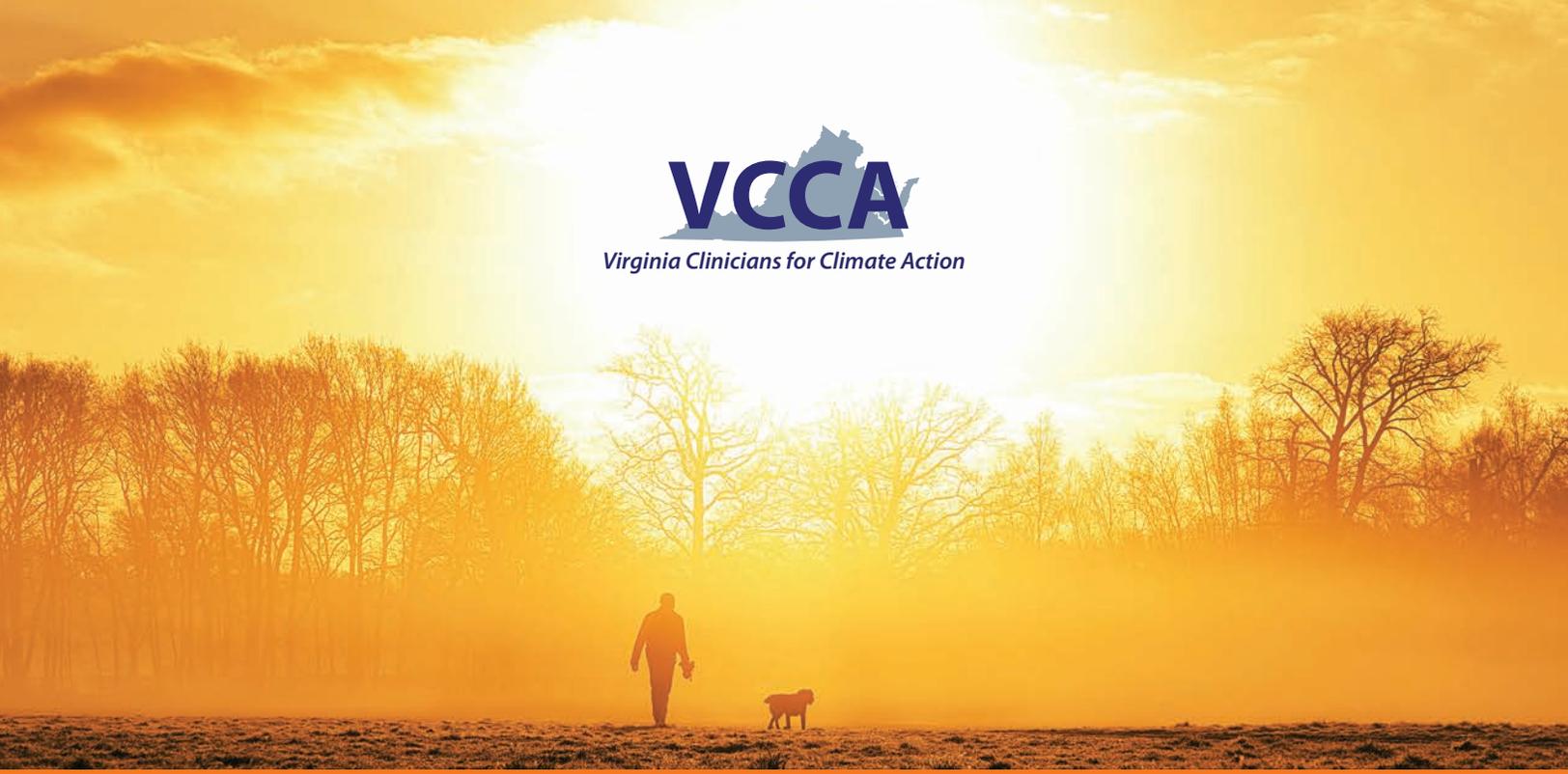




Virginia Clinicians for Climate Action



HEAT ILLNESS IN VIRGINIA



HEAT IN VIRGINIA

Virginia is getting hotter. As Virginia’s summer temperatures rise with our changing climate, the risks associated with extreme heat are increasing. Virginians face both health and economic costs related to an increased frequency and intensity of heat waves. Using temperature data collected by The National Oceanic and Atmospheric Administration, it was found that temperatures have risen every decade in Virginia since 1970.

