

Extreme Heat:

A Guide for Midwives

2026



© 2026 by the International Confederation of Midwives

Some rights reserved. This work is available under the Creative Commons Attribution-NonCommercial-Sharealike 4.0 license (CC BY-NC-SA 4.0); <https://creativecommons.org/licenses/by-nc-sa/4.0/deed.en>.

Under the terms of this license, you may copy, redistribute, and adapt the work for non-commercial purposes, provided the work is appropriately cited, as indicated below.

Suggested Citation

Extreme Heat: A Guide for Midwives. The Hague: International Confederation of Midwives; 2026. License: CC BY-NC-SA 4.0.

Translations

Translations of this document into languages other than English, French and Spanish are permitted.

Translated versions must include the following statement: This translation was not created by the International Confederation of Midwives (ICM). ICM is not responsible for the accuracy of this translation. The original English edition Extreme Heat: A Guide for Midwives. The Hague: International Confederation of Midwives; 2026. License: CC BY-NC-SA 4.0 is the binding and authentic edition.

Translated versions of this document must be sent to communications@internationalmidwives.org for dissemination on the ICM website.

ICM may be able to support with graphic design templates for translations into languages other than English, French and Spanish.

Please contact communications@internationalmidwives.org for details.

Sales, rights and licensing

To submit requests for commercial use and queries on rights and licensing, please contact communications@internationalmidwives.org.

General disclaimer

All reasonable precautions have been taken by ICM to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either expressed or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall ICM be liable for damages arising from its use.

Acknowledgements

ICM thanks Neha Mankani, author of *Extreme Heat: A Guide for Midwives*, and graphic designer Inma Nunez. Special thanks to Daniela Drandic, Liselotte Kweekel, Solomon Hailemeskel and Ana Gutierrez for reviewing the Guide and providing valuable input.

Gender inclusivity statement

At ICM we centre the experiences of women and girls in our work, while also recognising that gender diverse people, including trans and non-binary people, also need access to a midwife for sexual, reproductive, maternal, newborn and adolescent health care.

Contents

Background	8
<i>Why Midwives Must Be Prepared</i>	9
<i>What is in This Guide</i>	9
Definitions	11
Section 1. Extreme Heat, Pregnancy Health, Labour, and Birth	12
1. <i>Increased Risk of Preterm Birth</i>	13
2. <i>Increase in Congenital Anomalies</i>	14
3. <i>Increased Risk of Complications of Pregnancy and Poor Newborn Health Outcomes</i>	15
Section 2. Extreme Heat, Postnatal and Newborn Health	19
1. <i>Postpartum Maternal Recovery and Sepsis</i>	20
2. <i>Severe Newborn Hyperthermia</i>	20
3. <i>Decrease in Breast Milk Volume</i>	21
Section 3. Extreme Heat, Perinatal Mental Health, and Gender-Based Violence (GBV)	22
1. <i>Perinatal Mood and Anxiety Disorders (PMADs)</i>	23
2. <i>Intimate Partner Violence (IPV) & Domestic Abuse</i>	23
Section 4. Air Pollution, Wildfire Smoke and Increased Risk of Perinatal Mortality	25
Section 5. The Impact of Extreme Heat on Midwives, Health Professionals and Health Facilities	28
1. <i>Increase in Clinical Reaction Time and Errors</i>	29
2. <i>Increase in Physical Exhaustion</i>	29
3. <i>Increase in Irritability and Stress</i>	29
4. <i>Health Facilities and Adaptation Challenges</i>	30
Section 6. Intersectionality: Who is More Affected and Why?	31
Section 7. Adaptation Actions	34
1. <i>Actions During Pregnancy</i>	35
2. <i>Actions During Labour and Delivery</i>	37
3. <i>Actions During the Postpartum Period (Maternal Recovery)</i>	37

<i>4. Actions for Newborn Care</i>	38
<i>5. Actions for Lactation Support</i>	38
<i>6. Actions for Mental Health and Safety</i>	39
<i>7. Actions for Midwives and Providers</i>	39
<i>8. Actions for Healthcare Facilities</i>	40
<i>9. Actions for Policy Makers, Governments, and Member Associations</i>	41
Section 8. Quick Reference Tables	43
<i>Summary of Risks of Maternal and Newborn Hyperthermia</i>	44
<i>Signs of Dehydration</i>	45
<i>Recognising and Responding to Heat-Related Illness in Pregnant Women</i>	45
<i>Recognising and Responding to Overheating and Heat-Related Illness in Newborns</i>	46
<i>Protecting Mothers and Babies From Extreme Heat</i>	47
<i>Strategies to Keep a Newborn Cool</i>	48
Section 9. Additional Resources	49
References	51

Acronyms

ADH	Antidiuretic hormone
AKI	Acute kidney injury
ANC	Antenatal care
AQI	Air Quality Index
AVA	Arteriovenous anastomosis
BMI	Body mass index
CDC	Centers for Disease Control and Prevention
CHW	Community health worker
CKD	Chronic kidney disease
DVT	Deep vein thrombosis
EPDS	Edinburgh Postnatal Depression Scale
FGR	Fetal growth restriction
GBV	Gender-based violence
GDM	Gestational diabetes mellitus
GHHIN	Global Heat Health Information Network
HAP	Heat Action Plan
HEPA	High-efficiency particulate air
HVAC	Heating, ventilation and air conditioning
ICM	International Confederation of Midwives
IIASA	International Institute for Applied Systems Analysis
IPV	Intimate partner violence
IUGR	Intrauterine growth restriction
LBW	Low birth weight
MERV	Minimum Efficiency Reporting Value

MoHFW	Ministry of Health and Family Welfare
NAP	National Adaptation Plan
NTD	Neural tube defect
OTC	Over-the-counter
PIH	Pregnancy-induced hypertension
PM2.5	Fine particulate matter measuring 2.5 micrometres or less
PMAD	Perinatal mood and anxiety disorder
PPD	Postpartum depression
PTB	Preterm birth
REM	Rapid eye movement
RMC	Respectful Maternity Care
ROS	Reactive oxygen species
SIDS	Sudden Infant Death Syndrome
SMS	Short Message Service
SRMNAH	Sexual, reproductive, maternal, newborn and adolescent health
SSI	Surgical site infection
UNFCCC	United Nations Framework Convention on Climate Change
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
US	United States
UTI	Urinary tract infection
VSD	Ventricular septal defect
WHO	World Health Organization
WMO	World Meteorological Organization

Background

Extreme heat is an escalating global threat to sexual, reproductive, maternal, newborn and adolescent health (SRMNAH). Globally, heatwaves and extreme weather events are occurring with unprecedented frequency, greater intensity, and longer durations. These shifts are not confined to specific tropical regions; their consequences are felt in every corner of the world—from temperate northern zones experiencing record-breaking summer anomalies to equatorial regions facing sustained, unliveable heat indices.

Extreme heat is an invisible disaster. Unlike hurricanes or floods, it does not leave behind immediate physical destruction, making its severe physiological toll easy to overlook. Yet, the evidence is undeniable: extreme heat is a profound and direct threat to SRMNAH. Maternal and fetal health are uniquely vulnerable to environmental heat stress, and even a single day of extreme heat exposure can trigger a cascade of events that compromise clinical outcomes (1).



Why Midwives Must Be Prepared

As primary healthcare providers and defenders of SRMNAH, midwives are well placed to respond to the health impacts of extreme heat. They work in homes, communities and local clinics, where heat exposure often occurs, and are trusted providers of care and health information. To protect women and newborns, midwives need the knowledge to recognise heat-related complications and practical, low-cost tools to reduce the risks.

Extreme heat is a growing public health emergency and an occupational risk for midwives. Existing clinical guidance does not always address its specific effects on women, newborns and health workers. Midwives therefore need practical, climate-resilient approaches that can be adapted across different settings.

This guide connects emerging evidence on the effects of extreme heat with everyday midwifery practice. It provides midwives, educators and Member Associations with evidence-based actions to recognise heat-related illness early, adapt care and hydration, protect the medicine cold chain and safeguard their own health and wellbeing. These tools will support midwives to continue providing safe, quality care in a warming world.

What is in This Guide

- **Section 1: Pregnancy, Labour, and Birth –**
Explores how extreme heat affects pregnant women and the developing fetus, including the risks of preterm birth, congenital anomalies, pregnancy-induced hypertension (PIH), gestational diabetes mellitus (GDM) and disrupted fetal kidney development.
- **Section 2: Postnatal and Newborn Health –**
Addresses critical postpartum vulnerabilities, highlighting maternal recovery complications, wound sepsis, the physiology of neonatal hyperthermia, and heat-induced lactation insufficiency.



