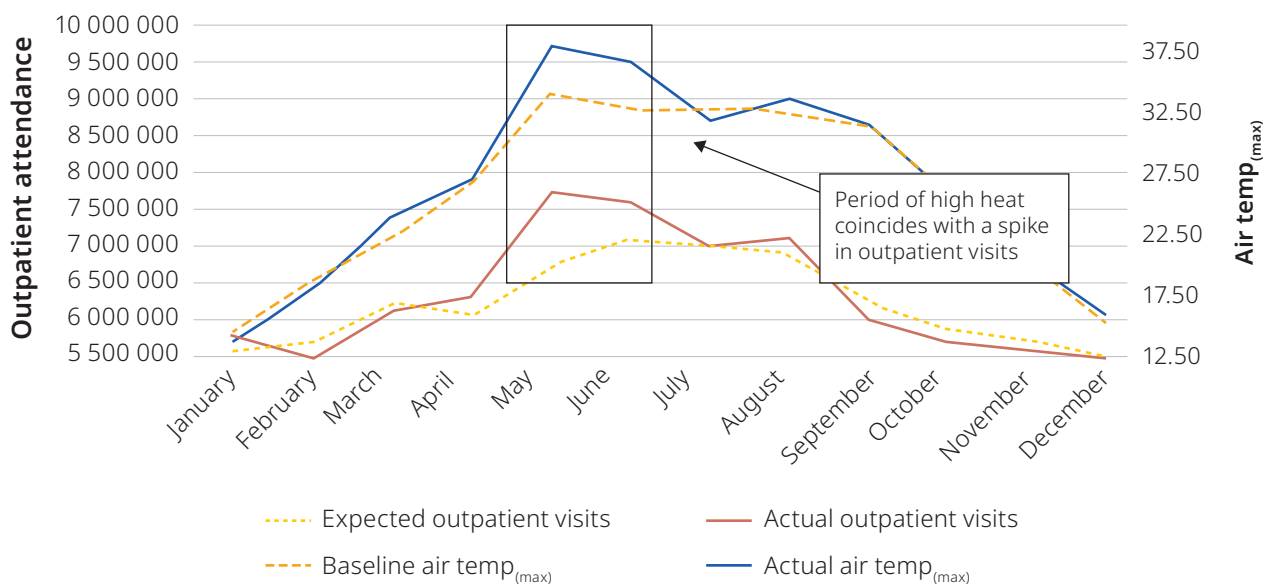
In these examples, periods of high heat are highlighted alongside concurrent increases in preterm birth rates and outpatient attendance. These patterns illustrate how MNCH indicators can signal that variations in heat may be affecting health outcomes.

Such signals should prompt further, more detailed investigation to assess the nature, magnitude and drivers of the observed changes, including potential confounding factors and context-specific vulnerabilities. While these analyses do not establish causality, they provide an important first step in signalling to authorities that more in-depth epidemiological and programmatic assessment is needed.

Additionally, data analysis could include disaggregation by geographic region, cause, gender/sex and age group to help determine patterns and support public health intervention planning and policy recommendations. Public health interventions could include preparation for increased caseload or community information campaigns.

Analysis of the charts in Fig. 4 and Fig. 5, together with percentage changes in Table 6 and Table 7, shows notable increases in outpatient attendance and preterm births in facilities coinciding with periods of elevated heat. The corresponding months with marked increases in preterm births and outpatient attendance are indicated in red in Table 6 and Table 7.

Fig. 4. Outpatient attendance and maximum air temperature combination chart^a



^a Fictitious data.

