

## TRAINING FOR HEALTH CARE PROVIDERS

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# CHILDREN'S ENVIRONMENTAL HEALTH INDICATORS

## Children's Health and the Environment

WHO Training Package for the Health Sector

World Health Organization

*www.who.int/ceh*

03/03/2010

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<<NOTE TO USER: Please add details of the date, time, place and sponsorship of the meeting for which you are using this presentation in the space indicated.>>

<<NOTE TO USER: This is a large set of slides from which the presenter should select the most relevant ones to use in a specific presentation. These slides cover many facets of the problem. Present only those slides that apply most directly to the local situation in the region.>>

<<NOTE TO USER: This presentation contains six examples of children's environmental health indicators in action for six separate health issues (slides 48 to 119). You should select one or two examples that are most relevant to your audience and present only these.>>

## Children's Environmental Health Indicators

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### LEARNING OBJECTIVES

- ❖ Learn what children's environmental health indicators are, and how to use them
- ❖ Understand the importance of children's environmental health indicators
- ❖ Introduction to indicators
  - ❖ Types of indicators
  - ❖ Indicators in context
- ❖ Review examples of indicators and how they are used
- ❖ Consider why, when, where and how to monitor the environmental health of children

## Children's Environmental Health Indicators

**"What can be measured can be improved."**



WHO

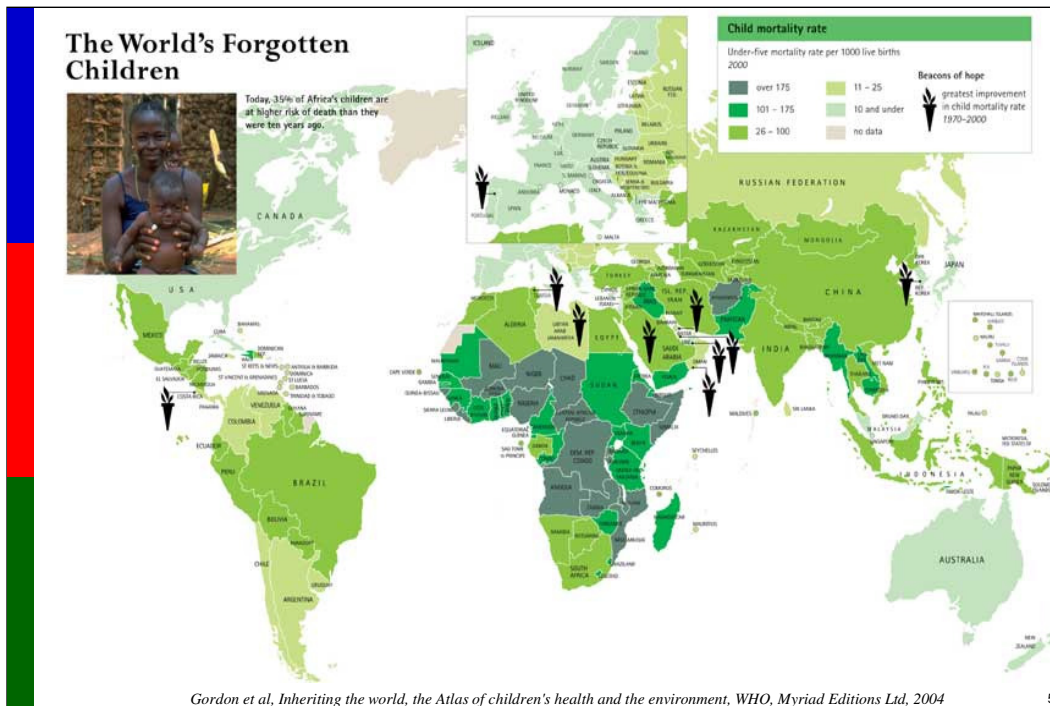
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Environmental health indicators are methods for measurement. We use indicators in health because, as this proverb says, "what can be measured can be improved." Taking measure of an environmental health issue helps us focus resources on the problems and people that need them most, and it helps us understand what is working to improve health.

*Picture: WHO*

**OUTLINE OF THE PRESENTATION**

- I. Introduction and background**
- II. Children's Environmental Health Indicators**
- III. Examples of indicators in action**



Nearly 10 million children aged under five years die every year – 98% of them in developing countries. Widespread malnutrition hampers children's growth and development, opening the door to the biggest killers of children in this age group. This presents a sharp contrast to the situation in the industrialized world, where junk food and a sedentary lifestyle have triggered an unprecedented epidemic of obesity in children, leading to diabetes and heart disease in adult life.

This slide shows that in country <<NOTE TO USER: Please specify the country you wish to highlight>>, X number of children under five died in the year 2000.

At the end of the twentieth century, the world joined together in the fight against poverty, and committed itself to the Millennium Development Goals, adopted by the United Nations in 2000: "to reduce by two-thirds the under-five mortality rate between 1990 and 2015" may be the most ambitious of these goals.

*Reference:*

- Gordon B et al. *Inheriting the world, the Atlas on Children's Health and the Environment*. Geneva, World Health Organization, Myriad Editions Ltd, 2004.

## Children's Environmental Health Indicators

### WHY CHILDREN?

#### Children are especially vulnerable to environmental risks

- ❖ Higher exposures compared to body weight
- ❖ More vulnerable to the effects of exposure
- ❖ Unique exposure patterns due to behaviours
- ❖ Less aware of risk
- ❖ Less able to control their environment
- ❖ "Windows of susceptibility"
- ❖ Ignored or poorly served by policy

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Compared to adults, children suffer disproportionately from a wide range of environmental diseases. Children are even more vulnerable than adults to environmental risks because:

- Compared to adults, children breathe more air, eat more food and drink more water relative to their body weight, so they are exposed to higher doses of environmental risk.
- Children's immune systems are still developing, so they are less able to deal with exposures.
- Childhood behaviours such as crawling on the ground, putting objects in mouths and playtime activities may pose risks that do not exist for adults.
- Children are less aware of risk, less able to communicate exposure to hazards, and less able to mitigate risk in their environment because they are usually powerless.
- Children have "windows of susceptibility" to environmental threats. These are specific periods in their development when the effect of a chemical, physical or biological agent is major and may result in adverse health outcomes.
- Finally, they are often disregarded or poorly served by policy. Children are essentially seen as little adults living in a big adults' world.

#### References:

- Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.
- WHO. A Call to Action: Using Indicators to Measure Progress on Children's Environmental Health. Geneva, World Health Organization, 2002.

## Children's Environmental Health Indicators

### WHY CHILDREN?

#### New research findings suggest:

- ❖ Children and developing fetuses have special vulnerability to certain toxicants (e.g. lead)
- ❖ Effects of exposure depend upon: toxicity, dose, and timing
- ❖ Effects of exposure are exacerbated by:
  - poverty
  - malnutrition
  - urbanization
  - degraded environments
  - stressful circumstances



WHO

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Although the special susceptibility of children has been recognized for decades (especially by paediatricians), it is only recently that science has discovered new, more sophisticated knowledge about the effects of toxins in children. For example, we now have detailed information about the specific effects of thalidomide on the developing fetus, and that of lead on the developing nervous system in young children.

The importance of toxicity, dose and timing of exposure are now recognized. Toxicity is the level at which a substance becomes toxic in the body; this may be different for children than for adults. Dose refers to the quantity and frequency of an exposure (for example, in the case of a repetitive exposure), whereas timing refers to specific vulnerabilities that come during certain developmental phases, which we call "windows of susceptibility."

For many children, the adverse effects of exposure are further exacerbated or magnified by poverty, malnutrition and stress (such as is experienced in refugee camps, or areas affected by drought, tornadoes or floods,...or in areas of war or conflict).

#### References:

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

•Hernandez-Avila. Effect of maternal bone lead on length and head circumference of newborns and 1-month-old infants. *Arch Environ Health*, 2002, 57:482.

*The authors evaluated the effects that maternal bone lead stores have in anthropometry at birth in 223 mother-infant pairs. The participants were recruited between April and November 1994. Anthropometric data were collected within the first 12 hrs following delivery. Maternal information was obtained 1 month after delivery occurred. Bone lead burden was determined with in-vivo K-X-ray fluorescence of the tibia (cortical bone) and the patella (trabecular bone). The authors transformed anthropometric measurements to an ordinal 5-category scale, and the association of measurements with other factors was evaluated with ordinal logistic-regression models. Mean bone lead levels were 9.8 microgram/gm bone mineral and 14.4 microgram/gm bone mineral for the tibia and patella, respectively. Birth length of newborns decreased as tibia lead levels increased. Compared with women in the lower quintiles of the distribution of tibia lead, those in the upper quintile had a 79% increase in risk of having a lower birth length newborn (odds ratio = 1.79; 95% confidence interval = 1.10, 3.22). The authors adjusted by birth weight, and the effect was attenuated – but nonetheless significant. Patella lead was positively and significantly related to the risk of a low head circumference score; this score remained unaffected by inclusion of birth weight. The authors estimated the increased risk to be 1.02 per microgram lead/gm bone mineral (95% confidence interval = 1.01–1.04 per microgram lead/gm bone mineral). Odds ratios did not vary substantially after the authors adjusted for birth weight and other important determinants of head circumference.*

•Hill LM, Kleinberg F. Effects of drugs and chemicals on the fetus and newborn. *Mayo Clin Proc*. 1984, 59(10):707-16. Review.

*The authors review known effects of drugs on the developing fetus. Drug teratogenicity has been demonstrated experimentally for more than 30 years. A complex set of circumstances must prevail for a specific teratogenic effect to result. Not only the drug or environmental pollutant in question but also its dose, timing, and frequency of administration as well as the genetic and individual susceptibility of the embryo are important factors.*

•Knobloch J, et al. Thalidomide induces limb deformities by perturbing the Bmp/Dkk1/Wnt signaling pathway. *FASEB J*. 2007, 21(7):1410-21. Epub 2007 Feb 5.

*Thalidomide, a sedative originally used to treat morning sickness and now used to treat leprosy and multiple myeloma, is also a teratogen that induces birth defects in humans such as limb truncations and microphthalmia. However, the teratogenic mechanism of action of this drug remains obscure. The authors perform a study of teratogenic effects of thalidomide in chicken embryos. They conclude that perturbing of the proteins Bmp/Dkk1/Wnt signaling is central to the teratogenic effects of thalidomide.*

Picture: WHO

### WHAT IS A CHILDREN'S ENVIRONMENTAL HEALTH INDICATOR?

An expression of the **link** between the environment and children's health, **targeted at an issue** of specific policy or management concern, and represented in a form that **facilitates interpretation** for effective decision-making.

What is an environmental health indicator?

Formally, an environmental health indicator is an expression of the link between the environment and children's health, targeted at an issue of specific policy or management concern, and represented in a form that facilitates interpretation for effective decision making.

*Reference:*

•Corválan C, et al. Development of Environmental Health Indicators. In: Likage Methods for Environment and Health Analysis. General Guidelines. Briggs DJ, Corválan C, Nurminen M, eds. Geneva, UNEP, USEPA, WHO, 1996, 19-53.

## Children's Environmental Health Indicators

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### WHAT IS A CHILDREN'S ENVIRONMENTAL HEALTH INDICATOR?

- ❖ A way of measuring what part of the population is affected by a certain condition
- ❖ Makes decision-making possible

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An indicator is a way of measuring what part of the population is affected by a certain condition, which makes decision-making possible.

*Reference:*

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. *Geneva, World Health Organization, 2003.*

## Children's Environmental Health Indicators

### WHAT IS A CHILDREN'S ENVIRONMENTAL HEALTH INDICATOR?

#### Examples:

- ❖ Road traffic injuries to children under 5 years of age – an indicator of health risks from road traffic
- ❖ Percentage of children living in unsafe, unhealthy or hazardous housing – an indicator of health risks from inadequate housing and shelter
- ❖ Percentage of children living in households in which at least one adult smokes on a regular basis – an indicator of health risks from environmental tobacco smoke

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The concept of a children's environmental health indicator involves two crucial ideas: 1) the indicator – i.e. something that *indicates* – a pointer, a proxy, a measurement; and 2) a connection between environment and children's health.

Here are some basic examples.

<<READ THE SLIDE.>>

#### *Reference:*

- Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

### WHAT CAN AN INDICATOR DO?

- ❖ Monitor environmental change and specific impacts on children's health (e.g. trends)
- ❖ Link environmental conditions to health status
- ❖ Compare the status of areas or groups of people
- ❖ Alert us to problem areas
- ❖ Prioritize issues
- ❖ Target resources efficiently
- ❖ Monitor effectiveness of targeted environment and health interventions
- ❖ Identify gaps in information
- ❖ Provide an opportunity for discussion

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Children's environmental health indicators can help healthcare providers, policy makers, and the public:

- Monitor trends in the environment to identify potential risks to health
- Monitor trends in health resulting from exposures to environmental risk factors in order to guide policy
- Link environmental conditions to health status
- Compare the status of areas or groups of people to help target action and allocate resources
- Assess the effects of policies or other interventions on environmental health

Indicators are tools for:

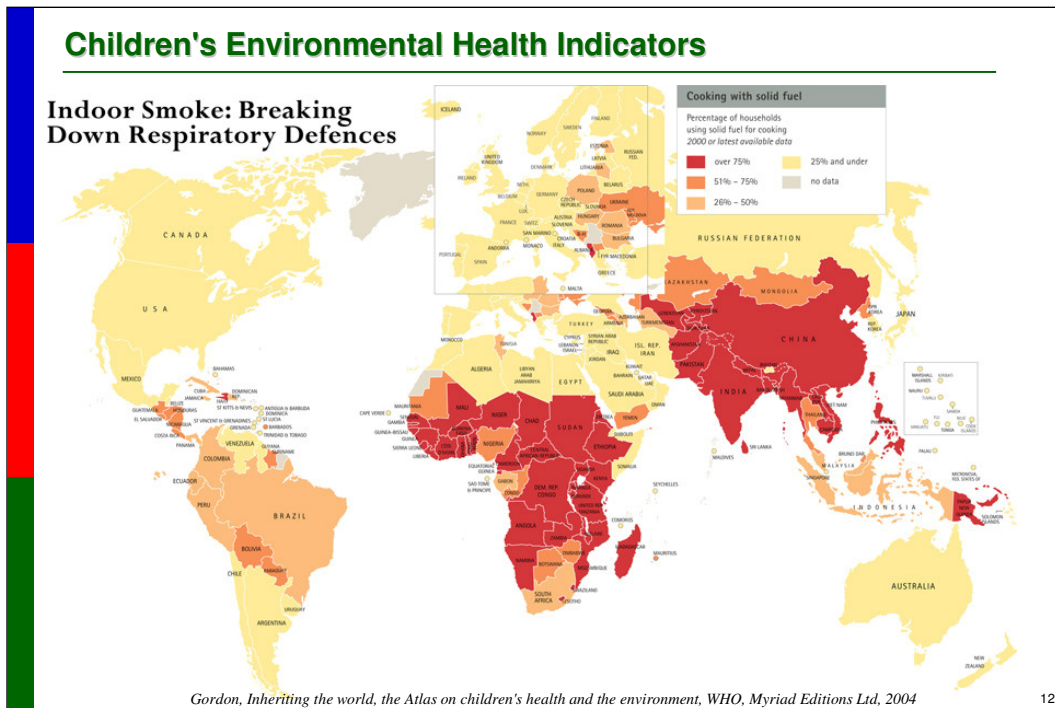
- Assessing and prioritizing the environmental health risk factors in an area
- Sensitizing policymakers to environmental health issues
- Targeting resources
- Encouraging action to improve management of the environmental risk factors affecting children's health
- Highlighting the gaps in information and increasing the knowledge base

Indicators are AN OPPORTUNITY FOR INTERACTION—between:

- Clinicians, nurses and health care workers
- patients
- environmental professionals, researchers and educators
- Decision- and policy-makers

*Reference:*

- A Call to Action: Using Indicators to Measure Progress on Children's Environmental Health. Geneva, World Health Organization, 2002.



This world map shows the distribution of households who cook with solid fuel. As you can see there are major differences between areas on a global scale. If we were interested in creating change to protect children from household smoke, we could use this information to target our interventions more effectively.

*Reference:*

- Gordon B, et al. *Inheriting the world, the Atlas on Children's Health and the Environment.* Geneva, World Health Organization, Myriad Editions Ltd, 2004.

## Children's Environmental Health Indicators

### BACKGROUND

- ❖ The Global Initiative on Children's Environmental Health Indicators (CEHI)
- ❖ Monitoring the environmental health of children through the use of indicators

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In September 2002, the Global Initiative on Children's Environmental Health Indicators, or CEHI, was launched at the World Summit on Sustainable Development along with other initiatives such as the Health and Environment Linkages Initiative.

Health care providers play a key role in the Children's Environmental Health Indicators initiative, as they are the "front lines" in dealing with children and adolescents; they are in contact with children, parents, teachers and communities in which children live. Health professionals are in a key position to identify children at risk from environmental causes, advise parents on how to reduce the risk, and recommend actions to policy-makers.

Health care providers should be able to recognize and assess the environmental health threats present in the places where children and adolescents live, learn, play and work. They should also know that the threats are greater in low-income populations and marginalized communities, in degraded environments and when children and adolescents are living under extreme stress (e.g. during civil unrest, or in refugee camps).

Health care providers are in a key position to record information about the environmental health of children, intervene to improve children's health, and advocate policy changes that will support these efforts.

#### *References:*

- WHO. Global Initiative on Children's Environmental Health Indicators. *Geneva, World Health Organization, Children's Environmental Health* ([www.who.int/ceh/indicators/globinit/en/index.html](http://www.who.int/ceh/indicators/globinit/en/index.html), accessed December 2009).
- WHO. Capacity Building. *Geneva, World Health Organization, Children's Environmental Health* ([www.who.int/ceh/capacity/en/](http://www.who.int/ceh/capacity/en/), accessed December 2009).

## Children's Environmental Health Indicators

### STRATEGIC AIMS OF CEHI

- ❖ Increase collaboration to report on the state of children's environmental health
- ❖ Develop and promote the use of CEH indicators
- ❖ Improve the quality of information available to policy-makers that will allow them to make better decisions to improve environmental conditions and child health outcomes

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The key aims of CEHI are to:

- Increase collaboration among governments, non-governmental organizations, UN agencies and other inter-governmental organizations, the private sector, health care providers, pediatricians, nurses and communities to report on the state of children's environmental health
- Promote the use of indicators for providing information about children's environmental health, and
- Improve the quality of data available on children's environmental health

*Reference:*

- Global Initiative on Children's Environmental Health Indicators. *Geneva, World Health Organization, Children's Environmental Health* ([www.who.int/ceh/indicators/globinit/en/index.html](http://www.who.int/ceh/indicators/globinit/en/index.html), accessed December 2009).

## Children's Environmental Health Indicators

### ROLE OF HEALTH CARE PROVIDERS

- ❖ Recognize environmental risk factors for children's health
- ❖ Understand how environment affects children's health outcomes
- ❖ Take exposure histories
- ❖ Contribute to knowledge on children's environmental health

CHILDREN'S ENVIRONMENTAL INFORMATION: "GREEN PAGE" (Final Version)		
Patient's name:	Address:	Date collected:
Sex:	Day of birth:	Professional recording date (name & position):
With whom does the child live?	Living environment:	Other data:
Is he/she working?	- Rural - Urban - Peri-Urban	
BUILDING: - House - School or child-care - Recreation place - Community		
GEOGRAPHICAL AREA:		
FOOD:		
AIR QUALITY:		
WATER QUALITY:		
SOIL TYPE AND QUALITY:		
EXCRETA DISPOSAL:		
SOLID WASTE DISPOSAL:		
NOISE:		
CHEMICALS:		
TRAFFIC:		
Does the intermediary giver express concerns about the environment? Which ones? Why?		
Are there any well-known environmental risk factors in the area? Which ones?		
Mother's and father's occupation:		
Is there exposure to venomous/poisonous animals?		
Are there pet animals at home and in the surroundings? Which ones?		
Are there sources of dusts? Which ones?		
Is there exposure to extreme temperatures? Describe		
Has the child suffered traffic-related injuries? Describe		
Has the child suffered fire-related injuries or other? Describe		
Has the child been exposed to chemical incidents? Describe		
Has the child had poisoning due to chemicals and/or food poisoning? Describe		
Observation (other relevant information):		

WHO WORLD HEALTH ORGANIZATION 1

The health care providers – from the paediatrician to the nurse, from the primary health care worker to the family doctor, and other relevant providers – are in a privileged position and play a key role in detecting the environmental threats to children's health because they are in direct contact with the child, his or her family and community.

"Front-line" health care providers – those dealing with children's health issues on a regular basis – have specific roles and responsibilities in recording environmental and health data. They should be able to:

- Recognize clinical, subclinical and potential effects of environmental risk factors on children's health. This requires the capacity to identify potential exposure to chemical, physical and biological agents and determine their effects on children's health and development.
- Understand the mechanisms of action – learn how environmental risk factors cause or trigger different diseases (e.g. respiratory, gastrointestinal or neurological) or how they may be linked to developmental problems or potential reproductive, endocrine and neurobehavioural effects.
- Take a thorough exposure history – ask the right questions and record the information in an appropriate place (the clinical record!).
- Contribute to research and knowledge generation – the data on environment and health that have been collected, collated and analysed provides valuable information to fill knowledge gaps and contribute to research.

All this knowledge will enable more effective assessment of children's environmental health and help monitor the success or failure of interventions to address specific children's environmental health problems at the local, national and international level. This is a critical step in the prevention of environment-related diseases.

#### Reference:

- Guide and instructions for the implementation of the Green Page Environmental Health Diagnostics. Geneva, World Health Organization, *Children's Environmental Health* ([www.who.int/ceh/capacity/greenpageguidelinesmarch2007.pdf](http://www.who.int/ceh/capacity/greenpageguidelinesmarch2007.pdf) - accessed December 2009).

## LINKS BETWEEN EXPOSURE AND HEALTH

	Housing and shelter	Water supply	Food	Sanitation and hygiene	Solid waste	Air pollution	Hazardous chemicals	Radiation	Noise	Road traffic	Social environment	Vector-borne diseases	Natural hazards
All-cause and infant mortality													
Nutritional diseases													
Diarrhoeal diseases													
Other infectious parasitic diseases													
Respiratory diseases													
Cancers and tumours													
Circulatory diseases													
Birth defects and perinatal conditions													
Eye and ear diseases													
Accidents and injuries													
Poisonings													
Mental/behavioural disorders													

*Briggs 2003*

As we consider interconnections between environmental exposures and health status in children, we need to stress the many-to-many links that exist between environment and health.

These links are not set in stone. Additional evidence adds to the body of knowledge regarding the level of evidence between the environmental exposure and the health effect. They are open to debate and challenge – and will certainly vary geographically. Each of the red boxes, however, represents point at which environment might affect health – and therefore where indicators have a role.

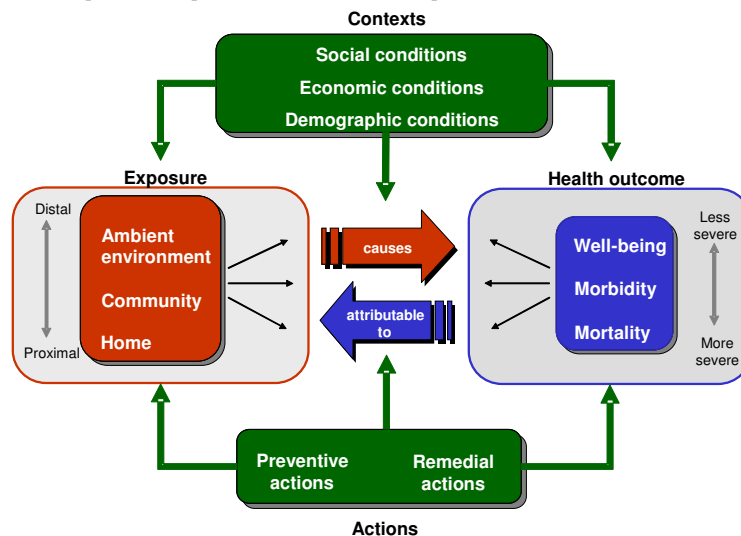
This matrix already begins to illustrate some of complexities of environmental health indicators, for it shows that we cannot design indicators to be read as simple expression of a single environmental risk factor causing a single health effect. This diagram, however, is itself a major simplification of the reality underneath. For each of these boxes represents a linkage between environment and health; and each link between environment and health represents a process or a system. Within each of these boxes, therefore, we need not one indicator, but many if we are to capture the issue in full, and know how and where to act.

*Reference:*

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

### The multiple-exposures multiple-effects model (MEME)



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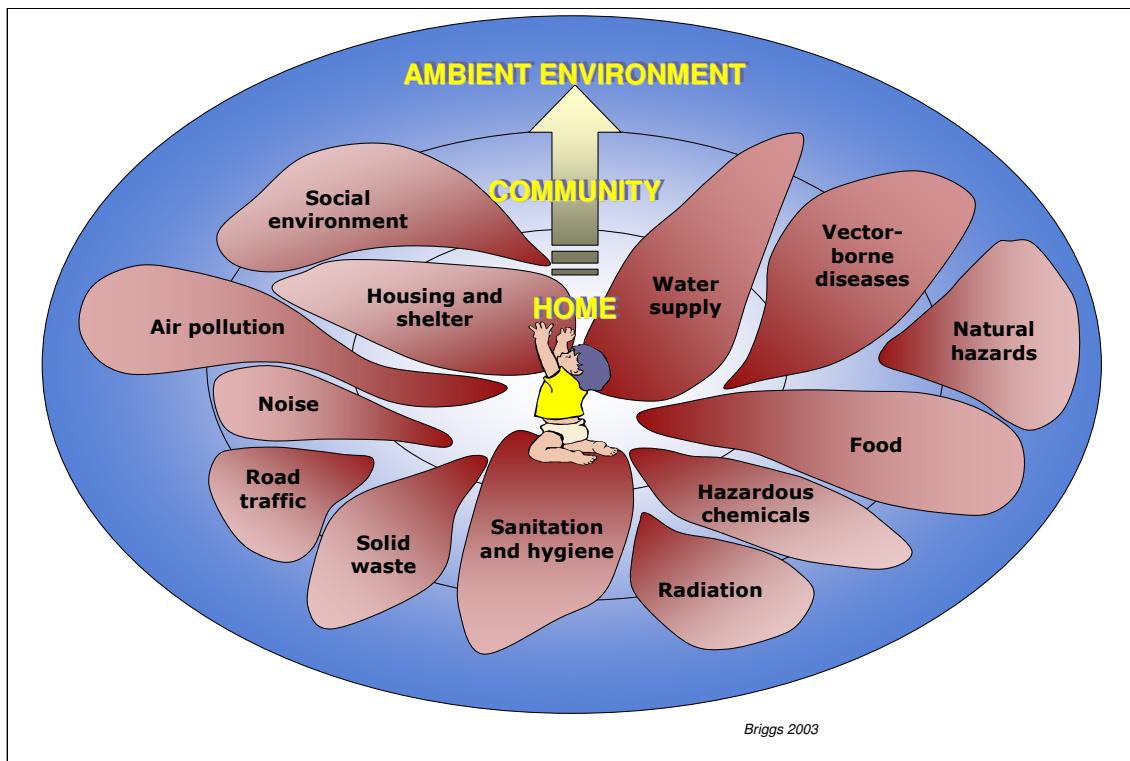
In light of the complex and multifaceted relationships between environmental exposures and human health effects, models have been developed to explain these relationships and to serve as a guiding framework for indicators development.

