Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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As the COVID-19 pandemic spreads, emerging evidence suggests that underlying health conditions influence the vulnerability of individuals and communities. Comorbidities identified as risk factors include cardiovascular and chronic pulmonary diseases. Initial findings from the US suggest that these conditions exacerbate the severity of COVID-19 symptoms and significantly increase mortality rates (CDC COVID-19 Response Team, Preliminary Estimates of the Prevalence of Selected Underlying Health Conditions Among Patients with Coronavirus Disease 2019, 2019).

Poor air quality, a burden disproportionately shouldered by people in developing countries, is an important contributing factor for pulmonary and cardiovascular diseases. The majority of the world's most air-polluted cities are in North India (World most polluted cities 2019, 2019), and given the prevalence of pollution-related chronic health problems, India may prove particularly vulnerable to COVID-19 (Chotiner, 2020). Common diseases like asthma increase the likelihood of acquiring viral lung infections (Juhn, 2014) and, by inference, may increase contagion risks. Even in countries with comparatively cleaner air, preliminary research suggests that long-term exposure to fine particulate pollution (i.e. PM$_{2.5}$) increases mortality rates from COVID-19 (Wu, 2020).

During the peak pollution period in November and early December in the breadbasket region of Northwest India, rice residue burning is a significant source of PM$_{2.5}$ that broadly affects rural and urban communities, including the capital New Delhi (Bikkina, 2019), with 3-fold increases in acute respiratory illnesses observed in the most fire-affected districts (Chakrabarti, 2019). Burning provides a low-cost method for removing residues that ensures timely planting of succeeding crops like wheat. Technologies like the Happy Seeder that permit planting while retaining rice residues have shown promise, but burning largely continues unabated despite laws banning the practice (Shyamsundar, 2019). Policies that mandate later rice planting to conserve groundwater have compounded the problem by shifting the fire period into a narrower window later in the year when weather conditions favor poor air quality (Balwinder-Singh, 2019). Moreover, there are strong indications that internal migration of the agricultural workforce due to COVID-19 may further delay rice planting. This unfolding scenario may compromise food security through productivity losses from later planting while worsening the recurrent public health crisis created by hazardous air pollution when rice residues are burned (Shultz & When, 2019).

Even if India avoids the worst of the pandemic in the near-term, seasonal air pollution spikes caused, in part, by rice residue burning could coincide with an anticipated COVID resurgence in the fall, potentially making the public health impacts more severe by increasing both morbidity and mortality rates. Current policies to curb agricultural burning emphasize supply-side interventions like machinery subsidies in addition to support programs for crop diversification away from rice. In light of the pandemic, more innovative approaches are required to catalyze rapid transitions to no-burn agricultural systems that are productive, profitable, and that protect vital ecosystem services, including clean air (Jat, 2020). As India plans an ambitious economic stimulus package to buttress the economy from the fallout of COVID-19, new strategies like providing cash incentives to farmers to forego residue burning (i.e. payments for ecosystem and public health services) may help jumpstart markets for sustainable production technologies and appropriately incentivize crop diversification. Every crisis presents an opportunity for positive change; there is no time like the present to make open agricultural burning a relic of the past in India.
Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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