

Environmental Stewardship Resource Desk

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COVID-19

- 1. Short-term exposure to ambient air pollution and individual emergency department visits for COVID-19: a case-crossover study in Canada.** Lavigne E et al. Thorax. 2022 Mar 31:thoraxjnl-2021-217602. doi: 10.1136/thoraxjnl-2021-217602. Online ahead of print.
<https://thorax.bmj.com/content/early/2022/03/30/thoraxjnl-2021-217602>
RESULTS: Cumulative ambient exposure over 0-3 days to PM_{2.5} (OR 1.010; 95% CI 1.004 to 1.015, per 6.2 µg/m³) and NO₂ (OR 1.021; 95% CI 1.015 to 1.028, per 7.7 ppb) concentrations were associated with ED visits for COVID-19. We found that the association between PM_{2.5} and COVID-19 ED visits was stronger among those hospitalised following an ED visit, as a measure of disease severity, (OR 1.023; 95% CI 1.015 to 1.031) compared with those not hospitalised (OR 0.992; 95% CI 0.980 to 1.004) (p value for effect modification=0.04).
CONCLUSIONS: We found associations between short-term exposure to ambient air pollutants and COVID-19 ED visits. Exposure to air pollution may also lead to more severe COVID-19 disease.
- 2. Pandemic-Related Pollution Decline and ST-Segment–Elevation Myocardial Infarctions.** Aung S, Vittinghoff E, Marcus GM. J Am Heart Assoc. 2022 Mar 29:e024605. doi: 10.1161/JAHA.121.024605. Online ahead of print.
<https://www.ahajournals.org/doi/10.1161/JAHA.121.024605>
The reason for the reduction in ST-segment–elevation myocardial infarctions (STEMI) during the COVID-19 pandemic¹ remains a mystery. Increased particulate matter 2.5 (PM 2.5) is a known risk factor for STEMI,² although evidence of the reciprocal relationship (decreased PM 2.5 associated with decreased STEMI incidence) has not been shown. Given the rare circumstances of the pandemic, where pollution across the United States substantially diminished,³ we sought to perform a natural experiment to determine if decreased PM 2.5 was associated with a decrease in STEMIs.

Health Impacts of Climate Change

3. **Exposure to air pollution and risk of incident dementia in the UK Biobank.** Parra KL, Alexander GE, Raichlen DA, Klimentidis YC, Furlong MA. *Environ Res.* 2022 Jun;209:112895. doi: 10.1016/j.envres.2022.112895. Epub 2022 Feb 8.
DISCUSSION: PM_{2.5} and NO₂ levels were associated with several types of dementia, and these associations were not modified by APOE-ε4. Findings from the UK Biobank support and extend to other epidemiological evidence for the potential association of air pollutants with detrimental brain health during aging.
4. **Incident cardiovascular disease and long-term exposure to source-specific air pollutants in a Swedish cohort.** Carlsen HK et al. *Environ Res.* 2022 Jun;209:112698. doi: 10.1016/j.envres.2022.112698. Epub 2022 Jan 22.
DISCUSSION/CONCLUSION: In an area with low to moderate air pollution exposure, we observed significant associations of long-term residential NO_x with increased risk of incident CHF and fatal MI, but not with coronary events and stroke.
5. **Microbiome: A forgotten target of environmental micro(nano)plastics?** Santos AL, Rodrigues CC, Oliveira M, Rocha TL. *Sci Total Environ.* 2022 May 20;822:153628. doi: 10.1016/j.scitotenv.2022.153628. Epub 2022 Feb 3.
Microplastics (MPs) and nanoplastics (NPs) are emerging pollutants in different environmental compartments (air, soil and water) and that may induce several ecotoxicological effects on organisms and their microbiota. A considerable number of studies has been addressing and highlighting the effects of MPs/NPs on biochemical, molecular and behavior effects of aquatic organisms. However, less attention has been focused on microbiota. Here, a critical overview of published studies focusing on microorganisms affected by MPs and NPs after in vitro or in vivo exposure is provided.
6. **Possible association between PM(2.5) and neurodegenerative diseases: A systematic review.** Cristaldi A, Fiore M, Oliveri Conti G, Pulvirenti E, Favara C, Grasso A, Copat C, Ferrante M. *Environ Res.* 2022 May 15;208:112581. doi: 10.1016/j.envres.2021.112581. Epub 2021 Dec 31.
Air pollution is one of the most serious environmental problems that afflict our planet and one of the greatest risk factors for human health. In particular, PM_{2.5} is able to cross the blood-alveolar and blood-brain barriers, thus increasing the onset of respiratory, cardiovascular and neurodegenerative diseases. Neurodegenerative disease is a progressive neuronal dysfunction that leads to neuronal lesions in both structure and function, and includes several diseases such as Alzheimer's disease (AD), Parkinson's disease (PD), vascular dementia (VaD), multiple sclerosis (MS), and others. We carried out a systematic review using PRISMA approach to investigate on the possible association between exposure to PM_{2.5} and neurodegenerative diseases.
7. **Exploring the distributional environmental justice implications of an air quality monitoring network in Los Angeles County.** Mullen C, Flores A, Grineski S, Collins T. *Environ Res.* 2022 Apr 15;206:112612. doi: 10.1016/j.envres.2021.112612. Epub 2021 Dec 23.