The World Health Organization's *multiple-exposure multiple-effect model* (MEME) captures the complex interactions between the environment and children's health. It emphasizes that exposures and health outcomes have many-to-many relationships. Individual exposures can lead to many different health outcomes; specific health outcomes can be attributed to many different exposures.

Both exposures and health outcomes – as well as the associations between them - are affected by contextual conditions, such as social, economic or demographic factors. The MEME model was developed especially for children's environmental health indicators and focuses on the child by distinguishing the settings where children's exposure occurs, including the home, the community and the ambient environment. Actions to improve conditions can be preventative--targeted at reducing or eliminating exposures, or treatment-oriented—targeted at health outcomes themselves through the health sector.

#### Reference:

- Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.



Using this model as a starting point to guide our thinking, we can begin to build indicators targeted at children's environmental health.

The first important question is 'what issues do we need these indicators to address?' It is important to recognise that indicators don't tell us this. Indicators may help us to prioritise issues, but they cannot define them for us.

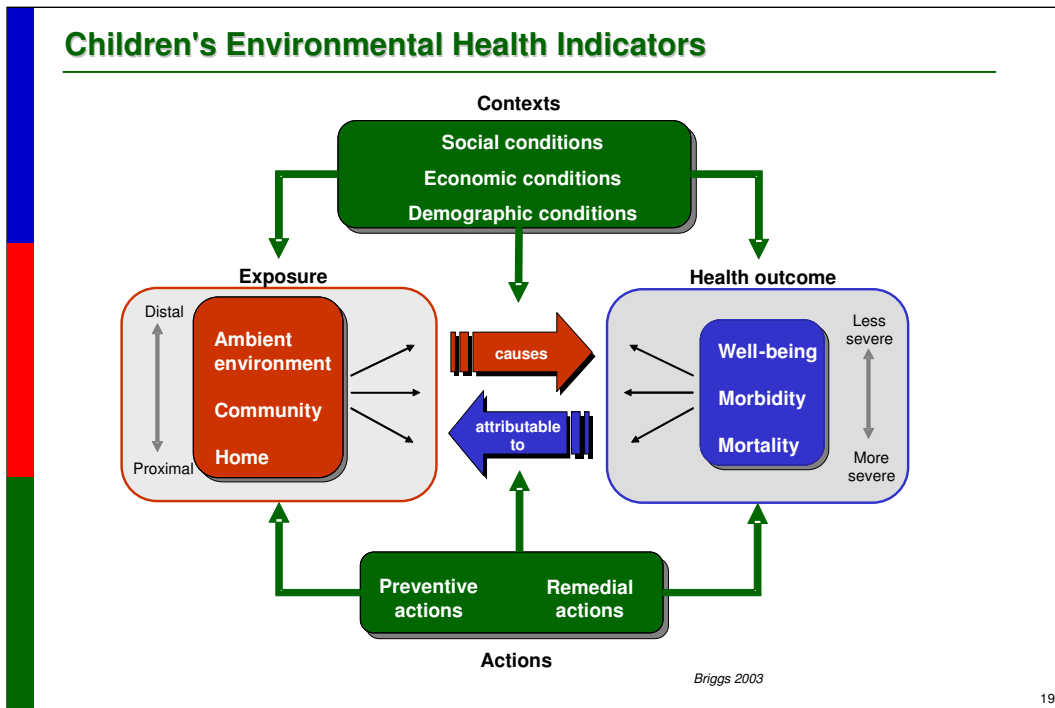
Defining the issues is not easy. Any issue is likely to be defined in different ways depending on the perspective of user: for example, whether we take an exposure-based or an outcome-based approach. Key issues also vary in different parts of world. It is therefore important that issues are defined as systematically and as logically as possible, within their context – otherwise gaps occur, overlaps occur, and biases and distortions creep into policy.

On the exposure side, it is possible to consider range of different issues and settings in which they occur. Issues are not confined to specific settings – they straddle different environments and scales. The importance of recognising the setting, however, is that it helps to identify where main risks occur and where to focus intervention.

**<<NOTE TO USER: The petals of this graphic are not intended to be proportional to the magnitude of the influence on the child's health. The magnitude of each influence will depend largely on individual circumstances.>>**

*Reference:*

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.



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With this in mind, we can turn to the specifics of the MEME model and the four elements required for monitoring children's environmental health:

1. Exposure indicators
2. Health Outcomes indicators
3. Contextual Indicators
4. Action indicators

*Reference:*

- Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

### Putting the MEME Model into Practice

Example: Respiratory disease in children

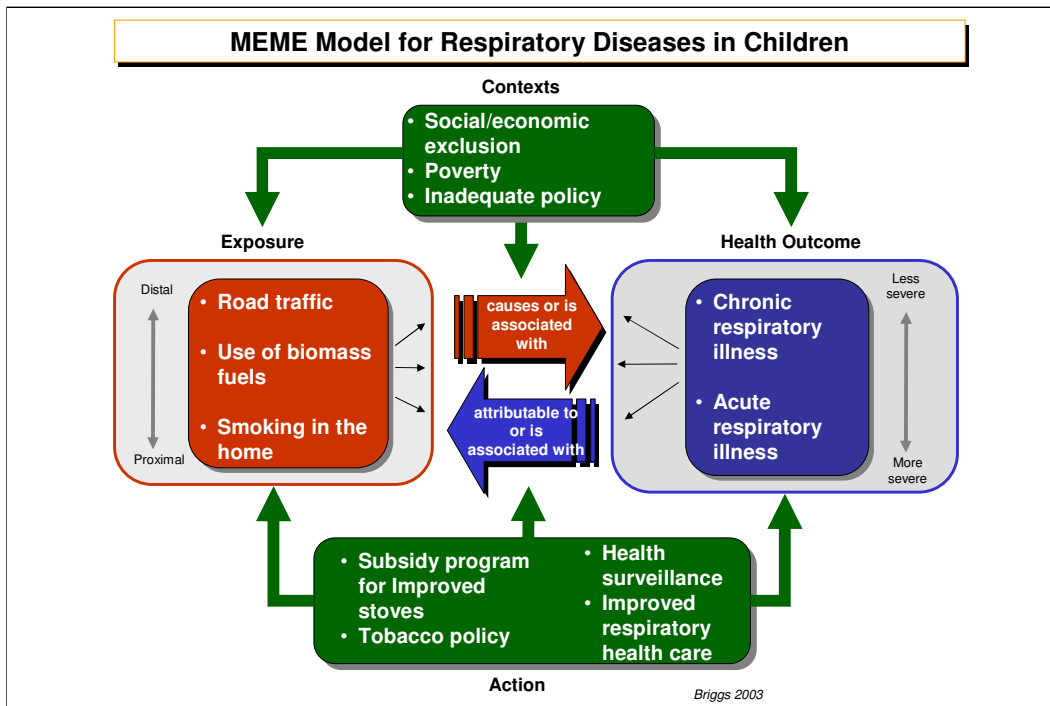


*WHO and Shantu Das*

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We'll use the example of respiratory diseases in children to see how the framework and specific indicators fit together.

*Picture: WHO and Shantanu Das*

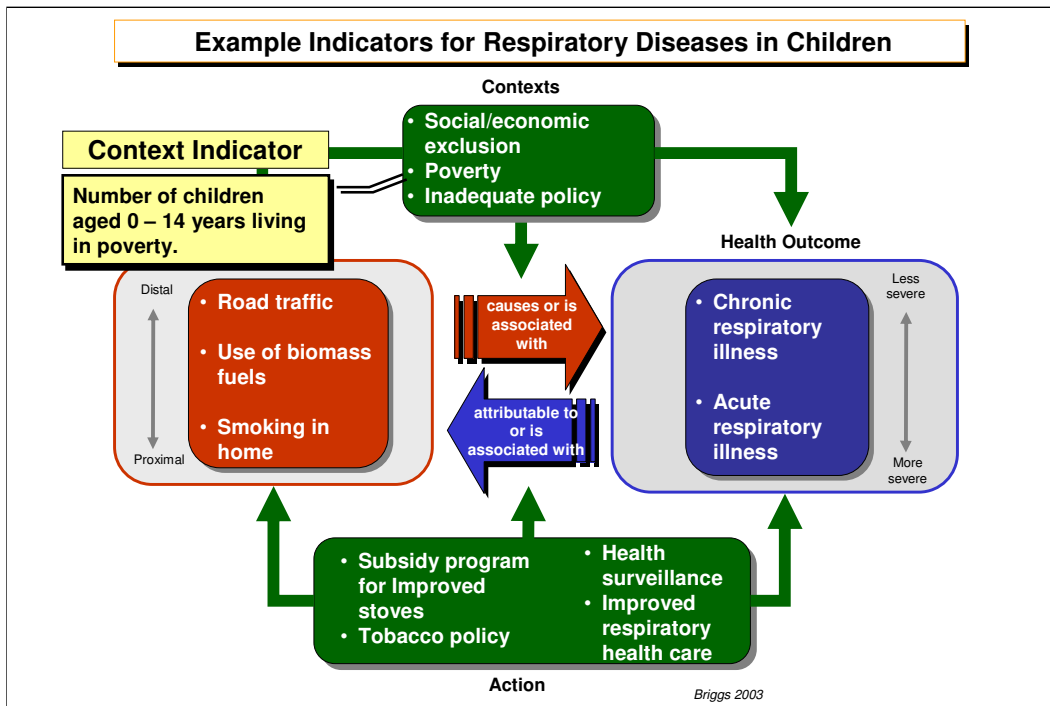


Here we see the MEME model completed for some aspects of respiratory disease in children.

- Under contextual factors, we have social/economic exclusion, poverty, and inadequate policy addressing respiratory health and air quality.
- Under exposures, we see that road traffic, use of biomass fuels, and smoking in the home environment all contribute to health outcomes.
- Under health outcomes, we see chronic and acute respiratory illness—the effects of the contextual factors and exposure.
- Under actions, we see some possible things that would influence respiratory disease outcomes: providing improved stoves, and improved tobacco control policy are two examples of actions that target the exposures. Health surveillance strategies such as asthma screening, and improved respiratory health care systems target the health outcome.

*Reference:*

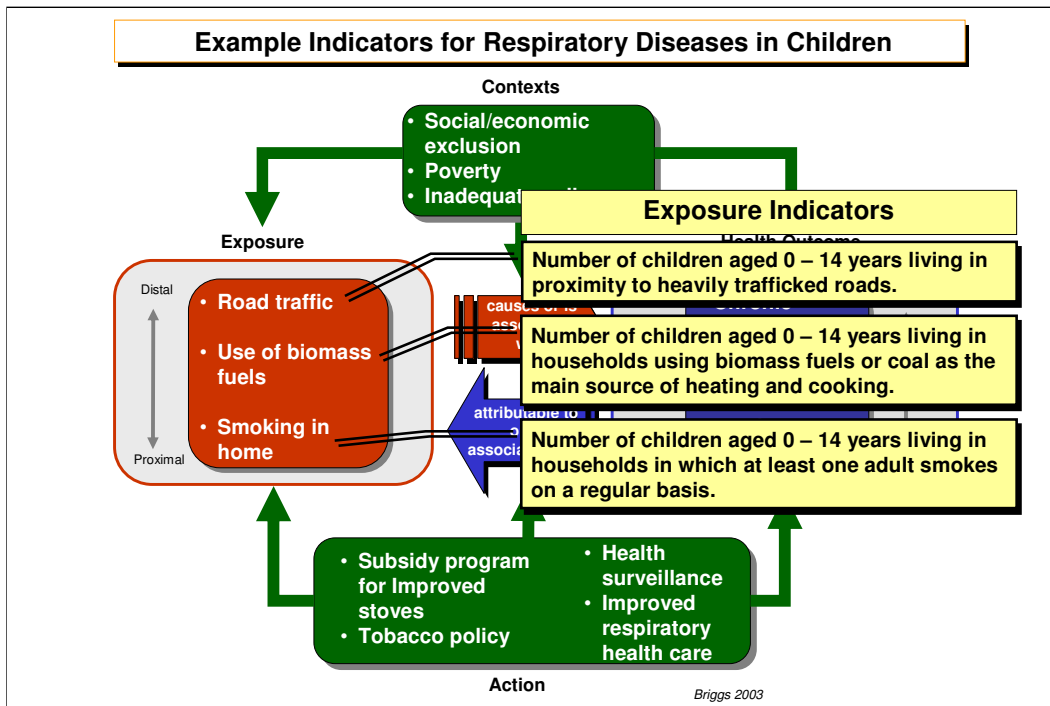
- Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.



One possible indicator providing information about the context for this issue is: **Number of children aged 0 – 14 years living in poverty.**

*Reference:*

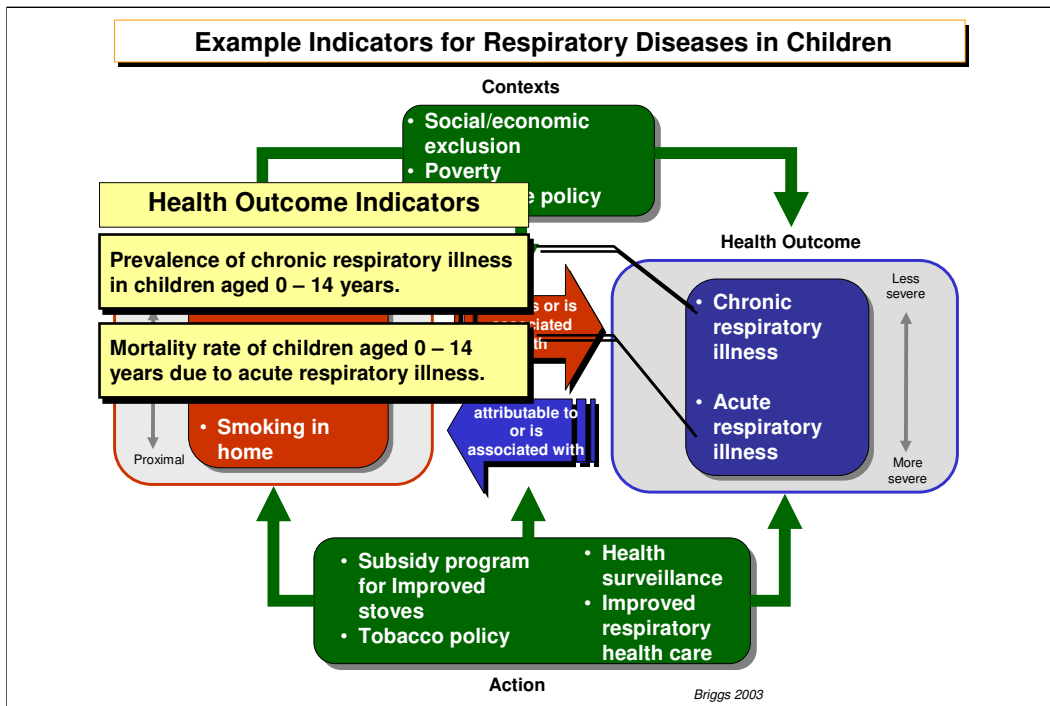
•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.



Here are three possible indicators measuring the exposure of children to causes of respiratory illness.

*Reference:*

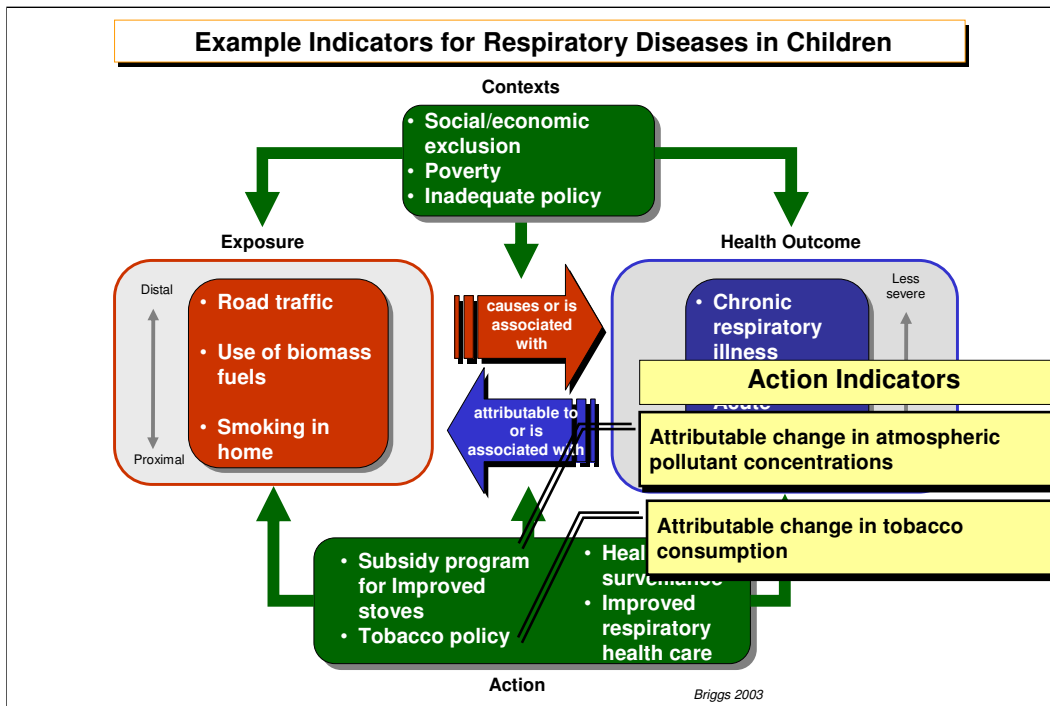
•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.



Here are two health outcome indicators, which give us information about the burden of respiratory disease among children.

*Reference:*

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.



Here are two possible action indicators, which provide information about how changes in policy or practice may be affecting the issue of respiratory disease in children.

<<NOTE TO USER: What are other exposure, context, outcome or action indicators could you identify in your practice? E.g. Parents who commit to only smoke outside the house (allow brainstorming discussion and write the suggestions on a flip chart).>>

*Reference:*

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

### Putting the MEME Model into Practice

Example: Insect-Borne Disease in Children

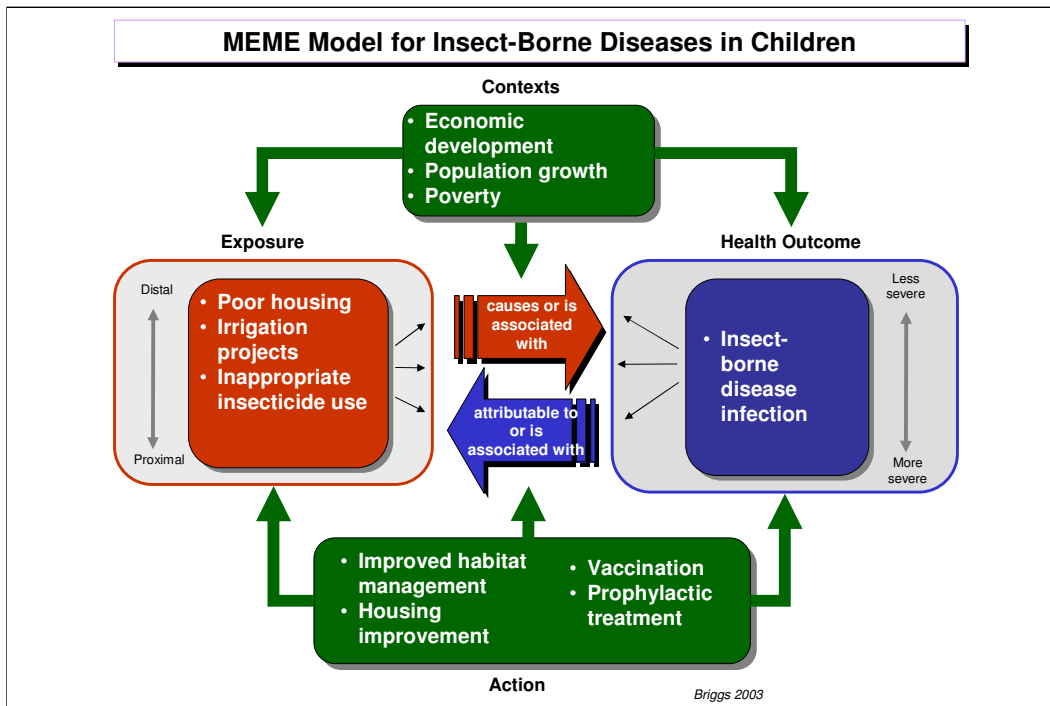


WHO

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Now, we'll use the issue of insect-borne diseases in children to see how the MEME model and specific indicators fit together.

*Picture: WHO*

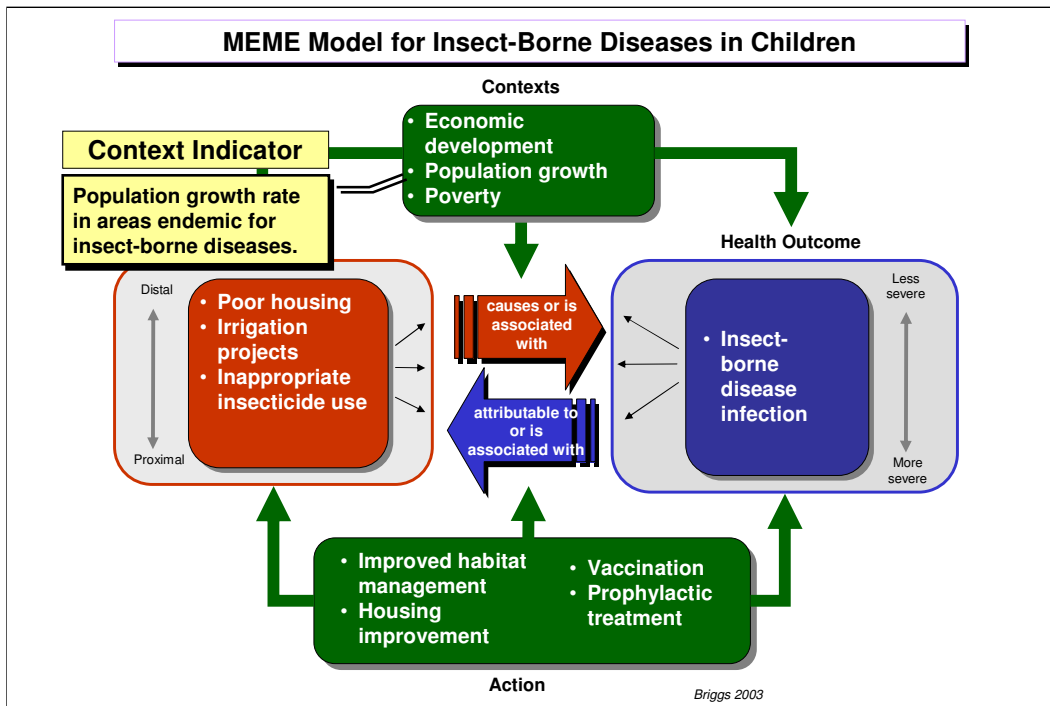


Here we see the MEME model completed for some aspects of insect-borne disease in children.

- Under contextual factors, we have economic development, population growth, and poverty.
- Under exposures, we see that poor housing, irrigation and drainage projects, and inappropriate use of insecticides contribute to exposure to disease vectors, and therefore to insect-borne disease in children.
- Under health outcomes, we see insect-borne disease infection. Specific outcomes would be tied to regional priorities, such as malaria or West Nile Virus.
- Under actions, we see some activities that would influence insect-borne disease outcomes in children: improved habitat management to minimize vector habitat areas and improved housing are two examples of actions that target the exposures. Vaccination or prophylactic treatment, directly targets disease infection, our health outcome.

*Reference:*

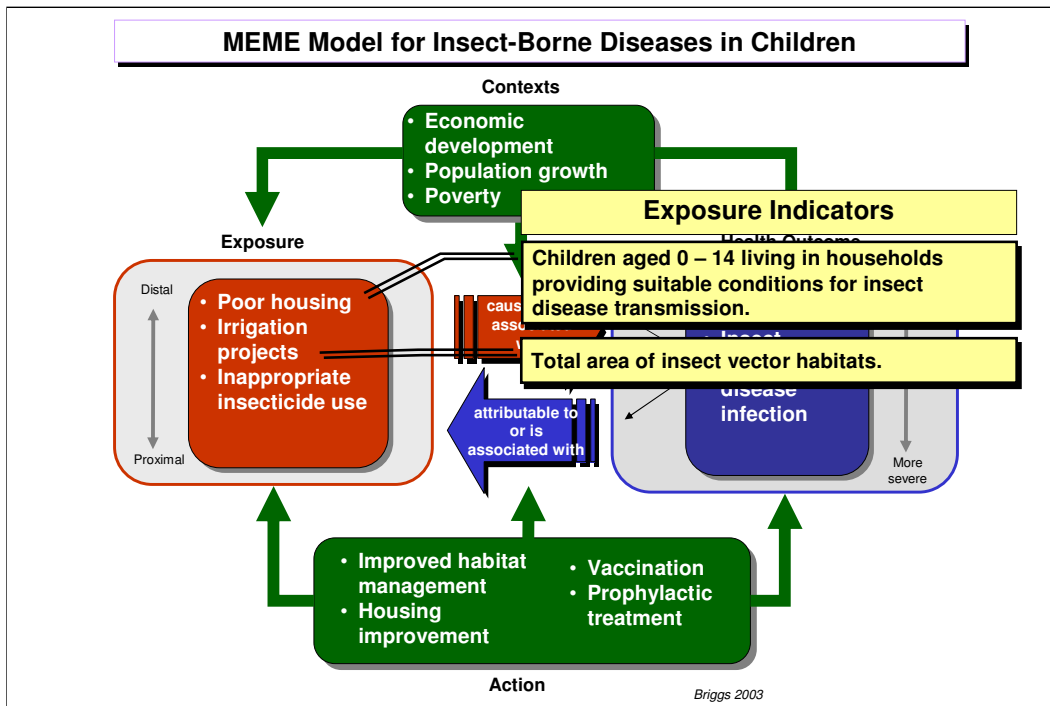
- Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.



