Inheriting the World:
The Atlas of Children’s Health and the Environment

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Acknowledgements 4
About the Authors 6
Foreword by  
Dr LEE Jong-wook, Director-General, World Health Organization 7

Part One  Child Health and Poverty  
1 The World’s Forgotten Children 8
2 Two Worlds: Rich and Poor 10
3 Traditional Hazards, New Risks 12

Part Two  Global Environmental Issues  
4 Water for All: Making it Happen 14
5 Hurry Up in the Toilet: 2.4 Billion are Waiting 16
6 To Fetch a Pail of Water 18
7 Malaria 20
8 Fluoride and Arsenic in Drinking Water 22
9 Indoor Smoke: Breaking Down Respiratory Defences 24
10 Passive Smoking: Children Protest 26
11 Polluted Cities: The Air Children Breathe 28
12 Child Injuries are Preventable 30
13 Child Labour: Growing Up Too Quickly 32
14 Lead: IQ Alert 34
15 Safe Food: Crucial for Child Development 36
16 Poisoning: Hidden Peril for Children 38

Part Three  A Look to the Future  
17 Getting the Lead Out 40
18 Healthy Schools: Empowering Children 42
19 Enjoying the Sun Safely 44
20 Climate Change 46
21 Highs and Lows of Environmental Health 48
22 WHO Sub-Regions 49
23 World Data Table 50
Sources 58
Index 64
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- page 8 WHO/H. Bower; 10 Nigel Bruce; 14 WHO/C. Gaggero; 16 WHO/C. Gaggero; 18 WHO/H. Anenden; 19 WHO/P. Virot; 26 WHO; 28 Steve Turner; 30 WHO/H. Anenden; 32 (top) ILO/P. Lissac; 32 (bottom) WHO/C. Gaggero; 34 WHO/C. Gaggero; 36 WHO/A. Waak; 38 Donald Cole, with thanks to Phil Landrigan, Mount Sinai School of Medicine and with the permission of Donald Cole, Associate Professor Public Health Sciences, University of Toronto; 42 WHO/C. Gaggero; 43 WHO/T. Kelly; 44 The Cancer Council Victoria; 47 WHO; 48 (left) ILO/P. Lissac; 48 (middle) WHO/C. Gaggero; 48 (right) WHO/C. Gaggero.

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Every child has the right to live in a healthy, supportive environment – an environment that encourages growth and development, and protects from disease. Many of the world’s children, however, are exposed to hazards in the very places that should be safest – the home, school and community. Considering that their growing bodies are particularly sensitive to environmental threats, the final burden of childhood disease is substantial. Every year, more than three million children die due to unhealthy environments.

The majority of these child deaths are caused by unsafe water, lack of sanitation, indoor air pollution, and mosquitoes bearing malaria. Other environmental hazards include passive smoking, lead and pesticides, road traffic accidents, and global environmental changes.

Persistent poverty aggravates these environmental threats. The children worst affected are those in the developing world, and the enormous burden of ill-health falling on their youngest citizens constrains the social and economic development of these countries.

Children are helpless in the face of environmental risks and, all too frequently, adults do not listen to the voices of children or act upon their most urgent needs. But we must listen. Children are our most precious resource. Together, now is the time to focus our efforts on combating environmental threats to children’s health and to work towards a sustainable and brighter future.

Dr LEE Jong-wook
Director-General
World Health Organization
Geneva
March 2004
O

ver 10 million children under five die every year—98 per cent of them in developing countries. Widespread malnutrition hampers children’s growth and development, opening the door to the biggest killers of children under five: perinatal diseases, pneumonia, diarrhoea, and malaria. 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.

The last three decades have witnessed an impressive decline in child mortality, from 17 million a year in the 1970s. Yet these gains have not been enjoyed everywhere: in some countries of sub-Saharan Africa, child mortality is rising as wars and the ravage of the AIDS epidemic undermine the medical, social and economic structures of society.

At the turn of the 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.

