Particulate Matter

1-Global, regional, and national burden of cancers attributable to particulate matter pollution from 1990 to 2019 and projection to 2050: Worsening or improving?

By Chen, JY (Chen, Junyan) [1] ; Cui, YY (Cui, Yuanyao) [2] ; Deng, Y (Deng, Ye) [2] ; Xiang, YT (Xiang, Yuting) [2] ; Chen, JM (Chen, Jiamei) [2] ; Wang, YT (Wang, Yuting) [2] ; Wang, TY (Wang, Tianyun) [2] ; He, M (He, Miao) [2] , [3] , [4] (provided by Clarivate) **Source JOURNAL OF HAZARDOUS MATERIALS Volume 477 DOI 10.1016/j.jhazmat.2024.135319 Article Number 135319 Published SEP 15 2024 Early Access JUL 2024 Indexed 2024-08-10 Document Type Article**

Abstract

Particulate matter pollution (PMP) has been identified as a substantial contributor to cancer. However, accurately delineating the evolving trends in cancer burden attributable to PMP remains an ongoing challenge. The 1990-2019 disability-adjusted life years (DALYs) were used for cancers attributable to PMP from the Global Burden and Disease Study (GBD) 2019, including ambient particulate matter pollution (APMP) and household air pollution from solid fuels (HAP). The joinpoint regression and the Bayesian age-period-cohort (BAPC) model were employed to assess the corresponding trends over the periods 1990-2019 and 2020-2050, respectively. Additionally, statistical models such as frontier analysis and health inequality analysis were also utilized. During the 30-year period, cancer DALYs attributable to APMP increased globally, while those attributable to HAP and PMP decreased. Cancer DALYs attributable to APMP were positively correlated with socio-demographic index (SDI), while those attributable to PMP and HAP were negatively correlated with SDI. Frontier analysis identified the countries and regions requiring urgent action to mitigate PMP-attributable cancer. Finally, it was anticipated that the cancer burden attributable to APMP would increase during 2020 to 2050, while the burden attributable to HAP and PMP would decrease. This study conducted an epidemiological investigation of the burden of cancer attributable to APMP, HAP and PMP in various regions and populations worldwide, providing epidemiological insights into the global burden of cancer attributable to PMP and guiding policy and research directions.

Keywords

Author Keywords

Particulate matter pollutionCancerEpidemiologyHealth inequalityGlobal Burden of Disease

Keywords Plus

TERM EXPOSUREAIR-POLLUTIONMORTALITY

Particulate Matter

2-Long-Term Exposure to Particulate Matter and Mortality: An Update of the WHO Global Air Quality Guidelines Systematic Review and Meta-Analysis

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By Orellano, P (Orellano, Pablo) [1] ; Kasdagli, MI (Kasdagli, Maria-Iosifina) [2] ; Velasco, RP (Perez Velasco, Roman) [3] ; Samoli, E (Samoli, Evangelia) [2] (provided by Clarivate) **Source INTERNATIONAL JOURNAL OF PUBLIC HEALTH Volume 69 DOI 10.3389/ijph.2024.1607683 Article Number 1607683 Published SEP 27 2024 Indexed 2024-10-17 Document Type Review**

Abstract

Objectives For the development of the 2021 global air quality guidelines, the World Health Organization (WHO) commissioned a series of systematic reviews and meta-analyses to assess the association between exposure to air pollution and all-cause and cause-specific mortality. One of these reviews, which we aim to update, focused on the effects of long-term exposure to PM2.5 and PM10 on all-cause and cause-specific mortality.Methods The protocol for this study was registered in PROSPERO (CRD42023425327). We searched the PubMed and Embase databases for studies published between September 2018 and May 2023. Study-specific effects were pooled using random-effects models.Results We included 106 studies in the meta-analysis, 46 studies from the previous review and 60 from this update. All exposure-outcome pairs analysed showed positive and significant associations, except for PM10 and cerebrovascular mortality. The certainty of the evidence was rated as high for the majority of exposure-outcome pairs.Conclusion We included a large number of new cohorts, and provided new concentration-response functions that will inform WHO advice on the use of this information for air pollution health risk assessments.

