

# The impact of heat exposure on maternal, newborn and child health: identifying priority actions and indicators

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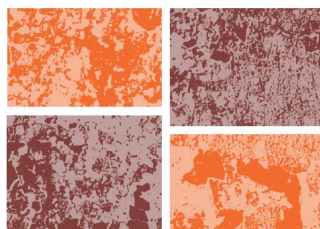
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# Background and 2023 meeting

# Previous WHO led efforts for indicator selection

## *Consultation on* Improving measurement of the quality of maternal, newborn and child care in health facilities



**World Health Organization and  
Partnership for Maternal, Newborn and Child Health**  
Ferney Voltaire, France  
9–11 December 2013

### Technical consultation on indicators of adolescent health

WHO, Geneva, Switzerland  
30 September – 1 October 2014



### Priority Indicators for Adolescent Health Measurement – Recommendations From the Global Action for Measurement of Adolescent Health (GAMA) Advisory Group

Andrew D. Marsh, Ann Beth Moller, Elizabeth Saewyc, Emmanuel Adebayo, Elsie Akwara, Peter Azzopardi, Mariame Guibye Ba, Valentina Baltag, Krishna Bose, Stephanie Burrows, Liliana Carvajal, Saeed Dastgiri, Lucy Fagan, Jane Ferguson, Howard S. Friedman, Charity Giyava, Ann Hagell, Jo Inchley, Debra Jackson, Anna E. Kärgsten, Aveneni Mangombe, Alison Morgan, Holly Newby, Linda Schultz, Marni Sommer, Ilene Speizer, Kun Tang, Regina Guthold. [Show less](#)

Bloomberg School of Public Health

Research | [Open Access](#) | Published: 08 July 2022

### Global core indicators for measuring WHO's paediatric quality-of-care standards in health facilities: development and expert consensus

[Moise Muzigaba](#) , [Tamar Chitashvili](#), [Allysha Choudhury](#), [Wilson M. Were](#), [Theresa Diaz](#), [Kathleen L. Strong](#), [Debra Jackson](#), [Jennifer Requejo](#), [Anne Detjen](#) & [Emma Sacks](#)

[BMC Health Services Research](#) **22**, Article number: 887 (2022) | [Cite this article](#)



# 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*



## WHO process for indicator selection

**Step 1:** Designate a WHO internal advisory group.

**Step 2:** Designate an external expert group and ensure disclosure of interests.

**Step 3:** Define core elements needed by the expert group to select and prioritize indicators. (a conceptual framework, criteria for indicator prioritization, and additional information needed for indicator prioritization).

**Step 4:** Collate indicators identified in published studies and in programmes on heat and MNCH and map to the conceptual framework to understand what is already collected and validated.

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

**Step 6:** Select priority indicators during an expert meeting where core information was presented.

**Step 7:** Finalize priority indicators to ensure alignment with defined indicator metadata.

**Step 8:** Publish and disseminate prioritized indicators for uptake and use.

# WHO/UNICEF/UNFPA/WMO publication on global and national indicators for monitoring impact of heat on MNCH



# The April 2023 Scoping Meeting

## Objective

To identify needs and next steps to reach consensus on a set of priority indicators to monitor the impacts of extreme heat on MNCH that are specific to pregnant and postpartum women, newborns and infants.

Report of a scoping meeting  
for the selection of indicators  
to monitor the impact of  
extreme heat on maternal,  
newborn and child health



## Recommendations

Key message from scoping meeting for MNCH indicators:

Despite weaknesses in the routine data collection systems, the group suggested using existing MNCH indicators that are very well defined, are being routinely collected in countries and therefore are available.

