

## Environmental Stewardship Resource Desk

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### New Research

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#### COVID-19

- 1. Plastic accumulation during COVID-19: call for another pandemic; bioplastic a step towards this challenge?** Mittal M, Mittal D, Aggarwal NK. Environ Sci Pollut Res Int. 2022 Jan 13:1-15. doi: 10.1007/s11356-021-17792-w. Online ahead of print.  
<https://link.springer.com/article/10.1007/s11356-021-17792-w>  
Plastic pollution has become a serious transboundary challenge to nature and human health, with estimation of reports published - predicting a twofold increase in plastic waste by 2030. However, due to the COVID-19 pandemic, the excessive use of single-use plastics (including face masks, gloves and personal protective equipment) would possibly exacerbate such forecasts. The transition towards eco-friendly alternatives like bio-based plastics and new emerging sustainable technologies would be vital to deal with future pandemics, even though the use or consumption of plastics has greatly enhanced our quality of life; it is however critical to move towards bioplastics. We cannot deny the fact that bioplastics have some challenges and shortcomings, but still, it is an ideal option for opt. The circular economy is the need of the hour for waste management. Along with all these practices, individual accountability, corporate intervention and government policy are also needed to prevent us from moving from one crisis to the next. Only through cumulative efforts, we will be able to cope up with this problem. This article collected scattered information and data about accumulation of plastic during COVID-19 worldwide. Additionally, this paper illustrates the substitution of petroleum-based plastics with bio-based plastics. Different aspects are discussed, ranging from advantages to challenges in the way of bioplastics.
- 2. Tethering Natural Capital and Cultural Capital for a More Sustainable Post-COVID-19 World.** Talmage CA, Allgood B, Ashdown BK, Brennan A, Hill S, Trevan E, Waugh J. Int J Community Wellbeing. 2022 Jan 7:1-22. doi: 10.1007/s42413-021-00151-5. Online ahead of print.  
<https://link.springer.com/article/10.1007/s42413-021-00151-5>

The world faced stark challenges during the global pandemic caused by COVID-19. Large forces such as climate change, cultural ethnocentrism and racism, and increasing wealth inequality continue to ripple through communities harming community well-being. While the global pandemic caused by COVID-19 exacerbated these forces, lessons across the globe have been captured that inform the field of community well-being long-after the end of the pandemic. While many scholars have looked to political capital, financial capital, and social capital to tackle these challenges, natural capital and cultural capital have extreme relevance. However, scholarship tends to overlook the inextricable and important links between natural capital and cultural capital in community development and well-being work. These capital forms also inform contemporary understandings of sustainability and environmental justice, especially in the fields of community development and well-being. This perspective article showcases the deep connections between natural capital and social capital through literature review and community cases across the globe. Questions are posed for future research and practice tethering together cultural capital and natural capital when looking to bolster community well-being.

- 3. Environmental risks of polymer materials from disposable face masks linked to the COVID-19 pandemic.** Du H, Huang S, Wang J. *Sci Total Environ.* 2022 Jan 7;815:152980. doi: 10.1016/j.scitotenv.2022.152980. Online ahead of print.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8741336/>

The indispensable role of plastic products in our daily life is highlighted by the COVID-19 pandemic again. Disposable face masks, made of polymer materials, as effective and cheap personal protective equipment (PPE), have been extensively used by the public to slow down the viral transmission. The repercussions of this have generated million tons of plastic waste being littered into the environment because of the improper disposal and mismanagement amid. And plastic waste can release microplastics (MPs) with the help of physical, chemical and biological processes, which is placing a huge MPs contamination burden on the ecosystem. In this work, the knowledge regarding to the combined effects of MPs and pollutants from the release of face masks and the impacts of wasted face masks and MPs on the environment (terrestrial and aquatic ecosystem) was systematically discussed. In view of these, some green technologies were put forward to reduce the amounts of discarded face masks in the environment, therefore minimizing MPs pollution at its source. Moreover, some recommendations for future research directions were proposed based on the remaining knowledge gaps. In a word, MPs pollution linked to face masks should be a focus worldwide.

