Air Pollution

1- COVID-19 lockdowns cause global air pollution declines

By:
Venter, ZS (Venter, Zander S.) [1] ; Aunan, K (Aunan, Kristin) [2] ; Chowdhury, S (Chowdhury, Sourangsu) [3] ; Lelieveld, J (Lelieveld, Jos) [3] , [4]
View Web of Science ResearcherID and ORCID
(provided by Clarivate)

PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA
Volume
117
Issue
32
Page
18984-18990
DOI
10.1073/pnas.2006853117
Published
AUG 11 2020
Indexed
2020-09-01
Document Type
Article

Abstract

The lockdown response to coronavirus disease 2019 (COVID-19) has caused an unprecedented reduction in global economic and transport activity. We test the hypothesis that this has reduced tropospheric and ground-level air pollution concentrations, using satellite data and a network of >10,000 air quality stations. After accounting for the effects of meteorological variability, we find declines in the population-weighted concentration of ground-level nitrogen dioxide (NO2: 60% with 95% CI 48 to 72%), and fine particulate matter (PM2.5: 31%; 95% CI: 17 to 45%), with marginal increases in ozone (O-3: 4%; 95% CI: -2 to 10%) in 34 countries during lockdown dates up until 15 May. Except for ozone, satellite measurements of the troposphere indicate much smaller reductions, highlighting the spatial variability of pollutant anomalies attributable to complex NOx chemistry and long-distance transport of fine particulate matter with a diameter less than 2.5 mu m (PM2.5). By leveraging Google and Apple mobility data, we find empirical evidence for a link between global vehicle transportation declines and the reduction of ambient NO2 exposure. While the state of global lockdown is not sustainable, these findings allude to the potential for mitigating public health risk by reducing "business as usual" air pollutant emissions from economic activities. Explore trends here: https://nina.earthengine.app/view/lockdown-pollution.

Keywords

Air Pollution

Author Keywords
air qualityCOVID-19 confinementemissionsnitrogen dioxideparticulate matter
Keywords Plus
EMISSIONSQUALITYTROPOMICLIMATEREGIONOZONE

Air Pollution

3- IoT enabled environmental toxicology for air pollution monitoring using AI techniques

By:
Asha, P (Asha, P.) [1] ; Natrayan, L (Natrayan, L.) [2] ; Geetha, BT (Geetha, B. T.) [3] ; Beulah, JR (Beulah, J. Rene) [4] ; Sumathy, R (Sumathy, R.) [5] ; Varalakshmi, G (Varalakshmi, G.) [6] ; Neelakandan, S (Neelakandan, S.) [7]
View Web of Science ResearcherID and ORCID
(provided by Clarivate)

ENVIRONMENTAL RESEARCH
Volume
205
Article Number
112574
DOI
10.1016/j.envres.2021.112574
Published
APR 1 2022
Early Access
DEC 2021
Indexed
2022-01-13
Document Type
Article

Abstract

In past decades, the industrial and technological developments have increased exponentially and accompanied by non-judicial and un-sustainable utilization of non-renewable resources. At the same time, the environmental branch of toxicology has gained significant attention in understanding the effect of toxic chemicals on human health. Environmental toxic agents cause several diseases, particularly high risk among children, pregnant women, geriatrics and clinical patients. Since air pollution affects human health and results in increased morbidity and mortality increased the toxicological studies focusing on industrial air pollution absorbed by the common people. Therefore, it is needed to design an automated Environmental Toxicology based Air Pollution Monitoring System. To resolve the limitations of traditional monitoring system and to reduce the overall cost, this paper designs an IoT enabled Environmental Toxicology for Air Pollution Monitoring using Artificial Intelligence technique (ETAPM-AIT) to improve human health. The proposed ETAPM-AIT model includes a set of IoT based sensor array to sense eight pollutants namely NH3, CO, NO2, CH4, CO2, PM2.5, temperature and humidity. The sensor array measures the pollutant level and transmits it to the cloud server via gateways for analytic process. The proposed model aims to report the status of air quality in real time by using cloud server and sends an alarm in the presence of hazardous pollutants level in the air. For the classification of air pollutants and determining air quality, Artificial Algae Algorithm (AAA) based Elman Neural Network (ENN) model is used

as a classifier, which predicts the air quality in the forthcoming time stamps. The AAA is applied as a parameter tuning technique to optimally determine the parameter values of the ENN model. In-order to examine the air quality monitoring performance of the proposed ETAPM-AIT model, an extensive set of simulation analysis is performed and the results are inspected in 5, 15, 30 and 60 min of duration respectively. The experimental outcome highlights the optimal performance of the proposed ETAPM-AIT model over the recent techniques.

