FORUM IV

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Protecting children from harmful chemical exposures

Prepared by: Forum Standing Committee Working Group chaired by Hungary

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An Information Document (IFCS/Forum IV/11INF) accompanies this Decision Document, providing more detailed information and additional references regarding the following material.
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Protecting children from harmful chemical exposures

I. Issues for consideration and action requested

Children represent the future of our societies. Protecting the health of children and ensuring that children live in environments that allow them to reach their full potential as individuals and contributing members of these societies is an intrinsic component of sustainable development.

As scientific understanding of the linkages between health and the environment continues to evolve, we are finding that children and the developing fetus can be especially vulnerable to some environmental exposures, such as exposures to certain chemicals. The effects of such exposure depend upon chemical toxicity, dose, timing and amount of exposure, as well as on other factors. Poverty, malnutrition and other stressful circumstances exacerbate a child’s susceptibility to these environmental hazards, and these hazards can, in turn, further exacerbate poverty and worsen environmental conditions. Governments and stakeholders must take action to reduce chemical risks and prevent childhood exposure. All Forum participants have a responsibility to recognize this situation as the first step in developing innovative solutions and taking action in partnership to prevent harmful exposures and to protect the health of children.

Governments should prepare, through multi-stakeholder consultation, initial national assessments of children’s health and chemical safety that identify the priority concerns and provide a basis for developing action plans to address those concerns and should report back to Forum V on progress. WHO is requested to develop guidance tools and assist at least one country in each region to prepare the assessments and action plans by 2006.

Research organizations and those supporting research (such as the European Commission, Science NGOs, The Global Health Research Forum, governments and others) should develop mechanisms to facilitate collaborative national and international research, involving organizations and bodies active in the area or related areas.

Governments and stakeholders should commit to sharing information on options for taking effective action to protect children from established chemical threats and from chemical risks where there is a degree of uncertainty. Forum IV is requested to identify an organization/organizations to explore a mechanism for collecting and making available information on cases where uncertainty about effects has been a major factor.

In addition, Forum IV may wish to request the IFCS President to convey these recommendations to other meetings and forums.

II. Background and Current Situation

A. Environmental Health Risks to Children

Over five million children between the ages of 0-14 die every year from illnesses that relate to environmental conditions, mainly in the developing world. Environmental conditions, such as inadequate sanitation and lack of clean and sufficient supplies of water, poor hygiene, inadequate housing, climate change, the proliferation of disease vectors, ozone layer depletion, indoor air pollution, and exposure to hazardous chemicals, can play a role in preventing children from reaching their full potential. While acute and chronic exposures to chemicals are not the main cause of child mortality and illness in the world, unintentional poisonings account for 50,000 deaths of children aged 0 to 14 years, according to World Health Day 2003, (www.who.int/world-health-day/2003).

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Organization (WHO)\textsuperscript{2}. These numbers are not merely statistics but rather faces of children throughout the world. A large number of illnesses are due or related to chemical pollutants in the environment. These may be emitted by heavy traffic or toxic waste sites, present in contaminated water or food or in the places where children live, grow and play. The social and economic cost of children’s poor environmental health includes increased medical expenses, sick days away from school, productivity lost by parents missing work to care for their children, and the personal agony that childhood sickness, disability and death cost families and communities. In addition to the immediate and long-term effects on individual children and their families, unhealthy children of today may adversely affect the long-term productivity of a country. Much can and should be done to prevent these threats through the sound management of chemicals, consistent with Chapter 19 of Agenda 21.

B. Chemical Hazards and Sustainable Development

The development and use of chemicals underpins some of the most important societal advances. For example, the use of chemicals is essential to the construction, transportation, communications, and food production industries. Chemicals are beneficial to many aspects of daily life; this includes health care and public health measures, such as water disinfection and vaccinations. In some regions of the world, the health and lives of millions of children and their families depend on chemicals and pharmaceuticals used to control malaria carrying vectors and impede transmission of disease.

While chemical use has brought many societal benefits, it also raises the potential for increased child exposure to harmful chemicals and, depending on dose, timing and circumstances of exposure, may cause adverse health and development consequences. Balances between benefits and risks must be sought to enable the best possible conditions that promote health and the environment. It is imperative that chemicals be used safely and judiciously to protect children’s health and to promote sustainable development.