- **Section 3: Perinatal Mental Health and Gender-Based Violence (GBV)** – Details how extreme thermal strain acts as a syndemic risk-amplifier, triggering perinatal mood disorders (PMADs), sleep disruption, and a direct increase in domestic abuse and intimate partner violence (IPV).
- **Section 4: Air Pollution, Wildfire Smoke and Perinatal Health** – Explains how extreme heat can worsen air pollution and wildfire smoke, compounding risks to maternal respiratory health, placental function and fetal development, and provides practical guidance for reducing exposure using the Air Quality Index (AQI).
- **Section 5: The Impact of Extreme Heat on Midwives, Health Professionals, and Health Facilities** – Examines the direct occupational hazards of heat stress on healthcare providers—such as cognitive fatigue, diagnostic errors, and threats to respectful maternity care (RMC)—alongside clinical building vulnerabilities and medicine cold-chain failures.
- **Section 6: Intersectionality: Who Is More Affected and Why?** – Examines how living and working conditions, chronic illness, limited access to water and healthcare, and persistent gender and social inequalities can compound heat-related risks during pregnancy and the newborn period.
- **Section 7: Adaptation Actions** – Outlines a comprehensive suite of practical, evidence-based, low-cost interventions across pregnancy, intrapartum, postpartum, newborn, and lactation stages, alongside provider, facility, and high-level national policy-maker adaptations.
- **Section 8: Quick Reference Tables** – Provides at-a-glance guidance to help midwives and families recognise heat exhaustion, heatstroke and dehydration in pregnant and postpartum women and newborns, respond appropriately, and take practical steps to prevent overheating throughout pregnancy, labour, birth, breastfeeding and the newborn period
- **Section 6: Resources and Direct Linkages** – Connects midwives, clinical educators, and Member Associations with high-yield global digital platforms, training videos, and implementation checklists to scale up advocacy.

Note: The clinical implications for exposure to extreme heat in pregnancy, labour, birth, and the postnatal period are an evolving science, and data will evolve over time

Definitions

Air Quality Index: A measure of air quality. AQI is reported on a scale from 0 to 500. When looking at the AQI, values of 0-100 represent satisfactory air and 101-500 represent unhealthy air.

Excessive Heat: Also known as extreme heat

Extreme Heat: occurs when high temperatures and other environmental conditions create elevated risks for human health, ecosystems, infrastructure and livelihoods. Often experienced as intense heatwaves or persistent heat and humidity that place stress on the human body, it is one of the deadliest weather and climate hazards worldwide. Temperatures above the 95th percentile of local distributions.

Heat Exposure: Contact with environmental or occupational conditions of high heat, including ambient temperature, humidity, and heat sources, that can overwhelm the body's ability to regulate its core temperature. It is often described as the combination of metabolic heat, environmental heat, and clothing or personal protective equipment, which results in increased heat storage within the body. Prolonged or severe heat exposure is a leading contributor to heat-related health complications (2).

Heat Wave: periods of unusually hot and dry or hot and humid weather that lead to local cumulative excess heat over a number of unusually hot days and nights. Heatwaves are defined using local thresholds rather than a single global temperature value, often using a mean temperature of 95th percentile threshold based on 30-years of local climate data (3)

High ambient temperatures: Elevated environmental temperature that raises heat exposure risk.

Hyperthermia: A rise in body temperature that happens when the body absorbs more heat than it releases. Long exposure to extreme heat or heat waves can cause hyperthermia.

Persistent hyperthermia: A sustained, abnormal elevation of body temperature above the normal range that continues over time, typically resulting from an impaired ability of the body to regulate its temperature at the normal hypothalamic set point. If left unaddressed, prolonged hyperthermia of this kind can lead to complications such as systemic inflammation and organ damage.



Section 1.

Extreme Heat, Pregnancy Health, Labour, and Birth

During pregnancy, the human body undergoes profound physiological changes that mimic mechanical heat stress: an elevated basal metabolic rate, increased blood volume, and a lower surface-area-to-mass ratio. When ambient heat rises, as it does during extreme heat exposure, the body's systems are pushed to the threshold of what they can tolerate, which has an impact on pregnancy. Data shows that even a single day of extreme heat exposure (defined as temperatures above the 95th percentile of local distributions) can trigger changes that require clinical attention (4, 5).



1. Increased Risk of Preterm Birth

A maternal body exposed to extreme heat triggers an involuntary stress cascade directly linked to premature labour and birth.

- **The biological mechanism:** Heat stress can trigger uterine contractions through two pathways. First, dehydration reduces blood volume, prompting the release of antidiuretic hormone (ADH) to conserve water. Because ADH is structurally similar to oxytocin, it can also activate uterine receptors. Second, heat stress may cause placental inflammation and cellular damage, releasing prostaglandins that can prematurely ripen the cervix (6).
- **Clinical outcomes:** Together, these processes may trigger Braxton Hicks contractions or, in more severe cases, contribute to true preterm labour.
- **When is the risk highest:** Risk compounds significantly during prolonged multi-day heatwaves and spikes dramatically during the third trimester, when the maternal cardiovascular system is already under maximal stress (7).

Data Snapshot: Increased Risk of Preterm Birth

A study across 12 U.S. states found that heat exposure during certain stages of pregnancy was associated with a 6% to 21% increase in the risk of preterm birth, particularly during week 34 and weeks 36–38. A 2.8°C rise in ambient temperature during the week before birth was also associated with a 12% to 16% higher risk of both early preterm birth before 34 weeks and late preterm birth between 34 and 36 weeks (8).



2. Increase in Congenital Anomalies

The developing embryo has no independent mechanism for thermoregulation; its core temperature relies entirely on maternal heat dissipation via the placenta.

- **The biological mechanism:** During early embryonic development, the embryo relies on the mother to regulate temperature. Maternal hyperthermia can damage essential proteins and cause cell death, disrupting the specialised cells that form the brain, spinal cord, face and heart. This may prevent these structures from developing and joining together normally (9)
- **Clinical outcomes:** Persistent maternal hyperthermia, in which core body temperature remains elevated above 38°C, during early pregnancy is associated with an increased risk of neural tube defects, including spina bifida, as well as orofacial clefts and congenital heart defects (6).
- **When is the risk highest:** The greatest vulnerability occurs during organogenesis, particularly weeks 3–8 after conception, when the embryo's major organs and structures are forming.

Data Snapshot: Increase in Congenital Anomalies

- A retrospective cohort study conducted in Canada reported that maternal exposure to 30°C during the critical period of neural tube closure was associated with an increased risk of neural tube defects (NTDs), including spina bifida, anencephaly, and encephalocele (10).
- Data from the U.S. National Birth Defects Prevention Study (1999–2007) suggested that increased odds of ventricular septal defect (VSD) were observed only among offspring exposed to extreme heat during pregnancy (11).
- A cohort study of live births and stillbirths in the Tel Aviv region of Israel found that each additional day of extreme heat exposure during pregnancy was associated with a 13% increase in the odds of multiple congenital heart defects (12).

3. Increased Risk of Complications of Pregnancy and Poor Newborn Health Outcomes

Dehydration, systemic inflammation, and compromised placental perfusion increase during and after exposure to extreme heat, elevating the risk of severe maternal and neonatal complications.

A. Placental Perfusion and Fetal Growth Restrictions

- **The biological mechanism:** To release heat, the maternal body dilates blood vessels near the skin, redirecting blood away from internal organs, including the uterus. Dehydration also reduces maternal blood volume, further limiting blood flow to the placenta and compromising uteroplacental perfusion (7).
- **Clinical Outcomes:** Reduced placental blood flow can limit the oxygen and nutrients reaching the fetus, contributing to fetal growth restriction (FGR), low birth weight and chronic fetal hypoxia. In severe cases, this may increase the risk of stillbirth and low Apgar scores at birth (1).
- **When is the risk highest?** The risk is greatest during prolonged or repeated exposure to extreme heat, particularly later in pregnancy when fetal growth accelerates and demands on placental blood flow are highest. Dehydration, strenuous physical activity and limited access to water or cooling further increase the risk.

Data Snapshot: Complications of Pregnancy and Poor Newborn Health Outcomes

Multiple studies have reported a strong association between maternal exposure to extreme heat during pregnancy and fetal growth restriction (FGR) or low birth weight (LBW). An empirical cohort study conducted in Bolivia, Colombia, and Peru found exposure to extreme heat was associated with an average reduction in birth weight of 20 g and a 0.7 percentage point increase in the probability of low birth weight. Similarly, a retrospective observational study of 29 million in U.S reported that exposure to above-average temperatures during pregnancy was associated with an increased risk of fetal growth restriction (13).

B. Pregnancy-Induced Hypertension (PIH) and Pre-eclampsia

- **The biological mechanism:** High ambient temperatures place additional strain on the maternal cardiovascular system, particularly during the first half of pregnancy when the placenta is developing. Heat stress can promote inflammation, oxidative stress and endothelial dysfunction, interfering with uterine artery function and placental vascularisation (14). Heat-induced vasodilation and dehydration may also reduce blood flow to the placenta, further increasing oxidative stress and inflammation and disrupting blood-pressure regulation.
- **Clinical outcomes:** Extreme heat exposure is associated with an increased risk of gestational hypertension, pre-eclampsia and eclampsia (6). For pregnant women with pre-existing or newly developed pre-eclampsia, dehydration can further compromise uteroplacental blood flow and increase the risk of placental abruption, acute kidney injury and maternal cardiovascular complications during labour and birth.
- **When is the risk highest?** The risk may be greatest during prolonged or repeated heat exposure, particularly during early placental development and later in pregnancy among women with hypertension or pre-eclampsia. Dehydration, strenuous physical activity and limited access to water or cooling further increase vulnerability

Data Snapshot: Extreme Heat and Hypertensive Disorders of Pregnancy

- In New York State, extreme heat events were associated with a **13% increase** in emergency department visits for hypertensive pregnancy complications.
- In China, exposure to temperatures above the **95th percentile** during early pregnancy increased the risk of gestational hypertension by **16% (16)**.
- In Israel, higher temperatures during the second and third trimesters were associated with an almost **threefold increase** in the risk of pre-eclampsia (17).