Keywords

Author Keywords

Air qualityHuman healthEnvironmental toxicologyArtificial intelligencePollution monitoringInternet of things

4- Drivers of PM2.5 air pollution deaths in China 2002-2017

By:
Geng, GN (Geng, Guannan) [1] ; Zheng, YX (Zheng, Yixuan) [2] , [3] ; Zhang, Q (Zhang, Qiang) [2] ; Xue, T (Xue, Tao) [2] ; Zhao, HY (Zhao, Hongyan) [1] ; Tong, D (Tong, Dan) [2] ; Zheng, B (Zheng, Bo) [4] ; Li, M (Li, Meng) [2] ; Liu, F (Liu, Fei) [1] ; Hong, CP (Hong, Chaopeng) [2] ; ...More
View Web of Science ResearcherID and ORCID
(provided by Clarivate)

NATURE GEOSCIENCE
Volume
14
Issue
9
Page
645-+
DOI
10.1038/s41561-021-00792-3
Published
SEP 2021
Early Access
JUL 2021
Indexed
2021-08-08
Document Type
Article

Abstract

Emission controls avoided some 870,000 deaths in China between 2002 and 2017 but further air quality improvements need energy-climate policies and changed economic structure, according to index decomposition analysis and chemical transport models.

Between 2002 and 2017, China's gross domestic product grew by 284%, but this surge was accompanied by a similarly prodigious growth in energy consumption, air pollution and air pollution-related deaths. Here we use a combination of index decomposition analysis and chemical transport modelling to quantify the relative influence of eight different factors on PM2.5-related deaths in China over the 15-year period from 2002 to 2017. We show that, over this period, PM2.5-related deaths increased by 0.39 million (23%) in China. Emission control technologies mandated by end-of-pipe control policies avoided 0.87 million deaths, which is nearly three-quarters (71%) of the deaths that would have otherwise occurred due to the country's increased economic activity. In addition, energy-climate policies and changes in economic structure have also became evident recently and together avoided 0.39 million deaths from 2012 to 2017, leading to a decline in total deaths after 2012, despite the increasing vulnerability of China's ageing population. As advanced end-of-pipe control measures have been widely implemented, such policies may

face challenges in avoiding air pollution deaths in the future. Our findings thus suggest that further improvements in air quality must not only depend on stringent end-of-pipe control policies but also be reinforced by energy-climate policies and continuing changes in China's economic structure.

Keywords

Keywords Plus

PARTICULATE MATTERANTHROPOGENIC EMISSIONSEAST-ASIATRENDSAEROSOLINVENTORYMETEOROLOGYIMPROVEMENTCHEMISTRYFRAMEWORK

Air Pollution

5- Sources of particulate-matter air pollution and its oxidative potential in Europe

By:
Daellenbach, KR (Daellenbach, Kaspar R.) [1] , [2] , [3] ; Uzu, G (Uzu, Gaelle) [4] ; Jiang, JH (Jiang, Jianhui) [1] ; Cassagnes, LE (Cassagnes, Laure-Estelle) [1] ; Leni, Z (Leni, Zaira) [5] ; Vlachou, A (Vlachou, Athanasia) [1] ; Stefenelli, G (Stefenelli, Giulia) [1] ; Canonaco, F (Canonaco, Francesco) [1] , [6] ; Weber, S (Weber, Samuel) [4] ; Segers, A (Segers, Arjo) [7] ; ...More
View Web of Science ResearcherID and ORCID
(provided by Clarivate)

NATURE
Volume
587
Issue
7834
Page
414-+
DOI
10.1038/s41586-020-2902-8
Published
NOV 19 2020
Indexed
2020-12-07
Document Type
Article

