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COVID-19

1. **Weather and COVID-19 Deaths During the Stay-at-Home Order in the United States.** Karimi SM, Majbouri M, DuPré N, White KB, Little BB, McKinney WP. J Occup Environ Med. 2021 Jun 1;63(6):462-468. doi: 10.1097/JOM.0000000000002160.
   https://journals.lww.com/joem/Abstract/9000/Weather_and_COVID_19_Deaths_During_the.97957.aspx
   OBJECTIVE: To estimate the association between weather and COVID-19 fatality rates during US stay-at-home orders.
   METHODS: With a county-level longitudinal design, this study analyzed COVID-19 deaths from public health departments' daily reports and considered exposure as the 18 to 22 day-period before death. Models included state-level social distancing measures, Census Bureau demographics, daily weather information, and daily air pollution. The primary measures included minimum and maximum daily temperature, precipitation, ozone concentration, PM2.5 concentrations, and U.V. light index.
   RESULTS: A 1 °F increase in the minimum temperature was associated with 1.9% (95% CI, 0.2% to 3.6%) increase in deaths 20 days later. An ozone concentration increase of 1 ppb (part per billion) decreased daily deaths by 2.0% (95% CI, 0.1% to 3.6%); ozone levels below 38 ppb negatively correlated with deaths.
   CONCLUSIONS: Increased mobility may drive the observed association of minimum daily temperature on COVID-19 deaths.

2. **High health expenditures and low exposure of population to air pollution as critical factors that can reduce fatality rate in COVID-19 pandemic crisis.** Coccia M. Environ Res. 2021 May 21;199:111339. doi: 10.1016/j.envres.2021.111339. Online ahead of print.
   https://www.sciencedirect.com/science/article/pii/S0013935121006332
   One of the problems hardly clarified in Coronavirus Disease 2019 (COVID-19) pandemic crisis is to identify factors associated with a lower mortality of COVID-19 between countries to design strategies to cope with future unforeseen pandemics in society. The study here confronts this

problem by developing a global analysis based on more than 160 countries. This paper proposes that Gross Domestic Product (GDP) per capita, healthcare spending and air pollution of nations are critical factors associated with fatality rate of COVID-19. The statistical evidence seems in general to support that countries with a low average COVID-19 fatality rate have high expenditures in health sector >7.5% of GDP, high health expenditures per capita >$2,300 and a lower exposure of population to days exceeding safe levels of particulate matter (PM2.5). Another relevant finding here is that these countries have lower case fatality rates (CFRs) of COVID-19, regardless a higher percentage of population aged more than 65 years. Overall, then, this study finds that an effective and proactive strategy to reduce the negative impact of future pandemics, driven by novel viral agents, has to be based on a planning of enhancement of healthcare sector and of sustainability in environment that can reduce fatality rate of infectious diseases in society.

3. **COVID-19 face masks: A new source of human and environmental exposure to organophosphate esters.** Fernández-Arribas J, Moreno T, Bartrolí R, Eljarrat E. Environ Int. 2021 May 18;154:106654. doi: 10.1016/j.envint.2021.106654. Online ahead of print. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8130499/
For the first time, organophosphate ester (OPE) content was studied in different types of surgical, self-filtering (KN95, FFP2, and FFP3) and reusable face masks used for COVID-19 prevention. OPEs were detected in all mask samples, although in highly variable amounts which ranged from 0.02 to a maximum of 27.7 µg/mask, with the highest mean concentrations obtained for KN95 masks (11.6 µg/mask) and the lowest for surgical masks (0.24 µg/mask). Twelve out of 16 tested analytes were detected, with TEP, TPHP, TNBP, TEHP and TClPP being the most common OPEs as well as present at the highest concentrations. The non-carcinogenic and carcinogenic risks of OPE inhalation were calculated as being always several orders of magnitude lower than threshold levels, indicating that the use of face masks is safe with regard to OPE contamination. However, given the wide range of OPEs observed in different masks, it can be concluded that some masks (e.g. reusable) are less OPE-contaminated than others (e.g. KN95). With regard to environmental pollution, the disposal of billions of face masks is adding to the already substantial levels of microplastics and associated toxic additives worldwide, an impact that is lessened by use of reusable masks, which also have the lowest economic cost per user. However, in situations of relatively high risk of viral inhalation, such as poorly ventilated indoor public spaces, we recommend the use of FFP2 masks.

