

## *How Air Pollution Contributes to Heart Disease*

Diseases of the heart or blood vessels, or cardiovascular disease, and in particular coronary heart disease (harm to the heart resulting from an insufficient supply of oxygenated blood) are leading causes of death in the US. Prevention of these killers has traditionally focused on controlling hypertension, cholesterol levels, and smoking and making healthy choices in regard to diet, exercise, and avoiding second-hand smoke. However, accumulating evidence indicates that **air pollutants contribute to serious, even fatal damage to the cardiovascular system** – and air pollution is a factor that you can't control just through healthy lifestyle.

Reducing our population's exposure to air pollutants is and remains an important aspect of improving cardiovascular health for the whole U.S. population.

### **Fatal Harm**

Harmful air pollutants lead to cardiovascular diseases such as artery blockages leading to heart attacks (*arterial occlusion*) and death of heart tissue due to oxygen deprivation, leading to permanent heart damage (*infarct formation*). The mechanisms by which air pollution causes cardiovascular disease are thought to be the same as those responsible for respiratory disease: pulmonary inflammation and oxidative stress.

- When the concentration of air pollutants called fine particulate matter (PM<sub>2.5</sub>) increases, hospital admissions also rise for heart attacks; heart diseases due to insufficient blood supply, usually because of a blocked artery (*ischemic* heart diseases); and congestive heart failure.
- Spikes in the concentration of other air pollutants – especially the combination of fine particulate matter and nitrogen oxides – correlate with increased hospital admissions for potentially fatal disturbances of heart rhythm.
- Studies show that cities with high nitrogen oxide concentrations had death rates four times higher than those with low nitrogen oxide concentrations.
- It's not only the short-term spikes that harm your heart. Deaths from cardiovascular causes also increase due to long-term (chronic) exposure to air pollutants, even when other risk factors like smoking are taken into account.

### **Very Large Effects, Nationwide**

The increase in disease rates related to air pollution may appear to be small when viewed in percentage terms. For example, the studies cited above on particulate matter found hospital admissions increasing on the order of a single percent. However, **the large number of Americans who suffer from heart ailments translates the result into a very large effect** when measured nationally, in terms of total hospital admissions, numbers of illnesses, patient deaths, and the costs to the economy of health care and days lost from work and school.

### **Clean Air Saves Lives**

On the other hand, long-term improvements in air pollution reduce mortality rates. For example, reductions in PM<sub>2.5</sub> concentration in 51 metropolitan areas were correlated with significant increases in life expectancy. The air quality improvements achieved under the Clean Air Act have **measurably improved the health of the U.S. population.**