What the Science Teaches Us about Common Solutions to Climate Change and Family Health Problems

ADDRESSING CLIMATE CHANGE YIELDS HEALTH BENEFITS:

Alliance of Nurses for Healthy Environments

As nurses we call on all our policymakers to join us in taking strong action now to address climate change and improve our families' and community health!

Stronger hurricanes and worsened heart disease. Extreme drought and flooding and more premature birth and infectious disease. The burning of fossil fuels that cause climate change make weather events more intense and cause other climate effects that contribute to everyday health problems including asthma, depression and learning disabilities.

On June 30, 2020, the US House Select Committee on the Climate Crisis released "Solving the Climate Crisis, A Congressional Roadmap for Ambitious Climate Action." The Alliance of Nurses for Healthy Environments (ANHE) supports this comprehensive proposal for three reasons:

1. Following the SCCC Roadmap will **lessen the suffering** caused by hurricanes, wildfires, heat waves and other climate-related severe weather events.

2. Adopting the SCCC course of action will **improve the health of American families** as the more than 100 references included in the full bibliography (available at www.envirn.org/commonsolutions) make clear.

3. Solving the climate crisis is an essential component to **addressing the institutionalized racism and health inequities** that are amplified in the incidence and death statistics of the COVID-19 pandemic. The communities most impacted by the coronavirus are also facing the greatest risk of health impacts from climate change—communities of color, low-income communities, people with pre-existing medical conditions, the elderly, and some essential workers. By tackling climate change, we have a powerful opportunity to significantly improve the health of these communities and create a healthier future for generations to come.

HOW ADDRESSING CLIMATE CHANGE WILL IMPROVE

Respiratory and Cardiac Health

Reducing air pollution saves lives and promotes healthier lungs in children.

Burning fossil fuels for power or transportation produces dangerous air pollutants that are harmful to human health and cause climate change.

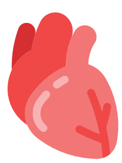
Ground-level ozone makes air quality worse. Hotter temperatures and prolonged periods of drought also increase the likelihood of wildfires that then causes even more air pollution, particularly, fine particle pollution.

The cost of air pollution in economic and health terms within the U.S. is staggering. In 2014 alone, early deaths from air pollution cost the U.S. economy $790 billion, roughly 5 percent of its yearly gross domestic product (GDP).[1]

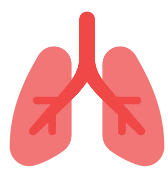
Exposure to particulate matter and ozone are associated with increased risk of cardiovascular and respiratory disease, hospitalizations and emergency room visits, as well as premature death. Improvements in air quality are shown to improve respiratory and cardiac health, save lives, and reduce costs associated with these diseases.[2]

The benefits of clean air regulations under the Clean Air Act were estimated at $2 trillion in 2020. Annual savings in the United States are largely from:

Avoiding more than 237,000 deaths from PM and ozone exposure



Preventing nearly 200,000 heart attacks



Eliminating 66,000 hospital admissions for respiratory conditions made worse by air pollution

Stopping 2.4 million asthma attacks[3] from taking place

1 Tschofen, P., Azevedo, I. L., & Muller, N. Z. (2019). Fine particulate matter damages and value added in the US economy. *Proceedings of the National Academy of Sciences*, *116*(40), 19857-19862.

2 Hystad, P., Larkin, A., Rangarajan, S., AlHabib, K. F., Avezum, Á., Calik, K. B. T., ... & Gupta, R. (2020). Associations of outdoor fine particulate air pollution and cardiovascular disease in 157 436 individuals from 21 high-income, middle-income, and low-income countries (PURE): a prospective cohort study. *The Lancet Planetary Health*, *4*(6), e235-e245.

3 Schraufnagel, D. E., Balmes, J. R., De Matteis, S., Hoffman, B., Kim, W. J., Perez-Padilla, R., ... & Wuebbles, D. J. (2019). Health benefits of air pollution reduction. *Annals of the American Thoracic Society*, *16*(12), 1478-1487.

HOW ADDRESSING CLIMATE CHANGE WILL

Protect Outdoor Workers from Extreme Heat

Reducing exposure to extreme heat conditions makes jobs safer for outdoor workers.