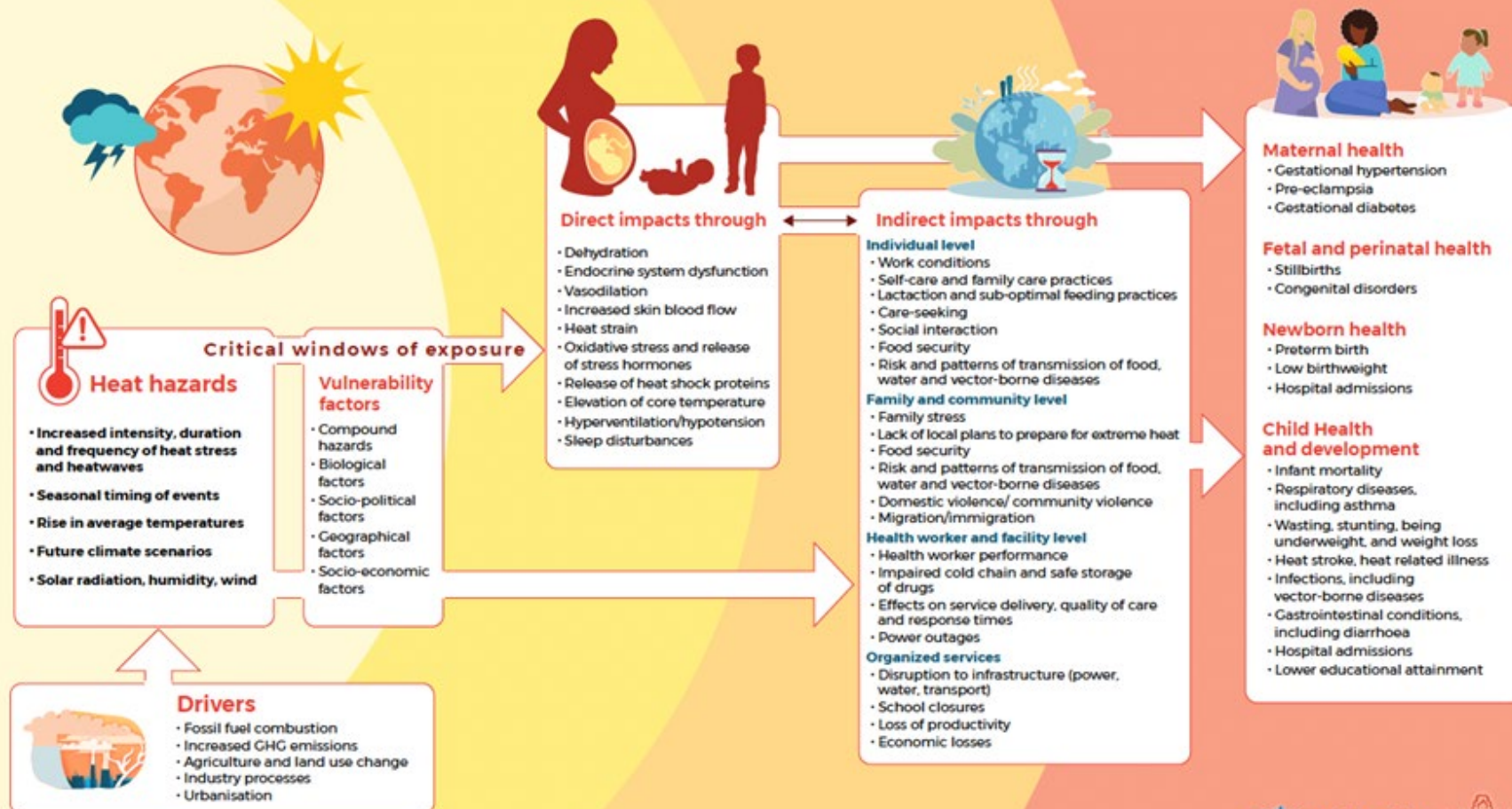
The experts would be open to new indicators if needed but ...

Geographic scope of the data

Feedback from countries was important

Maintain multidisciplinary group

# Conceptual framework Extreme heat and maternal, newborn and child health



# Ranking of priority criteria for indicator selection



- **Feasibility** – (It is feasible to collect the data required for the indicator in the relevant setting, preferably through item already in routine administrative systems)
- **Relevance** – (The indicator measures a specific construct in a priority area of interest and there is a clear, demonstrated relationship between the indicator and MNCH)
- **Important** – (The indicator and data generated will make an important contribution to determining how to respond to and prevent heat-related MNCH problems)



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# Post 2023 meeting to January 2026

# Post 2023



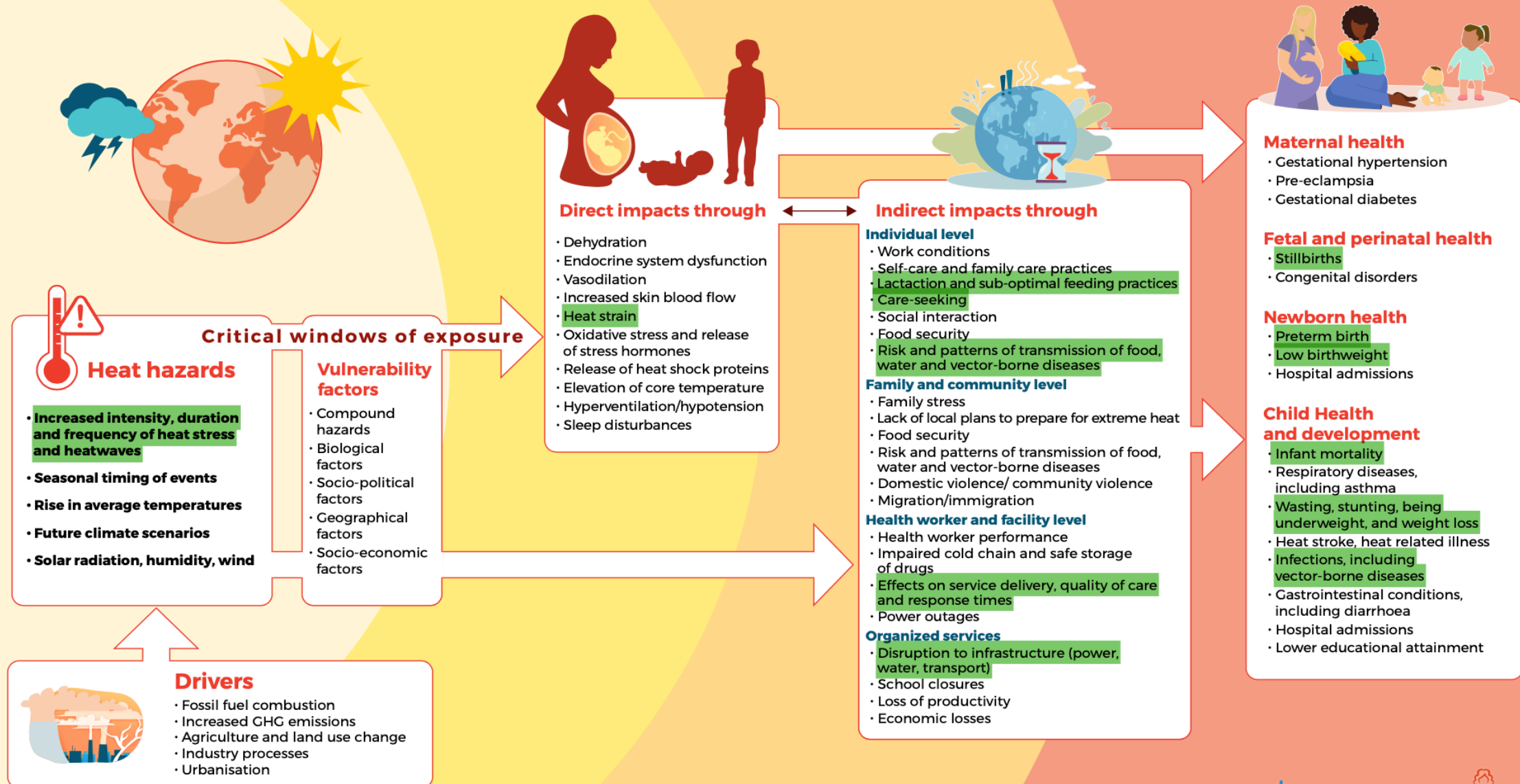
- We had two virtual meetings in 2024 to discuss study findings from completed studies and others in the literature.
- Some of the expert group members changed since 2023 to broaden to public health and surveillance and climate change and health and ensure the MNH professional associations