C. Gestational Diabetes Mellitus (GDM)

- **The biological mechanism:** Cumulative heat exposure decreases maternal insulin sensitivity and impairs glucose regulation through both direct and indirect pathways. Under severe thermal stress, the maternal body undergoes oxidative stress and produces reactive oxygen species (ROS) that directly damage pancreatic beta cells (the cells responsible for synthesising insulin), thereby limiting the body's capacity to process glucose. Simultaneously, heat stress triggers systemic low-grade inflammatory responses that promote cellular insulin resistance. Dehydration further compounds this issue: a drop in maternal blood volume restricts renal perfusion, which prevents the kidneys from efficiently filtering and clearing excess glucose from the bloodstream, causing maternal blood sugar levels to spike.
- **Clinical outcomes:** Prolonged or repeated exposure to ambient heat significantly elevates the risk of developing Gestational Diabetes Mellitus (GDM). Longitudinal cohort data shows that cumulative exposure to high temperatures over a 30-day window can nearly double the risk of a GDM diagnosis (18).
- **When the risk is highest:** The vulnerability window is persistent throughout pregnancy, but carries specific phase-dependent risks:
 - **Early Pregnancy (Trimester 1 & 2):** The risk of developing **pre-eclampsia, eclampsia, and pregnancy-induced hypertension** peaks when extreme heat exposure occurs during early placentation, specifically between weeks 3 and 4 of gestation (6).
 - **Mid-Pregnancy (Weeks 11–18):** The vulnerability window for **Gestational Diabetes Mellitus (GDM)** peaks during this period, as the cumulative metabolic and thermal load disrupts the mother's baseline glycaemic control precisely when placental hormones begin to naturally increase insulin resistance (18).
 - **Late Pregnancy (Trimester 3):** Spatiotemporal modelling indicates an acute 0 to 7 day lag window prior to labour where high-temperature spikes can precipitously trigger spontaneous preterm labour, placental abruption, or stillbirth due to acute cardiovascular shunt exhaustion and severe dehydration (1, 14).

Data Snapshot: Extreme Heat and Gestational Diabetes

- Evidence suggests that higher ambient temperatures are associated with an increased risk of gestational diabetes mellitus (GDM).
- A systematic review of studies from multiple countries found a consistent association between summer seasons, higher rates of GDM, and elevated maternal blood glucose levels.
- Several studies also reported that exposure to higher ambient temperatures during pregnancy was associated with increased blood glucose levels, indicating that extreme heat may contribute to the development of GDM (19).



Section 2.

Extreme Heat, Postnatal and Newborn Health

The postpartum period, also known as the “fourth trimester”, is often overlooked in heat-health communication, yet women recovering from childbirth and their newborns are among those most physiologically vulnerable to extreme heat.



1. Postpartum Maternal Recovery and Sepsis

A maternal body exposed to extreme heat triggers an involuntary stress cascade directly linked to premature labour and birth.

- **The biological mechanism:** The early postpartum body undergoes rapid cardiovascular remodelling, fluid shifts, and hormonal drops. Extreme heat causes heavy sweating and rapid dehydration, which concentrates the blood (hypercoagulability) and depletes physical reserves. At the same time, high ambient temperatures and humidity promote localised sweating and moisture accumulation around wound sites (20).
- **Clinical outcomes:** Dehydration combined with postpartum hypercoagulability directly elevates the risk of **deep vein thrombosis (DVT)** and pulmonary embolism. Moisture accumulation at episiotomy, perineal tear, or caesarean incision sites fosters rapid bacterial proliferation, significantly increasing the incidence of surgical site infections (SSIs), wound breakdown, and postpartum endometritis/sepsis.
- **When the risk is highest:** The first **6 weeks postpartum** is the most critical window for maternal cardiovascular stability and wound healing.

2. Severe Newborn Hyperthermia

- **The biological mechanism:** Newborns have a highly limited capacity for independent thermoregulation. Their large surface-area-to-body-mass ratio means they absorb environmental heat rapidly, while their immature autonomic nervous system cannot sweat effectively to cool down, nor do they possess sufficient subcutaneous fat to buffer against extreme ambient shifts (12). Heat stress can also overwhelm the autonomic nervous system, increasing the risk of sudden infant death syndrome (SIDS) (21).
- **Clinical outcomes:** Rapid thermal trapping leads to environmental hyperthermia (neonatal core temperature $>37.5^{\circ}\text{C}$, severe dehydration, electrolyte imbalances, and lethargy. In severe cases, this triggers multi-organ failure, seizures, or SIDS.
- **When the risk is highest:** Days 0 to 7 of life represent the most acute heat-vulnerability window in a human lifecycle.

Preventing accidental overheating

The challenge: In many cultures, newborns are wrapped or dressed in several layers to protect them from hypothermia. During a heatwave, however, heavy clothing, blankets and tight swaddling can trap heat and cause accidental neonatal hyperthermia.

What midwives can do: Discuss the risk of overheating with families in a clear, respectful and non-judgemental way. During extreme heat, advise parents to dress the newborn in one lightweight, loose layer of cotton clothing, or only a nappy when appropriate. If the newborn feels unusually hot, remove excess layers and move them to a cooler environment. Seek urgent medical care if the newborn is lethargic, feeding poorly, breathing rapidly or difficult to wake.

3. *Decrease in Breast Milk Volume*

- **The biological mechanism:** Breast milk is approximately 88% water. A lactating woman loses roughly 25 ounces (740ml) of water daily purely through basal milk production (22). Extreme ambient heat triggers heavy maternal sweating; if the mother's fluid intake does not scale up immediately, her extracellular fluid and plasma volume drop, restricting the blood supply to the mammary glands and limiting milk synthesis.
- **Clinical outcomes:** Dehydration-induced lactational insufficiency leads to low milk output, poor infant weight gain, and parental anxiety. This often triggers dangerous early introduction of unsafe water or infant formula, directly exposing the newborn to waterborne pathogen infections.
- **When the risk is highest:** Highly sensitive during the first 4 weeks postpartum while lactation is being established and the infant's feeding demands are shifting.



Section 3.

Extreme Heat, Perinatal Mental Health, and Gender-Based Violence (GBV)

The psychological and sociological impacts of rising global temperatures are as severe as their physical counterparts. Extreme heat is an environmental risk-amplifier that destabilises perinatal mental well-being and directly escalates safety threats to women and girls.



1. Perinatal Mood and Anxiety Disorders (PMADs)

Pregnancy and postpartum are windows of high vulnerability to affective mood changes, a risk that is significantly compounded by environmental thermal strain (23).

- **The Biological & Physiological Mechanism:** Extreme ambient temperatures trigger severe sleep fragmentation, nocturnal wakefulness, and chronic physical exhaustion. Under persistent thermal strain, the maternal neuroendocrine system is altered; sleep deprivation and heat stress elevate systemic cortisol and disrupt central serotonergic and dopaminergic baseline pathways. Furthermore, closed-door and closed-window thermal habits (often practised in high-smog or insecure areas) trap indoor humidity, preventing restorative REM sleep and driving clinical mood instability (24).
- **Clinical outcomes:** Chronic heatwave exposure is strongly associated with a sharp rise in perinatal panic disorders, generalised antenatal anxiety, and postpartum depression (PPD). Severe mental distress not only damages maternal wellness but impairs mother-infant bonding and early neonatal care (25).
- **The wider context:** For pregnant women in rural and marginalised communities, heat-related crop failures, water scarcity, loss of income and displacement can intensify psychological stress and compound the physical effects of heat. These interconnected pressures create a syndemic, in which environmental, economic and health risks reinforce one another (26).

2. Intimate Partner Violence (IPV) & Domestic Abuse

Extreme heatwaves act as immediate triggers for behavioural aggression and domestic violence, presenting a severe, direct threat to pregnant and postpartum individuals (26).

- **The biological mechanism:** The temperature-aggression hypothesis suggests that heat stress can cause dehydration, cardiovascular strain and physical discomfort, which may impair emotional regulation and reduce tolerance for frustration. This can increase irritability and the likelihood of aggressive behaviour.
- **The sociological mechanism:** High ambient heat confines families inside cramped, poorly ventilated thermal traps. When combined with cumulative sleep deficits and the financial strains of climate-induced crop or income losses, minor domestic friction rapidly escalates into physical aggression (26).

- **Clinical projections:** Extensive epidemiological datasets show that every 1 degree rise in annual ambient temperature correlates with a 6% average increase in intimate partner violence (IPV) and domestic aggression (26). In high-emission, low-resource scenarios where socioeconomic development stalls, UNFPA projections indicate that cases of maternal and domestic violence in vulnerable regions could nearly triple by 2060 (27).
- **Clinical relevance:** Overheated, abused, or highly anxious pregnant women often show poorer adherence to antenatal care (ANC) regimens, miss vital check-ups, and exhibit somatic complaints (such as headaches, dizziness, or hyperventilation) that are frequently misdiagnosed as simple “heat exhaustion,” masking an active domestic safety crisis.





