

Chemicals & Children: Evaluation of Environmental Health Risks and Risk Management Strategies



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Trends in children's health; developed countries

- **Increasing congenital anomalies**
doubled over 25 years
- **Decrease of male:female sex ratio at birth**
particularly in industrial zones
- **Increasing asthma and obesity**
X 3 over 20 years; X 1.5 over 30 years respectively
- **Increasing developmental disorders**
X 3 over 30 years



Children's Environmental Health (CEH)

- **G8** Environment Ministers Meeting (Siracusa, Italy, 2009): Children's health session co-chaired by Japan and USA
- ***DO MORE to investigate links between environment & health***
- Global Conference on CEH (Busan, Korea, 2009)



Children's Environmental Health Global Plan of Action 2010 - 2015

Global Plan of Action for Children's Health and the Environment (2010 - 2015)

Global Plan of Action for Children's Health and the Environment

Children are our future, numbering over 2.2 billion worldwide (aged 0-19) and representing boundless potential. Child survival and development hinge on basic needs to support life; among these, a safe, healthy and clean environment is fundamental.

Children are exposed to serious health risks from environmental hazards. Environmental risk factors often act in concert, and their effects are exacerbated by adverse social and economic conditions, particularly conflict, poverty and malnutrition. There is new knowledge about the special susceptibility of children to environmental risks: action needs to be taken to allow them to grow up and develop in good health, and to contribute to economic and social development.

- Each year, at least 3 million children under the age of five die due to environment-related diseases.
- Acute respiratory infections annually kill an estimated 2 million children under the age of five. As much as 60 percent of acute respiratory infections worldwide are related to environmental conditions.
- Charcoal-broth claim the lives of nearly 1.5 million children every year. Eighty to 90 percent of these diarrhoea cases are related to environmental conditions, in particular, contaminated water and inadequate sanitation.

Environmental risks to children vary from region to region. Children in many countries still face the major traditional environmental hazards, including unsafe water, lack of sanitation and contaminated food, indoor air pollution from use of solid fuel, and exposure to a myriad of toxic heavy metals, chemicals and hazardous wastes. However, other children live in adverse environments that are vastly different from those of generations ago. In addition to the traditional environmental hazards, due to rapid changes in economic structures, technologies and demography, new or modern environmental hazards have appeared or been recognized, such as



<http://www.who.int/ceh>

1. Data and measurement
2. Collaborative research
3. Advocacy
4. Capacity development
5. Clinical services



Current study

Japan:

- Birth-age 13 cohort study, 100,000 children recruiting 2011-14, core hypothesis:
 - ***Exposure to chemical substances at fetal and early development states affects areas such as physical and mental development giving rise to congenital, endocrinological, immunological, metabolic and development anomalies***

UNEP:

- Prepare annotated bibliographies of published literature, compendium of policy actions, proposals for further actions in developing countries
- Identify & rank chemicals risks upon the health of children in developing countries; identify risk management strategies; assist policy makers make effective decisions

WHO:

- Review progress since 1997 in advocacy, awareness raising and education

Complex causal factors influencing development outcomes

Causes
(Exposure)

Environmental
Chemicals

Genetics

Socioeconomics

Lifestyles

Effects
(Outcome/Endpoint)

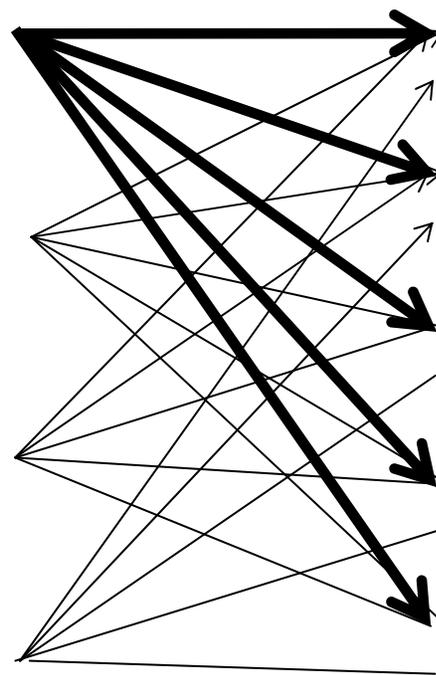
Physical Development

Congenital Anomalies

Psycho-neuro
Development

Immunologic
Impairment

Metabolic/
Endocrinologic
Impairments



Birth and longitudinal cohort studies

- **Decreasing prevalence requires increasing cohort size**
 - 10^5 a minimum cohort size for diseases with prevalence $\sim 0.1\%$
- **Large-scale birth cohort studies only in OECD countries;**
 - Cohorts most 10^{3-4} , only a few 10^5
- **International collaboration between Japan and US studies to increase confidence:**
 - Harmonized exposure and outcome measures, standard protocols for QA/QC of analysis, nutrition, development measurement
 - Outreach and concerted assistance to developing countries