- Organise a glossary of MNCH and heat terms <https://www.high-horizons.eu/resources/glossary/>
- Conduct a scoping review of available heat health indicators and content analysis of heat plans and MNCH currently used by countries. <https://jogh.org/2025/jogh-15-04157>
- Update the systematic reviews and for secondary analysis, expand the geographical scope of the datasets to be analysed and expand newborn and child health analysis (also consider addition of secondary datasets, such as DHS).
- Map the indicators to the conceptual framework and highlight existing validated indicators— key message was to align with what is currently being measured
- Hold discussions with country teams (Greece, South Africa and Zimbabwe) to examine options for incorporating heat monitoring for MNCH
- Conduct stakeholder interviews in four countries and with global partners to receive feedback on monitoring of heat and MNCH

# Conceptual framework

## Extreme heat and maternal, newborn and child health



# Indirect Impacts (continued)

## Areas with at least one validated indicator



## Validated indicators: Self-care and family care practices, Lactation and sub-optimal feeding practices, Care-seeking

- Postnatal care for women (facility based): Proportion of women receiving postnatal care (PNC) in a facility within a specified time period after delivery
- Postnatal care for newborns (facility based): Proportion of newborns receiving PNC in a facility within a specific time period after delivery
- Postnatal care coverage – newborn (Population-based): Proportion of newborns receiving PNC in a facility within a specific time period after delivery
- Postnatal care coverage – women (Population-based): Proportion of newborns who have postnatal contact with a healthcare provider within two (2) days of birth.
- Pregnant women counselled and tested for HIV: Proportion of women with a live birth who were counselled, offered voluntary HIV testing at ANC and received their test results before their most recent birth
- Pregnant women who received oral pre-exposure prophylaxis (PrEP): Percentage of pregnant women who received oral pre-exposure prophylaxis (PrEP)
- Antiretroviral therapy (ART) coverage in pregnant women (facility based): Proportion of HIV-positive pregnant women who received ART during pregnancy and/or at labour and delivery
- Care-seeking for children with symptoms of acute respiratory infection: Percentage of children under 5 years of age with suspected pneumonia (cough and difficult breathing NOT due to a problem from a blocked nose) in the two weeks taken to an appropriate health facility or provider
- Care-seeking for fever in children under the age of five: Percentage of children under 5 years of age with fever in the two weeks taken to an appropriate health facility or provider
- Antenatal 1st visit (more or less than 20 weeks): Antenatal visit before or after 20 weeks of gestation
- Postnatal visit 6 days after delivery: Postnatal visit to a healthcare facility 6 days after delivery

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# January 2026 meeting

# Systematic review

**RESEARCH**

Associations between high temperatures in pregnancy and risk of preterm birth, low birth weight, and stillbirths: systematic review and meta-analysis

Matthew Francis Chersich,<sup>1</sup> Minh Duc Pham,<sup>2,3</sup> Ashtyn Area,<sup>1,4</sup> Marjan Mosalam Haghighi,<sup>5</sup> Albert Manyuchi,<sup>6</sup> Callum P Swift,<sup>7</sup> Bianca Wernecke,<sup>8,9</sup> Matthew Robinson,<sup>10</sup> Robyn Hetem,<sup>11</sup> Melanie Boeckmann,<sup>12</sup> Shakoob Hajat,<sup>13</sup> on behalf of the Climate Change and Heat-Health Study Group