One possible indicator providing information about the context for this issue is: **Population growth rate in areas endemic for insect-borne diseases.**

*Reference:*

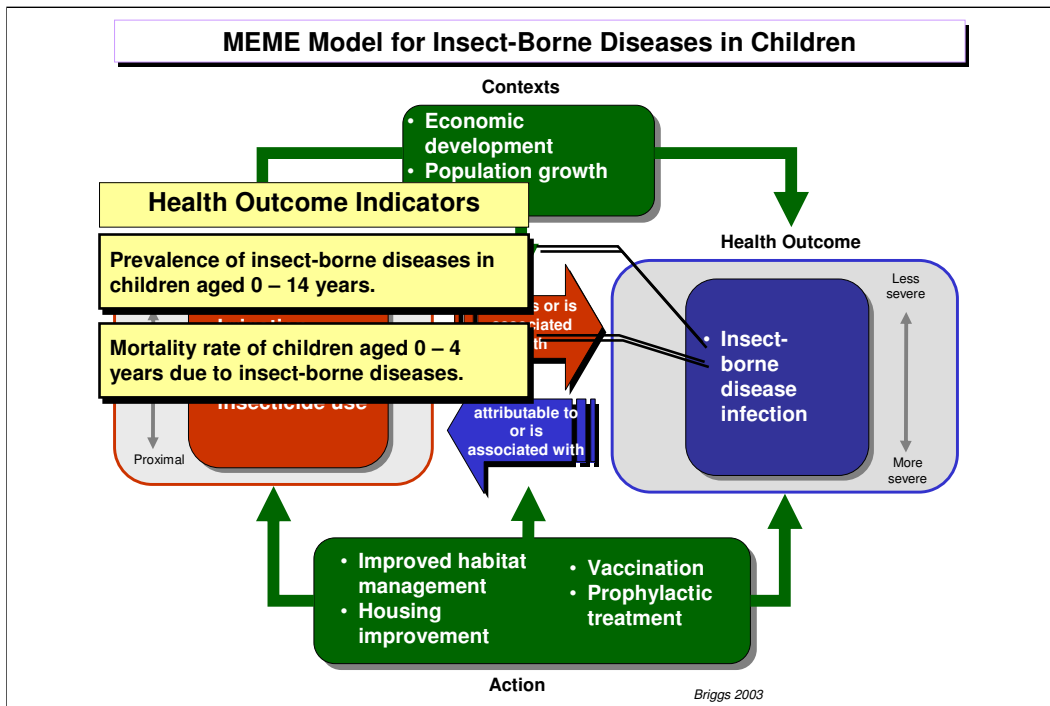
•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.



Here are some possible indicators measuring the exposure of children to insect-borne diseases.

*Reference:*

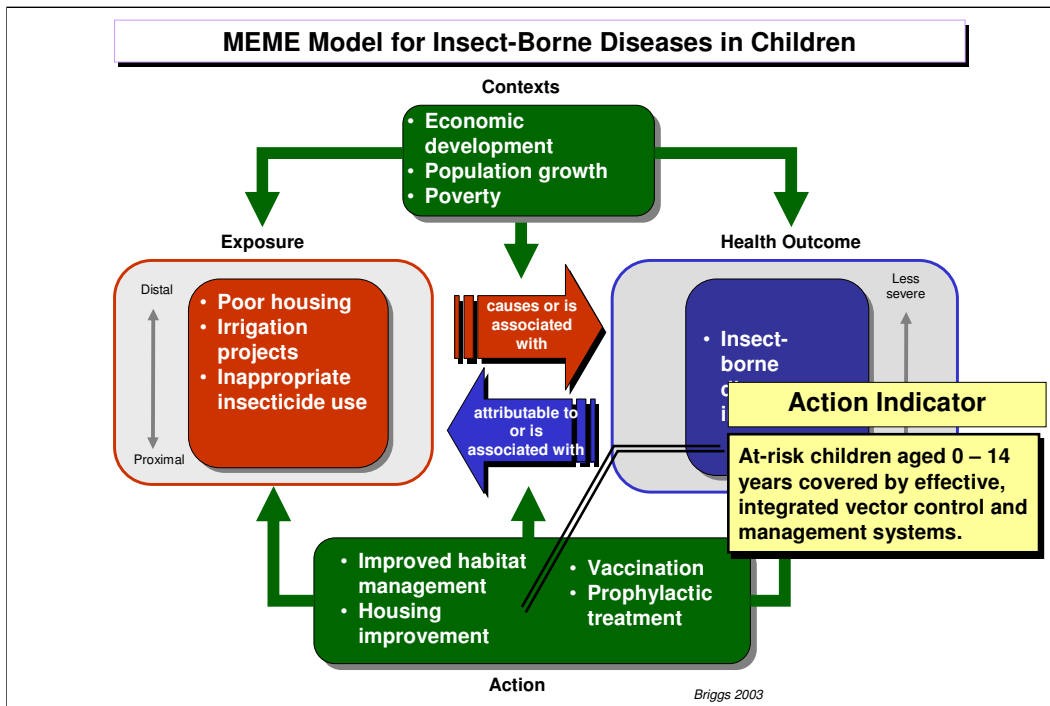
•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.



Here are two health outcome indicators, which give us information about the burden of insect-borne disease among children.

*Reference:*

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.



Here is an example of an action indicator, which provides information about how changes in vector control efforts may affect insect-borne disease in children.

*Reference:*

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

### WHERE DOES THIS INFORMATION COME FROM?

- ❖ International survey programmes
- ❖ National census data
- ❖ Health surveillance
- ❖ Healthcare data
- ❖ Scientific studies
- ❖ Other

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Availability of data greatly influences what indicators can tell us. The most common sources of data for indicator reporting are existing surveys, often performed on a national or regional scale. For example:

- Census data, giving information on the distribution of people by age, gender, and other socioeconomic status information
- Health surveillance giving information on deaths and morbidity by cause
- Healthcare data and hospital admissions data, giving information on the cause of admission and treatments provided

Some international surveys such as the Demographic Health Surveys, UNICEF's Multiple Indicator Cluster Survey, and WHO's World Health Surveys may provide valuable information that can be compared across countries.

Other data sources may include scientific studies at the local, or provincial level; regional household surveys.

As indicators are adopted, it may also be possible to add specific questions to existing surveys that collect indicator data.

*Reference:*

- Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

### REPORTING INDICATOR DATA

- ❖ Reported through United Nations Statistics Division (MDG indicators)
- ❖ Reported by World Health Organization and other international organizations (e.g. UNICEF, UNDP,...)
- ❖ Reported by humanitarian groups and nongovernmental organizations (NGOs)
- ❖ Reported by national government health or environment agencies



WHO

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<<NOTE TO USER: Fill in this slide with the accurate information for your region, explaining where and how indicator data is available.>>

Picture: WHO

## Children's Environmental Health Indicators

### USES FOR POLICYMAKERS

Indicators...

- ❖ Highlight problem areas
- ❖ Prioritize risk factors and issues
- ❖ Target resources efficiently
- ❖ Facilitate policy decisions
- ❖ Assess effects of interventions
- ❖ Provide an opportunity for discussion

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Children will always be without a voice of their own in formal politics. If environmental threats to health of children are to be addressed, decision makers need help and guidance. They need information about the issues that matter for children's health, and indication of the hazards and risks that need to be addressed. Decision makers need help prioritizing issues and evaluating interventions.

Indicators can provide this information. They can also provide a way to communicate with other policymakers, healthcare providers, and the public about the decisions they are making.

#### *References:*

- WHO. A Call to Action: Using Indicators to Measure Progress on Children's Environmental Health. *Geneva, World Health Organization, 2002.*
- WHO. Global Initiative on Children's Environmental Health Indicators. *Geneva, World Health Organization, Children's Environmental Health* ([www.who.int/ceh/indicators/globinit/en/index.html](http://www.who.int/ceh/indicators/globinit/en/index.html) - accessed December 2009).

## Children's Environmental Health Indicators

### USES FOR HEALTHCARE PROVIDERS

Indicators...

- ❖ Link environmental conditions to health status
- ❖ Streamline interventions
- ❖ Prioritize patient education efforts
- ❖ Facilitate policy decisions
- ❖ Assess effects of interventions
- ❖ Identify gaps in information
- ❖ Provide an opportunity for discussion

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Indicators also provide valuable information to health care providers. They can help healthcare providers and their patients link environmental conditions to health problems. They can help providers target home-based education and intervention efforts, turning provider visits into opportunities for long-term solutions.

Finally, indicators can provide an important opportunity for discussion among the health care community, who may be in the best position of all to instruct policymakers about prioritizing issues and advocate for preventive interventions. They can also help to inform patients about links between their environment and health.

#### *References:*

- WHO. Guide and instructions for the implementation of the Green Page Environmental Health Diagnostics. *Geneva, World Health Organization, Children's Environmental Health* ([www.who.int/ceh/capacity/greenpageguidelinesmarch2007.pdf](http://www.who.int/ceh/capacity/greenpageguidelinesmarch2007.pdf) - accessed December 2009).
- WHO. Capacity Building. *Geneva, World Health Organization, Children's Environmental Health* ([www.who.int/ceh/capacity/en/](http://www.who.int/ceh/capacity/en/) - accessed December 2009).

## Children's Environmental Health Indicators

### NEW DATA FOR INDICATORS (AND PROVIDERS)

- ❖ Modifications to surveys, national and local systems
- ❖ Integrate indicators into existing child health reporting systems
- ❖ Incorporate training on health and environment into medical and nursing education
- ❖ Environmental exposure history ("the Green Page")

The form is titled "CHILDREN'S ENVIRONMENTAL INFORMATION - GREEN PAGE" and includes the following sections:

- Parent's name:** [ ] Address: [ ] Date: [ ] Care record identifier: [ ]
- Sex:** [ ] Date of birth: [ ] Professional recording date (year & month): [ ]
- Where does the child live?** Living environment: [ ] Other data: [ ]
- Is father working?** Rural: [ ] Urban: [ ]
- BUILDING:** [ ]
- WATER QUALITY:** [ ]
- AIR QUALITY:** [ ]
- SOIL TYPE AND SOILS:** [ ]
- INDUSTRY:** [ ]
- TRAFFIC:** [ ]
- WATER:** [ ]
- WASTE:** [ ]

Below these sections are several paragraphs of text with lines for notes, such as "Does the mother/caregiver express concerns about the environment? Which ones? Why?" and "Are there any well-known environmental risk factors in the area? Which ones?"

WHO

WORLD HEALTH ORGANIZATION

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Where data is lacking, we need to think about new sources of information. As indicators are adopted and developed, we have the opportunity to add questions to existing surveys and reporting systems.

The incorporation of training on health and the environment into medical and nursing curricula is another "long-term" solution.

Health care providers can play a key role in gathering new data in the short-term, and for the benefit of individual patients. An immediately applicable solution is taking an *environmental exposure history*, or Green Page. This is one way in which health professionals can learn and apply basic environmental health concepts immediately. A careful and detailed exposure history will allow health personnel to recognize, assess, manage and prevent diseases linked to the environment in children.

#### Reference:

•WHO. Guide and instructions for the implementation of the Green Page Environmental Health Diagnostics. Geneva, World Health Organization, *Children's Environmental Health* ([www.who.int/ceh/capacity/greenpageguidelinesmarch2007.pdf](http://www.who.int/ceh/capacity/greenpageguidelinesmarch2007.pdf), accessed December 2009).

Picture: WHO

## Children's Environmental Health Indicators

### THE GREEN PAGE

- ❖ Describes a child's known or possible environmental exposures
- ❖ Builds capacity for healthcare professionals
- ❖ Provides a basis for alerting authorities to environmental problems that need to be corrected
- ❖ Provides information about positive effects of the environment

CHILDREN'S ENVIRONMENTAL INFORMATION: "GREEN PAGE" (Child Information)			
Patient's name:		Address:	Date: _____ Case record (number): _____
Sex:	Date of birth:	Professional recording data (name & position)	
With whom does the child live?		Living environment:	Other data:
Is he/she working?		- Rural - Urban - Peri-Urban	
<b>BUILDING:</b> - Home - School or child care - Recreation place - Community - GEOGRAPHICAL AREA			
FOOD			
AIR QUALITY			
WATER QUALITY			
SOIL TYPE AND QUALITY			
EXCRETA DISPOSAL			
SOLID WASTE DISPOSAL			
NOISE			
CHEMICALS			
TRAFFIC			
Does the mother/care giver express concern about the environment? Which one? Why?			
Are there any well-known environmental risk factors in the area? Which one?			
Mother's and father's occupation			
Is there exposure to venomous/poisonous animals?			
Are there pet animals or farms and in the surroundings? Which one?			
Are there vectors of disease? Which one?			
Is there exposure to extreme temperatures? Describe			
Has the child suffered fire-related injuries or other? Describe			
Has the child been exposed to chemical incidents? Describe			
Has the child had poisoning due to chemicals and/or food poisoning? Describe			
Observation (other relevant information)			

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1

The Green Page is a new tool that forms part of the clinical history and can be used in symptomatic and asymptomatic patients. It adds a new element to the medical record: a description of the environment that surrounds the child, exposure characteristics (real or potential) and its possible effects.

In addition, it allows medical personnel to become aware of the environment that children live in, and that of the mothers, fathers, families and communities. This kind of information improves clinical service for the child. It also builds the capacity of healthcare professionals responsible for the well-being of children, and alerts the authorities about those environmental situations that need to be corrected or mediated.

#### Reference:

•Guide and instructions for the implementation of the Green Page Environmental Health Diagnostics. Geneva, World Health Organization, *Children's Environmental Health* ([www.who.int/ceh/capacity/greenpageguidelinesmarch2007.pdf](http://www.who.int/ceh/capacity/greenpageguidelinesmarch2007.pdf), accessed December 2009).

Picture: WHO

## Children's Environmental Health Indicators

### THE GREEN PAGE

- ❖ Instrument for recording a child's environmental conditions
- ❖ Aids the healthcare provider in assessing the underlying cause of disease
- ❖ Identifies the most vulnerable patients and groups
- ❖ Records a history of exposure
- ❖ Captures new data for use in indicators

CHILDREN'S ENVIRONMENTAL INFORMATION: "GREEN PAGE" (Form No. 10)			
Patient's name:	Address:	Date:	Case record number:
Sex:	Date of birth:	Professional recording data (name & position)	
With whom does the child live?	Living environment:	Other data:	
Is he/she working?	- Rural - Urban - Peri-urban		
BUILDING:			
- Home			
- School or child care			
- Recreation place			
- Community			
GEOGRAPHICAL AREA			
FOOD			
AIR QUALITY			
WATER QUALITY			
SOIL TYPE AND QUALITY			
EXCRETA DISPOSAL			
SOLID WASTE DISPOSAL			
NOISE			
CHEMICALS			
TRAFFIC			
Does the mother/care giver express concern about the environment? Which ones? Why?			
Are there any well-known environmental risk factors in the area? Which ones?			
Mother's and father's occupation			
Is there exposure to venomous/poisonous animals?			
Are there pet animals at home and in the surroundings? Which ones?			
Are there vectors of disease? Which ones?			
Is there exposure to extreme temperatures? Describe			
Has the child suffered fire-related injuries or other? Describe			
Has the child suffered fire-related injuries or other? Describe			
Has the child been exposed to chemical incidents? Describe			
Has the child had poisoning due to chemicals and/or food poisoning? Describe			
Observation (other relevant information)			

WHO

WORLD HEALTH ORGANIZATION

1

The Green Page is an instrument for the harmonious recording of information about the child's environmental conditions in all the places where the child's life develops. The Green Page allows the healthcare professional to engage in environmental diagnostics, to characterize positive or negative factors and to detect the most vulnerable individuals or groups (for example, children living in poverty; children living in marginalized zones or in settlements with no basic sanitation infrastructure, or children exposed to pesticides).

In cases where a child is ill, documentation of the environmental conditions provides the elements to suggest or establish, if present, an environmental etiology.

The periodical registry of the Green Page allows for a longitudinal view of the environment and the environmental history of an individual patient. These environmental diagnostic records will allow the identification of possible antecedents and emergent clinical causes that may be expressed later, during adolescence and adulthood.

Finally the Green Page may be used to construct environmental health indicators.

Detailed information on the green page, and how to use it, is available at WHO's website.

#### Reference:

- WHO. Guide and instructions for the implementation of the Green Page Environmental Health Diagnostics. Geneva, World Health Organization, Children's Environmental Health ([www.who.int/ceh/capacity/greenpageguidelinesmarch2007.pdf](http://www.who.int/ceh/capacity/greenpageguidelinesmarch2007.pdf), accessed December 2009).

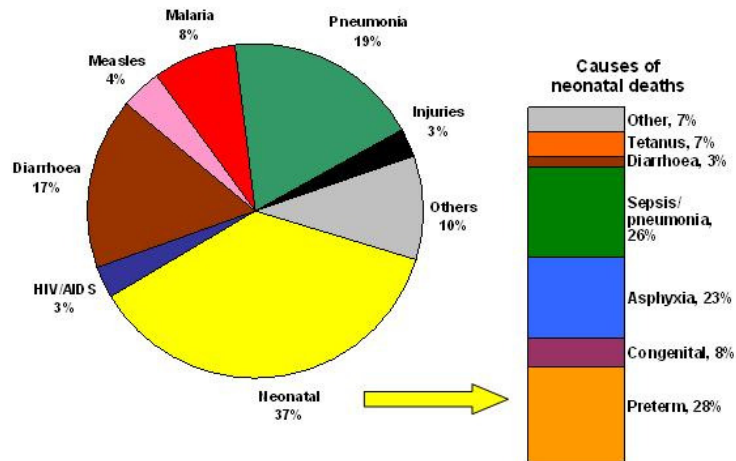
Picture: WHO

**OUTLINE OF THE PRESENTATION**

- I. Introduction and background
- II. **Children's Environmental Health Indicators**
- III. Examples of indicators in action

## Children's Environmental Health Indicators

Major causes of death among children under 5 years of age and neonates in the world, 2000-2003



WHO, Child and Adolescent Health.

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By selecting what to measure, we also set priorities. The CEHI initiative has selected five categories of diseases based on the global burden of disease among children. These are the five major environmental causes of death or illness among children—and thus the areas we need to focus on at the global level:

1. Perinatal Diseases
2. Respiratory Diseases
3. Diarrhoeal Diseases
4. Insect-Borne Diseases
5. Physical Injuries

Together, these five disease areas kill 10 million children each year. Over 98% of these deaths occur in the developing world. Environmental health priorities are regional, according to the predominant issues in each region.

Indicators have been developed around these five major categories.

### References:

- ❖ Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.
- ❖ WHO. Overview of Child Health and Development. Geneva, World Health Organization, Child and Adolescent Health. ([www.who.int/child-adolescent-health/OVERVIEW/CHILD\\_HEALTH/child\\_epidemiology.htm](http://www.who.int/child-adolescent-health/OVERVIEW/CHILD_HEALTH/child_epidemiology.htm) - accessed December 2009).

## Children's Environmental Health Indicators

### WHO's Children's Environmental Health Indicator initiative has adopted a set of 46 Children's Environmental Health Indicators



WHO

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The Global Initiative on Children's Environmental Health Indicators has adopted a set of 46 Children's Environmental Health Indicators. The list of indicators is provisional, and may not capture all aspects of children's environmental health as knowledge about the links between the environment and children's health is always changing. Also, not all indicators are likely to be relevant in all areas.

#### *Reference:*

❖ Briggs D. *Making a Difference: Indicators to Improve Children's Environmental Health.* Geneva, World Health Organization, 2003.

*Picture: WHO/Armando Waak*

## Children's Environmental Health Indicators

### 1. PERINATAL DISEASES

Contexts	Exposures	Health outcomes	Actions
<ul style="list-style-type: none"> <li>❖ Children aged 0-14 years living in poverty</li> </ul>	<ul style="list-style-type: none"> <li>❖ Famine risk</li> <li>❖ People living in informal settlements</li> <li>❖ Women of childbearing age who are malnourished</li> <li>❖ Women of childbearing age working in unregulated workplaces</li> <li>❖ Births to mothers living in unsafe or hazardous housing</li> </ul>	<ul style="list-style-type: none"> <li>❖ Perinatal mortality rate</li> <li>❖ Intrauterine growth retardation in newborn children</li> <li>❖ Congenital malformations requiring surgical correction in children under 1 year of age</li> </ul>	<ul style="list-style-type: none"> <li>❖ Women of childbearing age within one hour's travel of specialist maternity and perinatal care</li> <li>❖ Attributable change in number of households lacking basic services</li> <li>❖ Prevalence of stunting in children aged 0-4 years</li> </ul>

Briggs 2003

42

Perhaps more than during any other time in their lives, children are at risk during the period immediately prior to, and soon after, birth. Perinatal diseases consequently represent one of the major causes of loss of life and illness amongst children worldwide.

*Reference:*

❖ Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

### 2. RESPIRATORY DISEASES

Contexts	Exposures	Health outcomes	Actions
<ul style="list-style-type: none"> <li>❖ Children aged 0-14 years living in poverty</li> </ul>	<ul style="list-style-type: none"> <li>❖ Children aged 0-14 years living in unsafe, unhealthy or hazardous housing</li> <li>❖ Overcrowding</li> <li>❖ Children aged 0-14 years living in proximity to heavily trafficked roads</li> <li>❖ Mean annual exposure of children aged 0-4 years to atmospheric particulate pollution</li> <li>❖ Children aged 0-4 years living in households using biomass fuels or coal as the main source of heating and cooking</li> <li>❖ Children aged 0-14 years living in households in which at least one adult smokes on a regular basis</li> </ul>	<ul style="list-style-type: none"> <li>❖ Intrauterine growth retardation in newborn children</li> <li>❖ Mortality rate for children aged 0-4 years of age due to acute respiratory illness</li> <li>❖ Morbidity rate for children aged 0-4 years due to acute respiratory illness</li> <li>❖ Prevalence of chronic respiratory illnesses in children aged 0-14 years</li> </ul>	<ul style="list-style-type: none"> <li>❖ Attributable change in tobacco consumption</li> <li>❖ Attributable change in atmospheric pollutant concentrations</li> <li>❖ Attributable change in numbers of households relying on biomass fuels or coal as the main source of heating and cooking</li> </ul>

Briggs 2003 43

After perinatal diseases, respiratory illness represents the most important source of ill-health and mortality among young children. The main component of this burden comes from acute respiratory infection, both by viruses and bacteria.

Given effective and well-resourced systems of health care, these diseases need rarely be fatal. In the developing world, however, lack of adequate care or poor access to the available care mean that death is all too common. Globally, respiratory diseases account for more than 2 million deaths each year among children under five, the overwhelming proportion in developing countries.

*Reference:*

❖Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

### 3. DIARRHOEAL DISEASES

Contexts	Exposures	Health outcomes	Actions
❖ Children aged 0-14 years living in poverty	<ul style="list-style-type: none"> <li>❖ Drinking water supplies failing national microbiological water quality standards</li> <li>❖ People living in informal settlements</li> <li>❖ Children aged 0-14 years living in disaster-affected areas</li> <li>❖ Children aged 0-14 years living in households without basic services for water supply, sanitation and hygiene</li> </ul>	<ul style="list-style-type: none"> <li>❖ Diarrhea mortality rate in children aged 0-4 years</li> <li>❖ Diarrhea morbidity rate in children aged 0-4 years</li> <li>❖ Recurrence rate of outbreaks of diarrhoeal disease amongst children aged 0-4 years</li> </ul>	<ul style="list-style-type: none"> <li>❖ Attributable change in the number of households lacking basic services</li> <li>❖ Attributable change in number of food outlets failing food hygiene standards</li> <li>❖ Children aged 0-4 years able to obtain rehydration therapy within 24 hours of need</li> </ul>

Briggs 2003

44

Diarrhoeal diseases are a worldwide problem. Like most other diseases of children, however, they are far more prevalent in the developing world than in developed countries. Children below the age of five are especially susceptible.

*Reference:*

❖ Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

### 4. INSECT-BORNE DISEASES

Contexts	Exposures	Health outcomes	Actions
<ul style="list-style-type: none"> <li>❖ Population growth rate in areas endemic for insect-borne diseases</li> </ul>	<ul style="list-style-type: none"> <li>❖ Total area of insect vector habitats</li> <li>❖ Children aged 0-14 years living in households providing suitable conditions for insect-borne disease transmission</li> <li>❖ Children aged 0-14 years living in areas endemic for insect-borne diseases</li> </ul>	<ul style="list-style-type: none"> <li>❖ Mortality rate of children aged 0-4 years due to insect-borne diseases</li> <li>❖ Prevalence of insect-borne diseases in children aged 0-14 years</li> </ul>	<ul style="list-style-type: none"> <li>❖ At-risk children aged 0-14 years covered by effective, integrated vector control and management systems</li> </ul>

Briggs 2003

45

A wide range of insect-borne diseases threaten children. Dengue, onchocerciasis, leishmaniasis and sleeping sickness all take a large toll, though for children by far the greatest cause for concern is malaria. Today, even after decades of control and eradication campaigns, malaria is still endemic in about one fifth of the world. Some two billion people are at risk; as many as 300 million young children may be infected, of whom almost 1 million die annually.

Many of these diseases are the result of complex transmission pathways, often involving a range of different carriers and hosts. The prevalence of various diseases varies greatly from one part of the world to another, so regionally specific indicators need to be defined to reflect the particular disease of concern and its transmission pathways. Here, the focus is on outlining generic indicators that have widespread use. These can and should be adapted locally as needed.

*Reference:*

❖Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

### 5. PHYSICAL INJURIES

Contexts	Exposures	Health outcomes	Actions
<ul style="list-style-type: none"> <li>❖ Children aged 0-14 years living in poverty</li> </ul>	<ul style="list-style-type: none"> <li>❖ People living in informal settlements</li> <li>❖ Children aged 0-14 years living in disaster-affected areas</li> <li>❖ Children aged 0-14 years living in proximity to heavily trafficked roads</li> <li>❖ Children aged 0-14 years involved in routine employment</li> <li>❖ Children aged 0-14 years living in unsafe, unhealthy or hazardous housing</li> <li>❖ Children aged 0-14 years living in homes lacking access to a piped water supply</li> </ul>	<ul style="list-style-type: none"> <li>❖ Mortality rate of children aged 0-14 years due to physical injuries</li> <li>❖ Incidence of physical injuries to children aged 0-14 years requiring treatment</li> </ul>	<ul style="list-style-type: none"> <li>❖ Children aged 0-14 years living within reach of specialist emergency medical services</li> <li>❖ Attributable change in physical injuries to children aged 0-14 years</li> </ul>

Briggs 2003

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Injuries occur for many reasons and take many forms. They include drowning, road accidents, falls, burns, accidental poisonings, and injury as a consequence of natural events such as earthquakes or storms. Often these may seem to be chance occurrences. In the case of some natural disasters, this may be true.