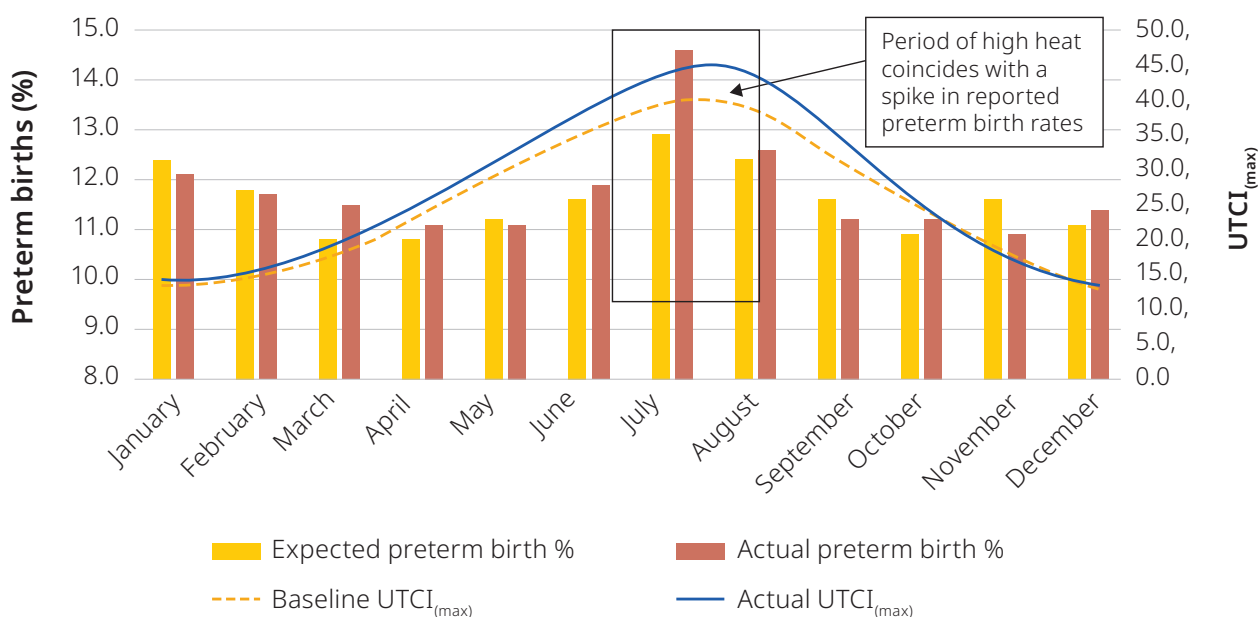
Table 6. Values for expected outpatient attendance, actual outpatient attendance, baseline maximum air temperature and calculations of change in outpatient attendance^a

Month	Expected outpatient attendance	Actual outpatient attendance	Baseline air temperature _(max)	Actual air temperature _(max)	% change
January	5 608 894	5 797 669	14.50	13.90	3%
February	5 708 894	5 508 894	18.80	18.20	-4%
March	6 228 246	6 109 046	22.40	24.10	-2%
April	6 056 332	6 302 187	26.70	27.10	4%
May	6 725 047	7 725 047	34.20	38.10	15%
June	7 099 342	7 603 273	32.90	36.80	7%
July	7 007 950	7 007 950	33.10	32.10	0%
August	6 908 894	7 099 342	32.50	33.90	3%
September	6 228 246	6 009 046	31.40	31.70	-4%
October	5 856 332	5 682 187	26.10	25.70	-3%
November	5 725 047	5 597 669	19.80	20.20	-2%
December	5 456 332	5 494 975	15.20	15.90	1%

Month with concurrent increases in heat and health indicators is highlighted in red.

^a Fictitious data.

Fig. 5. Preterm births in facilities and maximum UTCI, by month^a



^a Fictitious data.

Table 7. Expected and actual preterm births in facilities and maximum UTCI values and the percentage change in preterm births in facilities^a

Month	Expected preterm birth %	Actual preterm birth %	Baseline UTCI _(max)	Actual UTCI _(max)	% change
January	12.40	12.10	13.50	14.10	-2%
February	11.80	11.70	14.80	15.60	-1%
March	10.80	11.50	18.20	19.50	6%
April	10.80	11.10	23.10	25.40	3%
May	11.20	11.10	29.80	31.90	-1%
June	11.60	11.90	35.50	39.10	3%
July	12.90	14.60	39.20	44.50	13%
August	12.40	12.60	38.70	43.80	2%
September	11.60	11.20	31.20	34.00	-3%
October	10.90	11.20	24.60	26.10	3%
November	11.60	10.90	18.00	17.40	-6%
December	11.10	11.40	14.10	13.80	3%

Month with concurrent increases in heat and health indicators is highlighted in red.

^a Fictitious data.