**nature medicine**

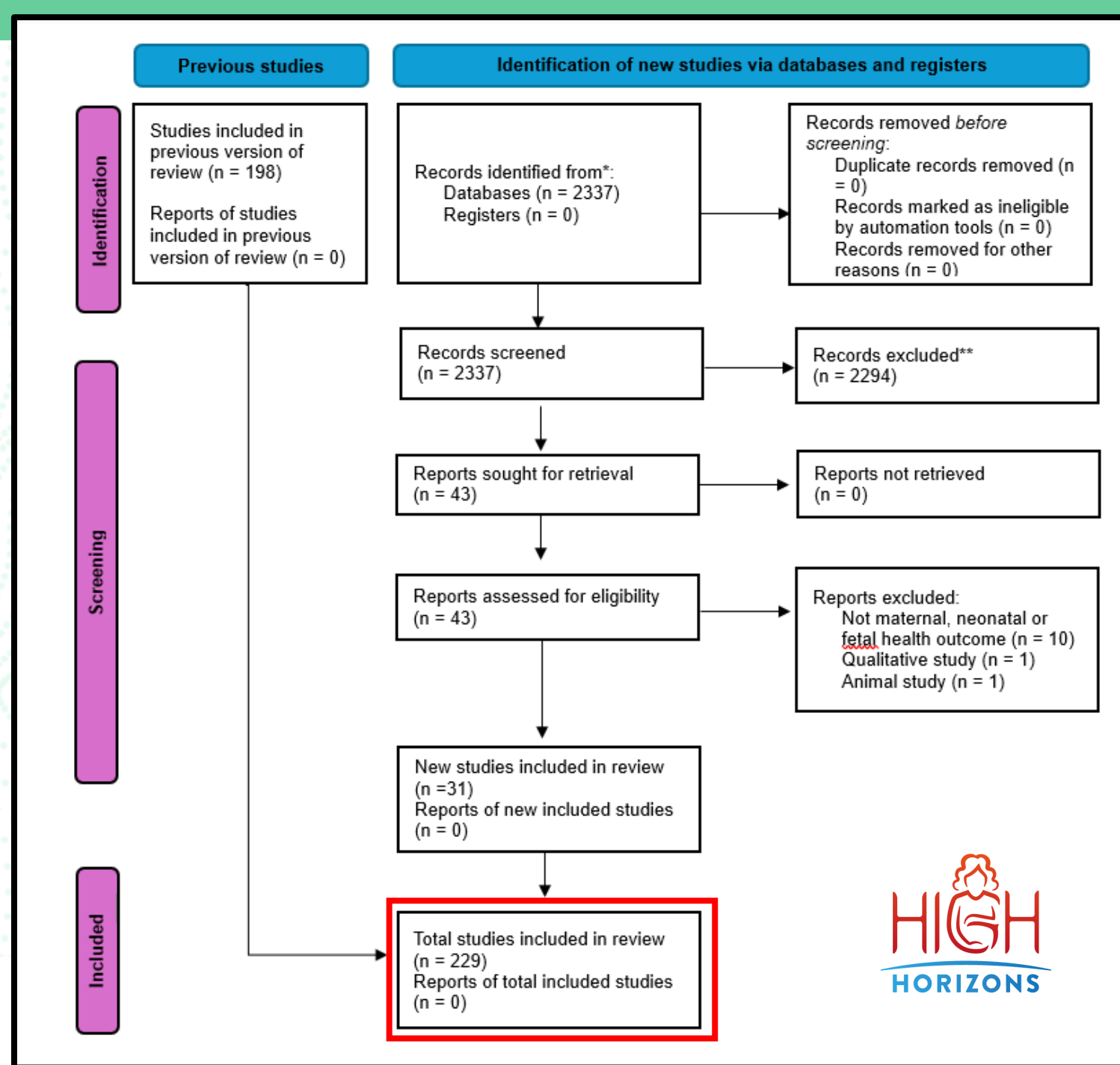
Analysis <https://doi.org/10.1038/s41591-024-03395-8>

**A systematic review and meta-analysis of heat exposure impacts on maternal, fetal and neonatal health**

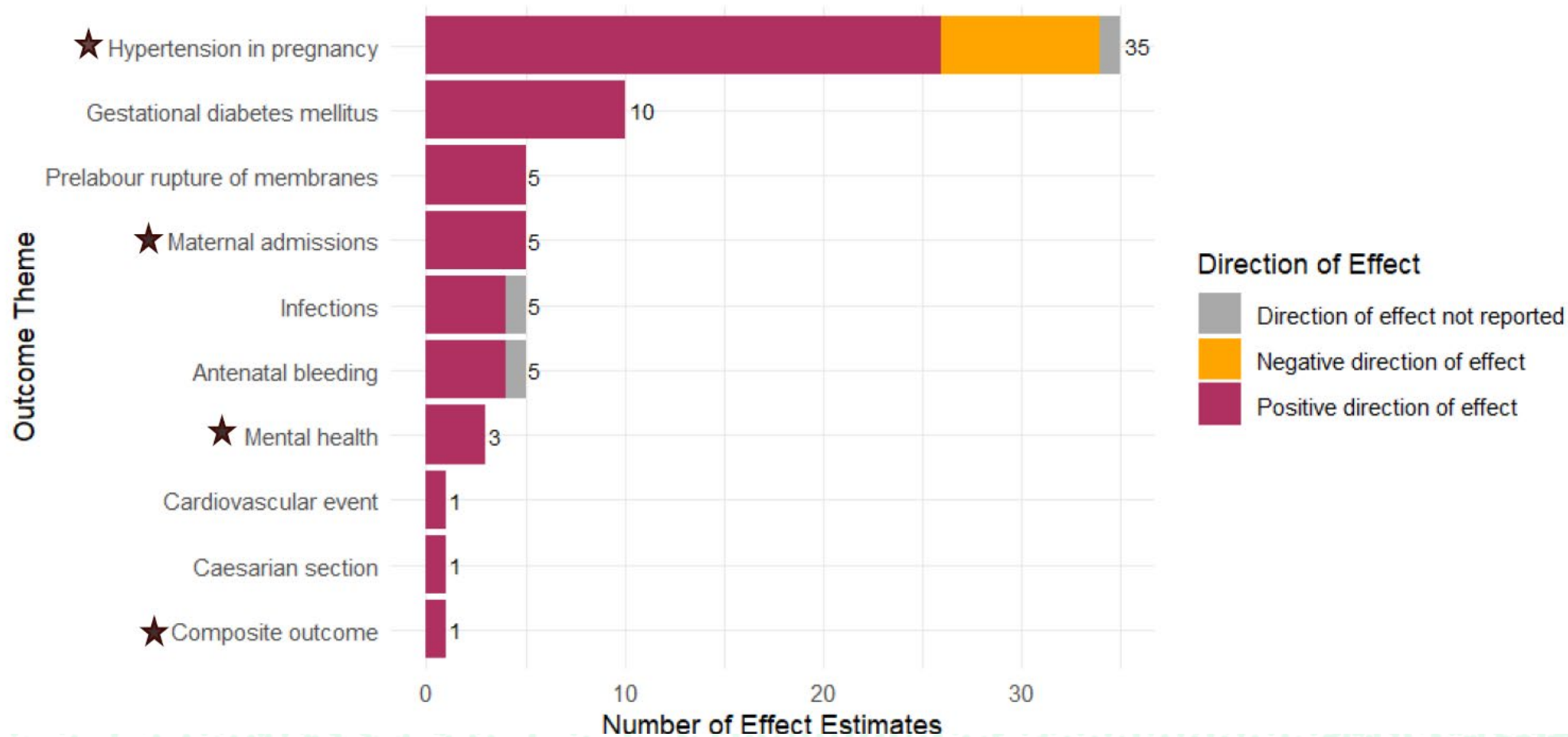
Received: 9 July 2024  
Accepted: 31 October 2024  
Published online: 05 November 2024

