Protecting Children from Environmental Risks in an Age of Uncertainty

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Overview

- Children are more vulnerable and need our protection
- There is a range of preventable environmental risks to children
- Children already carry a burden of contaminants
- True prevention means going to the root source of the problem – acting even when the evidence isn't 100% clear
- Prevention requires creativity at finding solutions to problems both on an individual level and population level


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WARNING
THIS WATER IS CONTAMINATED
FISH UNSAFE FOR FOOD
NO SWIMMING OR WADING
WARNING!
ALL FISH
THESE FISH SHOULD NOT BE EATEN

Challenges of protecting children from uncertain risks

- Lack of information on risks
- Difficulties in establishing causal relationships
  - complex etiologies
  - long latencies
  - uncertainties
- Regulatory systems that demand strong evidence before being able to act and often assumes safety until harmfulness proven
  - Limitations of the Toxics Substances Control Act

Results of the these challenges

- No data often = no problem
- Interpretation of lack of evidence as evidence of lacking
- As long as there is uncertainty, action is not taken (waiting for more evidence is a decision)
- A risk that “common sense” is discounted in favor of “hard” evidence
- Demands for perfect evidence can result in unethical delays in interventions

The costs of not taking action on preventable risks

- Costs to health, the economy, families and communities (economic plus pain and suffering)
  - Lead – approx $40 billion in lost productivity per year in US
  - Asbestos
  - CFCs, PCBs, mercury, etc.
- Preventable costs of environmentally related childhood illness in MA from $1.1 bn/yr to $1.6 (direct costs plus lost future income).

Wingspread Statement on the Precautionary Principle

- When an activity raises threats of harm to the environment or human health, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically.

Prevention – known and uncertain risks

- Primary Prevention
  - Substituting a problem chemical with a safer one
  - Eliminating a source of exposure (ie cockroach dander)
  - Education about alternatives to pesticides
- Secondary prevention
  - Biomonitoring to determine levels of contaminants and if action is needed
- Tertiary Prevention
  - Chelation and lead paint removal for child with elevated blood lead level
- Proximate cause prevention – prevention at point closest to impact (ie advise women not to eat certain fish)
- Root Cause prevention – prevention at earlier links in the causal chain, often the cumulative factors (ie remove mercury from products and coal in power plants).

Elements of Precaution

- A Right to a Healthy and Life Sustaining Environment
- Acting on Early Warnings
- Developing and Choosing the Safest Alternatives
- Burdens on those who Create Risks
- More Transparent and Participative Decision-Making Processes
- A New Role for Science

Public Health Model of Precaution

- Understand underlying problem
  - What are you trying to solve?
  - What are the root causes?
- Develop a full understanding of the problem
  - Information
- Develop alternative strategies for solving the problem
  - Mixed strategies
- Monitor, reevaluate, and change course as needed
- Examine not only proximate risk factors but also root factors; Population factors and not only individual ones

Alternatives Assessment

- Examine/understand impacts and purpose of activity. Broadly define
- Identify wide range of alternatives.
- Conduct detailed comparative analysis of alternatives (pros/cons, economic, technical, h&s)
- Select “best” alternative and institute implementation and follow-up plan.
- Identify technical/research support needs
- Develop metrics to measure successes
- Comparative assessment tools needed

Lets apply this approach to pesticide use in schools…

Example: What are we using pesticides for?

- The first step to understanding how to reduce their use.
- What service do they provide and can that service be provided in a less potentially harmful way?
  - Prevent crop loss
  - Control disease
  - Allow large scale mono-cropping
  - Control nuisance pests
  - ??
- Need to also understand what pest you are trying to control..

Defining IPM

- IPM is an effective and environmentally sensitive approach to pest management that relies on a combination of commonsense practices. IPM programs use current, comprehensive information on the life cycles of pests and their interactions with the environment. This information, in combination with available pest control methods, is used to manage pest damage by the most economical means, and with the least possible hazard to people, property, and the environment. IPM programs take advantage of all pest management options possibly including, but not limited to, the judicious use of pesticides.

