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Help! Our Toxic Environment is Killing Our Children

The Need for Protection and Action for Prevention

The impact of myriad toxins on our daily lives requires urgent attention. Although many scientific studies reveal their devastating effects on our children, concerted efforts by governmental regulators to reign in widespread dissemination of harmful chemically based substances remain questionable. Implicated in this environmental toxic soup are hormonal disruptors found in furniture, carpets, and mattresses. Pregnant women are adversely affected, the repercussions often showing up in their babies. Fathers working in a nuclear (radioactive) environment are also impacted, their children exhibiting health problems that include leukaemia. Children exposed to dust and chemical pesticides, among other causal agents, suffer nervous system disorders and allergies, cancers, changes in brain chemistry, and immune system deficiencies. Women (and some men) show increased susceptibility to breast cancer. Polluted air, water, and common household products are also taking their toll. So what can be done? The problem is complex, but an examination of past and current medical data is conclusive, indicating a critical need for decisive public measures to protect our planet, food stocks, and our families. Through preventative policies directed toward transition to safer materials, technologies, and products, our children's, and indeed our own health can be protected.

Protecting and promoting children's health is a fundamental value and one of our deepest wishes as human beings. The health of our families, communities, nations, and future generations depends upon a healthy environment and a just, peaceful society. In recent years, the rise in environmentally related children's conditions has become a cause for concern among many parents, health professionals, educators, government policy makers and citizens worldwide who realize that children need protection from an environment which has become increasingly toxic.

Essentially, this article explores and analyses issues and concerns surrounding children's health and the environment. Continual updates and resources address the impact of our toxic environment on the very young. In the section "A Toxic World Challenged," we add more contemporary material related to personal, governmental, and organizational efforts aimed at redressing the ravages caused by a toxic environment.

In essence, this article serves as an informative adjunct toward personal and policy changes in that it proposes some solutions to problems that concern parents, educators, health professionals, workers and policy makers. Our work on these issues began in the Women's Healthy Environments Network (WHEN) following on education and action relating to women's health and the environment, in particular to the prevention of breast and other reproductive cancers. This work inspired the production and education with the award-winning documentary, *Exposure: Environmental Links to Breast Cancer*, which continues today.

As we became aware of the environmental impact on children's health, we began to explore how we might participate in education directed at protection and action for prevention on this crucial subject. Having experienced positive and ongoing use of film as a tool for education on the prevention of breast cancer, it seemed important to create a film on children's health and the environment for similar ends. Thus began the production of *Toxic Trespass*, an NFB co-production with accompanying educational materials. It is another award winning documentary, now being widely used in educational, community, labour, First Nations, health professional and other organizations and institutions.

Why the importance of children's health? Are governments and businesses doing enough to protect children from toxins in both consumer products and the wider environment? As evidence in this article reveals, the success of governments in setting safe standards for controlling human exposure to toxins, particularly for children, is in serious doubt. Children receive their first exposures in the womb, hence it becomes necessary to protect pregnant mothers from unnecessary, and indeed avoidable, exposures before and during pregnancy. When infants crawl on the ground or the floor, they are exposed to contaminated dust, soil, pesticides, and household chemical and other substances.

Most regulatory exposure standards are set for healthy males, not infants or children. In May 2000, the comprehensive report, *Environmental Standard Setting and Children's Health* was released by the Ontario College of Family Physicians Environmental Committee and the Canadian Environmental Law Association (Cooper et al.). It included an extensive review of the international scientific research that addressed the links between environmental contamination and health effects in children and thoroughly reviewed how governments set standards that are supposed to control children's exposure to toxins. It raised

serious concerns that children are not adequately protected from environmental pollutants in consumer products, pesticides and in air, water and food. The need for preventive regulatory action utilizing the "precautionary principle" based on weight of evidence rather than absolute scientific proof of harm was also raised and is paramount.

The report states: "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" (Wingspread). Increasingly, environmental health professionals and advocates worldwide promote such measures.

