Supplemental information

An overview and thematic analysis of research on cities and the COVID-19 pandemic: Toward just, resilient, and sustainable urban planning and design

Ayyoob Sharifi
Table S1. Top 50 most influential references on cities and COVID-19, related to Figure 3.

| Title                                                                 | Source                              | Citations | Total link strength |
|-----------------------------------------------------------------------|-------------------------------------|-----------|---------------------|
| Effect of restricted emissions during COVID-19 on air quality in India | Science of the Total Environment    | 172       | 1409                |
| Changes in air quality during the lockdown in Barcelona (Spain) one month into the SARS-CoV-2 epidemic | Science of the Total Environment    | 159       | 1249                |
| Effect of lockdown amid COVID-19 pandemic on air quality of the megacity Delhi, India | Science of the Total Environment    | 151       | 1211                |
| The effect of human mobility and control measures on the COVID-19 epidemic in China | Science of the Total Environment    | 151       | 1211                |
| COVID-19 pandemic and environmental pollution: A blessing in disguise? | Science of the Total Environment    | 121       | 959                 |
| The effect of travel restrictions on the spread of the 2019 novel coronavirus (COVID-19) outbreak | Science of the Total Environment    | 118       | 331                 |
| The impact of COVID-19 partial lockdown on the air quality of the city of Rio de Janeiro, Brazil | Science of the Total Environment    | 116       | 1061                |
| COVID-19 pandemic: Impacts on the air quality during the partial lockdown in São Paulo state, Brazil | Science of the Total Environment    | 112       | 1017                |
| The COVID-19 pandemic: Impacts on cities and major lessons for urban planning, design, and management | Science of the Total Environment    | 111       | 227                 |
| Severe air pollution events not avoided by reduced anthropogenic activities during COVID-19 outbreak | Science of the Total Environment    | 110       | 704                 |
| An investigation of transmission control measures during the first 50 days of the COVID-19 epidemic in China | Science of the Total Environment    | 95        | 347                 |
| Does lockdown reduce air pollution? Evidence from 44 cities in northern China | Science of the Total Environment    | 93        | 820                 |
| Lockdown for CoViD-2019 in Milan: What are the effects on air quality? | Science of the Total Environment    | 93        | 808                 |
| Indirect effects of COVID-19 on the environment | Science of the Total Environment    | 93        | 610                 |
| Aerosol and surface stability of HCoV-19 (SARS-CoV-2) compared to SARS-CoV-1 | The New England Journal of Medicine | 91        | 267                 |
| Association between short-term exposure to air pollution and COVID-19 infection: Evidence from China | Science of the Total Environment    | 88        | 611                 |
| Amplified ozone pollution in cities during the COVID-19 lockdown | Science of the Total Environment    | 87        | 735                 |
| The effect of COVID-19 and subsequent social distancing on travel behavior | Transportation Research             | 83        | 250                 |
| Title                                                                 | Journal                                                                 | Volume | Issue |
|----------------------------------------------------------------------|-------------------------------------------------------------------------|--------|-------|
| Assessing nitrogen dioxide (NO2) levels as a contributing factor to coronavirus (COVID-19) fatality | Interdisciplinary Perspectives Science of the Total Environment          | 83     | 612   |
| Does Density Aggravate the COVID-19 Pandemic?                         | Journal of the American Planning Association                             | 81     | 131   |
| Assessing air quality changes in large cities during COVID-19 lockdowns: The impacts of traffic-free urban conditions in Almaty, Kazakhstan | Science of the Total Environment                                          | 78     | 780   |
| Temporary reduction in daily global CO2 emissions during the COVID-19 forced confinement | Nature Climate Change                                                    | 78     | 374   |
| Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China | The Lancet                                                               | 77     | 297   |
| COVID-19 as a factor influencing air pollution?                        | Environmental Pollution                                                  | 76     | 677   |
| Impact of Coronavirus Outbreak on NO2 Pollution Assessed Using TROPOMI and OMI Observations | Geophysical Research Letters                                             | 74     | 487   |
| Changes in U.S. air pollution during the COVID-19 pandemic             | Science of the Total Environment                                          | 71     | 576   |
| Antivirus-built environment: Lessons learned from Covid-19 pandemic    | Sustainable Cities and Society Environmental Pollution                  | 71     | 163   |
| Can atmospheric pollution be considered a co-factor in extremely high level of SARS-CoV-2 lethality in Northern Italy? | Environmental Pollution                                                  | 69     | 450   |
| COVID-19 lockdowns cause global air pollution declines                | PNAS                                                                    | 69     | 522   |
| A preliminary assessment of the impact of COVID-19 on environment – A case study of China | Science of the Total Environment                                          | 69     | 578   |
| A Novel Coronavirus from Patients with Pneumonia in China, 2019        | The New England Journal of Medicine The Lancet Infectious Diseases       | 68     | 302   |
| An interactive web-based dashboard to track COVID-19 in real time      |                                                                         | 67     | 111   |
| Effects of temperature variation and humidity on the death of COVID-19 in Wuhan, China | Science of the Total Environment                                          | 65     | 350   |
| The socio-economic implications of the coronavirus pandemic (COVID-19): A review | International Journal of Surgery                                         | 65     | 114   |
| Air quality changes during the COVID-19 lockdown over the Yangtze River Delta Region: An insight into the impact of human activity pattern changes on air pollution variation | Science of the Total Environment                                          | 64     | 551   |
| Title                                                                 | Journal                              | Volume | Page |
|----------------------------------------------------------------------|--------------------------------------|--------|------|
| Correlation between weather and Covid-19 pandemic in Jakarta, Indonesia | Science of the Total Environment     | 64     | 428  |
| The Management Transformation of Huawei From Humble Beginnings to Global Leadership | Cambridge University Press          | 64     | 306  |
| Effects of the COVID-19 Lockdown on Urban Mobility: Empirical Evidence from the City of Santander (Spain) | Sustainability                       | 62     | 254  |
| Association between ambient temperature and COVID-19 infection in 122 cities from China | Science of the Total Environment     | 62     | 340  |
| Nowcasting and forecasting the potential domestic and international spread of the 2019-nCoV outbreak originating in Wuhan, China: a modelling study | The Lancet                           | 61     | 177  |
| Decline in PM 2.5 concentrations over major cities around the world associated with COVID-19 | Environmental Research               | 58     | 525  |
| Correlation between climate indicators and COVID-19 pandemic in New York, USA | Science of the Total Environment     | 56     | 410  |
| Impact of Covid-19 lockdown on PM10, SO2 and NO2 concentrations in Salé City (Morocco) | Science of the Total Environment     | 56     | 524  |
| A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster | The Lancet                           | 55     | 165  |
| Role of the chronic air pollution levels in the Covid-19 outbreak risk in Italy | Environmental Pollution              | 55     | 397  |
| Modal share changes due to COVID-19: The case of Budapest | Transportation Research Interdisciplinary Perspectives | 54     | 252  |
| Unexpected air pollution with marked emission reductions during the COVID-19 outbreak in China | Science                              | 54     | 374  |
| The short-term impacts of COVID-19 lockdown on urban air pollution in China | Nature Sustainability                 | 53     | 379  |
| Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus–Infected Pneumonia | The New England Journal of Medicine  | 53     | 121  |
| COVID-19 and Public Transportation: Current Assessment, Prospects, and Research Needs | Journal of Public Transportation     | 53     | 124  |
Table S2. Top 20 most influential journals contributing to the literature on cities and COVID-19, related to Figure 4.