Non-governmental air quality monitoring networks include low-cost, networked air pollution sensors hosted at homes and schools that display real-time pollutant concentration estimates on publicly accessible websites. Such networks can empower people to take health-protective actions, but their unplanned organization may produce an uneven spatial distribution of sensors. Barriers to acquiring sensors may disenfranchise particular social groups. To test this directly, we quantitatively examine if there are social inequalities in the distribution of sensors in a non-governmental air quality monitoring network (PurpleAir) in Los Angeles County, California.

8. **Tripling of western US particulate pollution from wildfires in a warming climate.** Xie Y, Lin M, Decharme B, Delire C, Horowitz LW, Lawrence DM, Li F, Séférian R. *Proc Natl Acad Sci U S A*. 2022 Apr 5;119(14):e2111372119. doi: 10.1073/pnas.2111372119. Epub 2022 Mar 28. Record-setting fires in the western United States over the last decade caused severe air pollution, loss of human life, and property damage. Enhanced drought and increased biomass in a warmer climate may fuel larger and more frequent wildfires in the coming decades. Applying an empirical statistical model to fires projected by Earth System Models including climate-ecosystem-socioeconomic interactions, we show that fine particulate pollution over the US Pacific Northwest could double to triple during late summer to fall by the late 21st century under intermediate- and low-mitigation scenarios. The historic fires and resulting pollution extremes of 2017-2020 could occur every 3 to 5 y under 21st-century climate change, posing challenges for air quality management and threatening public health.
9. **Association of short-term exposure to ambient air pollution with mortality from ischemic and hemorrhagic stroke.** Xu R et al. *Eur J Neurol*. 2022 Apr 1. doi: 10.1111/ene.15343. Online ahead of print.
<https://onlinelibrary.wiley.com/doi/10.1111/ene.15343>
CONCLUSIONS: Short-term exposure to ambient air pollution was significantly associated with increased risk of both ischemic and hemorrhagic stroke mortality and posed considerable excess mortality. Our results suggest that air pollution exposure may lead to substantially greater adverse effects on mortality from ischemic stroke than that from hemorrhagic stroke.
10. **Climate change increases risk of extreme rainfall following wildfire in the western United States.** Touma D, Stevenson S, Swain DL, Singh D, Kalashnikov DA, Huang X. *Sci Adv*. 2022 Apr;8(13):eabm0320. doi: 10.1126/sciadv.abm0320. Epub 2022 Apr 1.
<https://www.science.org/doi/10.1126/sciadv.abm0320>
Post-wildfire extreme rainfall events can have destructive impacts in the western United States. Using two climate model large ensembles, we assess the future risk of extreme fire weather events being followed by extreme rainfall in this region. By mid-21st century, in a high warming scenario (RCP8.5), we report large increases in the number of extreme fire weather events followed within 1 year by at least one extreme rainfall event. By 2100, the frequency of these compound events increases by 100% in California and 700% in the Pacific Northwest in the Community Earth System Model v1 Large Ensemble. We further project that more than 90% of extreme fire weather events in California, Colorado, and the Pacific Northwest will be followed by at least three spatially colocated extreme rainfall events within five years. Our results point

to a future with substantially increased post-fire hydrologic risks across much of the western United States.