A leading expert in the field of children's health and the environment, Dr. Philip Landrigan, MD, M.Sc. Director, the Centre for Children's Health and the Environment, Mount Sinai School of Medicine, stated:

> It is now clear from studies in animals and children that subtle changes in concentration of normally occurring chemical such as hormones—as well as the presence of toxic agents like lead, mercury or PCBs—can produce profound and permanent changes in the developing nervous system. These changes can lead to decrements on mental performance, alterations of the reproductive system, cancers and other conditions…. We must increase our understanding of the neurotoxicity of chemical agents now in the environment, and we must adopt public health policies that limit the exposure of fetuses and children to environmental chemicals.

Background to the Issues

Increasingly, children are being diagnosed with asthma, allergies, developmental and learning disabilities, cancer and other health problems. Reproductive disorders and early onset of puberty are also on the rise. All too often, despite our best efforts, many children remain exposed to insidious toxic substances found in air, water, food, and commonly used products. Although illness is generally the result of complex interactions of social, economic, hereditary genetic and environmental factors, a growing number of scientific studies indicate that chemicals, radiation and other toxic substances are contributing to the significant increase in these conditions (Wigle).

In mammals, a healthy fetus requires a healthy egg and sperm before conception. Healthy fetal development and healthy offspring in turn lead to healthy children and future parents. Prior to conception, damage to the ovum and sperm can interfere with the formation and development of the fetus, making it imperative to protect both mothers and fathers from unnecessary toxic exposures

before pregnancy. Childhood illnesses known to be linked to parents' exposure to these toxins (often in the workplace) include brain cancers and leukemias (Colt and Blair). Implicated in such exposures are paint, petroleum products, solvents, pesticides and radiation. Air pollution has long been linked to asthma and other childhood lung diseases, hospitalizations and deaths. Animal tests show that small doses of certain chemicals absorbed during critical stages of development (windows of vulnerability) can cause permanent changes in the brain and its chemistry, hyperactivity and other neurological deficits as well as cancers and immune system deficiencies in early or later life (Steingraber 2001; Wigle; Perera).

In addition to being exposed to toxins by ingesting contaminated dust, soil, and household chemicals, babies and young children also consume more calories, drink more water and breathe more air per pound of body weight than adults; therefore, their body tissues can accumulate higher concentrations of harmful substances. Children are also more vulnerable because most chemical exposure regulations or standards are based on studies not conducted on children, but rather on healthy adult males. Thus, the concept of "windows of vulnerability" challenges current thinking and practice as relates to risk assessment setting standards so based and which implicitly allow permission to pollute. The question then is how much? The sixteenth-century Swiss chemist, Paracelsus, established a now-outdated rule of toxicology, "the dose makes the poison." Modern-day risk assessment and risk management all too often still adhere to this notion; however, it is now known that the *timing* of exposures can be just as, or more important than the dose, particularly considering the high sensitivity of the rapidly multiplying cells of the developing fetus (such as when organogenesis takes place).

A human female's eggs are formed in the first trimester of pregnancy; females do not produce additional eggs following birth, unlike males who produce sperm throughout their life after puberty. If a baby girl is exposed to toxic substances during early gestation, she may become ill and/or suffer genetic harm that can be passed to future generations. These "windows of vulnerability" are extremely sensitive stages in fetal development and during any time of rapidly multiplying cells (such as a young girl's breast development). Most regulatory limits are too high for these susceptible stages where the smallest amounts of exposures can cause havoc as previously described (Steingraber, 2001; Wigle).

Two examples of how toxic chemicals absorbed during these "windows of vulnerability" can produce health problems have been shown with diethylstilbestrol (DES, a synthetic form of estrogen) and Thalidomide (Steingraber 2001). Many offspring of women who were prescribed DES during pregnancy between 1941 and 1970 developed a rare cancer of their reproductive system. Many women who from 1957 to the early 1960s were prescribed Thalidomide for

morning sickness during pregnancy, gave birth to children with phocolmedia (flipper limbs) and other malformations depending on when the drug was taken during pregnancy (Steingraber 2001).