Section 4.

Air Pollution, Wildfire Smoke and Increased Risk of Perinatal Mortality

Extreme heat chemically accelerates and promotes dangerous levels of air pollutants (ground-level ozone, PM2.5, and sulphur dioxide) and increases the risk of wildfire smoke. Pregnant women with underlying asthma are at an extreme, intersecting risk for perinatal mortality if exposed to both poor air quality and heat simultaneously.

- **The biological mechanism:** Inhaling fine particulate matter (PM2.5) and gaseous pollutants triggers systemic maternal oxidative stress, inflammatory cascades, and epigenetic alterations. These processes damage vascular endothelial cells and promote micro-clots (hypercoagulability). This resulting endothelial dysfunction impairs normal spiral artery remodelling and placental development, directly compounding heat-driven vascular shunting and further reducing oxygenated uteroplacental blood flow (28, 29).
- **Clinical outcomes:** This combined environmental assault significantly escalates the risk of gestational hypertension, pre-eclampsia, intrauterine growth restriction (IUGR), low birth weight, and stillbirth. For pregnant individuals with pre-existing asthma, co-exposure to high heat and particulate pollution triggers acute respiratory distress, severe maternal hypoxia, and is associated with a sharp spike in perinatal and maternal mortality.
- **When the risk is highest:** While poor air quality represents a persistent threat throughout pregnancy, the hazard peaks during the third trimester and the intrapartum period when maternal cardiorespiratory demands are at their physiological maximum, as well as during peak wildfire seasons or high-smog summer months (4).

Reducing exposure to poor air quality

Encourage women to check the local Air Quality Index (AQI), particularly during heatwaves and wildfire events. When air quality is poor:

- Reduce or avoid outdoor activity.
- Stay in a cool indoor space with cleaner air.
- Use a portable HEPA filter where available.
- If going outdoors is unavoidable, wear a well-fitting N95 or equivalent particulate respirator.

N95 respirators protect against fine particles, including wildfire smoke, but not harmful gases such as ozone.

Air Quality and Pregnancy

Air Quality Index (AQI) Value	How to Respond
1-50 Good	• Enjoy normal outdoor and indoor activities
51-100 Moderate	• Spend less time outdoors if possible • If you are coughing or feel unwell, stay indoors
101-150 Unhealthy for Pregnancy	• Reduce or avoid outdoor exercise • Plan outdoor activities in the morning, when the air quality is better
151-200 Unhealthy for All	• Significantly reduce or avoid outdoor exercise • Plan outdoor activities when the air quality is better
201-300 Very Unhealthy for All	• Avoid being outdoors



Section 5.

The Impact of Extreme Heat on Midwives, Health Professionals and Health Facilities

Extreme heat fundamentally degrades the workforce capacity of midwives and the safety of the clinical spaces they inhabit. Midwives are high-stakes clinical decision-makers, navigating complex, time-sensitive obstetric emergencies where split-second judgements directly dictate maternal and neonatal survival. During heatwaves, midwives often work long, physically demanding shifts in poorly ventilated facilities or during home births, without access to personal cooling. The resulting occupational heat strain is not merely a matter of physical discomfort; it is a profound physiological hazard. Sustained thermal stress elevates baseline cortisol levels, accelerates dehydration, and triggers cardiovascular strain. This systemic strain directly impairs cognitive executive functions, situational awareness, and fine psychomotor skills. Consequently, the climate crisis at the bedside transforms a provider's occupational health hazard into a systemic threat to clinical patient safety, maternal outcomes, and the preservation of respectful maternity care (RMC).

1. Increase in Clinical Reaction Time and Errors

- **The biological mechanism:** Prolonged exposure to temperatures above 30°C (86F) or high heat indices causes mild cerebral dehydration, physiological fatigue, and a decline in short-term memory and working cognitive capacity.
- **Clinical impact:** Documented increases in diagnostic delays, charting omissions, and critical medication dosage or calculations errors.
- **When the risk is highest:** During consecutive, long shifts in uncooled clinics, especially during the peak daytime heat hours (11 AM to 4 PM).

2. Increase in Physical Exhaustion

- **The biological mechanism:** Continuous physical exertion in high temperatures leads to dehydration, core temperature elevation, and rapid muscular and cardiovascular fatigue.
- **Clinical impact:** Direct reduction in physical stamina, making it difficult to provide prolonged active support during labour and birth (e.g., maintaining supportive positions, moving patients, or assisting deliveries).
- **When the risk is highest:** During 12-to-24 hour night or day shifts where there is no or limited access to cooling, cooling stations or clean drinking water for staff. Heat spells may also increase midwives caseload when there is an increase in women coming in with adverse events due to heat stress.

3. Increase in Irritability and Stress

Climate change strains interpersonal dynamics at the bedside, making the provision of Respectful Maternity Care (RMC) more difficult.

- **The biological mechanism:** Physiological heat stress elevates baseline cortisol levels, causing irritability, anxiety, and psychological distress.
- **Clinical impact:** Public-facing health professionals report lower patience thresholds and communicative breakdowns, which correlates directly with an erosion of RMC principles and an increase in adversarial clinical encounters.

- **When the risk is highest:** When both the labouring woman and the attending midwife are physically overheating in an unventilated delivery room.

4. Health Facilities and Adaptation Challenges

Many maternity centres globally are architecturally ill-equipped for extreme heat.

- **The “convection” danger:** Poorly insulated brick clinics trap heat, as do clinics with tin roofs and those located on the highest floor of a health facility. Without continuous electricity or shading, indoor spaces become literal ovens, exceeding outdoor temperatures.
- **Medication and cold-chain degradation:** Essential medicines, most notably oxytocin, used to prevent postpartum haemorrhage, are heat-sensitive. Standard oxytocin must be stored between 2 and 8°C Exposure to ambient temperatures above 30°C quickly reduces its potency, rendering it ineffective during a bleeding emergency.



Section 6.

Intersectionality: Who is More Affected and Why?



Heat vulnerability impacts different people in different ways, depending on their socio-economic status, where they live, and on persistent gender inequalities. Women and families living in some of the following situations are at greater risk of developing health complications, including during pregnancy and the newborn period, related to extreme heat:

- **Living in low-resource and informal settlements:** Women and families living in densely populated urban heat islands or informal housing with corrugated iron roofs experience indoor temperatures that can exceed outdoor ambient air by up to 5-10°C.
- **Working in extreme heat:** In many agricultural and low-income economies, pregnant women bear the burden of heavy physical labour—walking long distances to fetch water, working in unshaded fields, cooking over open fires or in homes with high air pollution due to cooking methods.
- **Living with chronic diseases:** Pregnant individuals with pre-existing chronic conditions face severely dampened thermoregulatory compensatory mechanisms. Their bodies cannot tolerate the increased cardiac output required to shed heat, placing them at immediate risk of cardiovascular collapse, eclampsia, or acute kidney injury (AKI) during heatwaves (9). High-risk chronic diseases include:
 - **Cardiovascular disease & congenital heart conditions:** Because pregnancy already demands an increase in cardiac output, women with underlying heart conditions cannot safely meet the massive circulatory demands required to shunt blood to the skin to dissipate heat, leading to rapid cardiac decompensation.
 - **Diabetes (pre-existing type 1/type 2 and gestational):** Diabetes impairs autonomic vascular reactivity and sweating mechanisms (microvascular neuropathy). Under thermal stress, glycaemic control destabilises as dehydration rapidly spikes maternal blood glucose levels.
 - **Asthma & chronic respiratory diseases:** Coping with extreme heat alongside elevated ground-level ozone and PM2. triggers severe bronchospasms, compromising blood oxygen saturation and inducing severe maternal-fetal hypoxia.
 - **Chronic kidney disease (CKD):** Pre-existing renal damage is highly sensitive to drops in blood volume. Heat-induced volume depletion causes rapid concentration of urine, increased urinary tract acidity, recurrent gestational UTIs, and acute tubular necrosis, putting these individuals at immediate risk of **Acute Kidney Injury (AKI)**.

- **Hyperthyroidism:** Unmanaged hyperthyroidism increases baseline metabolic rate and endogenous heat generation, rendering the body highly sensitive to ambient temperature surges.
- **Obesity / high pre-pregnancy BMI:** Thick subcutaneous adipose tissue acts as a physical insulator that traps metabolic heat, severely limiting the body's primary cooling mechanisms and increasing cardiovascular strain.
- **Lack of access to safe, secure water:** Women who lack reliable, close proximity to safe drinking water cannot meet the heightened hydration targets required during a heatwave.
- **Systemic marginalisation:** Families from racially and socially marginalised groups face poorer baseline health outcomes, higher rates of unmanaged chronic conditions (like gestational diabetes or pre-existing hypertension), and have less access to responsive, climate-adapted healthcare systems.



Section 7.

