



# HEALTH, SAFETY & WELL-BEING

As the climate continues to change, in the next 30 years Columbia communities are likely to face vulnerabilities related to...

## Heat stress



HIGH

Warmer temperatures and more extreme heat may lead to higher risk of heat-related illness.

## Air quality



HIGH

More days of poor air quality and greater exposure to allergens could exacerbate respiratory illnesses.

## Vector-borne diseases



HIGH

Warmer temperatures may increase vector-borne diseases like West Nile Virus and Lyme disease.

## Mental health



MEDIUM-HIGH

Exposure to more climate-related disasters may lead to more anxiety and other mental health consequences.

### Vulnerability Ranking

LOW

LOW-MEDIUM

MEDIUM

MEDIUM-HIGH

HIGH



## Who is most at risk?

*“Every American is vulnerable to the health impacts associated with climate change.” [1]*

In general, children, older adults, women who are pregnant, outdoor workers, those with pre-existing illnesses, and those with weak social ties are more vulnerable to climate change-related health impacts. Low-income communities may have fewer options to respond and prepare for impacts, and may not have access to quality healthcare. The elderly, people with disabilities and mobility impairments, or families with mixed immigrant status may be less likely to leave their homes to seek aid. Columbia residents with Limited English Proficiency, which comprise of approximately 3.5% of the population, may need additional assistance to access information and prepare for and respond to health impacts [2]. The City is currently undertaking a community health assessment that will analyze primary and secondary data on various health issues to inform planning efforts.





## Rising temperatures and heat stress

Across Missouri, by the 2050s, 10 to 20 more days per year will have highs over 95°F compared to 2016 [3]. By late century, Columbia could see maximum daily highs of 104°F, with summer nights that don't dip below 80°F [4].

Between 2013 and 2016, there were 20 reports of heat-related illnesses and three heat-related deaths in Boone County [5]. Higher temperatures and more extreme heat days could increase the risk of heat stress and heat-related illnesses, especially among people who already have certain health conditions, live in buildings without air conditioning or cannot afford it, or experience homelessness. Additional public cooling centers, beyond the 9 that are currently available, may be needed to accommodate more people [6]. With greater cooling demand, households and businesses may see a rise in their energy costs in the summer. More low-income households may need financial assistance to cover higher costs, placing greater demand on an already tight public services budget in Columbia. Additional support may be needed for the Voluntary Action Center to continue providing air conditioning units to low-income residents.

Outdoor workers—including construction crews, farmworkers, landscapers, as well as City on-site inspectors, environmental health workers, and street maintenance crews—could be more exposed to extreme heat. To protect these workers, certain safety precautions may need to be taken, such as starting work shifts earlier in the morning to avoid daily high temperatures or working shorter shifts (e.g., two 4-hour shifts instead of one



8-hour shift). Outdoor recreation and sporting event participants will also be more exposed to extreme heat, and may benefit from adjustments to event timing and other adaptation strategies.

With warmer temperatures and extreme heat, transportation may become more difficult for older adults; people who rely on walking, biking, or public transit; children who walk to school; or people with limited mobility. It may be harder for these groups to get to workplaces, school, and health care facilities during extreme heat events.

## Extreme events

Risk to life may also increase with climate change. Flash flooding is a risk in Missouri, which poses a particular danger to people in cars on flooded roadways. In 2015, 27 people were killed by flooding in Missouri; 23 of them were in motor vehicles [17]. Climate change is expected to bring more heavy rainfall events, which increases the risk by reducing visibility.

During extreme heat, floods, drought, and other extreme or emergency weather conditions resulting in power outages, the Columbia community has higher demand for emergency response services. This requires more capacity and coordination among governments and service agencies to plan services for residents, especially meal delivery, provision of medicine, and other assistance for people with limited mobility or disabilities. In addition, extreme weather conditions make it harder for service providers to reach those in need, and to find locations for public heating and cooling centers that can accommodate more people.



## Vector-borne diseases

Currently in Columbia, there is a low incidence of two of the most common U.S. vector-borne diseases: tick-borne Lyme disease and mosquito-borne West Nile virus. Between 2011 and 2015, there were three reported cases of Lyme disease and only one of West Nile virus in Columbia/Boone County [7]. Although Zika and Dengue viruses are not currently in Missouri, there is concern that they could spread north into the state under warmer conditions.

There is a greater incidence in Missouri of Rocky Mountain Spotted Fever, Ehrlichiosis and Anaplasmosis. In 2013, there were 398 cases of Ehrlichiosis and Anaplasmosis in Missouri [8].