- 11. A systematic review on solid fuel combustion exposure and respiratory health in adults in Europe, USA, Canada, Australia and New Zealand.** Guercio V, Doutsis A, Exley KS. *Int J Hyg Environ Health*. 2022 Apr;241:113926. doi: 10.1016/j.ijheh.2022.113926. Epub 2022 Feb 8. The available epidemiological evidence between outdoor exposure to residential coal burning and respiratory outcomes suggests an increased risk of adverse respiratory effects. The studies considering the impact of the introduction of measures in order to reduce solid fuel burning on air quality and health showed an improvement in air quality resulting in a reduction of adverse respiratory effects. The identified epidemiological studies have several limitations. Additional and better conducted epidemiological studies are needed to establish whether exposure occurring indoors and outdoors to solid fuel combustion pollutants is associated with adverse respiratory outcomes in adults.
- 12. Association between long-term exposure to particulate matter and childhood cancer: A retrospective cohort study.** Lee JM, Lee TH, Kim S, Song M, Bae S. *Environ Res*. 2022 Apr 1;205:112418. doi: 10.1016/j.envres.2021.112418. Epub 2021 Nov 25. RESULTS: During the study period, 1,725 patients were newly diagnosed with cancer among 1,261,855 children. HR of all cancers per 10 µg/m³ increment in annual mean concentrations of PM_{2.5} and PM₁₀ were 3.02 (95% CI: 1.63, 5.59) and 1.04 (0.74, 1.45), respectively. CONCLUSION: PM_{2.5} exposure was positively associated with childhood cancer in a large retrospective cohort with exposure assessment accounting for residential mobility.
- 13. Projections of future wildfires impacts on air pollutants and air toxics in a changing climate over the western United States.** Yang CE, Fu JS, Liu Y, Dong X, Liu Y. *Environ Pollut*. 2022 Mar 27;304:119213. doi: 10.1016/j.envpol.2022.119213. Online ahead of print. Wildfires emit smoke particles and gaseous pollutants that greatly aggravate air quality and cause adverse health impacts in the western US (WUS). This study evaluates how wildfire impacts on air pollutants and air toxics evolve from the present climate to the future climate under a high anthropogenic emission scenario at regional and city scales. Through employing multiple climate and chemical transport models, small changes in domain-averaged air pollutant concentrations by wildfires are simulated over WUS. However, such changes significantly increase future city-scale pollutant concentrations by up to 53 ppb for benzene, 158 ppb for formaldehyde, 655 µg/m³ for fine particulate matter (PM_{2.5}), and 102 ppb for ozone, whereas that for the present climate are 104 ppb for benzene, 332 ppb for formaldehyde, 1,378 µg/m³ for PM_{2.5}, and 140 ppb for ozone. Despite wildfires induce smaller changes in the future, the wildfire contribution ratios can increase by more than tenfold compared to the present climate, indicating wildfires become a more critical contributor to future air pollution in WUS. In addition, additional 6 exceedance days/year for formaldehyde and additional 3 exceedance days/year for ozone suggest increasing health impacts by wildfires in the future.

14. **Short-term exposure to ambient air pollution and pneumonia hospital admission among patients with COPD: a time-stratified case-crossover study.** Lu W, Tian Q, Xu R, Zhong C, Qiu L, Zhang H, Shi C, Liu Y, Zhou Y. *Respir Res.* 2022 Mar 26;23(1):71. doi: 10.1186/s12931-022-01989-9.

<https://respiratory-research.biomedcentral.com/articles/10.1186/s12931-022-01989-9>

RESULTS: We included 6473 pneumonia hospital admissions during the study period. Each interquartile range (IQR) increase in PM_{2.5} (lag 2; IQR, 22.1 µg/m³), SO₂ (lag 03; IQR, 4.2 µg/m³), NO₂ (lag 03; IQR, 21.4 µg/m³), and O₃ (lag 04; IQR, 57.9 µg/m³) was associated with an odds ratio in pneumonia hospital admission of 1.043 (95% CI: 1.004-1.083), 1.081 (95% CI: 1.026-1.140), 1.045 (95% CI: 1.005-1.088), and 1.080 (95% CI: 1.018-1.147), respectively. Non-linear trends for PM_{2.5}, PM₁₀, and SO₂ were observed in the study. Sex, age at hospital admission, and season at hospital admission did not modify the associations.