Literature Review



- **Asia: ≈ 100 full text studies, 200 abstracts. Examples:**
 - Groundwater **As** contamination and its health effects in the state of Uttar Pradesh ... India. *Ahamed et al., Sci Total Environ. 2006 Nov 1;370(2-3):310-22. Epub 2006 Aug 8.*
 - ... estimated human exposures to polychlorinated **dibenzo-p-dioxins and dibenzofurans** from electronic waste recycling ... in Eastern China. *Ma, J. et al., Environ Sci Technol. 2008 Nov 15;42(22):8252-9.*
 - Environmental and human exposure ... near an abandoned **Hg** mine in the Philippines... *Maramba, et al., J Environ Manage. 2006 Oct;81(2):135-45. Epub 2006 Sep 1.*
- **Latin America: ≈ 125 studies. Examples:**
 - Effect of **PM10 and O3** on infant mortality ... in Mexico city... *Carvajal- Arroyo et al., J Epidemiol of Public Health*
 - Exposure of children to **Pb and Cd** from a mining area of Brazil, *Bastos MM et al., 2002, Environ Res.*
 - Elevated blood **Hg** and neuro-toxicological observations in children of the Ecuadorian gold mines, *Counter SA et al., 2002, J Toxicol Environ Health A.*
 - Increased childhood liver cancer mortality and **As** in drinking water in Northern Chile, *Law J et al. 2008. Cancer Epidemio Biomarkers Prev.*
- **Africa: ≈ 100 studies. Examples:**
 - Impaired semen quality associated with environmental **DDT** ... in the Limpopo Province, South Africa. *Aneck-Hahn NH, et al., 2007, J Androl 28(3):423-434.*
 - Effects of occupational **pesticide** exposure on children applying pesticides. *Abdel Rasoul GM, et al., 2008, Neurotoxicol. 29:833–838.*
 - Mass lead intoxication from informal **used lead-acid battery recycling** in Dakar, Senegal. *Haefliger P et al. 2009, Environ Health Perspect. 117(10):1535-40.*
 - Causes of **Pb** toxicity in a Nigerian city. *Wright NJ et al. 2005, Arch Dis Child.;90(3):262-6.*

Limitations identified in the annotated bibliography

- Longitudinal cohort studies are lacking; monitoring data mostly donor project-related
- Developing country community health practitioners are ill-equipped to gather, interpret and publish health monitoring studies
- Published studies principally of health effects from known chemicals of concern; supporting 'infill' evidence rather than emerging issues
- Lack of harmonized data for both exposure and outcome measures - impediment to chemicals risk assessment and management



Key Messages

- Broader networks with harmonized measures are needed to engage and empower developing country practitioners; including through the use of regional collaborating centres for laboratory monitoring of chemicals exposure
- Achieving the goals of children's environmental health requires the Health and Environment sectors to work closely together
- The role of the environment sector in the prevention of chemicals releases is crucial to reducing children's exposure risks
- Improving environmental conditions upstream is likely to be a cost-effective strategy to prevent environment related health outcomes