Prevention Avoidance Monitoring Suppression Prevention Avoidance Monitoring Suppression

Integrated Pest Management

As end users move away from the IPM foundation, they will experience...

Increasing...
- Costs
- Environmental Impacts

Decreasing...
- Sustainability
- Species diversity

Pesticides

Other Tools

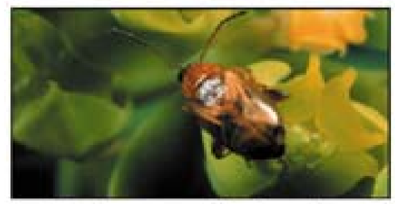
Cultural controls (grazing, crop rotations, tillage, cultivation, reseeding, etc.); mechanical controls (prescribed fire, mowing/clipping, etc.); genetics & host plant resistance; pheromones; sterile-male techniques; etc.

Biological Control

The use of natural enemies, such as parasites, predators and naturally occurring pathogens, to reduce the competitive advantage of exotic invasive weed & insect pests, nematodes and plant pathogens.

Biologically based IPM technologies

Attitudes about controlling exotic invasive weed and insect pests, nematodes and plant pathogens are changing. Ecological considerations are more important than ever before, and concerns about pesticide use are increasing.



Aphthona spp. flea beetle on leafy spurge.

Pesticides have historically been the foundation of the pest control pyramid – it was the tool everyone started with, the tool other efforts revolved around.

But the control pyramid is changing, and alternate methods of controlling weed and insect pests, nematodes and plant pathogens are being sought out and used. Pesticides are still the choice for containment, short-term relief and situations where other tools are ineffective, but biologically based strategies are now considered the foundation upon which to build.

Root damage to leafy spurge caused by Aphthona spp. flea beetle larvae.

Integrated Pest Management combines ecologically sound strategies with other tools to provide better control and more flexibility than could be achieved by using any single tool alone. **Affordability**, **effectiveness**, **flexibility** and **sustainability** are key components of IPM – **the preferred pest management tool of the new millennium.**

This information is provided to you by TEAM Leafy Spurge and the USDA-ARS Northern Plains Agricultural Research Laboratory in Sidney, Montana.

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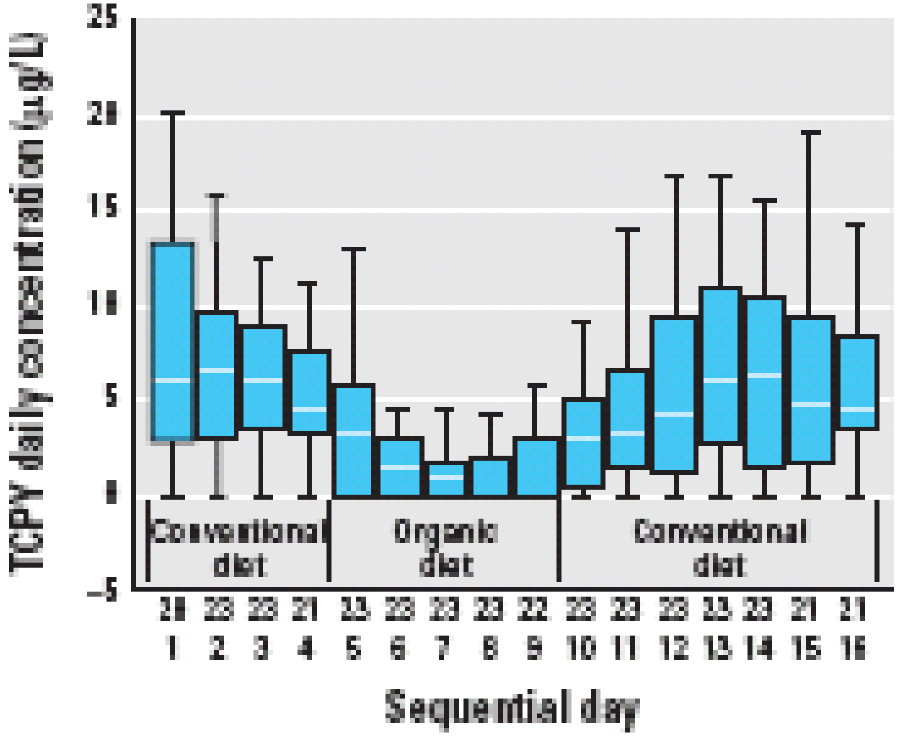