CONCLUSIONS: We found significantly positive associations of short-term exposure to PM_{2.5}, SO₂, NO₂, and O₃ with pneumonia hospital admission among COPD patients. It provides new insight for comprehensive pneumonia prevention and treatment among COPD patients.

15. **Association between long-term exposure to PM(2.5) and hypertension: A systematic review and meta-analysis of observational studies.** Zhao M, Xu Z, Guo Q, Gan Y, Wang Q, Liu JA. *Environ Res.* 2022 Mar;204(Pt D):112352. doi: 10.1016/j.envres.2021.112352. Epub 2021 Nov 9. CONCLUSIONS: A significantly positive correlation was observed between long-term PM_{2.5} exposure and risks of hypertension incidence and prevalence, and a high PM_{2.5} concentration resulted in an increased risk of hypertension.

WE ACT

16. **Healthcare waste generation in hospitals per continent: a systematic review.** Mol MPG, Zolnikov TR, Neves AC, Dos Santos GR, Tolentino JLL, de Vasconcelos Barros RT, Heller L. *Environ Sci Pollut Res Int.* 2022 Apr 1. doi: 10.1007/s11356-022-19995-1. Online ahead of print. There are increasing worldwide concerns about the negative impacts of healthcare waste generated in hospitals, especially in low- and middle-income countries. Hazardous type of waste can contribute to adverse effects both in human populations and the environment because of its physical, chemical, and biological characteristics. A comprehensive view on increasing waste in the world has not been conducted to understand the breadth of the issue; thus, this paper sought to provide an analysis of hospitals' healthcare waste generation rate. Comparisons were made with Wilcoxon and Kruskal-Wallis tests for simple and multiple comparisons, to analyze nonparametric data, with post hoc by Nemenyi test. Median values indicated that hospital waste was the highest in North and South America (4.42, 1.64 kg/bed/day, respectively) and was almost nonexistent in Oceania (0.19 kg/bed/day), while the median rates for hazardous waste were the highest in Oceania (0.77 kg/bed/day). Africa was almost the lowest producer of waste in each category (0.19 and 0.39 kg/bed/day for hospital and hazardous waste, respectively). Over time, linear regression indicated that hazardous waste in Asia and Europe has increased, while in Oceania, the total waste also increased. Interestingly, in North America, it was observed a reduction in the generation for both total and hazardous waste. This information highlights the importance of understanding continent-specific

characteristics and rates, which can be used to create a more individualized approach to addressing healthcare waste in the world.

17. **To solve climate, first achieve peace.** Thorp HH. *Science*. 2022 Apr;376(6588):7. doi: 10.1126/science.abq2761. Epub 2022 Mar 31.
<https://www.science.org/doi/10.1126/science.abq2761>
The horrific invasion of Ukraine by Russia has many devastating effects. The most immediate are on the people of Ukraine, but the long-term implications for the entire planet are enormous. For science, the disruption to international collaboration must be addressed and we must give our strongest support to Ukrainian scientists, as outlined by Marcia McNutt and John Hildebrand in a recent *Science* editorial. But for climate change, the effects may be the greatest. If we want a positive energy future for a healthier climate, the West must start by recasting foreign policy with climate and energy issues at the forefront. That can only succeed if nations strengthen the commitment to settle differences with diplomacy, not war. The only truly life-sustaining climate will be one accompanied by international peace.
18. **Planetary Health Nursing.** LeClair J, Potter T. *Am J Nurs*. 2022 Apr 1;122(4):47-52. doi: 10.1097/01.NAJ.0000827336.29891.9b.
https://journals.lww.com/ajnonline/Fulltext/2022/04000/Planetary_Health_Nursing.24.aspx
Planetary health is focused on the interconnectedness of the health of humans, other species, and the physical environment. Disruption of the Earth's natural ecosystems due to human overconsumption; disregard for sustainable practices; and the domination of other humans, species, and natural systems has led to an urgent moment in which humans must act to preserve these ecosystems, which support life on this planet. Restoring planetary health requires new directions for nursing. The pragmatic implications for nursing research, education, advocacy, and practice are explored in this article.
19. **Climate Change and Physiatry: A Call to Proportional and Prospective Action.** Taylor AL, Perret D, Morice K, Zafonte R, Skelton F, Rivers E, Alexander M. *Am J Phys Med Rehabil*. 2022 Mar 29. doi: 10.1097/PHM.0000000000002017. Online ahead of print.
https://journals.lww.com/ajpmr/Abstract/9900/Climate_Change_and_Physiatry_A_Call_to.12.aspx
Through increased temperature-related illness, exposure to wildfire smoke and air pollutants, and more frequent and intense natural disasters, climate change is disproportionately affecting the health of people with disabilities. While the evidence behind the health effects of climate change is growing, there remain critical research gaps in the physiatric literature that must be addressed. Increased education throughout the medical-education continuum is also needed to prepare physiatrists to address the climate-related health effects impacting their patient populations. Physiatrists and their member organizations should advocate for policies that address climate change with a focus on the unique needs of their patient population and the inclusion of people with disabilities in the policy making process.
20. **Pressurized metered-dose inhalers and their impact on climate change.** Fidler L, Green S, Wintemute K. *CMAJ*. 2022 Mar 28;194(12):E460. doi: 10.1503/cmaj.211747.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8967439/>