| Source                                                      | Citations | Total link strength |
|-------------------------------------------------------------|-----------|---------------------|
| Science of the Total Environment                            | 5393      | 132029              |
| Sustainability                                              | 1731      | 34953               |
| Lancet                                                      | 1422      | 30504               |
| International Journal of Environmental Research and Public Health | 1270      | 32803               |
| Atmospheric Environment                                     | 1229      | 42203               |
| Science                                                     | 1127      | 25606               |
| Plos One                                                    | 982       | 20508               |
| Sustainable Cities and Society                              | 954       | 25301               |
| Atmospheric Chemistry and Physics                           | 883       | 31127               |
| Proceedings of the National Academy of Sciences of the United States of America | 856       | 21589               |
| Environmental Pollution                                     | 850       | 30786               |
| Nature                                                      | 827       | 18800               |
| Environmental Research                                      | 784       | 26949               |
| The New England Journal of Medicine                         | 678       | 14399               |
| Landscape and Urban Planning                                | 609       | 16767               |
| The Journal of the American Medical Association             | 589       | 10511               |
| Cities                                                      | 585       | 11700               |
| Journal of Cleaner Production                               | 578       | 14388               |
| Aerosol and Air Quality Research                            | 577       | 20977               |
| Transport Policy                                            | 558       | 14387               |
Table S3. Top 20 most influential authors contributing to the literature on cities and COVID-19, related to Figure 4.

