

Heat, Air Quality, & Early Warning

Integrating two climate-health dimensions into routine surveillance

Brian O'Donnell
HISP-UiO

Climate change

Health risk

Vulnerability factors

- Demographic
- Geographical
- Biological factors & health status
- Sociopolitical
- Socioeconomic
- Health system capacity
- Gender & equity

Climate-related hazards

- Extreme weather events
- Heat
- Sea level rise
- Air pollution
- Vector distribution & ecology
- Water scarcity
- Reduced food production

Exposure

- People & communities
- Health workforce
- Infrastructure
- Energy systems
- Water systems
- Food systems
- Health systems

Environmental threats
and GHG emissions

Health outcomes



Injury and mortality
from extreme
weather events



Heat-related
illness



Respiratory
illness



Water-borne diseases
and other water-related
health impacts



Zoonoses



Vector-borne
diseases



Malnutrition
and food-borne
diseases



Noncommunicable
diseases (NCDs)



Mental and
psychosocial
health



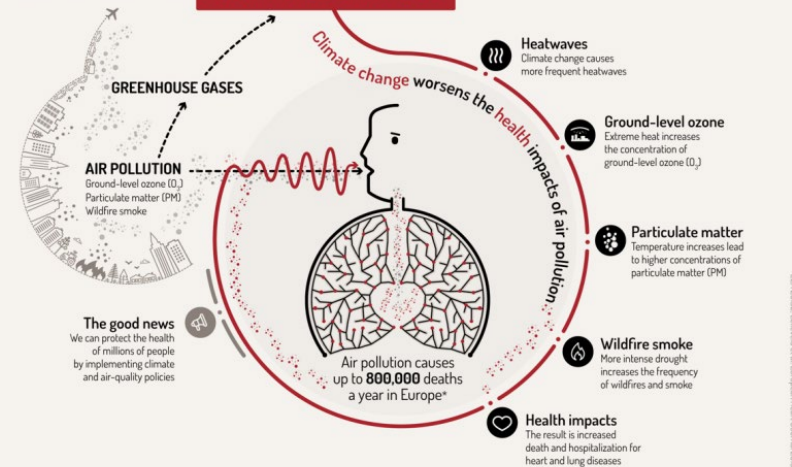
Impacts on
health care
facilities



Effects on
health systems

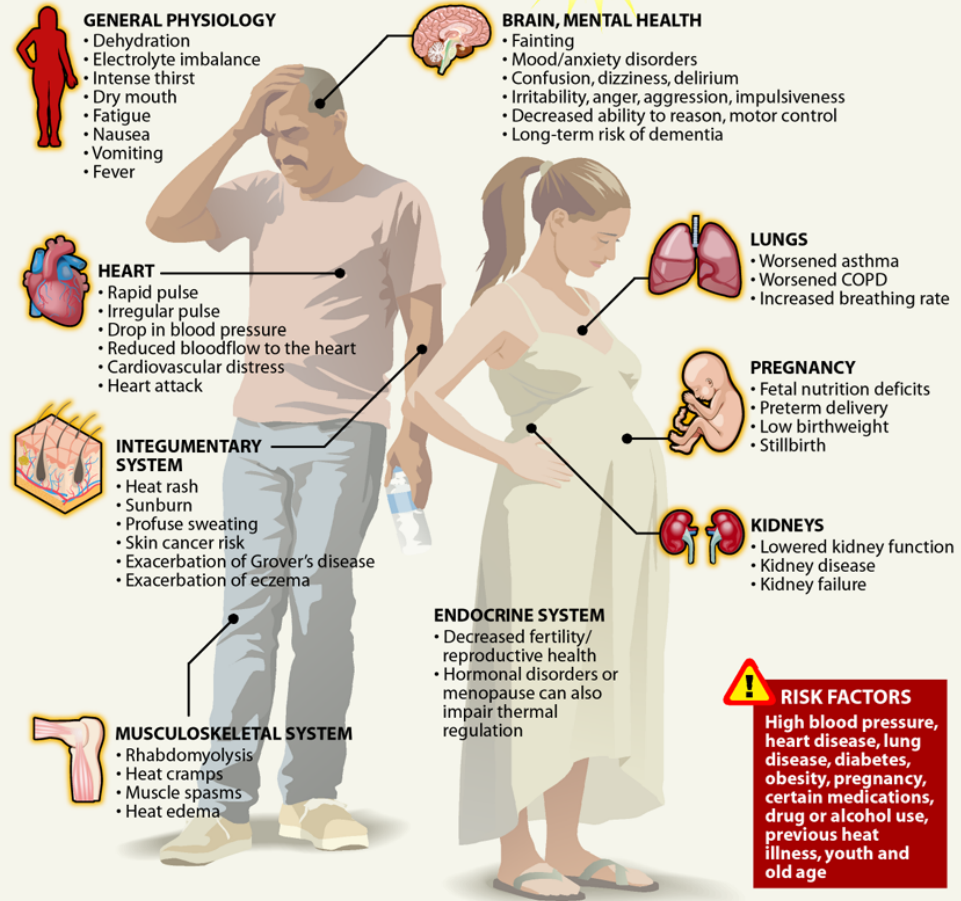
Health systems & facilities

WE BREATHE CLIMATE CHANGE



What Heat Does to the Body

Heat impacts every system in the body, from our skin down to our DNA. Here are key ways that heat can harm your health, and the factors that increase your risk.



Heat Health Early warning systems vary widely

Temperature metrics

- Maximum temperature
- Mean temperature
- Wet bulb globe temperature
- Apparent temp / heat index
- Humidex

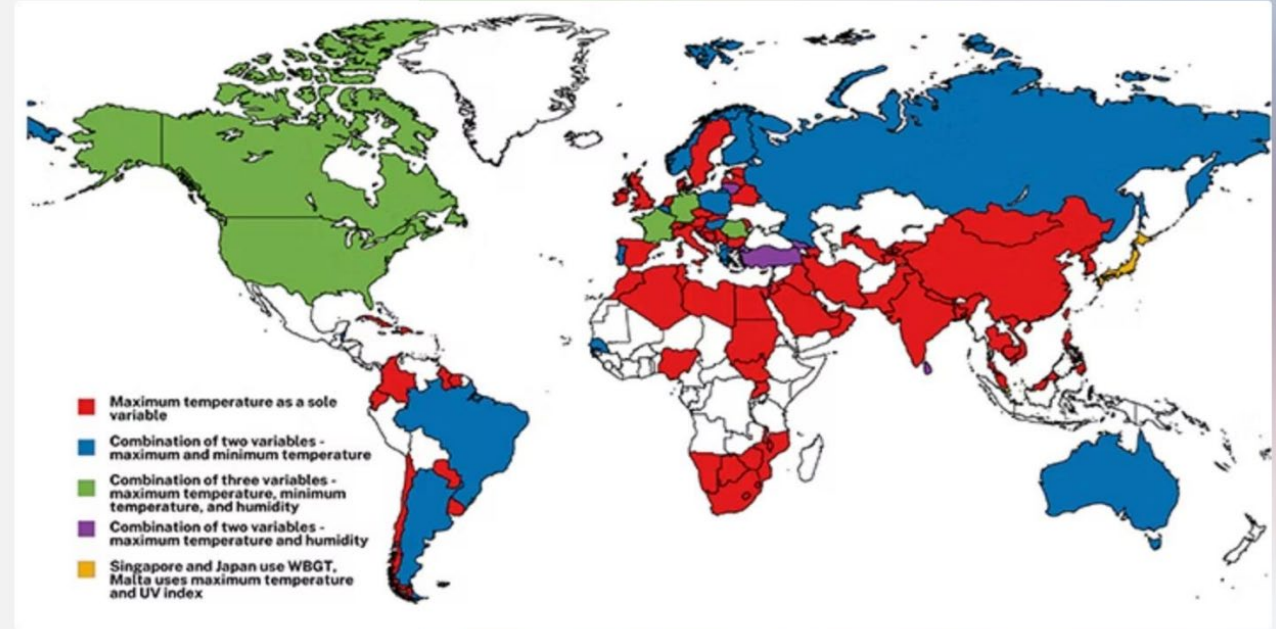
Alert thresholds

- Absolute thresholds (e.g. $>35^{\circ}\text{C}$)
- Percentile-based (e.g. 90th percentile)
- Duration-based (≥ 3 consecutive days)
- Composite indices

Health outcomes considered

- All-cause mortality
- CVD and respiratory admissions
- Heat stroke / heat exhaustion
- Neonatal and maternal outcomes

Variables used for HHWS across the world (Chandra Net al.2025)



Two dimensions, one early-warning system

HEAT

Temperature, heat index

AIR QUALITY

PM2.5, ozone

One DHIS2 pipeline (Climate App + Chap) -> combined or parallel risk signals.

First, identify temperature or AQ signals with excess mortality and morbidity

Then standard -> smart alert system: target messaging for vulnerable groups (informal settlements, MCH, NCD patients, outdoor workers)

Identify who's at risk - measure exposure - identify alert level - decide outcome - TAKE ACTION.

Three countries integrating heat and AQ monitoring into RHIS. WHO with global MNCH perspective.

SENEGAL

Runs it

Region's operational HHEWS:
ANACIM + MoH weekly heat health
bulletins since 2022.

Panelist: Dr. Tidiane GADIAGA,
MoH Senegal

SRI LANKA

Integrating it

Heat alerts live, bringing air quality
into system.

Speaker: Dr Pamod Amarakoon,
HISP Centre / HISP Sri Lanka

UGANDA

Has the foundation

Africa's first Health NAP, DHIS2
country - heat/AQ link not built yet.