4. **Exploring the Relationship Between Air Quality and Ischemic Stroke Admissions During the COVID-19 Pandemic.** Hameed S, Khan M, Fatmi Z, Wasay M. J Stroke Cerebrovasc Dis. 2021 May 9;30(8):105860. doi: 10.1016/j.jstrokecerebrovasdis.2021.105860. Online ahead of print. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8106888/
OBJECTIVES: Amongst all the global catastrophe due to Coronavirus disease 2019, a significant bright spot is a reduction in air pollution as countries undergo lockdowns to limit the spread of infection. Another reduction that has been reported is in the number of strokes presenting to hospitals, despite the virus implicated in causing a hypercoagulable state. Acute exposure to air pollution has been linked to increase in stroke incidence and the improvement in air quality may be responsible for the decrease in stroke presentations.

MATERIALS AND METHODS: To explore this hypothesis, we compared the air quality index (AQI) of Karachi, the largest cosmopolitan city of Pakistan, during the lockdown period in 2020 to the same period in the previous year.

RESULTS: We found a significant drop in AQI depicting an improvement in air quality. Simultaneously, we identified a drop in number of stroke admissions to less than half from 2019 to 2020 at one of the largest tertiary care hospitals of the city, during this period of interest.

CONCLUSION: We hypothesize that one important reason for this drop in stroke admissions, may be an actual reduction in stroke incidence brought about by an improvement in air quality.

5. **Lessons from a pandemic for systems-oriented sustainability research.** Selin NE. Sci Adv. 2021 May 26;7(22):eabd8988. doi: 10.1126/sciadv.abd8988. Print 2021 May.
https://advances.sciencemag.org/content/7/22/eabd8988.full
This review examines research on environmental impacts of coronavirus disease 2019 (COVID-19) from a systems-oriented sustainability perspective, focusing on three areas: air quality and human health, climate change, and production and consumption. The review assesses whether and how this COVID-19-focused research (i) examines components of an integrated system; (ii) accounts for interactions including complex, adaptive dynamics; and (iii) is oriented to informing action. It finds that this research to date has not comprehensively accounted for complex, coupled interactions, especially involving societal factors, potentially leading to erroneous conclusions and hampering efforts to draw broader insights across sustainability-relevant domains. Lack of systems perspective in COVID-19 research reflects a broader challenge in environmental research, which often neglects societal feedbacks. Practical steps through which researchers can better incorporate systems perspectives include using analytical frameworks to identify important components and interactions, connecting frameworks to models and methods, and advancing sustainability science theory and methodology.

Health Impacts of Climate Change

6. **Socioeconomic Inequality in Respiratory Health in the US From 1959 to 2018.** Gaffney AW, Himmelstein DU, Christiani DC, Woolhandler S. JAMA Intern Med. 2021 May 28. doi: 10.1001/jamainternmed.2021.2441. Online ahead of print.
https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/2780281
IMPORTANCE: Air quality has improved and smoking rates have declined over the past half-century in the US. It is unknown whether such secular improvements, and other policies, have helped close socioeconomic gaps in respiratory health.

OBJECTIVE: To describe long-term trends in socioeconomic disparities in respiratory disease prevalence, pulmonary symptoms, and pulmonary function.DESIGN, SETTING, AND PARTICIPANTS: This repeated cross-sectional analysis of the nationally representative National Health and Nutrition Examination Surveys (NHANES) and predecessor surveys, conducted from 1959 to 2018. included 215 399 participants aged 6 to 74 years.

EXPOSURES: Family income quintile defined using year-specific thresholds; educational attainment.

MAIN OUTCOMES AND MEASURES: Trends in socioeconomic disparities in prevalence of current/former smoking among adults aged 25 to 74 years; 3 respiratory symptoms (dyspnea

on exertion, cough, and wheezing) among adults aged 40 to 74 years; asthma stratified by age (6-11, 12-17, and 18-74 years); chronic obstructive pulmonary disease ([COPD] adults aged 40-74 years); and 3 measures of pulmonary function (forced expiratory volume in 1 second [FEV1], forced vital capacity [FVC], and FEV1/FVC<0.70) among adults aged 24 to 74 years.

RESULTS: Our sample included 215 399 individuals surveyed between 1959 and 2018: 27 948 children aged 6 to 11 years; 26 956 children aged 12 to 17 years; and 105 591 adults aged 18 to 74 years. Income- and education-based disparities in smoking prevalence widened from 1971 to 2018. Socioeconomic disparities in respiratory symptoms persisted or worsened from 1959 to 2018. For instance, from 1971 to 1975, 44.5% of those in the lowest income quintile reported dyspnea on exertion vs 26.4% of those in the highest quintile, whereas from 2017 to 2018 the corresponding proportions were 48.3% and 27.9%. Disparities in cough and wheezing rose over time. Asthma prevalence rose for all children after 1980, but more sharply among poorer children. Income-based disparities in diagnosed COPD also widened over time, from 4.5 percentage points (age- and sex-adjusted) in 1971 to 11.3 percentage points from 2013 to 2018. Socioeconomic disparities in FEV1 and FVC also increased. For instance, from 1971 to 1975, the age- and height-adjusted FEV1 of men in the lowest income quintile was 203.6 mL lower than men in the highest quintile, a difference that widened to 248.5 mL from 2007 to 2012 (95% CI, -328.0 to -169.0). However, disparities in rates of FEV1/FVC lower than 0.70 changed little.