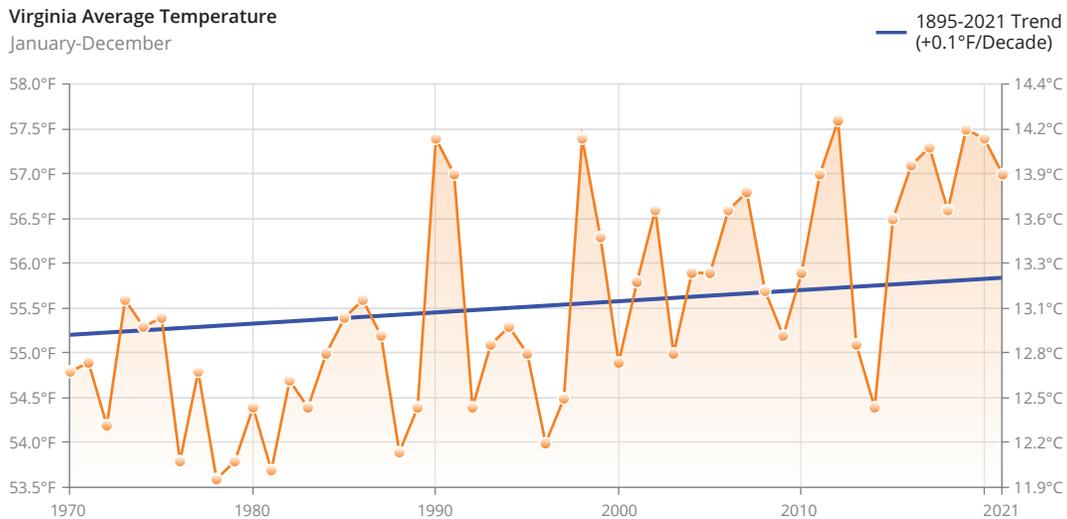


FIGURE 1: NOAA National Centers for Environmental information, *Climate at a Glance: Statewide Time Series*, published January 2022, retrieved on January 26, 2022 from <https://www.ncdc.noaa.gov/cag/>

Based on current temperature trends, Virginia is predicted to continue to warm for the next century. In higher emission scenarios, maximum temperature change can be upwards of 13 degrees. Under a pathway of lower emissions however, it is possible we could see only slight warming. In order to protect against worsening heat waves, we must tackle the source of increasing temperatures: greenhouse gases.

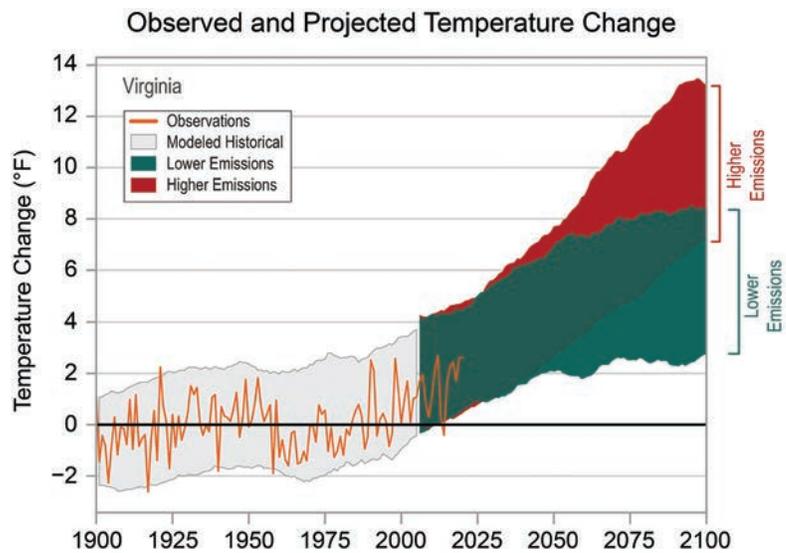


FIGURE 2: Runkle, J., K. Kunkel, L. Stevens, S. Champion, B. Stewart, R. Frankson, and W. Sweet, 2017: [Virginia State Climate Summary](#). NOAA Technical Report NESDIS 149-VA, 4 pp.