Environmental toxins also impact males where damage may include declining sperm counts, undescended testes, smaller penises (affecting reproduction), increases in testicular and prostate cancer, and other endocrine disruption and immune deficiencies (Davis 2002). These problems mirror a growing trend of environmental contamination by synthetic chemicals, specifically those that are toxic, radioactive, persistent, bioaccumulative and hormonally active. While all children and parents are at risk, disadvantaged groups are often more vulnerable because of substandard living conditions, lack of nutrition, poor working conditions, and occupational exposures (Chaudhuri).

Human Rights and Environmental Justice

Indigenous communities, people of colour and the poor are often disproportionately affected by toxic pollutants. Heavy industries, waste sites, incinerators, nuclear facilities and other industries are frequently located near marginalized communities. The Aamjiwnaang Reserve featured in *Toxic Trespass* is one example. Located adjacent to the Sarnia, Ontario petrochemical plants, this community has a 2:1 birth ratio of girls to boys, high asthma rates, excess cancers and many other serious health issues. It is suspected that these problems may be related to hormone disruptors and other chemicals released by the industrial plants. Worldwide, coal, copper, uranium and other minerals are mined with tragic health consequences, often on lands occupied by indigenous peoples. Such communities are affected by both proximity and occupational exposures to toxins. As a result of tradition or necessity, indigenous people often eat "country food," such as game or fish, which may have been contaminated by pollutants from industrial sites or agricultural activities. Poverty exposes children living 'downstream' to a heavier burden of toxic contaminants, and this is often combined with malnutrition. For many activists, environmental justice goes beyond drawing attention to unfair distribution of toxic dumping, but also includes uniting with communities fighting ecological desecration, and engaging in restoration of natural resources while protecting biodiversity.

Thousands of untested chemicals continue to be released globally on a regular basis. Industry, agribusiness and the military all manufacture, use and release huge quantities of toxins into the air, water and soil every year. Currently under Canadian and U.S. law, proof must be scientifically shown that a substance is dangerous *before* it will be banned. Responding to such lax regulations, in the early 1990s the International Joint Commission on the Great Lakes (IJC)

called for "zero discharge" of all persistent toxic chemicals in the Great Lakes, including radionuclides (IJC). It also proposed the adoption of the principle of *reverse onus* meaning that the polluter must prove that a chemical will not cause harm *before* it is allowed into the environment. The acceptance of this principle would set an important commercial and regulatory precedent in North America.

The sources of pollutants are many, some of which are chronicled below. The chemical industry currently produces about 40 million tonnes of chlorine annually, much of it for widely used industrial *organochlorines* that include common toxins like dioxin, DDE, PCBs and CFCs, which are all harmful even in trace amounts. They pose particular dangers as they accumulate in the fatty tissues of humans, animals, fish, birds and reptiles, where they can build up to dangerous levels as they persist in the environment for decades and even centuries. They cause hormonal disruptions, infertility, birth defects, impaired development, metabolic dysfunctions, neurological and behavioural changes, immune suppression and cancer. They do not occur naturally in human or animal tissue; yet 177 variations of these toxins have been identified in the fat, blood, breast milk, semen and breath of North Americans (Kramer).

In January 2003, the U.S.-based Environmental Working Group carried out the most comprehensive study of multiple chemical contaminants in humans. Blood and urine from nine people were tested for 210 chemicals that occur in consumer products and industrial pollution. An average of 91 industrial compounds, pollutants, and other chemicals were found in each of the nine volunteers. In July 2005, BodyBurden's study of industrial chemicals, pollutants, and pesticides in umbilical cord blood revealed a total of 287 contaminants among a group of ten newborns, with an average of 200 contaminants in the cord blood of each.

In June 2006, Environmental Defence released a report, *Polluted Children, Toxic Nation: A Report on Pollution in Canadian Families,* based on a study of 13 families in which parents and their children were tested. The laboratories found a total of 46 of the 68 chemicals tested (68 percent), including 38 chemicals that can cause reproductive disorders and harm the development of children, 38 suspected cancer-causing chemicals, 23 chemicals that can disrupt the hormone system, 19 neurotoxins, and 12 chemicals associated with respiratory illnesses. On average, 32 chemicals were found in the parents and 23 were found in the children. One of the families tested included three generations—a child, father and grandfather (Environmental Defence 2005). It can be assumed most of us carry these chemicals in our blood as well.