CONCLUSIONS AND RELEVANCE: Socioeconomic disparities in pulmonary health persisted and potentially worsened over the past 6 decades, suggesting that the benefits of improved air quality and smoking reductions have not been equally distributed. Socioeconomic position may function as an independent determinant of pulmonary health.

7. **Effects of Environmental Crude Oil Pollution on Newborn Birth Outcomes: A Retrospective Cohort Study.** Eleke C, Ngbala-Okpabi SO, Ogaji D, Agu IS, Bempong-Eleke EN. J Nurs Res. 2021 May 27. doi: 10.1097/JNR.0000000000000435. Online ahead of print.
https://ovidsp.ovid.com/ovidweb.cgi?T=JS&CSC=Y&NEWS=N&PAGE=fulltext&D=ovft&AN=00134372-900000000-99691&PDF=y

BACKGROUND: The World Health Organization encourages countries to improve birth outcomes to reduce rates of neonatal mortality and morbidity.

PURPOSE: This study was designed to examine the effect of environmental crude oil pollution on newborn birth outcomes in Rivers State, Nigeria.

METHODS: A retrospective cohort design was used to examine the effects of exposure to oil pollution on birth outcomes using facility-based records. K-Dere (an oil-polluted community) served as the exposure group, whereas birth records from Iriebe served as the comparison group. A sample size of 338 systematically selected birth records was examined (169 records for each arm of the study). A data extraction sheet was used for data collection. Data were analyzed using descriptive and inferential statistics at $p < .05$.

RESULTS: The risk of preterm birth was significantly higher in the exposed group (16% vs. 7.7%, relative risk = 2.08, 95% CI [1.11, 3.89], $p = .018$). At 6 weeks after birth, newborns in the exposed group weighed significantly less (4.64 ± 0.82 vs. 4.85 ± 0.92 kg, $p = .032$) and reported significantly higher incidence of morbidity compared with the newborns in the comparison group (relative risk = 3.03, 95% CI [2.20, 4.19], $p < .001$).

CONCLUSIONS: The oil-polluted area examined in this study was found to have a higher risk of preterm birth, a slower rate of newborn growth, and a higher rate of newborn morbidity than the non-oil-polluted area at 6 weeks after birth. Stakeholders should sustain efforts to remediate the environment in polluted regions and prevent oil pollution. Future research should investigate the mechanisms of the observed toxicological effects and the targeted protection of vulnerable groups in oil-polluted communities.

8. **Reduced Ambient PM2.5, Better Plasma Glucose Level, and Decreased Risk of Type 2 Diabetes in Adults: A Longitudinal Cohort Study.** Bo Y, Chang LY, Guo C, Lin C, Lau AKH, Tam T, Yeoh EK, Lao XQ. Am J Epidemiol. 2021 May 27:kwab159. doi: 10.1093/aje/kwab159. Online ahead of print.
It remains unknown whether reduced air pollution can prevent type 2 diabetes. This study investigated the associations of dynamic changes in long-term exposure to ambient fine particulate matter (PM2.5) with changes in fasting plasma glucose levels (FPG) and the incidence of type 2 diabetes. A total of 151,398 adults (aged ≥18 years) were recruited in Taiwan between 2001 and 2014. All participants were followed up for a mean duration of 5.0 years. The change in PM2.5 (ΔPM2.5) was defined as the value at a follow-up visit minus the corresponding value at the immediately preceding visit. The PM2.5 concentration in Taiwan increased during 2002-2004 and began to decrease in 2005. Compared to participants with little/no change in PM2.5, those with the largest decrease in PM2.5 exhibited a decrease in FPG (Coef: -0.39; 95% CI: -0.47, -0.32) and the risk of type 2 diabetes [hazard ration (HR): 0.86; 95% CI: 0.80, 0.93]. The sensitivity and stratified analyses by sex, age, body mass index, smoking, alcohol drinking and hypertension generally yielded similar results. An improvement in PM2.5 air quality is associated with a better level of FPG and a decreased risk of type 2 diabetes development.

