

Environmental Stewardship Resource Desk

#46 | 12.22.2021 to 12.28.2021

Prepared by [System Library Services](#)

Visit the [Environmental Stewardship site](#)

New Research

Environmental Stewardship publications by Providence caregivers – see [Digital Commons](#)

COVID-19

1. **Learning from the COVID-19 pandemic to combat climate change: comparing drivers of individual action in global crises.** Meijers MHC, Scholz C, Torfadóttir RH, Wonneberger A, Markov M. *J Environ Stud Sci.* 2021 Dec 6:1-11. doi: 10.1007/s13412-021-00727-9. Online ahead of print.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8646344/>

The COVID-19 pandemic and climate change are two global crises that require collective action. Yet, the inertia typically associated with behavior change to limit climate change stands in contrast to the speed associated with behavior change to stop the spread of COVID-19. Identifying the roots of these differences can help us stimulate climate-friendly behaviors. We assessed the extent to which a number of theory-based drivers underlie behaviors aiming to counter COVID-19 and climate change with an online survey (N = 534). We focused on the role of a number of drivers derived from prominent behavior change theories and meta-analyses in the field, namely, personal threat, threat to close others, threat to vulnerable others, fear, participative efficacy, injunctive and descriptive social norms, and governmental policy perceptions. We investigated (1) what drivers people perceived as most important to engage in behaviors that limit the spread of the COVID-19 pandemic and climate change and (2) the strength of the associations between these drivers and engaging in behaviors that limit the spread of the pandemic and climate change. Results highlight three key drivers for climate change action: changing perceptions of governmental policy and perceptions of threat to close others and priming participative efficacy beliefs.

2. **Effect of ambient air pollutants PM2.5 and PM10 on COVID-19 incidence and mortality: observational study.** Meo SA, Al-Khlaiwi T, Ullah CH. *Eur Rev Med Pharmacol Sci.* 2021 Dec;25(23):7553-7564. doi: 10.26355/eurrev_202112_27455.

<https://www.europeanreview.org/article/27455>

CONCLUSIONS: The evidence indicates that PM2.5 and PM10 can affect COVID-19 epidemiology in various geographical regions. The findings established an association and a possible causal link between increasing ambient air pollutants, particulate matter PM2.5 and PM10 with increased incidence and mortality of COVID-19. The global health authorities must take strict preventive measures to minimize air pollution and combat such challenging and threatening COVID-19 pandemic globally.

3. **COVID and Climate: Similarities and differences.** Grundmann R. Wiley Interdiscip Rev Clim Change. 2021 Nov-Dec;12(6):e737. doi: 10.1002/wcc.737. Epub 2021 Aug 31.

<https://wires.onlinelibrary.wiley.com/doi/10.1002/wcc.737>

The cases of COVID-19 and climate change highlight the central role of scientific research which supposedly guides political decision-making. Models and scenarios assume a central role. However, science cannot tell us what to do. While it provides important facts and metrics, uncertainties remain and decisions are based on considerations pertaining to fundamental values. Apart from these similarities, my aim is to emphasize some significant differences. They relate to policy goals, international cooperation, data and metrics, values, and the time horizons involved.

4. **Environmental Impacts of Personal Protective Clothing Used to Combat COVID- 19.** Uddin MA, Afroj S, Hasan T, Carr C, Novoselov KS, Karim N. Adv Sustain Syst. 2021 Oct 13:2100176. doi: 10.1002/adsu.202100176. Online ahead of print.

<https://onlinelibrary.wiley.com/doi/full/10.1002/adsu.202100176>

Personal protective clothing is critical to shield users from highly infectious diseases including COVID-19. Such clothing is predominantly single-use, made of plastic-based synthetic fibers such as polypropylene and polyester, low cost and able to provide protection against pathogens. However, the environmental impacts of synthetic fiber-based clothing are significant and well-documented. Despite growing environmental concerns with single-use plastic-based protective clothing, the recent COVID-19 pandemic has seen a significant increase in their use, which could result in a further surge of oceanic plastic pollution, adding to the mass of plastic waste that already threatens marine life. In this review, the nature of the raw materials involved in the production of such clothing, as well as manufacturing techniques and the personal protective equipment supply chain are briefly discussed. The environmental impacts at critical points in the protective clothing value chain are identified from production to consumption, focusing on water use, chemical pollution, CO2 emissions, and waste. On the basis of these environmental impacts, the need for fundamental changes in the business model is outlined, including increased usage of reusable protective clothing, addressing supply chain "bottlenecks", establishing better waste management, and the use of sustainable materials and processes without associated environmental problems.

