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COVID-19

1. **A pandemic-induced environmental dilemma of disposable masks: solutions from the perspective of the life cycle.** Chen Z, Zhang W, Yang H, Min K, Jiang J, Lu D, Huang X, Qu G, Liu Q, Jiang G. Environ Sci Process Impacts. 2022 Apr 7. doi: 10.1039/d1em00509j. Online ahead of print.
   The coronavirus disease 2019 (COVID-19) has swept the world and still afflicts humans. As an effective means of protection, wearing masks has been widely adopted by the general public. The massive use of disposable masks has raised some emerging environmental and bio-safety concerns: improper handling of used masks may transfer the attached pathogens to environmental media; disposable masks mainly consist of polypropylene (PP) fibers which may aggravate the global plastic pollution; and the risks of long-term wearing of masks are elusive. To maximize the utilization and minimize the risks, efforts have been made to improve the performance of masks (e.g., antivirus properties and filtration efficiency), extend their functions (e.g., respiration monitoring and acting as a sampling device), develop new disinfection methods, and recycle masks. Despite that, from the perspective of the life cycle (from production, usage, and discard to disposal), comprehensive solutions are urgently needed to solve the environmental dilemma of disposable masks in both technologies (e.g., efficient use of raw materials, prolonging the service life, and enabling biodegradation) and policies (e.g., stricter industry criteria and garbage sorting).

2. **Research on COVID-19 and air pollution: A path towards advancing exposure science.** Burns CJ, LaKind JS, Naiman J, Boon D, Clougherty JE, Rule AM, Zidek A. Environ Res. 2022 Apr 4:113240. doi: 10.1016/j.envres.2022.113240. Online ahead of print.
   https://www.sciencedirect.com/science/article/pii/S0013935122005679
   The COVID-19 pandemic has resulted in an extraordinary incidence of morbidity and mortality, with almost 6 million deaths worldwide at the time of this writing (https://covid19.who.int/). There has been a pressing need for research that would shed light on factors - especially

modifiable factors - that could reduce risks to human health. At least several hundred studies addressing the complex relationships among transmission of SARS-CoV-2, air pollution, and human health have been published. However, these investigations are limited by available and consistent data. The project goal was to seek input into opportunities to improve and fund exposure research on the confluence of air pollution and infectious agents such as SARS-CoV-2. Thirty-two scientists with expertise in exposure science, epidemiology, risk assessment, infectious diseases, and/or air pollution responded to the outreach for information. Most of the respondents expressed value in developing a set of common definitions regarding the extent and type of public health lockdown. Traffic and smoking ranked high as important sources of air pollution warranting source-specific research (in contrast with assessing overall ambient level exposures). Numerous important socioeconomic factors were also identified. Participants offered a wide array of inputs on what they considered to be essential studies to improve our understanding of exposures. These ranged from detailed mechanistic studies to improved air quality monitoring studies and prospective cohort studies. Overall, many respondents indicated that these issues require more research and better study design. As an exercise to solicit opinions, important concepts were brought forth that provide opportunities for scientific collaboration and for consideration for funding prioritization. Further conversations on these concepts are needed to advance our thinking on how to design research that moves us past the documented limitations in the current body of research and prepares us for the next pandemic.

Health Impacts of Climate Change

3. **Local mortality impacts due to future air pollution under climate change scenarios.** Ingole V, Dimitrova A, Sampedro J, Sacoor C, Acacio S, Juvekar S, Roy S, Moraga P, Basagaña X, Ballester J, Antó JM, Tonne C. Sci Total Environ. 2022 Jun 1;823:153832. doi: 10.1016/j.scitotenv.2022.153832. Epub 2022 Feb 11. https://www.sciencedirect.com/science/article/pii/S004896972200924X
The health impacts of global climate change mitigation will affect local populations differently. However, most co-benefits analyses have been done at a global level, with relatively few studies providing local level results. We aimed to quantify the local health impacts due to fine particles (PM2.5) under the governance arrangements embedded in the Shared Socioeconomic Pathways (SSPs1-5) under two greenhouse gas concentration scenarios (Representative Concentration Pathways (RCPs) 2.6 and 8.5) in local populations of Mozambique, India, and Spain. We simulated the SSP-RCP scenarios using the Global Change Analysis Model, which was linked to the TM5-FASST model to estimate PM2.5 levels. PM2.5 levels were calibrated with local measurements. We used comparative risk assessment methods to estimate attributable premature deaths due to PM2.5 linking local population and mortality data with PM2.5-mortality relationships from the literature, and incorporating population projections under the SSPs. PM2.5 attributable burdens in 2050 differed across SSP-RCP scenarios, and sensitivity of results across scenarios varied across populations. Future attributable mortality burden of PM2.5 was highly sensitive to assumptions about how populations will change according to SSP. SSPs reflecting high challenges for adaptation (SSPs 3 and 4) consistently resulted in the highest PM2.5 attributable burdens mid-century. Our analysis of local PM2.5 attributable premature deaths under SSP-RCP scenarios in three local populations highlights the importance of both