9. **Ambient Air Pollution and Adverse Waitlist Events Among Lung Transplant Candidates.** Hallett AM, Feng Y, Jones MR, Bush EL, Merlo CA, Segev DL, McAdams-DeMarco M. Transplantation. 2021 May 25. doi: 10.1097/TP.0000000000003837. Online ahead of print.
https://ovidsp.ovid.com/ovidweb.cgi?T=JS&CSC=Y&NEWS=N&PAGE=fulltext&D=ovft&AN=00007890-900000000-95244&PDF=y
BACKGROUND: Air pollution is associated with cardiopulmonary disease and death in the general population. Fine particulate matter (PM2.5) is particularly harmful due to its ability to penetrate into areas of gas exchange within the lungs. Persons with advanced lung disease are believed to be particularly susceptible to PM2.5 exposure but few studies have examined the effect of exposure on this population. Here we investigate the association between PM2.5 exposure and adverse waitlist events among lung transplant (LT) candidates.
METHODS: US registry data were used to identify LT candidates listed between 1/1/2010-12/31/2016. Annual PM2.5 concentration at year of listing was estimated for each candidate's ZIP Code using NASA's SEDAC Global Annual PM2.5 Grids. We estimated crude and adjusted hazard ratios for adverse waitlist events, defined as death or removal, using Cox proportional hazards regression.
RESULTS: Of the 15,075 included candidates, median age at listing was 60, 43.8% were female and 81.7% were non-Hispanic white. Median ZIP Code PM2.5 concentration was 9.06µg/m3.

When compared to those living in ZIP Codes with lower PM2.5 exposure (PM2.5 <10.53μg/m3), candidates in ZIP Codes in the highest quartile of PM2.5 exposure (≥10.53μg/m3) had 1.14-fold (95%CI 1.04-1.25) risk of adverse waitlist events. The result remained significant after adjusting for demographics, education, insurance, smoking, lung allocation score, BMI, and blood type (HR=1.17; 95%CI 1.07-1.29).

CONCLUSIONS: Elevated ambient PM2.5 concentration was associated with adverse waitlist events among LT candidates. These findings highlight the impact of air pollution on clinical outcomes in this critically ill population.

10. **Air pollution and the respiratory microbiome.** Soumana IH, Carlsten C. J Allergy Clin Immunol. 2021 May 25:S0091-6749(21)00818-6. doi: 10.1016/j.jaci.2021.05.013. Online ahead of print. https://www.jacionline.org/article/S0091-6749(21)00818-6/pdf

This paper advocates for more research to improve the current understanding of air pollution effects on lung microbiome composition and metabolic functions. Moreover, characterizing the ability of the lung microbiota to metabolize pollutants and the resulting metabolites will help manage the overall impact on respiratory health.

11. **Association of long-term exposure to ambient particulate pollution with stage 1 hypertension defined by the 2017 ACC/AHA Hypertension Guideline and cardiovascular disease: The CHCN-BTH cohort study.** Cao H, Li B, Liu K, Pan L, Cui Z, Zhao W, Zhang H, Niu K, Tang N, Sun J, Han X, Wang Z, Xia J, He H, Cao Y, Xu Z, Meng G, Shan A, Guo C, Sun Y, Peng W, Liu X, Xie Y, Wen F, Zhang F, Shan G, Zhang L. Environ Res. 2021 May 25:111356. doi: 10.1016/j.envres.2021.111356. Online ahead of print.

BACKGROUND: Evidence regarding the effects of ambient air pollution on new stage 1 hypertension defined by the 2017 ACC/AHA Hypertension Guideline remains sparse.

OBJECTIVES: To investigate the association of long-term exposure to ambient PM2.5 with stage 1 hypertension and to explore the mediating and modifying effects of PM2.5 on cardiovascular disease (CVD).

METHODS: A total of 32,135 participants aged 18-80 years were recruited in 2017. The three-year (2014-2016) average PM2.5 concentrations were assessed by a spatial statistical model. Blood pressure (BP) was divided into four categories according to the 2017 ACC/AHA Hypertension Guideline: normal BP (SBP<120 mmHg and DBP<80 mmHg), elevated BP (SBP 120-129 mmHg and DBP<80 mmHg), stage 1 hypertension (SBP 130-139 mmHg or DBP 80-89 mmHg), and stage 2 hypertension (SBP≥140 mmHg or DBP≥90 mmHg or taking antihypertensive medications). The associations of PM2.5 with BP categories were estimated by two-level generalized linear mixed models. Analyses stratified by age, mediation and interaction analyses of PM2.5 and stage 1 hypertension with CVD were performed.