WHAT IS HEAT-RELATED ILLNESS AND WHO IS VULNERABLE?

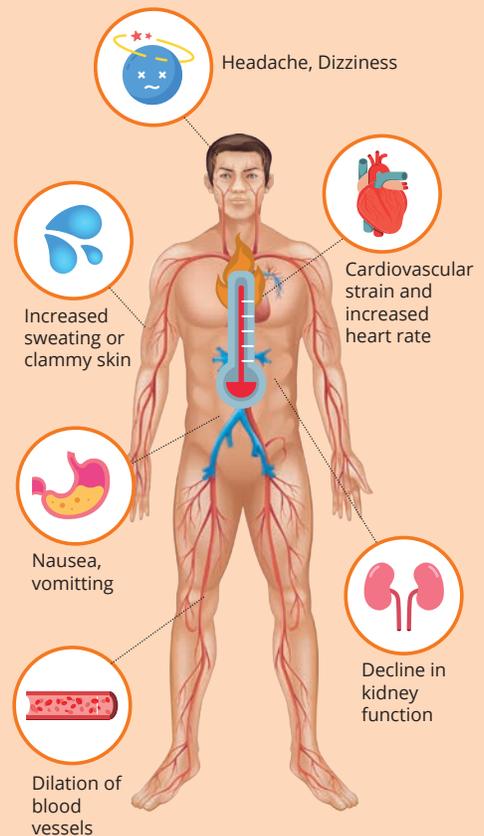
Heat-related illness occurs when the human body is not able to properly cool itself in response to exposure to extreme heat. The risk of heat illness is increased in the setting of high humidity, where increased moisture in the air limits effective body cooling by sweating. Higher night-time temperature also increases risk, as the human body can not recover from the day's heat if the night remains hot.

When it comes to heat vulnerability, there are three factors to consider:

- **Exposure** to high heat conditions.
- **Sensitivity** to heat illness based on age or underlying health conditions.
- **Adaptive capacity**, such as access to air conditioned spaces to cool down.



HOW HEAT ILLNESS IMPACTS THE BODY



SIGNS & SYMPTOMS

HEAT CRAMPS

Brief muscle cramps or spasms

DEHYDRATION

Increased thirst or dry mouth; headache; lack of energy; reduced or darker urine

HEAT EXHAUSTION

Dehydration; headache; dizziness; heavy sweating; nausea or vomiting; muscle cramps

HEAT STROKE

Headache; dizziness; heavy sweating; nausea or vomiting; fainting; hot skin; high heart rate and breathing; potential seizures

HEAT-RELATED ILLNESS BURDEN IN VIRGINIA

The burden of heat-related illnesses resulting in a visit to an emergency department or urgent care has been tracked since 2015 by the [Virginia Department of Health](https://www.vdh.virginia.gov/) (VDH). In the warm months of 2015 (May-Sept), 1,774 heat-related illness (HRI) visits were recorded and in 2021, 2,808 HRI visits were recorded. When rates of HRI visits are plotted between 2015-2021 by VDH health region, we see an increasing trend (Figure 3). Differences exist by region, with eastern and central areas around Richmond and Norfolk recording more HRI visits than in other locations in Virginia.