Outdoor workers in agriculture, construction, and other industries are at an elevated risk for severe illness or death from exposure to extreme heat. Those at greater risk for heat stress include the elderly, those with chronic health conditions such as diabetes, heart disease, or high blood pressure, and those taking medications that are affected by higher temperatures.[4]

Exposure to extreme heat can result in illness ranging from heat exhaustion, rash, cramps, and syncope to life-threatening heat stroke.[5] A study among migrant farmworkers in Georgia found that 80% experienced one or more symptoms of heat-related illness during the workday.[6]

From 1992 to 2016 heat stress among US workers caused an estimated

783 deaths & 69,374 serious injuries[7]

Occupational heat stress can also lead to chronic dehydration and potential development of heat stress nephropathy, a form of chronic kidney disease not associated with traditional risk factors for disease.[8] This type of chronic kidney disease is most frequently reported in hot rural communities in low and middle-income countries, however this an emerging concern among migrant workers in the US, particularly in the Central Valley of California.[9]

Currently in the United States there is not a national standard to protect outdoor workers from heat stress.

4 Center for Disease Control & Prevention (CDC): National Institute for Occupational Safety & Health (NIOSH). (2018). Heat stress. Retrieved from https://www.cdc.gov/niosh/topics/heatstress/default.html
5 CDC, 2018
6 Smith, D., Ferranti, E.P., Hertzberg, V.S., and Mac, V. (2020). Knowledge of heat-related illness first aid and self-reported hydration and heat-related illness symptoms in migrant farmworkers. *Workplace Health & Safety.* DOI: https://doi.org/10.1177/2165079920934478.
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8 Chicas, R., Mix, J., Mac, V., Flocks, J., Dickman, N.E., Hertzberg, V., and McCauley, L. (2019). Chronic kidney disease among workers: A review of the literature. *Workplace Health and Safety, 67*(9), 481-490. DOI: https://doi.org/10.1177/21650799198433; Glaser, J., Lemery, B., Rajagopalan, B., Diaz, H., Garcia-Trabanino, R., Taduri, G., Madero, M., ... Johnson, R. (2016). Climate change and the emergent epidemic of CKD from heat stress in rural communities: The case for heat stress nephropathy. *Clinical Journal American Society of Nephrology, 11*(8), 1472–1483. doi: 10.2215/CJN.13841215.
9 Glaser et al., 2016

HOW ADDRESSING CLIMATE CHANGE WILL IMPROVE

Maternal–Child Health

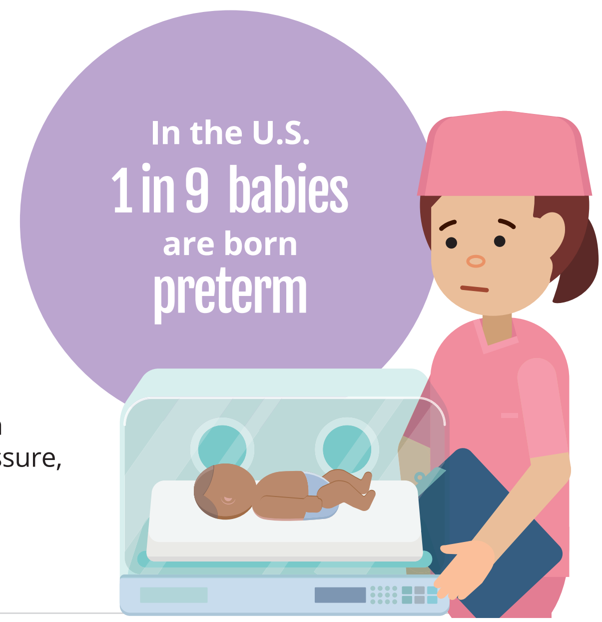
Cleaner air = healthier babies. By addressing climate change, we can reduce the risk of preterm birth, low birth weight, and stillbirth.

As nurses we want to help women and families have the healthiest pregnancies and the healthiest babies possible. Air pollution and ozone present a challenge for women and children who are especially sensitive to the negative impacts of these pollutants. In a recently published review that looked at over 32 million births in the United States, scientists found significant associations with preterm birth, low birth weight babies, and stillbirth in women exposed to the air pollutants and extreme heat waves that are becoming more common with climate change.[10]

Just as we have seen with the link between greater mortality from COVID and exposure to air pollution in communities of color, Black women bear a greater burden of poor pregnancy outcomes due to their greater exposure to air pollutants and extreme heat.

Over 40% of preterm births in high income countries worldwide occur in the US, even though the US is only 27% of high income countries' population, and 1 in 9 US babies are born preterm.[11] Both air pollution and extreme heat events increase the risk of preterm birth, especially for Black, Hispanic, and low-income women. Preterm births are very expensive—they can cost up to 10 times more than a term birth. By taking action on climate change we can help babies get off to the best start in life AND save families significant healthcare dollars.