RESULTS: We detected a positive significant association between long-term exposure to PM2.5 and stage 1 hypertension. Compared to normal BP, the OR was 1.05 (95% CI: 1.02, 1.08) per 10 μg/m3 increase in PM2.5. The association was stronger than that of elevated BP but weaker than that of stage 2 hypertension. Stage 1 hypertension only partially mediated the association between PM2.5 and CVD, and the mediation proportions ranged from 1.55% to 11.00%. However, it modified the association between PM2.5 and CVD, which was greater in participants with stage 1 hypertension (OR: 1.66; 95% CI: 1.43, 1.93) than in participants with

normal BP (OR: 1.32; 95% CI: 1.11, 1.57), with Pinteraction<0.001. In the analysis stratified by age, the above associations were age-specific, and significant associations were only observed in the young and middle-aged (<60 years) groups.

CONCLUSIONS: Long-term exposure to ambient PM2.5 was significantly associated with stage 1 hypertension. This earlier stage of hypertension may be a trigger BP range for adverse effects of air pollution in the development of hypertension and CVD, especially in young and middle-aged individuals.

12. **Ambient air pollutants, diabetes and risk of newly diagnosed drug-resistant tuberculosis.**
Song WM, Liu Y, Zhang QY, Liu SQ, Xu TT, Li SJ, An QQ, Liu JY, Tao NN, Liu Y, Yu CB, Yu CX, Li YF, Li HC. Ecotoxicol Environ Saf. 2021 May 25;219:112352. doi: 10.1016/j.ecoenv.2021.112352. Online ahead of print.
https://www.sciencedirect.com/science/article/pii/S0147651321004632
BACKGROUND: Drug-resistant tuberculosis (DR-TB), diabetes and exposure to air pollution are thought to be important threat to human health, but no studies have explored the effects of ambient air pollutants on DR-TB when adjusting diabetes status so far.
METHODS: We performed a study among 3759 newly diagnosed TB cases with drug-susceptibility testing results, diabetes status, and individual air pollution data in Shandong from 2015 to 2019. Generalized linear mixed models (GLMM) including three models (Model 1: without covariates, Model 2: adjusted by diabetes status only, Model 3: with all covariates) were applied.
RESULTS: Of 3759 TB patients enrolled, 716 (19.05%) were DR-TB, and 333 (8.86%) had diabetes. High exposure to O3 was associated with an increased risk of RFP-resistance (Model 2 or 3: odds ratio (OR) = 1.008, 95% confidence intervals (CI): 1.002-1.014), ethambutol-resistance (Model 3: OR = 1.015, 95%CI: 1.004-1.027) and any rifampicin+streptomycin resistance (Model 1,2,3: OR = 1.01, 95%CI: 1.002-1.018) at 90 days. In contrast, NO2 was associated with a reduced risk of DR-TB (Model 3: OR = 0.99, 95%CI: 0.981-0.999) and multidrug-resistant TB (MDR-TB) (Model 3: OR = 0.977, 95%CI: 0.96-0.994) at 360 days. Additionally, SO2 (Model 1, 2, 3: OR = 0.987, 95%CI: 0.977-0.998) showed a protective effect on MDR-TB at 90 days. PM2.5 (90 days, Model 2: OR = 0.991, 95%CI: 0.983-0.999), PM10 (360 days, Model 2: OR = 0.992, 95%CI: 0.985-0.999) had protective effects on any RFP+SM resistance.
CONCLUSIONS: O3 contributed to an elevated risk of TB resistance but PM2.5, PM10, SO2, NO2 showed an inverse effect. Air pollutants may affect the development of drug resistance among TB cases by adjusting the status of diabetes.

13. **Environmental impact on reproductive health and risk mitigating strategies.** Giudice LC. Curr Opin Obstet Gynecol. 2021 May 25. doi: 10.1097/GCO.0000000000000722. Online ahead of print.
https://ovidsp.ovid.com/ovidweb.cgi?T=JS&CSC=Y&NEWS=N&PAGE=fulltext&D=ovft&AN=00001703-900000000-99117&PDF=y
PURPOSE: The purpose of this review is to increase awareness among reproductive health professionals and trainees about the impact of environmental toxicants and climate change on

women's health and mitigation strategies at the individual, professional and governmental levels.

RECENT FINDINGS: Global health indicators reveal a meteoric rise of noncommunicable diseases over the past 50 years, which threaten reproductive health directly and indirectly. Evolutionary genetic mutations as contributors are unlikely in this timeframe, and environmental causes have been invoked. Notably, the past 75 years have witnessed marked increases in industrial chemical production, and global warming has rendered a 'climate crisis' with extreme temperatures and compromised food, water, and air quality. There is now strong experimental and epidemiologic evidence for endocrine disrupting chemicals and particulate matter and chemical components of air pollution in the pathophysiology of human reproductive disorders during development and across the lifespan, especially among vulnerable populations.