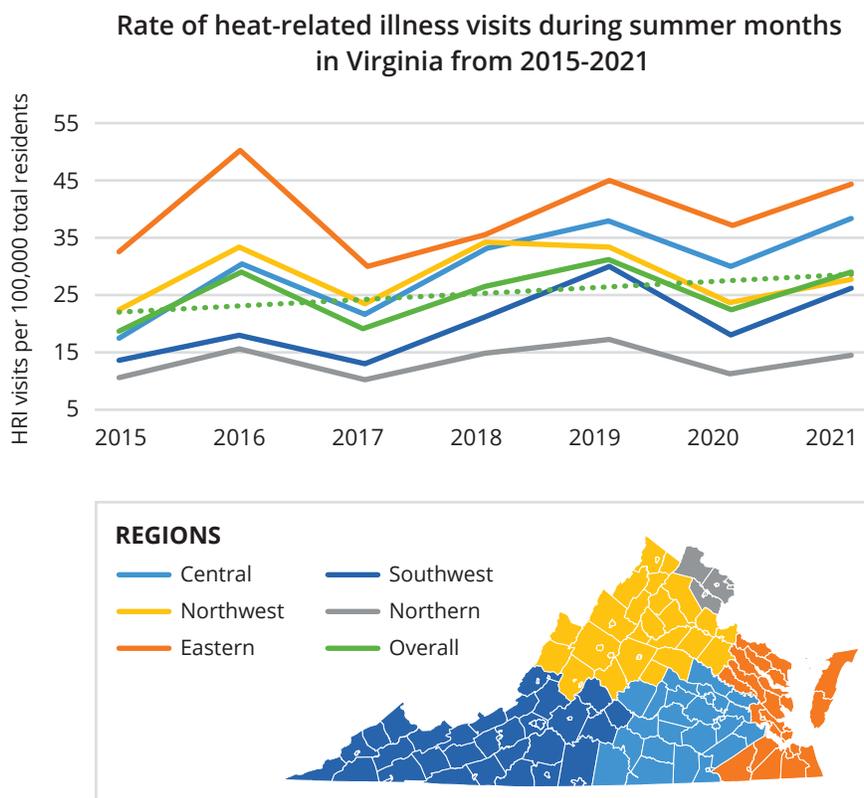
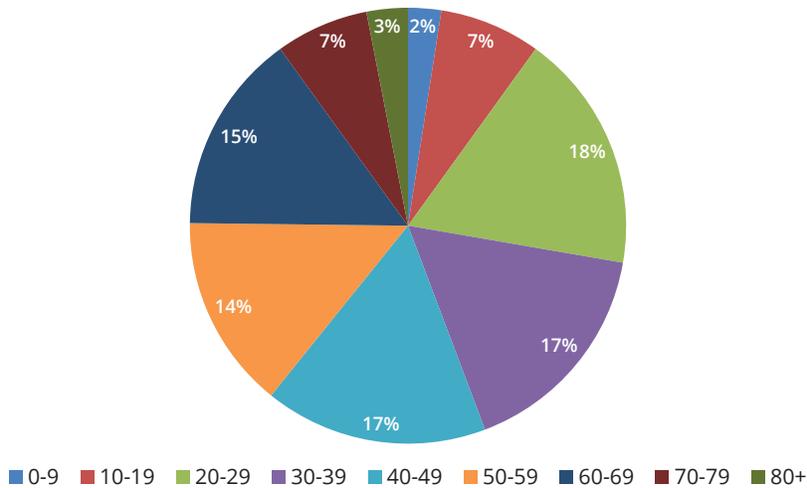


