

Children's Health and the Environment

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ABSTRACT *Peter Illig argues that children are at a disproportionate risk to environmental concerns that plague communities in both the developed and developing world context. They have few legal rights to influence the structures and routines that order their daily lives, and therefore there is the need for much more awareness in health policies about how to protect children, nearly 8.5 million of whom die each year due to environmentally sourced factors.*

KEYWORDS *pollution; behaviour; rights; sustainability; education*

Children are unique

Children are not 'little adults'. They possess unique biological, developmental and behavioural vulnerabilities. Every year some 8.5 million children below the age of 15 die from environmentally sourced factors as diverse as dirty water and road accidents. In all, 90 per cent of these victims are children under the age of five years. Uniquely, children breathe, ingest and absorb more toxins than adults on a weight basis ratio. This reality places them at a disproportionate risk to environmental concerns that plague communities in both the developed and developing world context. Further, children have few legal rights to influence the structures and routines that order their daily lives. Fundamentally, children are our most vulnerable segment of society, and at greater risk of morbidity and mortality than adults.

From conception to adolescence, rapid growth and development processes occur that can easily be disrupted by exposure to toxicants. During the first years of life, most of the development of the nervous system takes place. At this stage of development, the nervous system has a limited capacity to repair any structural damage. If cells in the developing brain are damaged or if vital connections between nerve cells fail to form, there is a high risk the resulting dysfunction will be permanent and irreversible (Rice and Barone, 2000: 18).

Worldwide, it is estimated that more than one-quarter of the global burden of disease (GBD) can be attributed to environmental risk factors. Over 40 per cent of the environmental disease burden falls on children under five years of age, yet these constitute only ten per cent of the world population (The Bangkok Statement). Global health care professionals have identified five main categories of diseases that demand attention: perinatal illnesses, respiratory diseases, diarrhoeal diseases, and physical injuries (Briggs, 2003).

Primary causes of illness among children

Perinatal illnesses represent one of the major causes of loss of life and illness among children worldwide. Various environmental factors contribute to these health effects, mainly maternal exposures and nutrition prior to, and immediately following, birth. Actions to reduce these risks include improving health care for pregnant women and mothers and improving the physical living environment into which children are born (Briggs, 2003).

Respiratory diseases are the second largest source of ill health and mortality among young children. Along with disease-causing pathogens, the growing problem of chronic respiratory illness can be traced to increased exposures to ambient and indoor air pollution.

Diarrhoeal diseases, prevalent in developing nations, are associated with a lack of proper domestic sanitation, hygiene, safe drinking water and exposure to solid waste. Environmental and social problems also contribute to the conditions for these diseases to proliferate.

Physical injuries, while the most pernicious, are perhaps the most preventable. They often are the result of avoidable risk factors such as poor housing, lack of adequate play space, road accidents and exposures to wastes and chemicals.

Absorption of damaging toxins and toxicants can occur by one of four pathways: the placenta, skin, breathing and eating. Several classes of compounds and other specific elements readily cross the placenta. Substances make contact with the developing fetus via the mother's blood flow and amniotic fluid. The skin of a newborn lacks the protective, exterior layer for the first three to five days following birth. At birth, a child has a three-times larger surface to mass ratio, and the child has a two-times larger surface to mass ratio than an adult.

Absorption through breathing is also unique. Compared to an adult, the breathing rate of a child is higher as they consume more oxygen and produce more carbon dioxide per kilogram of body weight. In addition, this increased breath rate typically occurs closer to the ground than an adult. Unfortunately, this is where heavier chemicals

such as mercury concentrate. Breathing in proximal distance to the ground also increases exposure to various allergens, a leading cause of asthma.

Children drink more water and consume more food than adults to maintain homeostasis. Children aged one to five years eat three to four times more food per unit body weight than the average adult. (Children's Health and Environment, 19). Accordingly, any food contaminant is ingested in greater quantity. As a consequence of biochemical immaturity, children's ability to detoxify and excrete chemicals differs from adults.

Recognizing the vulnerabilities of children, public health regulations set exposure limits to protect the most sensitive individuals. The rationale is to protect the greatest number of persons. Thus, it is this imperative that requires us to understand and minimize the environmental impacts on the most sensitive and vulnerable segment of society.

Address environmental sources

Environmental health risks to children are increasingly recognized and awareness is growing regarding the need to protect children from the damaging health effects of environmental degradation. The Convention on the Rights of the Child states (Article 24, paragraph 1) that a child has the right to 'the enjoyment of the highest attainable standard of health and to facilities for the treatment of illness and rehabilitation of health.' This is particularly relevant given that children carry a disproportionate *vis-à-vis* the rest of the population.

There is a growing body of scientific evidence that demonstrates the wide array of children's health problems that can be brought on or exacerbated by environmental exposures. Examples of the major environmental health problems affecting children include

- asthma deaths among children and young people have increased tremendously during the last decade and asthma is now the leading cause of hospital admissions for children in many countries;

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- children exposed to tobacco smoke at home have more days of restricted activity, bed confinement, and missed school days each year than other children;
- lead poisoning affects millions of children aged five and under, especially in countries that continue to use lead in gasoline and paint;
- millions of children under the age of twelve live within four miles of a toxic waste dump, or live on a waste dump;
- polluted waters can affect children when they come into contact with rivers or lakes and through the consumption of certain freshwater fish;
- the re-emergence of vector-borne diseases, particularly malaria, is occurring as a result of climate and land-use changes;
- the effects of desertification and deforestation on children's health are enormous;
- children may face developmental defects to the endocrine system, growth or mental retardation and neurobehavioural toxicological effects as a result of environmental exposure to pesticides, persistent organic pollutants and other chemicals;
- children are at greater toxicological risk after exposure to chemicals because their systems are still developing and because they consume more food and fluids and they breathe more air, relative to their body size, than adults;
- children's behaviour (early hand-mouth activity, their indoor and outdoor play activities) mean that they are at increased risk of exposure to dust, soil and other environmental contaminants as compared to adults;
- in several parts of the world, child labour is still accepted as a way to provide sufficient family income. In these countries an increasing number of children are at risk of occupational diseases and injuries.

