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COVID-19

1. **Effects of the COVID-19 pandemic on the environment, waste management, and energy sectors: a deeper look into the long-term impacts.** Mohamed BA, Fattah IMR, Yousaf B, Periyasamy S. Environ Sci Pollut Res Int. 2022 May 2:1-20. doi: 10.1007/s11356-022-20259-1. Online ahead of print.
   https://link.springer.com/article/10.1007/s11356-022-20259-1
   The COVID-19 pandemic not only has caused a global health crisis but also has significant environmental consequences. Although many studies are confirming the short-term improvements in air quality in several countries across the world, the long-term negative consequences outweigh all the claimed positive impacts. As a result, this review highlights the positive and the long-term negative environmental effects of the COVID-19 pandemic by evaluating the scientific literature. Remarkable reduction in the levels of CO (3 - 65%), NO2 (17 - 83%), NOx (24 - 47%), PM2.5 (22 - 78%), PM10 (23 - 80%), and VOCs (25 - 57%) was observed during the lockdown across the world. However, according to this review, the pandemic put enormous strain on the present waste collection and treatment system, resulting in ineffective waste management practices, damaging the environment. The extensive usage of face masks increased the release of microplastics/nanoplastics (183 to 1247 particles piece-1) and organic pollutants in land and water bodies. Furthermore, the significant usages of anti-bacterial hand sanitizers, disinfectants, and pharmaceuticals have increased the accumulation of various toxic emerging contaminants (e.g., triclocarban, triclosan, bisphenol-A, hydroxychloroquine) in the treated sludge/biosolids and discharged wastewater effluent, posing great threats to the ecosystems. This review also suggests strategies to create long-term environmental advantages. Thermochemical conversions of solid wastes including medical wastes and for treated wastewater sludge/biosolids offer several advantages through recovering the resources and energy and stabilizing/destructing the toxins/contaminants and microplastics in the precursors.

Health Impacts of Climate Change

2. **Micro(nano)plastics pollution and human health: How plastics can induce carcinogenesis to humans?** Kumar R, Manna C, Padha S, Verma A, Sharma P, Dhar A, Ghosh A, Bhattacharya P. Chemosphere. 2022 Jul;298:134267. doi: 10.1016/j.chemosphere.2022.134267. Epub 2022 Mar 14.
   Microplastics (MPs) and nanoplastics (NPs) are key indicators of the plasticine era, widely spread across different ecosystems. MPs and NPs become global stressors due to their inherent physicochemical characteristics and potential impact on ecosystems and humans. MPs and NPs have been exposed to humans via various pathways, such as tap water, bottled water, seafood, beverages, milk, fish, salts, fruits, and vegetables. This paper highlights MPs and NPs pathways to the food chains and how these plastic particles can cause risks to human health. MPs have been evident in vivo and vitro and have been at health risks, such as respiratory, immune, reproductive, and digestive systems. The present work emphasizes how various MPs and NPs, and associated toxic chemicals, such as polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs), impact human health. Polystyrene (PS) and polyvinyl chloride (PVC) are common MPs and NPs, reported in human implants via ingestion, inhalation, and dermal exposure, which can cause carcinogenesis, according to Agency for Toxic Substances and Disease Registry (ATSDR) reports. Inhalation, ingestion, and dermal exposure-response cause genotoxicity, cell division and viability, cytotoxicity, oxidative stress induction, metabolism disruption, DNA damage, inflammation, and immunological responses in humans. Lastly, this review work concluded with current knowledge on potential risks to human health and knowledge gaps with recommendations for further investigation in this field.

3. **Examining the status of forest fire emission in 2020 and its connection to COVID-19 incidents in West Coast regions of the United States.** Sannigrahi S, Pilla F, Maiti A, Bar S, Bhatt S, Kaparwan A, Zhang Q, Keesstra S, Cerda A. Environ Res. 2022 Jul;210:112818. doi: 10.1016/j.envres.2022.112818. Epub 2022 Jan 29.
   https://www.sciencedirect.com/science/article/pii/S0013935122001451
   Forest fires impact on soil, water, and biota resources. The current forest fires in the West Coast of the United States (US) profoundly impacted the atmosphere and air quality across the ecosystems and have caused severe environmental and public health burdens. Forest fire led emissions could significantly exacerbate the air pollution level and, therefore, would play a critical role if the same occurs together with any epidemic and pandemic health crisis. Limited research is done so far to examine its impact in connection to the current pandemic. As of October 21, nearly 8.2 million acres of forest area were burned, with more than 25 casualties reported so far. In-situ air pollution data were utilized to examine the effects of the 2020 forest fire on atmosphere and coronavirus (COVID-19) casualties. The spatial-temporal concentrations of particulate matter (PM2.5 and PM10) and Nitrogen Dioxide (NO_2) were collected from August 1 to October 30 for 2020 (the fire year) and 2019 (the reference year). Both spatial (Multiscale Geographically Weighted Regression) and non-spatial (Negative Binomial Regression) analyses were performed to assess the adverse effects of fire emission on human health. The in-situ data-led measurements showed that the maximum increases in PM2.5, PM10, and NO_2 concentrations (μg/m3) were clustered in the West Coastal fire-prone states