Panelist: Patrick Omiel Okecho,
HISP Centre / HISP Uganda

MNCH and heat health
Department of Sexual, Reproductive, Maternal, Child and Adolescent and Ageing Health
World Health Organization

Speaker: Anayunda Portela

Information Management on Air Quality, Heat & Health: Sri Lankan Experience



2 Related Use Cases

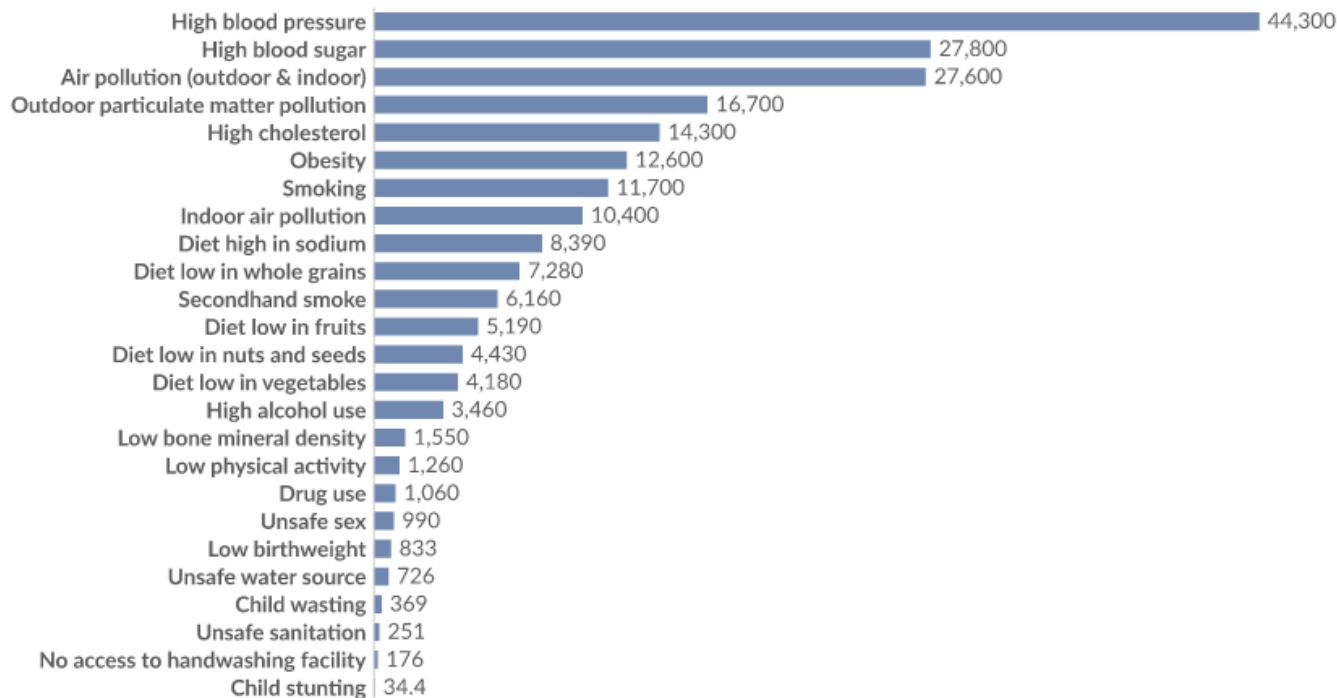


Air Quality & Health Risk



Deaths by risk factor, Sri Lanka, 2023

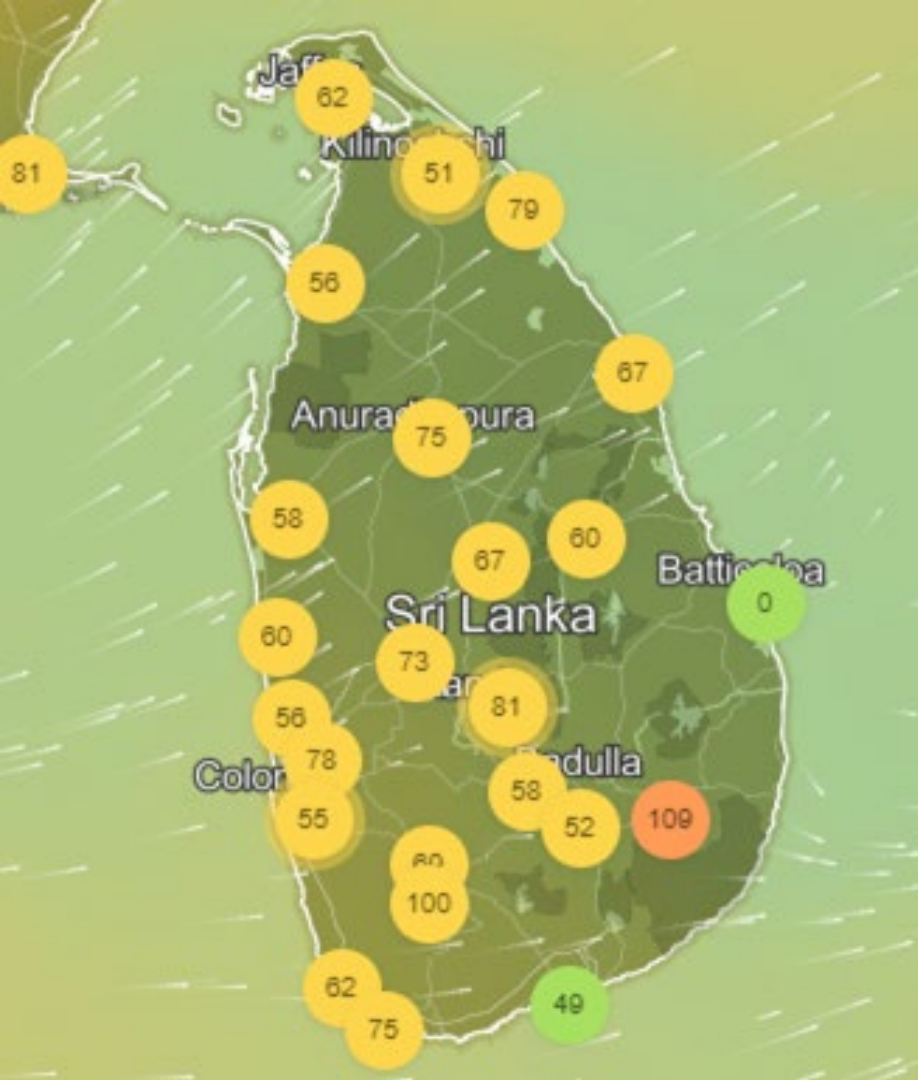
The estimated annual number of deaths attributed to each risk factor. Estimates come with wide uncertainties, especially for countries with poor vital registration.



Data source: IHME, Global Burden of Disease (2025)

OurWorldinData.org/causes-of-death | CC BY

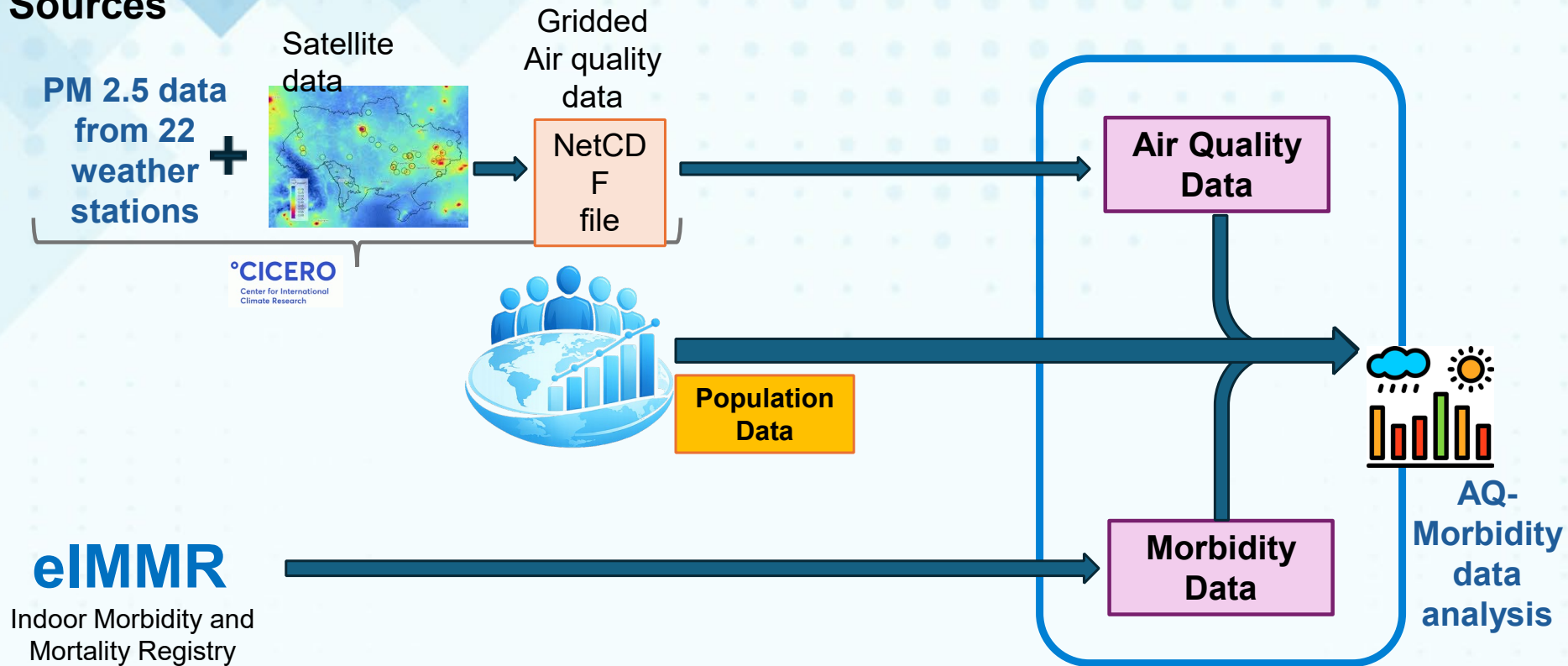
Note: Risk factors are not mutually exclusive. The sum of deaths attributed to each risk factor can exceed the total number of deaths.



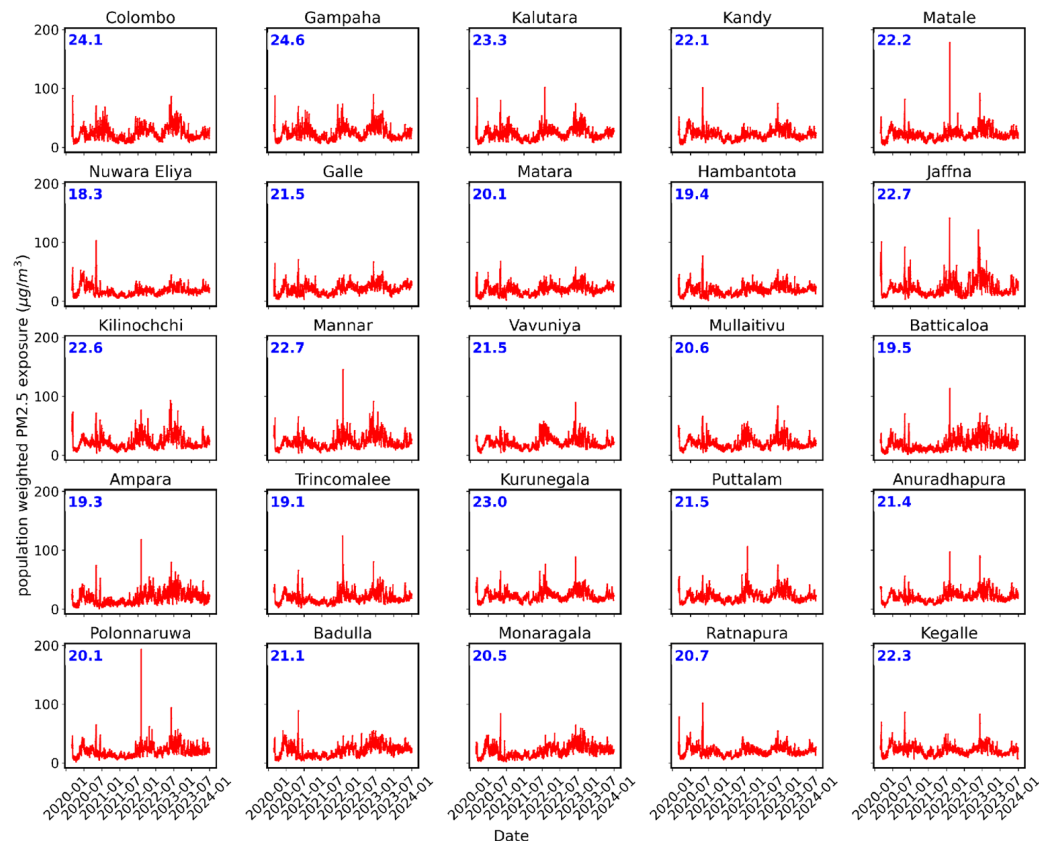
Broader Aims

- Produce a high-resolution dataset of PM2.5 for Sri Lanka.
- Build an epidemiological model linking human health outcomes with exposure to PM2.5 and heat.
- Develop an impact based early warning system for heat and air pollution for Sri Lanka.