The biggest killers of children under five

Main causes of child mortality 2002

1

Deaths associated with malnutrition 54%

Other 24%

Acute respiratory infection 18%

Diarrhoea 15%

Malaria 11%

Measles 5%

Human Immunodeficiency Virus (HIV) 4%

Perinatal diseases (within 7 days of birth) 23%

The price of life

Child mortality rate

Under-five mortality rate per 1000 live births

2000

Beacons of hope

greatest improvement in child mortality rate 1970–2000

1

no data

26 – 100

10 and under

11 – 25

Over 175

101 – 175

2

Over 175

101 – 175

26 – 100

10 and under

11 – 25

no data

Annual expenditure on pet food

US$ 17 billion

Annual cost of scaling-up vaccination, malaria prevention and essential treatment to reach every child in the developing world

US$ 7.5 billion

Annual cost of scaling-up vaccination, malaria prevention and essential treatment to reach every child in the developing world

US$ 7.5 billion

U.S. 17 billion

The World’s Forgotten Children

Ike is safely delivered in Kanamota, Japan, and can expect to live about 85 years. At the same time, Mariam comes into this world in one of the poorest areas of Freetown, Sierra Leone. She is underweight and vitamin-deficient, and has a 30% chance of dying before her fifth birthday.

Today, 25% of Africa’s children are at a higher risk of death than they were ten years ago.

"It is not enough to prepare our children for the world; we must also prepare the world for our children.” Louis J. Rodriguez (1954– )

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Two Worlds: Rich and Poor

Poverty is the single biggest threat to children’s health. Poor children are more likely to die as infants, and are sick more often and more seriously than better-off children.

The poor and the marginalized – especially children – often bear the brunt of environmental degradation. Yet, because of their vulnerability, children are the very group that can least afford to be exposed to environmental hazards. They are not “little adults” they breathe more air, consume more food, and drink more water in proportion to their weight. Children’s behaviour further puts them at risk. Their life takes place closer to the ground and young children frequently put their fingers in their mouths.

Exposure to environmental risks is one of the reasons for poor children being worse off than their wealthier peers. In developing countries, environmental risks are compounded in the poorest settlements, where housing is inadequate, water and sanitation are lacking, garbage collection is non-existent, and smoke fouls indoor air. In rich countries, low-income or minority neighbourhoods are sometimes disproportionately located near hazardous waste sites or polluting industries.

A rising income gap between the rich and the poor within countries around the world means that millions of children may be excluded from the health benefits of emerging prosperity.
Children today live in an environment that is vastly different from that of a few generations ago. Global challenges include industrialization, rapid urban population growth, the unsustainable consumption of natural resources, the increasing production and use of chemicals, and the movement of hazardous wastes across national borders.

Homes, schools, streets and fields – the settings where children live, learn, play and work – all present environmental hazards. Yet, children born into different countries, cities or rural areas, and even different neighbourhoods, face risks that may be poles apart.

As countries develop, many of the most serious “basic risks” to child health gradually vanish with improvements in water and sanitation, hygiene and cleaner fuels for cooking. Their decline, however, is accompanied by an increase in “modern risks”. Industrialization brings with it an increase in road traffic, air pollution, and the use of chemicals that infiltrate the air children breathe and the food they eat.

It is too early to judge the exact impact of “emerging risks”, such as endocrine-disruptors and global warming. These add to the challenges we must confront to safeguard our children’s health and future.

Environmental health risks

Sized according to significance of risk

2002 by WHO sub-region

- lack of safe water, sanitation and hygiene
- indoor air pollution from solid fuel use
- urban outdoor air pollution
- lead and other hazardous chemicals
- malaria and other vector-borne diseases
- child injuries

This simplified overview illustrates how certain environmental risks differ in magnitude between WHO sub-regions. It does not account for the often large variation between countries within a given region, nor is it a comprehensive summary of all environmental risks to children’s health.

Each year over three million children die from illnesses and other conditions caused by environmental hazards.

Summary of risks by income 2004

- Low-income populations in poverty
- Middle-income populations in transition
- High-income industrialized societies

basic risks: lack of safe water, sanitation and hygiene, indoor air pollution, vector-borne diseases, hazards that cause accidents and injuries

modern risks: unsafe use of chemicals, environmental degradation

emerging risks: climate change, ozone depletion, persistent organic pollutants, endocrine disruptors

“The problems we have today cannot be solved by thinking the way we thought when we created them.”

Albert Einstein (1879–1955)
Water for All: Making it Happen

Water is the essence of life and human dignity. As a fundamental human right “sufficient, safe, acceptable, physically accessible and affordable water for personal and domestic uses” is vital for all. Governments are responsible for ensuring that this human right is progressively fulfilled. As a result of their action, in collaboration with partners, 900 million more people gained access to an improved water supply during the 1990s.