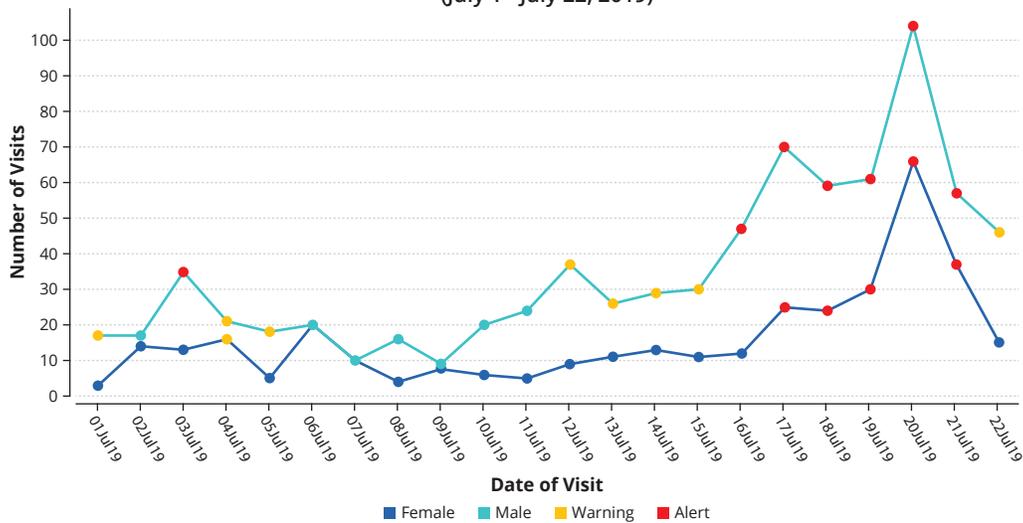
FIGURE 3: Data from VDH heat-related surveillance (<https://www.vdh.virginia.gov/surveillance-and-investigation/syndromic-surveillance/hri-surveillance/>). Population estimates are from NCHS yearly estimates, and 2020 population estimates are used for 2021. Note that during the Coronavirus Disease 2019 (COVID-19) pandemic, a decrease in the total number of ED visits occurred in Virginia. Because of this change in health care seeking behavior, VDH urges caution when comparing 2020 statistics to other years. MAP from: https://www.vdh.virginia.gov/content/uploads/sites/3/2016/03/Maps_2007Bsmall.pdf.

In July 2019, Virginia experienced a particularly extreme heat wave, resulting in a significant increase in healthcare visits for heat-related illness. Of the 653 visits during this event, males accounted for 68% of the visits and the largest proportion of visits were from those aged 20-29 years.

Number of ED and UCC Visits for Heat-Related Illness in Virginia by Age Group (July 16 - July 22, 2019)



Number of ED and UCC Visits for Heat-Related Illness in Virginia by Sex (July 1 - July 22, 2019)



FIGURES 4 and 5: From https://www.vdh.virginia.gov/content/uploads/sites/13/2019/07/Heat-Related-Illness_07-23-19_Final.pdf.

THE ECONOMIC COSTS OF EXTREME HEAT IN VIRGINIA

Hotter days decrease economic output: Numerous studies have measured productivity, particularly in outdoor work places, during hotter days (Figure 6). More rest and hydration is needed to maintain core body temperature within a safe range. Additionally, cognitive acuity, the brain’s response time, is reduced at higher temperatures, causing work hour losses and increased work-related injury claims and mortality on hotter days.

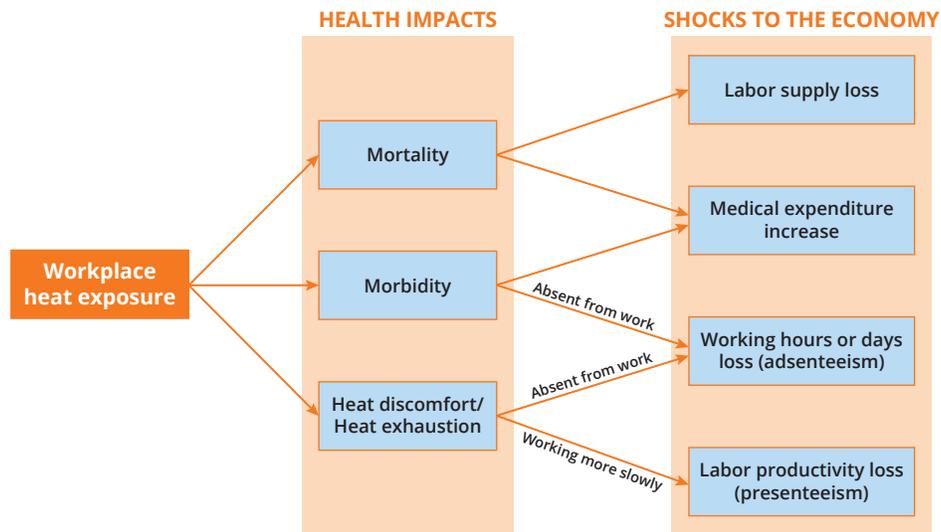


FIGURE 6: From Zhao et al. 2021. <https://link.springer.com/article/10.1007/s10584-021-03160-7>.