SUMMARY: Environmental impacts on fertility, pregnancy outcomes, childhood neurodevelopment, and reproductive tract development are significant, not widely appreciated, and may be preventable. In light of the evidence, education and advocating economical mitigations of toxic environmental chemicals and alternative energy strategies are imperatives to assure quality reproductive health for this and future generations.

14. **Wildfire exposure during pregnancy and the risk of adverse birth outcomes: A systematic review.** Amjad S, Chojecki D, Osornio-Vargas A, Ospina MB. Environ Int. 2021 May 21;156:106644. doi: 10.1016/j.envint.2021.106644. Online ahead of print.
https://www.sciencedirect.com/science/article/pii/S0160412021002695

BACKGROUND: Maternal wildfire exposure (e.g., smoke, stress) has been associated with poor birth outcomes with effects potentially mediated through air pollution and psychosocial stress. Despite the recent hike in the intensity and frequency of wildfires in some regions of the world, a critical appraisal of the evidence on the association between maternal wildfire exposure and adverse birth outcomes has not yet been undertaken. We conducted a systematic review that evaluated the scientific evidence on the association between wildfire exposure during pregnancy and the risk of adverse birth outcomes.

METHODS: Comprehensive searches in nine bibliographic databases were conducted from database inception up to June 2020. Observational epidemiological studies that evaluated associations between exposure to wildfire during pregnancy and adverse birth outcomes were eligible for inclusion. Studies were assessed using the National Toxicology Program's Office of Health Assessment and Translation (NTP OHAT) risk of bias tool and certainty of evidence was assessed using the Grading of Recommendations, Assessment, Development and Evaluation (GRADE) framework. Screening of retrieved articles, data extraction, and risk of bias assessment were performed by two independent reviewers. Study results were synthesized descriptively.

RESULTS: Eight epidemiological studies conducted in four countries and involving 1,702,252 births were included in the review. The exposure to wildfire during pregnancy was assessed in individual studies by measurement of PM2.5 (n = 2), PM10 (n = 1), Total Ozone Mapping Spectrometer (TOMS)aerosol index (n = 1), heat spots (n = 1), and by proximity of maternal residence to wildfire-affected areas (n = 3). There is some evidence indicating that maternal wildfire exposure associates with birth weight reduction (n = 7) and preterm birth (n = 4), particularly when exposure to wildfire smoke occurred in late pregnancy. The association

between wildfire exposure and small for gestational age (n = 2) and infant mortality (n = 1) was inconclusive.

CONCLUSION: Current evidence suggests that maternal exposure to wildfire during late pregnancy is linked to reduced birth weight and preterm birth. Well-designed comprehensive studies are needed to better understand the perinatal effects of wildfires.

15. **Breast cancer risk in relation to ambient concentrations of nitrogen dioxide and particulate matter: results of a population-based case-control study corrected for potential selection bias (the CECILE study).** Lemarchand C, Gabet S, Cénée S, Tvardik N, Slama R, Guénel P. Environ Int. 2021 May 21;155:106604. doi: 10.1016/j.envint.2021.106604. Online ahead of print.
https://www.sciencedirect.com/science/article/pii/S0160412021002294

BACKGROUND: There is only scant evidence that air pollution increases the risk of breast cancer.

OBJECTIVES: We investigated this relationship for three air pollutants: nitrogen dioxide (NO2) and particulate matter with an aerodynamical diameter below 10 μm (PM10) and 2.5 μm (PM2.5).

METHODS: We conducted a population-based case-control study on breast cancer in two French départements, including 1,229 women diagnosed with breast cancer in 2005-2007 and 1,316 control women frequency-matched on age. Concentrations of NO2, PM10 and PM2.5 at participants' addresses occupied during the last 10 years were assessed using a chemistry transport model. Odds ratios (OR) and 95% confidence intervals (95% CI) were estimated using multivariable logistic regression models where each woman was assigned a weight depending on her probability of selection into the study.

RESULTS: The OR for breast cancer per 10-μg/m3 increase in NO2 was 1.11 (95% CI, 0.98, 1.26), and 1.41 (95% CI 1.07, 1.86) in the highest exposure quintile (Q5), compared to the first. The ORs per 10-μg/m3 NO2 did not markedly differ between pre- (OR 1.09, 95% CI 0.89, 1.35)) and post-menopausal women (OR 1.14, 95% CI 0.97, 1.33)), but the OR was substantially higher for hormone-receptor positive (ER+/PR+) breast tumor subtypes (OR 1.15, 95% CI 1.00, 1.31) than for ER-/PR- tumors (OR 0.95, 95% CI 0.72, 1.26). Breast cancer risk was not associated with either PM10 (OR per 1 μg/m3 1.01, 95% CI, 0.96, 1.06) or PM2.5 (OR per 1 μg/m3 1.02, 95% CI 0.95, 1.08), regardless of the menopausal status or of the breast tumor subtype.