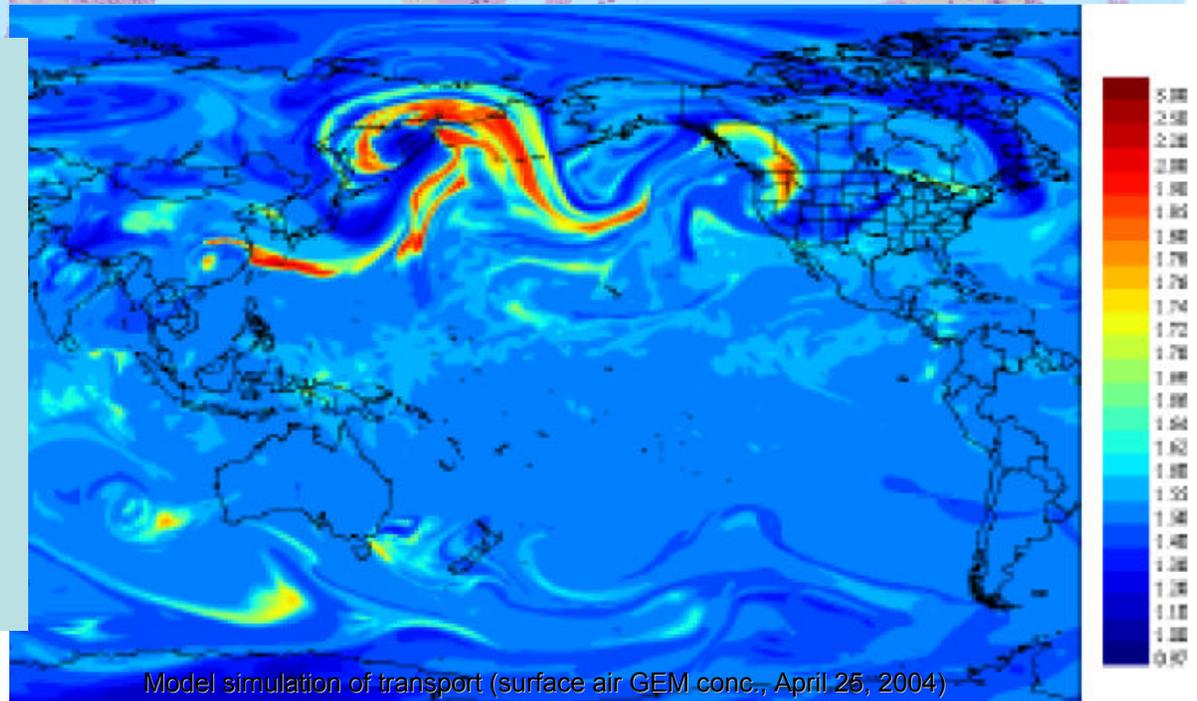
Implementing Sound Chemicals Management

- International regulation through Multilateral agreements addressing global concerns
- National regulatory and administrative frameworks
- Industry engagement towards responsible production and use of chemicals,
- Civil society engagement towards responsible use, informed choice
- Development assistance addressing priority problems

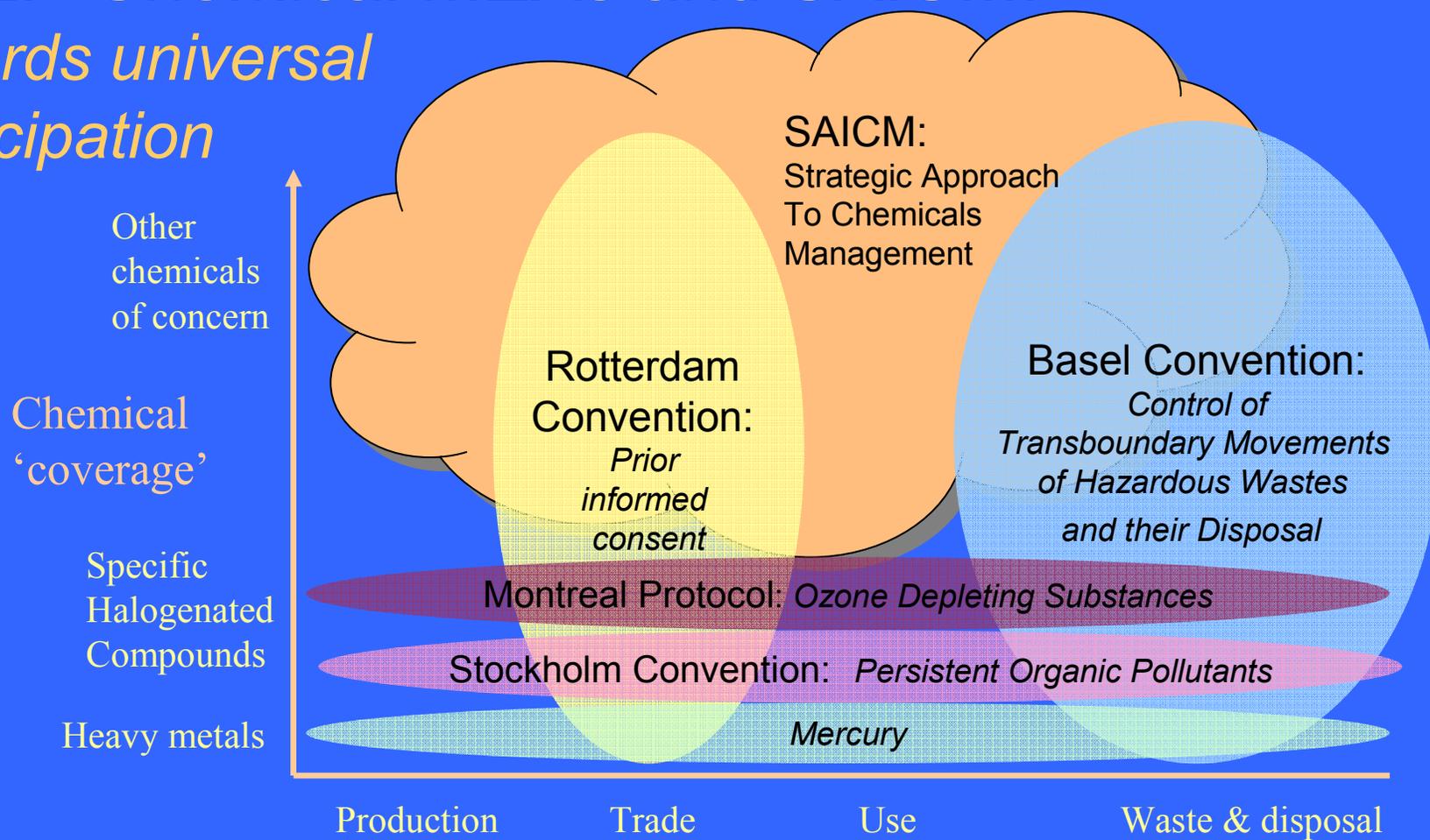
'Travellers without passports':