Abstract

Particulate matter is a component of ambient air pollution that has been linked to millions of annual premature deaths globally(1-3). Assessments of the chronic and acute effects of particulate matter on human health tend to be based on mass concentration, with particle size and composition also thought to play a part(4). Oxidative potential has been suggested to be one of the many possible drivers of the acute health effects of particulate matter, but the link remains uncertain(5-8). Studies investigating the particulate-matter components that manifest an oxidative activity have yielded conflicting results(7). In consequence, there is still much to be learned about the sources of particulate matter that may control the oxidative potential concentration(7). Here we use field observations and air-quality modelling to quantify the major primary and secondary sources of particulate matter and of oxidative potential in Europe. We find that secondary inorganic components, crustal material and secondary biogenic organic aerosols control the mass concentration of particulate matter. By contrast, oxidative potential concentration is associated mostly with anthropogenic sources, in particular with fine-mode secondary organic aerosols largely from residential biomass burning and coarse-mode metals from vehicular non-exhaust emissions. Our results suggest that mitigation strategies aimed at reducing the mass concentrations of particulate matter alone may not reduce the oxidative potential concentration. If the

oxidative potential can be linked to major health impacts, it may be more effective to control specific sources of particulate matter rather than overall particulate mass.

Observations and air-quality modelling reveal that the sources of particulate matter and oxidative potential in Europe are different, implying that reducing mass concentrations of particulate matter alone may not reduce oxidative potential.

Keywords

Keywords Plus

POSITIVE MATRIX FACTORIZATIONOXYGEN SPECIES GENERATIONSECONDARY ORGANIC AEROSOLSOURCE APPORTIONMENTCHEMICAL-COMPOSITIONDITHIOTHREITOL DTTAMBIENT AIRMULTILINEAR ENGINEMASS-SPECTROMETERELEMENTAL CARBON

Air Pollution

6- The short-term impacts of COVID-19 lockdown on urban air pollution in China

By:
He, GJ (He, Guojun) [1] ; Pan, YH (Pan, Yuhang) [2] ; Tanaka, T (Tanaka, Takanao) [3]
View Web of Science ResearcherID and ORCID
(provided by Clarivate)

NATURE SUSTAINABILITY
Volume
3
Issue
12
DOI
10.1038/s41893-020-0581-y
Published
DEC 2020
Early Access
JUL 2020
Indexed
2020-07-21
Document Type
Article

Abstract

To prevent the escalation of COVID-19 transmission, China locked down one-third of its cities, which strictly curtailed personal mobility and economic activities. Using comprehensive daily air quality data in China, we evaluated the impacts of these measures in terms of the Air Quality Index (AQI) and the concentrations of particulate matter with a diameter of less than 2.5 mu m (PM2.5). To infer their causal relationships, we employed difference-in-differences models that compare cities with and without lockdown policies. We found that city lockdowns led to a sizeable improvement in air quality. Within weeks, the AQI in the locked-down cities was brought down by 19.84 points (PM(2.5)down by 14.07 mu g m(-)(3)) relative to the control group. In addition, air quality in cities without formal lockdowns also improved because of the enforcement of other types of counter-virus measures. The AQI in those cities was brought down by 6.34 points (PM(2.5)down by 7.05 mu g m(-)(3)) relative to the previous year. The lockdown effects are larger in colder, richer and more industrialized cities. Despite these improvements, PM(2.5)concentrations during the lockdown periods remained four times higher than the World Health Organization recommendations, suggesting much further effort is needed. Existing environmental policies could obtain similar air quality improvements at a much lower economic cost, making city lockdowns an unsustainable option to address environmental issues.
Urban air quality remained remarkably worse than WHO recommended levels in cities during the first COVID-19 lockdown in China, despite substantial pollution reductions and the high costs of the measure.

Air Pollution

Keywords

Keywords Plus

SUSTAINED EXPOSURELIFE EXPECTANCYHEALTH

7- Unexpected air pollution with marked emission reductions during the COVID-19 outbreak in China

By:
Le, TH (Le, Tianhao) [1] ; Wang, Y (Wang, Yuan) [1] ; Liu, L (Liu, Lang) [2] , [3] ; Yang, JN (Yang, Jiani) [1] ; Yung, YL (Yung, Yuk L.) [1] ; Li, GH (Li, Guohui) [2] , [3] ; Seinfeld, JH (Seinfeld, John H.) [4] , [5]
View Web of Science ResearcherID and ORCID
(provided by Clarivate)

SCIENCE
Volume
369
Issue
6504
Page
702-+
DOI
10.1126/science.abb7431
Published
AUG 7 2020
Indexed
2020-08-26
Document Type
Article

Abstract

The absence of motor vehicle traffic and suspended manufacturing during the coronavirus disease 2019 (COVID-19) pandemic in China enabled assessment of the efficiency of air pollution mitigation. Up to 90% reduction of certain emissions during the city-lockdown period can be identified from satellite and ground-based observations. Unexpectedly, extreme particulate matter levels simultaneously occurred in northern China. Our synergistic observation analyses and model simulations show that anomalously high humidity promoted aerosol heterogeneous chemistry, along with stagnant airflow and uninterrupted emissions from power plants and petrochemical facilities, contributing to severe haze formation. Also, because of nonlinear production chemistry and titration of ozone in winter, reduced nitrogen oxides resulted in ozone enhancement in urban areas, further increasing the atmospheric oxidizing capacity and facilitating secondary aerosol formation.