Yet 1.1 billion people in rural areas and urban slums still rely on unsafe drinking water from rivers, lakes and open wells. Children, in particular, suffer from water-related illnesses. Each episode of diarrhoea sets back a child’s growth by lowering their appetite and reducing their calorie and nutrient uptake. Persistent diarrhoea and severe calorie and nutrient uptake. Persistent diarrhoea and severe

Health effects

Intestinal diseases caused by unsafe drinking water:
- Diarrhoea
- Cholera
- Dysentery
- Typhoid
- Guinea worm

Hygiene- and sanitation-related diseases (map 5)

- Water is essential for hygiene, especially for hand-washing after defecation (map 5)
- Pools and marshes are breeding sites for malaria-carrying mosquitoes (map 7)
- Arsenic and high levels of fluoride in drinking water cause severe illness (map 6)
- Children and women often spend many hours collecting water (map 6)
- During daily water collection, children face the risk of drowning and injuries (map 7)

Preventing diarrhoea

Annual number of deaths of children under five years 2002 thousands

- from diarrhoea
- that would be averted by piped water supply and sanitation
- that would be averted by household water treatment

Striving ahead
Multiple projects on household water management are underway (at least 20 litres per day).
Imagine a life without a clean, private place to defecate and urinate: the embarrassment of going to the toilet in an abandoned plot or on the open street, and for girls, the fear of assault at night.

This is the reality of life for a staggering 2.4 billion people, most of whom live in extreme poverty in Africa and Asia. Inadequate sanitation in the home and in public places erodes human dignity, undermines development, and causes disease.

Putting fingers into their mouth puts young children most at risk of catching diarrhoea. For families, preventing faecal-oral contamination depends on proper hygiene, and disposing of faeces safely. The availability of sufficient water enables both children and adults to wash their hands before meals and after defecating. Simple hand-washing could save up to one million lives every year.

Realizing the Millennium Development Goal of halving the proportion of people without access to sanitation by 2015 would still leave almost a quarter of humanity without a basic latrine. Hopes of achieving even this modest goal are fading fast.

**Health effects**

Diseases caused by inadequate sanitation and hygiene:
- Intestinal worms (including ascariasis, trichuriasis and hookworm)
- Schistosomiasis
- Trachoma
- Intestinal diseases (map 4)

**Intestinal diseases**

- Trachoma
- Schistosomiasis
- Intestinal worms (including ascariasis, trichuriasis and hookworm)
- Trachoma

A sewerage connection is an effective system for removing human faeces from a household. However, sewage is frequently discharged, untreated, into rivers, lakes and oceans, where it contaminates food and water supplies, causing illness, in particular among the poor. Even in industrialized countries not all sewage is treated. This dilemma will continue to plague the sewerage debate.

**Sewerage services**

- Percentage of population with a flush toilet connected to a sewer
- Percentage of urban wastewater that is not treated

**Meagre sanitation**

Percentage of households without access to improved sanitation

- Over 75%
- 51% – 75%
- 5% and under
- 26% – 50%
- No data

**Diseases caused by inadequate sanitation and hygiene**

- Intestinal worms (including ascariasis, trichuriasis and hookworm)
- Schistosomiasis
- Trachoma
- Intestinal diseases (map 4)
To Fetch a Pail of Water

A mother and her children take turns trekking 14 km to the nearest water source. They each carry a bucket weighing up to 25 kg, causing backache and, over the years, spinal injury. Some women have been attacked by stray dogs or bitten by snakes. Water is so hard to come by that there is barely sufficient for drinking.

fetching water prevents mothers from looking after their children and generating household income. The time children spend carrying heavy buckets, queuing at the water source or being sick with diarrhoea could be spent in school. Insufficient water causes diarrhoea and other intestinal diseases in children; the worst-hit families often have no access to medical care and are least able to pay for the cost of treatment, such as oral rehydration salts.

Difficulty in obtaining water causes disease, and denies families opportunities for education and income generation, perpetuating poverty.

Half the proportion of Africans without access to an improved water supply and improved sanitation would save US$ 1.2 billion in health treatment costs. Universal access for Africans to a piped water supply and sewage connection in their homes would save US$ 6.4 billion.

Time spent on water collection represents time lost to household and national economies. Every month, the Indian economy misses out on over 100 million working days in this way. With its large population, Asia loses more time than any other continent.