C. Why Are Children Particularly Vulnerable To Chemicals?

Children, especially the fetus and the small child, can be particularly vulnerable to certain chemicals in the environment. While there is still a significant level of uncertainty about the safety of many chemicals, it is known that a number of factors contribute to a child’s unique vulnerability to chemicals, including a typical child’s biology, physiology and behavior.

**Biology:** the central nervous, immune, reproductive, hormonal, and digestive systems, as well as the kidneys and lungs, of a fetus, infant, and child are immature and constantly developing. Depending on the state of development and a variety of other factors, a child’s ability to successfully detoxify and excrete toxins differs from that of an adult, sometimes offering them greater protection and sometimes increasing their vulnerability.

**Physiology:** Young children breathe faster, and eat and drink more in proportion to their body weight than do adults, and their skin absorption may be higher. (They may in some cases absorb a larger fraction of their intake, increasing their exposure to harmful chemicals and in some cases causing a proportionally greater chemical dose absorbed into the body.)

**Behavior:** Children spend more time outdoors than adults, playing and experiencing life closer to the ground where contaminants often accumulate. They also typically engage in hand-to-mouth behavior as part of their normal development. They are unaware of potential risks around them and therefore are less able to protect themselves from potential exposures.

The timing of exposure can also be significant. For example, studies suggest that for some chemicals the risk of developing cancer might be higher if exposure to carcinogens begins in childhood. Exposures to heavy metals, such as methylmercury and lead, both \textit{in utero} and early in life, can produce life-long disabilities in neurological function and learning abilities. In addition, there is concern that some substances could affect the developmental processes \textit{in utero} and early in life, for instance, by interfering with genetic expression, \textsuperscript{2}WHO Fact Sheet No. 272, April 2003 and WHO, The World Health Report 2002 \textit{Reducing Risks, Promoting Healthy Life}, Annex 2, pp. 186-191.
disturbing the endocrine system, altering cell development in major organs or through other, not well understood, mechanisms. More research is needed to better know when and how chemicals pose a threat to children’s health. It is becoming increasingly accepted and expected that risk assessments explicitly consider the unique exposure and biological characteristics of children and fetuses.

D. Chemical Exposures and Children’s Health

Children’s exposure to chemicals occurs through different routes, circumstances and settings. Children can be accidentally exposed to chemicals in products that are used or stored in households, schools, parks, rural environments, in swimming and recreational areas, or applied on pets or animals. Other exposure occurs through chemical releases to the environment from the manufacture or use of products, or from chemical incidents. Children in some populations may have relatively higher exposures to chemicals of concern due to particular cultural practices or diet. Potential occupational exposure to chemicals is also a growing concern. The International Labour Organisation/International Program on the Elimination of Child Labour estimates that over 171 million of the 352 million children ages 5 to 17 who work mainly in the poor regions of the world are exposed to hazardous conditions, including chemical exposure and poisonings.3

Before birth, chemicals can affect development: during pregnancy, many chemicals that enter a mother’s body can cross the placenta and have the potential to adversely affect the development of a fetus. Infants may be exposed to chemical pollutants through their mother’s breast milk, even though breast milk remains the most nutritious and safe source of food for infants worldwide. Strategies targeted at the protection of children, therefore, often emphasize prevention of unsafe exposure to chemicals among children and their parents.

Understanding the range of potential exposure sources is important in assessing cumulative exposure of single chemicals and exposure to mixtures of chemicals. In addition, there are many uncertainties about the health effects from exposures to chemicals:

- Although the basic battery of toxicity tests provides some information about reproductive and developmental effects, not all chemicals on the market have been appropriately tested for these effects.
- Where toxicity data does exist, much of it was generated from adult animal testing.4
- With advancing technology, new chemicals and lower levels of chemicals are detected in the environment, animals and humans. The health consequences of exposures to these very small amounts of chemicals are often not well understood.
- Subtle long-term consequences, such as influence on intelligence and behavior have been shown for some substances in groups of children even at exposure levels that do not produce clinically evident signs and symptom of toxicity for an individual child.
- Other generally applicable areas of uncertainty also have implications for children, including the effects of exposure to a multitude of chemicals and the effects of chemical interactions with the human genome.