Adaptation Actions

Mitigating heat risks requires concrete, practical interventions across every level of maternal care. Midwives should utilise a **H.E.A.T. Risk Questionnaire Assessment** during prenatal visits to identify vulnerabilities in a woman and/or family's.

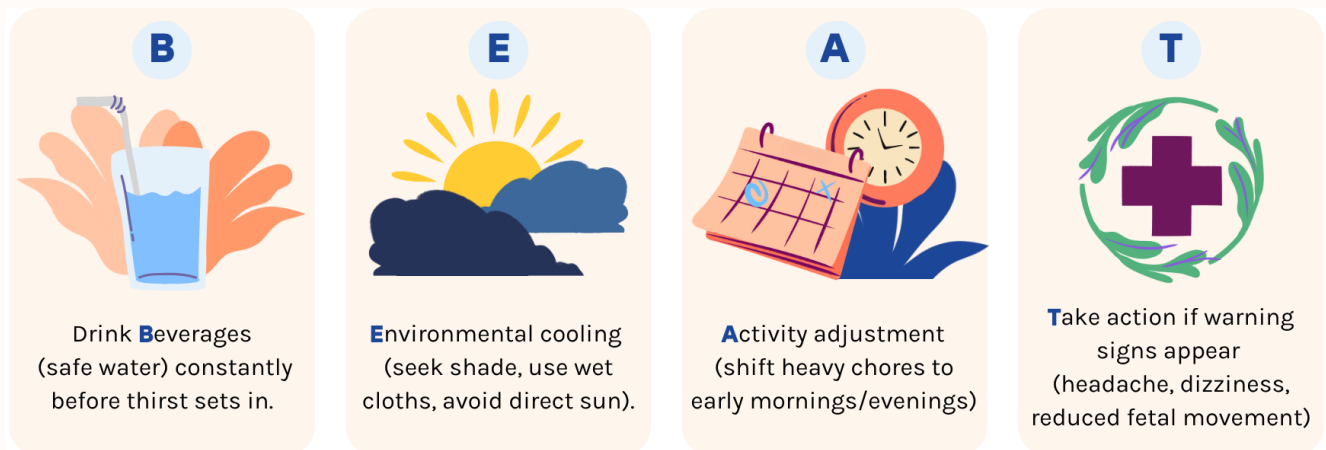
- **H**ousing/Indoor environment
- **E**mergency preparedness
- **A**wareness of health risks
- **T**emperature/Outdoor environment.



1. Actions During Pregnancy

The UNICEF "B.E.A.T. the Heat" framework

Teach women and community health workers to spot risks early:



- **Trimester-specific care:** During heatwaves, advise women in the first trimester to avoid activities that could raise their core body temperature, including hot tubs, saunas and prolonged exposure to direct midday sun. Schedule appointments for women with high-risk third-trimester pregnancies during the cooler morning hours and advise them to report reduced fetal movement promptly.
- **Early warning and daily heat tracking:** Counsel women to track the local heat and weather forecasts daily via local weather apps, radio, television, or community health worker alerts. Advise them to use these early warning indicators to plan their schedules proactively, restricting outdoor exposures and physically demanding household chores strictly during cooler early morning hours when a "High" or "Extreme" heatwave alert is active.
- **Targeted extremity cooling** (acral vasodilation & AVA activation): Advise women to immerse their hands or feet in comfortably cool, but not ice-cold, water (approximately 15–20°C) for 10–15 minutes. The palms and soles contain specialised blood vessels called arteriovenous anastomoses (AVAs), which carry warm blood close to the skin during heat exposure. Cool water helps draw this heat away from the body without causing the vasoconstriction and shivering that can result from very cold water. Cool foot soaks may also provide temporary relief from heat-related swelling of the feet and ankles. Sudden or severe swelling, particularly of the hands or face or when accompanied by headache or visual changes, requires prompt clinical assessment.

- **Low-literacy clinic flag warning systems:** Establish a standardised visual “community heat flag” protocol at all maternal health facility gates. Display large colour-coded banners matching meteorological warning index statuses:
 - **Green Flag:** Safe standard movement; adhere to daily baseline hydration targets.
 - **Yellow Flag:** Moderately warm; advise high-risk, chronic-disease clients to rest and scale down midday labour tasks.
 - **Orange Flag:** Severe threat; advise all pregnant clients to halt strenuous tasks between 11:00 and 16:00, seeking immediate shade.
 - **Red Flag:** High-intensity extreme heat; restrict all travel and agricultural labour, transition clients to active cooling, and prioritise home visits over standard clinic travel.
- **Personalised “heat action plans” (HAPs):** Early in pregnancy, work with each woman to develop a simple, written plan for periods of extreme heat. The plan should identify:
 1. A nearby and accessible cool or shaded place, such as an air-conditioned clinic, library or community space.
 2. A trusted partner, family or community member, or Community Health Worker (CHW), who can help with strenuous work, such as agricultural labour, heavy domestic tasks or collecting water, when local heat alerts are issued.
 3. A pre-positioned emergency domestic water storage container filled with a minimum of 15 litres of safe drinking water to prevent rapid dehydration in the event of heatwave-induced municipal power grid or water utility blackouts.
- **Air quality adjustments:** Counsel women to track the Air Quality Index (AQI). On days when the AQI is greater than 100, they should minimise outdoor exposure, ensure windows are closed if outdoor pollution is severe, and avoid indoor smoke sources, such as candles or indoor cooking fires without ventilation.
- **Medication audits:** Periodically review all prescription and over-the-counter medicines before and during the hot season, particularly antihistamines, antihypertensives and medicines used to treat mental health conditions.
 1. Some medicines can affect sweating, thirst, blood pressure, kidney function or fluid balance, increasing susceptibility to heat-related illness. Work with each woman to develop an individual medication plan for hot days, and advise her never to stop or change a medicine without consulting a qualified health professional (4).

2. Heat and humidity can reduce the effectiveness of some medicines and damage devices such as inhalers. Advise women to follow each product's storage instructions, keep medicines in their original packaging and away from direct sunlight, hot vehicles and humid rooms. Develop a backup plan for power cuts, particularly for medicines requiring refrigeration and electrical equipment such as nebulisers (4).
- **Electrolyte replacement:** Educate families on low-cost home rehydration recipes (water with precise ratios of salt and sugar/lemon) rather than sugary commercial drinks that worsen dehydration. Encourage checking the sodium content of beverages if a woman has gestational hypertension.

2. Actions During Labour and Delivery

- **Hydration protocols:** Establish a strict clinical standard requiring labouring women to drink at least 250–500 ml of fluids per hour during active labour in hot weather. Closely monitor fluid balance if the woman is experiencing nausea, vomiting, or diarrhoea.
- **Fetal monitoring during heat waves in labour:** Fetal heart rate auscultation after each contraction during the second stage of labour if the mother is under heat stress, as fetal reserves deplete much faster under maternal heat stress.
- **Manual hydro-cooling:** Regularly drape cool, damp towels across the labouring woman's forehead, neck, and chest, and keep a water spray bottle on hand to mimic evaporative cooling to prevent the “maternal skin shunt” from starving the labouring fetus of oxygenated blood.

3. Actions During the Postpartum Period (Maternal Recovery)

- **Wound moisture management:** Keep perineal tears, episiotomy sites, and caesarean incision wounds dry and clean. Ambient humidity and heavy maternal sweating promote rapid local bacterial growth. Instruct women to gently pat wounds dry after washing and wear loose-fitting, highly breathable cotton underwear. Strictly avoid synthetic fabrics that trap moisture against healing tissues.

- **Thromboembolism (DVT) prevention:** Postpartum hypercoagulability is severely compounded by heat-induced dehydration. Midwives must encourage early, gentle ambulation combined with a structured, proactive hydration routine to keep the blood volume thin and flowing.
- **Targeted recovery hydration:** Postpartum women require a baseline of 2.5 to 3 litres of safe fluids daily to facilitate blood volume stabilisation and wound healing, regardless of lactation status.

4. Actions for Newborn Care

- **The single-layer dressing rule:** Strongly counsel families to dress the newborn in only one thin layer of loose cotton clothing (or a diaper only) when indoor ambient temperatures are high. Counteract traditional wrapping, swaddling, or over-bundling which blocks thermal escape.
- **Safe skin-to-skin contact:** While skin-to-skin (Kangaroo Mother Care) is vital, during extreme ambient heat waves, place a thin, dry cotton barrier cloth between the mother's and baby's chests to prevent excessive heat conduction, skin rashes, and sweat-induced discomfort.
- **Tepid misting and wiping:** If a newborn exhibits signs of overheating (hot trunk, red skin, rapid breathing, or extreme lethargy), instruct parents to gently wipe the baby's limbs and torso with a cloth dampened with tepid (not cold) water, allowing evaporation to cool the skin. Never submerge an overheated newborn in cold water, as this can trigger reflex shock.

5. Actions for Lactation Support

- **The “nurse-and-drink” rule:** Counsel mothers to drink a large cup of water, every single time they nurse. A lactating mother must replenish her circulating plasma volume instantly to maintain milk production.
- **Preserving exclusive breastfeeding:** Reassure panicking families that breast milk is naturally 88% water and completely sufficient to hydrate an infant under 6 months, even in extreme heat. Strictly forbid the introduction of plain water, teas, or infant formula, which carries an extremely high risk of waterborne diarrhoeal pathogens.