DISCUSSION: Our study provides evidence that NO2 exposure, a marker of traffic-related air pollutants, may be associated with an increased risk of breast cancer, particularly ER+/PR+ tumors.

16. **Effect of Air Quality on the Risk of Emergency Room Visits in Patients With Atrial Fibrillation.** Liang B, He X, Du X, Liu X, Ma C. Front Cardiovasc Med. 2021 May 11;8:672745. doi: 10.3389/fcvm.2021.672745. eCollection 2021.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8148017/

Background: We investigated the effect of particulate matter with aerodynamic diameter <2.5 μm (PM2.5) and meteorological conditions on the risk of emergency room visits in patients with atrial fibrillation (AF) in Beijing, which is considered as a monsoon climate region. Methods: In this case-crossover design study, medical records from patients with AF who visited the Critical Care Center in the Emergency Department of Anzhen Hospital from January 2011 through

December 2014 and air quality and meteorological data of Beijing during the same period were collected and analyzed using Cox regression and time-series autocorrelation analyses. Results: A total of 8,241 patients were included. When the average PM2.5 concentration was >430 µg/m3, the risk of emergency room visits for patients with uncomplicated AF, AF combined with cardiac insufficiency, and AF combined with rheumatic heart disease increased by 12, 12, and 40%, respectively. When the average PM2.5 concentration was >420 µg/m3, patients with AF combined with diabetes mellitus had a 75% increased risk of emergency room visits, which was the largest increase in risk among all types of patients with AF. When the average PM2.5 concentration was >390 µg/m3, patients with AF combined with acute coronary syndrome had an approximately 30% increased risk of emergency room visits, which was the highest and fastest increase in risk among all types of patients with AF. The risk of emergency room visits for patients with AF was positively correlated with air quality as the time lag proceeded, with an autocorrelation coefficient of 0.223 between the risk of emergency room visits and air quality in patients with AF on day 6 of the time lag. Conclusion: Exposure to certain concentrations of PM2.5 in a monsoon climate region significantly increased the risk of emergency room visits in patients with AF.

17. **Exposure to Particulate Matter Air Pollution and Anosmia.** Zhang Z, Rowan NR, Pinto JM, London NR, Lane AP, Biswal S, Ramanathan M Jr. JAMA Netw Open. 2021 May 3;4(5):e2111606. doi: 10.1001/jamanetworkopen.2021.11606.
https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2780404
IMPORTANCE: Anosmia, the loss of the sense of smell, has profound implications for patient safety, well-being, and quality of life, and it is a predictor of patient frailty and mortality. Exposure to air pollution may be an olfactory insult that contributes to the development of anosmia.
OBJECTIVE: To investigate the association between long-term exposure to particulate matter (PM) with an aerodynamic diameter of no more than 2.5 µm (PM2.5) with anosmia.
DESIGN, SETTING, AND PARTICIPANTS: This case-control study examined individuals who presented from January 1, 2013, through December 31, 2016, at an academic medical center in Baltimore, Maryland. Case participants were diagnosed with anosmia by board-certified otolaryngologists. Control participants were selected using the nearest neighbor matching strategy for age, sex, race/ethnicity, and date of diagnosis. Data analysis was conducted from September 2020 to March 2021.
EXPOSURES: Ambient PM2.5 levels.
MAIN OUTCOMES AND MEASURES: Novel method to quantify ambient PM2.5 exposure levels in patients diagnosed with anosmia compared with matched control participants.
RESULTS: A total of 2690 patients were identified with a mean (SD) age of 55.3 (16.6) years. The case group included 538 patients with anosmia (20%), and the control group included 2152 matched control participants (80%). Most of the individuals in the case and control groups were women, White patients, had overweight (BMI 25 to <30), and did not smoke (women: 339 [63.0%] and 1355 [63.0%]; White patients: 318 [59.1%] and 1343 [62.4%]; had overweight: 179 [33.3%] and 653 [30.3%]; and did not smoke: 328 [61.0%] and 1248 [58.0%]). Mean (SD) exposure to PM2.5 was significantly higher in patients with anosmia compared with healthy control participants at 12-, 24-, 36-, 60-month time points: 10.2 (1.6) µg/m3 vs 9.9 (1.9) µg/m3;