- 4. COVID-19 and Air Pollution: A Spatial Analysis of Particulate Matter Concentration and Pandemic-Associated Mortality in the US.** Bossak BH, Andritsch S. *Int J Environ Res Public Health.* 2022 Jan 5;19(1):592. doi: 10.3390/ijerph19010592.

<https://www.mdpi.com/1660-4601/19/1/592>

In 2019, a novel coronavirus, SARS-CoV-2, was first reported in Wuhan, China. The virus causes the disease commonly known as COVID-19, and, since its emergence, it has infected over 252 million individuals globally and taken the lives of over 5 million in the same time span. Primary research on SARS-CoV-2 and COVID-19 focused on understanding the biomolecular composition of the virus. This research has led to the development of multiple vaccines with great efficacy

and antiviral treatments for the disease. The development of biomedical interventions has been crucial to combating this pandemic; additionally, environmental confounding variables that could have exacerbated the pandemic need further assessment. In this research study, we conducted a spatial analysis of particulate matter (PM) concentration and its association with COVID-19 mortality in the United States. Results of this study demonstrate a significant positive correlation between PM concentration levels and COVID-19 mortality; however, this does not necessarily imply a causal relationship. These results are consistent with similar studies in Italy and China, where significant COVID-19 cases and corresponding deaths were exhibited. Furthermore, maps of the data demonstrate clustering of COVID-19 mortality which suggest further investigation into the social determinants of health impacting the pandemic.

5. **Human Cooperation and the Crises of Climate Change, COVID-19, and Misinformation.** Van Lange PAM, Rand DG. *Annu Rev Psychol.* 2022 Jan 4;73:379-402. doi: 10.1146/annurev-psych-020821-110044. Epub 2021 Aug 2.

Contemporary society is facing many social dilemmas-including climate change, COVID-19, and misinformation-characterized by a conflict between short-term self-interest and longer-term collective interest. The climate crisis requires paying costs today to reduce climate-related harms and risks that we face in the future. The COVID-19 crisis requires the less vulnerable to pay costs to benefit the more vulnerable in the face of great uncertainty. The misinformation crisis requires investing effort to assess truth and abstain from spreading attractive falsehoods. Addressing these crises requires an understanding of human cooperation. To that end, we present (a) an overview of mechanisms for the evolution of cooperation, including mechanisms based on similarity and interaction; (b) a discussion of how reputation can incentivize cooperation via conditional cooperation and signaling; and (c) a review of social preferences that undergird the proximate psychology of cooperation, including positive regard for others, parochialism, and egalitarianism. We discuss the three focal crises facing our society through the lens of cooperation, emphasizing how cooperation research can inform our efforts to address them.

6. **Investigating the Co-movement Nexus Between Air Quality, Temperature, and COVID-19 in California: Implications for Public Health.** Fareed Z, Bashir MF, Bilal, Salem S. *Front Public Health.* 2021 Dec 23;9:815248. doi: 10.3389/fpubh.2021.815248. eCollection 2021.

<https://www.frontiersin.org/articles/10.3389/fpubh.2021.815248/full>

This research aims to look at the link between environmental pollutants and the coronavirus disease (COVID-19) outbreak in California. To illustrate the COVID-19 outbreak, weather, and environmental pollution, we used daily confirmed cases of COVID-19 patients, average daily temperature, and air quality Index, respectively. To evaluate the data from March 1 to May 24, 2020, we used continuous wavelet transform and then applied partial wavelet coherence (PWC), wavelet transform coherence (WTC), and multiple wavelet coherence (MWC). Empirical estimates disclose a significant association between these series at different time-frequency spaces. The COVID-19 outbreak in California and average daily temperature show a negative (out phase) coherence. Similarly, the air quality index and COVID-19 also show a negative association circle during the second week of the observed period. Our findings will serve as

policy implications for state and health officials and regulators to combat the COVID-19 outbreak.

7. **The Exposome and Immune Health in Times of the COVID-19 Pandemic.** Morales JS, Valenzuela PL, Castillo-García A, Butragueño J, Jiménez-Pavón D, Carrera-Bastos P, Lucia A. *Nutrients*. 2021 Dec 22;14(1):24. doi: 10.3390/nu14010024.

