# United States House of Representatives
# Select Committee on the Climate Crisis

## Hearing on February 5, 2020
## "Creating a Climate Resilient America: Overcoming the Health Risks of the Climate Crisis"

## Questions for the Record

## The Honorable Gina McCarthy
## President and Chief Executive Officer
## Natural Resources Defense Council

**The Honorable Kathy Castor**

1. **The impact of extreme heat on a person's health is relatively straight forward to understand. However, recent research has also found that these extreme weather events like extreme heat can impair a person's behavior and cognitive development. Can you explain more about this research?**

Extreme heat can exacerbate schizophrenia, suicidality, and other serious conditions among people with existing mental health illnesses, and affect cognitive abilities and sense of well-being among those without.[1,2,3,4,5,6] The stress of unhealthy heat and other weather extremes has also been linked to impaired learning and behavior disorders in children.[7]

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[1] Yoonhee Kim et al., "Suicide and Ambient Temperature: A Multi-Country Multi-City Study," *Environmental Health Perspectives* 127, no. 11 (November 2019): 117007, https://doi.org/10.1289/EHP4898.
[2] Jamie T. Mullins and Corey White, "Temperature and Mental Health: Evidence from the Spectrum of Mental Health Outcomes," *Journal of Health Economics* 68 (December 2019): 102240, https://doi.org/10.1016/j.jhealeco.2019.102240.
[3] Nai-Tzu Chen, Po-Hsiu Lin, and Yue-Liang Leon Guo, "Long-Term Exposure to High Temperature Associated with the Incidence of Major Depressive Disorder," *Science of The Total Environment* 659 (April 2019): 1016-1020, https://doi.org/10.1016/j.scitotenv.2018.12.434.
[4] Rupa Basu et al., "Examining the Association Between Apparent Temperature and Mental Health-Related Emergency Room Visits in California," *American Journal of Epidemiology* 187, no. 4 (April 1, 2018): 726-735, https://doi.org/10.1093/aje/kwx295.
[5] Clemens Noelke et al., "Increasing Ambient Temperature Reduces Emotional Well-Being," *Environmental Research* 151 (November 2016): 124-129, https://doi.org/10.1016/j.envres.2016.06.045.
[6] Jose Guillermo Cedeño Laurent et al., "Reduced Cognitive Function during a Heat Wave among Residents of Non-Air-Conditioned Buildings: An Observational Study of Young Adults in the Summer of 2016," ed. Jonathan Alan Patz, *PLOS Medicine* 15, no. 7 (July 10, 2018): e1002605, https://doi.org/10.1371/journal.pmed.1002605.
[7] Frederica P Perera, "Multiple Threats to Child Health from Fossil Fuel Combustion: Impacts of Air Pollution and Climate Change," *Environmental Health Perspectives* 125, no. 2 (2017): 141-148.

The mechanisms by which extreme heat harms mental health and cognitive function are not well understood. One possibility is that high temperatures affect how different parts of the brain "talk" to each other.[8] For example, exposure to extreme heat may affect serotonin function, leading to increases in violence, impulsive behavior, or aggression.[9,10] Another possibility is that hotter nighttime temperatures reduce sleep quality and quantity.[11,12]

The disturbing evidence gathered so far on the link between heat and brain health points to the need for more research in this area. Further, climate and health adaptation plans should have a greater focus on mental health and cognitive functioning.

2. **In your testimony, you cite figures that could compromise our military's readiness posture. From 2014 to 2018, the rate of heat stroke among active duty members increased 73 percent and the rate of heat exhaustion increased nearly 53 percent. What are the national security implications if these figures increase?**

The Department of Defense (DOD) has reported that extreme heat is already affecting troop readiness.[13] This is particularly true in the Middle East and the U.S. Southwest and Southeast, where extreme heat has interfered with training and testing operations.[14]

Extreme heat and drought can also damage roads and infrastructure at military bases, reduce the effectiveness of computer servers, cause water shortages, increase energy use, and increase social and political instability in some regions.[15,16]

Thanks to the U.S. military's aggressive approach to identifying and treating heat-related illnesses, the death rate from extreme heat among service members has been relatively low in

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[8] Mare Lõhmus, "Possible Biological Mechanisms Linking Mental Health and Heat—A Contemplative Review," *International Journal of Environmental Research and Public Health* 15, no. 7 (July 18, 2018): 1515, https://doi.org/10.3390/ijerph15071515.
[9] Yoonhee Kim et al. "Suicide and Ambient Temperature: A Multi-Country Multi-City Study." *Environmental Health Perspectives* 127, no. 11 (November 2019): 117007. https://doi.org/10.1289/EHP4898.
[10] Ryan Harp and Kristopher Karnauskas, "Global Warming to Increase Violent Crime in the United States," *Environmental Research Letters*, January 14, 2020, https://doi.org/10.1088/1748-9326/ab6b37.
[11] Nick Obradovich et al., "Nighttime Temperature and Human Sleep Loss in a Changing Climate," *Science Advances* 3, no. 5 (May 2017): e1601555, https://doi.org/10.1126/sciadv.1601555.
[12] Mullins, Jamie T., and Corey White. 2019. "Temperature and Mental Health: Evidence from the Spectrum of Mental Health Outcomes." *Journal of Health Economics* 68 (December): 102240. https://doi.org/10.1016/j.jhealeco.2019.102240.
[13] Office of the Under Secretary of Defense for Acquisition and Sustainment, "Report on Effects of a Changing Climate to the Department of Defense" (Department of Defense, January 2019), https://media.defense.gov/2019/Jan/29/2002084200/-1/-1/1/CLIMATE-CHANGE-REPORT-2019.PDF.
[14] Government Accountability Office, "Climate Change Adaptation: DOD Needs to Better Incorporate Adaptation into Planning and Collaboration at Overseas Installations," November 2017, https://www.gao.gov/assets/690/688323.pdf.
[15] Ibid.
[16] Kate A. Guy et al., "A Security Threat Assessment of Global Climate Change: How Likely Warming Scenarios Indicate a Catastrophic Security Future" (Security, Military, and Intelligence Panel on Climate Change, The Center for Climate and Security, February 2020), https://climateandsecurity.files.wordpress.com/2020/02/a-security-threat-assessment-of-global-climate-change_nsmip_2020_2.pdf.

