

Environmental contributors to preterm birth: Implications for practice and policy

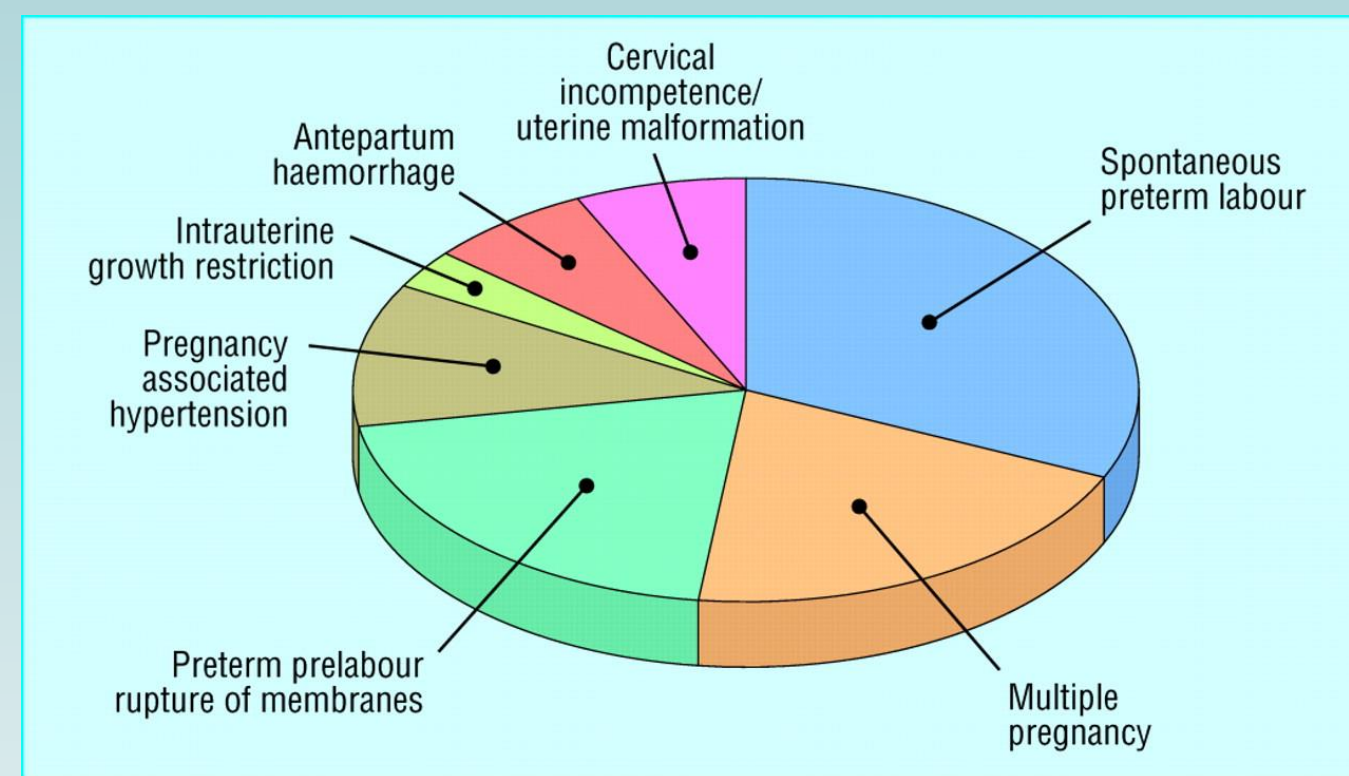


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Preterm Birth

Preterm birth is an intractable public health problem, affecting more than 500,000 infants per year in the United States. The etiology of preterm birth is complex, but is believed to involve a combination of maternal health, genetic and environmental factors. Traditional models of environmental influences examine the effects of nutrition, substance abuse, psychosocial stress and social support on the duration of gestation. A mounting body of research links environmental contaminants to preterm birth. While the biological mechanisms that lead to negative birth outcomes continue to be studied, potential mechanisms include oxidative stress, hypoxia, and inflammatory response.

Causes of Preterm Birth



Tucker J., and McGuire W. *BMJ* 2004;329:675-678

Pollution in Pregnancy

Recent studies have found more than 200 industrial chemicals present in the umbilical cord blood samples of neonates. In 2010, the President's Cancer Panel report acknowledged that 'babies are born 'pre-polluted.' Toxic substances found in air pollution, as well as pesticides, phthalates, PFOS, PFOA, PBDE, DDT, DDE and PCBs have been associated with preterm birth.