Darshnika P. Lakhoo<sup>12</sup>, Nicholas Brink<sup>12</sup>, Lebohang Radebe<sup>2</sup>, Marlies H. Craig<sup>2</sup>, Minh Duc Pham<sup>3,4</sup>, Marjan M. Haghighi<sup>5</sup>, Amy Wise<sup>6</sup>, Jeoma Solarin<sup>12</sup>, Stanley Luchters<sup>8,9</sup>, Gloria Maimela<sup>2</sup>, Matthew F. Chersich<sup>12,10</sup>, Heat-Health Study Group\* & HIGH Horizons Study Group\*

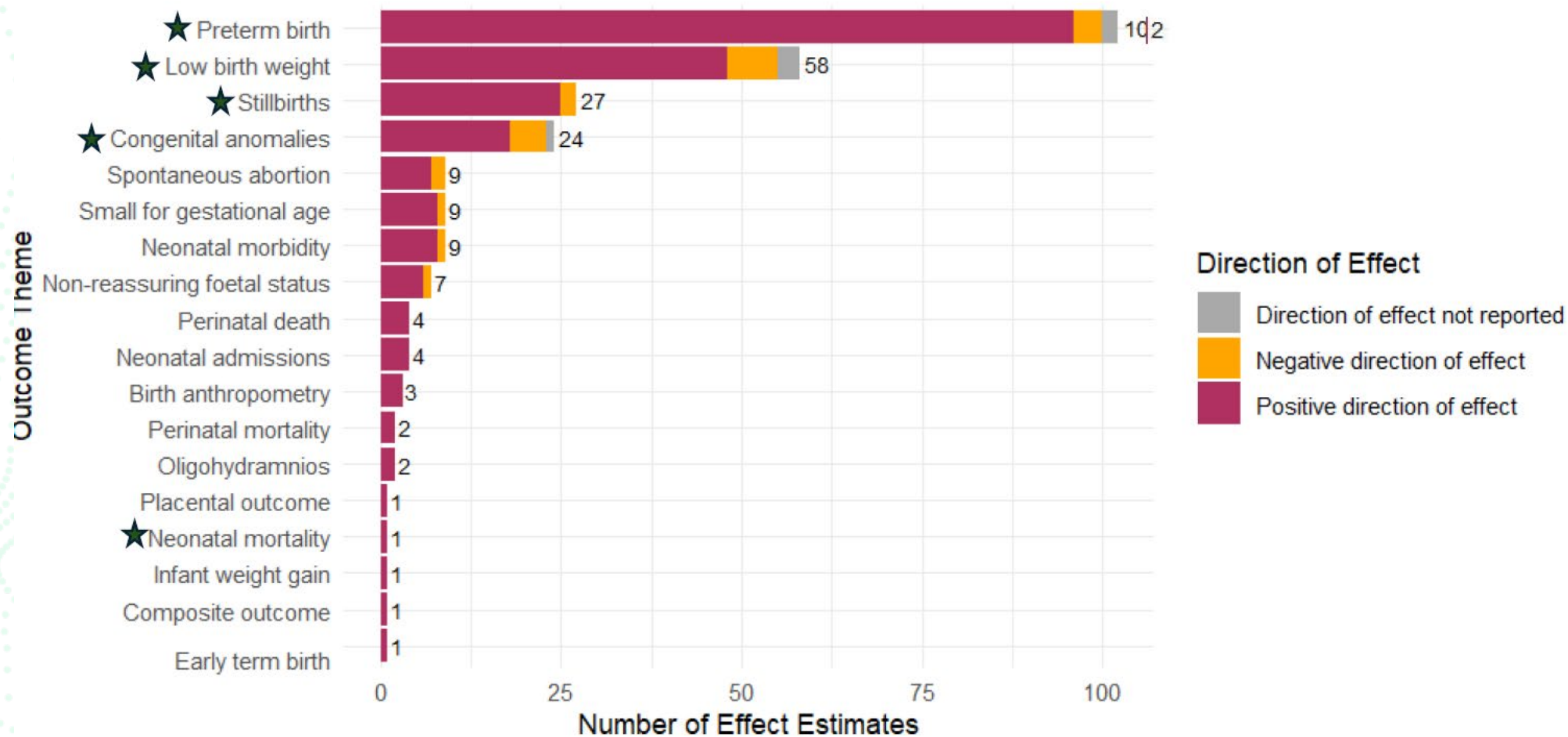
Updated 16 July 2025



# Maternal health outcomes (n=60 measures)



# Newborn health outcomes (n=197 measures)



# Heat Impacts in 15 Countries in Africa, Europe and Latin America and the Caribbean

Bao M, Nobile F, Koureas M, Bottini I, Fomenko E, Brimicombe C, et al. Trimester-specific exposure to multiple heat indicators and adverse birth outcomes across four European countries. *Environ Res.* 2026;296:124092. doi:10.1016/j.envres.2026.124092