during August 1 - October 30, 2020. The average concentration (µg/m3) of particulate matter (PM2.5 and PM10) and NO2 was increased in all the fire states severely affected by forest fires. The average PM2.5 concentrations (µg/m3) over the period were recorded as 7.9, 6.3, 5.5, and 5.2 for California, Colorado, Oregon, and Washington in 2019, increasing up to 24.9, 13.4, 25.0, and 17.0 in 2020. Both spatial and non-spatial regression models exhibited a statistically significant association between fire emission and COVID-19 incidents. Such association has been demonstrated robust and stable by a total of 30 models developed for analyzing the spatial non-stationary and local association. More in-depth research is needed to better understand the complex relationship between forest fire emission and human health.

4. **Short-term PM(2.5) exposure and early-readmission risk: a retrospective cohort study in North Carolina heart failure patients.** Wyatt LH, Weaver AM, Moyer J, Schwartz JD, Di Q, Diaz-Sanchez D, Cascio WE, Ward-Caviness CK. Am Heart J. 2022 Jun;248:130-138. doi: 10.1016/j.ahj.2022.02.015. Epub 2022 Mar 7.
https://www.clinicalkey.com/#!/content/playContent/1-s2.0-S0002870322000485
CONCLUSION: Our findings add to the evidence indicating substantial air quality-related health risks in individuals with underlying cardiovascular disease. Hospital readmissions are key metrics for patients and providers alike. As a potentially modifiable risk factor, air pollution-related interventions may be enacted that might assist in reducing costly and burdensome unplanned readmissions.

5. **What Is "Socioeconomic Position (SEP)," and How Might It Modify Air Pollution-Health Associations? Cohering Findings, Identifying Challenges, and Disentangling Effects of SEP and Race in US City Settings.** Clougherty JE, Humphrey JL, Kinnee EJ, Remigio R, Sheffield PE. Curr Environ Health Rep. 2022 May 5. doi: 10.1007/s40572-022-00359-3. Online ahead of print.
https://link.springer.com/article/10.1007/s40572-022-00359-3
RECENT FINDINGS: In answering this question, it is critical to acknowledge that SEP, stressors, and pollution are differentially distributed by race in US cities. These distributions have been shaped by neighborhood sorting and race-based residential segregation rooted in historical policies and processes (e.g., redlining), which have served to concentrate wealth and opportunities for education and employment in predominantly-white communities. As a result, it is now profoundly challenging to separate SEP from race in the urban US setting. Here, we cohere evidence from our recent and on-going studies aimed at disentangling synergistic health effects among SEP-related stressors and pollutants. We consider an array of SEP-linked social stressors, and discuss persistent challenges in this epidemiology, many of which are related to spatial confounding among multiple pollutants and stressors. Combining quantitative results with insights from qualitative data on neighborhood perceptions and stress (including violence and police-community relations), we offer a lens towards unpacking the complex interplay among SEP, community stressors, race, and pollution in US cities.

6. **In-utero exposure to air pollution and early-life neural development and cognition.** Yi C, Wang Q, Qu Y, Niu J, Oliver BG, Chen H. Ecotoxicol Environ Saf. 2022 May 4;238:113589. doi: 10.1016/j.ecoenv.2022.113589. Online ahead of print.
https://www.sciencedirect.com/science/article/pii/S0147651322004298

Air pollution remains one of the major health threats around the world. Compared to adults, foetuses and infants are more vulnerable to the effects of environmental toxins. Maternal exposure to air pollution causes several adverse birth outcomes and may lead to life-long health consequences. Given that a healthy intrauterine environment is a critical factor for supporting normal foetal brain development, there is a need to understand how prenatal exposure to air pollution affects brain health and results in neurological dysfunction. This review summarised the current knowledge on the adverse effects of prenatal air pollution exposure on early life neurodevelopment and subsequent impairment of cognition and behaviour in childhood, as well as the potential of early-onset neurodegeneration. While inflammation, oxidative stress, and endoplasmic reticulum are closely involved in the physiological response, sex differences also occur. In general, males are more susceptible than females to the adverse effect of in-utero air pollution exposure. Considering the evidence provided in this review and the rising concerns of global air pollution, any efforts to reduce pollutant emission or exposure will be protective for the next generation.