<https://www.mdpi.com/2072-6643/14/1/24>

Growing evidence supports the importance of lifestyle and environmental exposures—collectively referred to as the 'exposome'—for ensuring immune health. In this narrative review, we summarize and discuss the effects of the different exposome components (physical activity, body weight management, diet, sun exposure, stress, sleep and circadian rhythms, pollution, smoking, and gut microbiome) on immune function and inflammation, particularly in the context of the current coronavirus disease 2019 (COVID-19) pandemic. We highlight the potential role of 'exposome improvements' in the prevention—or amelioration, once established—of this disease as well as their effect on the response to vaccination. In light of the existing evidence, the promotion of a healthy exposome should be a cornerstone in the prevention and management of the COVID-19 pandemic and other eventual pandemics.

### Health Impacts of Climate Change

8. **The 2021 report of the Lancet Countdown on health and climate change: code red for a healthy future.** Romanello M et al. *Lancet*. 2021 Oct 30;398(10311):1619-1662. doi: 10.1016/S0140-6736(21)01787-6. Epub 2021 Oct 20.

[https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(21\)01787-6/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(21)01787-6/fulltext)

The Lancet Countdown is an international collaboration that independently monitors the health consequences of a changing climate. Publishing updated, new, and improved indicators each year, the Lancet Countdown represents the consensus of leading researchers from 43 academic institutions and UN agencies. The 44 indicators of this report expose an unabated rise in the health impacts of climate change and the current health consequences of the delayed and inconsistent response of countries around the globe—providing a clear imperative for accelerated action that puts the health of people and planet above all else.

9. **Climate change, human migration, and skin disease: is there a link?** Dayrit JF, Sugiharto A, Coates SJ, Lucero-Prisno DE 3rd, Davis MDD, Andersen LK. *Int J Dermatol*. 2022 Feb;61(2):127-138. doi: 10.1111/ijd.15543. Epub 2021 May 10.

<https://onlinelibrary.wiley.com/doi/full/10.1111/ijd.15543>

Climate change, exemplified by higher average global temperatures resulting in more frequent extreme weather events, has the potential to significantly impact human migration patterns and health. The consequences of environmental catastrophes further destabilize regions with pre-existing states of conflict due to social, political, and/or economic unrest. Migrants may carry diseases from their place of origin to their destinations and once there may be susceptible to diseases in which they had not been previously exposed to. Skin diseases are among the most commonly observed health conditions observed in migrant populations. To improve

awareness among dermatologists of the burden of skin diseases among migrants, the group searched the English language scientific literature to identify articles linking climate change, migration, and skin disease. Skin diseases associated with human migration fall into three major categories: (i) communicable diseases, (ii) noncommunicable diseases, and (iii) environmentally mediated diseases. Adopting comprehensive global strategies to improve the health of migrants requires urgent attention.

- 10. Air pollution exposure disparities across US population and income groups.** Jbaily A, Zhou X, Liu J, Lee TH, Kamareddine L, Verguet S, Dominici F. *Nature*. 2022 Jan;601(7892):228-233. doi: 10.1038/s41586-021-04190-y. Epub 2022 Jan 12.

<https://www.nature.com/articles/s41586-021-04190-y>

Air pollution contributes to the global burden of disease, with ambient exposure to fine particulate matter of diameters smaller than 2.5  $\mu\text{m}$  (PM<sub>2.5</sub>) being identified as the fifth-ranking risk factor for mortality globally<sup>1</sup>. Racial/ethnic minorities and lower-income groups in the USA are at a higher risk of death from exposure to PM<sub>2.5</sub> than are other population/income groups<sup>2-5</sup>. Moreover, disparities in exposure to air pollution among population and income groups are known to exist<sup>6-17</sup>. Here we develop a data platform that links demographic data (from the US Census Bureau and American Community Survey) and PM<sub>2.5</sub> data<sup>18</sup> across the USA. We analyse the data at the tabulation area level of US zip codes (N is approximately 32,000) between 2000 and 2016. We show that areas with higher-than-average white and Native American populations have been consistently exposed to average PM<sub>2.5</sub> levels that are lower than areas with higher-than-average Black, Asian and Hispanic or Latino populations. Moreover, areas with low-income populations have been consistently exposed to higher average PM<sub>2.5</sub> levels than areas with high-income groups for the years 2004-2016. Furthermore, disparities in exposure relative to safety standards set by the US Environmental Protection Agency<sup>19</sup> and the World Health Organization<sup>20</sup> have been increasing over time. Our findings suggest that more-targeted PM<sub>2.5</sub> reductions are necessary to provide all people with a similar degree of protection from environmental hazards. Our study is observational and cannot provide insight into the drivers of the identified disparities.

