CAFO Air Pollution and Children: A Prescription for Precaution

The vulnerability of children must be considered when identifying potential adverse health effects from large-scale confined animal feeding operations (CAFOs). Several noteworthy research efforts have focused specifically on the effects of CAFO-generated air emissions on young children and children of farm operators. The literature also includes numerous articles regarding the physical vulnerabilities of children to all types of air pollution. Children are not just "small adults" – as a result of their size, age, and developmental status, children are more vulnerable than adults to the health threats posed by environmental irritants and toxins.

In 2003, the American Public Health Association called for a moratorium on the construction of new CAFOs until more research could be completed regarding the public health effects of these facilities. The APHA specifically cited concerns about the potential harmful impacts of CAFOs on reproductive health, infants, and children. The Canadian Medical Association, the Michigan State Medical Society, and the Missouri Association of Osteopathic Physicians and Surgeons have also called for a moratorium on CAFOs. When we pair the two issues – air quality and kids, and air quality and CAFOs – we should recommend a "prescription for precaution" and protect young children from CAFO emissions until research proves to the health community that these emissions do not harm children.

Ambient (outdoor) air pollution is now recognized as an important problem, both nationally and worldwide. Our scientific understanding of the spectrum of health effects of air pollution has increased, and numerous studies are finding important health effects from air pollution at levels once considered safe. Children and infants are among the most susceptible to many of the air pollutants. In addition to associations between air pollution and respiratory symptoms, asthma exacerbations, and asthma hospitalizations, recent studies have found links between air pollution and pre-term birth, infant mortality, deficits in lung growth, and possibly, development of asthma.

(American Academy of Pediatrics Committee on Environmental Health. "Ambient Air Pollution: Health Hazards to Children." *Pediatrics* Vol. 114 (6). December 2004. http://aappolicy.aappublications.org/cgi/reprint/pediatrics;114/6/1699.pdf)

Being small makes a big difference. Children two years of age and under have ten times the risk of adults from exposure to toxins.

(Lorin, Martin. Baylor College of Medicine, as cited by Wolf, Vicki. "The Health Effects of Air Pollution Part VII: Dangers for infants living in a toxic environment." CLEAN Health. 2004. www.cleanhouston.org/health/health_effects/health7.htm)

Ounce for ounce, children drink more water, eat more food, and breathe more air than adults, resulting in disproportionately higher exposures to contaminants in water, food, and soil.

(Environment Canada. "Children's Environmental Health." *Envirozine*. Issue 20. May 2002. http://www.ec.gc.ca/EnviroZine/english/issues/20/feature2_e.cfm)

It may take even less exposure to a particular pollutant to trigger an asthma attack or respiratory event due to the sensitivities of the developing respiratory system.

(Wolf, Vicki. "The Health Effects of Air Pollution Part VII: Dangers for infants living in a toxic environment." CLEAN Health. 2004. www.cleanhouston.org/health/health_effects/health7.htm)

Neurotoxins such as lead and other toxic chemicals, even at low levels, can disrupt the brain's wiring causing permanent, irreversible learning and behavior problems.

(Environment Canada. "Children's Environmental Health." *Envirozine*. Issue 20. May 2002. http://www.ec.gc.ca/EnviroZine/english/issues/20/feature2_e.cfm)

Public health scientists now recognize that hydrogen sulfide is a potent neurotoxin, and that chronic exposure to even low ambient levels causes irreversible damage to the brain and central nervous system. H_2S is present in CAFO emissions. Children are among the most susceptible to this poison gas.

(Zhu, Jun and Xiwei Li. "A field study on downwind odor transport from swine facilities." *Journal of Environmental Science and Health*, Part B, Vol. 35 (2). March 2000. http://www.informaworld.com/smpp/content~content=a905855658~db=all~order=page)

Bacterial concentrations with multiple antibiotic resistances have been discovered upwind and downwind of swine facilities. Those working at the facility or who live in close proximity could be at risk for adverse health effects by exposure to large numbers of multidrug-resistant organisms.

(Gibbs, Shawn G., et al. "Isolation of Antibiotic-Resistant Bacteria from the Air Plume Downwind of a Swine Confined Animal Feeding Operation." *Environmental Health Perspectives*. Vol. 114 (7). July 2006. http://www.ehponline.org/members/2006/8910/8910.pdf)

Research conducted by investigators in the University of Iowa College of Public Health demonstrated that the prevalence of asthma is elevated among children living on farms where swine are raised.

(Merchant, James A. et al. "Asthma and Farm Exposures in a Cohort of Rural Iowa Children." *Environmental Health Perspectives*. Vol. 113 (3). March 2005. http://www.ehponline.org/members/2004/7240/7240.pdf)

Research demonstrates that CAFOs can be sources of antibiotic-resistant enteric bacteria that can lead to compromised environmental and potentially human health in ecosystems and populations adjacent to CAFOs.