Radebe L, Brimicombe C, Koureas M, Nobile F, Bao M, Suarez P, et al. Relative high heat exposure increases the likelihood of adverse birth outcomes: multi-country evidence of heat impacts on birth outcomes. [Preprint]. 2026 Mar. doi:10.21203/rs.3.rs-9092562/v1.

# Effects of ambient heat exposure on risk of all-cause mortality in children younger than 5 years in Africa: a pooled time-series analysis

Chloe Brimicombe PhD <sup>a</sup>  , Katharina Wieser BSc <sup>a</sup>, Tobias Monthaler BSc <sup>a</sup>, Prof Debra Jackson PhD <sup>b c</sup>, Jeroen De Bont PhD <sup>d</sup>, Prof Matthew F Chersich PhD <sup>e</sup>, Prof Ilona M Otto PhD <sup>a</sup>

Show more 

# MNCH working group recommendations



|            | Maternal                                                    | Newborn            | Child                                                      |
|------------|-------------------------------------------------------------|--------------------|------------------------------------------------------------|
| Core       | Preterm birth rate                                          | Preterm birth rate | Emergency room visits                                      |
| Additional | Antenatal care visit<br>Hypertensive disorders of pregnancy | Stillbirth         | Under-5 mortality<br><br>School attendance (5-9 years old) |



# Public health and surveillance working group recommendations



- All-cause mortality attributable to heat per age group
- All-cause ER visits or another health care utilization measure.



# Climate change and health working group recommendations



The group proposed modifying existing indicators used in the 2025 WHO Global Survey on Health and Climate Change:

- Governance and planning: Inclusion of MNCH in the health and climate change multistakeholder mechanism (e.g. task force or committee);
- Governance and planning: MNCH considered a highest priority health risk from climate change
- Adaptation: Integration of weather and climate information into the implementation/service delivery of the MNCH programme.
- Governance and planning: Consideration of children and women as specific population groups in the vulnerability and adaptation assessment.



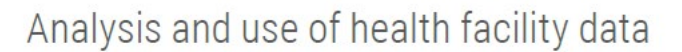
# Heat metrics

**Table 4 Heat metrics**

| Heat metric                            | Definition                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Air Temperature                        | The temperature of the atmosphere which represents the average kinetic energy of the molecular motion in a small region and is defined in terms of a standard or calibrated thermometer in thermal equilibrium with the air (11,19).                                                                                                                                                                                       |
| Wet Bulb Globe Temperature (WBGT)      | Wet Bulb Globe Temperature is the most widely used heat index because it is an international standard for heat stress (6,7). Wet bulb globe temperature is calculated using observations from a wet bulb thermometer – a thermometer wrapped in a damp muslin cloth, a globe thermometer to measure incidence of radiation and a dry air thermometer. Or it is approximated using empirical models of these values (8–11). |
| Universal thermal climate index (UTCI) | The universal thermal climate index is a bioclimatological model of an average human body's response to different thermal conditions where the subject is not acclimatised to the climate outdoors, doing minimal work (12–14). The input variables are air temperature, dew point temperature, mean radiant temperature and wind speed (m/s).                                                                             |
| Heat Index (HI)                        | An apparent temperature calculation designed to determine the temperature that the human "feels" when its evaporative cooling mechanism (perspiration) is limited due to increased relative humidity.                                                                                                                                                                                                                      |



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| Life-stage               | Indicator-name                 | Indicator-definition                                                                                      | Computation-(Numerator-[N],-Denominator-[D])                                                                                                                                                                                                                         | Suggested-disaggregation                                                                                                                                                                                                                                                    | Data-source                                                                                                  | Rationale                                                                                                                                   | Considerations                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------------|--------------------------------|-----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Core indicators          |                                |                                                                                                           |                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                             |                                                                                                              |                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Maternal, Newborn        | Preterm-birth-rate-in-facility | Number-or-proportion-of-births-in-facilities-that-are-preterm-( $<37$ -weeks-gestation)                   | Number-of-newborns-born- $<37$ -weeks-gestation<br>If-calculating-this-indicator-as-a-proportion-(per-100):<br>N: Number-of-newborns-born- $<37$ -weeks-gestation<br>D: Number-of-live-births-in<br>facilities-(3)<br><div> <div> </div> </div>                      | Classification:<br>$\rightarrow <37$ -weeks<br>$\rightarrow <32$ -weeks<br>$\rightarrow <28$ -weeks                                                                                                                                                                         | Preferred:<br>health-management-information-system-(HMIS)<br>Other:<br>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-HMIS-data-varies-greatly. Even-more-so, -accuracy-of-assessing-gestational-age-is-challenging-in-many-settings.<br>Where-gestational-age-is-not-reliable, low-birth-weight, listed-as-an-additional-indicator-below, can-be-used-as-a-proxy.<br>The-Hospital-ICD11-coding-may-be-available.<br>While-preterm-birth-is-considered-a-perinatal-health-outcome, -it-reflects-exposure-during-pregnancy. |
| Maternal, Newborn, Child | Outpatient-visits              | Number-or-proportion-of-outpatient-department-visits-in-a-specified-population-in-a-specified-time-period | Number-of-outpatient-visits-in-specified-age-group<br>If-calculating-this-indicator-as-a-proportion-(per-100):<br>N: Number-of-outpatient-visits-in-specified-age-group<br>D: Estimated-total-population-of-the-specified-age-group-(3)<br><div> <div> </div> </div> | Age-group:<br>$<10$ -years<br>$<6$ -months<br>$<28$ -days<br>Children-(1-month-4-years)<br>years, 5-9-years<br>Women-of-reproductive-age-(15-49)<br>Gender/Sex<br>Pregnancy-or-Post-partum-status<br>Reason-for-visit<br>Preventive-vs-Curative<br>New-visits-plus-revisits | Preferred:<br>HMIS<br>Other:<br>OPD-register                                                                 | Extreme-heat-is-associated-with-a-range-of-adverse-health-outcomes-and-may-lead-to-increased-health-service-utilization                     | Reason-for-visit-and-whether-or-not-new-visit-or-repeat-visit-may-not-be-well-documented.                                                                                                                                                                                                                                                                                                                                                                      |