- 11. Long-term exposure to low ambient air pollution concentrations and mortality among 28 million people: results from seven large European cohorts within the ELAPSE project.**

Stafoggia M et al. *Lancet Planet Health*. 2022 Jan;6(1):e9-e18. doi: 10.1016/S2542-5196(21)00277-1.

[https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196\(21\)00277-1/fulltext](https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196(21)00277-1/fulltext)

INTERPRETATION: Long-term exposure to concentrations of PM<sub>2.5</sub> and NO<sub>2</sub> lower than current annual limit values was associated with non-accidental, cardiovascular, non-malignant respiratory, and lung cancer mortality in seven large European cohorts. Continuing research on the effects of low concentrations of air pollutants is expected to further inform the process of setting air quality standards in Europe and other global regions.

FUNDING: Health Effects Institute.

- 12. Exposure to air pollutant mixture and gestational diabetes mellitus in Southern California: Results from electronic health record data of a large pregnancy cohort.** Sun Y, Li X,

Benmarhnia T, Chen JC, Avila C, Sacks DA, Chiu V, Slezak J, Molitor J, Getahun D, Wu J. *Environ Int.* 2022 Jan;158:106888. doi: 10.1016/j.envint.2021.106888. Epub 2021 Sep 24.

<https://www.sciencedirect.com/science/article/pii/S0160412021005134>

**RESULTS:** The incidence of GDM was 10.9% in the study population. In single-pollutant models, we observed an increased odds for GDM associated with exposures to PM<sub>2.5</sub>, PM<sub>10</sub>, NO<sub>2</sub> and PM<sub>2.5</sub> constituents. The association was strongest for NO<sub>2</sub> [adjusted odds ratio (OR) per interquartile range: 1.176, 95% confidence interval (CI): 1.147-1.205]. In multi-pollutant models, increased ORs for GDM in association with one quartile increase in air pollution mixtures were found for both kriging-based regional air pollutants (NO<sub>2</sub>, PM<sub>2.5</sub>, and PM<sub>10</sub>, OR = 1.095, 95% CI: 1.082-1.108) and PM<sub>2.5</sub> constituents (i.e., sulfate, nitrate, ammonium, organic matter and black carbon, OR = 1.258, 95% CI: 1.206-1.314); NO<sub>2</sub> (78%) and black carbon (48%) contributed the most to the overall mixture effects among all krigged air pollutants and all PM<sub>2.5</sub> constituents, respectively. The risk of GDM associated with air pollution exposure were significantly higher among Hispanic mothers, and overweight/obese mothers.

**CONCLUSION:** This study found that exposure to a mixture of ambient PM<sub>2.5</sub>, PM<sub>10</sub>, NO<sub>2</sub>, and PM<sub>2.5</sub> chemical constituents was associated with an increased risk of GDM. NO<sub>2</sub> and black carbon PM<sub>2.5</sub> contributed most to GDM risk.

13. **Climate Change and Infections on the Move in North America.** Hauser N, Conlon KC, Desai A, Kobziar LN. *Infect Drug Resist.* 2021 Dec 30;14:5711-5723. doi: 10.2147/IDR.S305077. eCollection 2021.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8722568/>

Climate change is increasingly recognized for its impacts on human health, including how biotic and abiotic factors are driving shifts in infectious disease. Changes in ecological conditions and processes due to temperature and precipitation fluctuations and intensified disturbance regimes are affecting infectious pathogen transmission, habitat, hosts, and the characteristics of pathogens themselves. Understanding the relationships between climate change and infectious diseases can help clinicians broaden the scope of differential diagnoses when interviewing, diagnosing, and treating patients presenting with infections lacking obvious agents or transmission pathways. Here, we highlight key examples of how the mechanisms of climate change affect infectious diseases associated with water, fire, land, insects, and human transmission pathways in the hope of expanding the analytical framework for infectious disease diagnoses. Increased awareness of these relationships can help prepare both clinical physicians and epidemiologists for continued impacts of climate change on infectious disease in the future.