(Sapkota, A., Curriero, F., Gibson, K., and Schwabb, K. "Antibiotic-resistant enterococci and fecal indicators in surface water and groundwater impacted by a concentrated swine feeding operation." *Environmental Health Perspectives*. Vol. 115 (7). July 2007. http://www.ehponline.org/members/2007/9770/9770.html)

Concentrated animal feeding operations near schools may pose asthma risk. Children who attend school near large-scale livestock farms may be at a higher risk for asthma, according to recent study by University of Iowa researchers led by Joel Kline, M.D., professor of internal medicine in the UI College of Medicine.

(Sigurdarson, Sigurdur T. and Joel N. Kline. "School Proximity to Concentrated Animal Feeding Operations and Prevalence of Asthma in Students." *CHEST*. Vol. 129 (6). June 2006. http://www.chestjournal.org/content/129/6/1486.full)

The high prevalence of multiple resistance genes at a swine operation reported in a Johns Hopkins study suggests that airborne Gram-positive bacteria from swine operations may be important contributors to environmental reservoirs of resistance genes.

(Sapkota, A.R., Ojo, K.K., Roberts, M.C., and Schwab, K.J. "Antibiotic resistance genes in multidrug-resistant Enterococcus spp. and Streptococcus spp. recovered from the indoor air of a large-scale swine-feeding operation." *Letters in Applied Microbiology*. Vol. 43 (5). July 2006. http://www3.interscience.wiley.com/journal/118581731/abstract)

The immune systems of infants are weaker than those of healthy adults. Their skin is thinner and more permeable, and they have a larger surface area for absorption relative to weight. The lungs and airways of infants are especially susceptible to harm from toxins, particulate matter and ozone in the air.

(Wolf, Vicki. "The Health Effects of Air Pollution Part VII: Dangers for infants living in a toxic environment." CLEAN Health. 2004. www.cleanhouston.org/health/health_effects/health7.htm)

Research suggests exposure to odor has an effect on secretory immune function and is particularly important in that it documents a physiologic effect among neighbors of industrial hog operations.

(Avery, Rachael. "Health Effects Associated with Exposure to Airborne Emissions from Industrial Hog Operations in Eastern North Carolina." The Graduate School at the University of North Carolina at Chapel Hill. 2003.)

Recent research was performed to investigate relationships between school exposures and respiratory health of middle school-aged children. The findings identify a plausible association between exposure to airborne pollution from swine CAFOs and wheezing symptoms among adolescents.

(Mirabelli, Maria C., Wing, Steve, Marshall, Stephen W., and Wilcosky, Timothy C. "Asthma Symptoms Among Adolescents Who Attend Public Schools That Are Located Near Confined Swine Feeding Operations." *Pediatrics*. Vol. 118 (1). July 2006. http://pediatrics.aappublications.org/cgi/content/abstract/118/1/e66)

Timing is an important factor in infant exposure. In its first two years of life, an infant has critical periods of development when even small amounts of a toxic substance can have a very serious, lifelong effect. Windows of vulnerability for brain development occur in these first two years. At this stage even a small dose of a particular toxin may be more devastating than a much larger dose at a different or later stage. Early infancy, childhood, and puberty are also critical windows of vulnerability for reproductive effects from exposure to toxins. Certain exposures during the infant or childhood stage could affect the development of the respiratory, nervous, endocrine and immune systems and could increase the risk of cancer later in life.

(Wolf, Vicki. "The Health Effects of Air Pollution Part VII: Dangers for infants living in a toxic environment." CLEAN Health. 2004. www.cleanhouston.org/health/health_effects/health7.htm)

Air pollution has been linked to a variety of respiratory illnesses, including permanent reduction in lung capacity and asthma. The number of U.S. children afflicted with asthma has increased dramatically: reports that between 1980 and 1994, the nu mber of children under age four afflicted with asthma grew 160 percent; and according to Western Michigan University Office of Health Promotion and Education, the number of school-age children with asthma increased 100 percent from 1980-1998.

(Wolf, Vicki. "The Health Effects of Air Pollution Part VII: Dangers for infants living in a toxic environment." CLEAN Health. 2004. www.cleanhouston.org/health/health_effects/health7.htm)

A study by the Pew Environmental Health Commission on the increasing incidence of asthma in the United States found that genetics "loads the gun" for a predisposition for asthma, but it is the environment that "pulls the trigger" on the alarming growth of this disease.

(Wolf, Vicki. "The Health Effects of Air Pollution Part VII: Dangers for infants living in a toxic environment." CLEAN Health. 2004. www.cleanhouston.org/health/health_effects/health7.htm)

Fetuses appear to be particularly vulnerable to environmental toxins and may not be able to clear them from their bodies or repair damaged DNA.

(Perera, F.P., et al. "Biomarkers in maternal and newborn blood indicate heightened fetal susceptibility to procarcinogenic DNA damage." *Environmental Health Perspectives*. Vol. 112 (10). July 2004. http://www.ehponline.org/docs/2004/6833/abstract.html)

The breathing zone is lower for children than adults, and heavier pollutants tend to concentrate at lower levels in the air.