socioeconomic development and climate policy in reducing the health burden from air pollution. Sensitivity of future PM2.5 mortality burden to SSPs was particularly evident in low- and middle- income country settings due either to high air pollution levels or dynamic populations.

4. **Emerging Insights into the Impact of Air Pollution on Immune-Mediated Asthma Pathogenesis.** Tuazon JA, Kilburg-Basnyat B, Oldfield LM, Wiscovitch-Russo R, Dunigan-Russell K, Fedulov AV, Oestreich KJ, Gowdy KM. Curr Allergy Asthma Rep. 2022 Apr 8. doi: 10.1007/s11882-022-01034-1. Online ahead of print.
RECENT FINDINGS: In this article, we review current research demonstrating the connection between common air pollutants and their downstream effects on non-TH2 immune responses emerging as key players in asthma, including PRRs, ILCs, and non-TH2 T cell subsets. We also discuss the proposed mechanisms by which air pollution increases immune-mediated asthma risk, including pre-existing genetic risk, epigenetic alterations in immune cells, and perturbation of the composition and function of the lung and gut microbiomes. Together, these studies reveal the multifaceted impacts of various air pollutants on innate and adaptive immune functions via genetic, epigenetic, and microbiome-based mechanisms that facilitate the induction and worsening of asthma.

5. **Tracking the impacts of climate change on human health via indicators: lessons from the Lancet Countdown.** Di Napoli C et al. BMC Public Health. 2022 Apr 6;22(1):663. doi: 10.1186/s12889-022-13055-6.
https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-022-13055-6
CONCLUSIONS: Our experience shows that CCIEVIs can effectively contribute to a world-wide monitoring system that aims to track, communicate, and harness evidence on climate-induced health impacts towards effective intervention strategies. An ongoing challenge is how to improve CCIEVIs so that the description of the linkages between climate change and human health can become more and more comprehensive.

6. **Associations of short-term exposure to air pollution and increased ambient temperature with psychiatric hospital admissions in older adults in the USA: a case-crossover study.** Qiu X, Danesh-Yazdi M, Wei Y, Di Q, Just A, Zanobetti A, Weisskopf M, Dominici F, Schwartz J. Lancet Planet Health. 2022 Apr;6(4):e331-e341. doi: 10.1016/S2542-5196(22)00017-1.
https://www.sciencedirect.com/science/article/pii/S2542519622000171
INTERPRETATION: In the US Medicare population, short-term exposure to elevated concentrations of PM2·5 and NO2 and cold season ambient temperature were significantly associated with an increased risk of hospital admissions for psychiatric disorders. Considering the increasing burden of psychiatric disorders in the US population, these findings suggest that intervening on air pollution and ambient temperature levels through stricter environmental regulations or climate mitigation could help ease the psychiatric health-care burden.

7. **Challenges of fluoride pollution in environment: Mechanisms and pathological significance of toxicity - A review.** Wu S, Wang Y, Iqbal M, Mehmood K, Li Y, Tang Z, Zhang H. Environ Pollut. 2022 Apr 1;304:119241. doi: 10.1016/j.envpol.2022.119241. Online ahead of print.