Health Impacts of Climate Change

5. **Health benefits of decreases in on-road transportation emissions in the United States from 2008 to 2017.** Choma EF, Evans JS, Gómez-Ibáñez JA, Di Q, Schwartz JD, Hammitt JK, Spengler

JD. Proc Natl Acad Sci U S A. 2021 Dec 21;118(51):e2107402118. doi: 10.1073/pnas.2107402118.

<https://www.pnas.org/content/118/51/e2107402118>

Decades of air pollution regulation have yielded enormous benefits in the United States, but vehicle emissions remain a climate and public health issue. Studies have quantified the vehicle-related fine particulate matter (PM_{2.5})-attributable mortality but lack the combination of proper counterfactual scenarios, latest epidemiological evidence, and detailed spatial resolution; all needed to assess the benefits of recent emission reductions. We use this combination to assess PM_{2.5}-attributable health benefits and also assess the climate benefits of on-road emission reductions between 2008 and 2017. We estimate total benefits of \$270 (190 to 480) billion in 2017. Vehicle-related PM_{2.5}-attributable deaths decreased from 27,700 in 2008 to 19,800 in 2017; however, had per-mile emission factors remained at 2008 levels, 48,200 deaths would have occurred in 2017. The 74% increase from 27,700 to 48,200 PM_{2.5}-attributable deaths with the same emission factors is due to lower baseline PM_{2.5} concentrations (+26%), more vehicle miles and fleet composition changes (+22%), higher baseline mortality (+13%), and interactions among these (+12%). Climate benefits were small (3 to 19% of the total). The percent reductions in emissions and PM_{2.5}-attributable deaths were similar despite an opportunity to achieve disproportionately large health benefits by reducing high-impact emissions of passenger light-duty vehicles in urban areas. Increasingly large vehicles and an aging population, increasing mortality, suggest large health benefits in urban areas require more stringent policies. Local policies can be effective because high-impact primary PM_{2.5} and NH₃ emissions disperse little outside metropolitan areas. Complementary national-level policies for NO_x are merited because of its substantial impacts-with little spatial variability-and dispersion across states and metropolitan areas.

- 6. Secondary organic aerosol association with cardiorespiratory disease mortality in the United States.** Pye HOT, Ward-Caviness CK, Murphy BN, Appel KW, Seltzer KM. Nat Commun. 2021 Dec 16;12(1):7215. doi: 10.1038/s41467-021-27484-1.

<https://www.nature.com/articles/s41467-021-27484-1>

Fine particle pollution, PM_{2.5}, is associated with increased risk of death from cardiorespiratory diseases. A multidecadal shift in the United States (U.S.) PM_{2.5} composition towards organic aerosol as well as advances in predictive algorithms for secondary organic aerosol (SOA) allows for novel examinations of the role of PM_{2.5} components on mortality. Here we show SOA is strongly associated with county-level cardiorespiratory death rates in the U.S. independent of the total PM_{2.5} mass association with the largest associations located in the southeastern U.S. Compared to PM_{2.5}, county-level variability in SOA across the U.S. is associated with 3.5× greater per capita county-level cardiorespiratory mortality. On a per mass basis, SOA is associated with a 6.5× higher rate of mortality than PM_{2.5}, and biogenic and anthropogenic carbon sources both play a role in the overall SOA association with mortality. Our results suggest reducing the health impacts of PM_{2.5} requires consideration of SOA.

- 7. Air pollution and breast cancer: an examination of modification by underlying familial breast cancer risk.** Niehoff NM, Terry MB, Bookwalter DB, Kaufman JD, O'Brien KM, Sandler DP, White

AJ. Cancer Epidemiol Biomarkers Prev. 2021 Dec 14;cebp.EPI-21-1140-E.2021. doi: 10.1158/1055-9965.EPI-21-1140. Online ahead of print.

<https://cebp.aacrjournals.org/content/early/2021/12/13/1055-9965.EPI-21-1140.full-text.pdf>

RESULTS: NO₂ was associated with a higher breast cancer risk among those with BOADICEA score >90th percentile (HR=1.28; 95% CI: 1.05-1.56) but not among those with BOADICEA score ≤90th percentile (HR=0.98; 95% CI: 0.90-1.06) (p-interaction=0.01). In contrast to NO₂, associations between PM_{2.5} and breast cancer did not vary between individuals with BOADICEA score >90th percentile and ≤90th percentile (p-interaction=0.26).

