

Adverse Birth Outcomes and Environmental Health Threats

Despite recent advances in medicine, the incidence of adverse birth outcomes appears to be rising across the United States. A growing body of literature contends that adverse birth outcomes are a result of harmful environmental exposures. Although the placenta was once thought to serve as a barrier between the fetus and the outside environment, recent research indicates that the fetus is directly vulnerable to external harms during critical stages of development. Attention should not be limited to fetal protection, however, as harmful exposures to the pre-conceptive mother and father may come to affect the development of the fetus later.

The most well-known adverse birth outcomes include:

- Pre-term births
- Low birth weight (due to intrauterine growth retardation)
- Congenital abnormalities (birth defects)
- Pregnancy loss (miscarriage)
- Neurodevelopmental defects

A newborn's gestational age and birth weight are two of the most important indicators of infant health. In the year 2003, for example, the mortality rate of low birth weight infants was 25 times higher than that of normal birth weight infants.¹ Moreover, these defects may give rise to a whole host of additional complications, such as hypoglycemia (low blood sugar), respiratory distress, thrombocytopenia (low blood platelet count) and hyperbilirubinemia (jaundice).² Low birth weight infants are even at increased risk of longer-term health problems, including cerebral palsy, seizure disorders, and chronic respiratory conditions.³ These adverse outcomes warrant significant attention because they impose not only an emotional burden on affected families, but also an economic burden on society due to rising health care costs and long-term treatment requirements. Through better understanding of the link between adverse birth outcomes and environmental exposures, we can work to reduce as many preventable factors as possible.

Air Pollution

Air pollution can originate from multiple sources, such as car exhaust, power plants, factories, fires, and fumes from solvents. Of the many chemical components that comprise air pollution, four of the most dangerous pollutants include sulfur dioxide

(SO₂), carbon monoxide (CO), nitrogen oxides (NO_x) and particulate matter.

No matter the source, atmospheric contaminants can have negative consequences on the delicate process of fetal development. For example, studies have linked maternal exposure to automobile pollution to an increased risk of low birth weight,⁴ and researchers have found that industrial cities tend to have higher incidences of premature birth and low birth weight than non-industrial cities.⁵ The timing of maternal exposure is also important, as a developing fetus is more susceptible to negative exposures during the first trimester.⁶

Pesticides and Herbicides

In the course of daily life, the public is exposed to numerous pesticides and herbicides through contact with contaminated air, food and water. Studies have linked maternal exposures to organophosphate pesticides with higher incidences of intrauterine growth retardation, which is known to cause low birth weight.⁷ While many pesticides, such as chlorpyrifos, are prohibited for residential use, they are still permitted for wide-scale industrial application and therefore pose a great risk to public health.⁸ Pesticide exposure may also have consequences beyond growth retardation. For example, families located in close proximity to pesticide-treated areas have been documented to express a higher rate of birth anomalies, such as limb reduction deformities and urogenital and musculoskeletal defects.⁹ Herbicides are also applied in large-scale agriculture, where they can contaminate groundwater and thereby reach consumers in distant communities. Researchers have recently linked the chemicals triazine, metolachlor and cyanazine to corresponding incidences of intrauterine growth retardation.¹⁰

Lead and Methylmercury

Although these neurotoxins have long been documented to impede growth and development in children, they nevertheless continue to persist in the environment. Lead is often pervasive in older and lower income communities, where it persists in antiquated plumbing or lead paint. High-level exposures of lead poisoning have been known to cause adverse neurological effects, strain development, and contribute to aggressive and violent behavior, but more recently scientists have found that low-level exposures may elicit negative responses in the neurological development of

fetuses.¹¹ Methylmercury – formed primarily from mercury emitted by coal-fired power plants – is more pervasive in the environment than lead, and the public is often exposed to the toxin through the consumption of contaminated seafood. Studies have found that that significant maternal exposure to methylmercury may induce severe mental retardation, cerebral palsy, deafness, blindness, and seizures in children.¹² Even post-birth exposures to methylmercury elicits negative consequences, as children that consumed contaminated seafood have been demonstrated to express deficits in attention, fine motor function, language, visual-spatial abilities, and memory.¹³

Conclusions

The precautionary principle holds that, “where an activity raises threats of harm to the environment or human health, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically.”¹⁴ While further research is needed to better understand the complex association between environmental pollutants and adverse birth outcomes, the evidence already available is enough to warrant action. Given the many pathways through which

fetal exposures may occur, a comprehensive, multi-dimensional approach will be necessary to minimize the contribution of environmental contaminants to pregnancy and birth complications. The Clean Air Act, Safe Drinking Water Act, Toxic Substances Control Act, and any other laws designed to protect the quality of our food, air, and drinking water must be strengthened to reflect the growing body of evidence linking environmental exposures and adverse birth outcomes.

Reform must begin with proper knowledge and policymakers must be made aware of the serious threat to fetal development posed by toxins and pollutants in the environment. Physicians and other reproductive health care providers have a unique role to play in this process. Informed by their experience in caring for children and families affected by air pollution and toxic chemicals, physicians can educate legislators and the public about these dangers. In so doing, they will build support for environmental and public health policies that ensure safer pregnancies and reverse the current trend of increasing incidences of adverse birth outcomes

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End Notes

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