In light of these and other uncertainties, new strategies are called for to enable protective action and thus prevent irreversible long-term injury before full scientific knowledge is available. Further research will help reduce many of these uncertainties.

E. Selected examples of chemical substances of concern

- **Metals** – Metals and their derivatives including lead, mercury, arsenic, cadmium, manganese, and chromium are widely used in modern society. These metals may, at sufficient exposures levels, negatively affect children’s health. As an example, lead is discussed in the box at the end of this section.

- **Pesticides** – Pesticides are integral to agriculture and vector-control programs worldwide and have widespread home, school, and industrial uses. The incidence of pesticide poisoning is significant in developing countries, including accidental exposure in children, occupational exposure of young farm workers, and exposure resulting from un-used, obsolete pesticides. For some pesticides, even chronic low levels of exposure might cause effects, such as impaired development of the nervous system, compromised immune system, or cancer.

- **POPs** – Organic compounds that persist in the environment (Persistent Organic Pollutants, POPs) tend to accumulate in the body fat of animals and humans, and can be highly toxic at very low concentrations. They include pesticides, such as DDT; industrial chemicals such as PCBs used, for example, in transformer oil, and byproducts of industrial processes such as dioxins. There is significant level of concern that these chemicals could cause long-term health effects, such as reproductive and neurological disorders.

- **Household products** – Kerosene, solvents, pharmaceuticals, cleaners and other chemical products are dangerous to children if they are kept in inappropriate containers and places that are accessible to children. Children may ingest dangerous chemicals and suffer acute poisoning with severe consequences.

- **Waste sites** – Improper waste disposal can result in the release of hazardous chemicals into the environment. Chemicals, such as PCBs, can seep from waste sites into soil and water. Open burning of materials can release chemicals, including dioxins, heavy metals and particulate matter into the environment. These pose a potential risk to the health of children, especially to those who live and scavenge in poor areas.

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**Lead: a chemical safety success story where the battle is not yet won**

Lead may be present in air, dust, food, and drinks in cans with lead solder, also in paint, ceramics, and folk health remedies. Once in the body it reaches the kidneys and the brain and deposits in bones and teeth. Even before birth, lead in the body of a pregnant woman can be transferred to an unborn child and cause abortion, premature birth or low birth weight.

Even in small amounts, lead can disturb early physical and mental growth and, later on, affect intellectual functioning and academic achievements, hindering the child’s ability to reach full potential. Low-level lead exposure has an effect on IQ of children, resulting in a significant loss of productivity and human potential worldwide.

Lead competes for absorption in the body with other minerals such as iron and calcium; therefore, diets low in these elements allow for greater lead absorption. This has significant implications for children in poor communities where lead levels remain high and malnutrition remains a problem. Low calcium intake during pregnancy causes a greater transfer of lead from the mother to the infant compared with what happens when the diet is adequate in calcium.

While lead remains a serious environmental problem for children in many countries, the removal of lead from gasoline in some countries around the word represents a compelling success story. Data from the U.S. and other areas show that blood lead levels in children decrease dramatically after lead is removed from gasoline. All countries and stakeholders should move forward with commitments to remove lead from gasoline. Efforts must also be made to address remaining sources of exposure, including the recycling of batteries and soil contamination from smelter sites.
F. International action to protect children from harmful chemical exposures

In *Priorities for Action beyond 2000*, IFCS recognizes that to protect the health of the general public, chemical safety issues regarding susceptible groups (including pregnant women, fetuses, and children) need to be clearly addressed in the assessment and management of risks (www.who.int/ifcs/Documents/Forum/ForumIII/f3-finrepdoc/Priorities.pdf). Global accords have highlighted the concern and the need for action to improve children’s environmental health. The following examples are representative of other international statements supporting these themes.