Keywords
Keywords Plus
MEXICO-CITYMODELING SYSTEMAPEC BLUEAEROSOLSHAZEHONOPHOTOCHEMISTRYGASES

8- Association between short-term exposure to air pollution and COVID-19 infection: Evidence from China

By:
Zhu, YJ (Zhu, Yongjian) [1] ; Xie, JG (Xie, Jingui) [2] , [3] ; Huang, FM (Huang, Fengming) [2] ; Cao, LQ (Cao, Liqing) [2]
View Web of Science ResearcherID and ORCID
(provided by Clarivate)

SCIENCE OF THE TOTAL ENVIRONMENT
Volume
727
Article Number
138704
DOI
10.1016/j.scitotenv.2020.138704
Published
JUL 20 2020
Indexed
2020-07-20
Document Type
Article

Abstract

The novel coronavirus pneumonia, namely COVID-19, has become a global public health problem. Previous studies have found that air pollution is a risk factor for respiratory infection by carrying microorganisms and affecting body's immunity. This study aimed to explore the relationship between ambient air pollutants and the infection caused by the novel coronavirus. Daily confirmed cases, air pollution concentration and meteorological variables in 120 cities were obtained from January 23, 2020 to February 29, 2020 in China. We applied a generalized additive model to investigate the associations of six air pollutants (PM2.5, PM10, SO2, CO, NO2 and O-3) with COVID-19 confirmed cases. We observed significantly positive associations of PM2.5, PM10, NO2 and O-3 in the last two weeks with newly COVID-19 confirmed cases. A 10-mu g/m(3) increase (lag0-14) in PM2.5, PM10, NO2, and O-3 was associated with a 2.24% (95% CI: 1.02 to 3.46), 1.76% (95% CI: 0.89 to 2.63), 6.94% (95% CI: 2.38 to 11.51), and 4.76% (95% CI: 1.99 to 7.52) increase in the daily counts of confirmed cases, respectively. However, a 10-mu g/m(3) increase (lag0-14) in SO2 was associated with a 7.79% decrease (95% CI: -14.57 to -1.01) in COVID-19 confirmed cases. Our results indicate that there is a significant relationship between air pollution and COVID-19 infection, which could partially explain the effect of national lockdown and provide implications for the control and prevention of this novel disease. (C) 2020 Elsevier B.V. All rights reserved.

Keywords

Air Pollution

Author Keywords

Air pollutionNovel coronavirus pneumoniaCOVID-19Generalized additive model

Keywords Plus

DAILY HOSPITAL ADMISSIONSCARDIOVASCULAR-DISEASESVIRUCIDAL PROPERTIESTIME-SERIESLIGHTSO2

9- Nexus between air pollution and NCOV-2019 in China: Application of negative binomial regression analysis

By:
Iqbal, W (Iqbal, Wasim) [1] ; Tang, YM (Tang, Yuk Ming) [2] , [3] ; Chau, KY (Chau, Ka Yin) [3] ; Irfan, M (Irfan, Muhammad) [4] , [5] ; Mohsin, M (Mohsin, Muhammad) [6]
View Web of Science ResearcherID and ORCID
(provided by Clarivate)

PROCESS SAFETY AND ENVIRONMENTAL PROTECTION
Volume
150
Page
557-565
DOI
10.1016/j.psep.2021.04.039
Published
JUN 2021
Early Access
MAY 2021
Indexed
2021-06-11
Document Type
Article

Abstract

On a global scale, the epidemic of the novel coronavirus (NCOV-2019) has become a major issue that is seriously harming human health and impairing the environment's quality. The current study examines the association between air pollution and NCOV-2019 in China, where cases of NCOV-2019 are correlated with deaths in public databases with data on air pollution tracked at multiple locations in different provinces of China. A negative binomial regression (NBR) model was applied to examine the difference between the number of people infected with NCOV-2019 and the number of deaths in China. The findings show that, after population density regulation, there is a positive connection between air pollutants concentration (particularly nitrogen dioxide) and the number of NCOV-2019 cases and deaths. Furthermore, PM2.5 is the key cause of NCOV-2019 cases and deaths in China. The results indicate that a 1% increase in the average of PM2.5 was correlated with an increase of 11.67 % in NCOV-2019 cases and a rise of 18 % in NCOV-2019 deaths. We concluded that a slight rise in air pollution has caused the number of NCOV-2019 cases and deaths to increase dramatically. This research provides a basis for future policies affected by this pandemic in terms of health and pollution.