7. **A global comprehensive analysis of ambient low temperature and non-communicable diseases burden during 1990-2019.** Song J, Qin W, Pan R, Yi W, Song S, Cheng J, Su H. Environ Sci Pollut Res Int. 2022 May 2. doi: 10.1007/s11356-022-20442-4. Online ahead of print.
Climate change and health are inextricably linked, especially the role of ambient temperature. This study aimed to analyze the non-communicable disease (NCD) burden attributable to low temperature globally, regionally, and temporally using data from the Global Burden of Disease (GBD) study 2019. Globally, in 2019, low temperature was responsible for 5.42% DALY and 7.18% death of NCDs, representing the age-standardized disability-adjusted life years (DALY) and death rates (per 100,000 population) of 359.6 (95% uncertainty intervals (UI): 306.09, 416.88) and 21.36 (95% UI:18.26, 24.74). Ischemic heart disease was the first leading cause of DALY and death resulting from low temperature, followed by stroke. However, age-standardized DALY and death rates attributable to low temperature have exhibited wide variability across regions, with the highest in Central Asia and Eastern Europe and the lowest in Caribbean and Western sub-Saharan Africa. During the study period (1990-2019), there has been a significant decrease in the burden of NCDs attributable to low temperature, but progress has been uneven across countries, whereas nations exhibiting high sociodemographic index (SDI) declined more significantly compared with low SDI nations. Notably, three nations, including Uzbekistan, Tajikistan, and Lesotho, had the maximum NCDs burden attributed to low temperature and displayed an upward trend. In conclusion, ambient low temperature contributes to substantial NCD burden with notable geographical variations.

8. **Links between chronic exposure to outdoor air pollution and cardiovascular diseases: a review.** Konduracka E, Rostoff P. Environ Chem Lett. 2022 Apr 25:1-18. doi: 10.1007/s10311-022-01450-9. Online ahead of print.
https://link.springer.com/article/10.1007/s10311-022-01450-9
Acute exposure to air pollution is associated with an increasing risk of death and cardiovascular disorders. Nonetheless, the impact of chronic exposure to air pollution on the circulatory system is still debated. Here, we review the links of chronic exposure to outdoor air pollution with mortality and most common cardiovascular diseases, in particular during the coronavirus

disease 2019 event (COVID-19). We found that recent studies provide robust evidence for a causal effect of chronic exposure to air pollution and cardiovascular mortality. In terms of mortality, the strongest relationship was noted for fine particulate matter, nitrogen dioxide, and ozone. There is also increasing evidence showing that exposure to air pollution, mainly fine particulate matter and nitrogen dioxide, is associated with the development of atherosclerosis, hypertension, stroke, and heart failure. However, available scientific evidence is not strong enough to support associations with cardiac arrhythmias and coagulation disturbances. Noteworthy, for some pollutants, the risk of negative health effects is high for concentrations lower than the limit values recommended by the European Union and Word Health Organization. Efforts to diminish exposure to air pollution and to design optimal methods of air pollution reduction should be urgently intensified and supported by effective legislation and interdisciplinary cooperation.

9. **Role of the Synergistic Interactions of Environmental Pollutants in the Development of Cancer.** Lagunas-Rangel FA, Linnea-Niemi JV, Kudłak B, Williams MJ, Jönsson J, Schiöth HB. Geohealth. 2022 Apr 1;6(4):e2021GH000552. doi: 10.1029/2021GH000552. eCollection 2022 Apr.
https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2021GH000552
There is a growing awareness that the large number of environmental pollutants we are exposed to on a daily basis are causing major health problems. Compared to traditional studies that focus on individual pollutants, there are relatively few studies on how pollutants mixtures interact. Several studies have reported a relationship between environmental pollutants and the development of cancer, even when pollutant levels are below toxicity reference values. The possibility of synergistic interactions between different pollutants could explain how even low concentrations can cause major health problems. These intricate that molecular interactions can occur through a wide variety of mechanisms, and our understanding of the physiological effects of mixtures is still limited. The purpose of this paper is to discuss recent reports that address possible synergistic interactions between different types of environmental pollutants that could promote cancer development. Our literature studies suggest that key biological pathways are frequently implicated in such processes. These include increased production of reactive oxygen species, activation by cytochrome P450, and aryl hydrocarbon receptor signaling, among others. We discuss the need to understand individual pathological vulnerability not only in relation to basic genetics and gene expression, but also in terms of measurable exposure to contaminants. We also mention the need for significant improvements in future studies using a multitude of disciplines, such as the development of high-throughput study models, better tools for quantifying pollutants in cancer patients, innovative pharmacological and toxicological studies, and high-efficiency computer analysis, which allow us to analyze the molecular mechanisms of mixtures.