| Author                          | Citations | Total link strength |
|---------------------------------|-----------|---------------------|
| Sharma, S                       | 190       | 1579                |
| Tobias, A                       | 186       | 1457                |
| Mahato, S                       | 163       | 1335                |
| Sharifi, A                      | 155       | 404                 |
| Kraemer, Mug                    | 150       | 459                 |
| Venter, ZS                      | 138       | 665                 |
| Hamidi, S                       | 131       | 211                 |
| Muhammad, S                     | 122       | 1034                |
| Nakada, LYK                     | 121       | 1109                |
| Coccia, M                       | 120       | 634                 |
| Wang, PF                        | 120       | 843                 |
| Chinazzi, M                     | 119       | 375                 |
| Dantas, G                       | 118       | 1102                |
| Kumar, P                        | 118       | 888                 |
| Sicard, P                       | 117       | 850                 |
| Wang, Q                         | 113       | 796                 |
| Zambrano-monserrate, MA         | 112       | 814                 |
| Collivignarelli, MC             | 107       | 909                 |
| Wu, X                           | 107       | 511                 |
| Liu, Y                          | 105       | 346                 |
Figure S1. Countries that have contributed more to research on COVID-19 and cities. Larger node size indicates more contribution to the literature and link thickness is proportional to the strength of the connection between two countries. Countries are divided into three clusters based on their level of research collaboration.
Figure S2. Institutions that have contributed more to research on COVID-19 and cities, related to Table S4. Larger node size indicates more contribution to the literature and link thickness is proportional to the strength of the connection between two institutions. Institutions are divided into three clusters based on their level of research collaboration.
Table S4. List of major institutions contributing to the literature on cities and COVID-19, related to Figure S2.

| Organization                           | Documents | Citations | Total link strength |
|----------------------------------------|-----------|-----------|---------------------|
| University of Hong Kong                | 38        | 2841      | 6968                |
| University of Oxford                   | 16        | 1002      | 3612                |
| Harvard University                     | 16        | 960       | 5224                |
| Peking University                      | 21        | 943       | 5677                |
| Tsinghua University                    | 20        | 869       | 4592                |
| University of Southampton              | 14        | 821       | 4366                |
| Beijing Normal University              | 11        | 765       | 3105                |
| Chinese Academy of Sciences            | 50        | 720       | 13191               |
| National Research Council (Italy)      | 17        | 554       | 3517                |
| University of Cambridge                | 22        | 467       | 3989                |
Table S5. The search string, related to STAR Methods.

| 1 | TS=(("covid" OR "coronavirus" OR "corona" OR "pandemic" OR "SARS-CoV-2" OR "Global Health Crisis" OR "epidemic") AND ("urban plan" OR "spatial plan" OR "neighborhood plan" OR "urban neighborhood plan" OR "urban design" OR "city plan" OR "town plan" OR "urban manage" OR "neighborhood design" OR "neighborhood plan") AND ("urban planning" OR "urban design" OR "urban studies") OR "urbanist" OR "sustainable urban" OR "sustainable urban design" OR "resilient cit" OR "urban resilient" OR "post-pandemic city" OR "post-corona city" OR "post-covid city" OR "smart city" OR "smart technology" OR "smart solution" OR "future of city" OR "urban future" OR "urban lifestyle" OR "urban place" OR "Urban space" OR "urban experience" OR "urban life" OR "urban living" OR "compact city" OR "compact urban" OR "urban compact" OR "urban sprawl" OR "urban growth" OR "urban expansion" OR "suburban development" OR "suburb" OR "peri-urban" OR "peri urban" OR "population density" OR "residential density" OR "city size" OR "outdoor space" OR "public space" OR "street reallocation" OR "street re-allocation" OR "street design" OR "built environment" OR "built areas" OR "built-up areas" OR "urban-rural" OR "urban rural" OR "rural-urban" OR "rural urban" OR "public transport" OR "active transport" OR "park use" OR "park visit" OR "access to open space" OR "access to outside space" OR "residential preference" OR "residential choice" OR "residential perception" OR "urban perception" OR "urban preference" OR "touristcit" OR "urban infrastructure" OR "greening of cities" OR "bike-sharing"))) |
| 2 | TS=(("covid" OR "coronavirus" OR "corona" OR "pandemic" OR "SARS-CoV-2" OR "Global Health Crisis" OR "epidemic") AND (("urban" OR "city" OR "cities" OR "built environment" OR "neighborhood" OR "town" OR "district" OR "metropolis") NEAR/8 ("spatial disparity" OR "open space" OR "socio-economic" OR "density" OR "street" OR "transport" OR "transit" OR "mobility" OR "bicycle" OR "bike" OR "cycling" OR "pedestrian" OR "social impact" OR "equity" OR "poverty" OR "poor" OR "inequality" OR "marginalization" OR "justice" OR "minority" OR "refugee" OR "homeless" OR "immigrant" OR "income" OR "park" OR "preference" OR "choice" OR "perception" OR "preference" OR "climate" OR "environment" OR "pollution" OR "air" OR "water" OR "economy" OR "business" OR "supply chain" OR "tourism" OR "green" OR "recovery" OR "governance" OR "nature" OR "health" OR "forest" OR "ecosystem" OR "food" OR "agriculture" OR "vulnerability" OR "services" OR "emission" OR "resident"))) |
| 3 | #2 OR #1 and 2021 or 2022 or 2020 (Publication Years) |
Figure S3. The PRISMA flowchart for literature identification, screening, and selection (Adapted from Page et al. (2021)), related to STAR Methods.
References

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., . . . Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*, 372, n71. https://doi.org/10.1136/bmj.n71