Women exposed to high levels of organochlorines have significantly higher levels of breast cancer. These include chemists, women working in factories that produce solvents and pesticides, working at boarder crossings where they

are exposed to diesel fumes, women living near hazardous waste sites and professional golfers exposed to lawn pesticides. At least 16 organochlorines have been found to cause mammary cancer in laboratory animals—including pesticides such as DDT, aldrin, chlordane, dieldrin and atrazine (a popular herbicide), as well as polyvinyl chloride (PVC) used in plastics and vinyl. Many of these contaminants can be found in the placental fluid, the umbilical cord as well as the breast milk of nursing mothers (Steingraber 2001).

In 1962, biologist Rachel Carson's landmark book, *Silent Spring,* alerted the world to the health hazards caused by pesticides (and nuclear fallout). She described how toxic chemicals make their way into the food chain and are stored in fat cells of wildlife and humans including breast tissue, breast milk and unborn fetuses. Notwithstanding attempts by chemical corporations to discredit her, her findings led to the banning of DDT in North America and Europe but it is still exported and used in many countries of the South where it often returns ("circle of poison") on food imported to the North. Her inspiration led to "Earth Day" now observed worldwide.

In 1993, the U.S. National Research Council of the National Academy of Science (NRC) Committee on Pesticides in the Diet of Infants and Children concluded that chronic exposure from food and water, surface contact from lawn spraying, play structures and homes may cause long-term effects such as birth defects, neurotoxicity or increases in behavioural, endocrine and immunological disease and cancer. "The data suggests that exposure to these chemicals at levels believed to be safe for adults could result in permanent loss of brain function when such exposure occurs during prenatal and early periods of brain development" (Poe and Rall).

A 2006 study by the Columbia Center for Children's Environmental Health (CCCEH) revealed that prenatal exposure to air pollutants in New York City can adversely affect cognitive development during childhood ("In Utero Exposure"; Perera).

Indoor Air Quality

Children in North America generally spend more time indoors than outdoors. Yet, indoor air quality can be as much or more of a health concern as heavily polluted outdoor air in urban areas. Many products used in homes, such as furniture, carpets, as well as cleaning and body care products, release volatile organic compounds (VOCs) into the air. In this case, volatility of a substance refers to its rapid transformation from a liquid or solid into airborne particles. Common VOCs in indoor air include formaldehyde, phenol, benzene, xylene and toluene, and are associated with or suspected to contribute to a range of reproductive and/or child health concerns. The use of air fresheners, household

cleaners, insecticides, and personal care products can release airborne toxins that ultimately heavily contaminate the indoor environment as they accumulate in household dust. These toxins can include lead, mercury and phthalates, among others. The U.S. Environmental Protection Agency (EPA) considers indoor air pollution to be one of the top five environmental hazards to human health.

Indoor air quality (IAQ) is also one of the most pervasive and damaging threats to the health and safety of schools. One hazard associated with Sick Building Syndrome (SBS) is mould growth. Canada Mortgage and Housing Corporation states: "Exposure to mould inside buildings is not healthy for anyone but it is particularly devastating for children with asthma and other allergies." For them, avoiding the stimulus is recommended, however, this is not always possible for students in school. Effective strategies are especially important in this time of crumbling buildings, overcrowding, funding cutbacks and deferred maintenance in many North American schools where repairs may be necessary.

Most plastics contain endocrine disruptors that can affect the development of reproductive organs and hormonal systems. Developing fetuses, infants and children are more vulnerable to such exposures. As with DES (given during pregnancy), these exposures may produce unexpected and tragic effects in children both currently and decades later. Some well-known endocrine disrupting toxins such as phthalates (chemicals that make plastic flexible) are softeners in PVC used in the production of babies' toys and cups. These phthalates can leach into babies' mouths. In January 2011, the Canadian government banned phthalates in babies' toys after advocacy by environmentally concerned organizations (Weeks).