10. **Attributing changes in food insecurity to a changing climate.** Dasgupta S, Robinson EJZ. Sci Rep. 2022 Mar 18;12(1):4709. doi: 10.1038/s41598-022-08696-x.
https://www.nature.com/articles/s41598-022-08696-x
It is generally accepted that climate change is having a negative impact on food security. However, most of the literature variously focuses on the complex and many mechanisms linking

climate stressors; the links with food production or productivity rather than food security; and future rather than current effects. In contrast, we investigate the extent to which current changes in food insecurity can be plausibly attributed to climate change. We combine food insecurity data for 83 countries from the FAO food insecurity experience scale (FIES) with reanalysed climate data from ERA5-Land, and use a panel data regression with time-varying coefficients. This framework allows us to estimate whether the relationship between food insecurity and temperature anomaly is changing over time. We also control for Human Development Index, and drought measured by six-month Standardized Precipitation Index. Our empirical findings suggest that for every 1 [Formula: see text] of temperature anomaly, severe global food insecurity has increased by 1.4% (95% CI 1.3-1.47) in 2014 but by 1.64% (95% CI 1.6-1.65) in 2019. This impact is higher in the case of moderate to severe food insecurity, with a 1 [Formula: see text] increase in temperature anomaly resulting in a 1.58% (95% CI 1.48-1.68) increase in 2014 but a 2.14% (95% CI 2.08-2.20) increase in 2019. Thus, the results show that the temperature anomaly has not only increased the probability of food insecurity, but the magnitude of this impact has increased over time. Our counterfactual analysis suggests that climate change has been responsible for reversing some of the improvements in food security that would otherwise have been realised, with the highest impact in Africa. Our analysis both provides more evidence of the costs of climate change, and as such the benefits of mitigation, and also highlights the importance of targeted and efficient policies to reduce food insecurity. These policies are likely to need to take into account local contexts, and might include efforts to increase crop yields, targeted safety nets, and behavioural programs to promote household resilience.

11. **Effects of short-term ambient PM(2.5) exposure on cardiovascular disease incidence and mortality among U.S. hemodialysis patients: a retrospective cohort study.** Xi Y, Richardson DB, Kshirsagar AV, Wade TJ, Flythe JE, Whitsel EA, Peterson GC, Wyatt LH, Rappold AG. Environ Health. 2022 Mar 11;21(1):33. doi: 10.1186/s12940-022-00836-0.
https://ehjournal.biomedcentral.com/articles/10.1186/s12940-022-00836-0
RESULTS: Among 314,079 hemodialysis patients, a 10 μg/m3 increase in the average lag 0-1 daily PM2.5 exposure was associated with CVD incidence (HR: 1.03 (95% CI: 1.02, 1.04)), CVD mortality (1.05 (95% CI: 1.03, 1.08)), and all-cause mortality (1.04 (95% CI: 1.03, 1.06)). The association was larger for people who initiated dialysis at an older age, while minimal evidence of effect modification was observed across levels of sex, race, or baseline comorbidities. CONCLUSIONS: Short-term ambient PM2.5 exposure was positively associated with incident CVD events and mortality among patients receiving in-center hemodialysis. Older patients appeared to be more susceptible to PM2.5-associated CVD events than younger hemodialysis patients.

12. **Air pollution in association with mental and self-rated health and the mediating effect of physical activity.** Hautekiet P, Saenen ND, Demarest S, Keune H, Pelgrims I, Van der Heyden J, De Clercq EM, Nawrot TS. Environ Health. 2022 Mar 7;21(1):29. doi: 10.1186/s12940-022-00839-x.
CONCLUSIONS: Long-term exposure to PM2.5, BC or NO2 was adversely associated with multiple mental health dimensions and self-rated health and part of the association was

mediated by physical activity. Our results suggest that policies aiming to reduce air pollution levels could also reduce the burden of mental health disorders in Belgium.