A heavy burden
Percentage of people who must travel more than half an hour to fetch water and return home — 2001 or latest available data.

- over 50%
- 26% – 50%
- 25% and over
- no data

Pakistan: 25
India: 12
Nepal: 9
Philippines: 8
Indonesia: 6

Time ticking away
Average number of hours per household spent each month on essential water collection — 2001 or latest available data.
The name “malaria” was coined in Italy, as people believed that “bad air” brought about the disease. In truth, the cause of malaria is a parasite transmitted from person to person through the bite of the female Anopheles mosquito.

The environment is a key determinant of the spread of malaria – the deadliest of all the vector-borne diseases. Malaria flourishes within a certain temperature range and altitude, where favourable rainfall patterns and humidity prevail, and where animal or human blood is available. Any clean standing water provides a potential breeding site for mosquitoes.

Ninety per cent of the at least one million deaths a year from malaria occur in Africa, mostly among young children. Malaria also hampers children’s education: because they miss school when ill, and because severe episodes of the disease may cause permanent neurological damage. Malaria has been estimated to cost Africa more than US$ 12 billion every year in lost GDP. The disease could be controlled for a fraction of that sum.

Preventive measures, such as insecticide-treated bed nets, stop mosquitoes biting children. Drugs, such as chloroquine, are available, but drug resistance means that new remedies are urgently being sought. Malaria is one of the major public health challenges undermining development. Long-term solutions are needed to stop an African child dying every 30 seconds.

<table>
<thead>
<tr>
<th>Other vector-borne diseases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schistosomiasis</td>
</tr>
<tr>
<td>Flat worms, whose life cycle partly takes place in freshwater snails, burrow through the skin. 200 million people, many of them children, are currently infected with schistosomiasis.</td>
</tr>
<tr>
<td>Japanese encephalitis</td>
</tr>
<tr>
<td>This is a virus transmitted by mosquitoes in Asia. 90% of the cases occur in children under five years.</td>
</tr>
<tr>
<td>Leishmaniasis</td>
</tr>
<tr>
<td>Transmitted by sand flies, this parasite causes skin lesions and damage to internal organs. It killed 59 000 people in 2001.</td>
</tr>
<tr>
<td>Dengue fever</td>
</tr>
<tr>
<td>Mosquitoes transmit the virus, which kills more than 10 000 children every year.</td>
</tr>
<tr>
<td>Lymphatic filariasis</td>
</tr>
<tr>
<td>Worms lodging in the lymphatic system can cause deformations in children as young as 12 years.</td>
</tr>
</tbody>
</table>

Malaria is one of the major public health challenges undermining development. Long-term solutions are needed to stop an African child dying every 30 seconds.
Millions of children are exposed to excessive amounts of fluoride through drinking water contaminated from natural geological sources. In China, the burning of fluoride-rich coal adds to the problem. Small amounts of fluoride are good for teeth; it is added to toothpaste and, in some countries, to drinking water. At higher doses, it destroys teeth and accumulates in bones, leading to crippling skeletal damage. With their bodies still growing, children are most at risk.

Like fluoride, arsenic is widely distributed throughout the earth's crust, and is present in almost all waters in very small amounts. In certain areas, however, there are dangerous levels of this toxin in children’s drinking water. The most tragic example is Bangladesh, where thousands of wells are causing a mass poisoning of the population. Unsafe wells are marked with red paint, warning people that this water is not for drinking.

**Fluorosis**
- Tooth discoloration and decay
- Crippling skeletal damage

**Arsenicosis**
- Skin pigmentation changes and skin thickening (hyperkeratosis)
- Cancer of the skin, lungs, bladder and kidney

---

**Fluorosis**

- **2004 or latest available data**
  - cases of dental or skeletal fluorosis reported
  - no data

**Arsenic poisoning in Bangladesh**

- Percentage of boreholes tested where arsenic levels are above 50 micrograms per litre (µg/l)
  - 75% and over
  - 50% – 74%
  - 25% – 49%
  - under 25%
  - no data

There are 2 million cases of skeletal fluorosis in China.

Some estimates suggest arsenic in drinking water will cause 200,000 to 270,000 deaths from cancer in Bangladesh alone.

“There is no such thing as a healthy level of arsenic in drinking water.”

- Paracelsus, physician (1493–1541)
Indoor Smoke: Breaking Down Respiratory Defences

Cooking is central to our lives, yet the very act of cooking is a threat to children’s health and well-being.