Figure 2. Box plots of DVWA of TCPY concentrations in 23 children 3–11 years of age for 15 consecutive days in which conventional and organic diets were consumed. The top row of numbers on the *x*-axis represents numbers of children.

Hope in Pollution Prevention: MA Toxics Use Reduction Program

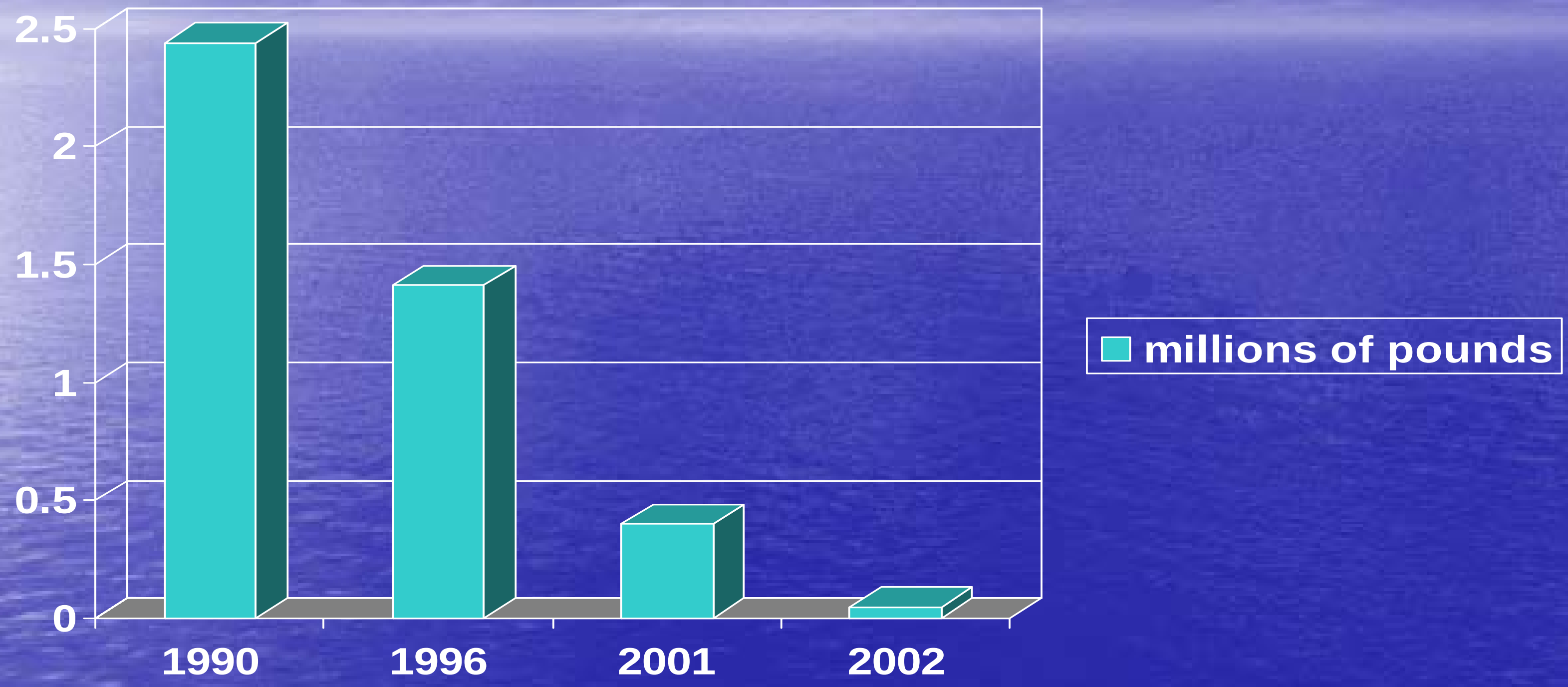
- Goal: 50% reduction in toxic waste
- Focus on ways to reduce waste and chemical use rather than on “acceptable exposures”
- Chemical List based on evidence but not proof of toxicity of chemicals
- Quantify materials used (why and how)
- Understand costs of chemical use

