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#23 | 7.7.2021 to 7.16.2021

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COVID-19

1. **COVID-19 pandemic and global carbon dioxide emissions: A first assessment.** Sikarwar VS, Reichert A, Jeremias M, Manovic V. Sci Total Environ. 2021 Jul 1;794:148770. doi:10.1016/j.scitotenv.2021.148770. Online ahead of print.
Anthropogenic carbon dioxide emissions are the main cause of global climate change. The COVID-19 pandemic has been one of the worst of its kind in the last century with regard to global deaths and, in the absence of any effective treatment, it led to governments worldwide mandating lock-down measures, as well as citizens voluntarily reducing non-essential trips and activities. In this study, the influence of decreased activity on CO2 emissions and on the economy was assessed. The US, EU-28, China and India, representing almost 60% of anthropogenic carbon emissions, were considered as reference entities and the trends were extrapolated to estimate the global impact. This study aimed to deduce initial estimates of anthropogenic CO2 emissions based on the available economic and industrial outputs and activity data, as they could not be directly measured. Sector-wise variations in emissions were modeled by assuming proportionality of the outputs/activities and the resulting emissions. A decline in road traffic was seen up to March 2020 and then a steady growth was observed, with the exception of China where road traffic started to recover by the end of January. The vast majority of passenger flights were grounded and, therefore, global air traffic plummeted by 43.7% from January to May 2020. A considerable drop in coal power production and the annual industrial growth rate was also observed. The overall economic decline led to a drop of 4.9% in annual global gross domestic product (GDP) for Q2 2020. The total global CO2 emissions reduction for January through April 2020 compared to the year before was estimated to be 1749 Mt. CO2 (14.3%) with a maximum contribution from the transportation sector (58.3% among total emissions by sector). Like other previous crises, if the economy rebounds as expected the reductions will be temporary. Long-term impacts can be minimized considering the business as well as lifestyle changes for travel, utilizing virtual structures created during this crisis, and switching to sustainable transportation.

2. **A critical review on environmental presence of pharmaceutical drugs tested for the covid-19 treatment.** Nippes RP, Macruz PD, da Silva GN, Neves Olsen Scaliante MH. Process Saf Environ Prot. 2021 Aug;152:568-582. doi: 10.1016/j.psep.2021.06.040. Epub 2021 Jun 30. https://www.sciencedirect.com/science/article/pii/S0957582021003335
   On March 11, 2020, the World Health Organization (WHO) declared COVID-19 a pandemic. The outbreak caused a worldwide impact, becoming a health threat to the general population and its professionals. To date, there are no specific antiviral treatments or vaccines for the COVID-19 infection, however, some drugs are being clinically tested. The use of these drugs on large scale raises great concern about their imminent environmental risk, since the elimination of these compounds by feces and urine associated with the inefficiency of sewage treatment plants in their removal can result in their persistence in the environment, putting in risk the health of humans and of other species. Thus, the goal of this work was to conduct a review of other studies that evaluated the presence of the drugs chloroquine, hydroxychloroquine, azithromycin, ivermectin, dexamethasone, remdesivir, favipiravir and some HIV antivirals in the environment. The research indicated the presence of these drugs in the environment in different regions, with concentration data that could serve as a basis for further comparative studies following the pandemic.

3. **The Unfurl of Corona Virus and its Thwack on Human and Environment: A Review.** Sivaranjanee R, Kumar PS. Curr Opin Environ Sci Health. 2021 Jun 26:100289. doi: 10.1016/j.coesh.2021.100289. Online ahead of print. https://www.sciencedirect.com/science/article/pii/S2468584421000611
   The new Covid SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus-2), was first recognized in Wuhan (China) in December 2019, addresses a similar family as the Severe Acute Respiratory Syndrome Coronavirus-1 (SARS-CoV-1). On January 30, 2020 the World Health Organization pronounced the flare-up as a Public Health Emergency of International Concern. Diagnosis of this disease is carried out by using special molecular tests. It is mandatory to associate the individual with COVID 19 symptom and isolation is necessary to prevent further transmission of this virus. This review highlights the formation, prodrome, transmission, survival mechanism of COVID 19 and shows that, the pandemic circumstance fundamentally improves air quality in various urban areas across the globe, decreases water contamination and commotion, and diminishes the tension on the traveller objections, which may help with the reclamation of the natural framework. The worldwide effect of this new outbreak is yet dubious.