Exposure to ozone and particulate matter, especially close to term, can increase the risk of stillbirth. Significantly reducing exposure to ozone could prevent up to 8000 stillbirths in the US each year.[12] Air pollution can also increase the risk of low birth weight. Low birth weight is not just a matter of a baby being born small, it is a serious condition that can lead to a variety of short and long-term health impacts for that baby and a greater risk of chronic of disease as an adult such as diabetes, high blood pressure, and obesity.



10 Bekkar, B., Pacheco, S., Basu, R., & DeNicola, N. (2020). Association of air pollution and heat exposure with preterm birth, low birth weight, and stillbirthPublic Citizen. (2018). Petition to OSHA for a heat standard. Retrieved from https://www.citizen.org/wp-content/uploads/migration/180717_petition_to_osha_on_heat_stress-signed_final_0.pdf bekk in the US: a systematic review. *JAMA Network Open*, *3*(6), e208243-e208243.

11 Crimmins, A., Balbus, J., Gamble, J.L., Beard, C.B., Bell, J.E., Dodgen, D., Eisen, R.J., Fann, N., Hawkins, M.D., Herring, S.C., Jantarasami, L., Mills, D.M., Saha, S., Sarofim, M.C., Trtanj, J. & Ziska, L. Eds. (2016) USGCRP: The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment. U.S. Global Change Research Program, Washington, DC. http://dx.doi.org/10.7930/J0R49NQX

12 Mendola, P., Ha, S., Pollack, A. Z., Zhu, Y., Seeni, I., Kim, S. S., ... & Liu, D. (2017). Chronic and acute ozone exposure in the week prior to delivery is associated with the risk of stillbirth. *International Journal of Environmental Research and Public Health*, 14(7), 731. doi:10.3390/ijerph14070731

HOW ADDRESSING CLIMATE CHANGE WILL IMPROVE

Mental Health

By addressing climate change, we can improve mental health and well-being from reducing incidence of, or exposure to, climate-related extreme weather events that cause or exacerbate stress and mental health consequences. Children, elderly, people with mental illness and other chronic conditions, and those with lower socioeconomic status are among those most vulnerable.

Extreme weather events, such as hurricanes, droughts, flooding and wildfires are all made worse by climate change. All have negative impacts on individual well being as well as economic and social consequences. Mental health impacts as a result of climate-related extreme weather events cover a spectrum, from minimal stress to clinical disorders, which include depression, anxiety, suicidality, and post-traumatic stress disorder.[13] Extreme heat events have been associated with increases in aggressive behavior and domestic violence.[14] Mental health effects can continue for years after the triggering event.[15]

Those with existing mental, behavioral, and cognitive disorders can be triggered or exacerbated by heat waves, resulting in increased emergency room visits.[16] Medication used to treat mental health disorders can also increase susceptibility to heat, putting those with existing conditions at risk for heat-related illness.

An average of over 20 million people worldwide are displaced annually[17] as a result of weather-related events, including floods, storms, wildfires, and extreme temperatures.[18] For children, forced displacement or loss of community stability as a result of disasters can carry a heavy mental health toll.[19]

Mental health impacts as a result of climate-related extreme weather events cover a spectrum, from minimal stress to clinical disorders, which include depression, anxiety, suicidality, and post-traumatic stress disorder.