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| Additional Indicators¶ |                                               |                                                                                                                                   |                                                                                                                                                                                                                                                                                                      |                                                                 |                                                                                          |                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Maternal¶              | Hypertension in pregnancy¶                    | Number or proportion of antenatal clients with elevated blood pressure¶                                                           | Number of antenatal clients (in facility) with elevated blood pressure¶<br>¶<br>If calculating this indicator as a proportion (per 100):¶<br>N: Number of antenatal clients (in facility) with elevated blood pressure¶<br>D: Number of antenatal clients with blood pressure measured in facility.¶ | Women's age¶                                                    | Preferred¶<br>HMIS¶<br>¶<br>Other:¶<br>Medical records, antenatal register¶<br>¶         | Heat exposure is linked 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.¶<br>¶<br>The hospital ICD11 coding may be available¶,¶<br>¶<br>¶                                                               |
| Newborn¶               | Stillbirths in facilities¶                    | Number or proportion of babies born in a health facility with no signs of life,¶<br>≥28 weeks.¶<br>gestation or weighing ≥1000 g¶ | Number of stillbirths in facility.¶<br>¶<br>If calculating this indicator as a proportion (per 100):¶<br>¶<br>N: Number of stillbirths in facilities.¶<br>D: Total number of births in facility (live births and stillbirths).¶                                                                      | Antepartum (macerated), intrapartum (fetal or placental).¶<br>¶ | Preferred:¶<br>HMIS¶<br>¶<br>Other:¶<br>Medical records, birth register¶<br>¶,¶          | Heat exposure during pregnancy is associated with adverse fetal and perinatal outcomes, including stillbirths (1).¶<br>¶   | Reporting challenges exist at the facility level given data quality issues, including incomplete, inaccurate and 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.¶<br>(e.g. ≥500 grams).¶<br>¶<br>The hospital ICD-11 coding may be available¶,¶<br>¶ |
| Newborn¶               | Low birth weight¶<br>(<2500 g) in facilities¶ | Number or proportion of live births in facilities with birth weight less than 2500 g¶                                             | Number of newborns born alive in a facility with weight <2500 g at birth.¶<br>¶<br>If calculating this indicator as a proportion (per 100):¶<br>¶<br>¶<br>In a facility with weight <2500 g at birth.¶<br>D: Number of live births in facility (3)¶<br>¶                                             | Subgroup of:¶<br>➤ → <2500 g¶<br>➤ → <2000 g¶<br>➤ → <1800 g¶   | Preferred:¶<br>HMIS¶<br>¶<br>Other:¶<br>¶<br>¶<br>records or birth register¶<br>¶,¶<br>¶ | Heat exposure is associated with increased odds of low birth weight (1).¶                                                  | Lack of digital scales and in some countries, health workers may round up birth weight impacting on the quality of data.¶<br>¶<br>available)¶                                                                                                                                                                                                                                     |

