

Environmental Health

Environmental Health refers to human health in the environment; it involves assessing, correcting, studying, controlling, and preventing factors in the environment that affect human health. The Environment refers to everything external to an individual host, such as the biological, physical, social and cultural factors. Human health refers to the condition of being sound in the mind, body, spirit and does not simply mean the absence of disease or infirmity. Determinants of health include but are not limited to genetics, age, sex, race, culture, access to medical care, personal behaviors, interactions with the environment, psychosocial condition, physical makeup, and biological makeup.

Environmental exposures play a key role in human growth and development, maintenance of health and in the development of disability and disease. Environmental health in the context of disability can thus be conceptualized as freedom from illness or injury related to exposure to toxic agents and other environmental conditions that are potentially detrimental to human health. The health impacts of contaminated homes, schools, work places, recreational spaces and communities pose a greater risk for the developing fetus, children, and people who already have compromising health issues and are faced with health disparities greater than the general population. This includes those living with an intellectual or developmental disability; they represent some of the more vulnerable people in our communities. Advocacy around environmental health involves working to reduce the environmental hazards that contribute to disabilities, and to minimize further health risks for people living with disabilities. Non-profit organizations (NGOs) that advocate for persons with disabilities are beginning to see environmental health as a quality of life issue, and it is certainly tied in to overall health concerns.

The rise of environmental health awareness in the United States (US) can perhaps be framed by various events leading to the formation of the United States Environmental Protection Agency (EPA), under the Nixon Administration in 1970. In the early 1960s, Rachel Carson published her groundbreaking book, *Silent Spring*, in which she documents the deadly impacts of pesticides on various bird species. In 1965, the truth about leaded gasoline dramatically emerged in Senate hearings as scientist Clair Patterson testified about the obvious and apparently deliberate lacunae and falsehoods in lead industry research. And in 1969, a river caught fire in Ohio due to oil and chemicals in the water, causing national attention. Growing public concerns over unregulated pollution in the environment prompted federal government action. Since the formation of the EPA, various chemicals have been banned or restricted from production in the US, and many more have been recognized as toxic to human health and specifically toxic to neurodevelopment.

However, much is still not known about chemical exposures and the complex interactions of chemicals in the human body that may lead to developmental problems. Scientific research increasingly demonstrates that genetics are not the exclusive cause of developmental disabilities. As a matter of fact, the few syndromes that seem to be genetic, such as Fragile X, Tay-Sachs, and Lesh Nyhan are rare. The gene-environment interaction, or the effects of environmental influences on human genetics, is key to

understanding human health within the paradigm of disability. People are exposed to a host of environmental agents on a daily basis and these exposures interact with the human system in complex and dynamic ways. Some of these environmental exposures include hormones, industrial chemicals, pesticides, pharmaceuticals, air pollutants, heavy metals, and nutrition. Mechanisms of exposure may include inhalation, dermal absorption, and ingestion, and many chemicals can cross the placental barrier in pregnant women.

Many of the gene-environment interactions are still not well understood. For instance, environmental tobacco smoke (ETS) is a known carcinogen, yet not all smokers will develop cancer. The etiology of toxic chemicals and neurodevelopmental disorders is equally as challenging to identify. In 60% of cases of intellectual disabilities the causes are unknown, yet four categories of etiological factors can occur before, during, or after birth: genetic disorders, chromosomal disorders, biological and organic causes, and environmental causes. Proper nutrition during pregnancy, drug and alcohol prevention programs, genetic counseling and prenatal testing, and testing for phenylketonuria (an autosomal recessive genetic disorder that can cause problems with brain development), lead, or hypothyroidism are all important public health steps in disability prevention.

A historical example of disabilities caused by environmental toxicant exposure may best be exemplified by the case of lead (Pb) in our environment. A heavy metal that exists naturally on this earth, lead is a toxicant that damages critical brain development and the central nervous system. The known health effects due to lead exposure vary dramatically, and include: behavior and learning problems (such as hyperactivity), slowed growth, hearing problems, headaches, difficulties during pregnancy, other reproductive problems (in both men and women), high blood pressure, digestive problems, nerve disorders, memory and concentration problems, and muscle and joint pain. Lead prevention is at the forefront in the field of public health.

The Centers for Disease Control and Prevention (CDC) sets the intervention level for lead in a child's body at 10 micrograms of lead per deciliter of blood (10 μ g/dL). However, studies show that a child's ability to learn is impaired at much lower blood lead levels. Scientists report a correlation between blood lead levels as low as 2 μ g/dL in children screened at ages one or two, and declines in math and reading test scores when the children reached fourth grade. These findings complement a host of other studies over the last 15 years showing learning and behavioral deficits occurring at blood lead levels well below the CDC's threshold. While this message is scientifically clear, there is still inadequate regulation of lead in common products, including many children's products. Disability advocates have long understood the multitude of problems associated with lead exposure, especially during the critical window of brain development prenatally and through the early developmental years, and continue to be concerned by this chemical in our everyday environments.

Historically, lead has many known uses, such as in paints, as a gasoline additive, plastic production, piping, and cosmetics. In the early 1920s, lead was used extensively as an additive to gasoline, and by 1924 was documented as an unsafe material for workers in refineries. Still, leaded gasoline was not phased out of gasoline in the United States (US)

until the 1970s—over half a century later, when the (EPA) was established. Today lead remains in US products, although most lead in plastics and other products appears in imported products. The example of lead as an environmental toxicant demonstrates two main points: Firstly, toxic chemicals often exist and impact human health for long periods of time before we fully or even partially understand what harm as occurred. Secondly, once harm is established, the process of eliminating that chemical exposure from the public can take many years, allowing the problem to persist for generations to come.

Environmental Health advocates fully support the Precautionary Principle, which asserts that when an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically. This founding principle sets the gold standard for environmental practices by humans. It is the idea that guides environmental health advocates in policy recommendations, industry performance standards, and other human activities that may harm our environments or the health of our public.

Resources:

- 1 WHO 1993
- 2 Last JM (ed.). a Dictionary of Epidemiology. 3rd ed. Oxford University Press, New York, 1995
- 3 Webster
- 4 AAIDD Environmental Health Initiative, www.ehinitiative.org
- 5 Edwards, TM, and Myers, JP. Environmental Exposures and Gene Regulation in Disease Etiology. *Environ Health Perspect.* 2007 September; 115(9): 1264–1270. Published online 2007 May 21. doi: 10.1289/ehp.9951. (<http://www.ehponline.org/docs/2007/9951/abstract.html>)
- 6 WHO. Atlas. Global resources for persons with intellectual disabilities. Geneva: WHO, 2007.
- 7 Miranda et al. The Relationship between Early Childhood Blood Lead Levels and Performance on End-of-Grade Tests. *Environ Health Perspect* 115:1242–1247 (2007) doi:10.1289/ehp.9994 available via <http://dx.doi.org/> [Online 27 April 2007] (<http://www.ehponline.org/docs/2007/9994/abstract.html>)
- 8 Wingspread Conference on the Precautionary Principle, January 26, 1998. (<http://www.sehn.org/wing.html>)
- 9 In Harms Way: Toxic Threats to Child Development. Greater Boston Physicians for Social Responsibility. May 2000 (<http://www.igc.org/psr/>)