
EXECUTIVE SUMMARY

Children are at risk

Children in Canada, including those within the City of Toronto, are at risk from environmental contaminants. There is scientific consensus that the developing fetus, infants and children up to age three years can experience greater exposure than adults to substances in the environment. The degree of risk arising from environmental exposures is often poorly understood. Risks vary across different contaminants, age groups and individual circumstances. Scientific evidence exists of associations between environmental hazards and asthma, cancer, learning, behavioural and developmental effects, low birth weight and birth defects. Emerging evidence exists for additional, equally serious, health effects such as impaired functioning of the immune system and interference with the hormones of the endocrine system.

There are many thousands of contaminants in the environment. Hundreds of them are suspected of contributing to these health outcomes although only a small number of them have been fully evaluated for their effects on prenatal and child development. Nevertheless, multiple exposures continue during pregnancy and throughout the early years of child development. Full scientific certainty about the effect of these exposures is in fact impossible. Such scientific proof would require carefully controlled experiments on children, an ethically abhorrent proposition.

Such “experiments” on children do not occur in the controlled environment of a scientific laboratory, but, in the environments where children live, learn and play. Uncontrolled “experiments” have been conducted for many years and they continue. For example, knowledge about the way lead can harm children’s brains comes from many years of exposing children to lead from its use in gasoline and paint and documenting negative effects on brain development.

Likewise, strong evidence exists that air pollution triggers asthma attacks in people with asthma and there is now suggestive evidence that some outdoor air pollutants can cause the onset of asthma as well. Increasing evidence exists of many other serious effects from air pollution in the developing fetus and child. This evidence comes from measuring these effects in children exposed to air pollution.

Health trends

Patterns of disease among children have changed dramatically in the last 100 to 200 years. Infant mortality is substantially lower and the historically common illnesses of early childhood are very rare in the developed world. Life expectancy has nearly doubled. However, chronic diseases and other debilitating conditions, including several with suspected or strong associations with environmental exposures, are on the rise among children.

Two health outcomes that are observable in large numbers of children include respiratory conditions, particularly asthma, and a range of conditions related to cognitive and neurobehavioural functioning. Substantial evidence demonstrates associations between respiratory effects and indoor and outdoor air pollutants. This evidence includes numerous studies, including in Canada, showing associations between increased air pollution and increased respiratory illness among vulnerable populations including children.

For effects and related outcomes in the developing nervous system, the situation is poorly understood for most contaminants although effects on the developing nervous system are well documented for some of the more extensively studied substances including lead, mercury, dioxins, PCBs and some solvents. Increasing concern exists about nervous system effects of the organophosphate insecticides and polyhalogenated compounds such as the flame retardants known as polybrominated diphenyl ethers (PBDEs). As well, mounting evidence of effects from early life exposure to environmental tobacco smoke on neurological development is of concern.

For each of the major health concerns with known or suspected links to environmental exposures it is generally possible to assemble some data on trends of these health outcomes in the Toronto population. Or, where Toronto-specific data are lacking, trend information from the provincial or national or even the international level can be noted. However, it is only rarely possible to draw a direct relationship between these health outcomes and exposures to environmental contaminants or to establish the relative impact of various factors such as socioeconomic status versus environment.

In Toronto, asthma, learning disabilities, cancer, low birth weight and birth defects occur in the child population at rates that are similar to, or in some cases higher than, rates that occur among children in the rest of Canada and in other industrialized countries. Children in Toronto are disproportionately affected by poverty, compared to children living in adjoining regions of the Greater Toronto

Area (GTA). Poverty is a known risk factor for both poor health and greater exposure to environmental contaminants.

Cancer rates have been rising among children in the US and countries in Europe for many years but such increases are not apparent in children in Canada. Although still very rare, cancer remains the leading cause of illness-related death for children in Canada older than one year of age. Moreover, cancer rates among young adults (aged 20 - 44 years) in Canada have increased gradually since the 1970s. For certain cancers, such as thyroid and testicular cancer in men, brain cancer in women and non-Hodgkin's lymphoma in both men and women, incidence rates increased by more than two percent per year or just under 20 percent per decade. Causes for these increases are unknown but given the long latency period for most carcinogens, that is, the time period between an exposure and the onset of disease, early childhood, prenatal or parental preconceptional exposures, especially during windows of vulnerability, could be contributing factors.

Effects on the Developing Respiratory and Nervous Systems

Current estimates place the prevalence of childhood asthma at 12% and Toronto physicians report treating children for acute and chronic respiratory symptoms more than any other health complaint. Data about these conditions among Toronto's children indicate that poorer children may be particularly vulnerable to general respiratory health effects from air pollution.

The prevalence of learning disabilities, Attention Deficit Hyperactivity Disorder (AD/HD), autism and other neurobehavioural deficits appear comparable among data from the US, Canada and Ontario. Although data are limited, Toronto appears to be on the higher end of the scale with about 13% of enrolled students with at least one or more learning or behavioural exceptionalities of concern.