14. **Health Disparities and Climate Change: The Intersection of Three Disaster Events on Vulnerable Communities in Houston, Texas.** Adepoju OE, Han D, Chae M, Smith KL, Gilbert L, Choudhury S, Woodard L. *Int J Environ Res Public Health.* 2021 Dec 21;19(1):35. doi: 10.3390/ijerph19010035.

<https://www.mdpi.com/1660-4601/19/1/35/htm>

Although evidence suggests that successive climate disasters are on the rise, few studies have documented the disproportionate impacts on communities of color. Through the unique lens of successive disaster events (Hurricane Harvey and Winter Storm Uri) coupled with the COVID-19



pandemic, we assessed disaster exposure in minority communities in Harris County, Texas. A mixed methods approach employing qualitative and quantitative designs was used to examine the relationships between successive disasters (and the role of climate change), population geography, race, and health disparities-related outcomes. This study identified four communities in the greater Houston area with predominantly non-Hispanic African American residents. We used data chronicling the local community and environment to build base maps and conducted spatial analyses using Geographic Information System (GIS) mapping. We complemented these data with focus groups to assess participants' experiences in disaster planning and recovery, as well as community resilience. Thematic analysis was used to identify key patterns. Across all four communities, we observed significant Hurricane Harvey flooding and significantly greater exposure to 10 of the 11 COVID-19 risk factors examined, compared to the rest of the county. Spatial analyses reveal higher disease burden, greater social vulnerability, and significantly higher community-level risk factors for both pandemics and disaster events in the four communities, compared to all other communities in Harris County. Two themes emerged from thematic data analysis: (1) Prior disaster exposure prepared minority populations in Harris County to better handle subsequent disaster suggesting enhanced disaster resilience, and (2) social connectedness was key to disaster resiliency. Long-standing disparities make people of color at greater risk for social vulnerability. Addressing climate change offers the potential to alleviate these health disparities.

15. **Association of NO<sub>2</sub> and Other Air Pollution Exposures With the Risk of Parkinson Disease.** Jo S, Kim YJ, Park KW, Hwang YS, Lee SH, Kim BJ, Chung SJ. *JAMA Neurol.* 2021 Jul 1;78(7):800-808. doi: 10.1001/jamaneurol.2021.1335.

<https://jamanetwork.com/journals/jamaneurology/fullarticle/2780249>

CONCLUSIONS AND RELEVANCE: In this large cohort study, a statistically significant association between NO<sub>2</sub> exposure and PD risk was identified. This finding suggests the role of air pollutants in PD development, advocating for the need to implement a targeted public health policy.

16. **Ambient Air Pollution: Health Hazards to Children.** Brumberg HL, Karr CJ; COUNCIL ON ENVIRONMENTAL HEALTH. *Pediatrics.* 2021 Jun;147(6):e2021051484. doi: 10.1542/peds.2021-051484. Epub 2021 May 17.

<https://publications.aap.org/pediatrics/article/147/6/e2021051484/180283/Ambient-Air-Pollution-Health-Hazards-to-Children>