recent years.[17] However, the Government Accountability Office found in June 2019 that "DOD installations have not consistently assessed risks from extreme weather and climate change effects."[18]

The DOD needs to more ambitiously plan for and implement measures to both protect the health of service members and maintain our national security in the face of climate disruption.

3. **Our health care sector is of the utmost importance to prepare for and respond to disasters. The health sector must become climate resilient. What are some actions that Congress can take to make this critical health infrastructure climate-resilient?**

Climate change imposes huge cost burdens on the U.S. healthcare system by increasing illnesses and deaths, inflicting major damage on hospitals and other healthcare facilities, and creating extended disruptions in operations.[19,20] For example, the NYU Langone Medical Center suffered nearly $1 billion in damages after Hurricane Sandy in 2012, and was unable to provide emergency room services for a year and a half after the storm.[21]

Despite progress in the wake of Hurricane Katrina and other major events, a recent review by Johns Hopkins' Bloomberg School of Public Health found significant room for improvement in the healthcare sector's resilience to large-scale natural disasters.[22] Improvement is hampered by the current piecemeal approach to federal regulation of hospitals and other facilities, recent declines in funding for emergency preparedness in hospitals, and the complicated interdependence between privately-owned facilities and public infrastructure such as roads and electric utilities.

Congress should:

- Increase funding for the Hospital Preparedness Program, which fell from $500 million in 2004 to $254.5 million in 2019.[23]

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[17] Benjamin P. Donham et al., "Low Incidence of Death and Renal Failure in United States Military Service Members Hospitalized with Exertional Heat Stroke: A Retrospective Cohort Study," *Military Medicine* 185, no. Supplement_1 (January 7, 2020): 362-367, https://doi.org/10.1093/milmed/usz214.

[18] Government Accountability Office, "Climate Resilience: DOD Needs to Assess Risk and Provide Guidance on Use of Climate Projections in Installation Master Plans and Facilities Designs," June 2019, https://www.gao.gov/products/gao-19-453.

[19] Vijay S. Limaye et al., "Estimating the Health-Related Costs of 10 Climate-Sensitive U.S. Events During 2012," *GeoHealth* 3, no. 9 (September 2019): 245-265, https://doi.org/10.1029/2019GH000202.

[20] Health Care Without Harm, "Safe Haven in the Storm: Protecting Lives and Margins with Climate-Smart Health Care," 2018, https://noharm-uscanada.org/safehaven.

[21] Nate Seltenrich, "Safe from the Storm: Creating Climate-Resilient Health Care Facilities," Environmental Health Perspectives 126, no. 10 (October 2018): 102001. https://doi.org/10.1289/EHP3810.

[22] Eric Toner et al., *A Framework for Healthcare Disaster Resilience: A View to the Future*, Johns Hopkins Bloomberg School of Public Health Center for Health Security, 2018, http://www.centerforhealthsecurity.org/our-work/pubs_archive/pubs-pdfs/2018/180222-framework-healthcare-disaster-resilience.pdf.

[23] Steven Ross Johnson, "Federal Hospital Preparedness Funding Weaker as Requirements Tighten," Modern Healthcare, August 20, 2019, www.modernhealthcare.com/government/federal-hospital-preparedness-funding-weaker-requirements-tighten.

- Ensure healthcare practitioners have ready access to reliable climate risk data and the technical support they need to make decisions. For instance, nearly a third of the 16 Harris County hospitals that flooded during Hurricane Harvey were outside the flood hazard areas designated by the Federal Emergency Management Administration, and half were outside the hurricane's projected inundation boundary.[24]
- Condition federal funding for hospitals and other healthcare facilities on climate vulnerability assessments and adaptation plans, using documented application of the Sustainable and Climate Resilient Health Care Facilities Toolkit as a minimum requirement.[25] These assessments and plans should account for both acute hazards such as wildfires, and more gradual climate hazards such as sea level rise and increases in average temperature.
- Invest in modernization of our electric grid and transportation and drinking water systems, which are all vital to the overall climate resilience of hospitals.[26]

[24] Emmanuelle Hines and Colleen E. Reid, "Hurricane Harvey Hospital Flood Impacts: Accuracy of Federal Emergency Management Agency Flood Hazard Areas in Harris County, Texas," *American Journal of Public Health*, February 20, 2020, e1–6, https://doi.org/10.2105/AJPH.2019.305520.
[25] U.S. Climate Resilience Toolkit, "Building Health Care Sector Resilience," modified November 22, 2016, https://toolkit.climate.gov/topics/human-health/building-climate-resilience-health-sector.
[26] NRDC, "Invest in 21st Century Infrastructure," 2020, https://www.nrdc.org/issues/invest-21st-century-infrastructure.