WE ACT

13. **Perspectives on climate change: can hand surgery go carbon neutral?** Dickson K, Cooper K, Gardiner MD. J Hand Surg Eur Vol. 2022 May 2:17531934221096786. doi: 10.1177/17531934221096786. Online ahead of print. https://journals.sagepub.com/doi/10.1177/17531934221096786
The world is getting hotter. The atmosphere and ocean are warming, amounts of snow and ice are falling, and the sea levels are rising. It is globally considered extremely likely that these changes are driven by human activity, primarily through the use of fossil fuel and resultant carbon dioxide emissions. Rising temperatures will have a negative impact on health through water and food insecurity, changing patterns of disease, population migration and extreme weather events. The link between hand surgery and climate change may appear tenuous, but healthcare activity contributes significantly to a population's carbon emissions (NHS England and NHS Improvement, 2020). Adapting how we deliver hand surgery will positively impact climate change, at a moment where we all need to play our part. In this article we argue for the importance of delivering care that improves our patients' lives while minimizing long-term damage to the world we share, and suggest our priorities for carbon neutral hand surgery.

14. **Social justice equity in healthy living medicine - An international perspective.** Jayasinghe S, Faghy MA, Hills AP. Prog Cardiovasc Dis. 2022 Apr 28:S0033-0620(22)00037-8. doi: 10.1016/j.pcad.2022.04.008. Online ahead of print. https://www.clinicalkey.com/#!/content/playContent/1-s2.0-S0033062022000378
Irrespective of geographical location, disadvantaged people are disproportionately affected by unnecessary disease and suffering caused by inequalities in health. Although equal access to opportunities for healthy living medicine regardless of legal, political, economic, or other circumstances should be a basic human right, it is increasingly improbable for scores of people, particularly in Africa, Asia, Latin America, and the Caribbean, to acquire this. In recent times, global initiatives have attempted to make 'healthy lifestyles' more equitable by pledging to be relevant to all economies, promoting prosperity, environmental protection, climate change interventions, and purposeful action to meet the needs of vulnerable populations, including women and children. Yet there remains much to be done to address and reduce the substantial international health equity gaps. Reducing disparities that disproportionately affect the lower end of social strata must entail collaborative and systemic action from important stakeholders across the whole system, an approach that translates theory and research into practice. Ideally, realist approaches that appreciate the importance of the context of problems and assume nothing works everywhere or for everyone, should be prioritised over linear/simple and non-scalable intervention strategies.

15. **Environmental Justice in the American Public Health Context: Trends in the Scientific Literature at the Intersection Between Health, Environment, and Social Status.** Smith A, Laribi

O. J Racial Ethn Health Disparities. 2022 Feb;9(1):247-256. doi: 10.1007/s40615-020-00949-7. Epub 2021 Jan 8.
Although various governmental entities in the USA are required to consider environmental justice (EJ) impacts of their actions during decision-making, socially vulnerable groups continue to be disproportionately exposed to environmental hazards. Tools and programs to quantify and mitigate environmental injustices are limited by existing data, which may not capture the full range of health disparities exacerbated by the complex interactions between environmental exposures and social stressors. In this study, we analyzed how the scientific literature approaches EJ issues in the USA. We searched PubMed for journal articles discussing at least one sociodemographic or environmental variable in the context of cumulative impacts and analyzed the relative frequency with which various EJ topics were studied. Our findings indicate that demographic variables are commonly used in epidemiologic studies, though some areas (e.g., age) are better studied than others. Similarly, occupational exposure and ambient air pollution were more studied than other types of exposures. Word frequency analyses revealed which toxicants and health outcomes are the most frequently studied. In addition, temporality analyses showed that the rate of occupational publications rose rapidly in the 1970-1980s and has since plateaued, while other publication rates increased two decades later and are still on the rise. Cumulative impacts are considered in a relatively small portion of journal articles across all topics; nevertheless, they have seen an exponential climb in the last decade. A more equitable distribution of scientific efforts might be needed for a better distribution of funding, policy-making efforts, and other resources to socially and environmentally vulnerable communities.

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News & Commentary

Who cares about climate change? Godlee F. BMJ. 2022 May 6;377:o1150. doi: 10.1136/bmj.o1150.

Climate change is here: What will the profession of pharmacy do about it? Beechinor RJ, Overberg A, Brown CS, Cummins S, Mordino J. Am J Health Syst Pharm. 2022 May 4:zxac124. doi: 10.1093/ajhp/zxac124. Online ahead of print.

Eating one-fifth less beef could halve deforestation. Guglielmi G. Nature. 2022 May 4. doi: 10.1038/d41586-022-01238-5. Online ahead of print.

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