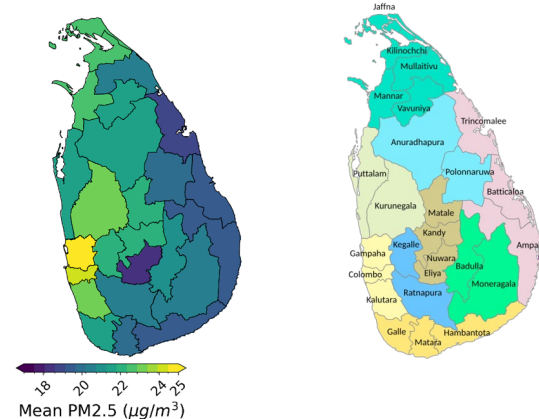
Data Sources



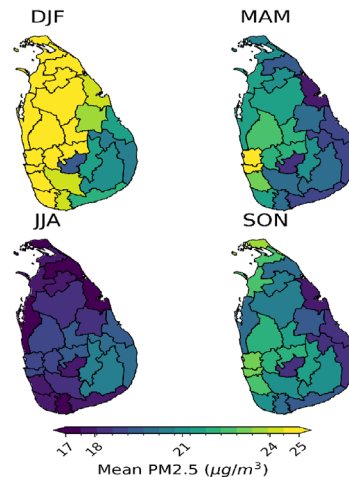
Bias-corrected PM2.5 for districts in Sri Lanka



2020-2023

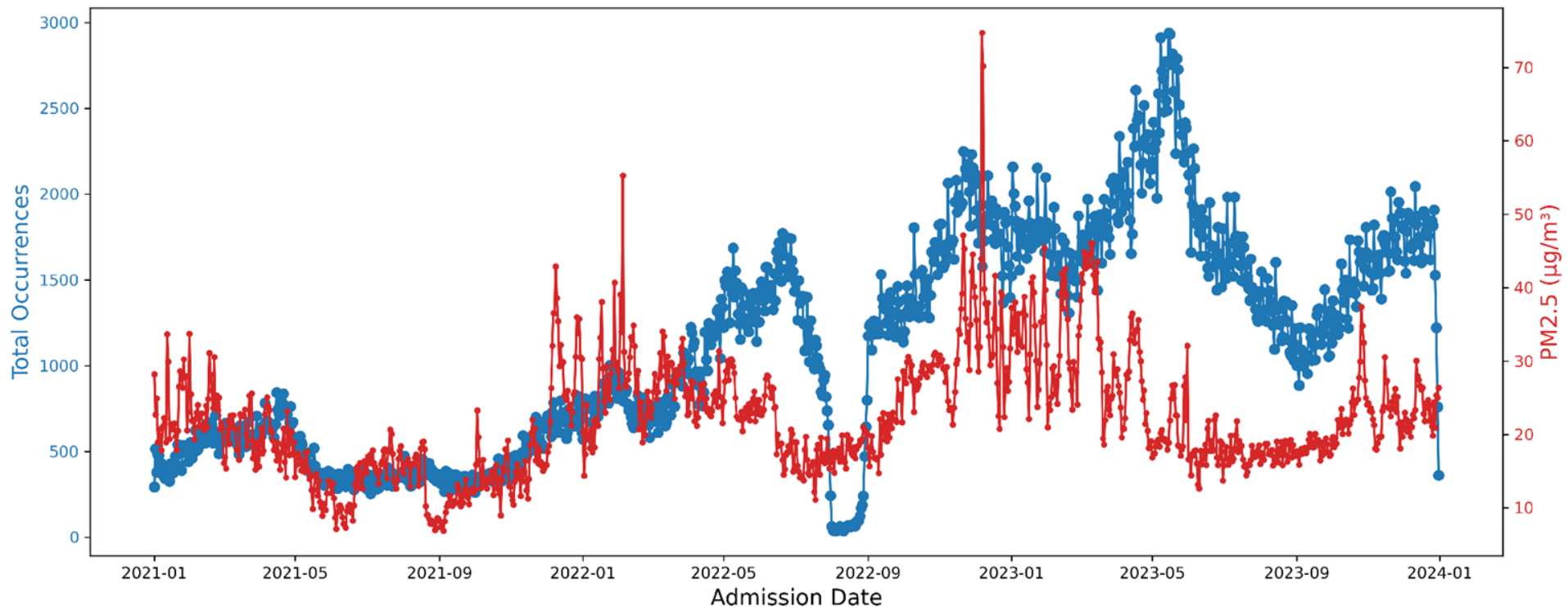


Seasonal PM2.5



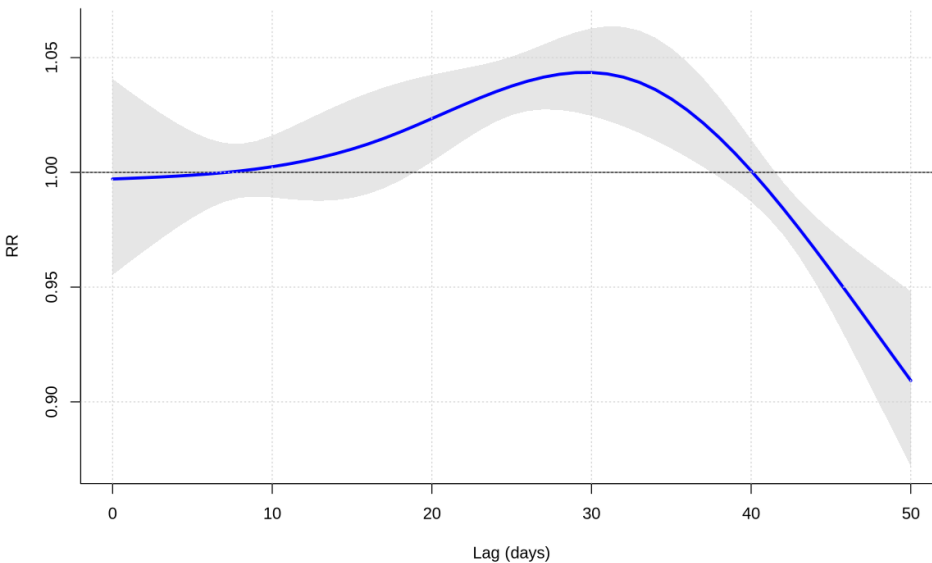
Time series of PM2.5 and respiratory disease hospitalizations.

Total Respiratory Disease Admissions and Mean PM2.5 (All Regions)

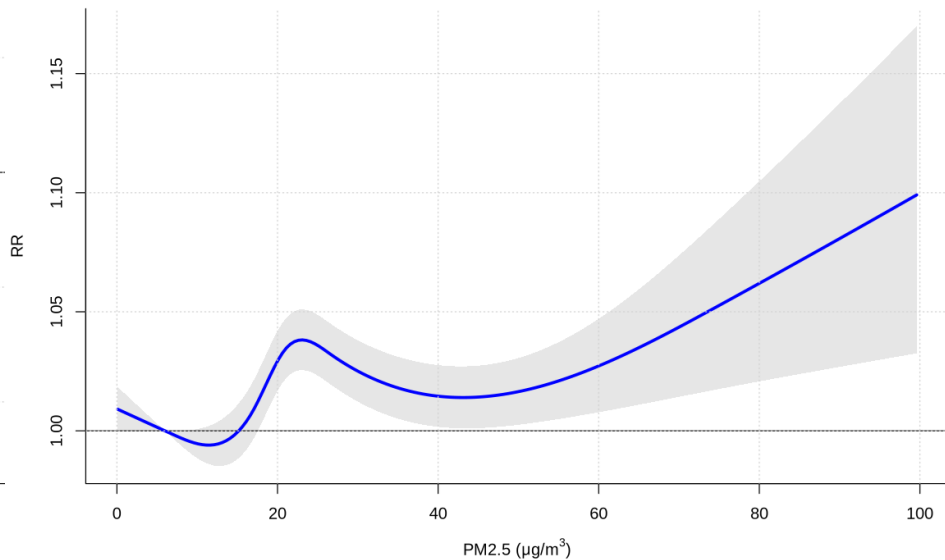


Exposure response relationships for Respiratory Hospitalizations

DLNM: RR vs Lag at Mean PM2.5 (Country-level)



DLNM: RR vs PM2.5 at lag 25 (Country-level)