Fluoride is an important trace element in the living body. A suitable amount of fluoride has a beneficial effect on the body, but disproportionate fluoride entering the body will affect various organs and systems, especially the liver, kidneys, nervous system, endocrine system, reproductive system, bone, and intestinal system. In recent years, with the rapid development of agriculture and industry, fluoride pollution has become one of the important factors of environmental pollution, and fluoride pollution in any form is becoming a serious problem. Although countries around the world have made great breakthroughs in controlling fluoride pollution, however fluorosis still exists. A large amount of fluoride accumulated in animals will not only produce the toxic effects, but it also causes cell damage and affect the normal physiological activities of the body. There is no systematic description of the damage mechanism of fluoride. Therefore, the study on the toxicity mechanism of fluoride is still in progress. This review summarizes the existing information of several molecular mechanisms of the fluoride toxicity comprehensively, aiming to clarify the toxic mechanism of fluoride on various body systems. We have also summerized the pathological changes of those organ systems after fluoride poisoning in order to provide some ideas and solutions to the reader for the prevention and control of modern fluoride pollution.

8. **Ecologically unequal exchange and disparate death rates attributable to air pollution: A comparative study of 169 countries from 1991 to 2017.** Hekmatpour P, Leslie CM. Environ Res. 2022 Mar 30;212(Pt A):113161. doi: 10.1016/j.envres.2022.113161. Online ahead of print. Ambient air pollution is among the most pressing environmental problems in our contemporary world that poses significant risks to global ecological and public health. This study analyzes cross-national heterogeneities in trajectories of death rates attributable to ambient air pollution. Compiling panel data from the Global Burden of Disease (GBD) study, the Direction of Trade Statistics (DOTS), and the World Development Indicators, we create a dataset that tracks 169 countries from 1991 to 2017. Using growth curve models (GCMs), we estimate country-specific trajectories of death rates attributable to air pollution, and condition them on time-invariant and time-varying independent variables. The results suggest that while the global death rate attributable to air pollution has been continuously decreasing, there are heterogeneities in countries' death rate trajectories based on their geographic location and position in the world economy. High-income countries of the global North have perpetually witnessed lower death rates attributable to air pollution compared to middle- and low-income countries of the global South. Moreover, our results indicate that increased export to high-income countries, as a proxy for ecologically unequal exchange, leads to higher death rates from air pollution in middle- and low-income countries.

9. **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
CONCLUSIONS: We found significantly positive associations of short-term exposure to PM2.5, SO2, NO2, and O3 with pneumonia hospital admission among COPD patients. It provides new insight for comprehensive pneumonia prevention and treatment among COPD patients.

10. **The Impact of PM2.5 on the Growth Curves of Children's Obesity Indexes: A Prospective Cohort Study.** Tong J, Ren Y, Liu F, Liang F, Tang X, Huang D, An X, Liang X. Front Public Health. 2022 Mar 22;10:843622. doi: 10.3389/fpubh.2022.843622. eCollection 2022.
https://www.frontiersin.org/articles/10.3389/fpubh.2022.843622/full
CONCLUSIONS: This study confirmed a dose-response relationship between PM2.5 exposure and childhood obesity, especially central obesity, suggesting that controlling ambient air pollution can prevent the occurrence of obesity in children and adolescents.

11. **Climate change impacts on the mental health and wellbeing of young people: A scoping review of risk and protective factors.** Ma T, Moore J, Cleary A. Soc Sci Med. 2022 Mar 18;301:114888. doi: 10.1016/j.socscimed.2022.114888. Online ahead of print.
CONCLUSIONS: Several RFs and PFs were identified, such as coping strategies, family factors (e.g. parenting style), social support, community connection, and cultural identity. Positioning the mental health impacts of singular events within the broader context of ongoing and escalating climate change impacts will better inform the development of interventions that seek to build resilience among young people.

12. **Projected climate-driven changes in pollen emission season length and magnitude over the continental United States.** Zhang Y, Steiner AL. Nat Commun. 2022 Mar 15;13(1):1234. doi: 10.1038/s41467-022-28764-0.
https://www.nature.com/articles/s41467-022-28764-0
Atmospheric conditions affect the release of anemophilous pollen, and the timing and magnitude will be altered by climate change. As simulated with a pollen emission model and future climate data, warmer end-of-century temperatures (4-6 K) shift the start of spring emissions 10-40 days earlier and summer/fall weeds and grasses 5-15 days later and lengthen the season duration. Phenological shifts depend on the temperature response of individual taxa, with convergence in some regions and divergence in others. Temperature and precipitation alter daily pollen emission maxima by -35 to 40% and increase the annual total pollen emission by 16-40% due to changes in phenology and temperature-driven pollen production. Increasing atmospheric CO2 may increase pollen production, and doubling production in conjunction with climate increases end-of-century emissions up to 200%. Land cover change modifies the distribution of pollen emitters, yet the effects are relatively small (<10%) compared to climate or CO2. These simulations indicate that increasing pollen and longer seasons will increase the likelihood of seasonal allergies.