CONCLUSIONS: Our results provide additional evidence that air pollution may be implicated in breast cancer, particularly among women with a higher familial risk.

IMPACT: Women at higher underlying breast cancer risk may benefit more from interventions to reduce exposure to NO₂.

8. **Disparities in Air Pollution Exposure in the United States by Race/Ethnicity and Income, 1990-2010.** Liu J et al. Environ Health Perspect. 2021 Dec;129(12):127005. doi: 10.1289/EHP8584. Epub 2021 Dec 15.

<https://ehp.niehs.nih.gov/doi/full/10.1289/EHP8584>

Comment in

doi: 10.1289/EHP10076.

RESULTS: For all years and pollutants, the racial/ethnic group with the highest national average exposure was a racial/ethnic minority group. In 2010, the disparity between the racial/ethnic group with the highest vs. lowest national-average exposure was largest for NO₂ [54% (4.6 ppb)], smallest for O₃ [3.6% (1.6 ppb)], and intermediate for the remaining pollutants (13%-19%). The disparities varied by U.S. state; for example, for PM_{2.5} in 2010, exposures were at least 5% higher than average in 63% of states for non-Hispanic Black populations; in 33% and 26% of states for Hispanic and for non-Hispanic Asian populations, respectively; and in no states for non-Hispanic White populations. Absolute exposure disparities were larger among racial/ethnic groups than among income categories (range among pollutants: between 1.1 and 21 times larger). Over the period studied, national absolute racial/ethnic exposure disparities declined by between 35% (0.66 µg/m³; PM_{2.5}) and 88% (0.35 ppm; CO); relative disparities declined to between 0.99 × (PM_{2.5}; i.e., nearly zero change) and 0.71 × (CO; i.e., a ~ 29% reduction).

DISCUSSION: As air pollution concentrations declined during the period 1990 to 2010, absolute (and to a lesser extent, relative) racial/ethnic exposure disparities also declined. However, in 2010, racial/ethnic exposure disparities remained across income levels, in urban and rural areas, and in all states, for multiple pollutants.

WE ACT

9. **Trend towards virtual and hybrid conferences may be an effective climate change mitigation strategy.** Tao Y, Steckel D, Klemeš JJ, You F. Nat Commun. 2021 Dec 16;12(1):7324. doi: 10.1038/s41467-021-27251-2.

<https://www.nature.com/articles/s41467-021-27251-2>

Since 2020, the COVID-19 pandemic has urged event holders to shift conferences online. Virtual and hybrid conferences are greener alternatives to in-person conferences, yet their environmental sustainability has not been fully assessed. Considering food, accommodation, preparation, execution, information and communication technology, and transportation, here we report comparative life cycle assessment results of in-person, virtual, and hybrid conferences and consider carbon footprint trade-offs between in-person participation and hybrid conferences. We find that transitioning from in-person to virtual conferencing can substantially reduce the carbon footprint by 94% and energy use by 90%. For the sake of maintaining more than 50% of in-person participation, carefully selected hubs for hybrid conferences have the potential to slash carbon footprint and energy use by two-thirds. Furthermore, switching the dietary type of future conferences to plant-based diets and improving energy efficiencies of the information and communication technology sector can further reduce the carbon footprint of virtual conferences.

10. **Physiotherapy and ecosystem services: improving the health of our patients, the population, and the environment.** Stanhope J, Maric F, Rothmore P, Weinstein P. *Physiother Theory Pract.* 2021 Dec 14:1-14. doi: 10.1080/09593985.2021.2015814. Online ahead of print.
DISCUSSION AND CONCLUSION: Physiotherapists with an understanding of ecosystem services may improve patient care by value-adding to management through patient education, empathy, advocacy, and broader population health approaches. Physiotherapists are also well placed to promote the conservation and restoration of ecosystem through participation, advocacy, and the development of public health measures, to the benefit of global sustainability and population health. Further research is required into how physiotherapists currently use nature-based interventions, and the barriers and enablers to their use. To be adequately prepared to meet the challenges that climate change and environmental degradation pose to patient care, population health and health systems, both current and future physiotherapists need to take a broader view of their practice. By including consideration of the potential role of the environment and green space exposure in particular on their patient's health, physiotherapists can ultimately contribute more to population and planetary health.
11. **Perceptions of Glove Use During Vaccination: A Cross-Sectional Study.** Biederman DJ, Hartman AM, Amarasekara S, Schneider K, Alvarez-Loayza P, Brigman J. *Creat Nurs.* 2021 Nov 1;27(4):278-284. doi: 10.1891/cn-2021-0013.
FINDINGS: Nearly all respondents equated NSG use with increased safety and professionalism. More than half of respondents reported feeling concerned about environmental waste associated with NSG use.
CONCLUSIONS: NSG are not indicated for routine vaccination. Adherence to evidence-based practices on NSG use during vaccination can substantially reduce associated medical waste. Nurses can lead by example by only using NSG when indicated.
12. **A Daily Practice for Planetary Health.** Rogers HH. *Creat Nurs.* 2021 Nov 1;27(4):267-268. doi: 10.1891/cn-2021-0025.