Although removed from toys, phthalates can also be found in the lining of food cans, household "supercleaners" and plastic dental amalgams. Plasticizers are not chemically bound and tend to leach fairly easily into food, especially when heated but also at room temperature. Some are known to cause cancer in mice. Cling wraps are a major source of plasticizers in the kitchen and are of particular concern when used to cover fatty foods, especially when they are used in microwave ovens.

Bisphenol-A (BPA) is another endocrine disruptor found in plastics. It mimics the female hormone estrogen in the human body, potentially affecting fertility and promoting cancer. It is found in clear plastics and can leach out during everyday use. It is estimated to be present in approximately 95 percent of baby bottles on the world market. As well, endocrine disruptors continue to surround us in our everyday lives, including being found in some construction products and in pipes carrying water. In 2010, the Canadian government banned Bisphenol A in baby bottles after a major campaign by Environmental Defence and other environmental health groups. The bans on these children's

products are most welcome, but how and when these policies can be enacted and enforced remains to be seen.

The detrimental effects of lead, a neurotoxin, are well-known, and its removal from gasoline, paint, and food tins has already had quantifiable effects in North America. However, there is still a reservoir of lead contamination that will pose a risk for decades to come. It is estimated that up to 90 percent of a woman's stores of lead can cross the placenta during pregnancy. Even low levels can affect nervous system and brain development in the fetus, infant and child. Children born to women with high lead levels are at higher risk for slow and/or delayed growth and nervous system disorders. Children continue to be subjected to lead contamination from industrial sources, soil and dust, and also housing that still has lead plumbing. Often children most affected by these exposures are in the poorest and marginalized sectors of industrial society and also in many countries of the South where gasoline containing lead is still used. As with other contaminants, scientific evidence indicates that there is no safe level of exposure to this developmental neurotoxin (CPCHE).

Mercury is a liquid metal found naturally in rocks and soils. The largest man-made emissions of mercury come from industry as well as coal and oil burning, mining and related activities. It is also found in hospital equipment, such as thermometers. When mercury is attached to carbon, it converts to methylmercury, a toxic compound. Methylmercury found in fish is very readily absorbed through oral intake. As well, mercury vapor coming from dental amalgams (silver fillings) is easily absorbed. Acute and chronic mercury exposure can be highly toxic to the nervous system and kidneys. Chronic, cumulative low-dose exposure may have subtle effects on mood, producing symptoms such as anxiety and depression, and may affect memory, thinking and nerve function. Some studies have shown that when women have higher levels of methylmercury exposure from eating marine mammals, their children have been found to have lower intelligence scores, delayed verbal and motor skills, impaired hearing and poor coordination (Steingraber 1998).

Polybrominated diphenyl ethers (PBDEs) are used in flame retardants that are applied to upholstered furniture, mattresses, curtains, carpets and electronics to slow the spread of fire. PBDEs can migrate from products, and have been detected in household dust, human blood and breast milk. Highly persistent and bioaccumulative, both in the environment and in people, PBDEs are suspected of disrupting hormones and causing cancer and developmental disorders. These chemicals can have detrimental effects on thyroid hormone (a hormone critical for brain development and other bodily processes), which can result in learning disabilities and behavioural problems (Environmental Defence 2006).

Radiation

Epidemiologist Rosalie Bertell notes, "We have all been exposed to radioactive fallout from nuclear weapons testing in the atmosphere … [and] the fallout from those tests included strontium 90, plutonium, uranium, radium and thorium, all of which are stored in our bodies."

Researchers from the University of Leeds and the London High School of Hygiene and Tropical Medicine looked at the health of 39,557 children born to 18,131 male workers. Their study, the "Nuclear Industry Family Study" (NIFS) (1999) concluded that the overall rate of all types of cancers was virtually similar to that of the general population; however, "the risk of Leukemia among children of fathers exposed to radiation before conception was *twice* that of children whose fathers were *not* exposed to radiation" (WISE). Also, it was revealed that leukemia risk was nearly six times greater for children of fathers exposed to a radiation dose of 100mSv (100 millisievert) or more (maximum permissible annual radiation dose to nuclear workers in the UK is 50mSv) prior to the child's conception ("Leukemia and Non Hodgkin's Lymphoma in Children of Male Sellafield Radiation Workers"; "Epidemiological Evidence for an Infective Basis of Childhood Leukemia.").