Although not universally accepted, there is limited evidence that prevalence rates for most of these neurocognitive and neurobehavioural conditions have increased in recent years with some US-based physicians referring to the problem as having reached epidemic proportions given the numbers of children affected. This apparent trend of increasing prevalence over time may be influenced by more aggressive diagnostic practices, nonetheless the burden of disabling conditions is high.

The social costs are considerable. Research into the economic burden of the diseases and disorders of concern with respect to toxic exposures suggests that

exposure prevention could result in substantial savings in health care, human productivity and myriad social costs.

Understanding Exposure

Like the wide range of health effects of concern that may arise from environmental contaminants, describing the range of substances to which children are exposed is challenging. There is both a vast range of substances and, in many cases, multiple sources or settings where exposure can occur. The gaps in information are even more profound for exposure data than for the scientific investigation of health effects. This gap also explains the inability to accurately describe the exposures of children in Toronto in this report. Moreover, many of the substances of greatest concern are often known or suspected of being associated with multiple effects and exposure occurs in many ways. Timing is also critically important given the reality of windows of vulnerability during prenatal development and the many stages of childhood.

Biomonitoring is one, quite direct means of measuring exposure. Although such data collection has never been done systematically in Canada, recent data looking at the US population has found that people of all ages have measurable evidence of exposure and, for persistent substances, body burdens of many contaminants, or their metabolites, at levels that, in most cases, are of uncertain health significance. These data provide a baseline of information to better understand the nature of exposure. Although useful to medical and scientific experts, biomonitoring results have also provided an unexpected and often unwelcome indication to many people of the pervasiveness of environmental contamination.

For pesticide residues in particular, biomonitoring data seem to be essential to improving understanding of exposure and to evaluating both the need for and the efficacy of regulatory measures to minimize exposure. Canadian Food Inspection Agency data appear to reveal a multi-year trend of lowering levels of exposure to pesticide residues on food. The proportion of samples with non-detectable residues is quite high and the proportion of samples showing exceedences of regulatory limits, that is, of the maximum residue limits (MRLs), is consistently low. These data paint a picture of fairly strong regulatory compliance and could lead to a conclusion of very low exposure. However, the US biomonitoring data reveal that pesticides and their metabolites are extremely common in people's bodies.

It is difficult to know either the extent, or the implications to children's health, of combined exposures to multiple pesticide residues on food, either at detection levels or for those found (fairly rarely) in excess of MRLs. It seems essential to

combine such data with actual biomonitoring results to know whether the record of minimal exceedences of MRLs in food is reflective of “safe” exposure levels. This work is of particular importance to the work required to re-evaluate the majority of pesticides in use, in most cases, to determine their potential for exposure and health effects in children.

Compared to the lower levels of pesticide residues on food, pesticide exposure can be much higher and unsafe when it occurs more directly from use outdoors, but particularly in the indoor environment. It is because of this potential for overexposing children that limits have increasingly been placed on the use of pesticides in areas frequented by children.

Less uncertainty exists with respect to the known hazards of exposure to outdoor and indoor air pollution. Air remains one of the most significant media for environmental exposures. All too well understood in Toronto, urban outdoor air is a complex mix of chemicals, including numerous substances that are harmful to children’s health. The burden of illness attributed to air pollution is also very high and estimated to be considerable for people, including children, in Toronto.

Indoor air quality is a largely unregulated source of exposure to a variety of contaminants. Globally, scientific experts acknowledge that poor indoor air quality is a significant environmental health issue requiring further study and monitoring. Indoor exposures are as relevant in a child’s home as they are in schools and child care facilities. Contaminant levels in indoor dust, arising from the tracking in of contaminants from outdoors, the deterioration of old paint or the use and break-down of consumer products, are also of concern.

Exposures will often occur through many media although certain media will be of greater significance than others depending on the particular contaminant or substance. For example, lead exposure can occur via water, food, soil or air. However, exposure to lead in indoor dust appears to be the single greatest exposure pathway for children due to its greater presence in dust than in other media as well as children’s exploratory and hand-to-mouth behaviour. It is a pathway for which greater awareness and precautionary responses are needed. Certain exposures are probably unsafe at any level, including lead, ozone, particulate matter but also the persistent organic pollutants (POPs).

For many of the substances of emerging concern, those that are also persistent and bioaccumulative need immediate attention. Full understanding of their toxic effects in humans will likely only be possible once environmental contamination is pervasive enough or has occurred for long enough that toxic effects can be discerned at which point preventive responses may be too late.

For example, unexpectedly high levels of polybrominated diphenyl ethers (PBDEs) and other substances originating from consumer products are turning up in indoor dust, air and a variety of foods. In Sweden, where longitudinal monitoring revealed a dramatic rise of PBDEs in breast milk over time, swift regulatory action to phase out these substances resulted in reduced exposure as measured via breast milk. The presence of PBDEs in the breast milk of North American women (in amounts that are the highest in the developed world) reflects this multi-media exposure and the fact that production and use of these substances is higher here than elsewhere in the world.