Hydrofluorocarbon propellants in pMDIs are responsible for roughly 0.03% of yearly global greenhouse gas emissions.¹ Prescriptions for pMDIs represent about 3% of total health care–related emissions from the United Kingdom’s National Health Service.² The carbon footprint from 1 pMDI (200 doses) is estimated as equivalent to a 290-km automobile ride.³ Reducing pMDI prescriptions when appropriate could have a meaningful environmental impact.

21. **Priorities for research on environment, climate and health, a European perspective.** Drakvik E, Kogevinas M, Bergman Å, Devouge A, Barouki R; HERA (Health and Environment Research Agenda) Consortium. *Environ Health*. 2022 Mar 28;21(1):37. doi: 10.1186/s12940-022-00848-w. <https://ehjournal.biomedcentral.com/articles/10.1186/s12940-022-00848-w>
The results call for an unprecedented effort to support a better understanding of the causes, interlinkages and impacts of environmental stressors on health and the environment. This will require breakdown of silos within policies, research, actors as well as in our institutional arrangements in order to enable more holistic approaches and solutions to emerge. The HERA project has developed a unique and exciting opportunity in Europe to consensuate priorities in research and strengthen research that has direct societal impact.

22. **Policies for supporting the regional circular economy and sustainability.** Arauzo-Carod JM, Kostakis I, Tsagarakis KP. *Ann Reg Sci*. 2022 Mar 24:1-8. doi: 10.1007/s00168-022-01124-y. Online ahead of print. <https://link.springer.com/article/10.1007/s00168-022-01124-y>
The Circular Economy and Sustainability are among the greatest challenges faced by policymakers, producers, and consumers. Circular Economy processes demand less from the environment since they can minimize waste generation and, hence, can be powerful tools to combat the negative effects of climate change. Additionally, following subsidiarity principles, public policies supporting the Circular Economy should be designed at the lowest levels of public administrations-this provides huge opportunities for regional governments to design, implement and monitor these policies. This editorial of the special issue explores and discusses implications for those policies before introducing the five papers published in the special issue dedicated to policies for regional economy and sustainability. While some of the papers attempt to conceptualize sustainable development through a microeconomic perspective, others have a clear macroeconomic empirical focus. In consequence, this special issue provides a rich body of work for further Circularity and Sustainability nexus studies.

23. **Nature-Based One Health Approaches to Urban Agriculture Can Deliver Food and Nutrition Security.** Ebenso B et al. *Front Nutr*. 2022 Mar 11;9:773746. doi: 10.3389/fnut.2022.773746. eCollection 2022. <https://www.frontiersin.org/articles/10.3389/fnut.2022.773746/full>
The increasing global human population is projected to reach 9.7 billion people by 2050. This population growth is currently linked to the trends of world-wide urbanization, growth of megacities and shifting dietary patterns. While humankind faces the daunting challenge of feeding and providing healthy lives for its teeming populations, urban agriculture holds promise for improving the quality of life in cities. Fortunately, policymakers and planners are accepting

the need to support peri-urban farmers to increase the resilience of food systems while efficiently managing already strained natural resources. We argue that for urban agriculture to significantly increase food yields, it is crucial to adopt a One Health approach to agriculture and environmental stewardship. Here, we propose six nature-based and climate-smart approaches to accelerate the transition toward more sustainable food systems. These approaches include reducing the reliance on synthetic agricultural inputs, increasing biodiversity through producing locally adapted crops and livestock breeds, using probiotics and postbiotics, and adopting portable digital decision-support systems. Such radical approaches to transforming food production will require cross-sectoral stakeholder engagement at international, national, and community levels to protect biodiversity and the environment whilst ensuring sustainable and nutritious diets that are culturally acceptable, accessible, and affordable for all.