Children and fetuses are ten to twenty times more susceptible to the carcinogenic and developmental effects of radiation than adults, largely due to rapid cell division during childhood growth. Reproductive organs and genes in the eggs and sperm are also more vulnerable to mutation from radiation exposure. This means increased dangers not only for children now, but also for future generations. When radiation exposure is added to many conditions, the dangers increase multifold. There is evidence of the interaction between radiation and estrogens: rats given low doses of estrogen show a slight increase in breast cancer but when x-rays are added there is a massive, explosive incidence of breast cancer (Segaloff and Maxfield). Radiation can accumulate in the food chain, and over time, could induce increases in childhood cancers and genetic diseases. Radiation exposures are also more dangerous to children than adults because the latency period for cancer in children is shorter. For adults, it can be 15 to 60 years, yet in children it may be only four to six years.

A 1995 study revealed a significant increase in breast cancer mortality rates among American women living near nuclear facilities. Such vulnerability extends to accidental and routine radioactive emissions from the whole nuclear fuel chain, including uranium mining, refining, reactors, and transportation. High-level nuclear waste produced by nuclear facilities lasts for at least 250,000 years (Gould et al.).

Electro Magnetic Fields (EMFs) are invisible lines of force that surround any electrical device. Many scientists, health professionals and activists have

illustrated that these ever-present fields can pose a serious challenge to health, housing values and community development plans. Exposure to EMFs comes from many sources: high-tension electrical transmission wires, working in or close to these fields, operating or sitting near a video display terminal (VDT), lying under an electric blanket, using cell phones, living near or under cell phone towers, wi-fi, electrical wiring, appliances, electronics, and using electrical appliances and gadgets (www.magdahavas.com). Children exposed to EMFs may be particularly susceptive to brain cancer, leukemia, lymphoma and other conditions. Male breast cancer is more common among electricians, power station operators, telephone linemen, and railroad and tram drivers (Tynes and Anderson). Many scientific studies have demonstrated links to deleterious health effects; however, evidence of EMF harm may often be dismissed by governments, electrical utility and cell phone companies as unproven claims (Davis 2010).

A majority of North Americans drink fluoridated water, while most of the world does not. Yet there is no evidence that the teeth of children on this continent are any healthier due to fluoride added to water; in fact, there are increasing signs of negative health impacts. If fluoride protects teeth at all, it protects them topically, not through ingestion (i.e., in toothpaste, not in drinking water). Fluoride accumulates in the body, particularly in bones. The rates of osteosarcoma (bone cancer) in young men have been found to increase in areas where water is fluoridated. As well, a recent independent study found that fluoride accumulates in the human pineal gland and may negatively affect the production of melatonin, a hormone that seems to have anti-cancer properties. The toxic effects of ingesting fluoridated water are exacerbated in children, particularly those who live in poverty and often have both poor dental hygiene and nutrition. According to critics, unless a clear benefit to children's teeth is established, the addition of fluoride to drinking water amounts to doubtful public health policy (Bryson; Limeback).

Energy and Transportation

Modern transportation methods pollute outdoor air in urban areas where most children live. The main culprits are the combustion of fossil fuels, gasoline and especially diesel fuel used by trucks, cars, buses and airplanes (Zelinski and Laird). The International Agency for Research on Cancer considers diesel exhaust a probable human carcinogen. Diesel exhaust is also linked to eye and respiratory system irritation, aggravation of asthma and allergies, and adversely affects the growth and development of children's lungs. Many children ride to school in diesel-powered buses. Studies have found that diesel exhaust levels are considerably higher *inside* buses than outside, and that exposures are highest around idling buses, trucks and cars. Solutions to the vehicular air pollution

problems include increased use of trains for people and goods. Train use would significantly reduce highway congestion, smog, greenhouse gasses (GHGs) and their associated health costs.