Ambient air pollution is produced by sources including vehicular traffic, coal-fired power plants, hydraulic fracturing, agricultural production, and forest fires. It consists of primary pollutants generated by combustion and secondary pollutants formed in the atmosphere from precursor gases. Air pollution causes and exacerbates climate change, and climate change worsens health effects of air pollution. Infants and children are uniquely sensitive to air pollution, because their organs are developing and they have higher air per body weight intake. Health effects linked to air pollution include not only exacerbations of respiratory diseases but also reduced lung function development and increased asthma incidence. Additional outcomes of concern include preterm birth, low birth weight, neurodevelopmental disorders, IQ loss, pediatric cancers, and increased risks for adult chronic diseases. These effects are mediated by oxidative stress,

chronic inflammation, endocrine disruption, and genetic and epigenetic mechanisms across the life span. Natural experiments demonstrate that with initiatives such as increased use of public transportation, both air quality and community health improve. Similarly, the Clean Air Act has improved air quality, although exposure inequities persist. Other effective strategies for reducing air pollution include ending reliance on coal, oil, and gas; regulating industrial emissions; reducing exposure with attention to proximity of residences, schools, and child care facilities to traffic; and a greater awareness of the Air Quality Index. This policy reviews both short- and long-term health consequences of ambient air pollution, especially in relation to developmental exposures. It examines individual, community, and legislative strategies to mitigate air pollution.

17. **Association Between Ambient Air Pollution and Amyloid Positron Emission Tomography Positivity in Older Adults With Cognitive Impairment.** Iaccarino L et al. JAMA Neurol. 2021 Feb 1;78(2):197-207. doi: 10.1001/jamaneurol.2020.3962.

<https://jamanetwork.com/journals/jamaneurology/fullarticle/2773645>

CONCLUSIONS AND RELEVANCE: This study found that higher PM<sub>2.5</sub> concentrations appeared to be associated with brain A $\beta$  plaques. These findings suggest the need to consider airborne toxic pollutants associated with A $\beta$  pathology in public health policy decisions and to inform individual lifetime risk of developing AD and dementia.

#### WE ACT

18. **Climate Change and Gastroenterology: Planetary Primum Non Nocere and How Industry Must Help.** Haddock R, de Latour R, Siau K, Hayee B, Gayam S. Am J Gastroenterol. 2022 Jan 12. doi: 10.14309/ajg.0000000000001604. Online ahead of print.

[https://journals.lww.com/ajg/Fulltext/9900/Climate\\_Change\\_and\\_Gastroenterology\\_Planetary.195.aspx](https://journals.lww.com/ajg/Fulltext/9900/Climate_Change_and_Gastroenterology_Planetary.195.aspx)

Climate change is a global emergency. Increasing awareness has led to policy changes regarding global industry emissions. The healthcare industry carbon footprint is large and growing more and more. Gastroenterology, with its heavy reliance on industry, is a major contributor toward this growth. For a significant change toward reducing the field's carbon footprint, it would involve serious industry commitment. At present, there are no clear guidelines or regulations on controlling healthcare-related industry emissions and improving sustainability. This narrative review aims to provide practical suggestions at each step of the supply chain can lead to greater sustainability.

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#### News & Commentary

[Global Climate Change and News of Difference: Collective Action for Planetary Health and Family Health.](#) J Fam Nurs. 2022 Jan 12:10748407211070079. doi: 10.1177/10748407211070079.

Online ahead of print.



Climate change and health research - lessons from COP26. Arasaradnam RP, Hillman T. 2022 Jan 14;clinmed.2021-0780. doi: 10.7861/clinmed.2021-0780. Online ahead of print.

[Call for Leadership: climate change and the future health of girls.](#) Roos EJ. J Pediatr Adolesc Gynecol. 2022 Jan 6:S1083-3188(21)00364-8. doi: 10.1016/j.jpag.2021.12.015. Online ahead of print.

[The devastating mudslides that follow forest fires.](#) Palmer J. Nature. 2022 Jan;601(7892):184-186. doi: 10.1038/d41586-022-00028-3.

[Extreme rainfall slows the global economy.](#) Liang XZ. Nature. 2022 Jan;601(7892):193-194. doi: 10.1038/d41586-021-03783-x.

[Plastics in blue carbon ecosystems: a call for global cooperation on climate change goals.](#) Adyel TM, Macreadie PI. Lancet Planet Health. 2022 Jan;6(1):e2-e3. doi: 10.1016/S2542-5196(21)00327-2.

Uniting the global gastroenterology community to meet the challenge of climate change and non-recyclable waste. Leddin D et al. Gut. 2021 Nov;70(11):2025-2029. doi: 10.1136/gutjnl-2021-325789.

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