Keywords
Author Keywords
COVID-19Air pollutionPM25SO2PM10NO2O3Negative binomial regression
Keywords Plus
TERM EXPOSURECOVID-19POISSONDESIGN

Air Pollution

10- The spatial spillover effect and nonlinear relationship analysis between environmental decentralization, government corruption and air pollution: Evidence from China

By:
Hao, Y (Hao, Yu) [1] , [2] , [3] , [4] , [5] ; Gai, ZQ (Gai, Zhiqiang) [1] ; Yan, GP (Yan, Guanpeng) [6] ; Wu, HT (Wu, Haitao) [1] , [2] ; Irfan, M (Irfan, Muhammad) [1]
View Web of Science ResearcherID and ORCID
(provided by Clarivate)

SCIENCE OF THE TOTAL ENVIRONMENT
Volume
763
Article Number
144183
DOI
10.1016/j.scitotenv.2020.144183
Published
APR 1 2021
Indexed
2021-02-10
Document Type
Article

Abstract

The massive development of the Chinese economy is being hindered by the deteriorating air pollution problem. Many methods have been used by the Chinese government to solve this environmental dilemma, out of which environmental decentralization is one of the important measures. The transparency of environmental decentralization may be weakened by the existence of the corruption problem, resulting in further deterioration of the air pollution problem. To examine this problem, the provincial panel data of 30 provinces in China from 2005 to 2016 is selected and the spatial measurement method is used to study the relationship between environmental decentralization, government corruption, and air pollution. The results indicate that air pollution in different provinces of China is spatially dependent. Local environmental decentralization has a significant inhibitory effect on air pollution, while local air pollution is not inhibited by neighbor's environmental decentralization. However, air quality is significantly deteriorated by local or neighbor's corruption problem. After adding the interaction item of environmental decentralization and government corruption as the adjusting variable, it is found that the inhibitory effect of local environmental decentralization on air pollution is weakened by the problem of local government corruption, while the government corruption of neighbor does not have this effect. In addition, both local and neighbor's environmental decentralization have heterogeneous effects on air pollution from the spatial dynamic threshold regression results with regional corruption as the threshold variable.

Air Pollution

Keywords
Author Keywords
Environmental decentralizationCorruptionAir pollutionSpatial econometric modelSpatial dynamic threshold regression
Keywords Plus
FISCAL DECENTRALIZATIONMARKET-SEGMENTATIONENERGY-CONSUMPTIONIMPACTPERFORMANCECOMPETITIONPOLICIESINNOVATIONEMISSIONSSTRATEGY

11- The asymmetric nexus between air pollution and COVID-19: Evidence from a non-linear panel autoregressive distributed lag model

By:
Wen, C (Wen, Chen) [1] ; Akram, R (Akram, Rabia) [2] ; Irfan, M (Irfan, Muhammad) [3] , [4] , [5] ; Iqbal, W (Iqbal, Wasim) [6] ; Dagar, V (Dagar, Vishal) [7] ; Acevedo-Duqued, A (Acevedo-Duqued, Angel) [8] ; Saydaliev, HB (Saydaliev, Hayot Berk) [9] , [10]
View Web of Science ResearcherID and ORCID
(provided by Clarivate)

ENVIRONMENTAL RESEARCH
Volume
209
Article Number
112848
DOI
10.1016/j.envres.2022.112848
Published
JUN 2022
Indexed
2022-02-25
Document Type
Article