The field of Planetary Health offers a theoretical framework to inspire and guide nurses as we work with individuals, families, and communities to improve health and well-being. As professionals, a daily practice of planetary health can help us flourish through connecting with nature, centering justice and equity, slowing down, savoring connection, and becoming stewards of our environments. Nurses are positioned to lead us into a future where health and well-being are built into our societies through endeavors that understand how our collective flourishing is dependent on realizing that human health is interconnected with the health of our planet and all beings.

13. Love the Food That Loves You Back: A Planetary Health and Women's Heart Health

Partnership. Drake D, Hayden AM, Delkoski S. *Creat Nurs.* 2021 Nov 1;27(4):262-266. doi: 10.1891/cn-2021-0016.

Planetary health and human health are inextricably linked in a complex relationship. Gender-based health vulnerabilities fall disproportionately on women regardless of a country's economy and resources. Women and girls are often the most affected by environmental degradation in food and water systems, along with gender-specific disparities. Addressing food production and nutrition can play a key role in the nursing profession's advocacy for planetary health and heart disease prevention in addressing gender-specific disparities. This article reviews research on the intersection of planetary health, heart health, nutrition strategies, and gender-specific disparities, utilizing the planetary health perspective that views human health and the Earth's health as deeply connected. Data supports nutritional solutions including a plant-based diet to improve environmental health, increase food security and planetary health, and decrease heart disease, the leading cause of death worldwide. Nurses play a critical role in assessing patients' food security and educating about the benefits of healthy and sustainable foods as well as how food choices can impact planetary health. Gender-sensitive research, including collection, analysis, and reporting of sex-disaggregated data, is needed to better understand the implications of planetary health threats, solutions, and policies.

14. From the Ground Up: An Immersive Farm Experience for Nursing Students. Cupelli LM. *Creat Nurs.* 2021 Nov 1;27(4):257-261. doi: 10.1891/CRNR-D-20-00059.

This personal narrative describes the author's experience of taking a diverse group of nursing students to a farm where they were shown the interconnections of healthy soil, quality food, and human health. Students observed the key components of sustainable farming and soil biodiversity through multiple hands-on activities. Participation included tasting and harvesting the vegetables from the ground up. As future educators, it is important for nursing students to think of food as part of an ecosystem and to promote healthy, agricultural growing practices to protect the environment and public health.

15. Looking Beyond Nursing Education Practice to Include Sustainable Health-Care Systems

Processes. Roden JE, Lewis T. *Creat Nurs.* 2021 Nov 1;27(4):251-256. doi: 10.1891/cn-2021-0014.

The education of nurses must continuously evolve for the application of best practice to occur. There are times that require a more meaningful pathway of sustainable health-care systems integration. Sustainable health-care systems processes include a series of actions to maintain

sustainable health-care outcomes for both humans and the environment. Traditional practice usually conforms to a medicalized approach. However, due to changing global patterns of unsustainability, of which health-care facilities are a part, the community of nurses have been called upon to be leaders in transformation that goes beyond traditional training to encompass innovative holistic systems processes designed to address the welfare of humans, areas of mitigation, and adaptation strategies, along with the 17 United Nations Sustainable Development Goals. This article highlights why challenging and updating nursing education practice is required and provides a possible solution through an innovative program-the NurSus TOOLKIT.

16. **Nurses Drawdown: Building a Nurse-Led, Solutions-Based Quality Improvement Project to Address Climate Change.** Huffling K. *Creat Nurs.* 2021 Nov 1;27(4):245-250. doi: 10.1891/cn-2021-0015.

METHODS: Nurses Drawdown is a web-based platform that builds on the work of Project Drawdown, which identifies and quantifies effective, evidence-based climate solutions. Nurses Drawdown utilizes evidence-based techniques for web design and movement building to engage a global nursing audience on five areas of action that have clear links to health: Energy, Food, Gender Equity, Mobility, and Nature-Based Solutions.