Examples of Chemicals Found in Infant Cord Blood

- PFCs - Perfluorinated chemicals (aka "Teflon chemicals")
 - ▶ PFOA - Perfluorooctanoate
 - ▶ PFOS - Perfluorooctane Sulfonate
- Brominated flame retardants
 - ▶ PBDE - Polybrominated diphenyl ethers
 - ▶ PBDD/F - Polybrominated dibenzodioxins, furans
- Additives to plastics, medical devices, cosmetics, personal care products
 - ▶ BPA - Bisphenol A
 - ▶ Phthalates
 - * DEHP - di-2-ethylhexyl phthalate
 - * DBP - di-n-butyl phthalate
 - * DEP - diethyl phthalate
- Pesticides
 - ▶ Atrazine
 - ▶ Chlordane
 - ▶ Chlorpyrifos
- DDT - Dichlorodiphenyltrichloroethane
- DDE - Dichlorodiphenylethane (metabolite of DDT)
- Fungicide - HCB - hexachlorobenzene
- Air Pollution Components
 - ▶ PAH - Polyaromatic hydrocarbons
 - ▶ Dioxin
- PCNs - Polychlorinated naphthalenes (Wood preservatives, varnishes, waste incineration)
- PCBs - Polychlorinated biphenyls (Industrial insulators and lubricants)



Screening for Exposures

In September 2013, the American Congress of Obstetricians and Gynecologists, along with the American Society of Reproductive Health Professionals, issued a Committee Opinion entitled: **Environmental Chemicals Harm Reproductive Health**. The document acknowledges the danger of prenatal exposure to toxicants, and gives advice on counseling clients. Environmental health screening tools designed for the preconception and prenatal period are available to assist healthcare providers to assess for exposures to environmental contaminants. The Green Choices Project and the Alliance of Nurses for Healthy Environments provide examples of prenatal environmental health assessment tools, and are available on-line.

Counseling Clients

Prematurity and low birth weight contribute significantly to infant mortality. Interventions that prevent or limit exposures to toxicants during the prenatal period are a valuable public health strategy. The Green Choices Project, UCSF Program on Reproductive Health and the Environment, the Association of Reproductive Health Professionals, and the Collaborative on Health and the Environment provide education and materials for counseling patients on risk reduction strategies.

Chemical Regulatory Reform

Although risk reduction is an important prevention measure, many exposures are not avoidable on an individual basis. The federal Toxic Substances Control Act of 1976 governs the regulation of chemicals in the marketplace. The law has not been updated in nearly 40 years and is inadequate to protect public health. The UCSF Program on Reproductive Health and the Environment and Physicians for Social Responsibility offer information for clinicians on becoming involved in chemical regulatory reform.

Toxic Substances Control Act of 1976

- About 85,000 chemicals on the market today
- Only a few hundred of these have undergone safety testing <http://www.apha.org/about/news/pressreleases/2011/clean+air+act+house+hearing>.
- Only 5 chemicals have been restricted in the last 37 years under TSCA:
 - PCBs, chlorofluorocarbons, dioxin, asbestos, and hexavalent chromium
 - Ban on asbestos overturned in 1991
- Unlike the FDA, which requires pre-market testing of drugs, thorough chemical testing and regulation is done after-market when problems are reported



Clean Air Standards

Air pollution has the largest evidence base of any environmental contributor to preterm birth and poor birth outcomes. Epidemiological and animal studies link particulate matter (PM_{2.5} and PM₁₀) and sulfur dioxide (SO₂), as well as carbon monoxide (CO), nitrogen dioxide (NO₂) and other nitrogen oxides (NO_x) in ambient air to shorter gestation. In 2012, the USEPA strengthened the annual National Ambient Air Quality Standard for fine particles (PM_{2.5}), reducing it to 12.0 micrograms per cubic meter (µg/m³). In 2011, the USEPA issued a decision to maintain existing National Ambient Air Quality Standards for carbon monoxide at 9 parts per million (ppm) over an 8 hour period.

Supporting strong national policy for clean air quality standards protects pregnant women and their developing fetuses from an important risk factor for preterm birth.



APHA Press Release: Doctors, Nurses other Health Professionals Urge Congress to Resist Efforts to Weaken the Clean Air Act

"Fulfill the promise of clean, healthy air for all Americans"

WASHINGTON, D.C. (February 9, 2011) – Leading public health organizations announced today that 1,882 physicians, nurses, respiratory therapists, certified asthma educators and other health and medical professionals from all 50 states and the District of Columbia sent a letter to President Obama, the U.S. Senate and the U.S. House of Representatives urging them to uphold the protections established in the Clean Air Act. The letter comes as the House Energy and Commerce Committee held a hearing on Rep. Upton's (R-MI) bill proposing elimination of Clean Air Act protections.

References

- Available on the APHA 2013 Annual Conference website or by email request.