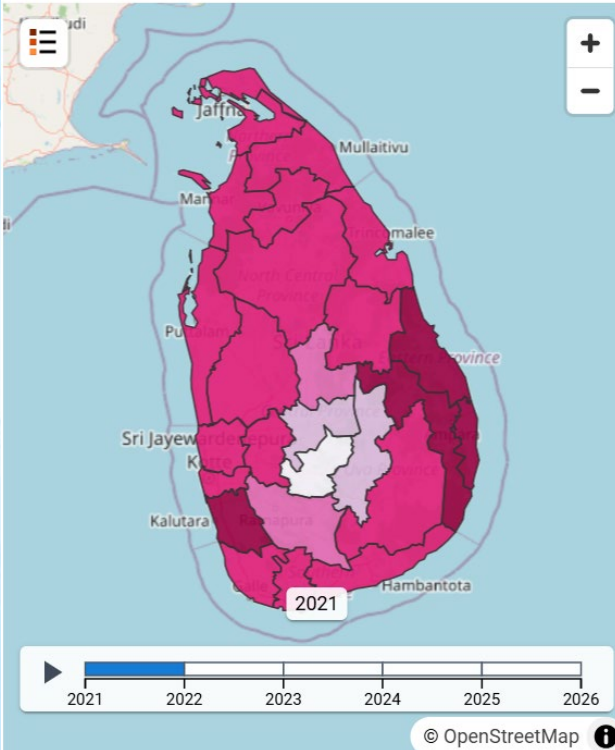


Heat and Impact on Health

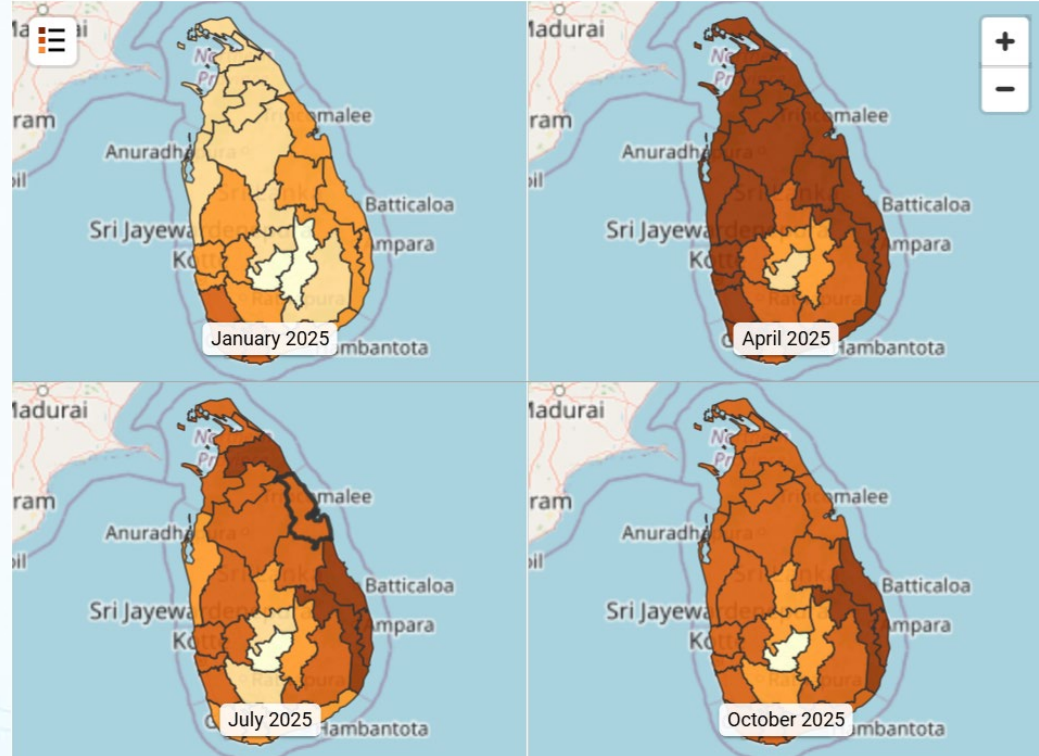


Context

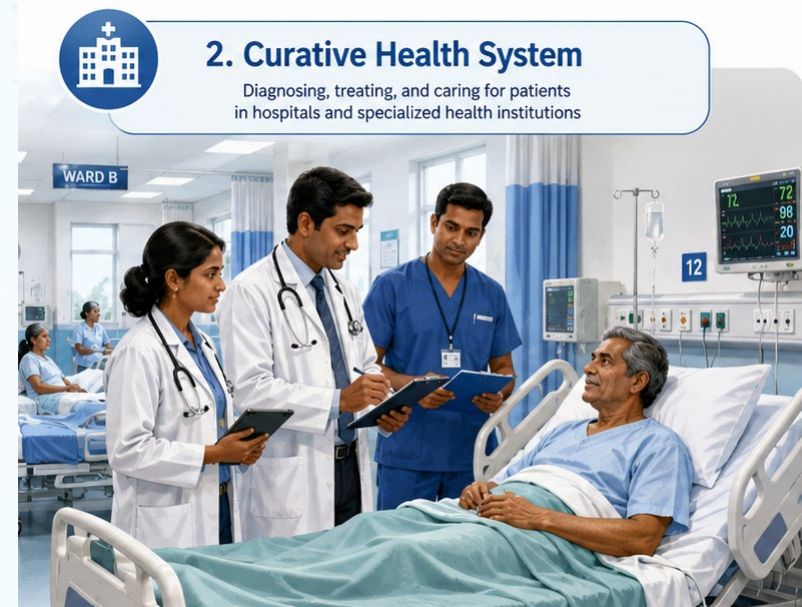
Heat Stress Variation in Sri Lanka over last 5 years by District



Seasonal Variation of Heat Stress in Sri Lanka Last Years by District



Sri Lanka Health Sector





1. Preventive Health System

Promoting health, preventing disease,
and caring for mothers and children in the community



RMNCAH System in Sri Lanka

eRHMS

Clinic - Balakaduwa
Clinic - Bulugohotenna
Clinic - Central Clinic
Clinic - Dunuwila
Clinic - Kasawatththa
Clinic - Kurugodahaela
Clinic - Kurugoda CD
Clinic - Pangollamada
Clinic - Rambuke ela CD
Clinic - Thelambugahawatta
Clinic - Wilanagama
PHI - Akurana
PHI - Alawathugoda
PHI - Bulugohotenna
PHI - Dunuwila
PHI - Kurugoda
PHM - Akurana
PHM - Alawathugoda
PHM - Arabepola
PHM - Balakaduwa
PHM - Bulugohotenna
PHM - Deegala
PHM - Dippitiya
PHM - Dodangolla

Data Entry

Organisation Unit: PHM - Akurana
Data Set: H524 - PHM M
Period: August 2025

විද්‍යා / முக்கியமான:

- 10 වනදා වනවිට සම්පූර්ණ කළ සෞඛ්‍ය සමීක්ෂණ කාලීන (10 වනදා වනවිට සම්පූර්ණ කළ සෞඛ්‍ය සමීක්ෂණ කාලීන)
- 20 වන දායින් පසු දත්ත ඇතුළත් කිරීමේ ජවයක්වන අක්‍රිය වී

1. රෝගාගාර පවුල් පිළිබඳ තොරතුරු
තනතුරු සහ සේවකයන්ගේ ප්‍රතිචාරය
2. මාසා සංරක්ෂණය - ලියාපදිංචි කරන අවස්ථාවේදී
ප්‍රතිචාර සමයටදීම පොදු තාක්ෂණික ප්‍රශ්න
3. මාසා සංරක්ෂණය - පුළුල් වාර්තාකරණයේදී
තාක්ෂණික ප්‍රශ්න පිරිසිදු කිරීමේදී
4. මාසා සංරක්ෂණය (ප්‍රථම පසු ප්‍රසව මහත්මිය)
තාක්ෂණික ප්‍රශ්න පිරිසිදු කිරීමේදී
5. මරණයෙන් පසු ප්‍රතිචාර
ප්‍රතිචාරයෙන් පසු ප්‍රතිචාර
6. පසු ප්‍රසව සංරක්ෂණය
ප්‍රතිචාරයෙන් පසු ප්‍රතිචාර
7. ලද්දේ සංරක්ෂණය
ප්‍රතිචාරයෙන් පසු ප්‍රතිචාර
8. ලබා සංරක්ෂණය
ප්‍රතිචාරයෙන් පසු ප්‍රතිචාර
9. ලබා නා නව රෝගීන් සංරක්ෂණය
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10. පවුල් සංවිධානය
ප්‍රතිචාරයෙන් පසු ප්‍රතිචාර

Bar chart showing data for various categories (A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z).

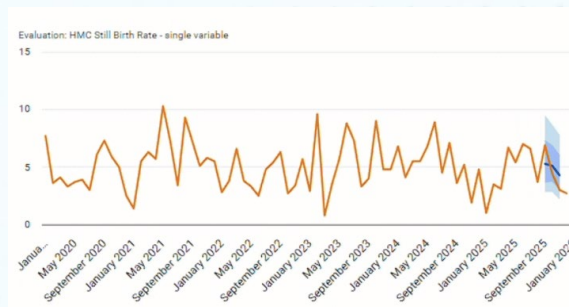
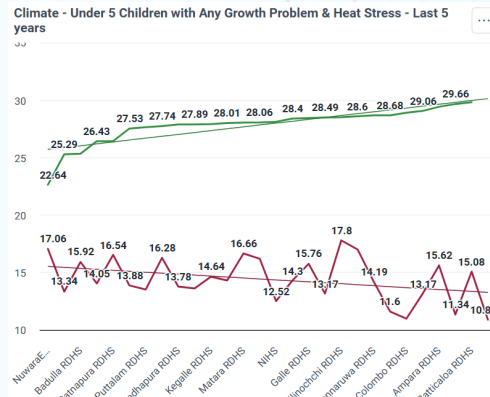
Process