However, more often there are deeper social or environmental factors that put children at risk of injury by accident. Avoidable risk factors include poor housing, lack of adequate play space, child labour, and exposure to wastes and chemicals.

Reducing risks of unintentional injuries is therefore largely a matter of effective planning and education: planning to create environments in which children can live and play in safety; and education to help them and the adults on whom they rely to better understand the hazards that exist.

*Reference:*

❖ Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

### CHOOSING FROM THE LIST

- ❖ MEME model highlights important issues
- ❖ Regionally defined health priorities
- ❖ Regionally defined criteria

Scientific Criteria	Utility and Practicality Criteria
<ul style="list-style-type: none"><li>❖ Credible</li><li>❖ Sensitive to change</li><li>❖ Consistent and comparable over space &amp; time</li><li>❖ Robust</li><li>❖ Representative of the conditions of concern</li><li>❖ Accurate</li><li>❖ Scalable</li></ul>	<ul style="list-style-type: none"><li>❖ Relevant to the issue</li><li>❖ Actionable</li><li>❖ Understandable to the user</li><li>❖ Timely</li><li>❖ Specific to the issue of concern</li><li>❖ Measurable</li><li>❖ Cost-effective</li></ul>

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By selecting what to measure, we also set priorities. The burden of disease is different for each country and even regions or groups of people within countries. Indicators should be selected according to local health priorities.

Models such as the MEME model help us depict the components of a health issue that might prove informative if they were measured using an indicator.

Criteria for choosing which indicators to collect should also be regionally defined according to local needs, priorities, and resources. The six criteria in bold were used in the development of the children's environmental health initiative we are discussing today.

What indicators are relevant to your practice?

*Reference:*

- ❖ Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

**OUTLINE OF THE PRESENTATION**

- I. Introduction and background**
- II. Children's Environmental Health Indicators**
- III. Examples of indicators in action**

**EXAMPLE 1**

**LOW BIRTH WEIGHT**

<<NOTE TO USER: This module contains six separate examples of indicators as applied to a health issue:

1. Low birth weight
2. Acute respiratory infection
3. Cholera infection
4. Malaria infection
5. Road traffic injuries
6. Lead in children's blood

You should select the one example most relevant to your audience, and remove the others.>>

## Children's Environmental Health Indicators

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WHO

### **INDICATORS IN ACTION: LOW BIRTH WEIGHT**

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We will examine the use of children's environmental health indicators as applied to the issue of low birth weight.

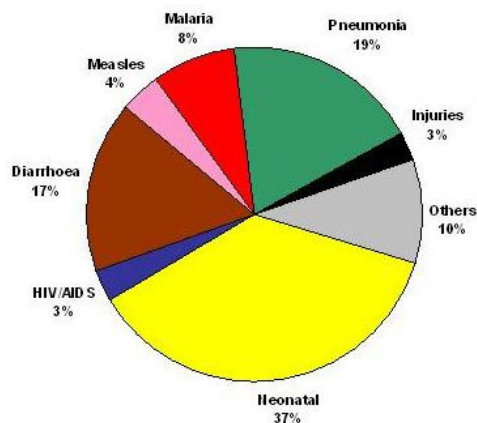
*Picture: WHO*

## Children's Environmental Health Indicators

### THE GLOBAL BURDEN OF DISEASE

Five main disease areas:

1. Perinatal Diseases
2. Respiratory Diseases
3. Diarrhoeal Diseases
4. Insect-Borne Diseases
5. Physical Injuries



WHO, Child and Adolescent Health.

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Perhaps more than at any other time, children are at risk during the period immediately prior to, and soon after, birth. Perinatal disease represent one of the major causes of loss of life and illness amongst children world-wide.

Infants weighing less than 2,500 g (5.5 lbs) are approximately 20 times more likely to die than heavier babies. Low birthweight is a very important risk factor for pneumonia, inhibited growth and cognitive development, and chronic disease later in life. Weight at birth is therefore used to identify people at risk for adverse health outcomes in infancy and adulthood.

Primary health care providers help ensure a healthy start in life for children by making certain that women commence pregnancy healthy and well nourished, and go through pregnancy and childbirth safely.

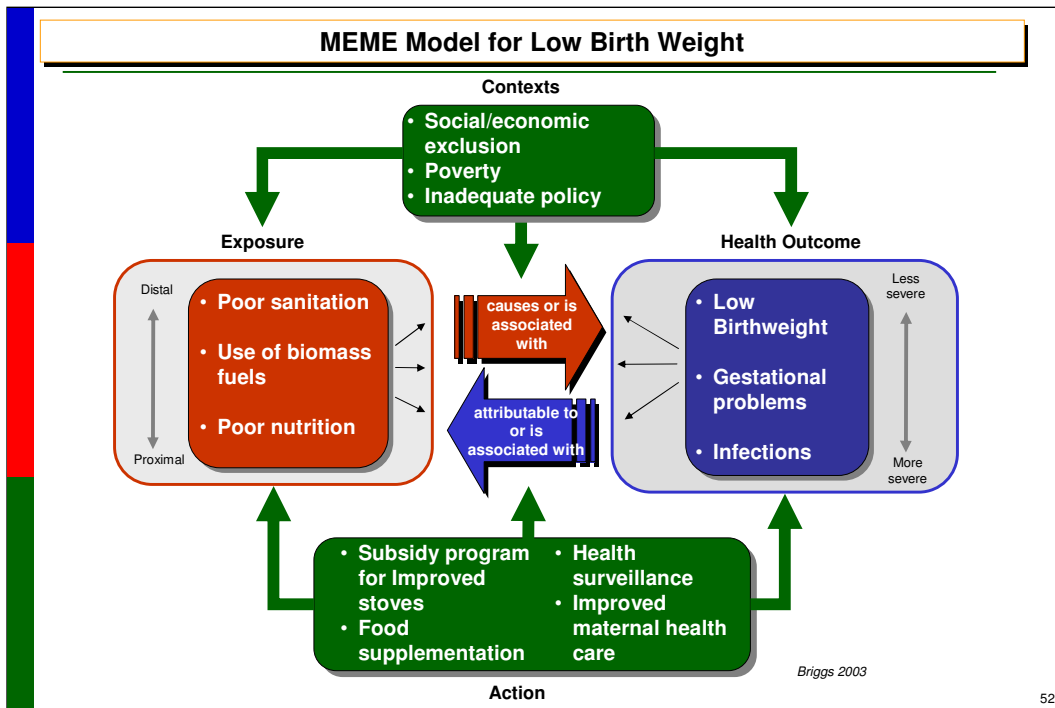
A baby's low weight at birth is either the result of preterm birth (before 37 weeks of gestation) or due to restricted fetal (intrauterine) growth.

**<<NOTE TO USER: Birthweight is defined by WHO as the first weight of the fetus or newborn obtained after birth. For live births, birthweight should preferably be measured within the first hour of life, before significant postnatal weight loss has occurred.**

**Low birthweight is defined as a birthweight less than 2,500 g (up to and including 2,499 g).>>**

#### References:

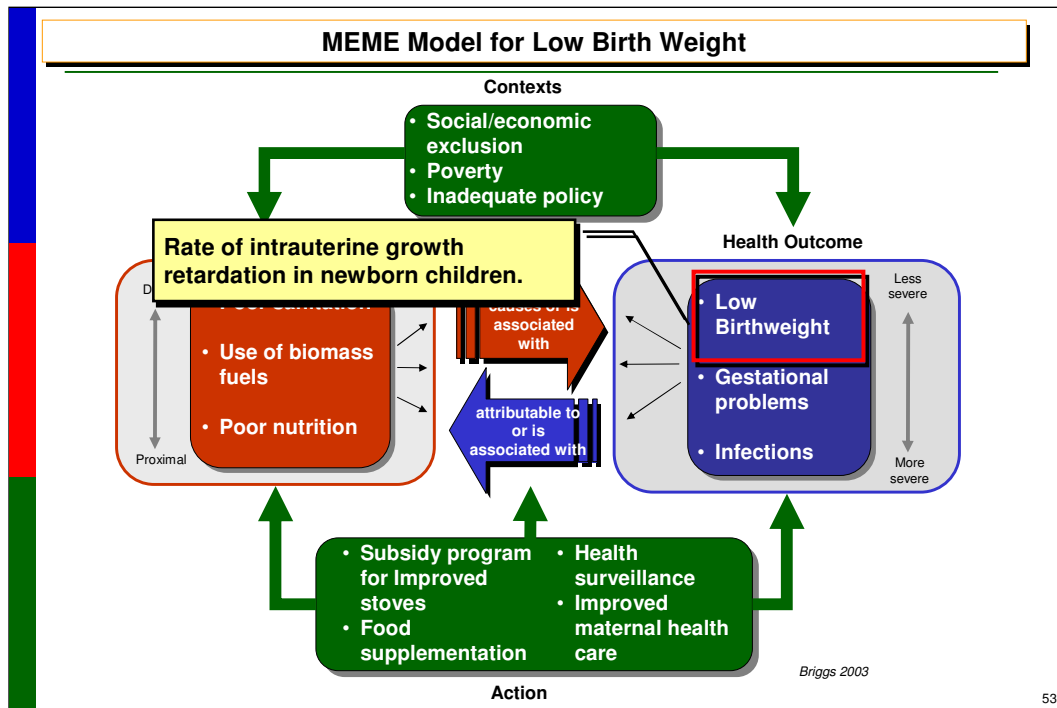
- Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.
- Wardlaw T, et al. Low Birth Weight: Country, regional and global estimates. New York. United Nations Children's Fund and World Health Organization, 2004. ([www.who.int/reproductive-health/publications/low\\_birthweight/low\\_birthweight\\_estimates.pdf](http://www.who.int/reproductive-health/publications/low_birthweight/low_birthweight_estimates.pdf) - accessed December 2009).
- WHO. Overview of Child Health and Development. Geneva, World Health Organization, Child and Adolescent Health. ([www.who.int/child-adolescent-health/OVERVIEW/CHILD\\_HEALTH/child\\_epidemiology.htm](http://www.who.int/child-adolescent-health/OVERVIEW/CHILD_HEALTH/child_epidemiology.htm) - accessed December 2009).



The first step is to think about the issue of low birthweight in terms of the context, exposure, action and health outcome. It is helpful to complete the MEME model to guide our thinking.

*Reference:*

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

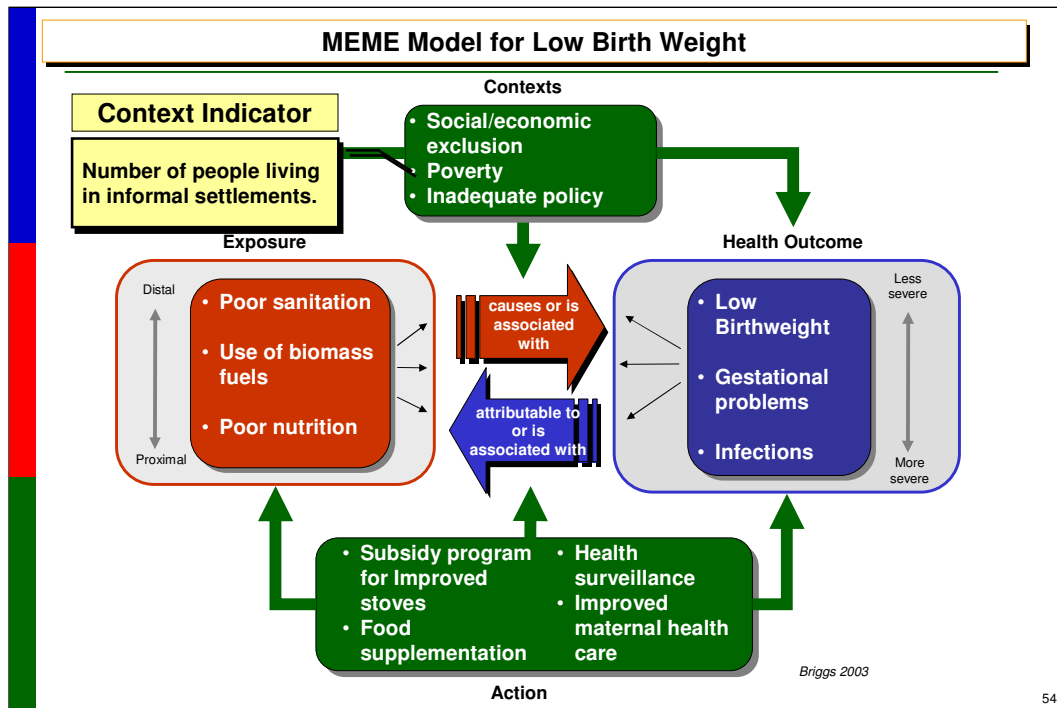


Low birthweight is a health outcome. We can measure the change in this outcome by using an indicator of the health outcome itself, such as: the rate of intrauterine growth retardation in newborn children. In this case, we are measuring the number of babies born at full-term who are under 2500g.

Information for this indicator might come from reporting by health care providers, who should weigh babies at birth. It tells us who is most at risk for adverse health outcomes in infancy and later in life. This indicator also tells us the magnitude of the problem in a given area or group of people, and we can use it to compare to other areas and issues to assess what our priorities for intervention should be.

*Reference:*

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.



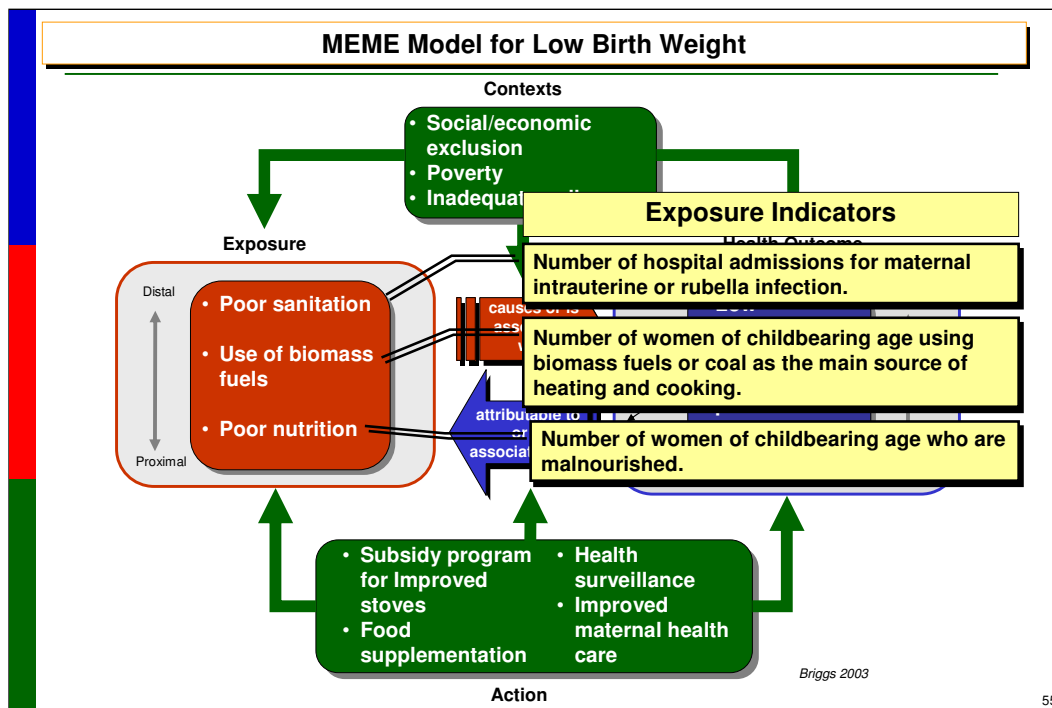
Many factors affect the duration of gestation and fetal growth, and thus, the birthweight. They relate to the infant, the mother, or the physical environment and play an important role in determining the birthweight and the future health of the infant.

As healthcare practitioners and policy makers, we want to know more about the problem than simply how many children have it. Knowing more about the contextual factors in this outcome will tell us what approaches would be most effective. Knowing which mothers are most at risk for having low birthweight babies can help us identify what mothers might benefit most from preventive treatment, education, or other assistance. This information might also help us track whether more or less children are at risk in a certain area or group of people, or if there have been trends over time. Knowing how the context affects low birthweight can help us target resources more efficiently.

Mothers in deprived socio-economic conditions frequently have low birthweight infants, and birthweight is affected to a great extent by the mother's own fetal growth and her diet from birth to pregnancy. In informal settlements, women are often exposed to these risk factors.

*References:*

- Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.
- Wardlaw T, et al. Low Birth Weight: Country, regional and global estimates. New York. United Nations Children's Fund and World Health Organization. 2004. ([www.who.int/reproductive-health/publications/low\\_birthweight/low\\_birthweight\\_estimates.pdf](http://www.who.int/reproductive-health/publications/low_birthweight/low_birthweight_estimates.pdf) - accessed December 2009).



Next we need to examine what specifically causes low birthweight. In environmental health, there is rarely a direct, one-to-one relationship between the cause or exposure, and the effect or outcome. The MEME model helps by allowing us to list the known exposures and think about them together.

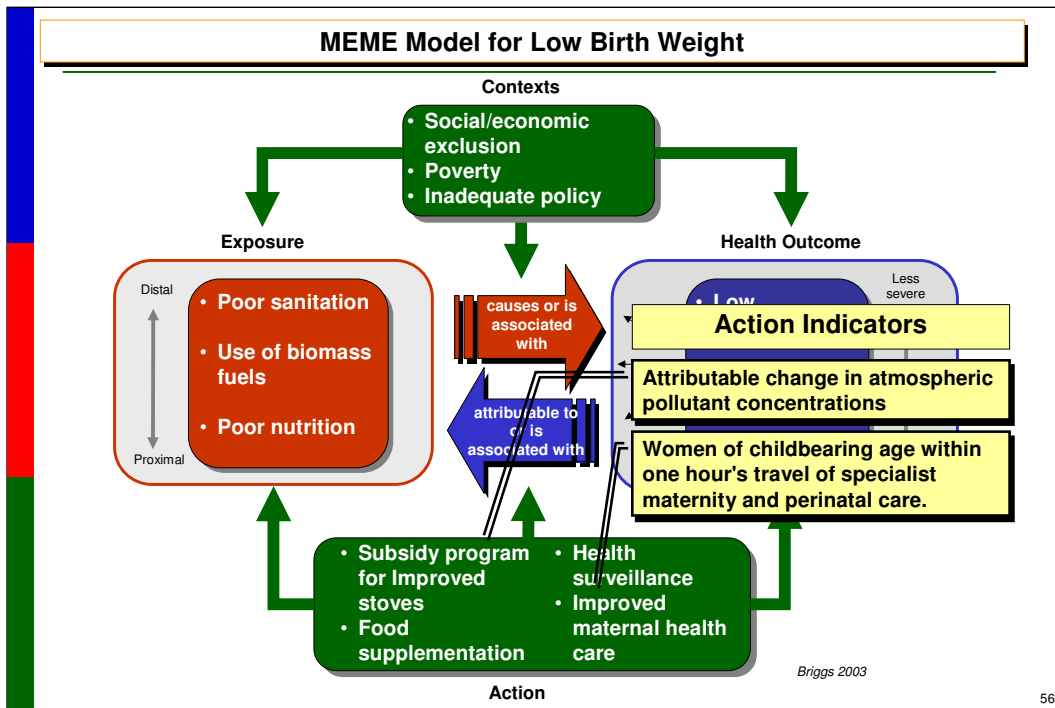
Birthweight is affected to a great extent by the mother's own fetal growth and her diet from birth to pregnancy, and thus, her body composition at conception. In informal settlements and other conditions of poverty, the infant's low birthweight often stems primarily from the mother's poor nutrition and health over a long period of time, including during pregnancy. It may also stem from infections, exacerbated by poor sanitation. Recent evidence suggests that low birthweight is also associated with exposure to smoke from the use of biomass fuels.

As practitioners, this information can be useful as we provide care for expectant mothers—they tell us what questions to ask about exposures. The indicators can tell us what exposures are common in a specific area or group of people.

As policymakers, the indicator data can tell us whether it would be more efficient to invest in sanitation, improved stoves, or a food supplement program. This information might also help us track whether more mothers are at risk in a certain area or group of people, or if there have been trends over time. It might tell us whether previous efforts have done anything to change the exposure levels, even before we can see effects in the health outcomes. Knowing what environmental exposures are associated with low birthweight can help us target resources more efficiently.

#### References:

- Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.
- Wardlaw T, et al. Low Birth Weight: Country, regional and global estimates. New York. United Nations Children's Fund and World Health Organization. 2004. ([www.who.int/reproductive-health/publications/low\\_birthweight/low\\_birthweight\\_estimates.pdf](http://www.who.int/reproductive-health/publications/low_birthweight/low_birthweight_estimates.pdf) - accessed December 2009).



This final portion of the model tells us what actions might be effective in improving the health outcomes of newborns. The information reported by these indicators can tell us what interventions have worked, and what secular trends might be changing outcomes. As policymakers, this is valuable information for setting priorities for future action. As practitioners, this information is useful for evaluating what the potential effect of your interventions might be.

*Reference:*

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

Indicator	Policy Uses	Practitioner Uses
<b>Outcome:</b> ❖ Perinatal mortality rate  ❖ Intrauterine growth retardation	❖ Understand magnitude and urgency of problem ❖ Understand how the issue affects different groups ❖ Prioritize issues	❖ Provide information for advocacy on the most important health issues ❖ Provide information for resource planning
<b>Context:</b> ❖ Children aged 0-14 living in poverty	❖ Identify families that would benefit most assistance ❖ Identify at-risk groups ❖ Identify trends over time ❖ Target resources efficiently	❖ Identify mothers at risk for low birthweight and provide preventive action ❖ Identify cases more quickly

Briggs 2003

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Here is an overview of the indicators related to low birthweight and their uses for policymakers and health care providers.

**<<NOTE TO USER: Read the most relevant indicators and uses to your audience.>>**

*Reference:*

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

Indicator	Policy Uses	Practitioner Uses
<b>Exposure:</b> <ul style="list-style-type: none"> <li>❖ Famine risk</li> <li>❖ People living in informal settlements</li> <li>❖ Women of childbearing age who are malnourished</li> <li>❖ Women of childbearing age working in unregulated workplaces</li> <li>❖ Births to mothers living in unsafe or hazardous housing</li> </ul>	<ul style="list-style-type: none"> <li>❖ Identify the most efficient target for intervention to prevent low birthweight</li> <li>❖ Identify groups with highest exposures</li> <li>❖ Identify trends over time</li> <li>❖ Assess whether interventions are working before health outcomes can be measured directly</li> </ul>	<ul style="list-style-type: none"> <li>❖ Identify possible root causes of low birthweight</li> <li>❖ Identify key points for education and action to prevent low birthweight</li> <li>❖ Provide information for advocacy on the most important health issues</li> </ul>

Briggs 2003

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*Reference:*

- Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

Indicator	Policy Uses	Practitioner Uses
<b>Action:</b> <ul style="list-style-type: none"> <li>❖ Women of childbearing age within one hour's travel from a specialist maternity and perinatal health care</li> <li>❖ Attributable change in number of households lacking basic services</li> <li>❖ Prevalence of stunting in children aged 0-4 years</li> </ul>	<ul style="list-style-type: none"> <li>❖ Assess whether interventions are effective</li> </ul>	<ul style="list-style-type: none"> <li>❖ Assess patients' environmental influences to better tailor education and preventive action</li> <li>❖ Provide information for advocacy on the most important health issues</li> </ul>

Briggs 2003

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*Reference:*

- Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

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### DATA AVAILABILITY

- ❖ WHO Data on low birthweight by country:  
[http://www.who.int/reproductive-health/publications/low\\_birthweight/index.html](http://www.who.int/reproductive-health/publications/low_birthweight/index.html)
- ❖ National or local health agency information

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**<<NOTE TO USER: Incorporate information about what data is available to your audience on this health outcome.>>**

Reference:

•Wardlaw T, et al. *Low Birth Weight: Country, regional and global estimates*. New York. *United Nations Children's Fund and World Health Organization*. 2004.  
([www.who.int/reproductive-health/publications/low\\_birthweight/](http://www.who.int/reproductive-health/publications/low_birthweight/) - accessed December 2009).

**EXAMPLE 2**

**ACUTE RESPIRATORY INFECTION**

<<NOTE TO USER: This module contains six separate examples of indicators as applied to a health issue:

1. Low birth weight
2. Acute respiratory infection
3. Cholera infection
4. Malaria infection
5. Road traffic injuries
6. Lead in children's blood

You should select the one example most relevant to your audience, and remove the others.>>

## Children's Environmental Health Indicators

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### INDICATORS IN ACTION: ACUTE RESPIRATORY INFECTION



WHO

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We will examine the use of children's environmental health indicators as applied to the issue of acute respiratory infection in children.

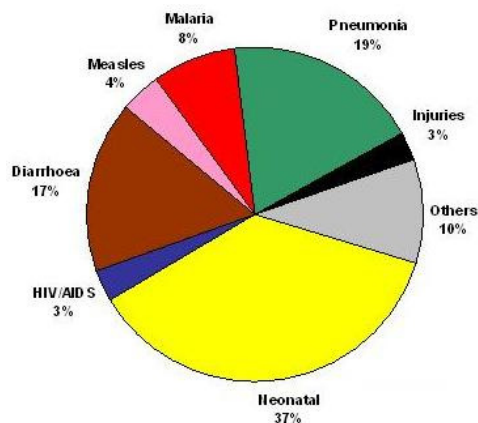
*Picture: WHO*

## Children's Environmental Health Indicators

### THE GLOBAL BURDEN OF DISEASE

Five main disease areas:

1. Perinatal Diseases
2. Respiratory Diseases
3. Diarrhoeal Diseases
4. Insect-Borne Diseases
5. Physical Injuries



WHO, Child and Adolescent Health.