13. **Air Quality Index and Emergency Department Visits and Hospitalizations for Childhood Asthma.** Rosser F, Han YY, Rothenberger SD, Forno E, Mair C, Celedón JC. Ann Am Thorac Soc. 2022 Jan 10. doi: 10.1513/AnnalsATS.202105-539OC. Online ahead of print.
https://www.atsjournals.org/doi/10.1513/AnnalsATS.202105-539OC
CONCLUSIONS: The AQI is associated with asthma exacerbations among children in Allegheny County. This is driven primarily by PM2.5, with Black and younger children particularly affected. Healthcare providers should discuss the AQI in asthma management.

WE ACT

14. **Personal Interventions to Reduce Exposure to Outdoor Air Pollution.** Laumbach RJ, Cromar KR. Annu Rev Public Health. 2022 Apr 5;43:293-309. doi: 10.1146/annurev-publhealth-052120-103607. Epub 2021 Dec 22.
https://www.annualreviews.org/doi/10.1146/annurev-publhealth-052120-103607
Unhealthy levels of air pollution are breathed by billions of people worldwide, and air pollution is the leading environmental cause of death and disability globally. Efforts to reduce air pollution at its many sources have had limited success, and in many areas of the world, poor air quality continues to worsen. Personal interventions to reduce exposure to air pollution include avoiding sources, staying indoors, filtering indoor air, using face masks, and limiting physical activity when and where air pollution levels are elevated. The effectiveness of these interventions varies widely with circumstances and conditions of use. Compared with upstream reduction or control of emissions, personal interventions place burdens and risk of adverse unintended consequences on individuals. We review evidence regarding the balance of benefits and potential harms of personal interventions for reducing exposure to outdoor air pollution, which merit careful consideration before making public health recommendations with regard to who should use personal interventions and where, when, and how they should be used.

15. **The Unintended Contribution of Clinical Microbiology Laboratories to Climate Change and Mitigation Strategies: A Combination of Descriptive Study, Short Survey, Literature Review and Opinion.** Yusuf E, Luijendijk A, Roo-Brand G, Friedrich AW. Clin Microbiol Infect. 2022 Apr 1:S1198-743X(22)00175-6. doi: 10.1016/j.cmi.2022.03.034. Online ahead of print.
https://www.sciencedirect.com/science/article/pii/S1198743X22001756
RESULTS: The study shows that the largest amount of CO2 emission in the microbiological laboratories comes from consumables and personnel commuting. For example, the production and transportation of agar plates needed to culture samples for a year in a hospital with 1320 beds, result in 16,590 kg CO2 is emitted. All survey participants mentioned that they were committed to reduce environmental impact of their products. The initiatives to reduce CO2 emission can be performed at the laboratory and at policy level, such as reducing the number of tests to only the necessary amount to reduce consumables.
CONCLUSIONS: The calculations contribute to map CO2-related emissions in clinical microbiology laboratory activities, and the proposed initiatives to reduce the CO2 may serve as starting point for further discussions.

16. **Ophthalmologists and climate change.** Campbell TG, Al-Qureshi S. Clin Exp Ophthalmol. 2022 Apr;50(3):274-279. doi: 10.1111/ceo.14041. Epub 2022 Jan 26.
https://onlinelibrary.wiley.com/doi/10.1111/ceo.14041
It is indisputable that human activities have caused climate change and that, if left unchecked, these activities will lead to worsening of weather extremes including fire, drought, and flood with all their attendant human suffering. Reducing future climate change requires limiting cumulative emissions of CO2 and other greenhouse gases including methane. We have written this evidence-based perspective to highlight interventions with the largest effect to help the average ophthalmologist make the changes with the highest impact in their day-to-day lives.