Keywords

Author Keywords

air pollutionparticulate mattermortalitysystematic reviewmeta-analysis

Keywords Plus

ALL-CAUSE MORTALITYCARDIOVASCULAR-DISEASEPOLLUTIONCOHORTPM2.5RISK

Particulate Matter

3-M-quantile regression shrinkage and selection via the Lasso and Elastic Net to assess the effect of meteorology and traffic on air quality

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By Ranalli, MG (Ranalli, M. Giovanna) [1] ; Salvati, N (Salvati, Nicola) [2] ; Petrella, L (Petrella, Lea) [3] ; Pantalone, F (Pantalone, Francesco) [4] (provided by Clarivate) **Source BIOMETRICAL JOURNAL Volume 65 Issue 8 DOI 10.1002/bimj.202100355 Published DEC 2023 Early Access SEP 2023 Indexed 2023-10-12 Document Type Article**

Abstract

In this work, we intersect data on size-selected particulate matter (PM) with vehicular traffic counts and a comprehensive set of meteorological covariates to study the effect of traffic on air quality. To this end, we develop an M-quantile regression model with Lasso and Elastic Net penalizations. This allows (i) to identify the best proxy for vehicular traffic via model selection, (ii) to investigate the relationship between fine PM concentration and the covariates at different M-quantiles of the conditional response distribution, and (iii) to be robust to the presence of outliers. Heterogeneity in the data is accounted by fitting a B-spline on the effect of the day of the year. Analytic and bootstrap-based variance estimates of the regression coefficients are provided, together with a numerical evaluation of the proposed estimation procedure. Empirical results show that atmospheric stability is responsible for the most significant effect on fine PM concentration: this effect changes at different levels of the conditional response distribution and is relatively weaker on the tails. On the other hand, model selection allows to identify the best proxy for vehicular traffic whose effect remains essentially the same at different levels of the conditional response distribution.

Keywords

Author Keywords

additive modelsB-splinescross-validationinfluence functionrobust regression

Keywords Plus

VARIABLE SELECTIONMODELSHETEROGENEITYSPLINES

Particulate Matter

4-The 2024 report of the Lancet Countdown on health and climate change: facing record-breaking threats from delayed action

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By Romanello, M (Romanello, Marina) [1] ; Walawender, M (Walawender, Maria) [1] ; Hsu, SC (Hsu, Shih-Che) [2] ; Moskeland, A (Moskeland, Annalyse) [9] ; Palmeiro-Silva, Y (Palmeiro-Silva, Yasna) [1] ; Scamman, D (Scamman, Daniel) [3] ; Ali, Z (Ali, Zakari) [10] ; Ameli, N (Ameli, Nadia) [3] ; Angelova, D (Angelova, Denitsa) [3] ; Ayeb-Karlsson, S (Ayeb-Karlsson, Sonja) [5] ; **(provided by Clarivate) Source LANCET Volume 404 Issue 10465 Page 1847-1896 DOI 10.1016/S0140- 736(24)01822-1 Published NOV 9 2024 Early Access NOV 2024 Indexed 2025-02-13 Document Type Review**

Keywords
Keywords Plus
ALL-CAUSE MORTALITYSEA-LEVEL RISEPARIS AGREEMENTNATURAL-GASFOOD INSECURITYSLEEP DURATIONHEATIMPACTSFUTUREMETAANALYSIS

Particulate Matter

5-Lung cancer in patients who have never smoked - an emerging disease

By LoPiccolo, J (LoPiccolo, Jaclyn) [1] , [2] ; Gusev, A (Gusev, Alexander) [1] , [3] ; Christiani, DC (Christiani, David C.) [4] , [5] ; Jänne, PA (Janne, Pasi A.) [1] , [2] **Source NATURE REVIEWS CLINICAL ONCOLOGY Volume 21 Issue 2 Page 121-146 DOI 10.1038/s41571-023-00844-0 Published FEB 2024 Early Access JAN 2024 Indexed 2024-01-17 Document Type Review**

Abstract

Lung cancer is the most common cause of cancer-related deaths globally. Although smoking-related lung cancers continue to account for the majority of diagnoses, smoking rates have been decreasing for several decades. Lung cancer in individuals who have never smoked (LCINS) is estimated to be the fifth most common cause of cancer-related deaths worldwide in 2023, preferentially occurring in women and Asian populations. As smoking rates continue to decline, understanding the aetiology and features of this disease, which necessitate unique diagnostic and treatment paradigms, will be imperative. New data have provided important insights into the molecular and genomic characteristics of LCINS, which are distinct from those of smoking-associated lung cancers and directly affect treatment decisions and outcomes. Herein, we review the emerging data regarding the aetiology and features of LCINS, particularly the genetic and environmental underpinnings of this disease as well as their implications for treatment. In addition, we outline the unique diagnostic and therapeutic paradigms of LCINS and discuss future directions in identifying individuals at high risk of this disease for potential screening efforts.