- **Monitoring infant hydration output:** Teach parents to monitor hydration by counting wet diapers and observing feeding and alertness. From day five, a well-hydrated newborn should usually have at least six wet diapers every 24 hours, appear alert and suck effectively. Fewer wet diapers, unusual sleepiness or a weak suck require prompt assessment.

6. *Actions for Mental Health and Safety*

- **Trauma-informed heat screenings:** During antenatal and postnatal visits, offer mental health and safety screening in a private, cool and supportive environment. Ask sensitively about chronic sleep loss, maternal distress, and domestic fear. Symptoms such as unexplained fatigue, panic episodes or headaches may provide an opportunity to begin a confidential conversation about intimate partner violence (26).
- **Heatwave domestic safety planning:** For women identified as living in unsafe environments, develop a heatwave safety plan. Help them identify cooled public “safe zones”, such as local air-conditioned clinics, libraries, community centres, or religious institutions, that they can visit during peak heat hours to safely escape domestic confinement (26,27).
- **Integrating perinatal mental health screening:** Incorporate standardised, rapid-screening tools (such as the Edinburgh Postnatal Depression Scale - EPDS) into routine summer checkups to detect early onset antenatal or postnatal anxiety and depression, particularly for women experiencing resource or agricultural climate displacement (23).

7. *Actions for Midwives and Providers*

- **Maternal heat risk registries and proactive alerts:** Establish a systematic clinic-level weather-monitoring protocol linked to forecasts from local meteorological services. Maintain an up-to-date register of women at increased risk, including those with gestational diabetes, pre-eclampsia or kidney conditions, and those living in densely populated urban heat islands. When high-temperature or heatwave alerts are issued, initiate proactive communication through SMS, WhatsApp or Community Health Worker outreach to advise women and families on hydration and cooling measures before temperatures rise.

- **Peer-to-peer hydration audits:** Implement a buddy-system or regular clinic timers where midwives prompt each other to drink water and take 10-minute cooling breaks during long shifts.
- **Shift structuring:** Where staffing allows, rotate midwives out of high-heat labour triage zones more frequently to prevent cognitive burnout.

8. *Actions for Healthcare Facilities*

- **The 32°C fan safety standard:** Electric fans must not be used if ambient room temperature exceeds 32°C unless the skin is actively kept wet. In dry, extreme heat above 32°C fans act as a convection oven, accelerating dehydration and increasing core body temperature. Switch to wet, cool cloths instead.
- **Protecting the cold chain:** Shield medication fridges with solar backup power. If power fails, store oxytocin in insulated cooler boxes with ice packs, or pivot to heat-stable carbetocin for postpartum haemorrhage prevention where nationally approved and available. Develop a backup power plan for clinical machinery (nebulisers, oxygen concentrators).
- **Air filtration safeguards:** In facilities subject to heavy wildfire smoke or urban smog, install HVAC air filters with a MERV 13 rating or higher, or utilise portable HEPA filters to protect labouring women and newborns from dangerous particulate matter.
- **Passive cooling upgrades:** Encourage facility leaders to apply white lime wash or white reflective paint to clinic roofs, install external window shutters or wet Vetiver screens, and plant shade trees around clinic perimeters. Have cold water available for women to drink.
- **Leadership accountability:** Facility leaders and health authorities must treat heat preparedness as a patient-safety responsibility, not an optional environmental measure. They should designate a named person or team responsible for heat preparedness, establish clear temperature and air-quality thresholds for action, allocate budgets for cooling and backup systems, and regularly report on whether essential measures are functioning. Midwives and other frontline staff should have clear channels to document unsafe conditions, escalate concerns and request urgent action without fear of retaliation. Where facilities repeatedly fail to provide safe temperatures, clean air, reliable power, drinking water or functioning equipment, these failures should be formally recorded and raised with district, regional or national health authorities.

9. Actions for Policy Makers, Governments, and Member Associations

Protecting women and newborns in a warming world requires action beyond individual behaviour and clinical care. Governments, policymakers and Midwives' Associations must work together to strengthen health systems, influence national policy and ensure that climate financing addresses maternal and newborn health. The following five priority areas can support this work:

- **Integrate climate resilience into midwifery education and regulation:** Work with Ministries of Health and Education, midwifery education institutions and national regulatory bodies to incorporate climate-related SRMNAH risks and responses into curricula, continuing professional development and regulatory standards. Midwives should be equipped to assess environmental risks, recognise and manage heat-related complications within their scope of practice, and implement practical, low-cost cooling measures.
- **Strengthen climate-resilient standards for health facilities:** Advocate for national building standards and dedicated funding for climate-resilient maternal and newborn health facilities. Priorities should include reflective roofing, external shading, cross-ventilation and tree cover, which can reduce indoor temperatures by 5–10°C without relying on grid-powered cooling (28).
- **Protect obstetric medicines and cold chains:** Advocate for sustainable funding to protect temperature-sensitive medicines and expand access to heat-stable uterotonics, such as heat-stable carbetocin, where nationally approved and appropriate. National essential medicines lists and procurement policies should prioritise facilities in rural and under-resourced areas affected by frequent power cuts. Governments should also invest in solar-powered refrigerators and reliable backup systems for primary care facilities.
- **Establish enforceable protections for pregnant and lactating workers:** Introduce legally binding labour standards that protect pregnant and lactating workers from extreme heat. These should include:
 - Regular rest breaks in shaded or cooled areas and reliable access to safe, cool drinking water.
 - Restrictions on strenuous outdoor work when locally established heat-safety thresholds are exceeded.

- Paid climate leave or temporary reassignment to safer indoor duties during official extreme-heat alerts, supported by social protection measures that prevent loss of income (22).
- **Integrate SRMNAH into national and global climate policy:** Advocate for sexual, reproductive, maternal, newborn and adolescent health outcomes to be explicitly included in National Adaptation Plans and national health adaptation strategies developed under the UNFCCC framework. Governments should allocate climate-health financing directly to reproductive, maternal and newborn health systems, recognising the heightened vulnerability of pregnant women and newborns to climate-related hazards.

Using this guidance

These recommendations complement, rather than replace, national and local guidelines, clinical protocols and emergency plans. Midwives, facility leaders and health authorities should follow applicable national requirements and adapt these recommendations to local conditions, available resources and approved clinical practices. Where guidance is absent or insufficient, these recommendations can support the development or strengthening of appropriate policies and protocols.

Section 8.

Quick Reference Tables



Summary of Risks of Maternal and Newborn Hyperthermia

The risks described below are primarily associated with **significant and sustained maternal hyperthermia** during early embryonic development, rather than ordinary exposure to a single hot day.

Risk varies according to the intensity and duration of exposure, hydration, air quality, underlying health conditions and access to cooling and care.

Stage	Main maternal risks	Main risks for the fetus or newborn	Key risk window
First trimester	- Dehydration and cardiovascular strain - Disruption of early placental development - Increased risk of developing hypertensive disorders later in pregnancy	- Congenital anomalies associated with significant, sustained maternal hyperthermia - Impaired placental development	Early embryonic development, particularly weeks 3-8 after conception, and early placentation.
Second trimester	- Impaired glucose regulation and increased risk of developing gestational diabetes - Dehydration - Hypertensive disorders; Reduced uteroplacental blood flow	- Congenital anomalies associated with significant, sustained maternal hyperthermia - Impaired placental development	Early embryonic development, particularly weeks 3-8 after conception, and early placentation.
Third trimester	- Severe dehydration - Heat illness - Preterm labour - Worsening hypertension or pre-eclampsia - Increased risk of placental abruption - Increased risk of renal, cardiovascular or respiratory complications	- Preterm birth - Fetal distress or hypoxia - Fetal growth restriction - Low birth weight - Increased risk of stillbirth or perinatal mortality	Prolonged heatwaves and acute heat exposure during the days immediately preceding labour
Labour and birth	- Dehydration and electrolyte imbalance - Heat exhaustion or heatstroke - Worsening pre-eclampsia - Cardiovascular and respiratory strain - Maternal hypoxia	- Fetal distress or hypoxia - Low Apgar scores - Complications related to placental abruption or prematurity	During labour, when fluid, cardiovascular, respiratory and thermoregulatory demands are already elevated
Postnatal and newborn period	- Dehydration and heat illness during recovery from birth - Increased hydration needs, particularly during breastfeeding	- Overheating and dehydration - Impaired temperature regulation, particularly among preterm and low-birth-weight newborns - complications resulting from prematurity - Low birth weight or antenatal hypoxia	The first days and weeks after birth, particularly where access to cooling, safe water or appropriate newborn care is limited.

Across all stages: Repeated heat exposure can cause dehydration, inflammation and reduced placental blood flow. Exposure to extreme heat alongside air pollution or wildfire smoke may further increase the risk of hypertensive disorders, respiratory distress, fetal growth restriction, preterm birth, stillbirth and maternal or perinatal mortality. Women with asthma, cardiovascular disease, hypertension, diabetes or limited access to cooling may be particularly vulnerable.