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|                                             |                                                                                 |                                                                                                                     |                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                        |                                                          |                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------------------|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Newborn, <sup>¶</sup><br>Child <sup>¶</sup> | Under-5-year-<br>mortality-<br>rate-in-<br>facilities <sup>¶</sup><br>¶<br>¶    | Number-or-<br>proportion-of-<br>inpatient-deaths-in-<br>health-facilities,-<br>by-age-group- <sup>¶</sup><br>¶<br>¶ | Number-of inpatient-deaths-in-<br>health-facilities,-by-age-group- <sup>¶</sup><br>¶<br>If-calculating-this-indicator-as-a-<br>proportion,-disaggregated-by-age-<br>group:- <sup>¶</sup><br>N: Number-of inpatient-deaths- <sup>¶</sup><br>D: Number-of discharges-(including-<br>deaths)-among-population-of-<br>interest-(3) <sup>¶</sup> | Age <sup>¶</sup><br>➤ Newborns-(0-6-<br>days-and-7-<br><28-days) <sup>¶</sup><br>➤ Children-(1-<br>month-4- <sup>¶</sup><br>➤ years,-5-9-<br>years) <sup>¶</sup><br>¶<br>Gender/Sex <sup>¶</sup><br>¶<br>All-cause-and-<br>cause-specific-<br>deaths <sup>¶</sup><br>¶ | HMIS <sup>¶</sup><br>¶<br>¶                              | Excess-<br>mortality-is-<br>strongly-linked-<br>to-heat-<br>exposure;-with-<br>evidence-for-<br>heat-related-<br>mortality-on-<br>every-<br>continent-(4). <sup>¶</sup><br>¶<br>¶                              | Accurate-reporting-of-causes-of-<br>death-in-aggregate-RHIS-may-be-<br>difficult.-Linkages-between-national-<br>civil-registration-and-vital-statistics-<br>(CRVS)-and-maternal-and-perinatal-<br>death-surveillance-and-response-<br>(MPDSR)-systems-should-be-<br>considered. <sup>¶</sup><br>¶<br>In-many-settings,-extreme-heat-is-<br>often-under-reported-as-a-cause-of-<br>an-adverse-outcome. <sup>¶</sup> |
| Child <sup>¶</sup>                          | Average-daily-<br>attendance-<br>at-(primary)-<br>school <sup>¶</sup><br>¶<br>¶ | Overall-percentage-<br>of-enrolled-<br>students-who-<br>attend-class-every-<br>day. <sup>¶</sup><br>¶<br>¶          | N: Number-of-days-attended-by-all-<br>students-in-school- <sup>¶</sup><br>D: Number-of-enrolled-student-days-<br>* <sup>¶</sup><br>¶<br>¶                                                                                                                                                                                                   | ¶<br>draft                                                                                                                                                                                                                                                             | School-<br>attendance-<br>records <sup>¶</sup><br>¶<br>¶ | Increased-<br>heat-leads-to-<br>more-days-of-<br>school-missed-<br>among-<br>children,-<br>either-due-to-<br>absenteeism-<br>or-decisions-<br>by-authorities-<br>to-close-<br>schools.- <sup>¶</sup><br>¶<br>¶ | Although-some-schools-opt-for-end-<br>of-year-attendance-analysis,-it-is-<br>recommended-to-track-this-data-<br>continuously.-Ongoing-analysis-<br>allows-for-the-identification-of-<br>attendance-issues-in-real-time. <sup>¶</sup><br>¶<br>¶                                                                                                                                                                     |

In this table, the term health management information system (HMIS) is used to refer to aggregated data reported by health facilities. <sup>¶</sup>

Table 2 • Indicators for MNCH to be integrated into public health and surveillance systems

| Indicator-name <sup>a</sup>        | Indicator-definition <sup>a</sup>                    | Computation <sup>a</sup> (Numerator{N}, Denominator{D}) <sup>a</sup>                                                                                                                                                                                                    | Suggested disaggregation <sup>a</sup>                                                                                                                                                                                                                                     | Data-source <sup>a</sup>                                                                                         | Rationale <sup>a</sup>                                                                                                                                                                                                                                                                                                  | Considerations <sup>a</sup>                                                                                                                                                                                                                                                                                                                                                            |
|------------------------------------|------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mortality <sup>a</sup>             | Number-or-rate-of-deaths <sup>a</sup>                | Number-of-deaths <sup>a</sup><br>If-expressed-as-a-rate: <sup>a</sup><br>N: Number-of-deaths <sup>a</sup><br>D: Total-population (or age-specific-population) <sup>a</sup>                                                                                              | Gender/sex <sup>a</sup><br>Age <sup>a</sup><br>➤ Newborns (0-6 days and 7-<28 days) <sup>a</sup><br>➤ Children (1 month-4 years and 5-9 years) <sup>a</sup><br>➤ Women-of-reproductive-age (15-49 years) <sup>a</sup><br>All-cause-and-cause-specific-deaths <sup>a</sup> | CRVS-or-death-registers-or-national/subnational-surveillance-systems <sup>a</sup>                                | Extreme-heat-is-associated-with-a-range-of-adverse-health-outcomes. <sup>a</sup><br>Excess-mortality-is-strongly-linked-to-heat-exposure; with-evidence-for-heat-related-mortality-on-every-continent (4). <sup>a</sup>                                                                                                 | In-many-settings, extreme-heat-is-often-under-reported-as-a-cause-of-an-adverse-outcomes, thus-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. <sup>a</sup><br>Linkages-between-national-CRVS-and-maternal-and-MPDSR-systems-should-be-considered. <sup>a</sup> |
| Emergency-room-visits <sup>a</sup> | Number-or-rate-of-emergency-room-visits <sup>a</sup> | Number-of-emergency-room-visits <sup>a</sup><br>If-calculating-this-indicator-as-a-rate: <sup>a</sup><br>N: Number-of-emergency-room-visits <sup>a</sup><br>D: Total-population (if-by-age-group, then-respective-population-denominators-should-be-used.) <sup>a</sup> | ➤ Newborns (0-6 days and 7-<28 days) <sup>a</sup><br>➤ Children (1 month-4 years, 5-9 years) <sup>a</sup><br>➤ Women-of-reproductive-age (15-49 years) <sup>a</sup><br>Pregnant-or-post-partum-women <sup>a</sup><br>All-cause-and-specific-causes-of-visits <sup>a</sup> | National-surveillance-of-morbidity-outcomes-or-subnational-sources <sup>a</sup><br>Hospital-records <sup>a</sup> | Extreme-heat-is-associated-with-a-range-of-adverse-health-outcome-and-may-lead-to-increased-health-service-utilization. <sup>a</sup><br>Emergency-department-visits-is-one-of-the-most-commonly-tracked-indicators-in-heat-along-with-mortality, hospital-admission, ambulance-calls-and-physician-visits. <sup>a</sup> | Cause-of-visit-and-heat-related-morbidities-are-often-not-reported. <sup>a</sup>                                                                                                                                                                                                                                                                                                       |

draft

**Thank you.**



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