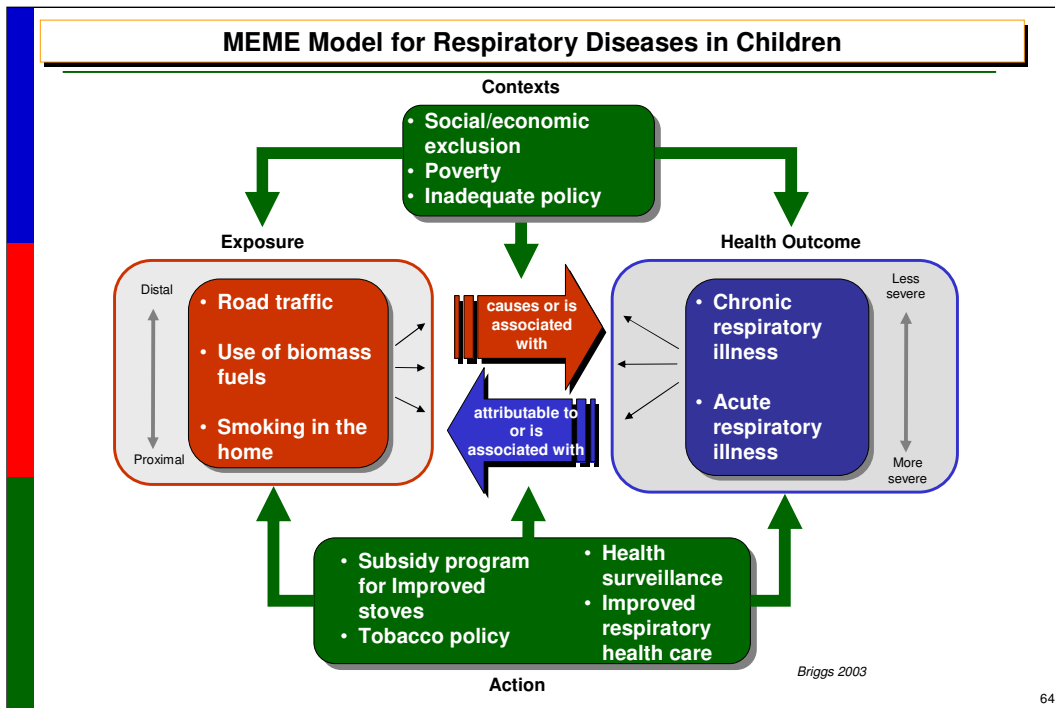
63

Respiratory illness represents the second most important source of ill-health and mortality among young children in the world today. The main component of the disease burden comes from acute respiratory infections (ARI), both by viruses and bacteria. Industrial emissions, emissions from road traffic, and especially the use of biomass fuels and coal for cooking and heating in the home are associated with acute respiratory infection in children. Lack of adequate nutrition can create vulnerability to respiratory infection, and inadequate access to health care services can mean death for a child with a respiratory infection. How can indicators inform us about how to approach this problem?

<<NOTE TO USER: Acute respiratory infection is defined by WHO as being the mothers' perceptions of a child who has a cough, is breathing faster than usual with short, quick breaths or is having difficulty breathing, excluding children that had only a blocked nose. Infection is most often caused by bacterial pneumonia, an infection of the lungs. In early childhood, other risk factors are also important, including respiratory syncytial virus (RSV), para-influenza virus type 3, measles, whooping cough, and acute asthma. However, the specific agent of infection is often not clinically important in acute respiratory infection.>>

#### References:

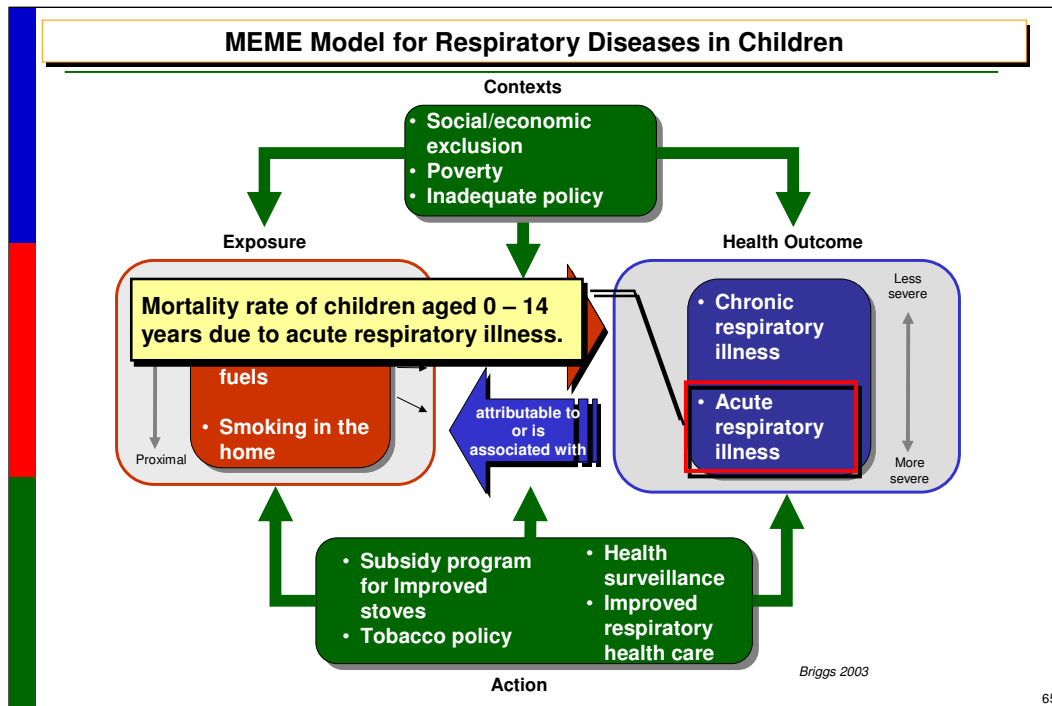
- Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.
- WHO. Indoor Air Pollution. Geneva, Switzerland. World Health Organization. ([www.who.int/indoorair/en/](http://www.who.int/indoorair/en/) - accessed December 2009).
- WHO. World Health Statistics 2007. Geneva, Switzerland. World Health Organization. ([www.who.int/whosis/en/](http://www.who.int/whosis/en/) - accessed December 2009).
- WHO. Overview of Child Health and Development. Geneva, World Health Organization, Child and Adolescent Health. ([www.who.int/child-adolescent-health/OVERVIEW/CHILD\\_HEALTH/child\\_epidemiology.htm](http://www.who.int/child-adolescent-health/OVERVIEW/CHILD_HEALTH/child_epidemiology.htm) - accessed December 2009).



The first step is to think about the issue of acute respiratory infection in terms of the context, exposure, action and health outcome. It is helpful to complete the MEME model to guide our thinking.

*Reference:*

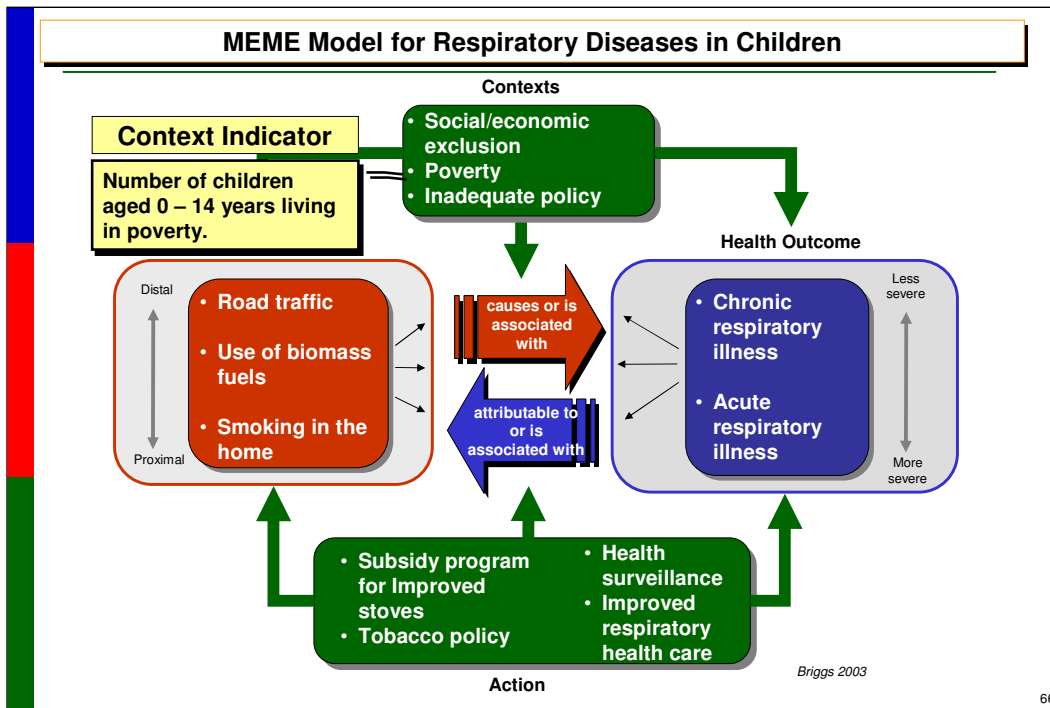
•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.



Acute respiratory infection is a health outcome. We can measure the change in this outcome by using an indicator of the health outcome itself, such as: the mortality rate of children aged 0 – 14 years due to acute respiratory illness. Information for this indicator might come from death records or a national census. It tells us the magnitude of the problem in a given area or group of people, and we can use it to compare to other areas and issues to assess what our priorities for intervention should be.

*Reference:*

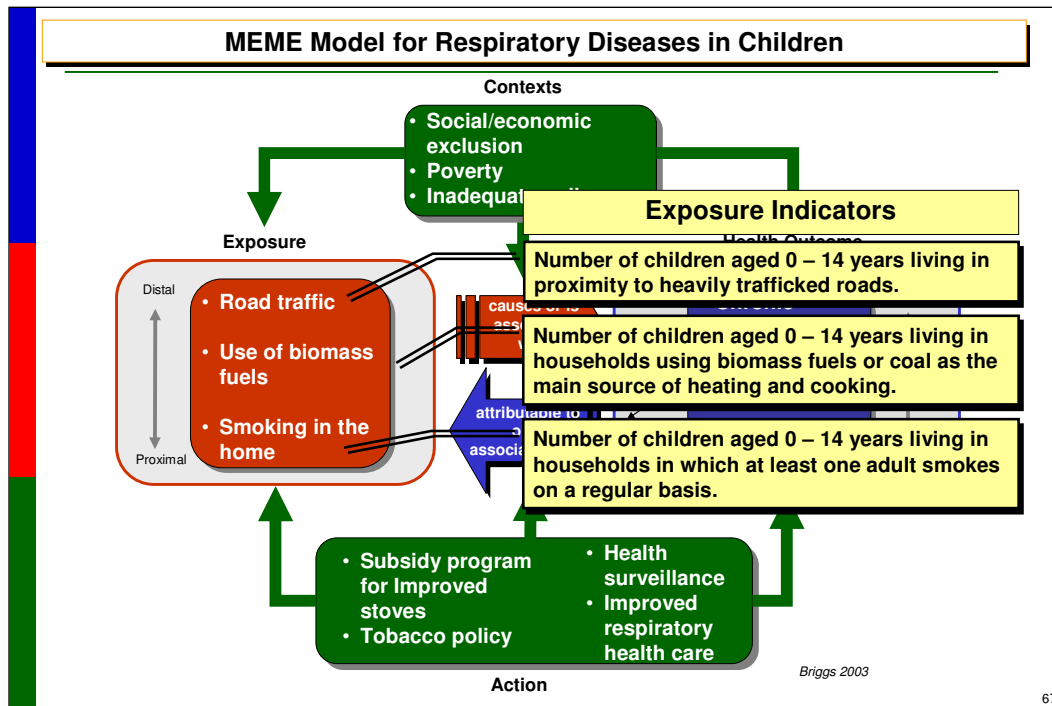
•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.



Knowing more about the contextual factors in this outcome will tell us what approaches would be most effective. Knowing which children are most at risk for acute respiratory infection will help us identify children which families might benefit most from education, aggressive treatment, or other assistance. This information might also help us track whether more or less children are at risk in a certain area or group of people, or if there have been trends over time. Knowing how the context affects acute respiratory infection can help us target resources more efficiently.

*Reference:*

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.



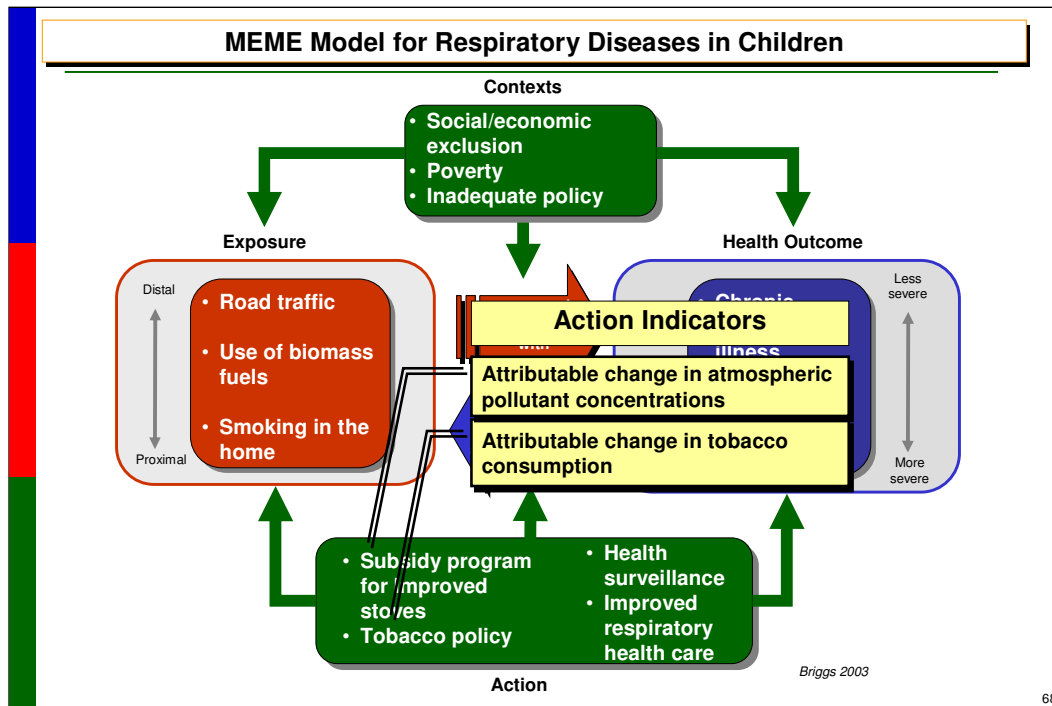
Next we need to examine what specifically causes acute respiratory infection. In environmental health, there is rarely a direct, one-to-one relationship between the cause or exposure, and the effect or outcome. The MEME model helps by allowing us to list the known exposures and think about them together.

This model indicates that children living in homes that use biomass fuels, or have adult smokers, are at higher risk. Living near a heavily trafficked road is also an exposure associated with acute respiratory infection. As practitioners, this information can be useful when we see a child with poor respiratory health—they tell us what questions to ask about exposures. The indicators can tell us what exposures are common in a specific area or group of people.

As policymakers, the indicator data can tell us whether it would be more efficient to invest in traffic calming, improved stoves, or a smoking cessation program. This information might also help us track whether more children are exposed in a certain area or group of people, or if there have been trends over time. It might tell us whether previous efforts have done anything to change the exposure levels, even before we can see effects in the health outcomes of children. Knowing what environmental exposures are associated with acute respiratory infection can help us target resources more efficiently.

*References:*

- Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.
- WHO. Indoor Air Pollution. Geneva, World Health Organization. ([www.who.int/indoorair/en/](http://www.who.int/indoorair/en/) - accessed December 2009).



This final portion of the model tells us what actions might be effective in improving the health outcomes of acute respiratory infection. The information reported by these indicators can tell us what interventions have worked, and what secular trends might be changing outcomes. As policymakers, this is valuable information for setting priorities for future action. As practitioners, this information is useful for evaluating what the potential effect of your interventions might be.

*Reference:*

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

Indicator	Policy Uses	Practitioner Uses
<b>Outcome:</b> Mortality rate of children aged 0 – 14 years due to acute respiratory illness.	<ul style="list-style-type: none"> <li>❖ Understand magnitude and urgency of problem</li> <li>❖ Understand how the issue affects different groups</li> <li>❖ Prioritize issues</li> </ul>	<ul style="list-style-type: none"> <li>❖ Provide information for advocacy on the most important health issues</li> <li>❖ Provide information for resource planning</li> </ul>
<b>Context:</b> Number of children aged 0 – 14 years living in poverty.	<ul style="list-style-type: none"> <li>❖ Identify children whose families might benefit from education or other assistance</li> <li>❖ Identify at-risk groups</li> <li>❖ Identify trends over time</li> <li>❖ Target resources efficiently</li> </ul>	<ul style="list-style-type: none"> <li>❖ Identify risk factors for acute respiratory infection among children</li> <li>❖ Identify children who are at higher risk for preventive action</li> <li>❖ Identify cases more quickly</li> </ul>

Briggs 2003

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Here is an overview of the indicators related to acute respiratory infection and their uses for policymakers and health care providers.

<<NOTE TO USER: Read the most relevant indicators and uses to your audience>>

*Reference:*

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

Indicator	Policy Uses	Practitioner Uses
<p><b>Exposure:</b></p> <ul style="list-style-type: none"> <li>❖ Number of children aged 0 – 14 years living in proximity to heavily trafficked roads.</li> <li>❖ Number of children aged 0 – 14 years living in households using biomass fuels or coal as the main source of heating and cooking.</li> <li>❖ Number of children aged 0 – 14 years living in households in which at least one adult smokes on a regular basis.</li> </ul>	<ul style="list-style-type: none"> <li>❖ Identify the most efficient target for intervention to prevent acute respiratory infection</li> <li>❖ Identify groups with highest exposures</li> <li>❖ Identify trends over time</li> <li>❖ Assess whether interventions are working before health outcomes can be measured directly</li> </ul>	<ul style="list-style-type: none"> <li>❖ Identify possible root causes of acute respiratory infection</li> <li>❖ Identify key points for education and action to prevent acute respiratory infection</li> <li>❖ Provide information for advocacy on the most important health issues</li> </ul>

Briggs 2003

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*Reference:*

- Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

Indicator	Policy Uses	Practitioner Uses
<b>Action:</b> <ul style="list-style-type: none"><li>❖ Attributable change in atmospheric pollutant concentration</li><li>❖ Attributable change in tobacco consumption</li></ul>	<ul style="list-style-type: none"><li>❖ Assess whether interventions are effective</li></ul>	<ul style="list-style-type: none"><li>❖ Assess patients' environmental influences to better tailor education and preventive action</li><li>❖ Provide information for advocacy on the most important health issues</li></ul>

Briggs 2003

### Reference:

- Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

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### DATA AVAILABILITY

- ❖ WHO data on acute respiratory infection by country:  
<http://www.who.int/whosis/en/>
- ❖ WHO data on indoor air pollution burden of disease estimates:  
[http://www.who.int/indoorair/health\\_impacts/burden\\_national/index.html](http://www.who.int/indoorair/health_impacts/burden_national/index.html)
- ❖ National or local health agency information

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<<NOTE TO USER: incorporate information about what data is available to your audience on this health outcome.>>

#### *References:*

- WHO. Children under five years of age with acute respiratory infection and fever (ARI) taken to facility. Geneva, Switzerland. *World Health Organization, World Health Statistics Program*. ([www.who.int/whosis/whostat2006Under5WithARI.pdf](http://www.who.int/whosis/whostat2006Under5WithARI.pdf), accessed December 2009).
- WHO. Indoor Air Pollution. Geneva, World Health Organization. ([www.who.int/indoorair/en/](http://www.who.int/indoorair/en/) - accessed December 2009).

## Children's Environmental Health Indicators

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### EXAMPLE 3

### CHOLERA

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<<NOTE TO USER: This module contains six separate examples of indicators as applied to a health issue:

1. Low birth weight
2. Acute respiratory infection
3. Cholera infection
4. Malaria infection
5. Road traffic injuries
6. Lead in children's blood

You should select the one example most relevant to your audience, and remove the others.>>

## Children's Environmental Health Indicators

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### INDICATORS IN ACTION: CHOLERA INFECTION



WHO

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We will examine the use of children's environmental health indicators as applied to the issue of cholera infection in young children.

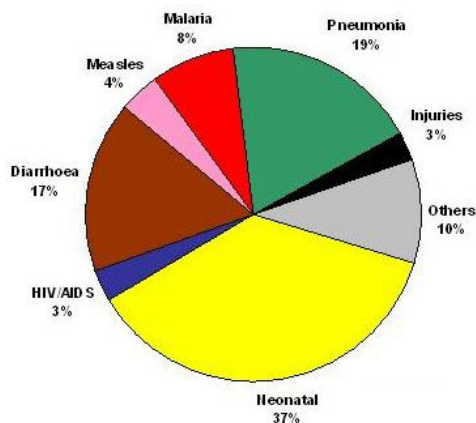
*Picture: WHO*

## Children's Environmental Health Indicators

### THE GLOBAL BURDEN OF DISEASE

Five main disease areas:

1. Perinatal Diseases
2. Respiratory Diseases
3. Diarrhoeal Diseases
4. Insect-Borne Diseases
5. Physical Injuries



WHO, Child and Adolescent Health.

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Diarrhoeal diseases are a worldwide problem. Children under the age of 5 are most susceptible, and among the many forms of disease that they may encounter, by far the most severe in terms of clinical manifestations is cholera infection. Other important causes of diarrhoeal disease include rotavirus, salmonellosis, shigellosis, amoebiasis, and other protozoal and viral intestinal diseases. Many of these diseases can be understood using the same models presented for Cholera here.

Global estimates are that about 1.8 million people die every year from diarrhoeal diseases (including cholera), and 90% are children under 5, mostly in developing countries. Typically, the fraction of diarrhoeal disease attributed to unsafe water, sanitation and hygiene in the industrialized countries is approximately 60%, whereas in developing countries as much as 85-90% of diarrhoeal illness can be attributed to these causes.

How can indicators inform us about how to approach this problem?

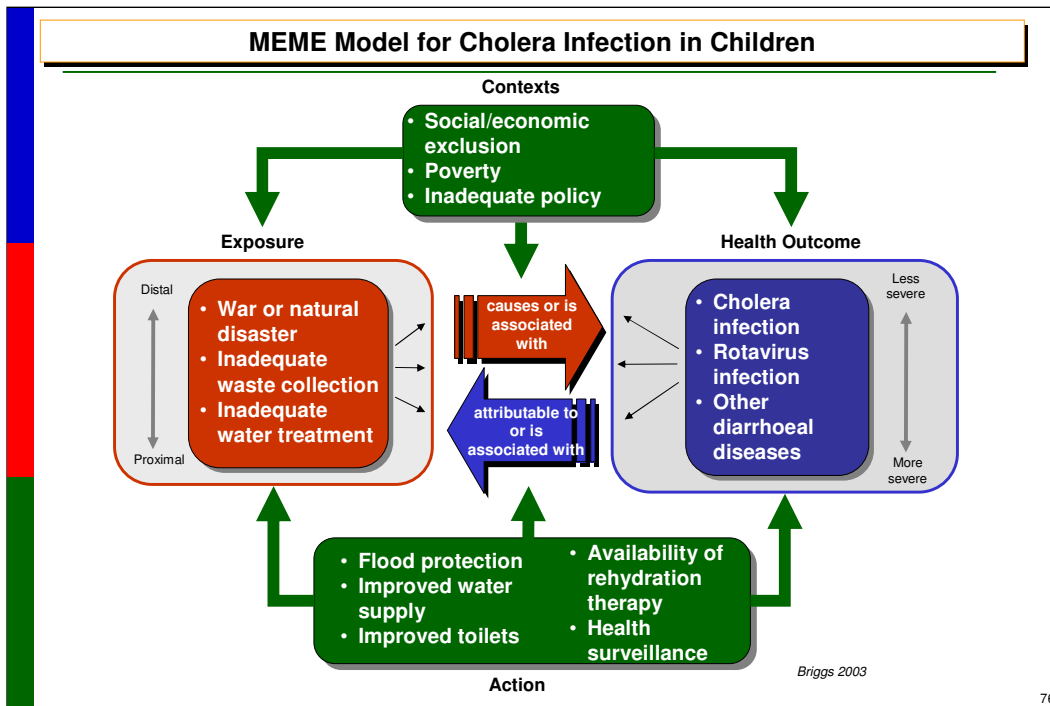
Cholera is an acute intestinal infection caused by ingestion of food or water contaminated with the bacterium *Vibrio cholerae*. It has a short incubation period and produces an enterotoxin that causes a copious, painless, watery diarrhea that can quickly lead to severe dehydration and death if treatment is not promptly given. Vomiting also occurs in most patients.

Most persons infected with *V. cholerae* do not become ill, although the bacterium is present in their feces for 7-14 days. When illness does occur, about 80-90% of episodes are of mild or moderate severity and are difficult to distinguish clinically from other types of acute diarrhea. Less than 20% of ill persons develop typical cholera with signs of moderate or severe dehydration.

Cholera remains a global threat and is one of the key indicators of social development. While the disease no longer poses a threat to countries with minimum standards of hygiene, it remains a challenge to countries where access to safe drinking water and adequate sanitation cannot be guaranteed. Almost every developing country faces cholera outbreaks or the threat of a cholera epidemic.