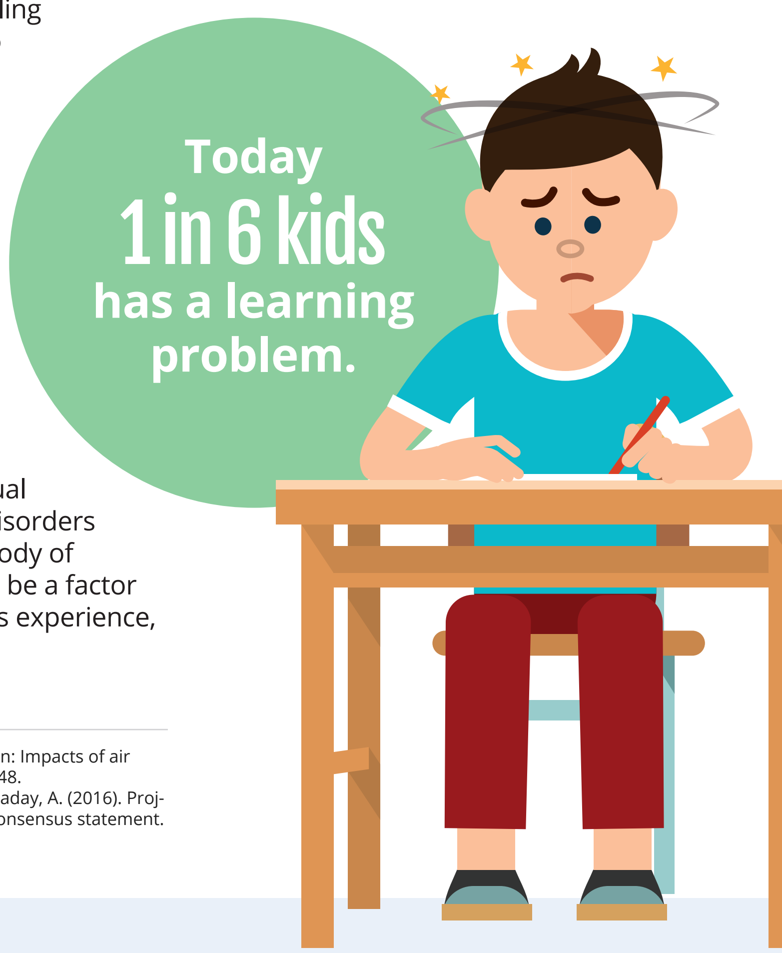
13 Ebi, K.L., Balbus, J.M., Luber, G., Bole, A., Crimmins, A.M., Glass, G., ... White-Newsome, J.L. (2018). Human health. In D.R. Reidmiller, C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (Eds.), *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* (pp. 539-571).U.S. Global Change Research Program.
14 Crimmins et al., 2016
15 Ebi et al., 2018
16 Basu, R., Gavin, L., Pearson, D., Ebisu, K., & Malig, B. (2018). Examining the association between apparent temperature and mental health-related emergency room visits in California. *American Journal of Epidemiology*, *187*(4), 726-735.
17 Data from 2008-2014
18 World Meteorological Organization. (2016). *Disaster-related displacement in a changing climate.* Retrieved from https://public.wmo.int/en/resources/bulletin/disaster-related-displacement-changing-climate
19 Ebi et al., 2018

HOW ADDRESSING CLIMATE CHANGE WILL IMPROVE

Neurological Health

Burning fossil fuels creates toxic air pollution that harms developing brains. Supporting cleaner, renewable energy sources helps babies be born with futures less threatened by learning disabilities, impaired IQs, ADHD and autism. Addressing climate change will help more children be able to learn and thrive.

Almost everyone in the world is affected by air pollution; only one person in 10 lives in a city with air clean enough to meet World Health Organization (WHO) air quality guidelines. Inhaling tiny air pollution particles can be extremely harmful to human health and development, particularly early in life. An estimated 2 billion children live in areas exceeding WHO guidelines for fine particle exposure. In the United States, people in low-income communities and communities of color experience disproportionately high exposure to particulate air pollution and air pollution from coal- fired power plants and oil and gas operations.[20]



According to a 2016 scientific consensus statement signed by 47 leading scientists, healthcare providers and children's health advocates, the chemicals in air pollution are "prime examples of toxic chemicals that can contribute to learning, behavioral or intellectual impairment, as well as specific neurodevelopmental disorders such as ADHD or autism."[21] In addition, an emerging body of scientific evidence suggests that air pollution may also be a factor in neurodegenerative disorders that many older adults experience, such as dementia.

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20 Perera, F. P. (2017). Multiple threats to child health from fossil fuel combustion: Impacts of air pollution and climate change. *Environmental Health Perspectives*, 125(2), 141-148.

21 Bennett, D., Bellinger, D. C., Birnbaum, L. S., DABT, ATS, Bradman, A., ... & Halladay, A. (2016). Project TENDR: Targeting environmental neuro-developmental risks the TENDR consensus statement. *Environmental Health Perspectives*, 124(7), A118-A122.

The common sense solutions to the problems of climate change in the Action Plan of the US House Select Committee on the Climate Crisis are also solutions to many of the health problems that are hurting our families. The Alliance of Nurses for Healthy Environments (ANHE) calls on all policy makers to advocate for the Select Committee's Roadmap to lessen the suffering from climate change, improve our families' health and address institutional racism and health inequities.

Alliance of Nurses for Healthy Environments

The Alliance of Nurses for Healthy Environments is the only national nursing organization focused solely on the intersection of health and the environment.

The mission of the Alliance is to promote healthy people and healthy environments by educating and leading the nursing profession, advancing research, incorporating evidence-based practice, and influencing policy.

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