4. **How changes in human activities during the lockdown impacted air quality parameters: A review.** Marinello S, Butturi MA, Gamberini R. Environ Prog Sustain Energy. 2021 May 10:e13672. doi: 10.1002/ep.13672. Online ahead of print. https://aiche.onlinelibrary.wiley.com/doi/10.1002/ep.13672
   The health emergency linked to the spread of COVID-19 has led to important reduction in industrial and logistics activities, as well as to a drastic changes in citizens' behaviors and habits. The restrictions on working activities, journeys and relationships imposed by the lockdown have had important consequences, including for environmental quality. This review aims to provide a structured and critical evaluation of the recent scientific bibliography that analyzed and

described the impact of lockdown on human activities and on air quality. The results indicate an important effect of the lockdown during the first few months of 2020 on air pollution levels, compared to previous periods. The concentrations of particulate matter, nitrogen dioxide, sulfur dioxide and carbon monoxide have decreased. Tropospheric ozone, on the other hand, has significantly increased. These results are important indicators that can become decision drivers for future policies and strategies in industrial and logistics activities (including the mobility sector) aimed at their environmental sustainability. The scenario imposed by COVID-19 has supported the understanding of the link between the reduction of polluting emissions and the state of air quality and will be able to support strategic choices for the future sustainable growth of the industrial and logistics sector.

Health Impacts of Climate Change

5. **Association between long-term ambient air pollution exposure and the risk of breast cancer: a systematic review and meta-analysis.** Wei W, Wu BJ, Wu Y, Tong ZT, Zhong F, Hu CY. Environ Sci Pollut Res Int. 2021 Jul 5. doi: 10.1007/s11356-021-14903-5. Online ahead of print.
Breast cancer is a complex and multifactorial disease which stems significantly from both environmental and genetic factors. A growing number of epidemiological studies have suggested that ambient air pollution (AAP) exposure may play an important role in breast cancer development. However, no consistency has been reached concerning whether high levels of air pollutant exposure were related to increased breast cancer risk among the current evidence. To further clarify such association of long-term AAP exposure with risk of breast cancer, a systematic review and meta-analysis of available evidence was performed. An extensive literature search in 3 academic databases was conducted before March 10, 2020. The risk of bias (RoB) for each individual study was evaluated with a domain-based assessment tool, developed by the National Toxicology Program/Office of Health Assessment and Translation (NTP/OHAT). Meta-estimates for air pollutant-breast cancer combinations were calculated for a standardized increment in exposure by random-effect models. The confidence level in the body of evidence and the certainty of evidence was also assessed for each air pollutant-breast cancer combination. The initial search identified 5446 studies, and 18 of them were eligible. The pooled analysis found an increased risk of breast cancer was associated with an increase in each 10 μg/m3 in nitrogen dioxide (NO2) exposure (hazard ratio (HR) = 1.02, 95% confidence interval (CI) = 1.01, 1.04), while particulate matter with aerodynamic diameters ≤ 2.5 μm and 10 μm (PM2.5, PM10) revealed no statistically significant associations with breast cancer risk. Our evaluation on the certainty of evidence indicates that there was a "moderate level of evidence" in the body of evidence for an association of NO2 exposure with an increased breast cancer risk and an "inadequate level of evidence" in the body of evidence for an association of PM2.5 and PM10 exposure with an increased breast cancer risk. Our study suggests long-term exposure to NO2 is related to an increased risk of breast cancer. However, in consideration of the limitations, further studies, especially performed in developing countries, with improvements in exposure assessment, outcome ascertainment, and confounder adjustment, are needed to draw a definite evidence of a causal relationship.

6. **Parkinson disease and air pollution: does what we breathe matter?** Calderón-Garcidueñas L. Nat Rev Neurol. 2021 Jul 5. doi: 10.1038/s41582-021-00531-7. Online ahead of print.

7. **Climate change-induced migration: a bibliometric review.** Milán-García J, Caparrós-Martínez JL, Rueda-López N, de Pablo Valenciano J. Global Health. 2021 Jul 3;17(1):74. doi: 10.1186/s12992-021-00722-3.
https://globalizationandhealth.biomedcentral.com/articles/10.1186/s12992-021-00722-3
BACKGROUND: This paper has reviewed the international research on the terms "climate change" and "human migration" from 1999 to 2019. To this end, a bibliometric and a cluster analysis by fractional accounting have been carried out using two of the most important databases: Web of Science (WoS) and Scopus. The research found and studied 140 documents from WoS Core Collection and 193 from Scopus.
RESULTS: The results show a continual increase in the number of articles published and citations received during the whole period studied. The U.S., U.K., Germany and China have been shown to be the most productive countries and there is a predominance of North American organizations supporting and fostering research on these topics.
CONCLUSIONS: The main contribution of this article is the analysis of new tendencies. The trend shows a transition from concepts such as vulnerability, climate change, land degradation, refugees and security to others such as concepts such as international migration, climate justice, sustainability, human rights and disaster risk reduction. Future research in this field should address the comparison of results from research focused on human beings to a focus on other living beings.