10.5 (1.7) μg/m3 vs 10.2 (1.9) μg/m3; 10.8 (1.8) μg/m3 vs 10.4 (2.0) μg/m3; and 11.0 (1.8) μg/m3 vs 10.7 (2.1) μg/m3, respectively. There was an association between elevated PM2.5 exposure level and odds of anosmia in multivariate analyses that adjusted for age, sex, race/ethnicity, body mass index, alcohol or tobacco use, and medical comorbidities (12 mo: odds ratio [OR], 1.73; 95% CI, 1.28-2.33; 24 mo: OR, 1.72; 95% CI, 1.30-2.29; 36 mo: OR, 1.69; 95% CI, 1.30-2.19; and 60 mo: OR, 1.59; 95% CI, 1.22-2.08). The association between long-term exposure to PM2.5 and the odds of developing anosmia was nonlinear, as indicated by spline analysis. For example, for 12 months of exposure to PM2.5, the odds of developing anosmia at 6.0 μg/m3 was OR 0.79 (95% CI, 0.64-0.97); at 10.0 μg/m3, OR 1.42 (95% CI, 1.10-1.82); at 15.0 μg/m3, OR 2.03 (95% CI, 1.15-3.58).

CONCLUSIONS AND RELEVANCE: In this study, long-term airborne exposure to PM2.5 was associated with anosmia. Ambient PM2.5 represents a potentially ubiquitous and modifiable risk factor for the loss of sense of smell.

WE ACT

18. **The environmental impact of personal protective equipment in a pre and post COVID era in the ENT clinic.** Farrell E, Smyth D. Eur Arch Otorhinolaryngol. 2021 May 27:1-8. doi: 10.1007/s00405-021-06860-z. Online ahead of print.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8159065/
PURPOSE: The use of single use plastic items and plastic wrapping has increased over the last number of decades. Outside of the medical field there has been a conscious drive to reduce single use plastic and reuse items to reduce the amount of waste we produce. We undertook this investigation to quantify our plastic waste production and generate ideas to reduce this volume.
METHODOLOGY: Data was collected from a University Hospital ENT outpatient department via real-time recording methods using standard data collection forms. We measured plastic unit usage pre and post COVID restrictions and compared this to our number of patient encounters. Projections of plastic usage were determined via a hypothetical resumption of patient services model.
RESULTS: In total there were 440 patients included. In period one the mean units of plastic used per day was 65.1 (median 67; range 27-84). In the second period, the mean number of plastic units was 23.4 (median 22; range 1-7). Blue nitrile gloves and masks were the most commonly used single use items. The hypothetical projection model predicted a 147.6% increase in single use items following the introduction of COVID precautions.
CONCLUSION: We have a duty of care not only to our patients but future generations of patients and the environment which we share. Single use items and excessive plastic wrapping have benefits in terms of convenience and sterility, but these conveniences can be easily extended to reusable types to limit our volume of waste, reduce our waste management costs and protect our environment.

19. **Does Eco-Certification Correlate with Improved Financial Performance? Evidence From a Longitudinal Study in the US Hospital Industry.** Izón GM, Islip N. Int J Health Serv. 2021 May 24:207314211018965. doi: 10.1177/00207314211018965. Online ahead of print.

https://journals.sagepub.com/doi/full/10.1177/00207314211018965

Health care-based negative production externalities, such as greenhouse gas emissions, underscore the need for hospitals to implement sustainable practices. Eco-certification has been adopted by a number of providers in an attempt, for instance, to curb energy consumption. While these strategies have been evaluated with respect to cost savings, their implications pertaining to hospitals' financial viability remain unknown. We specify a fixed-effects model to estimate the correlation between Energy Star certification and 3 different hospitals' financial performance measures (net patient revenue, operating expenses, and operating margin) in the United States between 2000 and 2016. The Energy Star participation indicators' parameters imply that this type of eco-certification is associated with lower net patient revenue and lower operating expenses. However, the estimated negative relationship between eco-certification and operating margin suggests that the savings in operating expenses are not enough for a hospital to achieve higher margins. These findings may indicate that undertaking sustainable practices is partially related to intangible benefits such as community reputation and highlight the importance of government policies to financially support hospitals' investments in green practices.

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News & Commentary

The Need to Expand the Framework of Environmental Determinants of Cardiovascular Health From Climate Change to Planetary Health: Trial by Wildfire. Chang AY, Barry M, Harrington RA. Circulation. 2021 May 25;143(21):2029-2031. doi: 10.1161/CIRCULATIONAHA.120.051892. Epub 2021 May 24.

Climate Action for Health: An Urgent Call from the Global Cardiovascular Community. Pinto FJ, Armstrong-Walenczak K, Sliwa K. Glob Heart. 2021 May 3;16(1):33. doi: 10.5334/gh.1051.

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