



CLIMATE CHANGE: AIR POLLUTION AND ALLERGENS

Climate change is projected to impact human health by increasing ground-level ozone and particulate matter air pollution. Also, more frost-free days and warmer seasonal air temperatures are contributing to a greater prevalence of allergy.

Ground-level ozone, a key component of smog, causes many health problems, such as diminished lung function, more hospital admissions and emergency room visits for asthma, and increases in premature deaths.

Ozone is produced when temperatures are over 80°F and when it is sunny with few or no clouds, or only high transparent clouds. Sunlight (ultraviolet radiation) stimulates volatile organic compounds VOCs and nitrogen oxides NO_x to have photochemical reactions. When there is little cloud cover, sunlight penetrates to ground level, enabling the photochemistry that generates ground-level ozone. When cloud cover increases, the likelihood of elevated ozone levels decreases. The higher the temperature, the more likely elevated levels of ozone will occur.

Particulate matter air pollution is caused by wildfire emissions or another direct source, and stagnant air incidents. Secondary contributors are three pollutants: nitrates, sulfates, and organic carbon. Meteorological conditions and atmospheric chemistry for high particulate matter days vary seasonally.

Climate change also causes more airborne allergens. Higher temperatures change the botanical landscape, increasing the distribution of allergenic plants across a wider geographic area. More frost-free days, warmer seasonal air temperatures, and higher levels of carbon dioxide (CO₂) contribute to changes in flowering time and longer and more intense plant pollination cycles from allergenic plant species. Under these conditions, allergenic plants such as grasses and weeds to grow faster and produce more allergens. Higher pollen concentrations and longer pollen seasons can increase allergic sensitizations and asthma episodes, diminishing productive work and school days. Individuals prone to seasonal allergies may have greater difficulty when they are simultaneously exposed to toxic air pollutants.

Extreme rainfall and rising temperatures can also contribute to indoor air quality problems such as indoor molds, with increases in respiratory and asthma-related conditions.

Allergenic insects such as roaches, wasps, bees, and fire ants are coming out earlier and staying out longer, increasing the chances that allergic patients will encounter them. Of special mention is the distribution of fire ants, which are currently limited to the southern U.S. due to frozen ground in the northern states. As the country gradually warms, fire ants may expand northward.