What Toronto Parents Know About Environmental Risks to Children

Results of a telephone survey show that Toronto parents have high awareness of the harmfulness of exposures to children's health for exposures that are high profile or are already well covered in TPH health promotion work (e.g. air pollution, water quality, pesticides). Parents also feel these same areas are worthy of action on the part of the City. While most parents feel they can do a fair amount to protect their children themselves, there is a need to enhance that sense among some parents by providing written information at appropriate literacy levels and by considering development of educational materials other than in written format.

Most parents or caregivers are already practising or ensuring they take some simple measures that may reduce their child's exposures in and around the home such as shoe removal, frequent floor cleaning and child's hand-washing, attention to sources of drinking water and use of sunscreen. They also widely report precautionary household practices that mean children's exposures to potentially harmful substances are minimized. For example, a substantial proportion of Toronto parents report avoiding the use of pesticides and providing a smoke-free home environment.

The survey also identified public education needs such as support for further reducing pesticide use, additional sun protection measures, avoiding smoking indoors, avoiding pets sleeping in the child's room and informing Toronto parents about the benefits of extending protective, cautionary behaviours to all children, regardless of age. The results should allow for risk communication and children's environmental health resources and programs that are relevant, appropriate and tailored to the needs of Toronto parents.

The Policy Response

For most environmental exposures control measures are often delayed or opposed until solid proof of harm is obtained. This delay in applying control measures or finding alternatives is also because the activities in question, such as automobile dependence, are part of entrenched patterns in society that are difficult to change.

Some progress has occurred in terms of revising regulatory approaches to take children's health into account. But the fact remains that widespread exposure to thousands of potentially hazardous substances continues. Equally daunting, there is an enormous number of substances in commercial use, or that result from industrial emissions, that have never been fully evaluated for toxicity during prenatal and childhood life stages. The ability, and political willingness, to control even those situations where strong evidence of harm exists has not been impressive. Part of the problem is the reality that it can be far more difficult to address environmental problems after the fact compared to preventing their occurrence in the first place.

There is much to learn from past experience. Waiting until there is proof of harm from environmental exposures can result in undue exposure and other well-studied toxic substances is the need to act sooner when impacts on children, while the science is debated. The regulatory lesson from the case of lead early evidence suggests a problem. Taking action earlier, despite scientific uncertainty, is an approach that seeks to prevent harm in the first place rather than scientifically documenting it in one generation of children and then, if possible, belatedly preventing harm in the next.

There will never be full scientific certainty in environmental debates. An approach of waiting for proof of harm before controlling or eliminating harmful exposures will continue to place the developing fetus and child at unnecessary and avoidable risk. Advocates for changing traditional approaches to environmental hazards call for a precautionary approach. This approach speaks directly to the reality of forever having incomplete information. It denotes a duty, on all members of society, to prevent harm, when it is within our power to do so, even when the evidence is uncertain or unattainable.

Numerous international agreements have been signed by Canada recognizing the vulnerability of children and committing to policy and related efforts to address these risks. Federal and provincial law and policy has been revised to better account for child health and exposure risks but much remains to be done to either re-evaluate pesticides or assess and manage the tens of thousands of substances in commerce or resulting from transportation emissions, industrial and other human

activities. The incomplete and obsolete nature of Canada's regulation of potentially toxic substances in consumer products is an area of particular concern.

There is an urgent need for strong political leadership and clear accountability and resources for children's environmental health at both the federal and provincial level. There must be greater integration across departments where policies and programs can minimize exposure to environmental hazards. At the provincial level, particular attention needs to be directed at coordinating the activities of the Ministries of the Environment, Health and Long-Term Care, and Children and Youth services into a comprehensive cross-cutting provincial program.

Many Canadian municipalities have exercised leadership in applying precautionary action to recognized risks through the passage of progressive bylaws and other actions. Toronto has been in the forefront of this precautionary activity as have Toronto school boards. However, both the municipal ability and that of school boards to apply progressive or proactive environmental controls is limited by funding constraints, their respective arenas of policy and regulatory authority and influence, and the magnitude of issues needing to be confronted.

Based on a review of key policies and initiatives in Canada, the report concludes that some progress has occurred in terms of revised federal and provincial regulatory approaches to take children's health into account. However, much remains to be done at the federal, provincial and local levels. The recommendations in the report encompass measures that will assist the City of Toronto in reducing and preventing children's exposure to harmful substances in the environment.

The strategic directions recommended address the gaps that are identified from the review of literature and policy responses. Recommendations identify needs in: (1) research; (2) policy; and (3) education. Priorities for action are guided by the need to address exposure risks that are: a) preventable; b) have the potential to affect large numbers of children, including children whose health status is compromised by other circumstances such as poverty; and c) associated with serious or irreversible health effects or with long-term consequences. Given that the authority, responsibility and mandate for the key issues of relevance to children's environmental health in Toronto do not fall solely under one government jurisdiction, recommendations are directed at federal, provincial or local governments as indicated. Recommendations for school boards and independent/private schools in the City are included as well, in light of the importance of the school environment for children's health.

The public health mandate of health protection and health promotion is fundamentally one of applying a precautionary approach. This report makes

recommendations that are intended to assist the City of Toronto in choosing a course of action in the face of uncertainty and to continue to apply a precautionary approach to reducing and preventing children's exposure to harmful substances in the environment.