How can we think and act on these problems? In Western society, there is a prevailing belief that maintaining a healthy lifestyle will keep us well all our lives. If we eat vegetables, don't smoke, exercise and reduce stress, we will reduce the risk of heart attacks, strokes and cancer. Of course this is wise practice, but this accounts for only part of the equation. The other part is largely environmental, often involuntary and thus political, requiring social policy changes. Therefore, the two approaches need to be symbiotic.

A problem with the lifestyles-only approach is that it puts the onus on the individual while toxic contamination is allowed to continue in the name of "progress." Over four decades ago, the World Health Organization (WHO) estimated that 80 per cent of cancers were related to environmental causes (Proctor). As ecologist Sandra Steingraber (1998) notes, the larger environment includes what we eat, drink and inhale—and what we take in becomes our "internal environment."

With climate change and other global concerns, the need for long-term sustainability is urgent. Sustainability means living within the earth's limits. It means living in a world where feeding people does not necessitate polluting groundwater and coastal shorelines; where transporting people and goods does not mean polluting the air and changing the climate; where heating homes and powering industries does not require vast amounts of polluting fossil fuels or nuclear power or where wars are continually fought over oil and other resources.

Most parents, educators, and community members work tirelessly to keep our streets safe and protect children from harm. By the same token, it is essential that there be prevention and protection marshalled against the harm caused by environmental contamination.

Children and future generations can be safeguarded from many environmentally related illnesses through assiduous control of industrial chemicals, heavy metals (neurotoxins), ionizing radiation, and electromagnetic fields in the environment. Disease-causing agents created by industrial pollutants in our homes, communities, and workplaces can be reduced and/or eliminated.

Governments and businesses must do more to protect children from toxins in both the environment and consumer products. As noted, governments are frequently lax in setting safe standards for controlling human exposure to toxins, particularly for children. In the past, most prevention research has largely focused on genetics, diets, exercise, screening and drug use. As mentioned, in recent years, scientific research on the links between environmental contaminants and children's health has highlighted a need for preventive regulatory

action using the "precautionary principle," instead of requiring full scientific proof of harm in every case (Wingspread).

We can protect children's health by promoting policies that require a transition to the safest materials, technologies and products, the adoption of reverse onus (proof of safety beforehand) policies and influence business, industry, manufacturers, employers, health care institutions and policy makers to change. Such changes include safe, sustainable energy production, the community's right to know what is being emitted, and a conversion to safe technologies with jobs assured for workers. We, in industrialized countries, can do our part by reducing our consumption and the wasteful use of resources. There are safe alternatives to most toxic production processes. The province of Ontario has initiated the *Toxic Reduction Act* (2010) and the city of Toronto has initiated a community right to know and disclosure bylaw, both intended to lead to creating a safer environment (Chemtrac).

We may not know everything about the links between toxins and health and it will take time before the benefits of reduction and/or elimination become evident, but *we have no excuse for delaying action.* Prevention of environmental exposures to children is also more cost effective. Indeed, several studies have analyzed the high cost of diagnosis, treatment, and parents' time lost from work resulting from exposure to toxins (Massey and Ackerman).

On the hopeful side, there is a growing constituency of children's health and environment advocates in Canada, the United States and internationally. In North America, the Canadian Partnership on Children's Health and the Environment (CPCHE) and the U.S.-based, Partnership on Children's Health and the Environment (PCHE), and internationally, the World Health Organization (WHO) are such advocates. Added to these organizations are the growing number of health professionals—physicians, nurses, naturopathic doctors, researchers and educators and others—engaging in environmental health promotion and primary prevention.

In New York City, at Columbia University Center for Children's Environmental Health (CCCEH) Dr. Frederica Perera's studies on environmental threats to children have pioneered molecular epidemiology using biological markers (biomarkers) at the cellular level of human studies to indicate hazardous exposures and disease risk in children. CCCEH works with community organizations and is conducting research projects on the environmental causes of three signal conditions: asthma, growth and development impairments and cancer (Perera).