Half of the world’s population rely on solid fuels, such as dung, wood, crop waste or coal to meet their most basic energy needs. In most developing countries, these fuels are burned in open fires or rudimentary stoves that give off black smoke. Children, often carried on their mother’s back during cooking, are most exposed. The indoor smoke inhaled gives rise to pneumonia and other respiratory infections – the biggest killer of children under five years of age. Indoor air pollution is responsible for nearly half of the more than 2 million deaths each year that are caused by acute respiratory infections.

Good ventilation and improved cooking stoves can dramatically reduce children’s exposure to smoke. Ultimately, making the transition to gas and electricity will save lives and reduce the physical toll on women and children from gathering wood, freeing time for education and development.

This problem has been largely ignored by policy-makers.

Health effects

Established effects:
- Pneumonia and other respiratory infections
- Chronic obstructive pulmonary disease (including bronchitis, emphysema)

Suspected effects:
- Tuberculosis
- Cataracts
- Asthma
- Low birth weight
- Middle ear infection (otitis media)

The Energy Ladder

Increasing cleanliness, efficiency, convenience

- Electricity
- Liquefied petroleum gas, natural gas
- Kerosene
- Charcoal, coal
- Wood
- Crop waste, dung

Increasing prosperity

Cooking with solid fuel

Percentage of households using solid fuel for cooking 2000 or latest available data
- over 75%
- 51% - 75%
- 26% - 50%
- 25% and under
- no data

Smoky homes

Typical 24-hour mean concentration of particulate matter of less than 10 micrometres in diameter (PM<sub>10</sub>)
- early 2000s
- micrograms per cubic metre ($\mu g/m^3$)

European Union standard 50

10

Hut with an open fire

Bangkok roadside

Berlin city centre
The burning of tobacco produces a cocktail of dangerous chemicals. Almost half the world’s children (about 700 million) are exposed to smoke from burning tobacco and exhaled smoke at home. Environmental tobacco smoke has particularly harmful effects on foetuses and young children, causing respiratory infections and other illness. Children do not choose to inhale a mix of over 4000 chemicals, including carcinogens. In fact, the majority of children worldwide urge people to stop smoking in public places. At home, it is the responsibility of parents to protect their children and stop smoking. Media campaigns, combined with smoking restrictions in public places and the workplace, can help make homes tobacco-free.

Other tobacco control measures include taxation, bans on tobacco advertising and health warnings on cigarette packs. The Framework Convention on Tobacco Control, an international treaty instigated by WHO, is currently in the process of signature and ratification. Children whose parents and friends smoke are more likely to become addicted themselves; 250 million children alive today will be killed by tobacco if current consumption trends continue.

“Child abuse doesn’t have to mean broken bones and black and blue marks. Young growing tissues are far more vulnerable to carcinogens than those of adults. Knowing subjecting children to respiratory tract disease is child abuse.”

Dr. William Cahan, Memorial Sloan Kettering Cancer Center, USA, 1993
Polluted Cities: The Air Children Breathe

Power plants, factories and vehicles spew out harmful gases and small particles that can penetrate deep into children’s lungs. In strong sunlight, oxides of nitrogen from vehicle exhaust fumes form ozone at ground level, which can trigger asthma attacks.

Air pollution does not respect national borders. Heavy metals and persistent organic pollutants are carried by winds, contaminating water and soil far from their origin. In the late 1990s, forest fires, mainly in Indonesia, caused a haze of smoke to hang for months over neighbouring South-East Asian countries. Schools and kindergartens were forced to close, while local hospitals reported large numbers of haze-related illnesses in young children.

The Great London Smog of 1952 focused the world’s attention on the problem of air pollution, and since then there has been a marked improvement in air quality in developed countries. Nevertheless, every year outdoor air pollution is responsible for the death of hundreds of children in Europe, and of more than 20 000 globally.

Industrial growth and rapid urbanisation aggravate the problem, with the pressure felt most acutely in the megacities of the developing world. Use of cleaner fuels and technologies, refined motor engines, and public transport are crucial in ensuring that children breathe clean air.