Lung cancer is a disease typically associated with tobacco smoking; however, lung cancer in individuals who have never smoked (LCINS) is estimated to be the fifth most common cause of cancer-related deaths globally. Moreover, smoking rates are declining around the world and therefore LCINS is likely to increase as a proportion of all lung cancers over time. Thus, understanding the aetiology and features of LCINS is increasingly important. Herein, the authors review the emerging data on the epidemiology, clinical characteristics and molecular features of LCINS as well as the genetic and environmental risk factors for this disease. They also summarize the unique diagnostic and management paradigms of LCINS.

The global incidence of lung cancer is decreasing in parallel with declining smoking rates in developed countries; however, the incidence of lung cancer in individuals who have never smoked (LCINS) is stable or increasing.LCINS is the eighth leading cause of cancer-related mortality in the USA and the fifth most common cause of cancer-related deaths worldwide.LCINS has histological and epidemiological distinctions from smoking-related lung cancers, occurring almost exclusively as adenocarcinomas and most commonly in women and individuals of Asian ancestry.LCINS are highly enriched for targetable oncogenic alterations, have low tumour mutational burden and low rates of PD-L1 positivity, and lack mutational signatures, even in patients who report passive, secondhand smoke exposure.LCINS development probably involves interactions between genetic risk, mediated by common and rare germline variants, and environmental exposures, including air pollution and particulate matter, with potential opportunities for broader lung cancer screening.In the era of precision oncology, the biological underpinnings of LCINS necessitate unique diagnostic and treatment paradigms and warrant consideration of this disease as an important and distinct clinical entity.

Keywords

Particulate Matter

Keywords Plus

GENOME-WIDE ASSOCIATIONGROWTH-FACTOR RECEPTORENVIRONMENTAL TOBACCO-SMOKEAMBIENT AIR-POLLUTIONHORMONE REPLACEMENT THERAPYFINE PARTICULATE MATTERCIGARETTE-SMOKINGRESIDENTIAL RADONUNITED-STATESLONG-TERM

Particulate Matter

6-Raman spectral optimization for soot particles: A comparative analysis of fitting models and machine learning enhanced characterization in combustion systems

By Chen, LF (Chen, Longfei) [1] , [2] ; Cao, Y (Cao, Yang) [1] ; Hu, XH (Hu, Xuehuan) [1] ; Zhang, B (Zhang, Bin) [2] ; Chen, XY (Chen, Xiaoyang) [1] ; Cui, BX (Cui, Boxuan) [1] ; Xu, J (Xu, Jun) [3] ; Yu, T (Yu, Tao) [1] , [4] ; Xu, Z (Xu, Zheng) [2] **(provided by Clarivate) Source BUILDING AND ENVIRONMENT Volume 271 DOI 10.1016/j.buildenv.2025.112600 Article Number 112600 Published MAR 1 2025 Early Access FEB 2025 Indexed 2025-02-23 Document Type Article**

Abstract

Investigating soot particles and indoor airborne particles is crucial in identifying the key factors influencing combustion processes, indoor air quality, and formulating more effective environmental policies. This study conducts an in-depth examination of the first-order Raman structures of soot particles derived from combustion sources, focusing on their Raman spectral fitting model of nanostructure characteristics. A systematic comparison of six Raman spectral fitting models for soot particles was performed, and machine learning algorithms were introduced to establish correction models, significantly improving the accuracy of La value calculations. The 3L2G model (D1, D2, and G bands using Lorentzian fitting, D3, and D4 bands using Gaussian fitting) demonstrated superior fitting quality and broader applicability compared to the conventional 4L1G model, offering a valuable tool for assessing indoor air quality. Furthermore, the application of Random Forest (RF), Support Vector Machine (SVM), and Linear Regression (LR) models enabled the effective handling of complex nonlinear relationships and high-dimensional feature spaces in Raman spectral analysis. Our results advocate that the choice of a fitting model, specifically the 3L2G technique, is vital for precise Raman spectral interpretation and a deeper understanding of soot particles' microstructures. This optimized analysis approach not only advances the characterization of soot particles but also provides a scientific basis for improving indoor air quality, combustion processes and environmental sustainability.