A Toxic World Challenged

As a scientist and mother, in her recent book, Steingraber (2011) searches for

ways to protect children from the toxic world they inhabit. She explores the underlying social, political and ecological forces that continue to shape our world. Steingraber documents how the parenting world is entwined with the public world, compromised by the ongoing environmental crisis. She argues that the environmental crisis is essentially a crisis of family life.

Blending statistical data and social analysis, Susan Palmer argues that the world we live in toxifies our children. Our modern society impairs their natural development. Through lack of play (which undermines physical development), exposure to the array of electronic devices, and a diet of food high in sugar and fat, children have become unhealthy "couch potatoes." In essence, modern society is poisoning our children's hearts and bodies. Nonetheless, although Palmer exposes how the modern world has a deleterious affect on the young, she offers redemptive strategies we can incorporate to save them.

In *My Toxic Baby*, award-winning filmmaker, Min Sook Lee portrays the challenges faced by new parents as they confront the health risks spawned by their child's exposure to chemicals in everyday items. After hearing news about toy recalls and the danger of bisphenol in plastic baby bottles, her mother instinct kicked in. Lee set out on a quest to determine how she can minimize toxicity and indeed "go green." To achieve this, Lee reflected on the products and food purchases she makes and offered up her body and her home for scrutiny by an analyst. Opting not to use wipes, lotions and soaps with artificial fragrances, she embarked on a noble challenge and decided to produce a film that offers simple ways to minimize toxic threats.

In a study of blood samples of 30 pregnant women and 39 non-pregnant women conducted at the University of of Sherbrooke Hospital Centre in Quebec, researchers found Bt toxins used for implanting GM techniques in corn and other crops (Poulter). Although the impact of the toxins on the unborn fetus is unknown, the team suggested that, "Given the potential toxicity of these environmental pollutants and the fragility of the foetus, more studies are needed" (Poulter). Further, the "director of GM Freeze, an umbrella group for community, consumer and environmental organisations opposed to GM farming, described the research as 'very significant'" (Poulter). Accordingly, the Canadian team reported, "This is the first study to highlight the presence of pesticides associated with genetically modified foods in maternal, foetal and non-pregnant women's blood" (cited in Poulter). Although Dr. Little, chairman of the Agriculture Biotechnology Council, spoke of the questionable realibility of the study and that the toxins apparently do no harm to human health, it nontheless remains an issue of grave and immediate concern.

Many organizations and coalitions like Canadian Partnership for Children's Health and Environment (CPCHE) and Environmental Working Group (EWG) are engaged in actions for personal, institutional and policy change. As this paper

has shown, the implications of *not* taking action are far-reaching. Besides the already noted physical diseases and conditions such as cancer, asthma, allergies and birth defects, neurological deficits such as learning disabilities, behavioural problems, attention deficit and hyperactivity disorders also profoundly affect many children and indeed their families.

The need for education and action for prevention is vital according to Dr. Monica Campbell, then manager of the Health Promotion and Environmental Protection Office for the Department of Public Health, City of Toronto. In her presentation of proceedings from the 1999 conference on "The Effects of Hormonal Disrupters on the Health and Development of Children," she stated:

> The final themes that emerged included the need for research, policy and education … a stronger education initiative is necessary to give the public sufficient information by which to protect themselves and their families, and to empower the public to advocate for more health protective policies. The public's right to know about environmental health risks needs to be addressed and the work of environment health groups needs to be supported. The end result should be increased pressure on politicians to regulate the use of these chemicals to safeguard our health, our children's health as well as generations to come.

Final Thoughts

To heed Dr. Campbell's recommendation, we close with final thoughts for inspiring action for prevention:

> *Powerlessness and silence go together. We in this country should use our privileged positions not as a shelter from the world's reality but as a platform from which to speak. A voice is a gift. It should be cherished and used.*
> (Margaret Atwood, Canadian author and poet).

> *Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it's the only thing that ever has.*
> (Margaret Mead, anthropologist)

> *Get busy, get active, do it for those you love.*
> (A young mother recently diagnosed with breast cancer)

> *Activism is the rent I pay for living on this planet.*
> (Alice Walker, author).

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