8. **Seasonality of mortality under a changing climate: a time-series analysis of mortality in Japan between 1972 and 2015.** Madaniyazi L, Chung Y, Kim Y, Tobias A, Ng CFS, Seposo X, Guo Y, Honda Y, Gasparrini A, Armstrong B, Hashizume M. Environ Health Prev Med. 2021 Jul 3;26(1):69. doi: 10.1186/s12199-021-00992-8.
https://environhealthprevmed.biomedcentral.com/articles/10.1186/s12199-021-00992-8
BACKGROUND: Ambient temperature may contribute to seasonality of mortality; in particular, a warming climate is likely to influence the seasonality of mortality. However, few studies have investigated seasonality of mortality under a warming climate.
METHODS: Daily mean temperature, daily counts for all-cause, circulatory, and respiratory mortality, and annual data on prefecture-specific characteristics were collected for 47 prefectures in Japan between 1972 and 2015. A quasi-Poisson regression model was used to assess the seasonal variation of mortality with a focus on its amplitude, which was quantified as the ratio of mortality estimates between the peak and trough days (peak-to-trough ratio (PTR)). We quantified the contribution of temperature to seasonality by comparing PTR before and after temperature adjustment. Associations between annual mean temperature and annual estimates of the temperature-unadjusted PTR were examined using multilevel multivariate meta-regression models controlling for prefecture-specific characteristics.
RESULTS: The temperature-unadjusted PTRs for all-cause, circulatory, and respiratory mortality were 1.28 (95% confidence interval (CI): 1.27-1.30), 1.53 (95% CI: 1.50-1.55), and 1.46 (95% CI: 1.44-1.48), respectively; adjusting for temperature reduced these PTRs to 1.08 (95% CI: 1.08-1.10), 1.10 (95% CI: 1.08-1.11), and 1.35 (95% CI: 1.32-1.39), respectively. During the period of

rising temperature (1.3 °C on average), decreases in the temperature-unadjusted PTRs were observed for all mortality causes except circulatory mortality. For each 1 °C increase in annual mean temperature, the temperature-unadjusted PTR for all-cause, circulatory, and respiratory mortality decreased by 0.98% (95% CI: 0.54-1.42), 1.39% (95% CI: 0.82-1.97), and 0.13% (95% CI: - 1.24 to 1.48), respectively.
CONCLUSION: Seasonality of mortality is driven partly by temperature, and its amplitude may be decreasing under a warming climate.

9. **Air pollution and cardiovascular disease hospitalization - Are associations modified by greenness, temperature and humidity?** Klompmaker JO, Hart JE, James P, Sabath MB, Wu X, Zanobetti A, Dominici F, Laden F. Environ Int. 2021 Jul 2;156:106715. doi: 10.1016/j.envint.2021.106715. Online ahead of print.
https://www.sciencedirect.com/science/article/pii/S0160412021003408
BACKGROUND: Studies have observed associations between long-term air pollution and cardiovascular disease hospitalization. Little is known, however, about effect modification of these associations by greenness, temperature and humidity.
METHODS: We constructed an open cohort consisting of all fee-for-service Medicare beneficiaries, aged ≥ 65, living in the contiguous US from 2000 through 2016 (~63 million individuals). We assigned annual average PM2.5, NO2 and ozone zip code concentrations. Cox-equivalent Poisson models were used to estimate associations with first cardiovascular disease (CVD), coronary heart disease (CHD) and cerebrovascular disease (CBV) hospitalization.
RESULTS: PM2.5 and NO2 were both positively associated with CVD, CHD and CBV hospitalization, after adjustment for potential confounders. Associations were substantially stronger at the lower end of the exposure distributions. For CVD hospitalization, the hazard ratio (HR) of PM2.5 was 1.041 (1.038, 1.045) per IQR increase (4.0 μg/m3) in the full study population and 1.327 (1.305, 1.350) per IQR increase for a subgroup with annual exposures always below 10 μg/m3 PM2.5. Ozone was only positively associated with CVD, CHD and CBV hospitalization for the low-exposure subgroup (<40 ppb). Associations of PM2.5 were stronger in areas with higher greenness, lower ozone and Ox, lower summer and winter temperature and lower summer and winter specific humidity.
CONCLUSION: PM2.5 and NO2 were positively associated with CVD, CHD and CBV hospitalization. Associations were more pronounced at low exposure levels. Associations of PM2.5 were stronger with higher greenness, lower ozone and Ox, lower temperature and lower specific humidity.