#### References:

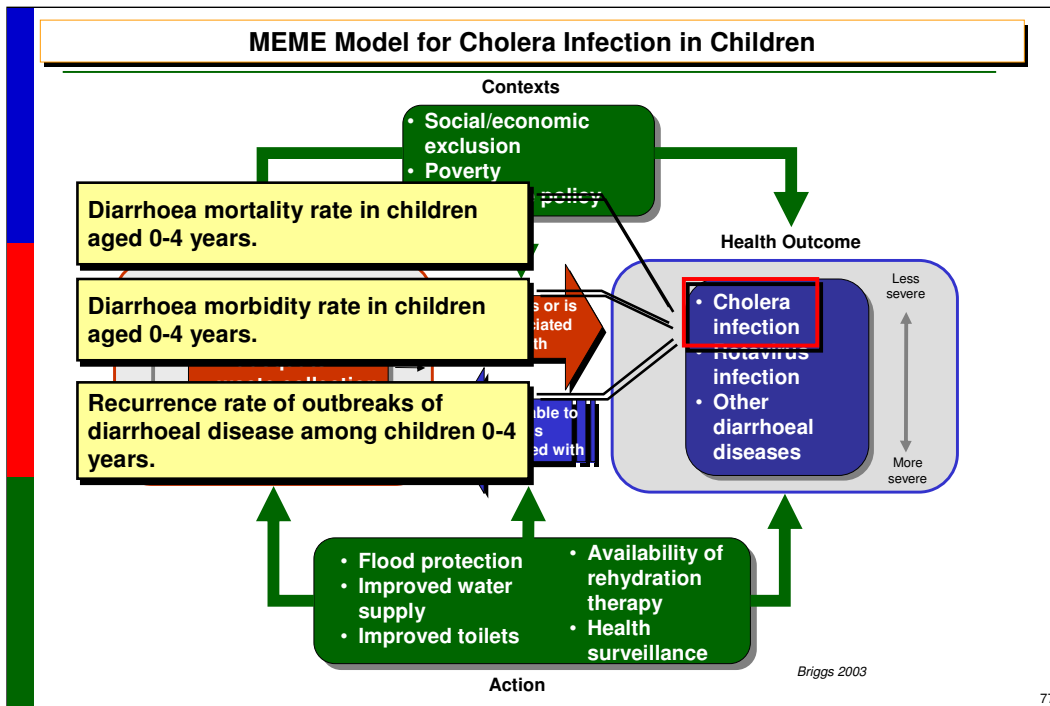
- Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.
- Gordon B, et al. Inheriting the world, the Atlas on Children's Health and the Environment. Geneva, World Health Organization, Myriad Editions Ltd, 2004.
- WHO. The Global Task Force on Cholera Control. Geneva, World Health Organization. ([www.who.int/cholera/en/](http://www.who.int/cholera/en/) - accessed December 2009).
- WHO. Overview of Child Health and Development. Geneva, World Health Organization, Child and Adolescent Health. ([www.who.int/child-adolescent-health/OVERVIEW/CHILD\\_HEALTH/child\\_epidemiology.htm](http://www.who.int/child-adolescent-health/OVERVIEW/CHILD_HEALTH/child_epidemiology.htm) - accessed December 2009).



The first step is to think about the issue of cholera infection in terms of the context, exposure, action and health outcome. It is helpful to complete the MEME model to guide our thinking.

*Reference:*

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

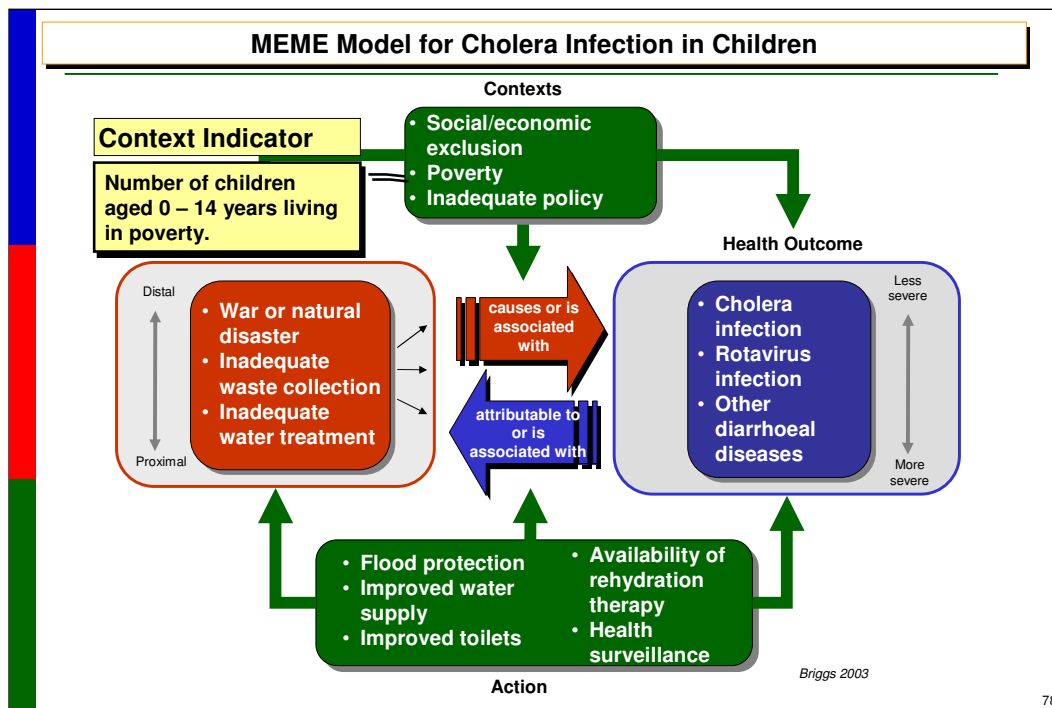


Cholera infection is a health outcome. We can measure the change in this outcome by using an indicator of the health outcome itself, such as: the diarrhoea mortality rate in children aged 0-4 years, or the diarrhoea morbidity rate in children aged 0-4 years.

Information for these indicators might come from death records and healthcare provider reports of diagnosis and treatment. It tells us the magnitude of the problem in a given area or group of people, and we can use it to compare to other areas and issues to assess what our priorities for intervention should be.

*Reference:*

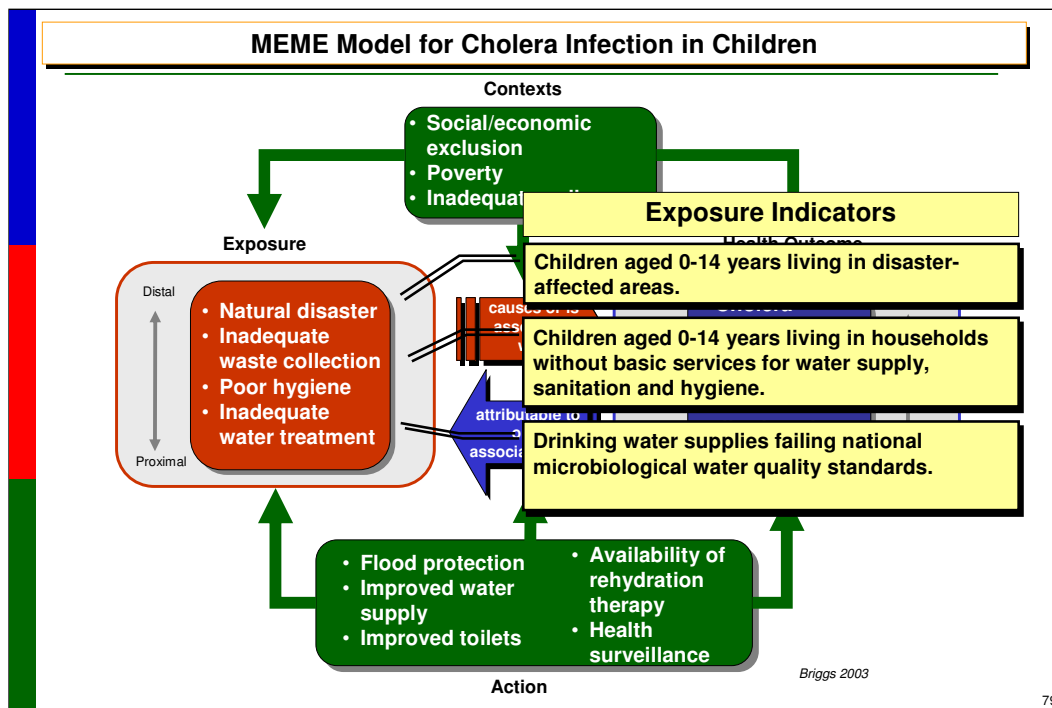
•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.



As healthcare practitioners and policy makers, we want to know more about the problem than simply how many children have it. Knowing more about the contextual factors in this outcome will tell us what approaches would be most effective. Knowing which children are most at risk for cholera infection will help us identify children who might benefit most from preventive interventions such as improved water supply, or education programs. This information might also help us track whether more or less children are at risk in a certain area or group of people, or if there have been trends over time. Knowing how the context affects cholera infection can help us target resources more efficiently.

*Reference:*

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.



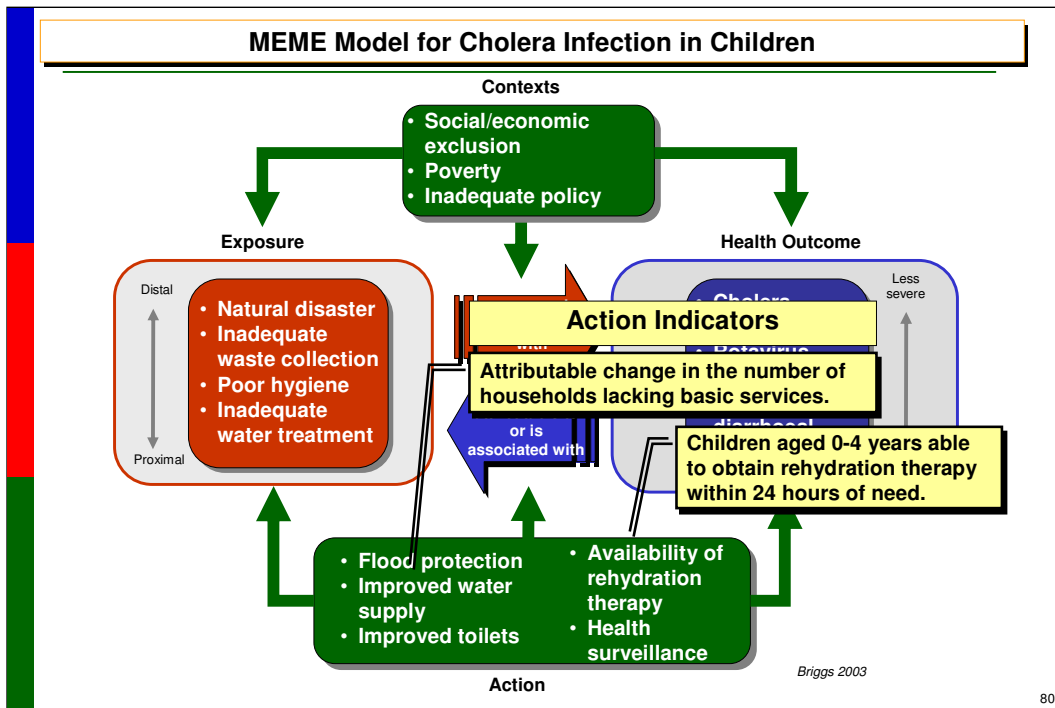
Next we need to examine what specifically causes cholera infection. We know that cholera is directly caused by ingesting the cholera bacteria. But what factors in the environment make some groups so vulnerable to infection? The MEME model helps by allowing us to list the known risk factors and think about them together.

This model indicates that children living in conditions of war or natural disaster, or who do not have access to adequate waste collection or safe water, are at higher risk. Areas in which soap or water for hand-washing is not readily available may impose additional risk. As practitioners, this information can tell us what questions to ask about exposures. The indicators can tell us what exposures are common in a specific area or group of people.

As policymakers, the indicator data can tell us whether it would be more efficient to invest in natural disaster preparedness, sanitation, water treatment, or education about hand-washing. This information might also help us track whether more children are exposed in a certain area or group of people, or if there have been trends over time. It might tell us whether previous efforts have done anything to change the exposure levels, even before we can see effects in the health outcomes of children. Knowing what environmental exposures are associated with cholera infection can help us target resources more efficiently.

#### References:

- Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.
- WHO. The Global Task Force on Cholera Control. Geneva, World Health Organization. ([www.who.int/cholera/en/](http://www.who.int/cholera/en/) - accessed December 2009).



This final portion of the model tells us what actions might be effective in improving the health outcomes of cholera infection. The information reported by these indicators can tell us what interventions have worked, and what secular trends might be changing outcomes. As policymakers, this is valuable information for setting priorities for future action. As practitioners, this information is useful for evaluating what the potential effect of your interventions might be.

*Reference:*

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

Indicator	Policy Uses	Practitioner Uses
<b>Outcome:</b> <ul style="list-style-type: none"> <li>❖ Diarrhoea mortality rate in children aged 0-4 years</li> <li>❖ Diarrhoea morbidity rate in children aged 0-4 years</li> <li>❖ Recurrence rate of outbreaks of diarrhoeal disease among children aged 0-4 years</li> </ul>	<ul style="list-style-type: none"> <li>❖ Understand magnitude and urgency of problem</li> <li>❖ Understand how the issue affects different groups</li> <li>❖ Prioritize issues</li> </ul>	<ul style="list-style-type: none"> <li>❖ Provide information for advocacy on the most important health issues</li> <li>❖ Provide information for resource planning</li> </ul>
<b>Context:</b> <ul style="list-style-type: none"> <li>❖ Children aged 0-14 living in poverty</li> </ul>	<ul style="list-style-type: none"> <li>❖ Identify families that would benefit most assistance</li> <li>❖ Identify trends over time</li> <li>❖ Target resources efficiently</li> </ul>	<ul style="list-style-type: none"> <li>❖ Identify children at risk for cholera infection and provide preventive assistance &amp; education</li> <li>❖ Identify cases more quickly</li> </ul>

Briggs 2003

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Here is an overview of the indicators related to cholera infection and their uses for policymakers and health care providers.

<<NOTE TO USER: Read the most relevant indicators and uses to your audience>>

*Reference:*

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

Indicator	Policy Uses	Practitioner Uses
<b>Exposure:</b> <ul style="list-style-type: none"> <li>❖ Drinking water supplies failing national microbiological water quality standards</li> <li>❖ People living in informal settlements</li> <li>❖ Children aged 0-14 years living in disaster-affected areas</li> <li>❖ Children aged 0-14 years living in households without basic services for water supply, sanitation and hygiene</li> </ul>	<ul style="list-style-type: none"> <li>❖ Identify the most efficient target for intervention to prevent cholera infection and reduce mortality from infection</li> <li>❖ Identify groups with highest exposures</li> <li>❖ Identify trends over time</li> <li>❖ Assess whether interventions are working before health outcomes can be measured directly</li> </ul>	<ul style="list-style-type: none"> <li>❖ Identify possible environmental causes of cholera infection</li> <li>❖ Identify key points for education and action to prevent cholera infection</li> <li>❖ Provide information for advocacy on the most important health issues</li> </ul>

*Briggs 2003*

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### *Reference:*

- Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

Indicator	Policy Uses	Practitioner Uses
<b>Action:</b> <ul style="list-style-type: none"> <li>❖ Attributable change in number of households lacking basic services</li> <li>❖ Attributable change in the number of food outlets failing food hygiene standards</li> <li>❖ Children aged 0-4 years able to obtain rehydration therapy within 24 hours of need</li> </ul>	<ul style="list-style-type: none"> <li>❖ Assess whether interventions are effective</li> </ul>	<ul style="list-style-type: none"> <li>❖ Assess patients' environmental influences to better tailor education and preventive action</li> <li>❖ Provide information for advocacy on the most important health issues</li> </ul>

*Briggs 2003*

*Reference:*

- Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

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### DATA AVAILABILITY

- ❖ WHO Data on cholera by country:  
<http://www.who.int/cholera/countries/en/index.html>
- ❖ National or local health agency information

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**<<NOTE TO USER: incorporate information about what data is available to your audience on this health outcome.>>**

*Reference:*

•WHO. The Global Task Force on Cholera Control. *Geneva, World Health Organization.* (www.who.int/cholera/en/ - accessed December 2009).

## Children's Environmental Health Indicators

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### EXAMPLE 4

### MALARIA

85

<<NOTE TO USER: This module contains six separate examples of indicators as applied to a health issue:

1. Low birth weight
2. Acute respiratory infection
3. Cholera infection
4. Malaria infection
5. Road traffic injuries
6. Lead in children's blood

You should select the one example most relevant to your audience, and remove the others.>>

## Children's Environmental Health Indicators

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### INDICATORS IN ACTION: MALARIA



WHO

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We will examine the use of children's environmental health indicators as applied to the issue of malarial disease in children.

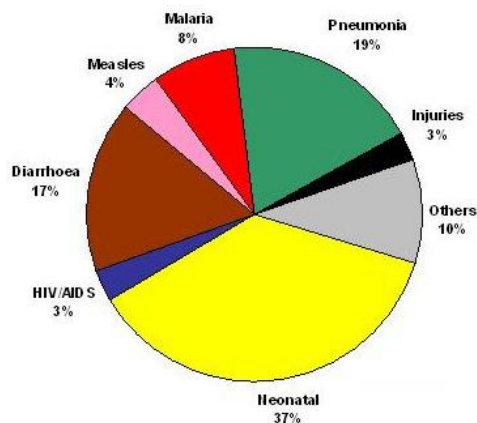
*Picture: WHO*

## Children's Environmental Health Indicators

### THE GLOBAL BURDEN OF DISEASE

#### Five main disease areas:

1. Perinatal Diseases
2. Respiratory Diseases
3. Diarrhoeal Diseases
4. **Insect-Borne Diseases**
5. **Physical Injuries**



WHO, Child and Adolescent Health.

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A wide range of insect-borne diseases affect children, but the greatest cause for concern is by far malaria. Today, even after decades of control and eradication campaigns, malaria is still endemic in about one fifth of the world, and its range may expand as the global temperature rises. As many as 200-300 million young children may be infected, of whom almost 1 million die annually. How can indicators inform us about how to approach this problem?

Malaria is caused by a parasite called Plasmodium, which is transmitted via the bites of infected mosquitoes. In the human body, the parasites multiply in the liver, and then infect red blood cells.

Symptoms of malaria include fever, headache, and vomiting, and usually appear between 10 and 15 days after the mosquito bite. If not treated, malaria can quickly become life-threatening by disrupting the blood supply to vital organs. In many parts of the world, the parasites have developed resistance to a number of malaria medicines.

Key interventions to control malaria include: prompt and effective treatment with artemisinin-based combination therapies; use of insecticidal nets by people at risk; and indoor residual spraying with insecticide to control the vector mosquitoes.

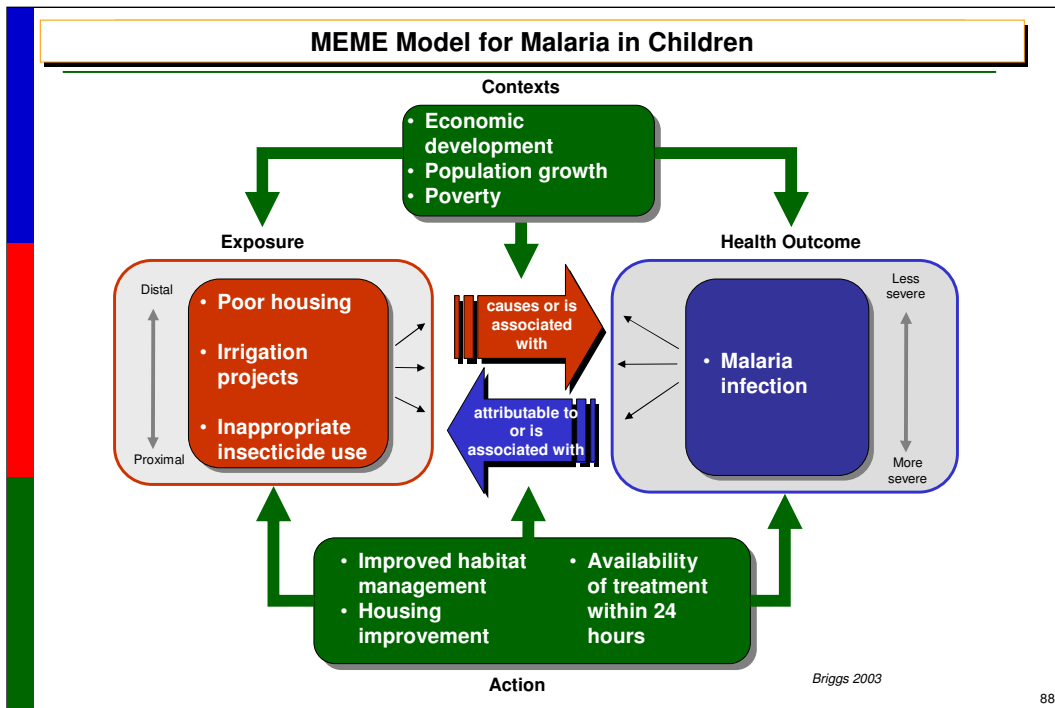
- Malaria is both preventable and curable.

- A child dies of malaria every 30 seconds.

- More than one million people die of malaria every year, mostly infants, young children and pregnant women and most of them in Africa.

#### References:

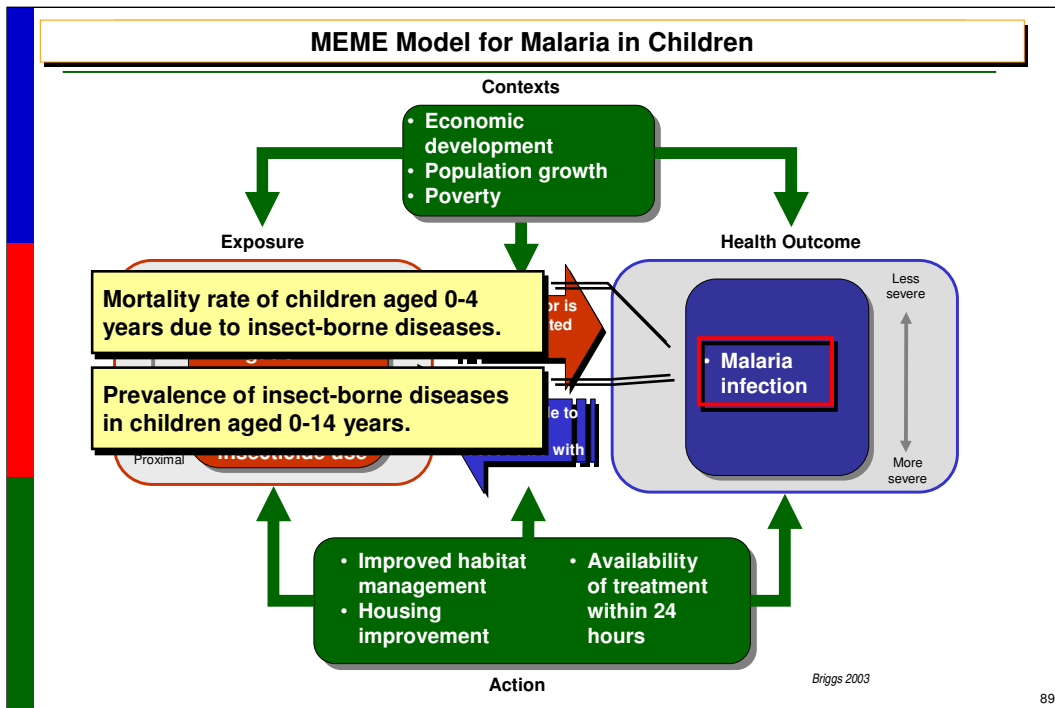
- Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.
- Gordon B, et al. Inheriting the world, the Atlas on Children's Health and the Environment. Geneva, World Health Organization, Myriad Editions Ltd, 2004.
- WHO. The Global Malaria Program. Geneva, World Health Organization. ([www.who.int/malaria/](http://www.who.int/malaria/) - accessed December 2009).
- WHO. Overview of Child Health and Development. Geneva, World Health Organization, Child and Adolescent Health. ([www.who.int/child-adolescent-health/OVERVIEW/CHILD\\_HEALTH/child\\_epidemiology.htm](http://www.who.int/child-adolescent-health/OVERVIEW/CHILD_HEALTH/child_epidemiology.htm) - accessed December 2009).



The first step is to think about the issue of malaria infection in terms of the context, exposure, action and health outcome. It is helpful to complete the MEME model to guide our thinking.

*Reference:*

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

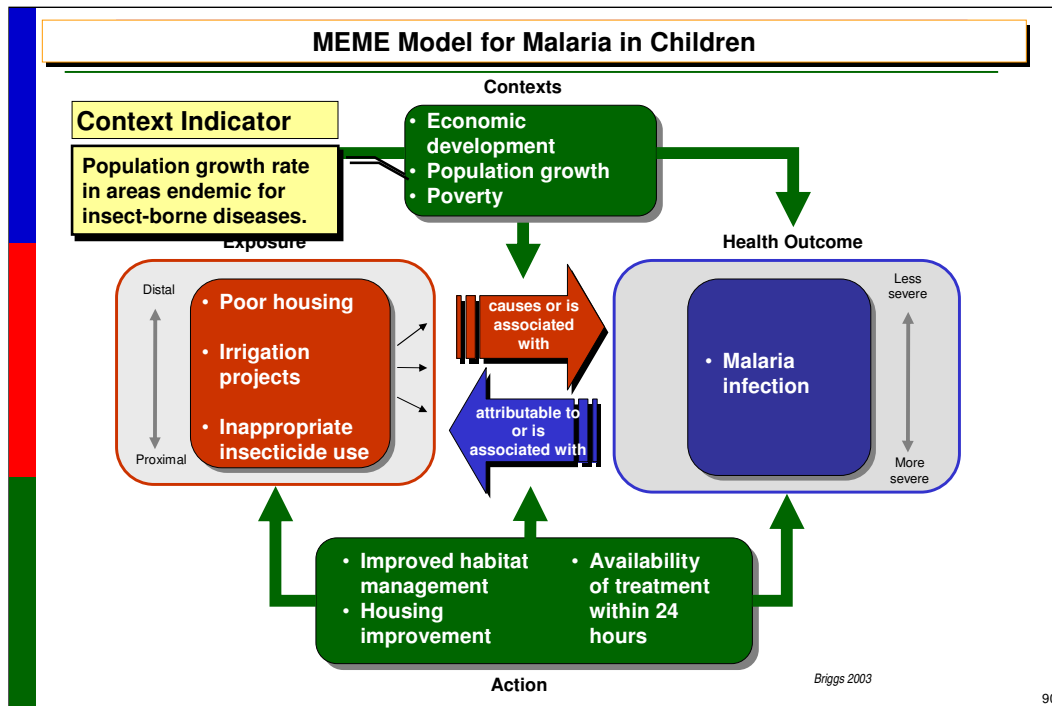


Malaria is a health outcome. We can measure the change in this outcome by using an indicator of the health outcome itself, such as: the mortality rate of children aged 0-4 years due to insect-borne diseases, or the prevalence of insect-borne diseases in children aged 0-14 years.

Information for these indicators might come from death records and healthcare provider reports of diagnosis and treatment. It tells us the magnitude of the problem in a given area or group of people, and we can use it to compare to other areas and issues to assess what our priorities for intervention should be.

