

Good morning, my name is Jim Phillips. I am a physician trained in Internal Medicine and chest disease. I am a professor of medicine at UAMS and a part-time consultant at the Arkansas Department of Health. At the last stakeholder meeting, you heard from my colleague, Dr. William Mason, about the effects of fine particulate matter on human health. Today, I am here speaking on behalf of the Arkansas Department of Health to set out the economic consequences that result from respiratory and cardiovascular disease produced by air pollution that results from the combustion of coal.

Arkansas is always ranked near the bottom or at the bottom among all states in regard to the health of its citizens. Burning of coal, as I will explain, contributes to this unfavorable health status. Such an unhealthy population significantly contributes to the low economic status of the state and its citizens.

We estimate that the total health related cost to Arkansas that results from combusting coal is approximately 450 million dollars each year. These costs include premature death, chronic respiratory conditions such as emphysema, chronic bronchitis, lung cancer and asthma, and cardiovascular diseases such as heart attack, stroke, and congestive heart failure. Scientific research conducted over decades regarding the impact of air pollution on population health has documented these health harms. The greatest threat to health is found among susceptible populations such as pregnant women, children, the elderly, persons with chronic conditions, low income communities, and minorities.

Three substances generated from coal-fired electrical generating plants are of special concern. The first, small particulate termed 2.5 micron particle or $PM_{2.5}$, is very small and about the size of the carbon particles in cigarette smoke. These particles are so small that when they are breathed into the lungs they travel into the distal lung air sacs and from there they may move about the body via the blood stream. Each 10 microgram per cubic meter elevation of these particles in the ambient air is associated with a 4% increase in all cause death rates, a 6% increase in heart and lung disease death rates, and an 8% increase in lung cancer death rates according to reports published in the Journal of the American Medical Association.

Another product of the burning of coal is ozone. We are all aware of the so-called “summer ozone days” that happen in Central Arkansas and areas surrounding West Memphis. In laboratory animals, ozone increases the inflammation of the airways in the lung and worsens the function of the lung. For this reason, persons with asthma, emphysema, and chronic obstructive lung disease are advised to remain indoors when ozone concentrations in the ambient air reach very unhealthy levels.

Coronary heart disease and chronic obstructive lung disease are the first and third leading causes of death in Arkansas; heart disease death rates are substantially higher in Arkansas as compared to the national rate. Both coronary heart disease and chronic obstructive lung disease account for many emergency department visits, clinic visits, diminished productive work days, increased drug expenditures, and premature deaths. Causation of coronary heart disease and chronic obstructive lung disease includes multiple risk factors two of which are small particulates and ozone. In 2012, there were 9,095 hospital admissions in Arkansas with a diagnosis of chronic obstructive lung disease. In addition, there were 43,834 hospital admissions for heart disease in Arkansas during the same time period.

Asthma, though not a common cause of death, is a very common cause for emergency room and clinic visits and missed days of work or school. While many factors work together to produce asthma including genetics, food allergies, airborne irritants including tobacco and allergens, it is important to stress that air pollution, particularly small particulate matter and ozone, is a well-established factor that contributes to the worsening and complications of asthma which results in increased clinic visits, emergency department care, hospitalizations, and those rare deaths from asthma. Nine percent of adults in Arkansas report having asthma and it is probably higher in children. In 2012, there were 2,708 persons in Arkansas that were hospitalized because of asthma and 46,259 emergency department visits due to asthma.

According to the U.S. Energy Information Administration, CO₂ emissions from fossil fuel consumption in Arkansas increased from 37.6 million metric tons in 1980 to 66.7 million metric tons in 2011, a 77%

increase. Likewise, emissions that are a product of coal consumption increased by 750%, from 3.4 million metric tons in 1980 to 28.9 million metric tons in 2011. In 2012, Arkansas's five coal-fired power plants consumed nearly 19,000,000 tons of coal of which almost half was burned by two plants that lack any scrubbers. While, in 2013, coal-fired electric power plants supplied over 53% of the state's electricity, the state's five plants produce far more energy than is needed by Arkansas consumers and leaves Arkansans with this exorbitant amount of unnecessary air pollution.

National estimates for "health related costs of the current effects of ozone pollution exceeding national standards have been estimated at \$6.5 billion (in 2008 U.S. dollars)" (Luber 2014). Furthermore, if there is no change in regulatory controls or populations characteristics it is estimated that 1,000-4,300 additional premature deaths will occur by 2050 "from combined ozone and particle health effects" (Luber 2014).

Lastly, I would like to comment on mercury in the lakes of Arkansas. On August 11th the Arkansas Department of Health issued an advisory warning persons about eating largemouth bass, white bass, and striped bass of a certain size caught in Lake Ouachita. The mercury content in the meat of these fish is too high for safe consumption if the fish are eaten too often or if the fish is consumed by women who are pregnant. There are 20 lakes in Arkansas where similar mercury advisories regarding eating fish caught in these lakes have been issued. The main source of mercury in these lakes is from the burning of coal.

Coal has mercury in it and when the coal is burned the mercury is sent out of the smoke stacks. When it rains, particles containing mercury fall to the earth's surface and are deposited in the ground. Some of this rain water flows into our streams and lakes. Once the mercury, which is not degradable, settles at the bottom of our lakes and streams, the bacteria present there convert it to another form of mercury called methylmercury. The methylmercury is the very harmful form of mercury. It is ingested by small plant life, then by larger and larger fish as it moves up the food chain. Methylmercury is especially toxic for nerve tissue in the brain. This is why the warning is especially important for pregnant women and young children.

The mercury in these lakes will increase each year as Arkansas continues to burn coal. It is not an overstatement to predict that in 2050, if present practices continue most lakes in Arkansas will have advisory warnings about eating fish from them.

Luber, G., K. Knowlton, J. Balbus, H. Frumkin, M. Hayden, J. Hess, M. McGeehin, N. Sheats, L. Backer, C. B. Beard, K. L. Ebi, E. Maibach, R. S. Ostfeld, C. Wiedinmyer, E. Zielinski-Gutiérrez, and L. Ziska, 2014: Ch. 9: Human Health. *Climate Change Impacts in the United States: The Third National Climate Assessment*, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, 220-256. doi:10.7930/JOPN93H5.