10. **The burden of heat-related mortality attributable to recent human-induced climate change.** Vicedo-Cabrera AM et al. Nat Clim Chang. 2021 Jun;11(6):492-500. doi: 10.1038/s41558-021-01058-x. Epub 2021 May 31.
Climate change affects human health; however, there have been no large-scale, systematic efforts to quantify the heat-related human health impacts that have already occurred due to climate change. Here, we use empirical data from 732 locations in 43 countries to estimate the mortality burdens associated with the additional heat exposure that has resulted from recent human-induced warming, during the period 1991-2018. Across all study countries, we find that 37.0% (range 20.5-76.3%) of warm-season heat-related deaths can be attributed to

anthropogenic climate change and that increased mortality is evident on every continent. Burdens varied geographically but were of the order of dozens to hundreds of deaths per year in many locations. Our findings support the urgent need for more ambitious mitigation and adaptation strategies to minimize the public health impacts of climate change.

11. **Does Industrial Air Pollution Increase Health Care Expenditure? Evidence From China.** Shen JS, Wang Q, Shen HP. Front Public Health. 2021 Jun 18;9:695664. doi: 10.3389/fpubh.2021.695664. eCollection 2021.
https://www.frontiersin.org/articles/10.3389/fpubh.2021.695664/full
This paper discusses the impact of air pollution on medical expenditure in eastern, central, and western China by applying the fixed-effect model, random-effect model, and panel threshold regression model. According to theoretical and empirical analyses, there are different relationships between the two indexes in different regions of China. For eastern and central regions, it is obvious that the more serious the air pollution is, the more medical expenses there are. However, there is a non-linear single threshold effect between air pollution and health care expenditure in the western region. When air pollution is lower than this value, there is a negative correlation between them. Conversely, the health care expenditure increases with the aggravation of air pollution, but the added value is not enough to make up for the health problems caused by air pollution. The empirical results are basically consistent with the theoretical analysis, which can provide enlightenment for the government to consider the role of air pollution in medical expenditure. Policymakers should arrange the medical budget reasonably, according to its situation, to make up for the loss caused by air pollution.

WE ACT

12. **Global trends in research on carbon footprint of buildings during 1971-2021: a bibliometric investigation.** Raza MS, Khahro SH, Memon SA, Ali TH, Memon NA. Environ Sci Pollut Res Int. 2021 Jul 5. doi: 10.1007/s11356-021-15291-6. Online ahead of print.
The increasing issue of global warming has received tremendous attention from researchers around the world as researchers are actively publishing their findings related to environmental issues such as greenhouse gas emissions, carbon footprint, and air quality. In this bibliometric review, Scopus database was accessed to retrieve publications from 1971 to 2021, related to carbon footprint of buildings which is significantly associated with global warming and air quality. The results suggested that 41% of publications were published in close access journals requiring nominal subscription fee and/or institutional permissions for access to articles. Only 1% of publications were in press for publication, while 99% of them were online available. The trend of publications on carbon footprint has increased after 2002 and is also increasing in recent years as the topic is widely studied in many fields such as environmental sciences, engineering, materials sciences, earth and planetary sciences, chemical engineering, and energy. Approximately 97% publications were peer-reviewed journal articles. The authors, i.e., Aresta, M., Lin, T.P., and Persily, A.K., published highest number of publications among all on topic of carbon footprint. However, other authors, i.e., Cai, W., Chen, Z., Ma, M. Paik, I., and Pomponi, F., have published two publications each on carbon footprint of buildings. The funding for research on carbon footprint of buildings is mainly received from the National

Institute of Standards and Technology, Lawrence Berkeley National Laboratory, and Tianjin University. However, the National Taiwan University, George Mason University, and Universita degi Studi di Bari hold 3% share in total number of publications on carbon footprint of buildings. As China and the USA are countries with highest share in global carbon footprint, both countries also have highest contribution in research on carbon footprint, followed by South Korea, the UK, Japan, Italy, Germany, Taiwan, etc. The study also concluded that, due to its wider readability and understanding, most of the publications were in the English language.

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News & Commentary

The environment in the post-pandemic scenario: sustaining the gains. Macaraan WER. J Public Health (Oxf). 2021 Jul 3:fdab262. doi: 10.1093/pubmed/fdab262. Online ahead of print.

Countdown on health and climate change: too important for methodological errors. Morfeld P, Erren TC. Lancet. 2021 Jul 3;398(10294):26. doi: 10.1016/S0140-6736(21)00884-9.

Countdown on health and climate change: too important for methodological errors - Authors' reply. Kiesewetter G, Amann M, Milner J, Liu Z, Romanello M. Lancet. 2021 Jul 3;398(10294):26. doi: 10.1016/S0140-6736(21)00878-3.

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