

## Toxic waste sites may cause health problems for millions | Environment

**Exposure to lead and chromium particularly problematic for people living in three developing countries**

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Living near a toxic waste site may represent as much of a health threat as some infectious diseases, a study in three developing countries finds.

Researchers analyzed 373 toxic waste sites in India, Indonesia and the Philippines, where an estimated 8.6 million people are at risk of exposure to lead, asbestos, hexavalent chromium and other hazardous materials. Among those people at risk, the exposures could cause a loss of around 829,000 years of good health as a result of disease, disability or early death, the team reports May 4 in *Environmental Health Perspectives*.

In comparison, malaria in these countries, whose combined population is nearly 1.6 billion, causes the loss of 725,000 healthy years while outdoor air pollution claims almost 1.5 million healthy years, according to the World Health Organization.

Although scientists have known for years about the risks of pollutants at toxic waste dumps, no one had quantified the health effects in this way, says study coauthor Kevin Chatham-Stephens, a pediatrician at the Icahn School of Medicine at Mount Sinai in New York City.

For developing countries, "I think they've only touched the tip of the iceberg," says William Suk, a microbiologist and public health expert at the National Institute of Environmental Health Sciences in Morrisville, N.C. "That scares the hell out of me."

In 2010, researchers with the Blacksmith Institute, a nonprofit environmental health organization, identified the toxic waste sites, such as lead battery recycling centers and former tanneries. For each site, the investigators determined the main pollutant; whether the pollutant is in the water, soil or air; and how many people might regularly come into contact with the polluted area.

Chatham-Stephens and colleagues plugged those data into a computer program that estimates how much of a material should be in the human body given a particular exposure. The team then used another program to estimate how many people should be afflicted with particular diseases or disabilities linked to a toxic material. Lead, for example, can cause mild mental retardation in children, anemia and cardiovascular disease. The researchers determined the number of lost healthy years by weighting each disease based on its relative severity.

Lead and hexavalent chromium, a carcinogen, accounted for more than 99 percent of the lost healthy years. The team estimates that the three countries could house an additional 5,000 toxic waste sites that weren't studied, affecting another 35 million people. In total, they suggest, the studied and unstudied toxic sites could

result in more than 4.3 million lost healthy years.

Almost 65 percent of the affected people are children and women of child-bearing age, Chatham-Stephens says, providing cause for concern: "In utero and early childhood are the stages of life that are most vulnerable to toxic insults."

In a related study, the team looked at 200 toxic waste sites in 31 developing countries. Nearly 780,000 kids younger than age 4 who live near these sites may be exposed to lead. The team determined that exposures could be high enough to cause mild mental retardation in 6 out of every 1,000 kids, Chatham-Stephens reported May 6 at the Pediatric Academic Societies annual meeting in Washington, D.C.

The results are "sobering," says Howard Hu, a physician and epidemiologist at the University of Toronto. The next step, he says, is to directly measure the level of toxicants in people living near these sites and the diseases that affect them. He also points out that the study only considered one pollutant per site and only eight materials total, so future work should try to look at more toxicants and how they interact to influence health.

The actual health impacts could be even higher, Suk notes, because many people living near these sites may also suffer from nutritional deficiencies and infectious diseases. Having a weakened immune system may make these individuals more vulnerable to environmental threats, he says.