Example: Massachusetts Toxics Use Reduction Program

- Examine alternatives
- Innovation and technical support
- Measure progress and re-evaluate
- Results: 1990-2000
  - 60% reduction in waste
  - 40% reduction in use
  - 80% reduction in emissions
- Benefits to industry $15 million (not considering health/environmental benefits)

Lets apply this approach now to household cleaners...

MA TCE Cleaning Use Data



The Result of the MA Toxics Use Reduction Planning and Technical Support Process

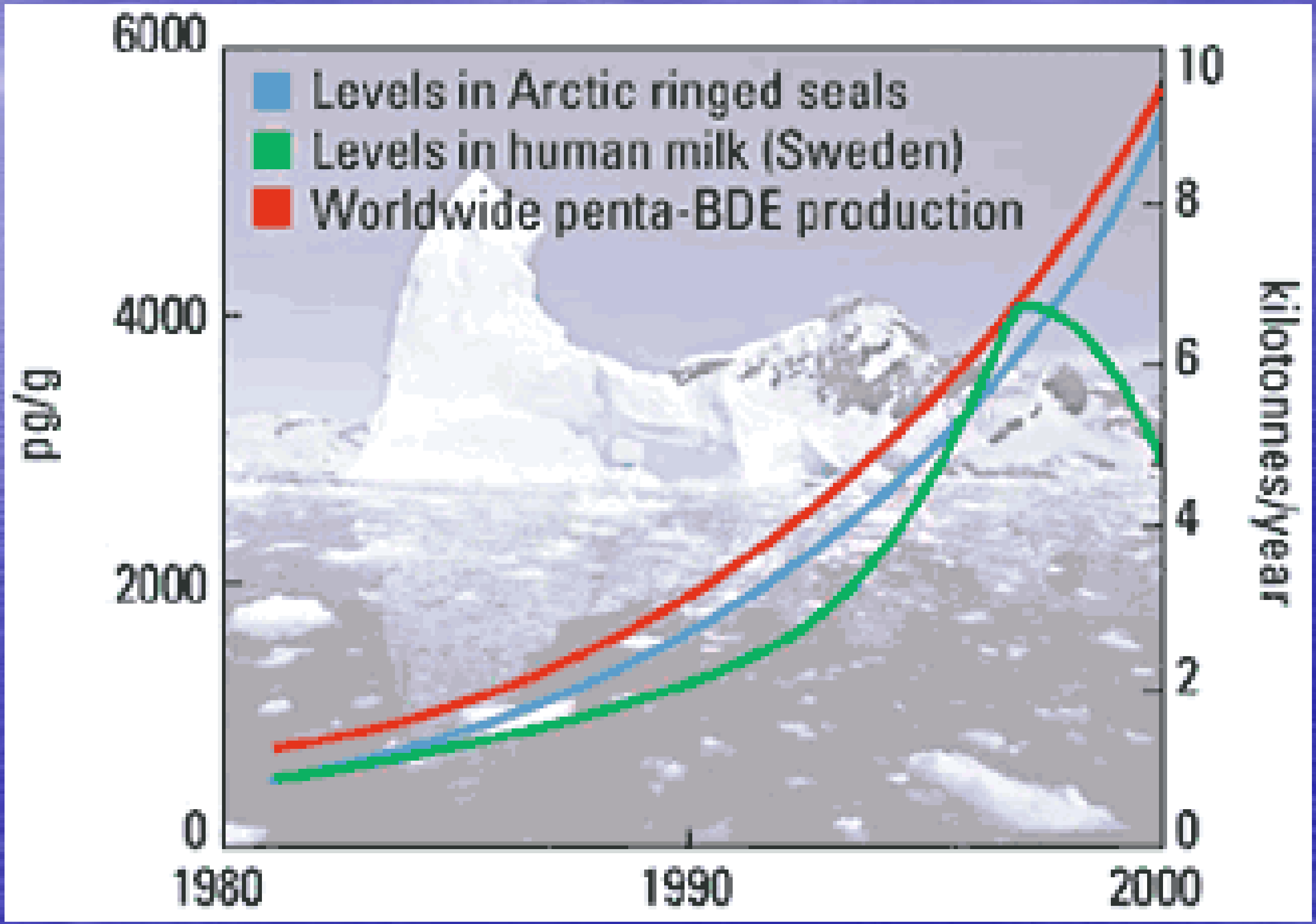
The important goal – when do we know enough to act?