Opportunities for systemic changes – sustainability; education; development

As the above statistics highlight, the global environmental situation is replete with problems and the potential for disaster. Calls for sustainable development reflect the need for a world that devel-

ops with safety and health as a primary and fundamental tenet. The presence of human health risk factors in the environment is demonstrative of the lack of sustainability in our current global systems for development.

In recent years, the international community has codified the need to address sustainability by establishing explicit goals and objectives. For example, the Millennium Development Goals (MDG) of the United Nations include the target of a two-thirds reduction in child mortality under five years between 1990 and 2015. Agenda 21, produced at the 1992 Earth Summit or Rio Conference (UNCED, 1992c), proclaims human health as fundamental to sustainable development, and necessitates addressing the determinants that shape health outcomes (<http://www.changenet.sk/azms/projects/agenda21.htm>) Human health and economic development are intimately interconnected. Inappropriate development can result in severe environmental health problems. Primary health needs are integral to the achievement of the goals of sustainable development and primary environmental care (UNCED, 1992a).

Environmental causes to illnesses are often the most easy to identify. A prerequisite to addressing the burden of disease sourced in the environment is specific, technical subject matter expertise that integrates various disciplines such as science, engineering, chemistry and law. With a general emphasis on prevention, minimizing or managing causes of illness greatly diminish recurrence or eliminate the illness altogether. This provides the most cost-effective approach to address the social and economic burden of illnesses: tackle the source.

While the medical profession is adept at treating most human health maladies after they manifest, inadequate attention is paid to understanding and addressing the environmental sources of human illness. Little formal preparation occurs on the link between environmental hazards and their relationship to illness within medical school and residency training (Etzel, 1999: 3). Including environmental sources of the human burden of disease within the formal curriculum of medical education offers an effective

and cost-effective means to address these issues. Only now is the issue gaining attention, as, for example, the Committee on Environmental Health recognizes that paediatric environmental health is a field in the early stages of development (Etzel, 1999: 4).

Sound development is not possible without a healthy population; yet most developmental activities affect the environment to some degree, which in turn can exacerbate many health problems (UNCED, 1992b). This vicious cycle is a prevalent condition in which we are currently engaged. We continue to pollute and damage our environmental systems in the pursuit of necessary economic gains, knowledge and a better way of life. Yet the resulting health impacts detract from our ability to continue to pursue these goals. We are now able to quantify social and economic costs of illness, emphasizing the fundamental and positive correlation between a healthy population and a strong economy.

A call to action

Based upon current statistics, research, and attention on specific linkages between children's health and environmental factors, priority action items need to include the best way to protect children from environmental hazards is to reduce or eliminate harmful environmental exposures. In addition, in setting protective measures, including emission standards, food safety standards and all other regulations, the relatively high exposure and susceptibility of children must be taken into account.

It is important build an international platform for multi-disciplinary expertise and a forum to present and discuss the latest research findings in paediatric environmental health. The overall objective is to stimulate action that may contribute to the understanding of the relationship between the environment and the health status of children. An aim is to improve the quality of the environment and thus the health and well-being of children. WHO's new Healthy Environment for Children's Alliance would be a step in that direction (<http://www.who.int/heca/en/>).

Research on the relationship between environmental contamination and children's health and advocate policy to minimize childhood exposure to environmental contaminants is important as well as the environmental causes of ill health in children, especially neurological diseases. It is important to promote research projects to protect children, particularly by identifying and stimulating research into their unique susceptibility and high exposure to environmental pollutants.

There are very few studies of children and delayed effects of acute organophosphate poisoning, despite evidence from adults that delayed psychological deficits occur. There needs to be long-term prospective epidemiological studies of the health impacts of organophosphate and organochloride pesticides, with a focus on intellectual development. There has been virtually no action since the 'early warnings' of Angle in 1968, on the neurotoxicological effects of organophosphate poisonings, even though the extent of these effects 'might exceed the effects currently presented by lead' (Weiss, 1997). Data from poison centres could be the basis for some of these studies.

Many actors need to take more responsibility particularly health professionals need to be more aware of the issues and national governments, inter-governmental organizations and international agencies need to set up and to review current standards and to set new public health and environmental standards to ensure protection of children's health. It is also important to improve the education and awareness of parents, teachers and other guardians of children so that they can help create safer environments for them. Equivalents of the American Academy of Pediatrics' 'Handbook of Environmental Health for Children', and the 'Resource Guide' and training materials for US doctors and nurses produced by the Children's Environmental Health Network, California, would be helpful in this as well as give children relevant legal protection with safety standards for chemicals that take their special vulnerabilities into account. For example, provide in regulation an extra ten-fold safety margin for children, as well as provisions for the cumulative exposures of children to pesticides. In total, 10,000 existing pesticide tolerances need to be re-assessed.

Conclusion

Taking steps now to prevent childhood disease, illness, and injury will not only diminish the potential for widespread suffering, but will reduce the high cost of treating illnesses that otherwise might be avoided.

Action to advance policies designed to increase the protection of children around the world and

to accelerate the development of regulations and standards that are effective in protecting children's health is required.

The time has come for the responsible actors of society to act. The science is credible and the potential impacts profound. Prudence – and a commitment to act responsibly on behalf of the world's children and all future generations – dictate a prompt and effective response.

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