Addressing Global concerns; bringing local benefits

- Persistence in the environment
- Bio-accumulation
- Significant negative effects on human health and the environment
- Long-range atmospheric transport



UNEP Chemical MEAs and SAICM: *towards universal participation*



Also:

Chemical 'life cycle'

ILO 170 (Safe use of Chemicals at work); 174 (Major industrial accidents),

UNECE agreements: LRTAP, Aarhus, Kiev

Major regional and national responses: REACH, TSCA ...



Key Partnerships for Implementation

Inter-organization Programme for the Sound Management of Chemicals (IOMC):

established 1995, initiating, facilitating and coordinating international action towards achieving the WSSD 2020 goal

FAO, ILO, OECD, UNDP, UNEP, UNIDO, UNITAR, WB, WHO

GHS (ILO+UNITAR); Mainstreaming (UNDP+UNEP); Pesticide Code of Conduct (FAO+WHO+UNEP); Health Environment Strategic Alliance (WHO+UNEP); Cleaner Production (UNIDO+UNEP)

Strategic Approach to International Chemicals

Management: agreed 2006 following JPOI. A policy framework + global plan of action. Voluntary and multistakeholder: governments, industry, academia, civil society.

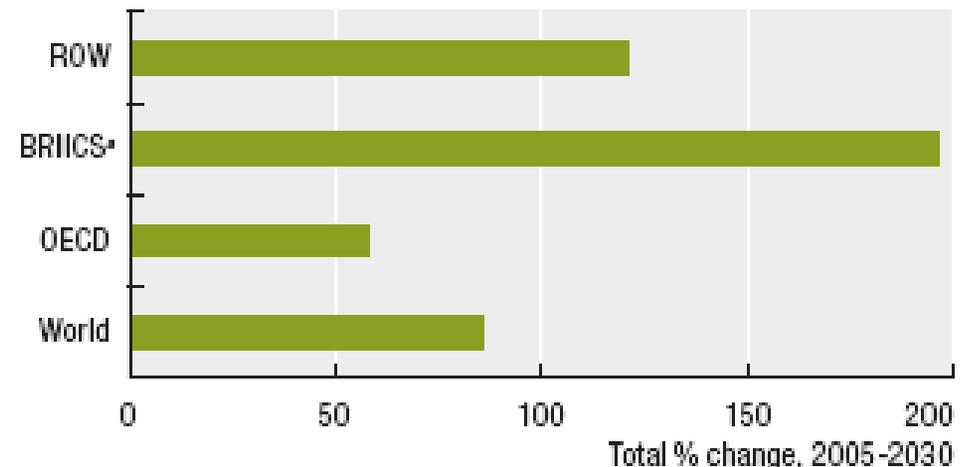
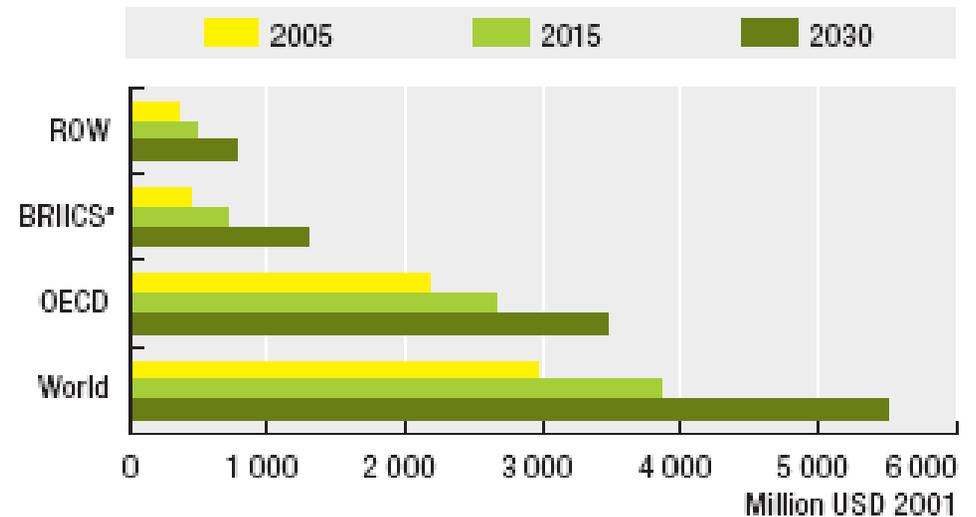
Emerging issues – actions being taken through partnerships:

Lead in Paint (UNEP+WHO); Chemicals in Products (UNEP); Nanomaterials (OECD+UNITAR); e-waste (UNIDO +Secretariat Basel Convention); PFCs (OECD+UNEP)

Chemicals Outlook: use and production trends



- Increase in number of individual chemicals and mixtures
- Product Complexity
- Production and consumption shifting to developing countries and CEITs
- Loss of regulatory control; increased government responsibility?



a) Includes Indonesia and South Africa.

Source: OECD Environmental Outlook Baseline.



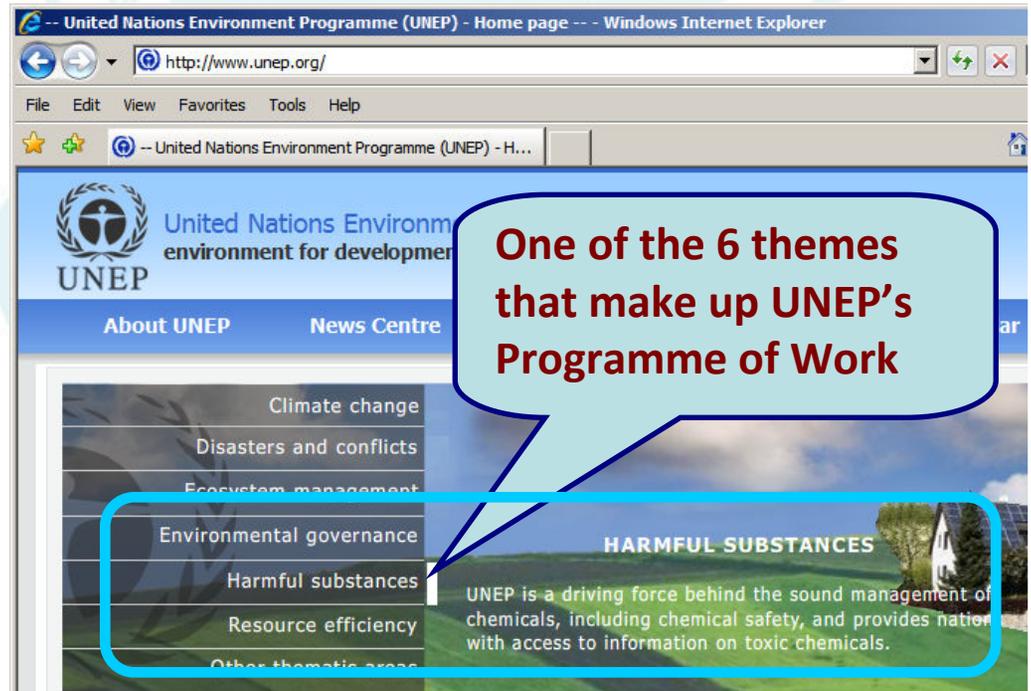
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Thank you



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