Examining the Intersection of
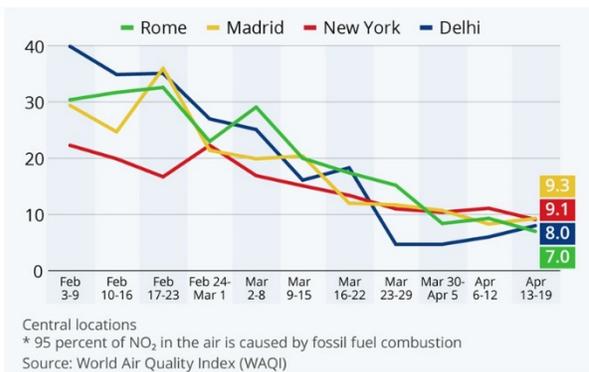# Air Pollution Exposure and COVID-19
Five HEI Studies Funded Under RFA 20-1B

The COVID-19 pandemic has challenged public health across the globe. It has also created unprecedented conditions that call for timely and novel air pollution research aimed at exploring just what may or may not be exacerbating the pandemic, and other key policy-relevant questions. Stay-at-home orders have reduced traffic volumes and industrial productivity, resulting in lower emissions and possibly benefits to human health. At the same time, important questions ─ and some early analyses ─ have surfaced about possible relationships between air pollution exposure and susceptibility to the effects of COVID-19 infections, although such links remain unclear.

HEI expects to make a valuable contribution to this rapidly expanding new field of research with the launch of five new studies funded after rigorous competition under RFA 20-1B, "Air Pollution, Covid-19, and Human Health." These studies in the United States, Europe, and Asia will focus on two key areas:

Nitrogen dioxide levels during February-April 2020
Central locations
* 95 percent of NO₂ in the air is caused by fossil fuel combustion
Source: World Air Quality Index (WAQI)
Statista graphic: Creative Commons License CC BY-ND 3.0

• Accountability studies will evaluate how interventions to control the pandemic may have impacted emissions, air pollution, and human health.

• Susceptibility studies will evaluate how air pollution exposure may impact the COVID-19 disease course, as well as differences in health outcomes by race, ethnicity, and socioeconomic status.

Accountability

Kai Chen of Yale University and colleagues will conduct a multicountry study to evaluate whether changes in mortality are associated with changes in ambient NO_2 and $PM_{2.5}$ levels before, during, and after the lockdown and disentangle the short-term effects of NO_2 versus $PM_{2.5}$ on mortality. The analysis will be conducted in four countries: China, Germany, Italy, and the United States.

Susceptibility

Zorana Andersen of the University of Copenhagen and colleagues will investigate whether exposure to air pollution increases the risk of severe COVID-19 outcomes, and identify the most susceptible groups by socioeconomic status, ethnicity, and comorbidities. Between March and December 2020, the

investigators followed more than 3 million adults in Denmark. They will evaluate whether long- (40 years) and short- (1 year) term exposure to several common air pollutants increased the risk of COVID-19 hospitalization and mortality.

Michael Kleeman of the University of California–Davis and colleagues will study the chronic and acute effects of air pollution exposure on COVID-19 incidence, mortality, and long-term complications, including onset of disease formation. Long- (2017–2018) and short- (2020) term exposures will be linked to a large medical records database in Southern California, with assessments at both the neighborhood and individual level.

Shutterstock

Jeanette Stingone of Columbia University and colleagues will conduct a retrospective evaluation of the interactions between long-term exposure to air pollution and neighborhood vulnerability to adverse COVID-19 outcomes. They will investigate both single and multipollutant air pollution exposures in relation to COVID-19 hospitalization, inpatient length of stay, ICU admission, ventilator use, and death among a racially diverse population in New York City.

Cathryn Tonne of ISGlobal and colleagues will test whether long- or short-term exposure to air pollution increases the risk of COVID-19 hospital admissions or mortality and identify vulnerable subgroups among 6 million residents of Catalonia, Spain. They will link air pollution exposures to residents' addresses and inpatient and outpatient electronic medical records.

These one- and two-year studies will be underway early in 2021 under intensive oversight and quality assurance from HEI. For more information contact Hanna Boogaard or Eva Tanner.