RESULTS: Sixteen nursing organizations signed on with Nurses Drawdown as official partners; within 1 month of going live, nurses from 16 countries had committed to take action. Web-based movement building can effectively engage a global nursing audience. However, new partnerships with nursing organizations may not form until there is proof of nursing engagement.

17. **Planetary Health in Nursing: A Transdisciplinary Equity-Centered Approach.** Astle B. *Creat Nurs.* 2021 Nov 1;27(4):237-241. doi: 10.1891/cn-2021-0027.

Planetary Health is an evolving and essential field requiring global attention. Nursing must take up the challenge and responsibility to work alongside other disciplines to ensure the health of the global community and the protection of the planet. To act, it is important that a transdisciplinary equity-centered approach be incorporated if we are to address and be responsive to supporting equity-informed solutions for human vitality. This article discusses and compares the Pan American Health Organization Equity Commission's Conceptual Framework and the Planetary Health Education Framework, a project of the Planetary Health Alliance.

18. **Planetary Health: An Essential Framework for Nursing Education and Practice.** Potter TM. *Creat Nurs.* 2021 Nov 1;27(4):226-230. doi: 10.1891/cn-2021-0017.

Traditionally, we would have considered biodiversity loss, increasing severity and frequency of natural disasters, more frequent infectious disease outbreaks, and increased human migration around the world as disparate issues requiring unique solutions. We are now realizing that the health of humans and the health of the planet are interconnected, and that the Earth's natural systems that support life are in critical jeopardy. Planetary health needs to be a core component of nursing education and practice. Several conditions make this the perfect time for transformative change. The COVID-19 pandemic revealed the deep connection between the human health and the health of the planet and illuminated the need for global solutions that

are both sustainable and equitable. The Future of Nursing 2020 - 2030: Charting a Path to Achieve Health Equity report acknowledged the urgent need to address climate change. The new American Association of Colleges of Nursing essentials for nursing education supports transformation of nursing curricula. Finally, the recent publication of a global transdisciplinary framework for planetary health education offers nursing a blueprint for education and practice.

19. **Toward an Integrated System of Climate Change and Human Health Indicators: A Conceptual Framework.** Liu AY, Trtanj JM, Lipp EK, Balbus JM. *Clim Change*. 2021 Jun;166(3-4):49. doi: 10.1007/s10584-021-03125-w. Epub 2021 Jun 29.

Environmental health indicators are helpful for tracking and communicating complex health trends, informing science and policy decisions, and evaluating public health actions. When provided on a national scale, they can help inform the general public, policy makers, and public health professionals about important trends in exposures and how well public health systems are preventing those exposures from causing adverse health outcomes. There is a growing need to understand national trends in exposures and health outcomes associated with climate change and the effectiveness of climate adaptation strategies for health. To date, most indicators for health implications of climate change have been designed as independent, individual metrics. This approach fails to take into account how exposure-outcome pathways for climate-attributable health outcomes involve multiple, interconnected components. We propose reframing climate change and health indicators as a linked system of indicators, which can be described as follows: upstream climate drivers affect environmental states, which then determine human exposures, which ultimately lead to health outcomes; these climate-related risks are modified by population vulnerabilities and adaptation strategies. We apply this new conceptual framework to three illustrative climate-sensitive health outcomes and associated exposure-outcome pathways: pollen allergies and asthma, West Nile Virus infection, and vibriosis.

[Lancet Planetary Health](#) – *open-access, interdisciplinary journal focused on sustainability*

News

[COP26-will it connect the dots between climate change and inequality?](#) Webster P, Neal K. *J Public Health (Oxf)*. 2021 Dec 10;43(4):685-686. doi: 10.1093/pubmed/fdab388.

[The loss of the world's frozen places.](#) Witze A. *Nature*. 2021 Dec;600(7889):381-382. doi: 10.1038/d41586-021-03705-x.

[Open access for human-and planetary-health.](#) Edgell C. *BMJ*. 2021 Nov 26;375:n2913. doi: 10.1136/bmj.n2913.

[An imperative for the pediatric surgical community to prioritize climate change.](#) Cockrell HC, Anderson JE, Hansen EE, Waldhausen JHT, Greenberg SLM. *J Pediatr Surg*. 2021 Nov 14:S0022-3468(21)00780-6. doi: 10.1016/j.jpedsurg.2021.11.004. Online ahead of print.

If you would like to receive a **customized Environmental Stewardship Topic Alert** related to your specialty or area of interest, would like a **literature search** conducted, or have difficulty **accessing** any of the above articles please contact us at librarian@providence.org

Find previous weeks [here](#).