Abstract

The emergence of a new coronavirus (COVID-19) has become a major global concern that has damaged human health and disturbing environmental quality. Some researchers have identified a positive relationship between air pollution (fine particulate matter PM2.5) and COVID-19. Nonetheless, no inclusive investigation has comprehensively examined this relationship for a tropical climate such as India. This study aims to address this knowledge gap by investigating the nexus between air pollution and COVID-19 in the ten most affected Indian states using daily observations from 9th March to September 20, 2020. The study has used the newly developed Hidden Panel Cointegration test and Nonlinear Panel Autoregressive Distributed Lag (NPARDL) model for asymmetric analysis. Empirical results illustrate an asymmetric relationship between PM2.5 and COVID-19 cases. More precisely, a 1% change in the positive shocks of PM2.5 increases the COVID-19 cases by 0.439%. Besides, the estimates of individual states expose the heterogeneous effects of PM2.5 on COVID-19. The asymmetric causality test of Hatemi-J's (2011) also suggests that the positive shocks on PM2.5 Granger-cause positive shocks on COVID19 cases. Research findings indicate that air pollution is the root cause of this outbreak; thus, the government should recognize this channel and implement robust policy guidelines to control the spread of environmental pollution.

Keywords

Air Pollution

Author Keywords
Asymmetric effectsAir pollutionPM2.5COVID-19Hidden panel cointegrationNon-linear panel ARDL
Keywords Plus
ECONOMIC-GROWTHENERGY-CONSUMPTIONCOUNTRIESEMISSIONSIMPACTRISK

Air Pollution

12- A step toward reducing air pollution in top Asian economies: The role of green energy, eco-innovation, and environmental taxes

By:
Chien, FS (Chien, Fengsheng) [1] , [2] ; Sadiq, M (Sadiq, Muhammad) [3] ; Nawaz, MA (Nawaz, Muhammad Atif) [4] ; Hussain, MS (Hussain, Muhammed Sajjad) [5] ; Tran, TD (Tran, Tai Duc) [6] ; Le Thanh, T (Le Thanh, Tiep) [7]
View Web of Science ResearcherID and ORCID
(provided by Clarivate)

JOURNAL OF ENVIRONMENTAL MANAGEMENT
Volume
297
Article Number
113420
DOI
10.1016/j.jenvman.2021.113420
Published
NOV 1 2021
Early Access
JUL 2021
Indexed
2021-09-10
Document Type
Article

Abstract

Environmental degradation is significantly studied both in the past and the current literature; however, steps towards reducing the environmental pollution in carbon emission and haze pollution like PM2.5 are not under rational attention. This study tries to cover this gap while considering the carbon emission and PM2.5 through observing the role of renewable energy, non-renewable energy, environmental taxes, and ecological innovation for the top Asian economies from 1990 to 2017. For analysis purposes, this research considers cross-sectional dependence analysis, unit root test with and without structural break (Pesaran, 2007), slope heterogeneity analysis, Westerlund and Edgerton (2008) panel cointegration analysis, Banerjee and Carrion-i-Silvestre (2017) cointegration analysis, long-short run CS-ARDL results, as well as AMG and CCEMG for robustness check. The empirical evidence in both the short- and long-run has confirmed the negative and significant effect of renewable energy sources, ecological innovation, and environmental taxes on carbon emissions and PM2.5. Whereas, nonrenewable energy sources are causing environmental degradation in the targeted economies. Finally, various policy implications related to carbon emission and haze pollution like PM2.5 are also provided to control their harmful effect on the natural environment.

Air Pollution

Keywords
Author Keywords
Carbon emissionsPM25Renewable energyEnvironmental taxesAsian
Keywords Plus
NONRENEWABLE ENERGYRENEWABLE ENERGYCARBON EMISSIONCO2 EMISSIONSCOINTEGRATIONSUSTAINABILITYELECTRICITYNEXUS

13- High health expenditures and low exposure of population to air pollution as critical factors that can reduce fatality rate in COVID-19 pandemic crisis: a global analysis

By:
Coccia, M (Coccia, Mario) [1]
View Web of Science ResearcherID and ORCID
(provided by Clarivate)

ENVIRONMENTAL RESEARCH
Volume
199
Article Number
111339
DOI
10.1016/j.envres.2021.111339
Published
AUG 2021
Early Access
MAY 2021
Indexed
2021-07-08
Document Type
Article

Abstract

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 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 environmental sustainability that can reduce fatality rate of infectious diseases in society.

Keywords
Author Keywords

COVID-19Case fatality ratesInfected peopleHealth expendituresHealth policyHealth systemsAir pollutionCrisis managementEnvironmental sustainability

Keywords Plus

RESPONSESEVOLUTIONLOCKDOWNIMPACTSPM2.5