4.2 Considerations for interpretation

In some instances, when monthly averages are used to measure heat exposure, extreme heat events may not be visible because they are masked by the average. Changes of only a few degrees during a high-heat event lasting over several days can affect MNCH outcomes. However, it may be difficult to correlate monthly data with short heat spikes or events that span two months. In such cases, additional insights can be gained by using daily or weekly data (if available) rather than monthly values, or by identifying specific heatwave events on the timeline. Since weather patterns vary regionally, the definition of an extreme weather or climate event differs by location. For the purposes of a heat-health warning system, heatwave⁵ can be defined specifically according to the potential impacts on human health (31). Managers should also consider possible time lags between a heat event and certain health outcomes (e.g. preterm births may lag by several days following elevated heat exposure).

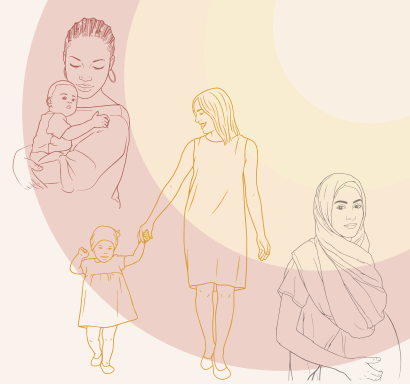
⁵ According to WMO, a heatwave can be defined as a period of marked and unusually hot weather persisting for at least two consecutive days.

The data and their interpretation may be affected by reporting completeness, which should be considered when interpreting the charts. Adjustments may be needed to correct for missing data – for example, restricting the analysis to health facilities that have provided consistent reporting.⁶ Other data anomalies can occur due to seasonal increases in the incidence of certain illnesses or spikes in the delivery of interventions, such as vaccination campaigns. MNCH managers should thus consider the context (e.g. timing, setting) to guide further investigation of the reported data (12).

MNCH programme managers and monitoring and evaluation officers can conduct this analysis monthly, or more frequently during a high-heat event. They should carry out basic analyses and data visualizations of these indicators, and interpret indicator values and their implications for current and future MNCH programme management related to heat events.

⁶ For details on how to address missing data, refer to (12).

5. Conclusions



Important knowledge and data gaps remain in understanding how heat affects MNCH, and evidence continues to emerge. Integrating heat considerations into routine MNCH monitoring and disaggregating data within public health surveillance to identify MNCH outcomes can strengthen anticipatory planning and responses to heat-related risks. Countries can use the priority indicators presented in this document as a starting point to develop context-specific monitoring frameworks and to begin systematically addressing critical data gaps. Integrating MNCH considerations into efforts to monitor national climate change policies will also help track whether these needs are being adequately addressed.

Monitoring of MNCH and heat can be operationalized according to each country's context and data availability. Routine administrative systems already capture health data that, when combined with heat exposure data, can provide valuable insights into trends and potential areas requiring action. However, effective integration requires dialogue between health authorities and meteorological services, including at subnational levels, to enable data sharing and informed responses. Depending on the context, countries may identify other relevant indicators beyond those included in this document to better capture heat exposure and its health impacts.

Given the evolving evidence base, these indicators should be periodically reviewed and refined based on available data, as well as country experiences in implementing and using them. Regular reviews can help identify new or refined indicators as evidence increases, monitoring capacity improves and progress is made.

Measurement drives action, and strengthening the availability and use of data remains a critical step in protecting MNCH in the context of rising heat exposure.

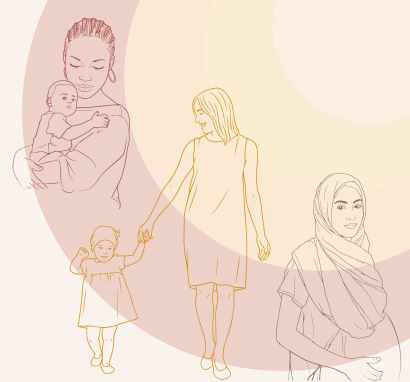
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The priority indicators to monitor the impact of heat exposure on maternal, newborn and child health were selected through a structured process, adapted from methods used by WHO in previous indicator prioritization exercises. The following people participated in the various steps. All names are listed in alphabetical order and with institutional affiliation at the time of participation.

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