17. **Mapping research on healthcare operations and supply chain management: a topic modelling-based literature review.** Ali I, Kannan D. Ann Oper Res. 2022 Mar 31:1-27. doi: 10.1007/s10479-022-04596-5. Online ahead of print.
https://link.springer.com/article/10.1007/s10479-022-04596-5
The literature on healthcare operations and supply chain management has seen unprecedented growth over the past two decades. This paper seeks to advance the body of knowledge on this topic by utilising a topic modelling-based literature review to identify the core topics, examine their dynamic changes, and identify opportunities for further research in the area. Based on an analysis of 571 articles published until 25 January 2022, we identify numerous popular topics of research in the area, including patient waiting time, COVID-19 pandemic, Industry 4.0 technologies, sustainability, risk and resilience, climate change, circular economy, humanitarian logistics, behavioural operations, service-ecosystem, and knowledge management. We reviewed current literature around each topic and offered insights into what aspects of each topic have been studied and what are the recent developments and opportunities for more impactful future research. Doing so, this review help advance the contemporary scholarship on healthcare operations and supply chain management and offers resonant insights for researchers, research students, journal editors, and policymakers in the field.

18. **Climate Change, Human Health, and Health Informatics: A New View of Connected and Sustainable Digital Health.** Gray K. Front Digit Health. 2022 Mar 15;4:869721. doi: 10.3389/fdgth.2022.869721. eCollection 2022.
https://www.frontiersin.org/articles/10.3389/fdgth.2022.869721/full
The connection between human health and climate change has had a scientific basis for many decades. However, little attention has been directed to applying the science of health informatics to this aspect of health and healthcare until recently. This paper briefly reviews examples of recent international work on two fronts: to consider how health informatics can reduce the carbon footprint of healthcare, and to consider how it can integrate new kinds of data for insights into the human health impacts of climate change. Health informatics has two principles of fundamental relevance to this work - connectedness, in other words linking and integrating health data from multiple sources; and sustainability, in other words making healthcare overall more efficient and effective. Deepening its commitment to these principles will position health informatics as a discipline and a profession to support and guide technological advances that respond to the world's climate health challenges.

19. **The environmental impacts of telemedicine in place of face-to-face patient care: a systematic review.** Ravindrane R, Patel J. Future Healthc J. 2022 Mar;9(1):28-33. doi: 10.7861/fhj.2021-0148.
https://www.rcpjournals.org/content/futurehosp/9/1/28
RESULTS: Out of 2,916 search results, 14 met full inclusion criteria. All 14 studies found an environmental benefit of telemedicine versus face-to-face consultations through reduced greenhouse gas emissions from travel. Three studies found there to be fewer greenhouse gas emissions through telemedicine consultations after accounting for greenhouse gas emissions from the use of telemedicine equipment.

20. **Controlled Substance Waste: Concerns, Controversies, Solutions.** Breve F, LeQuang JAK, Batastini L. Cureus. 2022 Feb 24;14(2):e22564. doi: 10.7759/cureus.22564. eCollection 2022 Feb.
https://www.cureus.com/articles/78322-controlled-substance-waste-concerns-controversies-solutions
Hospitals, clinics, and organizations using controlled substances must have policies and procedures in place for disposing of these substances and to avoid potential drug diversion as well as environmental pollution. Challenging, particularly to hospitals, is the ability to dispose of the waste of any number of hundreds of products every day, some of which require specific handling and protocols for safety. Incineration might be appropriate but many hospitals and certainly smaller clinics lack the appropriate facilities. Clinics and facilities that use controlled substances must maintain adequate and detailed records, but individual healthcare systems impose their own specific requirements. Some, for example, require drug disposal to be witnessed. However, recordkeeping systems must be robust and frequently audited to prevent diversion. Most healthcare systems want to dispose of controlled substances in an environmentally responsible way but in addition to federal laws in the United States, most states have their own environmental agencies and may have local regulations. Navigating this system can be complex, and since all regulations are subject to change, it requires vigilance and expertise.

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Ecological Citizenship and Climate Change: Role of Education in Public Health. Del Castillo FA. Disaster Med Public Health Prep. 2022 Apr 5:1. doi: 10.1017/dmp.2022.68. Online ahead of print.

Regreening: green is not always gold. Orr MC, Hughes AC. Nature. 2022 Apr;604(7904):40. doi: 10.1038/d41586-022-00944-4.

What the war in Ukraine means for energy, climate and food. Tollefson J. Nature. 2022 Apr;604(7905):232-233. doi: 10.1038/d41586-022-00969-9.

Thinking Honestly About Climate Change: Intergenerational Ethics and the Limits of Rationality. Kerridge I, Komesaroff P. J Paediatr Child Health. 2022 Apr;58(4):739-740. doi: 10.1111/jpc.15922. Epub 2022 Mar 5.

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