*Reference:*

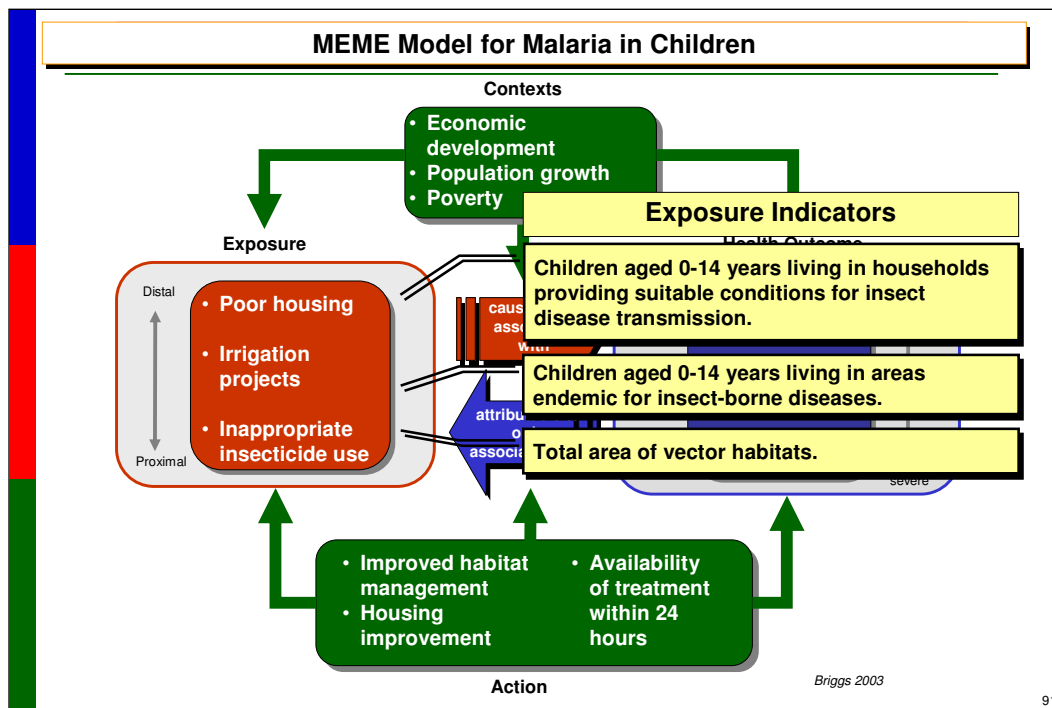
•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.



As healthcare practitioners and policy makers, we want to know more about the problem than simply how many children have it. Knowing more about the contextual factors in this outcome will tell us what approaches would be most effective. Knowing which children are most at risk for malaria will help us identify children which families might benefit from preventive interventions such as distribution of pesticide-treated sleeping nets, or education programs. This information might also help us track whether more or less children are at risk in a certain area or group of people, or if there have been trends over time. Knowing how the context affects malaria infection in children can help us target resources more efficiently.

*Reference:*

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.



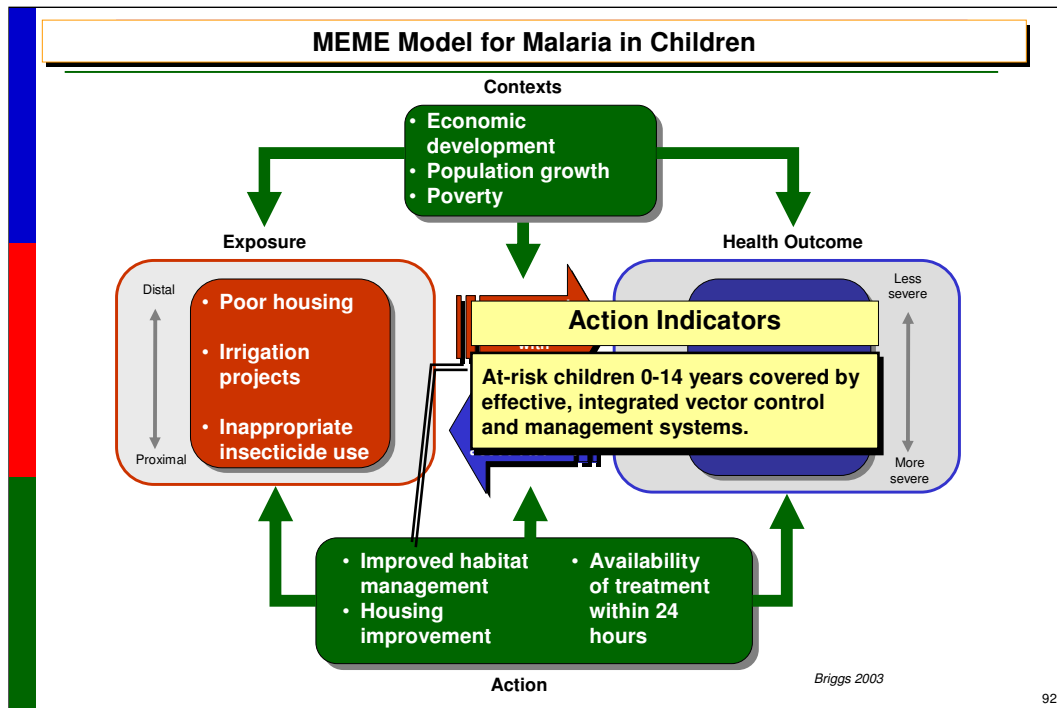
Next we need to examine what specifically causes malarial disease. We know that malaria is directly caused by being bitten by an infected mosquito. But what things in the environment make some groups so vulnerable to infection? The MEME model helps by allowing us to list the known risk factors and think about them together.

This model indicates that children living in areas where malaria is endemic, where there is ample habitat for mosquitoes to breed, and whose houses provide conditions for being bitten, are at highest risk. As practitioners, this information can tell us what questions to ask about exposures. The indicators can tell us what exposures are common in a specific area or group of people.

As policymakers, the indicator data can tell us whether it would be more efficient to invest in land-use planning to minimize irrigation related mosquito breeding grounds or the distributing mosquito nets. This information might also help us track whether more children are exposed in a certain area or group of people, or if there have been trends over time. It might tell us whether previous efforts have done anything to change the exposure levels, even before we can see effects in the health outcomes of children. Knowing what environmental exposures are associated with malarial infection can help us target resources more efficiently.

*Reference:*

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.



This final portion of the model tells us what actions might be effective in improving the health outcomes of malaria. The information reported by these indicators can tell us what interventions have worked, and what secular trends might be changing outcomes. As policymakers, this is valuable information for setting priorities for future action. As practitioners, this information is useful for evaluating what the potential effect of your interventions might be.

*Reference:*

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

Indicator	Policy Uses	Practitioner Uses
<b>Outcome:</b> <ul style="list-style-type: none"> <li>❖ Mortality rate of children aged 0-4 years due to insect-borne diseases</li> <li>❖ Prevalence of insect-borne diseases in children aged 0-14 years</li> </ul>	<ul style="list-style-type: none"> <li>❖ Understand magnitude and urgency of problem</li> <li>❖ Understand how the issue affects different groups</li> <li>❖ Prioritize issues</li> </ul>	<ul style="list-style-type: none"> <li>❖ Provide information for advocacy on the most important health issues</li> <li>❖ Provide information for resource planning</li> </ul>
<b>Context:</b> <ul style="list-style-type: none"> <li>❖ Population growth rate in areas endemic for insect-borne diseases</li> </ul>	<ul style="list-style-type: none"> <li>❖ Identify families that would benefit most assistance</li> <li>❖ Identify trends over time</li> <li>❖ Target resources efficiently</li> </ul>	<ul style="list-style-type: none"> <li>❖ Identify children at risk for malaria and provide preventive assistance &amp; education</li> <li>❖ Identify cases more quickly</li> </ul>

*Briggs 2003*

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Here is an overview of the indicators related to malarial disease and their uses for policymakers and health care providers.

**<<NOTE TO USER: Read the most relevant indicators and uses to your audience>>**

*Reference:*

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

Indicator	Policy Uses	Practitioner Uses
<b>Exposure:</b> <ul style="list-style-type: none"> <li>❖ Total area of insect vector habitats</li> <li>❖ Children aged 0-14 years living in households providing suitable conditions for insect disease transmission</li> <li>❖ Children aged 0-14 years living in areas endemic for insect-borne diseases</li> </ul>	<ul style="list-style-type: none"> <li>❖ Identify the most efficient target for intervention to prevent malaria and reduce mortality from infection</li> <li>❖ Identify groups with highest exposures</li> <li>❖ Identify trends over time</li> <li>❖ Assess whether interventions are working before health outcomes can be measured directly</li> </ul>	<ul style="list-style-type: none"> <li>❖ Identify possible environmental causes of malarial infection</li> <li>❖ Identify key points for education and action to prevent malarial infection</li> <li>❖ Provide information for advocacy on the most important health issues</li> </ul>

*Briggs 2003*

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*Reference:*

- Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

Indicator	Policy Uses	Practitioner Uses
<b>Action:</b> <ul style="list-style-type: none"><li>❖ At-risk children covered by effective, integrated vector control and management systems</li></ul>	<ul style="list-style-type: none"><li>❖ Assess whether interventions are effective</li></ul>	<ul style="list-style-type: none"><li>❖ Assess patients' environmental influences to better tailor education and preventive action</li><li>❖ Provide information for advocacy on the most important health issues</li></ul>

*Briggs 2003*

*Reference:*

- Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

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### DATA AVAILABILITY

- ❖ WHO Data on malaria by country:  
<http://rbm.who.int/wmr2005/index.html> or  
<http://www.who.int/whosis/en/>
- ❖ National or local health agency information

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**<<NOTE TO USER: Incorporate information about what data is available to your audience on this health outcome.>>**

*Reference:*

•Korenromp E, et al. World Malaria Report 2005. Geneva, Switzerland. *World Health Organization, Roll Back Malaria Department and the United Nations Children's Fund.* ([rbm.who.int/](http://rbm.who.int/) - accessed December 2009).

**EXAMPLE 5**

**ROAD TRAFFIC INJURIES**

<<NOTE TO USER: This module contains six separate examples of indicators as applied to a health issue:

1. Low birth weight
2. Acute respiratory infection
3. Cholera infection
4. Malaria infection
5. Road traffic injuries
6. Lead in children's blood

You should select the one example most relevant to your audience, and remove the others.>>

## Children's Environmental Health Indicators

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WHO

### INDICATORS IN ACTION: ROAD TRAFFIC INJURIES

98

We will examine the use of children's environmental health indicators as applied to the issue of road traffic injuries infection in children.

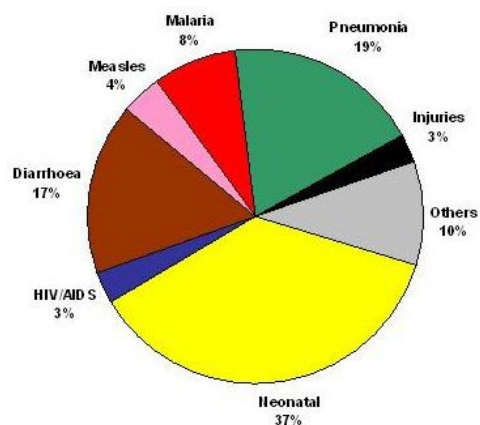
*Picture: WHO*

## Children's Environmental Health Indicators

### THE GLOBAL BURDEN OF DISEASE

#### Five main disease areas:

1. Perinatal Diseases
2. Respiratory Diseases
3. Diarrhoeal Diseases
4. Insect-Borne Diseases
5. Physical Injuries



WHO, Child and Adolescent Health.

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Injuries occur for many reasons, and take many forms. They include drowning, falls and burns, accidental poisonings, injury as a consequence of natural events like storms or earthquakes, and injuries from road traffic accidents.

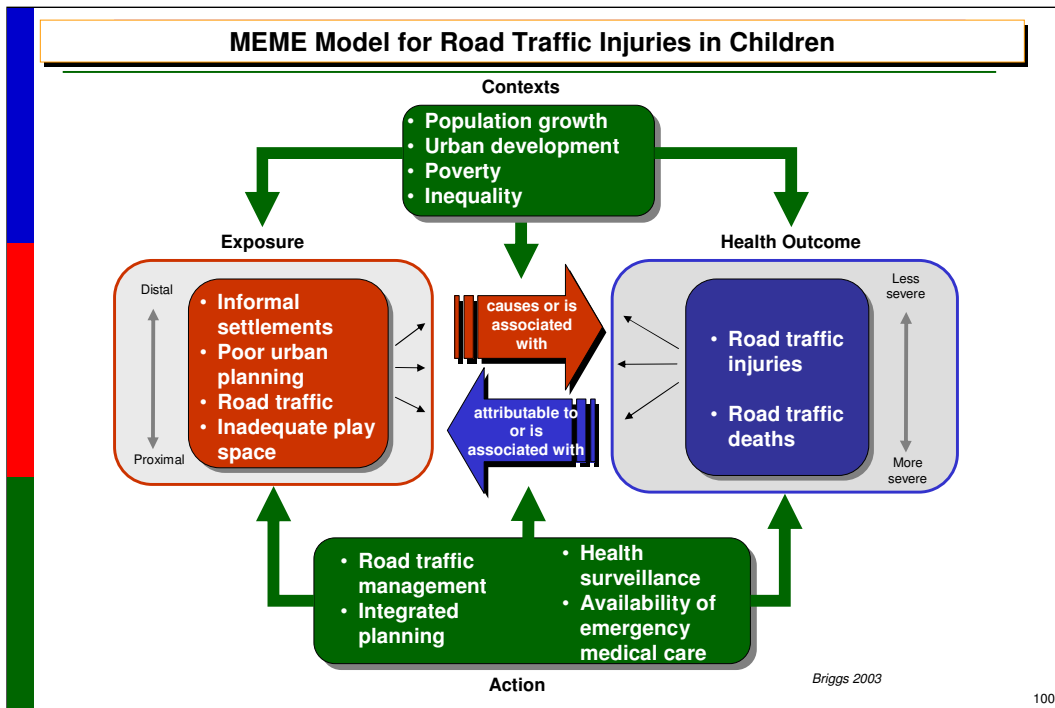
Among children under 15 years, the overriding cause of injuries is road traffic accidents, which kill approximately 180 000 children each year. Children suffer as pedestrians, cyclists and passengers on the road. Injuries are unnecessary and avoidable. The use of seatbelts and car seats and wearing helmets are essential to prevent the death of child passengers or cyclists. Traffic measures such as checking vehicle roadworthiness, enforcing speed limits, and prosecuting drunk drivers are important worldwide. They are especially important in developing countries where roads tend to be poorly maintained and the number of vehicles is growing rapidly. Deaths from road accidents are projected to rise by 65% by 2020, mostly in developing countries. How can indicators inform us about how to approach this problem?

Injuries have traditionally been regarded as random, unavoidable "accidents". Within the last few decades, however, a better understanding of the nature of injuries has changed these old attitudes, and today both unintentional and intentional injuries are viewed as largely preventable events. As a result of this shift in perception, injuries and their health implications have demanded the attention of decision-makers worldwide and injury policy has been firmly placed in the public health arena. Furthermore, the growing acceptance of injuries as a preventable public health problem over the past decade or so has led to the development of preventative strategies and, consequently, a decrease in the human death toll due to injuries in some countries.

WHO's World report on road traffic injury prevention defines a road traffic injury as fatal or non-fatal injuries incurred as a result of a road traffic crash. A road traffic crash is defined as a collision or incident that may or may not lead to injury, occurring on a public road and involving at least one moving vehicle. In 2002 nearly 1.2 million people worldwide died as a result of a road traffic crash. This represents an average of 3242 persons dying each day around the world. In addition to these deaths, between 20 million and 50 million people globally are estimated to be injured or disabled every year.

#### References:

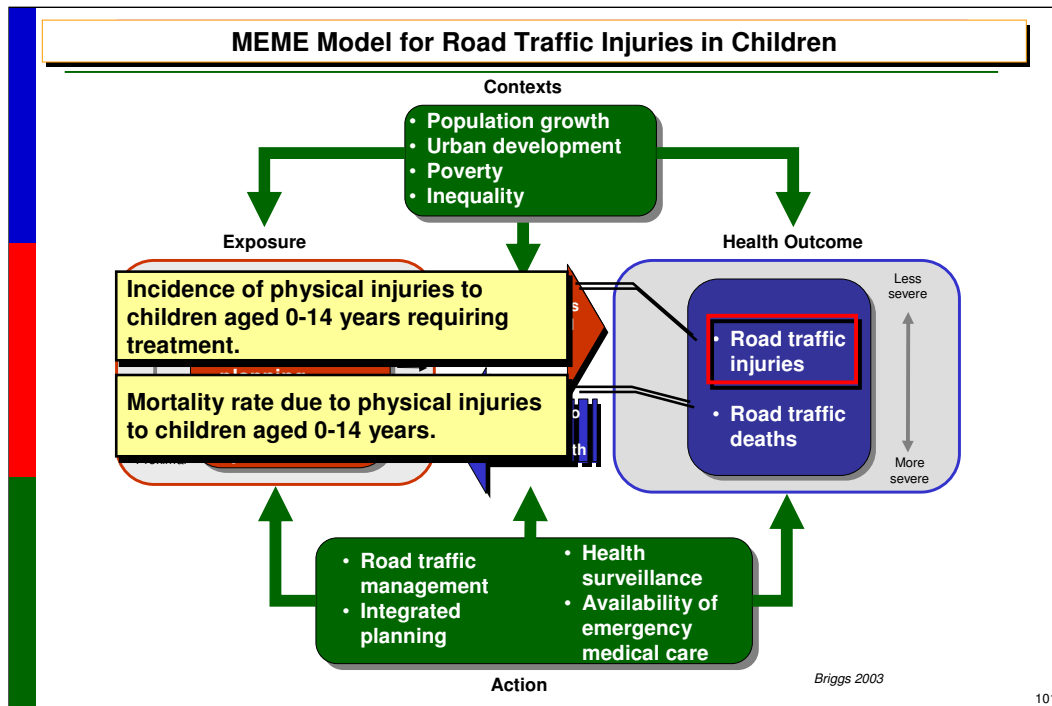
- Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.
- Gordon B, et al. Inheriting the world, the Atlas on Children's Health and the Environment. Geneva, World Health Organization, Myriad Editions Ltd, 2004.
- WHO. Road Traffic Injuries. Geneva, World Health Organization, Injuries and Violence Prevention. ([www.who.int/violence\\_injury\\_prevention/road\\_traffic/en/](http://www.who.int/violence_injury_prevention/road_traffic/en/) - accessed December 2009).
- WHO. Overview of Child Health and Development. Geneva, World Health Organization, Child and Adolescent Health. ([www.who.int/child-adolescent-](http://www.who.int/child-adolescent-)



The first step is to think about the issue of road traffic injuries in terms of the context, exposure, action and health outcome. It is helpful to complete the MEME model to guide our thinking.

*Reference:*

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

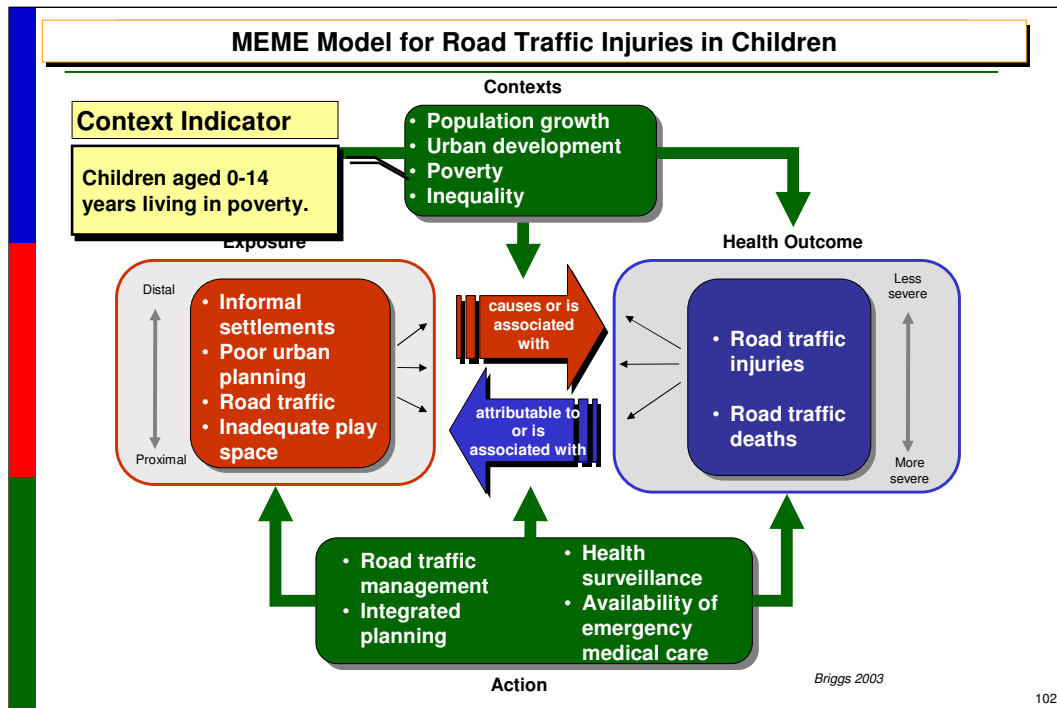


Road traffic injuries are health outcomes. We can measure the change in this outcome by using an indicator of the health outcome itself, such as: the mortality rate due to physical injuries to children aged 0-14 years, or incidence of physical injuries to children aged 0-14 years requiring treatment.

Information for these indicators might come from death records, police reports, and healthcare provider reports of treatment. It tells us the magnitude of the problem in a given area or group of people, and we can use it to compare to other areas and issues to assess what our priorities for intervention should be.

*Reference:*

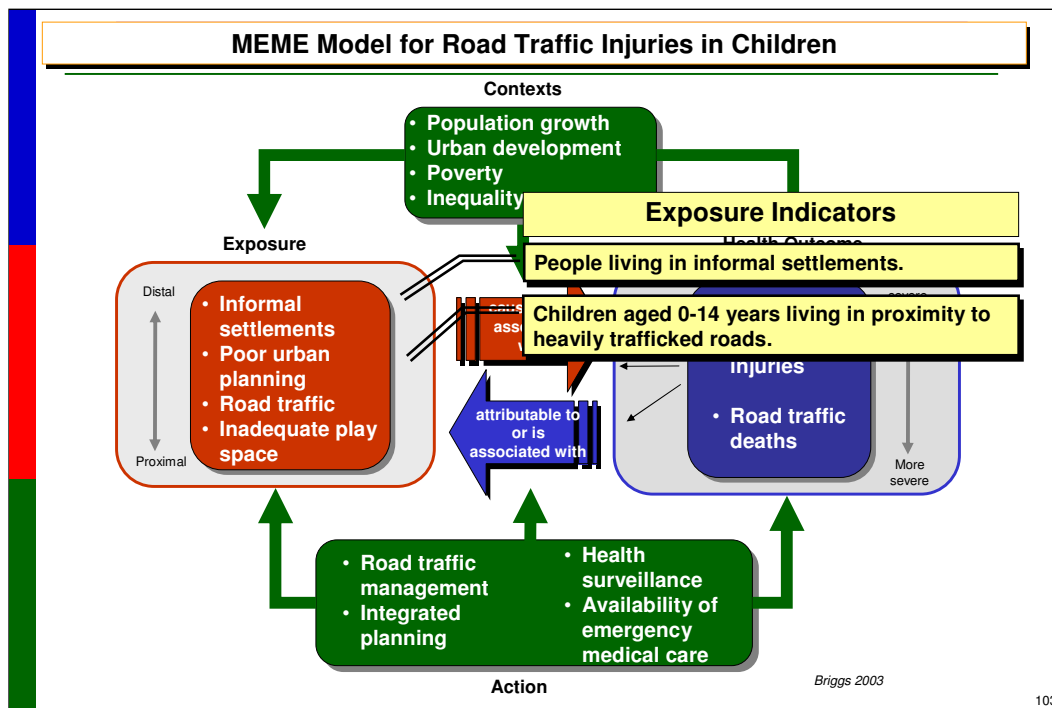
•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.



As healthcare practitioners and policy makers, we want to know more about the problem than simply how many children have it. Knowing more about the contextual factors in this outcome will tell us what approaches would be most effective. Knowing which children are most at risk for road traffic injuries will help us identify children which families might benefit from preventive interventions. This information might also help us track whether more or less children are at risk in a certain area or group of people, or if there have been trends over time. Knowing how the context affects road traffic injuries in children can help us target resources more efficiently.

*Reference:*

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.



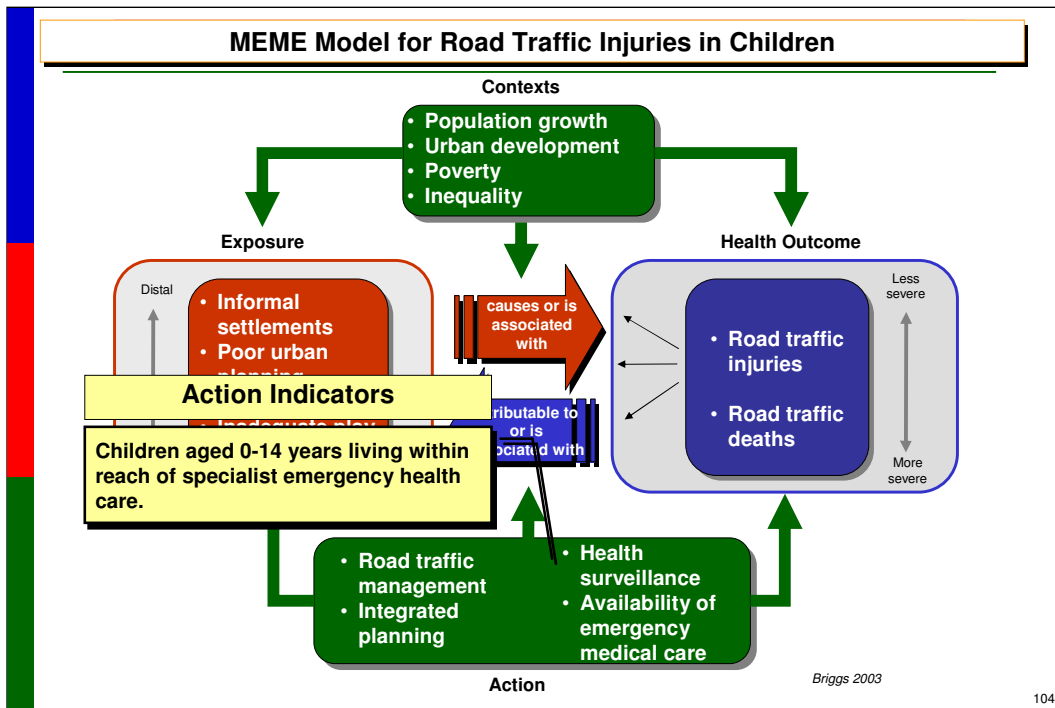
Next we need to examine what specifically causes road traffic injuries. In environmental health, there is rarely a direct, one-to-one relationship between the cause or exposure, and the effect or outcome. The MEME model helps by allowing us to list the known risk factors and think about them together.