Climate App



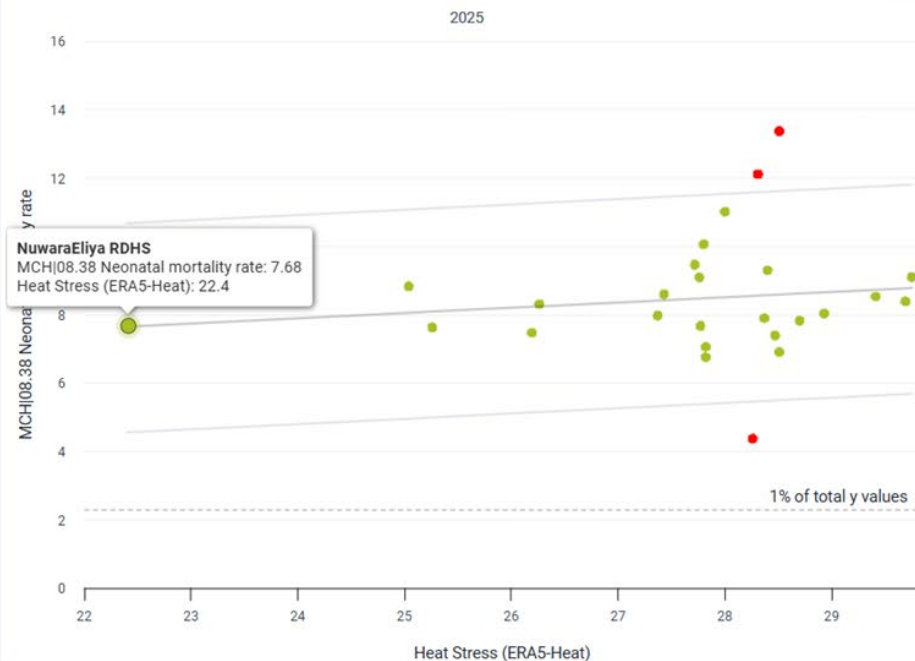
CHAP



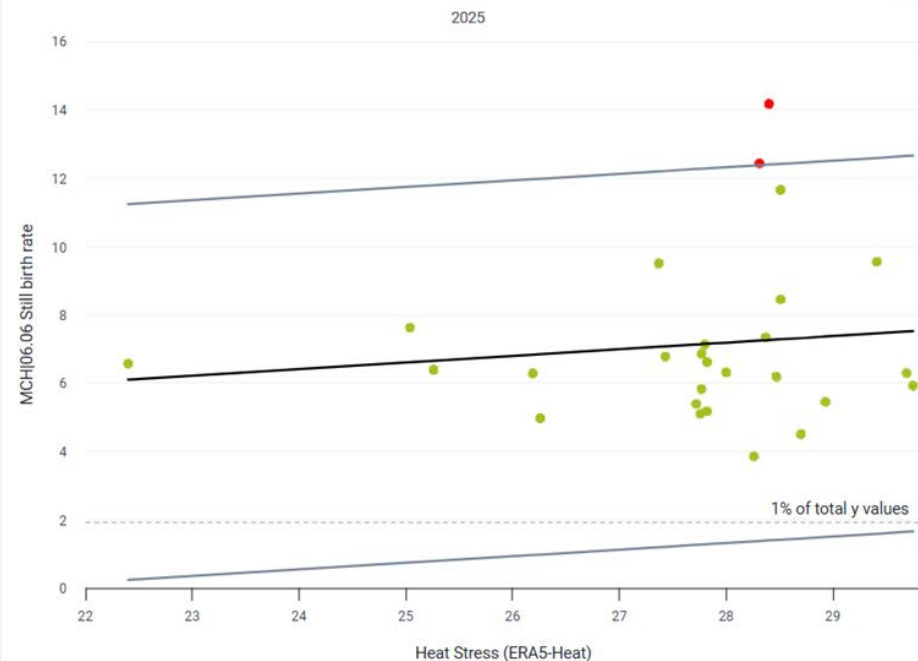
RMNCH Indicators vs Heat



Climate HS11 - Neonatal mortality rate vs heat stress



Climate HS9 - Still birth rate vs heat stress



Predictions





2. Curative Health System

Diagnosing, treating, and caring for patients in hospitals and specialized health institutions



eIMMR

Indoor Morbidity and
Mortality Registry

Process

 **dhis2**
National Climate
Health Data System

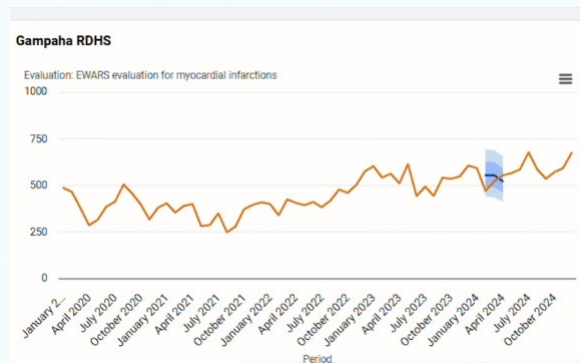
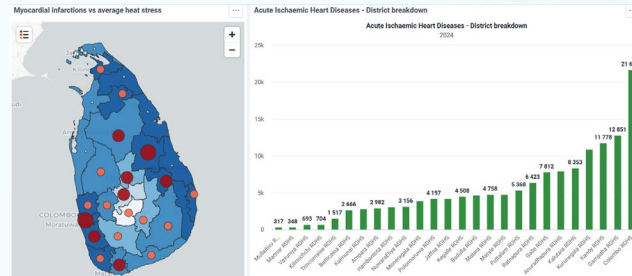
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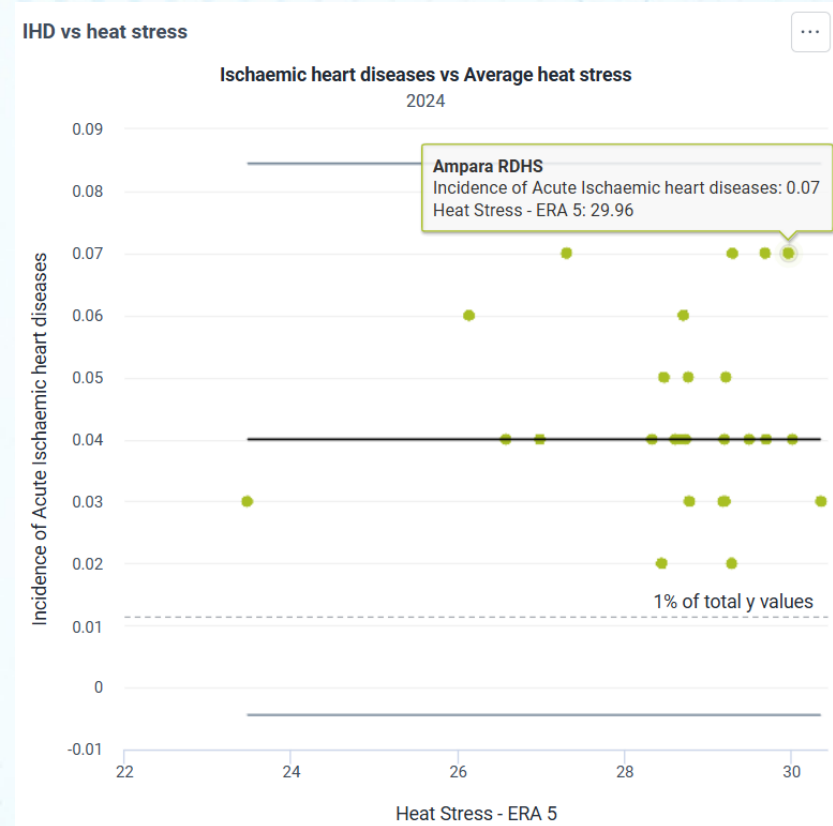
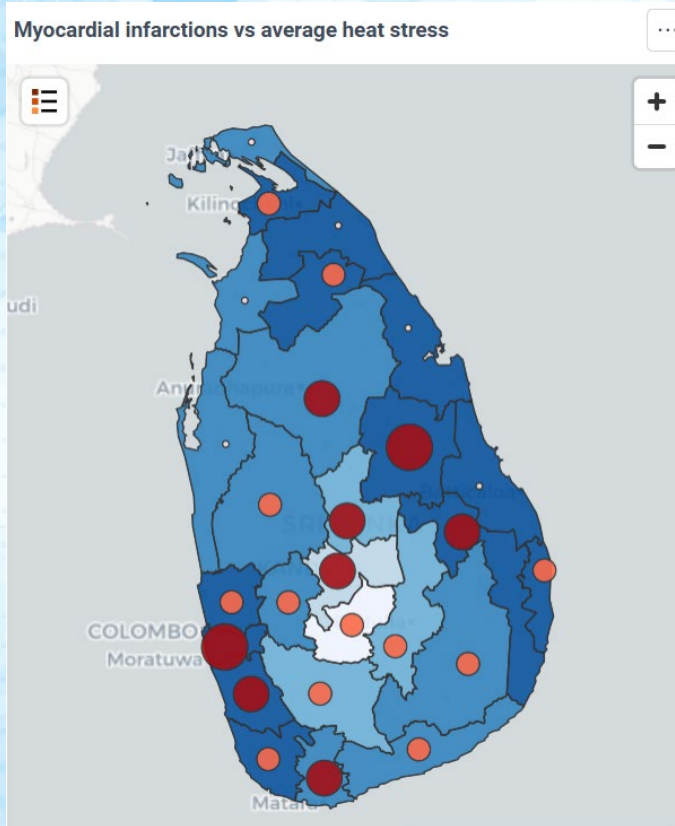
Climate App