Signs of Dehydration

Signs and symptoms of dehydration in pregnancy and the postnatal period

- Cold, clammy skin
- Dizziness or feeling lightheaded
- Rapid heart rate
- Excessive sweating or an inability to sweat
- Fatigue
- Headache
- Muscle cramps or spasms
- Nausea
- Abdominal cramping
- Swelling in extremities
- Darker colour urine
- Infrequent urination
- Excessive thirst
- Preterm contractions

Signs and symptoms of dehydration for newborns and infants

- Decreased urination (fewer than 4 wet diapers in 24 hours)
- Being extra thirsty
- Heavy sweating followed by no sweating at all, the skin is hot, dry and flushed
- Seeming more fussy than normal
- No tears when crying
- Dry mouth and tongue
- Tachycardia (fast heartbeat)
- Shallow breathing (especially with infants)
- Sunken eyes
- Sunken soft spot on the head (fontanelle)

Recognising and Responding to Heat-Related Illness in Pregnant Women

Possible heat exhaustion

Signs and symptoms

- Headache
- Dizziness or light-headedness
- Weakness or unusual tiredness
- Nausea or loss of appetite
- Intense thirst
- Heavy sweating
- Cool, pale or clammy skin
- Muscle cramps
- Reduced urination

What to do

1. Stop all activity and move to a cool, shaded or air-conditioned place.
2. Loosen tight clothing and remove unnecessary layers.
3. If fully alert and not vomiting, offer frequent sips of cool water or oral rehydration solution.
4. Cool the skin using damp cloths, water and a fan. Place cool packs wrapped in cloth around the neck, armpits and groin.
5. Do not leave the woman alone.
6. Seek medical advice if symptoms worsen, vomiting prevents drinking or she does not improve within 30 minutes.

Possible heat stroke – medical emergency

Emergency signs

- Confusion, unusual behaviour or slurred speech
- Extreme drowsiness or difficulty responding
- Seizures or loss of consciousness
- Very high body temperature
- Hot skin, which may be dry or sweaty
- Rapid, shallow breathing
- Rapid heartbeat

What to do

1. Call emergency services immediately.
2. Move the woman to a cool place and remove unnecessary clothing.
3. Begin rapid cooling while waiting for help: wet the skin and use a fan, or apply cool, wet cloths and wrapped cold packs to the neck, armpits and groin.
4. If she is unconscious but breathing, place her safely on her side—preferably her left side in later pregnancy—and monitor her breathing.
5. Do not give anything by mouth if she is confused, vomiting, having a seizure or not fully conscious.
6. Stay with her until help arrives.

Pregnancy-specific warning signs: Regular contractions or persistent uterine cramping, vaginal bleeding, fluid leaking from the vagina, or a noticeable reduction in fetal movements once movements are usually felt require urgent maternity assessment—even if the heat-related symptoms improve.

Recognising and Responding to Overheating and Heat-Related Illness in Newborns

Possible overheating or dehydration

Possible signs

- Skin feels unusually warm
- Irritability or unusual restlessness
- Sleepiness or reduced activity
- Feeding less effectively than usual
- Dry mouth or lips
- Fewer wet nappies than usual
- Heat rash

What to do

1. Move the baby to a cooler, well-ventilated place.
2. Remove excess blankets and clothing, leaving one light layer.
3. Measure the baby's temperature with a digital thermometer.
4. Offer breast milk or formula more frequently. Do not give plain water to a baby under six months.
5. Monitor feeding, alertness and wet nappies closely.
6. Seek medical advice if the baby does not improve promptly or if you are concerned.

Danger signs requiring urgent medical assessment

Danger signs

- Temperature of 38°C or higher, or below 35.5°C
- Difficult to wake, floppy or unresponsive
- Unable to feed or markedly weaker feeding
- Weak or absent cry
- Rapid or difficult breathing, grunting or severe chest indrawing
- Seizures
- Persistent vomiting
- Loss of consciousness

What to do

1. Arrange urgent medical assessment immediately.
2. Call emergency services if the baby is unresponsive, having a seizure or experiencing severe breathing difficulties.
3. While arranging help, move the baby away from the heat and remove excess layers.
4. Do not force breast milk, formula or water into the mouth of a baby who is vomiting, seizing, unresponsive or not fully conscious.

Assessment across skin tones: Changes such as pallor or flushing may be less visible on darker skin tones. Do not rely on skin colour alone. Check the baby's temperature, breathing, alertness, feeding, mouth and wet nappies.

Protecting Mothers and Babies From Extreme Heat

Stage	Advice
During Pregnancy	Remember B.E.A.T. the Heat: • Beverages (drink water often, before feeling thirsty), • Environmental cooling (shade, wet cloths, avoid direct sun), • Activity adjustment (do chores in early morning or evening), • Take action if warning signs appear (headache, dizziness, baby moving less than usual) Avoid hot baths and midday sun, especially in early pregnancy Some common medicines can make it harder for the body to cool itself. These can include antihistamines and blood pressure medication. It's worth reviewing these with a midwife or health professional Check daily weather and heat alerts, and plan outdoor activities around cooler hours Check the Air Quality Index (AQI). If it's above 100, stay indoors more, close windows, and avoid smoke sources like candles or indoor cooking fires. Use air purifiers with HEPA filters or MERV13 where available for indoors and respirator masks (not surgical or cloth masks) for outdoors. Simple homemade rehydration drinks (water with the right amount of salt and sugar or lemon) are better than sugary store-bought drinks
During Labour & Birth	Women in labour should drink plenty of fluids in hot weather, roughly a cup to two cups every hour If a mother is overheated, her baby's heart rate should be checked more frequently, since heat stress affects the baby faster than the mother Cool, damp cloths on the forehead, neck, and chest, plus a water spray bottle, help keep both mother and baby safe
After Birth (Recovery)	Keep healing wounds (tears, incisions) clean and dry. Heat and sweat can encourage bacteria to grow, so loose, breathable cotton clothing is best Heat and dehydration raise the risk of dangerous blood clots after birth, so gentle movement and steady fluid intake are important New mothers need about 2.5 to 3 litres of fluids a day to recover well, whether or not they're breastfeeding
Breast-feeding	Drink water every time you breastfeed. Keep a large cup or bottle of water nearby, and drink some each time you breastfeed. Your body needs to replace fluids quickly to keep making milk. Breast milk is enough, even in the heat. It's about 88% water, so it fully hydrates your baby under 6 months old, even on the hottest days. You don't need to give your baby plain water, tea, or formula. In fact, it's best to avoid these, and only offer breastmilk, since these other liquids can carry germs that cause diarrhoea in young babies. Check that your baby is getting enough milk. From day 5 onward after birth, your baby should have at least 6 heavy, wet diapers in 24 hours. Your baby should also seem alert and suck strongly while feeding. These are good signs they're getting enough fluid.
Newborn cooling	Keep clothing to one thin layer. In a hot room, dress your baby in just one thin layer of loose cotton, or even just a diaper. Avoid the urge to wrap, swaddle, or bundle your baby up. This traps heat and stops it from escaping. During very hot weather, place a thin, dry cotton cloth between your chest and your baby's chest. This is a way to adapt skin-to-skin contact for extreme heat, and is still very good for your baby. The cloth helps prevent your baby from getting too much heat from your body, along with preventing rashes or discomfort from sweat. Cool your baby gently if they seem too hot. Watch for signs like a hot chest or belly, red skin, fast breathing, or unusual sleepiness. If you notice these, gently wipe your baby's arms, legs, and body with a cloth dampened in lukewarm (not cold) water. Letting it evaporate helps cool their skin naturally. Never put an overheated baby into cold water. This can cause a dangerous shock response in their body.

Strategies to Keep a Newborn Cool

Generally

- Offer breast milk or correctly prepared formula more frequently. Do not dilute formula or give the newborn plain water unless specifically advised by a qualified health professional.
- Dress newborns in light, loose fitting clothing, or even just a diaper
- Give cool baths before bedtime
- If carrying newborns close to your body, remember to use lightweight fabric and know baby is receiving your heat as well
- Seek public places that are cooler than your home, e.g. cooling centres, public buildings etc.

Outdoors

- Stay indoors when the sun is at its highest (usually between 10-15h)
- Keep newborns in the shade and out of direct sunlight
- Use a broad brimmed hat when carrying newborns, or a parasol if using a buggy
- Do not cover buggies with cloth or blankets, as this can make the temperature rise inside

In the home

- Turn off electrical equipment and lights that can heat the home
- Close windows and blinds/curtains during the day to keep the room cool
- Keep windows open at night if it is safe
- Keep doors open to help air move, if it is safe
- Use a fan or air conditioner to move air, but ensure it is not aimed at the newborn

Adapt and Use These Tables

These tables available in an editable PowerPoint format, so you can use them in presentations or print them as needed.

You can also adapt or translate them into your language.

Download the editable PowerPoint template

Section 9.

