



## How Environmental Toxins Reduce Life Expectancy in Many American Neighborhoods

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The number of years people typically live varies a lot from one neighborhood to another in many of America's 200 midsize cities. In Louisville, Kentucky, for example, differences in life expectancy can be as much as 13 years from one neighborhood to the next. Why? The answer is a source of local controversy and provides a powerful case study of the uses and misuses of statistical analysis in political arguments about environmental policymaking.

Charged with explaining gaps in life expectancy, the Louisville Health Department released in 2013 a highly publicized research report funded by government agencies, businesses, and foundations. This study broke down underlying causes of neighborhood differences in life spans – and the headliner was its conclusion that two-fifths of the variation was due to the social characteristics of people living in various neighborhoods, especially their levels of education. In addition, the report attributed 30% of variation in life expectancy to differences in residents' health behaviors and 20% to variations in their access to medical care. Just ten percent of the variation was attributed to the varied physical environments of neighborhoods. But our research shows that Louisville health officials committed serious statistical errors that undermine their report's major conclusions.

### Correlation is Not Causation

At the Spring 2014 Urban Affairs Association Meeting in San Antonio, we presented research that reveals major flaws in the Louisville report. According to Department of Health analyses, low levels of individual educational attainment appear to be the single best predictor of premature death, an even stronger determinant than low income or exposure to environmental contaminants. The problem is that the Louisville study overlooked a basic fact all first-year statistics students learn: correlation is not causation.

- When the study was released, the media touted the idea that lack of education is the primary explanation for neighborhood gaps in premature death rates. But consider the odd logic at work. Do health officials really mean that high school or college degrees are the prescribed remedy for cancer, lung and heart disease? Common sense – and sound science – reveals that two people breathing the same amount of toxic air are going to be similarly affected, even if one is a high-school dropout and the other has earned a PhD degree.  
People with advanced degrees are not immune from toxic fumes in the water, soil, and air.
- Another major problem is the report's emphasis on lack of access to medical care as a major contributor to premature deaths. In fact, residents of Louisville neighborhoods with high premature death rates live

only about half as far away from the city's major medical center as other residents typically do. This statistical fallacy is like claiming that hospitals are bad for you since so many people die there.

## **A New Look at the Role of Environmental Contaminants**

The Louisville report arrives at conclusions unlike other authoritative studies of the same issues. We do not know of any valid scientific research documenting the claim that education or access to nearby medical facilities are more important causes of premature death than low income and environmental contaminants. As many public health studies document, thousands of residents who live near polluting industries are at risk for premature death. Dr. Richard Jackson of the University of California, Los Angeles finds that environmental factors now explain up to 70% of the premature deaths in disadvantaged neighborhoods. Drawing from such research, we looked again at Louisville neighborhoods, using two different measures of environmental degradation. One refers to the location of "brownfield sites" in which dangerous toxins were abandoned on formerly industrial sites primarily in poor and black neighborhoods of West Louisville; and the other measures proximity to chemical factories in a neighborhood known as "Rubbertown." Using standard statistical techniques, we found that such environmental contaminants constitute a major cause of shortened lives in Louisville. In West Louisville, one of the major predictors of neighborhood premature deaths was living in proximity to chemical factories that emit a variety of toxins. Living closer to such factories ranked fourth as a cause of premature death (after standard variables of social disadvantage such as race, income, and crime rates). Once the high concentration of brownfields in some communities is taken into account in our analysis, environmental pollutants equal racial and income disadvantages as a primary reason for premature deaths.

## **U.S. States with Clean Air Have Citizens Who Live Longer**

Properly designed research studies show, in short, that remediating environmental degradation and reducing air pollution could help the city of Louisville reduce worrisome neighborhood disparities in premature deaths. Across America, indeed, states with cleaner air have citizens who live longer. The U.S. Centers for Disease Control has estimated the causes of variations in "healthy life expectancy" – that is, living longer without major medical problems. It finds that residents in eight states (most in the South) are more likely than Americans in general to experience premature deaths linked to air pollution. For the whole United States, 73% of citizens self-report that they are "healthy" at age 65, but that number decreases to 62% in Alabama, 67% in Arkansas, 62% in Kentucky, 67% in Louisiana, 62% in Mississippi, 68% in Oklahoma, 66% in Tennessee, and 63% in West Virginia. Sixty-five-year-olds in Oregon, a state with strong environmental regulations including clean air protections ranking in the top third for U.S. states, rate themselves the healthiest at 78%. In contrast, Kentucky policies fall in the bottom third.

Frustratingly, saving lives and cleaning the air requires bucking politics as usual in the South, where elections are routinely won by politicians who decry environmental protections as "job killers." Ironically, this overlooks how much killing of people rather than jobs is actually going on in polluted states – and hides the reality that the U.S. states with the cleanest air have lower unemployment rates than states with the dirtiest air. In 2013, the ten states with the cleanest air had unemployment rates averaging 4.2 percentage points less than rates in the seven states with the dirtiest air. Proponents of environmental protection need to shift the spotlight to healthy life expectancy, asking why so many people – especially in the South – need to die too soon just because their cities and states refuse to clean up the air, water and soil around them.