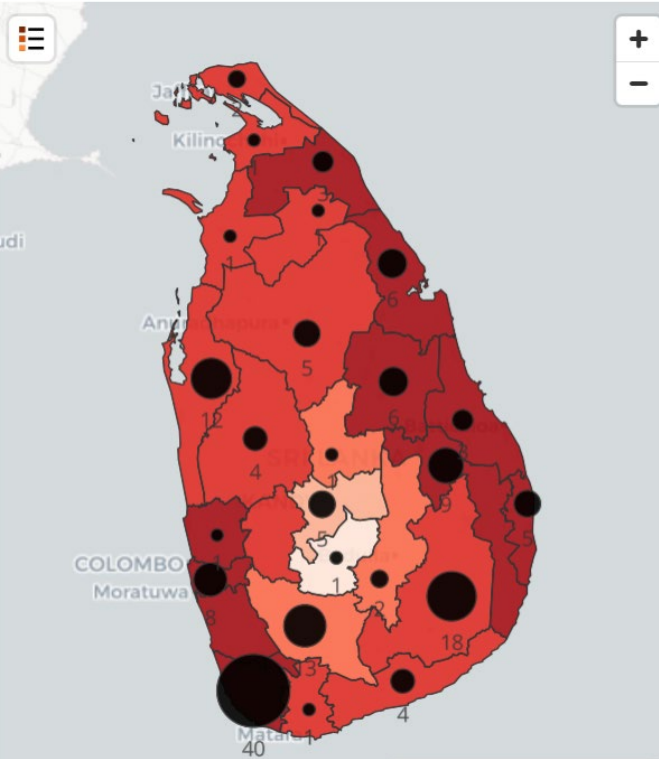
CHAP



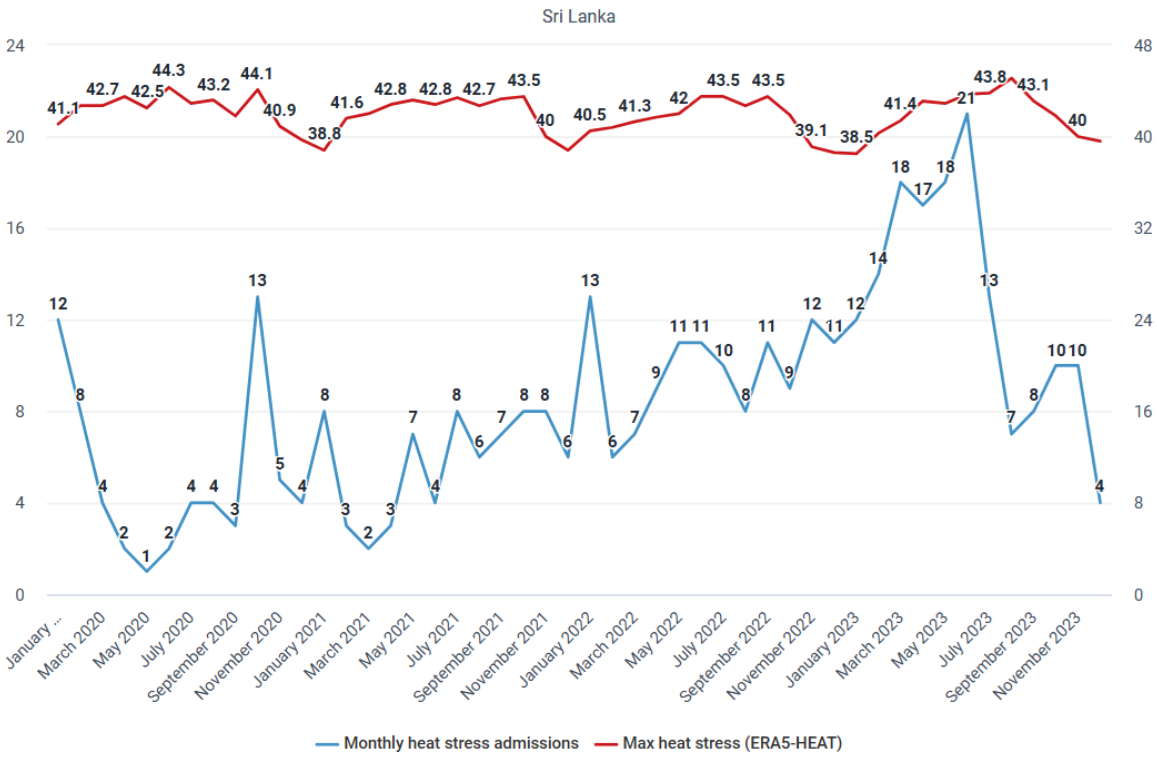
Ischemic Heart Disease & Heat



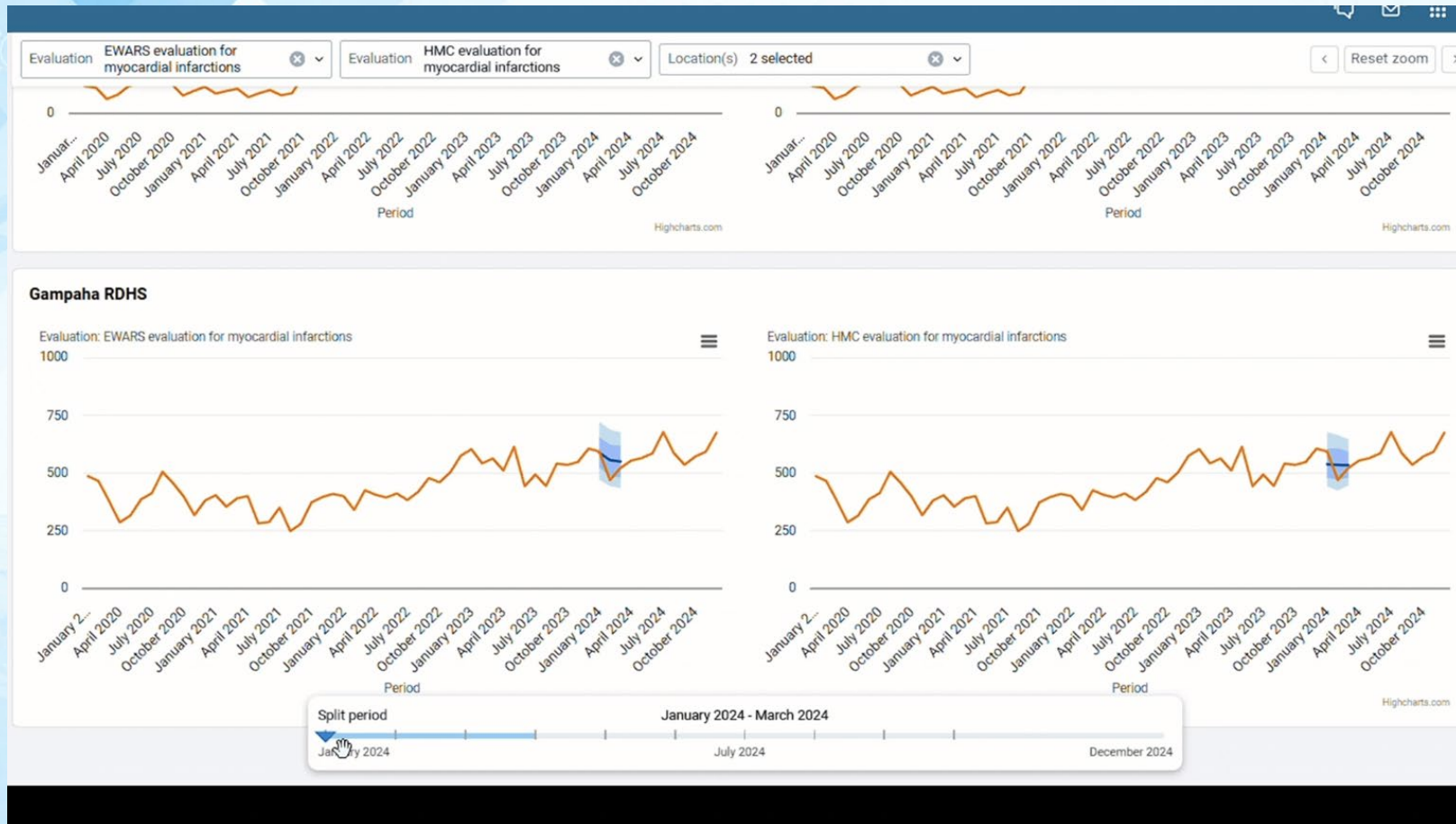
Atmospheric heat stress vs heat related admissions 2023



Heat related admissions vs Max atmospheric heat stress - trend



Predictions



Thank you



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

Anayda Portela

Department of Sexual, Reproductive,
Maternal, Child and Adolescent and
Ageing Health
World Health Organization



World Health
Organization



Photo: © Curt Carnemark / World Bank

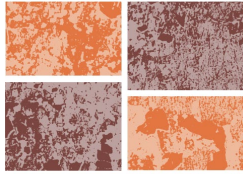
Background and 2023 meeting



World Health
Organization

Previous WHO led efforts for indicator selection

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

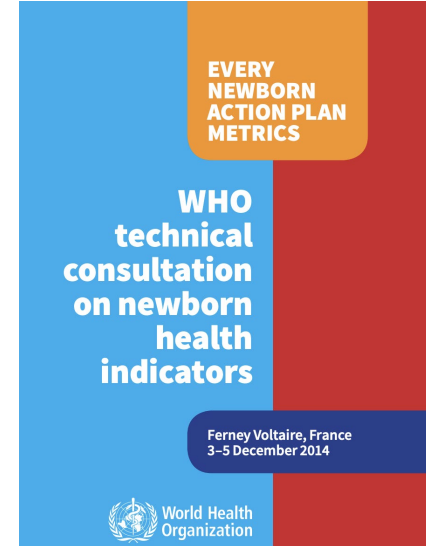


**World Health Organization and
Partnership for Maternal, Newborn and Child Health**

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, Lilianna Carvajal, Saeed Dastgiri, Lucy Fagan, Jane Ferguson, Howard S. Friedman, Charity Giyava, Ann Hagell, Jo Inchley, Debra Jackson, Anna E. Kluge, 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 ...

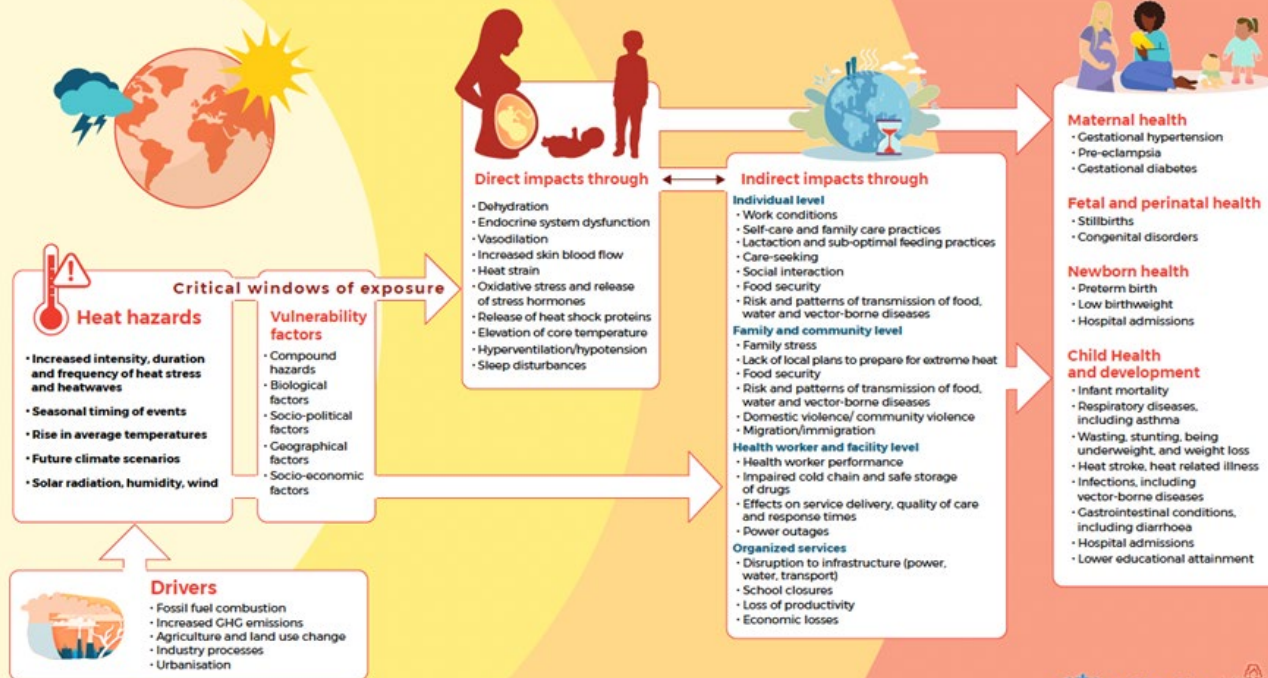
Geographic scope of the data

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)