Keywords

Author Keywords

Raman spectroscopySoot crystalline structureFitting modelSoot particles

Keywords Plus

MINI-CAST SOOTMICROSPECTROSCOPIC ANALYSISPHYSICOCHEMICAL PROPERTIESPARTICULATE MATTERCHEMICAL-STRUCTURED-BANDSPECTROSCOPYDIESELNANOSTRUCTUREREACTIVITY

Particulate Matter

7-The 2023 China report of the *Lancet* Countdown on health and climate change: taking stock for athriving future

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By Zhang, SH (Zhang, Shihui) [27] ; Zhang, C (Zhang, Chi) [4] ; Cai, WJ (Cai, Wenjia) [27] ; Bai, YQ (Bai, Yuqi) [27] ; Callaghan, M (Callaghan, Max) [13] , [42] ; Chang, N (Chang, Nan) [14] ; Chen, B (Chen, Bin) [5] ; Chen, HQ (Chen, Huiqi) [22] ; Cheng, LL (Cheng, Liangliang) [22] ; Dai, HC (Dai, Hancheng) [16] ; **(provided by Clarivate) Source LANCET PUBLIC HEALTH Volume 8 Issue 12 Page E978-E995 DOI 10.1016/S2468-2667(23)00245-1 Published DEC 2023 Early Access NOV 2023 Indexed 2023-12-25 Document Type Article**

Abstract

With growing health risks from climate change and a trend of increasing carbon emissions from coal, it is time for China to take action. The rising frequency and severity of extreme weather events in China, such as record-high temperatures, low rainfall, severe droughts, and floods in many regions (along with the compound and ripple effects of these events on human health) have underlined the urgent need for health-centred climate action. The rebound in the country's coal consumption observed in 2022 reflected the great challenge faced by China in terms of its coal phase-down, over-riding the country's gains in reducing greenhouse gas (GHG) emissions. Timely and adequate responses will not only reduce or avoid the impacts of climate-related health hazards but can also protect essential infrastructures from disruptions caused by extreme weather. Health and climate change are inextricably linked, necessitating a high prioritisation of health in adaptation and mitigation efforts. The 2023 China report of the Lancet Countdown continues to track progress on health and climate change in China, while now also attributing the health risks of climate change to human activities and providing examples of feasible and effective climate solutions. This fourth iteration of the China report was spearheaded by the Lancet Countdown regional centre in Asia, based at Tsinghua University in Beijing, China. Progress is monitored across 28 indicators in five domains: from climate change impacts, exposures, and vulnerability (section 1); to the different elements of action, including adaption (section 2) and mitigation, and their health implications (section 3); to economics and finance (section 4); and public and political engagement (section 5). This report was compiled with the contribution of 76 experts from 26 institutions both within and outside of China. The impending global stocktake at the UN Framework Convention on Climate Change 28th Conference of the Parties (COP28), the UN initiative on early warning systems (which pledged to ensure the world was protected by the end of 2027), and China's action plans to reduce air pollutants and GHGs illustrate that global climate action has moved from talk to concrete plans. These initiatives could deliver major health benefits, but none of them explicitly list health as a policy target or indicator. The results of the global stocktake could guide health-focused and feasible interventions. The first Health Day and climate-health ministerial meeting that will be hosted at COP28 underline the trend to mainstream health in the global climate change agenda. Health risks arising from human-induced climate change, and production-based and consumption-based CO2 and ambient particulate matter (PM2 center dot 5) emissions (indicator 4.2.4) indicate the urgent need for mitigation by identifying human contributions to carbon emissions and climate change. Early warning systems for health risks (indicator 2.4) and the city-level human comfort index provide bottom-up examples of adaptation practices.