As temperatures warm, disease spread through mosquitoes, ticks, and other vectors may become more prevalent in Columbia, as a longer warm season could increase populations of these

vectors known to carry certain diseases. Across the U.S., illnesses from mosquito, tick, and flea bites tripled from 2004 through 2014 [9].

The Vector Control Specialists who help manage mosquito populations engage in physically demanding work outdoors, so they are more exposed to extreme heat. In addition, heavy and extended rains during the spring postpones vector control efforts until the rains stop, allowing mosquito breeding to go unchecked. Under these conditions, environmental and public health workers could face heavier workloads and may need additional capacity, and costs would likely increase to support these efforts.

Education programs may be needed with local health providers to ensure they can recognize symptoms of vector-borne diseases as the incidence increases. There are few local infectious disease specialists meaning diagnosis and care must often be provided by primary care or urgent care physicians.



## Poor air quality, allergens, and respiratory illnesses

Between 2012 and 2014, Boone County had 13 days when the air quality was considered unhealthy for higher risk populations, such as older adults, children, and people with respiratory disease [10]. In particular, poor air quality can exacerbate asthma conditions. In 2015, there were 725 asthma-related emergency room visits in Boone County [11]. In the future, warmer temperatures may lead to higher levels of ozone smog pollution, which can harm lung and heart health [12]. Columbia may experience more days each year with poor air quality, and air quality may be worse on those high-risk days. During these times, indoor air quality will also likely be lower as ozone enters buildings through windows, doors, cracks, and other openings. Given that people spend most of their time indoors, Columbia residents will be more exposed to indoor ozone for longer periods of time and may experience negative respiratory health effects as a result of indoor exposure [13].

With warmer temperatures, the pollen season may also become longer and more severe across Missouri [12]. These changes could worsen allergy symptoms and possibly contribute to asthma attacks. Additional capacity may be needed among health services to adequately serve the community's changing needs.

Indoor air quality may also be reduced with heavy rain events, more flooding, and higher outdoor humidity that increases moisture and humidity indoors, supporting more mold, dust, and other air contaminants [14]. This may worsen asthma symptoms and increase cases of respiratory infections. Extreme weather events and flooding may heighten this risk if power outages occur and turn off heating, ventilation, and air conditioning systems, reducing air flow and humidity control [15].

Poor outdoor and indoor air quality and increased exposure to allergens could disproportionately impact people who work outdoors, spend longer periods of time indoors, or already have certain health conditions, including allergies, asthma, and other respiratory conditions. Practices and procedures may be needed to protect Columbia residents from exposure on high-risk days.

Some communities in Columbia are more vulnerable to ozone smog pollution due to higher exposure and limited resources to prevent exposure and respond to health impacts. Neighborhoods will be more exposed if there is more vehicular traffic generating air pollution, more paved surfaces increasing surface air temperatures and heightening ozone levels, and less park space, vegetation, and tree canopy coverage, which remove ozone from the air.



## Implications for food security

Climate change impacts, including drought, may limit food production in Missouri, across the U.S., and worldwide. Extreme events could also interrupt transportation of food. These impacts could mean higher prices at the grocery store and farmers' markets. Lower-income households may have difficulty bearing this higher cost burden and require public assistance. In the past, Columbia has seen higher demand for public services when economic conditions change. Boone County already has high levels of food uncertainty and very high participation in the national free and reduced school lunch program relative to the rest of the state, yet low participation in the Supplemental Nutrition Assistance Program (SNAP) and the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) program [18]. Additional resources may be needed to close that gap and better serve these community members in need. Meanwhile, local farmers in the Columbia area could also face economic challenges with lower yields or losses of certain crops. In addition, more extreme weather events, like heat waves and heavy rainstorms, could make it more difficult for older adults and people with limited mobility to access grocery stores.





## Implications for mental health

Climate change is expected to bring more extreme temperatures and other severe weather. Even the threat of these conditions can impact an individual's mental health and the community at large, especially when they could cause loss of life, significant loss of resources, property or social support, or require relocation or other extensive changes to one's daily routine. Many people exposed to climate-related disasters experience serious mental health consequences, such as post-traumatic stress disorder (PTSD), depression, and general anxiety. It has been documented that in the wake of a disaster, instances of domestic violence and drug and alcohol abuse increase. Some studies also show a link between higher temperatures and increased rates of suicide [16]. As higher temperatures and extreme weather become more common in Columbia, it will be important for the community to have tools and strategies to handle stress when these conditions occur, and for mental health providers to have sufficient resources and capacity to prepare their patients for these changes. Affordability of mental health services is currently a challenge for many adults in Columbia, indicating that financial support may be needed in the future. In addition, further development of the mental health workforce will likely be important, as Columbia is already experiencing a shortage of mental health workers.

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