Health effects on children

- Pneumonia and other lower respiratory infections
- Asthma
- Low birth weight

Dirty air: the silent killer

Average concentration of small particles (PM$_{10}$) in outdoor urban air by WHO sub-region 2000 micrograms per cubic metre ($\mu$g/m$^3$)

- over 25
- 21 – 25
- 11 – 15
- 16 – 20
- no data

Average concentration of small particles (PM$_{10}$) in selected European cities 2001 micrograms per cubic metre ($\mu$g/m$^3$)

- over 30
- 21 – 30
- 20 and under

PM$_{10}$ refers to particles less than 10 micrometers in diameter, which can penetrate deep into the lungs and cause adverse health effects. The European Union standard for 24-hour mean PM$_{10}$ levels is set at 50 $\mu$g/m$^3$, not to be exceeded more than 35 days per year.

The entire bus fleet of New Delhi has converted to compressed natural gas to ease the city’s infamous pea-soup smog.
Drowning is the most common cause of injuries for infants, killing approximately 60,000 children under five every year and leaving roughly the same number permanently disabled. Children also suffer burns from open fires and kerosene stoves, and are injured in falls at home, at school and at playgrounds.

In older children, however, the overriding cause of injuries is road traffic accidents, killing approximately 180,000 children under 15 each year. Children are rarely the cause of road traffic accidents but suffer as pedestrians, cyclists and passengers. Boys, often given greater freedom to roam, are more likely to be injured than girls.

Injuries are unnecessary and avoidable. The use of seat belts and child car seats, and the wearing of 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 particularly important in developing countries, where roads tend to be poorly maintained and the number of vehicles is growing rapidly.

Injuries from road traffic accidents already cost developing countries US$ 65 billion a year – more than the annual amount of development assistance they receive.

How children are injured

Causes of deaths worldwide due to unintentional injuries for children under 15 years 2002

- Road traffic accidents: 89,955 boys, 76,261 girls
- Drowning: 111,559 boys, 55,104 girls
- Fires: 14,234 boys, 19,966 girls
- Falls: 39,969 boys, 22,234 girls
- Poisonings: 15,818 boys, 19,787 girls

Deaths due to road traffic accidents of children aged 0–14 years per 100,000

2002 by WHO sub-region

- 20.0 and over
- 10.0 – 19.9
- 5.0 – 9.9
- 2.5 – 4.9
- under 2.5
- no data

Deaths from road accidents are projected to rise by 65% by 2020, mostly in developing countries.
The need to support themselves and their families forces over 200 million children aged 5 to 14 years to work. More than half of these child workers toil in hazardous occupations, such as agriculture, mining and construction.

Agriculture exposes children to pesticides, extreme temperatures, disease-carrying insects and dangerous machinery. Mining and construction involve long hours of strenuous physical labour, often in environments rife with dust, noise and toxic chemicals such as mercury, which is used for gold extraction.

Children are powerless in the face of such hazardous working conditions: they lack the experience to recognize risks and they lack the physical and emotional strength to protect themselves. Every year, more than 35 000 child workers under 17 years die as a result of occupational injuries.

Children also lack the choice to shape their own lives: many child workers cannot attend school – a precious right that will equip them to build a better future for themselves.

The International Labour Organization’s Convention 182 calls for the immediate elimination of the worst forms of child labour, including hazardous child labour. Nearly 150 countries have already committed themselves to the fight against hazardous child labour by ratifying the Convention. There is, however, a long road ahead in developing alternative livelihoods for children and their families.

Child scavengers search through waste with their bare hands.

Children dying on the job

<table>
<thead>
<tr>
<th>Occupation</th>
<th>1994</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>32</td>
</tr>
<tr>
<td>Mining</td>
<td>15</td>
</tr>
<tr>
<td>Construction</td>
<td>4</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>3</td>
</tr>
<tr>
<td>Services</td>
<td>3</td>
</tr>
<tr>
<td>Retail</td>
<td></td>
</tr>
</tbody>
</table>

* This figure refers to injury fatality rates per 100 000 child workers aged 15–17 years.
The toxic effects of lead have been known for centuries: severe anaemia was common among aristocratic women who relied on lead-based powder to meet their desire for a fair complexion. Workers in lead mines, constantly exposed to high doses of lead, frequently suffered convulsions and even death.

Lead continues to be present in the surroundings as an additive to gasoline, an ingredient of 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. They may swallow lead in dust from decaying lead-based paint or suck the ceramic beads of necklaces. Even blood lead levels as low as 5 micrograms per decilitre can irreversibly impair the development of children’s brains, reducing their IQ.

