



## Pregnancy and Heat Providers

Heat exposure increases the risk of adverse maternal health and birth outcomes during pregnancy.<sup>1</sup>

### Heat Exposure Risks for Pregnant Individuals

Studies have found that higher ambient temperatures are associated with a greater fetal risk of low birth weight, stillbirths, preterm birth, and congenital anomalies, including congenital cataracts, hypospadias, and certain types of cardiac and neural tube defects.<sup>2-4</sup>

At higher ambient temperatures, pregnant individuals may have greater risk of Group B Streptococcus colonization of the cervix and vagina and associated risk of neonatal sepsis, pre-eclampsia, gestational diabetes, and adverse cardiovascular events, including myocardial infarction and cerebrovascular accidents.<sup>3,5-11</sup> A study of 680 pregnant women with singleton deliveries across 12 US cities found that a 1°C increase in ambient temperature during the week prior to delivery was associated with a 7% increased risk of adverse cardiovascular events (95% CI: 3-12%). The strength of the association was greater among non-Hispanic Black mothers and heat exposure more proximal to the date of delivery.<sup>8</sup> Although many studies have established links between heat and adverse pregnancy outcomes, mechanisms underlying these associations have not been well established.<sup>12</sup>

#### Birth Defects

Heat exposure during the first trimester, and particularly during the critical period of organogenesis, may raise core maternal temperature and thus be teratogenic, or predisposing to birth defects.<sup>13,14</sup>

#### Preterm Birth, Low Birth Weight, and Stillbirth

Heat stress may trigger uterine contractions or lead to placental inflammation, either of which may promote preterm labor.<sup>15,16</sup> Heat stress may occur if the adaptive thermoregulatory changes that occur during pregnancy – including decreased maternal core temperature, increased skin blood flow, and a lower sweating threshold – are overwhelmed.<sup>12,17,18</sup>

Dehydration may decrease uterine blood flow, which can impair fetal growth or contribute to destabilized placental decidua lysosomes and prostaglandin release.<sup>15,19,20</sup> Stillbirths might occur if heat exposure initiates premature labor or damages the placenta, possibly to the point of placental abruption.<sup>4,21,22</sup>

#### Maternal Health, Racial Inequities, and Heat Risk

The maternal mortality rate among Non-Hispanic Black pregnant women is about 3 times the rate of non-Hispanic White women in the US.<sup>23,24</sup> Disparate maternal health outcomes result from many forces, including inaccessible high-quality healthcare and variation in the rates of underlying chronic conditions.<sup>25,26</sup> Racial inequities in heat-related cardiovascular complications during pregnancy may reflect higher prevalence of chronic medical conditions among Black mothers and a lower likelihood that Black households have air conditioning.<sup>27,28</sup>

#### Comorbidities

In the US, 1 in 5 women of reproductive age report having at least two chronic medical conditions, including asthma, depression, anxiety, diabetes, and high blood pressure.<sup>23</sup> The rate of pre-pregnancy obesity has also risen in recent years, in line with general population trends.<sup>29</sup> These conditions increase the risk of heat-related morbidity and mortality among women who are pregnant.

## Medication Considerations

Antidepressants (serotonin and norepinephrine reuptake inhibitors) and antipsychotics are two medication classes commonly used during pregnancy for mental health conditions that have been associated with a greater risk of needing medical care during heat waves. No trials have been conducted to guide clinical decision making considering these increased risks. Other medication classes, including anticholinergics, ACE inhibitors, and ARBs, have also been associated with a greater risk, though are not recommended in pregnant individuals due to the risk of fetal complications.<sup>30-32</sup>

## Temperatures of Concern

The temperatures that increase the risk of harm for pregnant individuals may be far lower than those considered dangerous to many people. For most cities in the United States, the minimum mortality temperature (the temperature above which mortality rates increase) is often just below the 80th percentile of the annual temperature range for American cities.<sup>33</sup>

Temperatures tend to peak in mid to late afternoon. The time of day with the highest temperatures for your location can be found at [weatherspark.com](https://weatherspark.com).

The National Weather Service (NWS) issues heat advisories, excessive heat watches, and excessive heat warnings. To see if a heat alert has been issued for your location, check the weather app on your smart phone, or go to [weather.gov](https://weather.gov) and select your county or enter your zipcode. For more details on how to access NWS alerts for heat (and other weather extremes), as well as the differences between heat watches and warning, see the accompanying toolkit document titled “Accessing Weather Alerts”.

## Built Environment

The forecast temperature available to patients may not accurately represent the temperature they are exposed to in their home or community. The upper levels of multi-story buildings, especially those without air conditioning, may be much warmer than lower levels.

Urban heat islands can result in temperatures more than 4°F higher than reported due to factors such as fewer trees and parks, more asphalt and concrete, and more traffic. Black American, Hispanic, and lower-wealth communities often live in neighborhoods with greater heat island effects.<sup>34</sup> Homeless individuals are at particularly high risk of heat exposure.

## Heat Action Plans for Pregnant Individuals

Appropriate guidance for pregnant individuals should be based upon an assessment of the severity of their disease, comorbidities, occupation (especially if outdoors), access to air conditioning at home, and excess heat exposure from an urban heat island or the home environment.

Prior to a heat event, you can work with an individual’s pregnancy medical care provider to develop a plan. We recommend that you familiarize yourself with the “Heat Action Plan” provided in the toolkit and review it with patients. The action plan can be provided during care visits and can be the basis for a discussion around safety planning and care management in the event of extreme heat. Action plans should be completed in advance of heat season in your locale.

For additional guidance, see the accompanying toolkit document titled “Establishing a Heat Action Plan”.

## Anticipatory Guidance for Providers to Give Patients

Anticipatory guidance for hot days may contribute to improved health outcomes. The strategies and resources below may be helpful for you to provide to patients who are at risk from excessive heat and reflect the “Heat Tip Sheet – Pregnancy” available in the toolkit, which we encourage you to share with patients.

1. Before going outside, check the weather forecast on your phone, television, radio, or online (e.g., at [weather.gov](http://weather.gov) or [weather.com](http://weather.com)).
2. If a patient does not have a thermostat or thermometer that measures room temperature in their home, they can be bought for a few dollars at hardware stores or online. Consider having inexpensive thermometers available in your clinic to distribute.
  - a. Indoor temperatures in the patient’s home should ideally remain <80°F. If they cannot keep the temperature below 80°F, they should use a fan or consider moving to an air-conditioned space until the temperature cools.
3. When a heat advisory or heat alert has been announced by the NWS (see “Accessing Weather Alerts” for more information), advise patients to:
  - a. Follow their heat action plan (see “Establishing a Heat Action Plan” for guidance)
  - b. If a heat advisory is issued, pregnant patients should preferably stay indoors in an air-conditioned space. If going outside is necessary, limit outdoor activities especially during the hottest part of the day (typically 11AM to 3 PM).
  - c. If an excessive heat warning is issued, pregnant patients should remain in air-conditioned spaces until the warning expires.

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