Particulate Matter

Keywords

Keywords Plus

PHYSICAL-ACTIVITY

Particulate Matter

8-Impacts of climate change on the fate of contaminants through extreme weather events

By Bolan, S (Bolan, Shiv) [1] , [2] , [3] ; Padhye, LP (Padhye, Lokesh P.) [4] ; Jasemizad, T (Jasemizad, Tahereh) [4] ; Govarthanan, M (Govarthanan, Muthusamy) [5] , [6] ; Karmegam, N (Karmegam, N.) [7] ; Wijesekara, H (Wijesekara, Hasintha) [8] ; Amarasiri, D (Amarasiri, Dhulmy) [8] ; Hou, DY (Hou, Deyi) [9] ; Zhou, PF (Zhou, Pingfan) [9] ; Biswal, BK (Biswal, Basanta Kumar) [10] ; **(provided by Clarivate) Source SCIENCE OF THE TOTAL ENVIRONMENT Volume 909 DOI 10.1016/j.scitotenv.2023.168388 Article Number 168388 Published JAN 20 2024 Early Access NOV 2023 Indexed 2024-02-04 Document Type Review**

Abstract

The direct impacts of climate change involve a multitude of phenomena, including rising sea levels, intensified severe weather events such as droughts and flooding, increased temperatures leading to wildfires, and unpredictable fluctuations in rainfall. This comprehensive review intends to examine firstly the probable consequences of climate change on extreme weather events such as drought, flood and wildfire. This review subsequently examines the release and transformation of contaminants in terrestrial, aquatic, and atmospheric environments in response to extreme weather events driven by climate change. While drought and flood influence the dynamics of inorganic and organic contaminants in terrestrial and aquatic environments, thereby influencing their mobility and transport, wildfire results in the release and spread of organic contaminants in the atmosphere. There is a nascent awareness of climate change's influence of climate change-induced extreme weather events on the dynamics of environmental contaminants in the scientific community and decision-making processes. The remediation industry, in particular, lags behind in adopting adaptive measures for managing contaminated environments affected by climate change-induced extreme weather events. However, recognizing the need for assessment measures represents a pivotal first step towards fostering more adaptive practices in the management of contaminated environments. We highlight the urgency of collaboration between environmental chemists and climate change experts, emphasizing the importance of jointly assessing the fate of contaminants and rigorous action to augment risk assessment and remediation strategies to safeguard the health of our environment.

Keywords

Author Keywords

Climate changeGreenhouse gas emissionsExtreme weather eventsFloods, droughts and wildfiresContaminantsTerrestrial, aquatic and atmospheric environments

Keywords Plus

POLYCYCLIC AROMATIC-HYDROCARBONSAIRBORNE PARTICULATE MATTERWILDFIRE IGNITION RISKURBAN AIR-POLLUTIONON-SNOW EVENTSSPATIAL-PATTERNSFOREST-FIREWILDLAND FIREHEAVY-METALSGIS ANALYSIS

Particulate Matter

9-Efficacy of China's clean air actions to tackle $PM_{2.5}$ pollution between 2013 and 2020

By Geng, GN (Geng, Guannan) [1] ; Liu, YX (Liu, Yuxi) [2] , [3] ; Liu, Y (Liu, Yang) [1] ; Liu, SG (Liu, Shigan) [2] ; Cheng, J (Cheng, Jing) [2] ; Yan, L (Yan, Liu) [1] ; Wu, NN (Wu, Nana) [2] ; Hu, HW (Hu, Hanwen) [1] ; Tong, D (Tong, Dan) [2] ; Zheng, B (Zheng, Bo) [4] ; (provided by Clarivate) **Source NATURE GEOSCIENCE Volume 17 Issue 10 DOI 10.1038/s41561-024-01540-z Published OCT 2024 Early Access SEP 2024 Indexed 2024-09-25 Document Type Article**

Abstract

Beginning in 2013, China launched two phases (2013-2017 and 2018-2020) of clean air actions that have led to substantial reductions in PM2.5 concentrations. However, improvement in PM2.5 pollution was notably slowing down during Phase II. Here we quantify the efficacy and drivers of PM2.5 improvement and evaluate the associated cost during 2013-2020 using an integrated framework that combines an emission inventory model, a chemical transport model and detailed cost information. We found that national population-weighted mean PM2.5 concentrations decreased by 19.8 mu g m(-3) and 10.9 mu g m(-3) in the two phases, and the contribution of clean air policies in Phase II (2.3 mu g m(-3) yr(-1)) was considerably lower than that of Phase I (4.5 mu g m(-3) yr(-1)), after excluding the impacts from meteorological condition changes and COVID-19 lockdowns. Enhanced structure transitions and targeted volatile organic compounds and NH3 reduction measures have successfully reduced emissions in Phase II, but measures focusing on the end-of-pipe control were less effective after 2017. From 2013 to 2020, PM2.5 abatement became increasingly challenging, with the average cost of reducing one unit of PM2.5 concentration in Phase II twice that of Phase I. Our results suggest there is a need for strengthened, well-balanced, emission control strategies for multi-pollutants.