Post 2023 meeting to January 2026



World Health
Organization

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

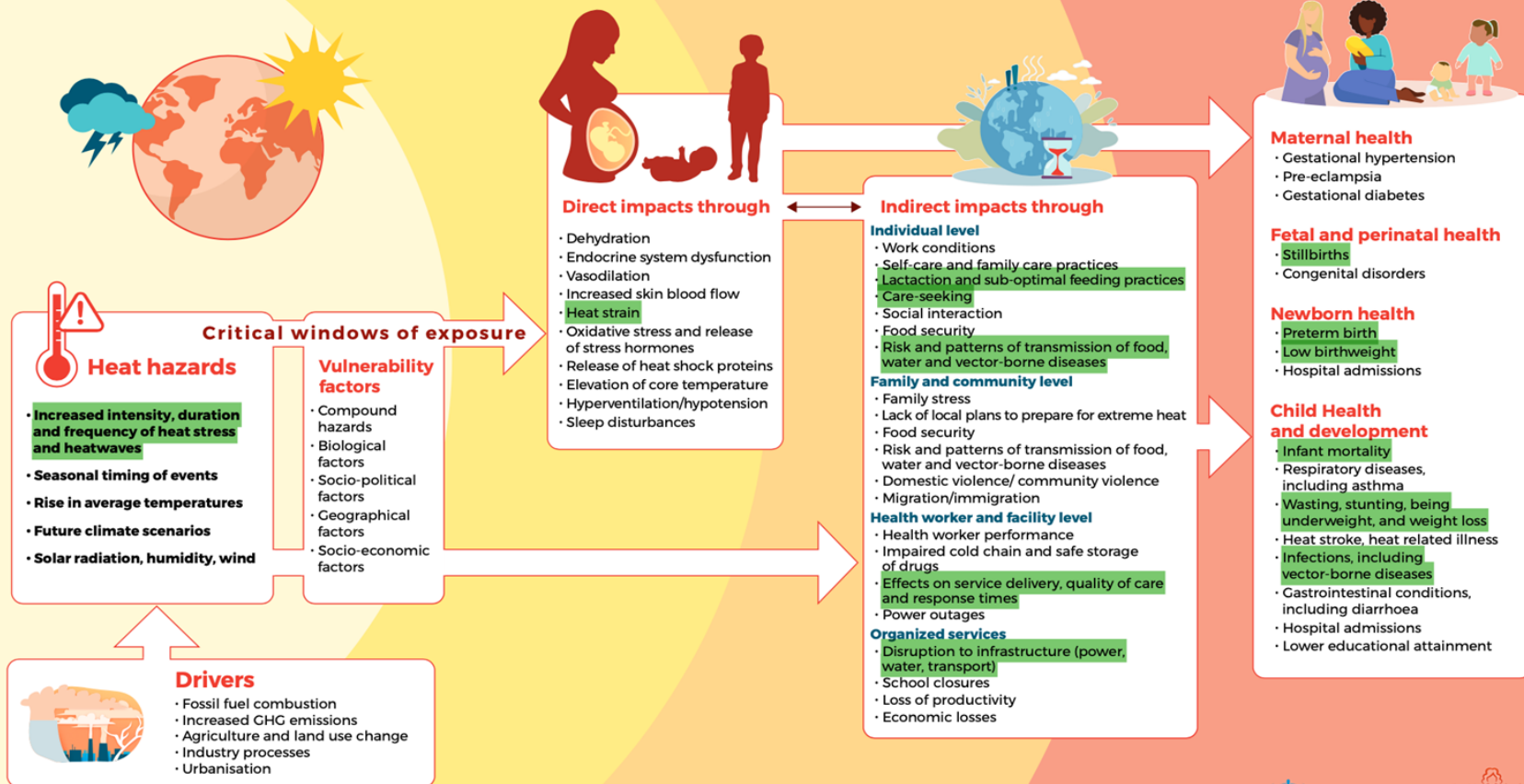


- Organise a glossary of MNCH and heat terms <https://www.high-horizons.eu/resources/glossary/>
- Conduct a scoping review of available heat health indicators and content analysis of heat plans and MNCH currently used by countries. <https://jogh.org/2025/jogh-15-04157>
- Update the systematic reviews 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

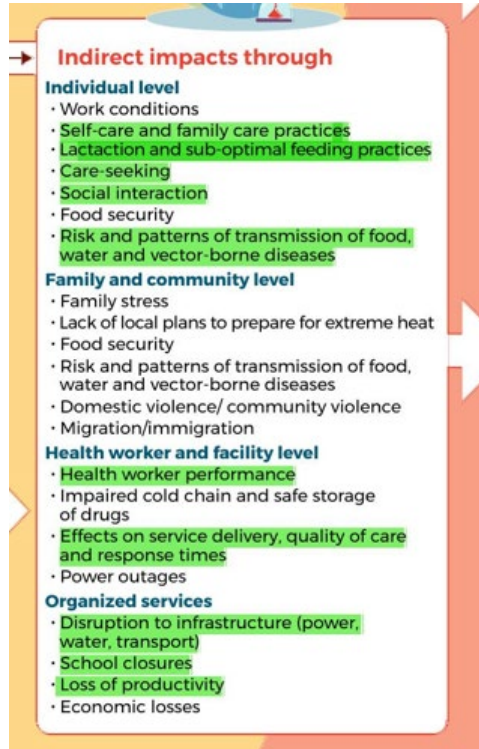
Areas highlighted in green have at least five indicators



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

January 2026 meeting



World Health
Organization

Systematic review

RESEARCH

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

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nature medicine

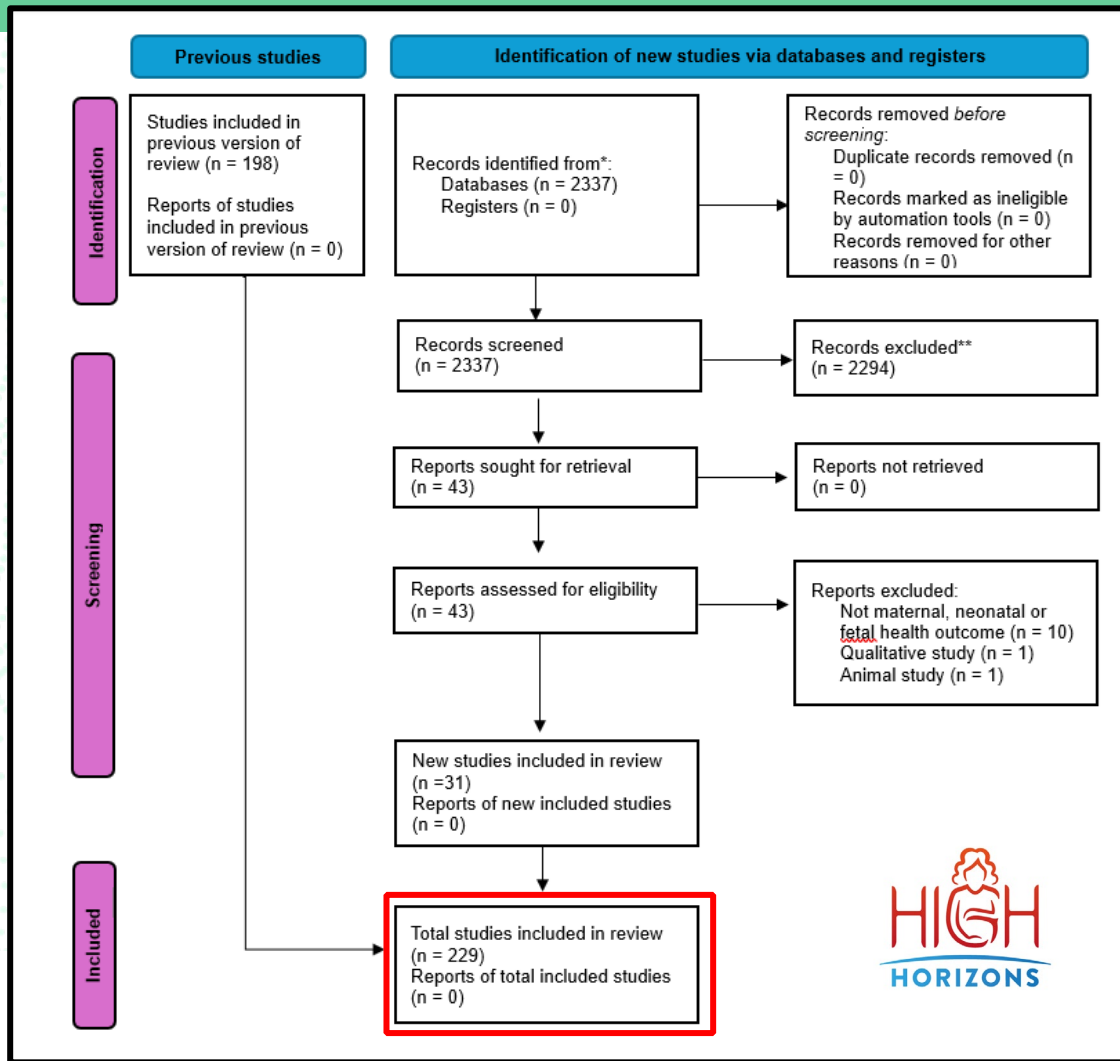
Analysis <https://doi.org/10.1038/s41591-024-03395-9>