- The United Nations General Assembly Special Session on Children (2002) (UNGASS) recognized that exposure to hazardous chemicals needs to be addressed to ensure the health and well-being of children and pledged to protect the environment in a sustainable manner (www.unicef.org/specialsession).
- The 2002 World Summit on Sustainable Development (WSSD) recognized the need to reduce environmental health threats, taking into account the special needs of children and the linkages between poverty, health and environment. At that Summit, the Healthy Environments for Children Alliance (HECA) was announced (www.who.int.heca/en).
- Other important international activities are included in the information document, including the United Nations Millennium Development Goals (www.un.org/milleniumgoals/index.htm) and the Organization for Economic Cooperation and Development program (www.oecd.org).

III. What can be done to Increase Chemical Safety for Children?

The most effective means of protecting children from chemical risks is by preventing hazardous exposures. This can best be achieved by identifying risks and implementing preventive measures that will reduce unsafe exposure, minimize risks, and promote transparent science-based risk assessment procedures. In many countries, there are already rigorous programs and measures in place to manage chemical risks, particularly where there is potential for high exposures, such as for pesticides, food additives and drugs. Experience shows that adopting robust regulatory programs and implementing them vigorously can be an efficient way to prevent harm to children. Not only governments, but also individuals, communities, non-governmental organizations, industries that make and use chemicals, and multilateral organizations have roles to play in addressing children’s health issues. Parents also play a critical role in protecting the health of their children and should have information and knowledge about the presence of environmental risks to their children.

Actions that could be taken to improve chemical safety for children could be placed into the following categories: prevention of exposure and reduction of risk; education and training; data and research needs; and indicators of environmental health.

Specific examples of actions include the following:

- Adopt pollution prevention and other appropriate management strategies that prevent children’s unsafe exposure to chemicals, in particular to those chemicals of highest concern.
- Educate parents, children, teachers, and communities about types and routes of exposure and how to recognize and avoid unsafe exposure, e.g. safe chemical use and distribution, disposal, and appropriate alternatives.
- Design educational materials and implement school programs and media campaigns in the local language, taking into account local needs, to alert and teach children, parents and the public about the potential dangers of improper chemical use and potential unintentional chemical exposures.
- Encourage further industry participation in educational campaigns to raise awareness about children’s special vulnerability and the need to protect them through safe use of chemicals.
- Educate environmental actors, media, policy-makers and other professionals about chemical risks and risk communication.
Raise the awareness of decision-makers about the risks to children's health and development associated with chemical use and encourage policies that take into account a child’s special vulnerability to chemicals.

Train health professionals about children's unique vulnerability to certain chemicals and the risk of chemical exposures in different settings, the most common exposure pathways, as well as how to diagnose, identify the cause, prevent and treat exposures.

Increase and support further scientific research on the link between chemical exposure and health outcomes in different age groups, and in different settings.

Continue to improve and implement risk assessment approaches that account for child-specific issues.

Adopt the precautionary approach in the context of children’s environmental health.

Ensure that effective safety information labels are included on consumer products that are potentially hazardous to children, providing guidance on handling, transport, use and disposal, and about first aid and contacting poison information centres.

Further support the creation and/or strengthening of poison control centers in developing countries.

Encourage donors to fund innovative research and educational programmes, incorporating children and chemicals into development assistance programmes, and taking the opportunities offered through existing convention funding mechanisms to address children and chemicals issues.

Develop and use appropriate indicators on chemical safety and children’s health.

In addition, to protect children’s health, Chapter 19 of Agenda 21 should be further implemented and countries should sign, ratify and implement existing international treaties regarding certain chemicals such as the Rotterdam Convention on Prior Informed Consent, and the Stockholm Convention on Persistent Organic Pollutants.

**Main References:**

- Lynn Goldman & Nga Tran, Toxics and Poverty: The Impact of Toxic Substances on the Poor in Developing Countries, (World Bank 2002)
- Children’s Environmental Health [www.who.int/phe/ceh](http://www.who.int/phe/ceh)
- Healthy Environments for Children Alliance [www.who.int/heca/en/](http://www.who.int/heca/en/)
- Children’s Environmental Health in Latin America and the Caribbean [www.cepis.org.pe/bvsana/i/chelac.html](http://www.cepis.org.pe/bvsana/i/chelac.html)
- International Society of Doctors for the Environment [www.isde.org](http://www.isde.org)

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5 Rio Declaration on Environment and Development Principle 15: “In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effectivene measures to prevent environmental degradation”