There has been a 20% reduction in labor productivity in Virginia due to extreme heat [Yang and Shindell \(2021\)](#). In the United States, it is estimated that the increased number of hot days in 2006–2016 compared to 1980–1990 led to labor productivity losses equating to \$1.7 billion annually. In Virginia, labor productivity losses are estimated at \$20.5 million (15%) loss annually. In Virginia, economic losses in the construction and manufacturing industries accounted for the largest percentage of overall productivity losses (Figure 7).

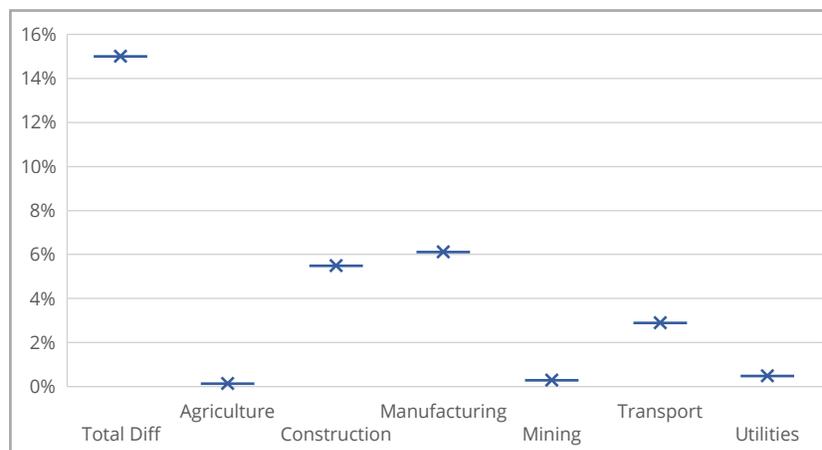


FIGURE 7: Virginia sector specific relative losses in labor productivity comparing 1980-1990 to 2006-2016 time periods. Data found in supplemental material of [this article](#).

VIRGINIA CAN LEAD THE WAY IN DEVELOPING AND IMPLEMENTING HRI RISK REDUCTION STRATEGIES BY:

Virginia is serving as a national policy leader to reduce heat-trapping gas pollution. The [Virginia Clean Economy Act](#), our participation in the [Regional Greenhouse Gas Initiative](#) and our [Clean Cars](#) policy all will help prevent extreme temperature rise and heat illness.

1. According to [Yang and Shindell \(2021\)](#), significant reductions in greenhouse gas emissions would prevent 77 million lost work hours per year by the 2050s, saving ~\$2.5 billion annually in the United States. In Virginia, this reduction would save \$32 million per year from lost work hours. Improving occupational standards for preventing HRI at the workplace could also help minimize losses to businesses.
2. Development of improved training, cooling stations and surveillance in high-risk locations, including youth outdoor sports, outdoor occupations, and older adults living alone.
3. Incentivizing tree planting, green roofs and park development in urban areas to increase access to urban shade and reduce heat absorption, through support of programs like [Southside ReLeaf](#) in Richmond.



HOW TO PREVENT HEAT ILLNESS



Drink plenty of water.

Don't wait until you feel thirsty. Drink plenty regularly.



Look for shade.

Provide a shaded space for events and outdoor breaks.



Take more breaks.

Increase the number of breaks in shaded areas with water if working or playing outside.



Schedule events earlier or later.

Schedule events earlier or later when it is cooler.



Consider climate change.

Keep summers safe by helping reduce air pollution.

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