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Will environmental impacts of social distancing due to the pandemic caused by SARS-CoV-2 decrease allergic disease?

Valentin Navel, MD,[a] Frédéric Chiambaretta, MD, PhD,[a] and Frédéric Dutheil, MD, PhD[b] *Clermont-Ferrand, France*

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The burden of climatic change and air pollution represents a massive challenge for humanity, affecting the development of allergic diseases and upsetting the exposome.[1] Air pollution, a causative factor of climate change, contributes to 9 million deaths per year,[2] and more than 500 million people have an allergic disease around the world.[3] In urban areas of industrial countries, the ocular surface, the respiratory tracts, and the skin are exposed daily to the intense burden of particulate matter, ozone (O_3), carbon dioxide (CO_2), nitrogen dioxide (NO_2), and sulfur dioxide (SO_2) produced by diesel combustion and industrial fumes. Air pollution is a causative factor for both various symptoms such as bronchospasm, rhinorrhea, eye redness, and irritation and various allergic diseases such as asthma, chronic rhinitis, nasal polyposis, atopic dermatitis, seasonal or perennial allergic conjunctivitis, and vernal or atopic keratoconjunctivitis.[4] Since December 8, 2019, humanity has been confronted with a viral pneumonia pandemic caused by a coronavirus named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Initially described in Wuhan, Hubei, China, the increase in worldwide tourism and commercial airline flights upgraded the numbers of countries infected, causing several million cases and hundred-thousands of deaths. The worldwide authorities responded by promulgating global quarantine in accordance with the World Health Organization. Consequently, human activities have been drastically decreased, with massive reduction in greenhouse gas emissions. Since the last 1 century, the worldwide emission of greenhouse gases, that is, NO_2 and CO_2, has involved a global warming up to 1°C compared with the preindustrial era, increasing air humidity and mold exposure, and modifying pollen patterns.[5] Concordantly with the climatic changes, sensitization rates and allergic diseases increased with the level of allergenicity of several species of plants such as ragweed, birch, or plane tree. The heat stress and the air pollution peaks promote mucosal and systemic inflammation, decreasing the airway hyperreactivity threshold and increasing asthma

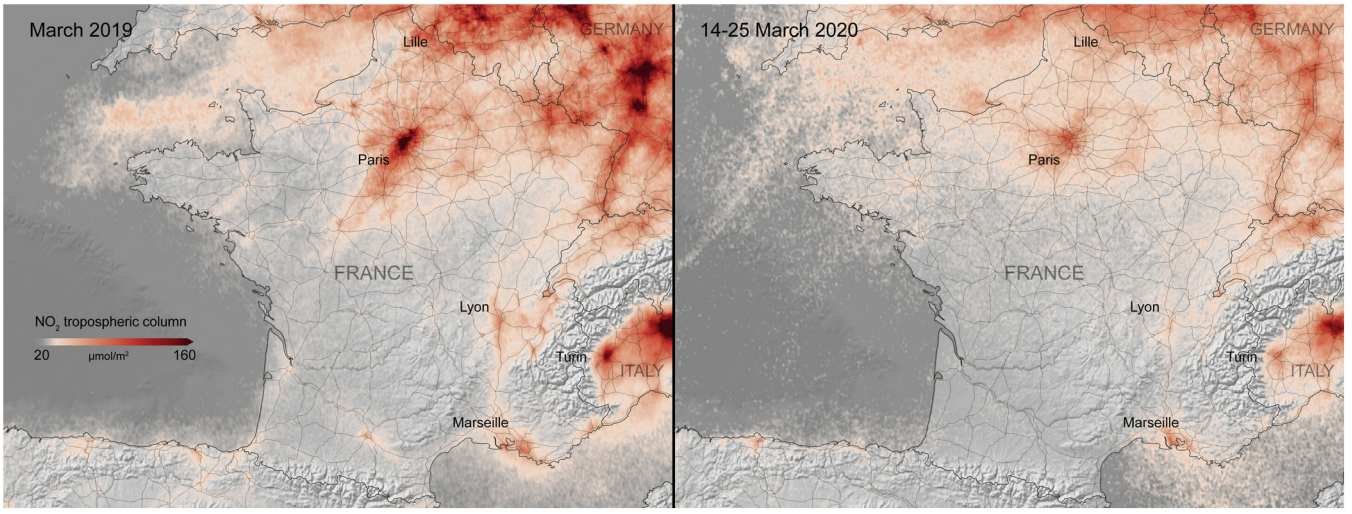

FIG 1. A major decrease in NO_2 pollution in most megalopolis of developing countries following containment for limiting the spreading of the pandemic caused by SARS-CoV-2 (satellite images from European Spatial Agency).[8]

From [a]Université Clermont Auvergne, CNRS, INSERM, GReD, Translational Approach to Epithelial Injury and Repair, CHU Clermont-Ferrand, University Hospital of Clermont-Ferrand, Ophthalmology, and [b]Université Clermont Auvergne, CNRS, LaPSCo, Physiological and Psychosocial Stress, CHU Clermont-Ferrand, University Hospital of Clermont-Ferrand, Preventive and Occupational Medicine, Witty Fit, Clermont-Ferrand.

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Corresponding author: Valentin Navel, MD, University Hospital of Clermont-Ferrand, CHU Clermont-Ferrand, Ophthalmology, Clermont-Ferrand, France 63000. E-mail: valentin.navel@hotmail.fr.

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exacerbations and the global mortality.[6] Putative etiologic relation between atmospheric changes and allergic diseases is mediated by inflammation and oxidative stress in tissues exposed, enhancing immunologic responses to allergens, carrying aeroallergens into the airways, and inducing epithelial permeability.[6] Interestingly, NASA's Aura satellite described an NO_2 decrease by 25% across China from January 1-20, 2020 (before the quarantine), to February 10-25 (during the quarantine).[7] A similar decrease was measured in most megalopolis of developing countries around the world where containment was set for limiting the spreading of the SARS-CoV-2 (Fig 1).[8] At the time of writing, a third of humanity (more than 3 billion people) have to stay confined at home. Initially spreading around Asia, the epicenter of epidemic moved to Europe and, tomorrow, probably in American and African continent. Even if this global containment lasts 1 or 2 months, the impact of the air quality should be significant on the allergic diseases exposome during forthcoming months. We have seen smaller examples in which regional decrease in the use of fossil fuels is related to decreased exacerbation of allergic disease. However, the pandemic caused by SARS-CoV-2 has resulted in a global decrease in the use of fossil fuels. This may offer an unintended insight on a global scale into the impact of decreased fossil fuel use on allergic and respiratory disease.

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