Additional Resources



Provide these direct linkages at the bottom of your online platform to help member associations scale up their advocacy and programmes:

- **The Heat Science Hotline:** A free of cost rapid-response expert service, allowing midwives and associations to submit context-specific questions on heat adaptation and receive expert epidemiological and clinical guidance.
<https://heranow.org/heat-science-hotline-expert-answers-for-a-hotter-world/>
- **UNICEF Technical Note:** Protecting Children from Heat Stress – A valuable source for regional policy data on neonatal and infant thermal safety thresholds:
<https://www.unicef.org/media/139926/file/Protecting-children-from-heat-stress-A-technical-note-2023.pdf>
- **Global Heat Health Information Network (GHHIN):** Provides technical materials, heatwave action plan templates, and materials customizable for local Member Associations.
<https://heathealth.info/>
- **High Horizons Climate Change and Health Resources:** Developed by the HIGH Horizons project, these visual and interactive materials examine the impacts of rising temperatures on pregnant and postpartum women, infants, and healthcare workers.
<https://youtu.be/sofW-NzXQYE?si=jvYW0mtsgXfzY2CR>
https://youtu.be/rMF2yLW_BR0?si=7EDTGpozmAys8eOW
- **UNFPA: Heat and Pregnancy Guidance for Healthcare Providers and Community Health Workers:** Developed in collaboration with the Ministry of Health and Family Welfare (MoHFW), Government of India, this handbook is designed specifically for low-resource environments. It contains clinical heat-risk screening checklists, home-cooling guides, and tailored counselling scripts for healthcare workers.
<https://india.unfpa.org/en/publications/heat-and-pregnancy-guidance-healthcare-providers-and-community-health-workers>
- **Unlocking Health Systems Resilience:** A Resource Guide for Protecting Women's Lives in a Warming World (2026 Update)
<https://theicfp.org/unlocking-health-systems-resilience>

References

1. Chersich MF, Pham MD, Areal A, Haghighi MM, Manyuchi A, Swift CP, et al. Associations between high temperatures in pregnancy and risk of preterm birth, low birth weight, and stillbirths: systematic review and meta-analysis. *BMJ*. 2020;371:m3811. doi:10.1136/bmj.m3811.
2. National Institute for Occupational Safety and Health. Heat stress and workers [Internet]. Atlanta: Centers for Disease Control and Prevention; 2026 Mar 3 [cited 2026 Jul 17]. Available from: <https://www.cdc.gov/niosh/heat-stress/about/index.html>
3. Nairn J. Understanding heatwaves: beyond extreme temperatures [Internet]. Geneva: Global Heat Health Information Network; 2026 Jan 29 [cited 2026 Jul 17]. Available from: <https://heathealth.info/news/understanding-heatwaves-beyond-extreme-temperatures/>
4. Centers for Disease Control and Prevention. Clinical overview of heat and pregnancy [Internet]. Atlanta: Centers for Disease Control and Prevention; 2025 Sep 18 [cited 2026 Jul 17]. Available from: <https://www.cdc.gov/heat-health/hcp/clinical-overview/heat-and-pregnant-women.html>
5. Sun S, Weinberger KR, Spangler KR, Eliot MN, Braun JM, Wellenius GA. Ambient temperature and preterm birth: a retrospective study of 32 million US singleton births. *Environ Int*. 2019;126:7-13. doi:10.1016/j.envint.2019.02.023.
6. Dalugoda Y, Kuppa J, Phung H, Rutherford S, Phung D. Effect of elevated ambient temperature on maternal, foetal, and neonatal outcomes: a scoping review. *Int J Environ Res Public Health*. 2022;19(3):1771. doi:10.3390/ijerph19031771.
7. Dadvand P, Basagaña X, Sartini C, Figueras F, Vrijheid M, de Nazelle A, et al. Climate extremes and the length of gestation. *Environ Health Perspect*. 2011;119(10):1449-53. doi:10.1289/ehp.1003241.
8. Ha S, Liu D, Zhu Y, Kim SS, Sherman S, Mendola P. Ambient temperature and early delivery of singleton pregnancies. *Environ Health Perspect*. 2017;125(3):453-9. doi:10.1289/EHP97.
9. Edwards MJ. Hyperthermia and fever during pregnancy. *Birth Defects Res A Clin Mol Teratol*. 2006;76(7):507-16. doi:10.1002/bdra.20277.
10. Stingone JA, Luben TJ, Sheridan SC, Langlois PH, Shaw GM, Reefhuis J, et al. Associations between fine particulate matter, extreme heat events, and congenital heart defects. *Environ Epidemiol*. 2019;3(6):e071. doi:10.1097/EE9.0000000000000071.

11. Auger N, Fraser WD, Arbour L, Bilodeau-Bertrand M, Kosatsky T. Elevated ambient temperatures and risk of neural tube defects. *Occup Environ Med*. 2017;74(5):315-20. doi:10.1136/oemed-2016-103956.
12. Agay-Shay K, Friger M, Linn S, Peled A, Amitai Y, Peretz C. Ambient temperature and congenital heart defects. *Hum Reprod*. 2013;28(8):2289-97. doi:10.1093/humrep/det244.
13. Baharav Y, Nichols L, Wahal A, Gow O, Shickman K, Edwards M, et al. The impact of extreme heat exposure on pregnant people and neonates: a state of the science review. *J Midwifery Womens Health*. 2023;68(3):324-32. doi:10.1111/jmwh.13502.
14. Li Z, Li S, Su S, Morawska L, Jalaludin B, Dharmage S, et al. Extreme temperature events exposure and risks of stillbirths: nationwide large birth cohort study in China. *Environ Int*. 2025;204:109854. doi:10.1016/j.envint.2025.109854.
15. Kim J, Lee A, Rossin-Slater M. What to expect when it gets hotter: the impacts of prenatal exposure to extreme temperature on maternal health. *Am J Health Econ*. 2021;7(3):281-305. doi:10.1086/714359.
16. Qu Y, Zhang W, Ryan I, Deng X, Dong G, Liu X, et al. Ambient extreme heat exposure in summer and transitional months and emergency department visits and hospital admissions due to pregnancy complications. *Sci Total Environ*. 2021;777:146134. doi:10.1016/j.scitotenv.2021.146134.
17. Xiong T, Chen P, Mu Y, Li X, Di B, Li J, et al. Association between ambient temperature and hypertensive disorders in pregnancy in China. *Nat Commun*. 2020;11(1):2925. doi:10.1038/s41467-020-16775-8.
18. Granés L, Essers E, Kusters MSW, Petricola S, Tiemeier H, Soriano-Mas C, et al. Early life ambient temperature and brain volumes change throughout childhood. *Environ Int*. 2026;214:110385. doi:10.1016/j.envint.2026.110385.
19. Preston EV, Eberle C, Brown FM, James-Todd T. Climate factors and gestational diabetes mellitus risk: a systematic review. *Environ Health*. 2020;19(1):112. doi:10.1186/s12940-020-00668-w.
20. Principi N, Campana BR, Argentiero A, Fainardi V, Esposito S. The influence of heat on pediatric and perinatal health: risks, evidence, and future directions. *J Clin Med*. 2025;14(4):1123. doi:10.3390/jcm14041123.
21. Auger N, Fraser WD, Smargiassi A, Kosatsky T. Ambient heat and sudden infant death: a case-crossover study spanning 30 years in Montreal, Canada. *Environ Health Perspect*. 2015;123(7):712-6. doi:10.1289/ehp.1307960.

22. Howells M, Palmquist AEL, Josefson C, Dancause K, Quinn E, Daniels L, et al. Climate change, evolution, and reproductive health: the impact of water insecurity and heat stress on pregnancy and lactation. *Evol Med Public Health*. 2025;13(1):125-39. doi:10.1093/emph/eoaf008.
23. Barkin JL, van Rhijn S, Johnson CM. The connection between climate change and perinatal mental health. *Front Psychiatry*. 2024;15:1515895. doi:10.3389/fpsyt.2024.1515895.
24. Lakhoo DP, Brink N, Radebe L, Craig MH, Pham MD, Haghighi MM, et al. A systematic review and meta-analysis of heat exposure impacts on maternal, fetal and neonatal health. *Nat Med*. 2025;31:684-94. doi:10.1038/s41591-024-03395-8.
25. International Confederation of Midwives. Extreme heat is putting maternal, newborn and child health at risk [Internet]. The Hague: International Confederation of Midwives; 2026 Mar 9 [cited 2026 Jul 17]. Available from: <https://internationalmidwives.org/extreme-heat-is-putting-maternal-newborn-and-child-health-at-risk/>
26. Mulambo CH, Thakur R, Mathew S. Hot weather and violence against women: a global scoping review. *Int J Environ Res Public Health*. 2025;22(7):1069. doi:10.3390/ijerph22071069.
27. United Nations Population Fund, University of Vienna, International Institute for Applied Systems Analysis. Climate change impacts and intimate partner violence in sub-Saharan Africa [Internet]. Johannesburg: United Nations Population Fund; 2024 [cited 2026 Jul 17]. Available from: https://esaro.unfpa.org/sites/default/files/pub-pdf/2024-09/2024_IPV%20and%20Climate%20Report_FINAL.pdf
28. Ministry of Health and Family Welfare, Government of India; United Nations Population Fund India. Heat and pregnancy: guidance for healthcare providers and community health workers [Internet]. New Delhi: UNFPA India; 2026 May 6 [cited 2026 Jul 17]. Available from: <https://india.unfpa.org/en/publications/heat-and-pregnancy-guidance-healthcare-providers-and-community-health-workers>