Keywords

Keywords Plus

ANTHROPOGENIC EMISSIONSPARTICULATE MATTERGLOBAL BURDENTRENDSOZONEINVENTORIESSIMULATIONPOLLUTANTSDISEASEQUALITY

Particulate Matter

10-Substantially underestimated global health risks of current ozone pollution

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By Wang, Y (Wang, Yuan) [1] ; Yang, YJ (Yang, Yuanjian) [1] ; Yuan, QQ (Yuan, Qiangqiang) [2] ; Li, TW (Li, Tongwen) [3] ; Zhou, Y (Zhou, Yi) [1] ; Zong, L (Zong, Lian) [1] ; Wang, MY (Wang, Mengya) [1] ; Xie, ZY (Xie, Zunyi) [4] ; Ho, HC (Ho, Hung Chak) [5] ; Gao, M (Gao, Meng) [6] ; **(provided by Clarivate) Source NATURE COMMUNICATIONS Volume 16 Issue 1 DOI 10.1038/s41467-024-55450-0 Article Number 102 Published JAN 2 2025 Indexed 2025-01-11 Document Type Article**

Abstract

Existing assessments might have underappreciated ozone-related health impacts worldwide. Here our study assesses current global ozone pollution using the high-resolution (0.05 degrees) estimation from a geo-ensemble learning model, with key focuses on population exposure and all-cause mortality burden. Our model demonstrates strong performance, achieving a mean bias of less than -1.5 parts per billion against in-situ measurements. We estimate that 66.2% of the global population is exposed to excess ozone for short term (> 30 days per year), and 94.2% suffers from long-term exposure. Furthermore, severe ozone exposure levels are observed in Cropland areas, particularly over Asia. Importantly, the all-cause ozone-attributable deaths significantly surpass previous recognition from specific diseases worldwide. Notably, mid-latitude Asia (30 degrees N) and the western United States show high mortality burden, contributing substantially to global ozone-attributable deaths. Our study highlights current significant global ozone-related health risks and may benefit the ozone-exposed population in the future.

Keywords

Keywords Plus

AIR-QUALITYEXPOSURESATELLITEMORTALITYFIRESENSITIVITYNETWORKTRENDSFORESTMODIS

Particulate Matter

11-First close insight into global daily gapless 1 km $PM_{2.5}$ pollution, variability, and health impact

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By Wei, J (Wei, Jing) [1] ; Li, ZQ (Li, Zhanqing) [1] ; Lyapustin, A (Lyapustin, Alexei) [2] ; Wang, J (Wang, Jun) [3] ; Dubovik, O (Dubovik, Oleg) [4] ; Schwartz, J (Schwartz, Joel) [5] ; Sun, L (Sun, Lin) [6] ; Li, C (Li, Chi) [7] ; Liu, S (Liu, Song) [8] ; Zhu, T (Zhu, Tong) [9] **(provided by Clarivate) Source NATURE COMMUNICATIONS Volume 14 Issue 1 DOI 10.1038/s41467-023-43862-3 Article Number 8349 Published DEC 15 2023 Indexed 2024-01-08 Document Type Article**

Abstract

Here we retrieve global daily 1 km gapless PM2.5 concentrations via machine learning and big data, revealing its spatiotemporal variability at an exceptionally detailed level everywhere every day from 2017 to 2022, valuable for air quality monitoring, climate change, and public health studies. We find that 96%, 82%, and 53% of Earth's populated areas are exposed to unhealthy air for at least one day, one week, and one month in 2022, respectively. Strong disparities in exposure risks and duration are exhibited between developed and developing countries, urban and rural areas, and different parts of cities. Wave-like dramatic changes in air quality are clearly seen around the world before, during, and after the COVID-19 lockdowns, as is the mortality burden linked to fluctuating air pollution events. Encouragingly, only approximately one-third of all countries return to pre-pandemic pollution levels. Many nature-induced air pollution episodes are also revealed, such as biomass burning.

Keywords

Keywords Plus

AEROSOL OPTICAL DEPTHSHORT-TERM EXPOSUREPARTICULATE AIR-POLLUTIONSPATIAL-RESOLUTIONDAILY MORTALITYTIME-SERIESQUALITYCHINANO2DISEASE