

By Dr. David Hill

# Nature And Nurture: The environment and children's health

**A**n economic downturn has myriad impacts on children's health. When families have to skimp on medical care and prescriptions, children suffer. The stress of financial hardship may play out in the household, and children sense anxiety despite their parents' best efforts.

In times like these it's tempting to see any new industry as good for the community. But before we recruit a new business to our area it's fair to ask, "What's the real cost to the community?" When all the costs are tallied, we sometimes find what looks like a good deal at first is not so good after all. As a parent and a pediatrician the costs I care about most are the ones borne by our children. This month we'll look at some of those costs as they might be incurred by a cement kiln.

### What's wrong with a little mercury?

Currently New Hanover County ranks sixth in North Carolina for mercury emissions. A cement kiln proposed for the area has asked permission to expel 263 more pounds of mercury into the air each year.

Mercury is a natural byproduct of burning coal. Coal contains traces of mercury, which vaporize and enter the atmosphere. From there the mercury can be absorbed in two ways: inhaled or eaten. Direct inhalation of mercury vapor is very dangerous, to the extent that if a mercury thermometer or fluorescent light bulb breaks children must be cleared from the room until the entire area has been appropriately decontaminated.

Most of the vaporized mercury falls to earth, where it enters the water supply. There, bacteria metabolize it into its most toxic form, methyl mercury. Methyl mercury marches up the food chain, concentrating at each step, until it reaches its highest levels in top marine predators like tuna and swordfish. Currently, the North Carolina Division of Public Health lists 24 species of local fish women of childbearing age, nursing mothers, and children under fifteen should never eat. Of the fish they consider "safe," mercury levels are still high enough they advise only two servings a week for these high-risk groups.

### What makes mercury so toxic?

Methyl mercury is easily absorbed by the body. Once absorbed, it concentrates in the brain, from which it can never be removed. Fetuses are exposed to mercury in the womb, and nursing infants get it though their mother's milk. Mercury kills neurons and the cells that support them, called glia. Methyl mercury also interferes with the growth and organization of neurons putting the fetus, infants, and children at especially high risk of brain damage. Studies from the Faroe Islands show even at levels not considered toxic mercury exposure can decrease children's memory, attention, and language skills.

### What about air quality?

Coal-fired cement kilns also expel air pollutants, specifically nitrogen dioxide, sulfur dioxide, volatile organic compounds, and small particles. Kilns also require hundreds of diesel-powered trucks and mining machines, which emit many of the same chemicals, compounding the air problem. These emissions are particularly dangerous to children.

### How do lungs grow?

Alveoli are the little air sacs in the lungs where the blood gets oxygen. A newborn has only 20% of the alveoli he or she will eventually need; the other 80% have to develop with time. Children exposed to nitrogen dioxide, sulfur dioxide, and particulate matter have decreased lung function and may never develop their full lung capacities. The more a child exercises, the more the ultimate decrease in lung function.

### Why is air pollution so toxic to children?

Children breathe more than adults, which means their lungs process more pollution than their parents'. A typical kindergarten student will breathe 24 times a minute at rest, compared with 16 times a minute for her teacher. Over 24 hours that's 11,520 breaths more. Children also spend more time outside than adults, and when they're outside they're more likely to be active, taking even more breaths and inhaling more deeply. The cumulative

effect of all this breathing puts children at especially high risk when the air is contaminated.

### Does air pollution cause asthma?

Air pollution causes more asthma attacks in people who already have the disease. Whether it actually causes new cases of asthma depends on how much the child exercises. Ironically, the children most likely to get asthma from breathing polluted air are the ones who exercise the most, participating in three or more team sports a year.

### What other problems would air pollution from a cement kiln cause?

In addition to poor lung growth and increased rates of asthma, pollutants from a coal-fired concrete kiln are associated with higher rates of colds, bronchitis, and pneumonia. A rise in levels of particulate matter independently increases death rates at affected hospitals. Diesel exhaust is a potent carcinogen and a known cause of lung cancer.

### What can a parent do to protect children?

For all its natural beauty, our area is already burdened with significant contamination by mercury, nitrogen dioxide, sulfur dioxide, particulate matter, and volatile organic compounds. We can't keep our children in a bubble, but we can let our political leaders know we are concerned about the impact of these pollutants on our children, 8,500 of whom will attend school within five miles of the proposed kiln. As a pediatrician I have learned there is no voice more powerful than that of a concerned parent. For the sake of your children and mine, I encourage you to use that voice now.



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