(Environment Canada. "Children's Environmental Health." *Envirozine*. Issue 20. May 2002. http://www.ec.gc.ca/EnviroZine/english/issues/20/feature2_e.cfm)

Asthma prevalence in rural children is comparable with rates found in large cities of the U.S. Midwest.

(Chrischilles et al. "Asthma prevalence and morbidity among rural Iowa schoolchildren." *Journal of Allergy and Clinical Immunology*. Vol. 113 (1). 2004. http://www.ncbi.nlm.nih.gov/pubmed/14713909)

The potential induction of asthma is of special concern because the self-reported prevalence of asthma has increased 75% in the entire population (and 160% in children under the age of five) from 1980 to 1994.

(Mannino et al. "Surveillance for Asthma – United States, 1960-1995. Morbidity and Mortality Weekly Report, Surveillance Summaries (47(SS-1);1-28. April 24, 1998. http://www.cdc.gov/mmwr/preview/mmwrhtml/00052262.htm)

Repeated exposure to odorous irritants can induce chronic respiratory disorders including asthma.

(Anderson et al., 2003; Tarlo and Liss, 2003; Luo et al., 2003; and Yang et al., 2003, as cited by Schiffman, Susan M. and Williams, C.M. "Science of Odor as a Potential Health Issue." *Journal of Environmental Quality*. Vol. 34 (1). 2005. http://jeq.scijournals.org/cgi/content/full/34/1/129#BIB5#BIB5)

The elevated vulnerability to environmental exposures in young children is due to the fact that they breathe more air per pound of body weight than adults.

(Committee on Environmental Health. "Ambient Air Pollution: Respiratory hazards to children." *Pediatrics*. Vol. 91(6). June 1993. http://aappolicy.aappublications.org/cgi/content/abstract/pediatrics;91/6/1210)

Direct health care costs for asthma in the U.S. total approximately $14.7 billion annually; indirect costs (lost productivity) add another $5 billion for a total of $19.7 billion.

(American Lung Association Epidemiology and Statistics Unit Research and Services Division. Trends in Asthma Morbidity and Mortality. American Lung Association. January 2009. http://www.lungusa.org/atf/cf/%7B7a8d42c2-fcca-4604-8ade-7f5d5e762256%7D/ASTHMA%20JAN%202009.PDF)

Children spend more time and play more vigorously outdoors, leading to greater exposure. They tend to focus less on symptoms, and they may not stop playing even if they are wheezing.

(Environment Canada. "Children's Environmental Health." *Envirozine*. Issue 20. May 2002. http://www.ec.gc.ca/EnviroZine/english/issues/20/feature2_e.cfm)

76° Partly Cloudy

1 million gallons of manure seeps from Canton farm

Posted: Tuesday, April 16, 2013 10:45 am | *Updated: 6:15 am, Wed Apr 17, 2013.*

John Weiss

CANTON — About 1 million gallons of cow manure flowed out of an above-ground storage pit when a wall broke at a rural Canton farm Sunday, some into a nearby creek that feeds Wisel Creek, a state designated trout stream.

Steve Klotz, area Department of Natural Resources fisheries supervisor, said he checked Wisel Monday and didn't see any dead fish. "The water was filthy" from the manure and runoff from the rains that fell that day, he said.

Whether the spill causes some problems later on is hard to say, he said. "I have no idea what's going to happen," he said. The pit had a total capacity of about 2.2 million gallons; it's about the size of a football field with walls 11 feet high, he said.

Past manure spills from above-ground storage pits have usually been from a crack in a wall, or a leaking or opened valve, he said. This is the first he can recall of a wall giving way. "That's a lot of manure to go shooting out a facility all at once," he said.

The owner called the state duty officer between 9 p.m. and 10 p.m. Sunday, according to Cathy Rofshus, regional Minnesota Pollution Control Agency spokeswoman. The state has not identified the owner, who operates a dairy operation with about 300 cows, she said. At this point, no one knows how much manure got into Wisel, she said.

The landowner and officials from the MPCA and DNR were at the site Monday trying to contain as much of the spill as possible, she said. The landowner was able to pump some out of the ditch and nearby lands and spread it on the field, she said. No one knows how much got into the creek and how much was recovered, she said.

The owner also is pumping out the remaining manure from the holding pond so the wall can be repaired. The pit was built in 2011 after getting a permit from Fillmore County, she said.

The MPCA will also investigate whether any charges should be filed against the owner, she said.

Besides that spill, there have been other issues with manure throughout the region this spring, Klotz said. Because of the late spring, and a lot of frost last winter, farmers were having problems spreading manure without letting it get into the water. About a dozen dead trout were found in Gorman Creek near Kellogg, probably because of manure, he said.

Posted in Local on *Tuesday, April 16, 2013 10:45 am. Updated: 6:15 am.*

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