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

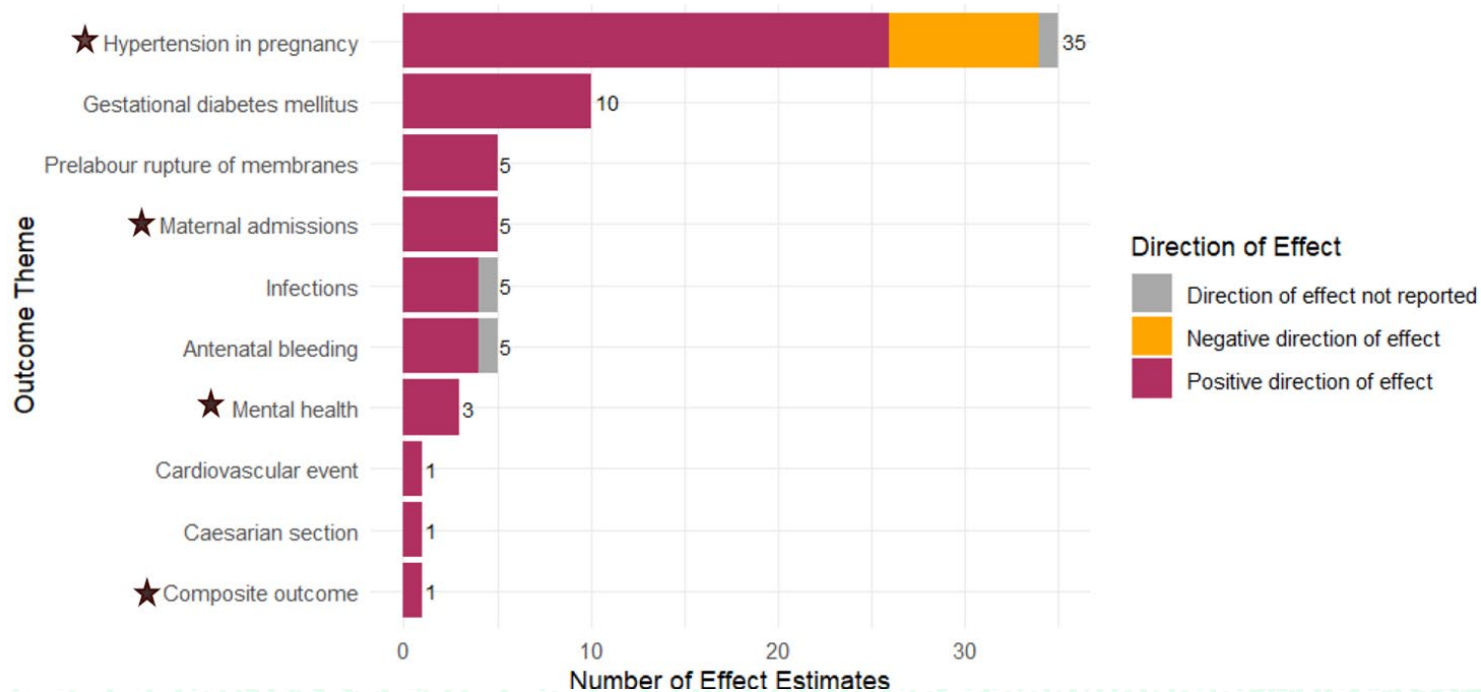
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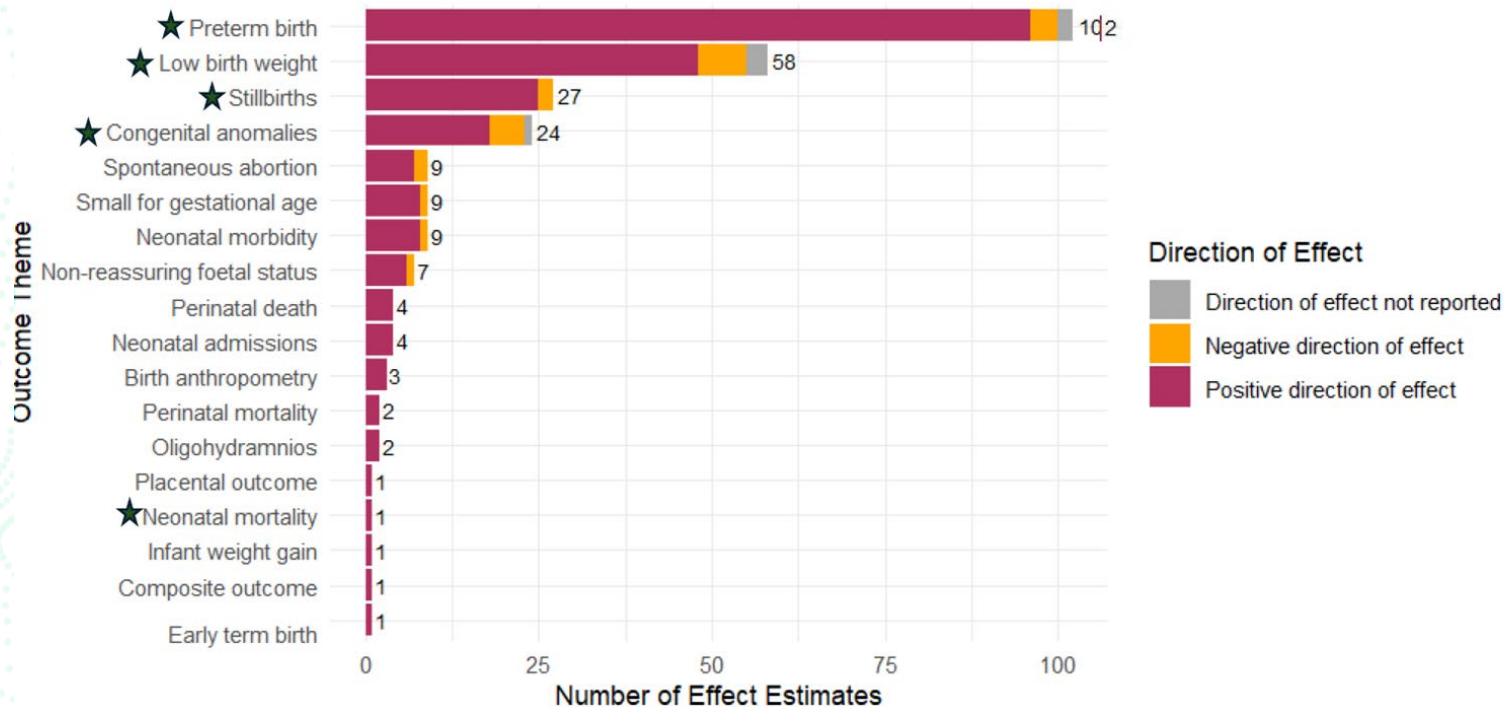
Updated 16 July
2025



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



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MNCH working group recommendations

	Maternal	Newborn	Child
Core	Preterm birth rate	Preterm birth rate	Emergency room visits
Additional	Antenatal care visit Hypertensive disorders of pregnancy	Stillbirth	Under-5 mortality 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:

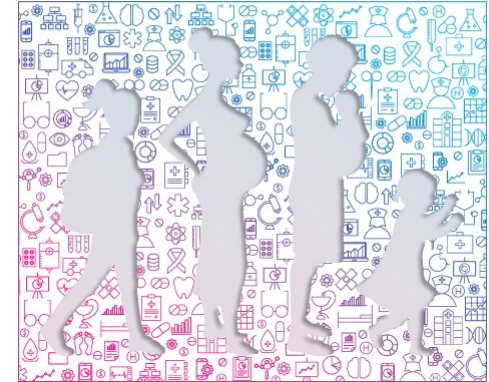
- Governance and planning: Inclusion of MNCH in the health and climate change multistakeholder mechanism (e.g. task force or committee);
- Governance and planning: MNCH considered a highest priority health risk from climate change
- Adaptation: Integration of weather and climate information into the 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.

Post-January 2026 meeting



Analysis and use of health facility data

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

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 ¶ If-calculating-this-indicator-as-a-proportion-(per-100): ¶ N: Number-of-newborns-born-<37-weeks-gestation ¶ D: Number-of-live-births-in-facilities-(3) ¶ □	Classification: ¶ > → <37-weeks ¶ > → <32-weeks ¶ > → <28-weeks ¶	Preferred: ¶ health-management-information-system-(HMIS) ¶ ¶ 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-HMIS-data-varies-greatly. Even-more-so, accuracy-of-assessing-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-ICD11-coding-may-be-available; ¶ ¶ 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) ¶ If-calculating-this-indicator-as-a-proportion-(per-100): ¶ N: Number-of-outpatient-visits-in-specified-age-group ¶ D: Estimated-total-population-of-the-specified-age-group-(3) ¶ □	Age- > Newborns (0-6 days and 7- <28 days) ¶ > Children (1-month-4-¶ > years, 5-9- years) ¶ > Women-of-reproductive-age-(15-49) ¶ ¶ Gender/Sex ¶ ¶ Pregnancy-or-Post-partum-status-¶ ¶ Reason-for-visit-¶ ¶ Preventive-vs-Curative ¶ ¶ New-visits-plus-continuing-¶	Preferred: ¶ HMIS ¶ ¶ Other: ¶ OPD-register ¶ ¶ □	Extreme-heat-is-associated-with-a-range-of-adverse-health-MNCH-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 ^a	Hypertension in pregnancy ^a	Number or proportion of antenatal clients with elevated blood pressure ^a	Number of antenatal clients (in facility) with elevated blood pressure ^a If calculating this indicator as a proportion (per 100): ^a N: Number of antenatal clients (in facility) with elevated blood pressure ^a D: Number of antenatal clients with blood pressure measured in facility ^a	Women's age ^a	Preferred: ^a HMIS ^a Other: ^a Medical records, antenatal register ^a	Heat exposure is linked with hypertensive disorders of pregnancy, such as pre-eclampsia and gestational hypertension (1). ^a	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. ^a The hospital ICD11 coding may be available ^a
Newborn ^a	Stillbirths in facilities ^a	Number or proportion of babies born in a health facility with no signs of life, ≥ 28 weeks gestation or weighing ≥ 1000 g ^a	Number of stillbirths in facility ^a If calculating this indicator as a proportion (per 100): ^a N: Number of stillbirths in facilities ^a D: Total number of births in facility (live births and stillbirths) ^a	Antepartum (macerated), intrapartum (fetal death) ^a	Preferred: ^a HMIS ^a Other: ^a Medical records, birth register ^a	Heat exposure during pregnancy is associated with adverse fetal and perinatal outcomes, including stillbirths (1). ^a	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 (e.g. ≥ 500 grams). ^a The hospital ICD-11 coding may be available ^a
Newborn ^a	Low birth weight (<2500 g) in facilities ^a	Number or proportion of live births in facilities with birth weight less than 2500 g ^a	Number of newborns born alive in a facility with weight <2500 g at birth ^a If calculating this indicator as a proportion (per 100): ^a In a facility with weight <2500 g at birth ^a D: Number of live births in facility (3) ^a	Subgroup of: $> < 2500$ g ^a $> < 2000$ g ^a $> < 1800$ g ^a	Preferred: ^a HMIS ^a Other: ^a records or birth register ^a	Heat exposure is associated with increased odds of low birth weight (1). ^a	Lack of digital scales and in some countries, health workers may round up birth weight impacting on the quality of data. ^a available ^a

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n this table, the term health management information system (HMIS) is used to refer to aggregated data reported by health facilities.

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

Indicator-name ^a	Indicator-definition ^a	Computation (Numerator{N}, Denominator{D}) ^a	Suggested-disaggregation ^a	Data-source ^a	Rationale ^a	Considerations ^a
Mortality [¶] ^a	Number-or-rate-of- [¶] deaths [¶] [¶] ^a	Number-of-deaths [¶] [¶] If-expressed-as-a-rate: [¶] [¶] N: Number-of-deaths [¶] [¶] D: Total-population (or-age-specific-population)) [¶] [¶] ^a	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 ^a	CRVS-or-death-registers-or-national/subnational-surveillance-systems [¶] [¶] ^a	Extreme-heat-is-associated-with-a-range-of-adverse-health-outcomes. [¶] Excess-mortality-is-strongly-linked-to-heat-exposure; with-evidence-for-heat-related-mortality-on-every-continent-(4). [¶] [¶] ^a	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. [¶] [¶] Linkages-between-national-CRVS-and-maternal-and-MPDSR-systems-should-be-considered. ^a
Emergency-room-visits ^a	Number-or-rate-of-emergency-room-visits ^a	Number-of-emergency-room-visits [¶] [¶] If-calculating-this-indicator-as-a-rate: [¶] [¶] N: Number-of-emergency-room-visits [¶] [¶] D: Total-population (if-by-age-group, then-respective-population-denominators-should-be-used.) ^a	➤ 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-post-partum-women [¶] All-cause-and-specific-causes-of-visits [¶] [¶] ^a	National-surveillance-of-morbidity-outcomes-or-subnational-sources [¶] [¶] Hospital-records ^a	Extreme-heat-is-associated-with-a-range-of-adverse-health-outcome-and-may-lead-to-increased-health-service-utilization. [¶] [¶] Emergency-department-visits-is-one-of-the-most-commonly-tracked-indicators-in-heat-along-with-mortality, hospital-admission, ambulance-calls-and-physician-visits. ^a	Cause-of-visit-and-heat-related-morbidities-are-often-not-reported. [¶] [¶] ^a

Thank you.



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