This threshold level is 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 many consumer goods and replacing lead pipes with copper pipes. Lead-based paint, however, continues to be a considerable problem in North America.

A potential link between elevated lead levels and antisocial behaviour and delinquency makes tackling this problem even more urgent.

Blood and lead

<table>
<thead>
<tr>
<th>Region</th>
<th>Percentage of children with blood lead levels above 10 micrograms per decilitre (µg/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Americas</td>
<td>Amr-A: 33% Amr-B: 34% Amr-D: 20% Eur-A: 23% Eur-B: 28% Eur-C: 20% (2002 or latest available data)</td>
</tr>
<tr>
<td>Europe</td>
<td>Afr-D: 24% Afr-E: 18% Sear-B: 17% Sear-D: 17% (2002 or latest available data)</td>
</tr>
<tr>
<td>Eastern Med.</td>
<td>Wpr-A: 3% Wpr-B: 17% (2002 or latest available data)</td>
</tr>
<tr>
<td>Africa</td>
<td>Sear-D: 17% (2002 or latest available data)</td>
</tr>
<tr>
<td>South Asia</td>
<td>Sear-D: 17% (2002 or latest available data)</td>
</tr>
<tr>
<td>Western Pac.</td>
<td>Sear-D: 17% (2002 or latest available data)</td>
</tr>
</tbody>
</table>

Lead in children’s blood

Mean blood lead level in urban children by WHO sub-region 2002 or latest available data
micrograms per decilitre (µg/dl)

- over 15.0
- 10.1 – 15.0
- 5.1 – 10.0
- 5.0 and under
- no data

21.9% of African-American children in older housing are poisoned by lead compared with 2.2% of all American children.

Lead-free environments enable successful learning.
15 Safe Food: Crucial Child Development

The proper development of the human brain is one of the biggest mysteries of biology. This complex, rapid process – at times 250 000 neurons are added per minute – is uniquely vulnerable to environmental influences in air, water and, in particular, food.

Babies with toxoplasmosis, contracted by the mother from a parasitic in undercooked meat, suffer brain damage and blindness. This disorder affects up to 1 in every 1000 live births. Methyl mercury, which also harms brain development, is a particular threat to children living in coastal areas who eat predatory fish such as swordfish and shark.

Children come into contact with microbes and hazardous chemicals through many pathways: through the placenta to the developing fetus, through breast milk to the nursing infant, or directly through contaminated food. The young are more susceptible to foodborne diseases because they eat more in proportion to their body weight than adults, have rapidly growing organ systems, and have fewer defences against toxins.

Dioxins, dioxin-like polychlorinated biphenyls and persistent organic pollutants (POPs) that work their way up the food chain by dissolving and remaining stored in the body fat of animals. These so-called “endocrine disruptors” may upset a child’s hormone balance.

Food safety is one of the most important preventive measures to protect infants and children. The solution lies in good hygiene and, ultimately, in reducing emissions of hazardous substances into our environment.

Dioxin (TEQ) concentration in human breast milk 1988–2002 picograms per gram of fat (pg/g)

<table>
<thead>
<tr>
<th>Year</th>
<th>Netherlands</th>
<th>Spain</th>
<th>Germany</th>
<th>Finland</th>
<th>Czech Republic</th>
<th>Slovak Republic</th>
<th>Ukraine</th>
<th>Norway</th>
<th>Croatia</th>
<th>Hungary</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988</td>
<td>40</td>
<td>28</td>
<td>18</td>
<td>12</td>
<td>19</td>
<td>19</td>
<td>11</td>
<td>12</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>1993</td>
<td>37</td>
<td>26</td>
<td>19</td>
<td>12</td>
<td>11</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>2002</td>
<td>19</td>
<td>12</td>
<td>12</td>
<td>10</td>
<td>19</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>10</td>
<td>14</td>
</tr>
</tbody>
</table>

Fetus at risk

Many contaminants in the diet of pregnant mothers present a hazard to the developing fetus:

- **Toxoplasmosis** Women infected during pregnancy can transmit the infection to the fetus, leading to stillbirths, birth defects and mental retardation.
- **Listeriosis** Women infected during pregnancy can transmit the infection to the fetus, leading to spontaneous abortion or infants born with visual and mental problems.
- **Heavy metals** Lead and methyl mercury can cross the placenta. These neurotoxic substances result in IQ depression and behavioural problems.
- **POPs** POPs (persistent organic pollutants) can cross the placenta and lead to behavioural problems, hormone disturbances, and cancer.
- **Alcohol** Maternal prenatal alcohol use causes severe birth defects and developmental disabilities, ranging from growth retardation and subtle changes in IQ to fetal alcohol syndrome characterized by brain disorders and facial malformations.