This model indicates that children living in informal settlements or in close proximity to heavily trafficked roads are at highest risk. As practitioners, this information can tell us what questions to ask about exposures. The indicators can tell us what exposures are common in a specific area or group of people.

As policymakers, the indicator data can tell us whether it would be more efficient to invest in land-use planning, traffic calming, or the creation of safe spaces for children to play. This information might also help us track whether more children are exposed in a certain area or group of people, or if there have been trends over time. It might tell us whether previous efforts have done anything to change the exposure levels, even before we can see effects in the health outcomes of children. Knowing what environmental exposures are associated with road traffic injuries can help us target resources more efficiently.

*Reference:*

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.



This final portion of the model tells us what actions might be effective in improving the health outcomes of road traffic injuries. The information reported by these indicators can tell us what interventions have worked, and what secular trends might be changing outcomes. As policymakers, this is valuable information for setting priorities for future action. As practitioners, this information is useful for evaluating what the potential effect of your interventions might be.

*Reference:*

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

Indicator	Policy Uses	Practitioner Uses
<b>Outcome:</b> <ul style="list-style-type: none"> <li>❖ Mortality rate due to physical injuries to children aged 0-14 years</li> <li>❖ Incidence of physical injuries to children aged 0-14 years requiring treatment</li> </ul>	<ul style="list-style-type: none"> <li>❖ Understand magnitude and urgency of problem</li> <li>❖ Understand how the issue affects different groups</li> <li>❖ Prioritize issues</li> </ul>	<ul style="list-style-type: none"> <li>❖ Provide information for advocacy on the most important health issues</li> <li>❖ Provide information for resource planning</li> </ul>
<b>Context:</b> <ul style="list-style-type: none"> <li>❖ Children aged 0-14 years living in poverty</li> </ul>	<ul style="list-style-type: none"> <li>❖ Identify families that would benefit most assistance</li> <li>❖ Identify trends over time</li> <li>❖ Target resources efficiently</li> </ul>	<ul style="list-style-type: none"> <li>❖ Identify children at risk for road traffic injuries and provide preventive assistance &amp; education</li> </ul>

*Briggs 2003*

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Here is an overview of the indicators related to road traffic injuries and their uses for policymakers and health care providers.

**<<NOTE TO USER: Read the most relevant indicators and uses to your audience>>**

*Reference:*

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

Indicator	Policy Uses	Practitioner Uses
<b>Exposure:</b> <ul style="list-style-type: none"> <li>❖ People living in informal settlements</li> <li>❖ Children aged 0-14 years living in proximity to heavily trafficked roads</li> </ul>	<ul style="list-style-type: none"> <li>❖ Identify the most efficient target for intervention to prevent road traffic injuries</li> <li>❖ Identify groups with highest exposures</li> <li>❖ Identify trends over time</li> <li>❖ Assess whether interventions are working before health outcomes can be measured directly</li> </ul>	<ul style="list-style-type: none"> <li>❖ Identify possible environmental causes of injuries</li> <li>❖ Identify key points for education and action to prevent injuries</li> <li>❖ Provide information for advocacy on the most important health issues</li> </ul>

*Briggs 2003*

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*Reference:*

- Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

Indicator	Policy Uses	Practitioner Uses
<b>Action:</b> <ul style="list-style-type: none"><li>❖ Children aged 0-14 living within reach of specialist emergency health care</li><li>❖ Attributable change in injuries to children aged 0-14 years requiring treatment</li></ul>	<ul style="list-style-type: none"><li>❖ Assess whether interventions are effective</li></ul>	<ul style="list-style-type: none"><li>❖ Assess patients' environmental influences to better tailor education and preventive action</li><li>❖ Provide information for advocacy on the most important health issues</li></ul>

*Briggs 2003*

*Reference:*

- Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

### DATA AVAILABILITY

- ❖ WHO Data on burden of disease for road traffic injuries:  
[http://www.who.int/healthinfo/global\\_burden\\_disease/en/index.html](http://www.who.int/healthinfo/global_burden_disease/en/index.html)
- ❖ National or local health agency information

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**<<NOTE TO USER: incorporate information about what data is available to your audience on this health outcome.>>**

#### *References:*

- WHO. Global Burden of Disease Estimates 2002 [Online database]. *Geneva, World Health Organization.*  
([www.who.int/healthinfo/global\\_burden\\_disease/estimates\\_2000\\_2002/en/index.html](http://www.who.int/healthinfo/global_burden_disease/estimates_2000_2002/en/index.html) - accessed 14 August 2009).
- WHO. Global Burden of Disease Estimates 2004 [Online database]. *Geneva, World Health Organization.*  
([www.who.int/healthinfo/global\\_burden\\_disease/estimates\\_regional/en/index.html](http://www.who.int/healthinfo/global_burden_disease/estimates_regional/en/index.html) - accessed 14 August 2009).
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([www.who.int/healthinfo/global\\_burden\\_disease/2004\\_report\\_update/en/index.html](http://www.who.int/healthinfo/global_burden_disease/2004_report_update/en/index.html) - accessed 14 August 2009)

## Children's Environmental Health Indicators

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### EXAMPLE 6

### LEAD IN CHILDREN'S BLOOD

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<<NOTE TO USER: This module contains six separate examples of indicators as applied to a health issue:

1. Low birth weight
2. Acute respiratory infection
3. Cholera infection
4. Malaria infection
5. Road traffic injuries
6. Lead in children's blood

You should select the one example most relevant to your audience, and remove the others.>>

## Children's Environmental Health Indicators

### INDICATORS IN ACTION: LEAD IN CHILDREN'S BLOOD



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We will examine the use of children's environmental health indicators as applied to the issue of lead body burden in children.

The toxic effects of lead have been known for centuries: severe anaemia, lowered IQ, convulsions, and in acute cases, death. Recent research shows that lead may be linked to antisocial behaviour and delinquency among children.

Lead continues to be present in our surroundings as an additive to gasoline, an ingredient in paint and pottery glaze, or the main material of old water pipes. Children are at the greatest risk because lead is more easily absorbed by their growing bodies, and because their tissues are especially sensitive to damage. Their normal behaviour also puts them at increased risk—small children may put paint chips, painted toys, and dusty hands into their mouths. Even very low blood lead levels can irreversibly impair the development of children's brains, reducing their IQ.

Threshold levels for blood lead levels are still exceeded around the world, particularly in children in the cities of developing countries. Industrialized countries have made progress by phasing lead out of gasoline, banning lead in consumer goods and replacing lead pipes with copper pipes. However, lead based paint in older housing stock continues to be a considerable problem.

Lead poisoning is a serious health hazard with major socio-economic implications. Lead is a potent neurotoxin (nerve poison), particularly in children whose growing bodies are highly susceptible. Exposure to excessive levels of lead in air, water, soil and food is harmful to the health and intellectual development of millions of children and adults, in almost all regions of the world. Urban children in developing countries are most at risk.

At low levels, lead poisoning in children causes:

- reduction in IQ and attention span
- reading and learning disabilities
- hyperactivity and behavioural problems
- impaired growth and visual and motor functioning
- hearing loss

At high levels, lead poisoning in children causes:

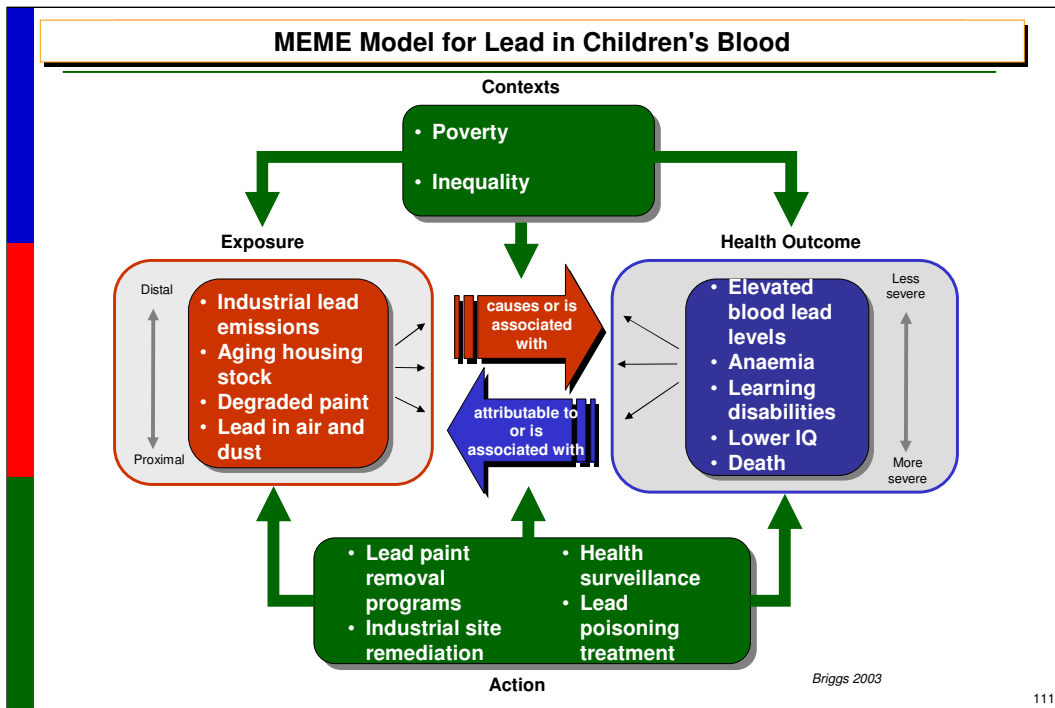
- anaemia
- brain, liver, kidney, nerve, stomach damage
- coma
- convulsions
- death

These effects of lead poisoning on children are:

- long-term and potentially irreversible
- intensified with repeated exposure and accumulation of lead in the body

There is no proven safe level of lead exposure in children. Current toxicity studies suggest that:

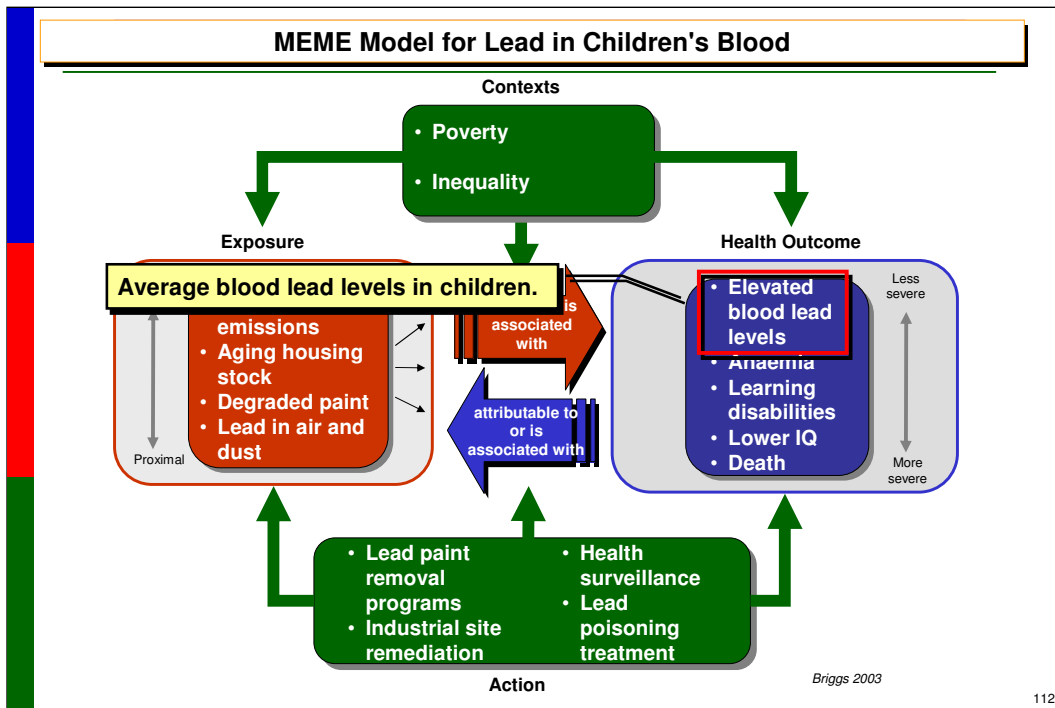
- a blood-lead concentration of 10 mg/dl (micrograms per deciliter, indicating the amount of lead in a tenth of a liter of blood, a common way of indicating the lead stored in an individual's body) is considered as an action level.
- an amount of 45 mg/dl demands that treatment begin within 48 hours;
- more than 70 mg/dl in blood presents a medical emergency;
- over 120 mg/dl in blood is highly toxic and potentially lethal.



The first step is to think about the issue of elevated blood lead levels in terms of the context, exposure, action and health outcome. It is helpful to complete the MEME model to guide our thinking.

*Reference:*

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

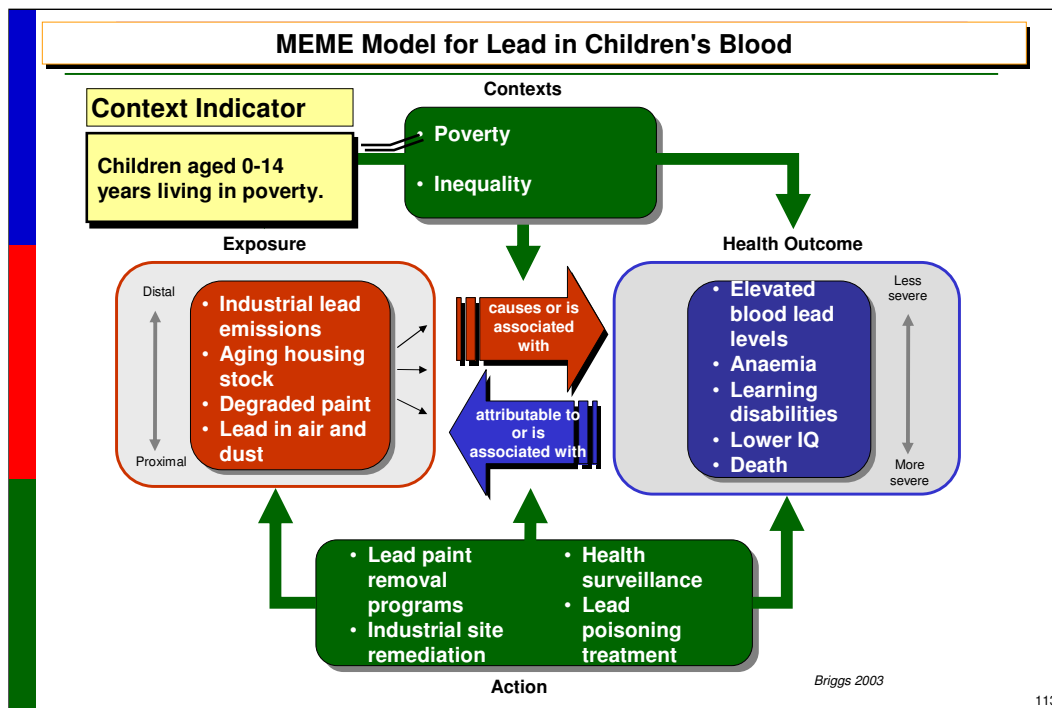


Elevated blood lead level in children is a health outcome. We can measure the change in this outcome by using an indicator of the health outcome itself, such as: the average blood lead level in children.

Information for this indicator might come from mandatory blood lead testing through primary care providers. It tells us the magnitude of the problem in a given area or group of people, and we can use it to compare to other areas and issues to assess what our priorities for intervention should be.

*Reference:*

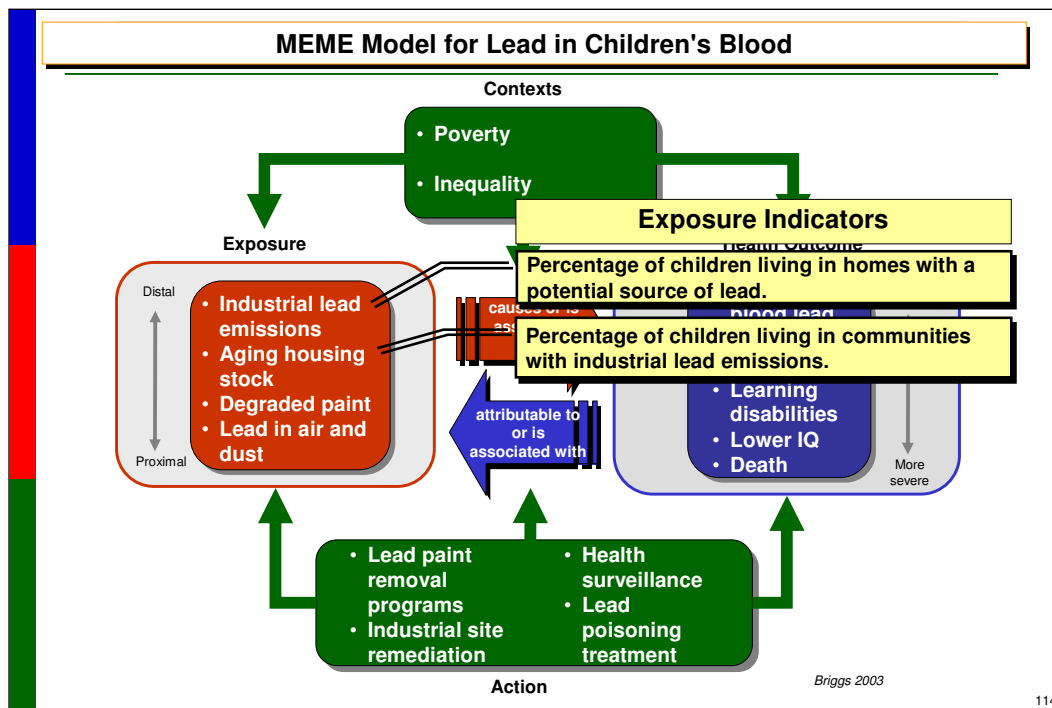
•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.



As healthcare practitioners and policy makers, we want to know more about the problem than simply how many children have it. Knowing more about the contextual factors in this outcome will tell us what approaches would be most effective. Knowing which children are most at risk for elevated lead body burden will help us identify children whose families might benefit from preventive interventions, such as lead paint repair or removal, or closer surveillance of soil and air lead contamination in certain neighbourhoods. This information might also help us track whether more or less children are at risk in a certain area or group of people, or if there have been trends over time. Knowing how the context affects blood lead levels in children can help us target resources more efficiently.

*Reference:*

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.



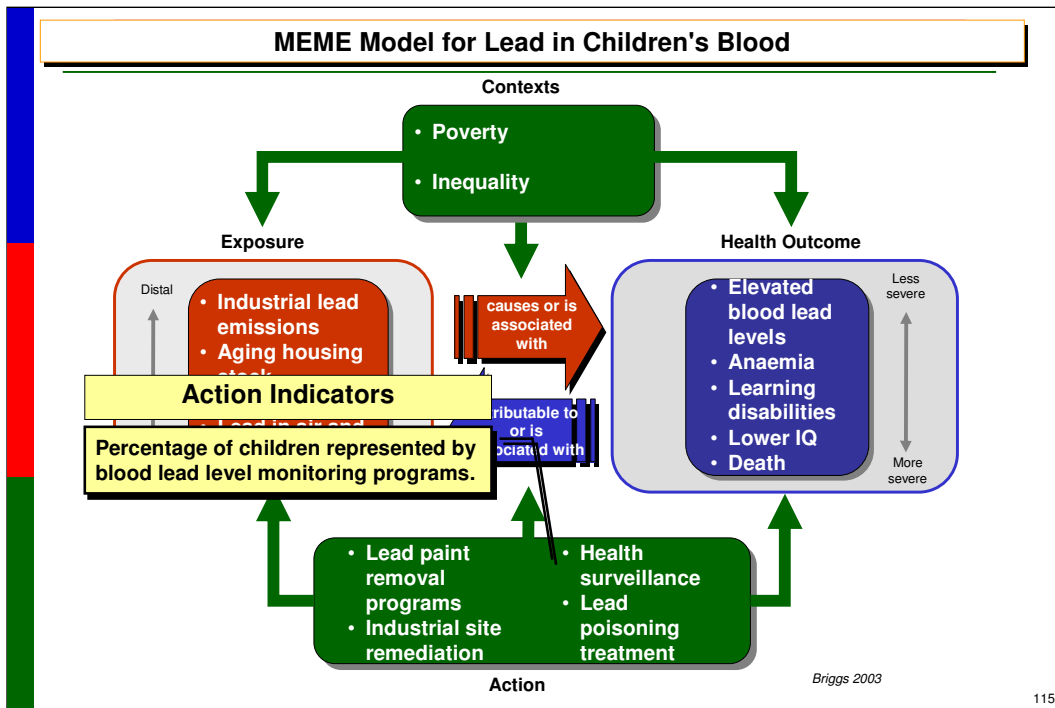
Next we need to examine what specifically causes elevated blood lead levels in children. We know that this is directly caused by exposure to lead, but what environmental causes create more risk for some people? The MEME model helps by allowing us to list the known risk factors and think about them together.

This model indicates that children living in homes with a potential source of lead, such as older interior house paint, or in close proximity to industrial sources of lead pollution, are at highest risk. As practitioners, this information can tell us what questions to ask about exposures. The indicators can tell us what exposures are common in a specific area or group of people.

As policymakers, the indicator data can tell us whether it would be more efficient to invest in industrial cleanup of lead, improving housing stock, or removing contaminated soil and dust. This information might also help us track whether more children are exposed in a certain area or group of people, or if there have been trends over time. It might tell us whether previous efforts have done anything to change the exposure levels, even before we can see effects in the health outcomes of children. Knowing what environmental exposures are associated with elevated blood lead levels can help us target resources more efficiently.

*Reference:*

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.



This final portion of the model tells us what actions might be effective in improving the health outcomes of elevated blood lead levels in children. The information reported by these indicators can tell us what interventions have worked, and what secular trends might be changing outcomes. As policymakers, this is valuable information for setting priorities for future action. As practitioners, this information is useful for evaluating what the potential effect of your interventions might be.

*Reference:*

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

Indicator	Policy Uses	Practitioner Uses
<b>Outcome:</b> ❖ Average blood lead levels in children.	❖ Understand magnitude and urgency of problem ❖ Understand how the issue affects different groups ❖ Prioritize issues	❖ Provide information for advocacy on the most important health issues ❖ Provide information for resource planning
<b>Context:</b> ❖ Children aged 0-14 years living in poverty	❖ Identify families that would benefit most assistance ❖ Identify trends over time ❖ Target resources efficiently	❖ Identify children at risk for elevated blood lead levels and provide preventive assistance & education

Briggs 2003

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Here is an overview of the indicators related to elevated blood lead levels and their uses for policymakers and health care providers.

<<NOTE TO USER: Read the most relevant indicators and uses to your audience>>

*Reference:*

•Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

Indicator	Policy Uses	Practitioner Uses
<p><b>Exposure:</b></p> <ul style="list-style-type: none"> <li>❖ Percentage of children living in homes with a potential source of lead.</li> <li>❖ Percentage of children living in communities with industrial lead emissions.</li> </ul>	<ul style="list-style-type: none"> <li>❖ Identify the most efficient target for intervention to prevent elevated blood lead levels</li> <li>❖ Identify groups with highest exposures</li> <li>❖ Identify trends over time</li> <li>❖ Assess whether interventions are working before health outcomes can be measured directly</li> </ul>	<ul style="list-style-type: none"> <li>❖ Identify possible environmental causes of elevated blood lead levels</li> <li>❖ Identify key points for education and action to prevent elevated blood lead levels</li> <li>❖ Provide information for advocacy on the most important health issues</li> </ul>

*Briggs 2003*

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*Reference:*

- Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

Indicator	Policy Uses	Practitioner Uses
<b>Action:</b> <ul style="list-style-type: none"><li>❖ Percentage of children represented by blood lead level monitoring programs.</li></ul>	<ul style="list-style-type: none"><li>❖ Assess whether interventions are effective</li></ul>	<ul style="list-style-type: none"><li>❖ Assess patients' environmental influences to better tailor education and preventive action</li><li>❖ Provide information for advocacy on the most important health issues</li></ul>

Briggs 2003

*Reference:*

- Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

## Children's Environmental Health Indicators

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### DATA AVAILABILITY

- ❖ National or local health agency information

<<NOTE TO USER: Incorporate information about what data is available to your audience on this health outcome.>>

**END OF EXAMPLES**

**<<NOTE TO USER: This module contains six separate examples of indicators as applied to a health issue:**

- 1. Low birth weight**
- 2. Acute respiratory infection**
- 3. Cholera infection**
- 4. Malaria infection**
- 5. Road traffic injuries**
- 6. Lead in children's blood**

**You should select the one example most relevant to your audience, and remove the others.>>**

## Children's Environmental Health Indicators

### LOOKING FORWARD

Children's environmental health indicators are tools for:

- ❖ Prioritizing issues
  - ❖ Understanding links between the environment and health
  - ❖ Targeting resources efficiently
  - ❖ Monitoring trends
  - ❖ Feeding information into normative monitoring and decision-making mechanisms nationally, regionally or internationally (e.g. Health Metrics Network)
- ❖ **Most importantly, they provide an opportunity for action to improve the environmental health of children worldwide.**



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Children's environmental health indicators can help healthcare providers, policy makers, and the public:

- Prioritize the environmental health risk factors in an area
- Understand how environmental conditions relate to health status in children
- Target resources efficiently
- Monitor trends in the environment to identify potential risks to health

But most importantly, indicators are an opportunity to take action to improve the environmental health of children worldwide.

#### *Reference:*

- Briggs D. Making a Difference: Indicators to Improve Children's Environmental Health. Geneva, World Health Organization, 2003.

*Picture: WHO*

## Children's Environmental Health Indicators

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### RESOURCES AVAILABLE ON INDICATORS

- ❖ The Global Initiative on Children's Environmental Health Indicators: [www.who.int/ceh/indicators/](http://www.who.int/ceh/indicators/)
- ❖ USEPA-Office of Children's Health Protection  
[yosemite.epa.gov/ochnp/ochpweb.nsf/content/homepage.htm](http://yosemite.epa.gov/ochnp/ochpweb.nsf/content/homepage.htm)
- ❖ UNEP [www.unep.org/ceh/about-unep.html](http://www.unep.org/ceh/about-unep.html)
- ❖ UNICEF-Statistical data access by indicator or country:  
[www.unicef.org/statis/index.html](http://www.unicef.org/statis/index.html)
- ❖ UN MDG indicators [mdgs.un.org/unsd/mdg/Default.aspx](http://mdgs.un.org/unsd/mdg/Default.aspx)

## Children's Environmental Health Indicators

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*Latest update: December 2009*

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## Children's Environmental Health Indicators

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