24. **Food waste (mis)takes: The role of (mis)perception and (mis)estimation.** Block L, Vallen B, Paul Austin M. *Curr Opin Psychol.* 2022 Mar 1;46:101327. doi: 10.1016/j.copsyc.2022.101327. Online ahead of print.
Food waste (mis)takes are implicated as drivers of global issues including climate change, food security, environmental sustainability, and international trade. In this article, we review recent research in this area and generate a novel conceptual organization through which we can understand the theoretical underpinnings of food waste. Our framework identifies consumer (mis)perception of food safety and (mis)estimation of food for consumption as the dominant mechanisms underlying food waste and specifies a set of psychological antecedents that activate these two theoretical drivers. This dynamic conceptual lens offers a framework through which researchers might categorize extant work, frame subsequent research aimed at understanding the drivers of food waste, and design solutions aimed at curbing it.
25. **Nursing strategies for environmental justice: A scoping review.** LeClair J, Watts T, Zahner S. *Public Health Nurs.* 2021 Mar;38(2):296-308. doi: 10.1111/phn.12840. Epub 2020 Nov 19. <https://onlinelibrary.wiley.com/doi/10.1111/phn.12840>
RESULTS: Articles in the sample highlighted the importance of authentic community partnership and represented diversity of nursing strategies that addressed a range of environmental exposures and subsequent health and racial inequities. Climate justice, a concept that emerged from the EJ movement and intersects with planetary health, is a recent focus in professional nursing.
CONCLUSIONS: This scoping review establishes an understanding of the extent of nursing knowledge and research in EJ and lays the groundwork for further research on effective EJ nursing strategies. Community-Based Participatory Research/Participatory Action Research methods are fundamental for EJ research, and further theoretical development is needed to guide evaluation of EJ nursing strategies for education, advocacy, and practice.
26. **Sustaining a nurse-led community partnership to promote environmental justice.** Dressel A, Bell-Calvin J, Lee E, Hermanns L, Anderko L, Swaney V, Steinberg J, Hawkins M, Yeldell S. *Public Health Nurs.* 2021 Mar;38(2):136-140. doi: 10.1111/phn.12820. Epub 2020 Oct 6. <https://onlinelibrary.wiley.com/doi/10.1111/phn.12820>

The Westlawn Partnership for a Healthier Environment (WPHE) is a longstanding group of community stakeholders that was formed over a decade ago to identify, prioritize, and address environmental health (EH) concerns in a low-income, predominantly African American, urban neighborhood, which faces a disproportionate burden of EH risks, particularly asthma. Launched by the University of Wisconsin-Milwaukee College of Nursing, which established a nurse-managed health center within the community 30 years ago, WPHE utilized the Protocol of Assessing Community Excellence in Environment Health methodology to develop, implement, and sustain the partnership. WPHE implemented programs for Healthy Homes, Healthy Day Cares, and bicycling, and made system and infrastructure changes within the community to address the top identified EH concerns: indoor and outdoor air pollution, mold exposure, access to safe and healthy food, and pesticide exposure. WPHE's efforts have resulted in significant local, state, and national policy impacts to promote environmental justice. This brief report shares how the partnership was formed, its priorities, major activities and accomplishments, and insights into sustaining a community-based EH partnership, including recommendations for the key role that public health nurses can play to promote environmental justice.

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News & Commentary

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[The Health Effects of Climate Change.](#) Am J Nurs. 2022 Apr 1;122(4):14. doi: 10.1097/01.NAJ.0000827272.52400.6e.

[Protecting human health in a time of climate change: how Cochrane should respond.](#) Thomson D et al. Cochrane Database Syst Rev. 2022 Mar 30;3:ED000156. doi: 10.1002/14651858.ED000156.

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