- A "moving target"
- Consider when and how to act in context of:
  - Available knowledge and accumulated understanding
  - Scientific "suspicion"/judgment
  - Complexity/magnitude/severity/uncertainty/reversibility
  - Availability of alternatives/prevention options
  - Public values
  - Responsibility to protect health

Sir Bradford Hill (1965)

- "All scientific work is incomplete – whether it be observational or experimental. All scientific work is liable to be upset or modified by advancing knowledge. *That does not confer upon us a freedom to ignore the knowledge we already have, or to postpone the action that it appears to demand at a given time."*

Levels of Brominated Diphenyl Ethers (PBDES) in the environment



Example – Brominated Fire Retardants (PBDEs)

- Flame retardants used in plastics, textiles, and furniture
- Evidence of bioaccumulation in humans, fish, throughout the world – breast milk levels doubling every 5 years
- We don't know with certainty how exposure occurs (from products, food, dust, etc) or if there are cumulative exposures with other similar substances – PCBs
- We have some evidence of toxicity in laboratory animals at exposures within an order of magnitude of those in humans
- There are viable alternatives for most uses (though we want to be sure that they are indeed safer).

Example – phthalates in Children's PVC toys

- Known evidence of exposure
- Evidence of toxicity
- Vulnerability of children
- Availability of alternatives
- Need for soft teething toys
- Based on whole of evidence policy of prohibiting use by small children
- US Consumer Product Safety Commission approach – quantify risks but large data gaps, costly and time consuming

Example: Precautionary Goal Setting/Foresight Planning

- Common in Public Health
- Goals for:
  - Reducing impacts/exposure
  - Reducing/Phasing out materials. European chemicals policies: phase outs of the most harmful chemicals and those that are unstudied; rapid assessment
  - Establishing “red flag” activities
- Backcasting to figure out means to achieve goals, ways to overcome barriers, etc.

Swedish Environmental Quality Objectives

- Reduced climate impact
- Clean air
- Natural acidification
- A non-toxic environment
- A protective ozone layer
- A safe radiation environment
- Zero Eutrophication
- Thriving wetlands
- Good-quality groundwater
- A balanced marine environment
- A good build environment
- Sustainable forests

Conclusions

- We shouldn't accept damage to our children, ourselves and future generations as inevitabilities…it doesn't have to be this way
- We can be avoiding new problems while addressing the problems of today
- We need to think creatively about new approaches to prevent exposures/problems in the first place, examining alternatives.
- While parental advice is important, we need to also act at a societal level so that people don't have to make potentially harmful choices in the first place.

Resources

- MA Toxics Use Reduction Institute – www.turi.org
- Northwest Coalition for Alternatives to Pesticides – www.pesticide.org
- Clean Production Action – www.cleanproduction.org
- US EPA Office of Pollution Prevention and Toxics – www.epa.gov/oppt
- US EPA Pesticide division - http://www.epa.gov/pesticides/factsheets/ipm.htm
- Lowell Center for Sustainable Production – www.sustainableproduction.org