Foodborne pathogens are responsible for up to 70% of dioxins in infants and children worldwide.
Young children are naturally inquisitive – opening, eating, and drinking what adults would recognize as poisonous. Drinking kerosene, which is often stored in soft-drinks bottles, is a common problem in developing countries. In industrialized countries, children may swallow medicines such as pain killers, iron supplements and antidepressants, which often look like sweets. Snakebites, scorpion stings, poisonous plants and fungi can also cause acute health effects in children. Concern is growing about the impact of chronic exposure to pesticide residues and heavy metals in food.

Poisons centres around the world advise on treatment, record incidents, raise awareness and promote prevention campaigns. Despite their efforts, more than 35 000 children aged 0 to 14 years die every year as a result of unintentional poisoning. Educating both adults and children, and encouraging the safe storage, use and disposal of toxic substances such as kerosene, bleach and pesticides, can reduce this toll. Moreover, the use of child-resistant packaging for medicines and household products limits children’s access to toxic substances.

About half of all poisonings among teenagers in the USA are classified as suicide attempts.
Getting the Lead Out

Lead has been added to gasoline (petrol) since the 1920s as an anti-knocking agent, to improve fuel performance and reduce wear on vehicle engines. In developed countries, concern about the health impacts of lead (see map 14) emitted by vehicles grew during the 1970s. This, together with the fact that lead interferes with the pollution control devices in automobiles, spurred the introduction of lead-free gasoline.

Blood lead levels of children have been falling dramatically in countries that phased out leaded gasoline, with an average 7.8 percent reduction per year. Using unleaded gasoline makes economic sense: countries can save five to 10 times the conversion cost in health and economic savings. Children in the USA are already benefiting from past policies, resulting in increased worker productivity and economic benefits between US$ 110 and US$ 319 billion every year.

Many poorer countries, however, have yet to make the switch because of the costs involved in modernizing refineries.

Eliminating lead from gasoline is the single most important action to reduce children’s exposure to lead and is a prerequisite for additional air-pollution control measures: unleaded gasoline is needed for using catalytic converters, which reduce emissions of nitrogen oxides and other harmful air pollutants.

**Falling lead levels**

Comparison of vehicular lead emissions and medium blood-lead levels in the USA 1978–1991

<table>
<thead>
<tr>
<th>Year</th>
<th>Vehicular lead emissions (thousand tons)</th>
<th>Blood lead levels (µg/dl) for children aged 1–5 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978</td>
<td>80</td>
<td>15.0</td>
</tr>
<tr>
<td>1991</td>
<td>5.0</td>
<td>3.6</td>
</tr>
</tbody>
</table>

**Brain gain**

Percentage of children who would gain 1.95 or more 10 points over a lifetime if not exposed to lead 2000 by WHO sub-region

- **The Americas**
  - Amr-A: 4%
  - Amr-B: 28%
  - Amr-D: 28%

- **Europe**
  - Eur-A: 18%
  - Eur-B: 23%
  - Eur-C: 22%
  - Eur-D: 24%

- **Eastern Mediterranean**
  - Emr-B: 22%
  - Emr-C: 24%

- **Africa**
  - Afr-B: 14%
  - Afr-C: 14%
  - Afr-D: 21%

- **South-East Asia**
  - S Ea-B: 13%
  - S Ea-C: 13%

- **Western Pacific**
  - Wpr-B: 13%
  - Wpr-A: 2%
Healthy Schools: Empowering Children

Education and health form a virtuous circle. Healthy, attentive and secure children can fully participate in classroom activities to achieve their full potential. And better education leads to improved health: the educated child will grow to live an informed, healthy lifestyle and, through better earnings, will be able to afford health services.

Implementing this vision constitutes the philosophy of a Health-Promoting School: a school where children are taught to understand their bodies and how to treat them well, a school that provides an environment free of physical hazards such as unsafe food or mosquito-breeding sites, and free of violence and harassment. It is a place where medical services, such as immunisation, can be delivered safely, and where teachers and children are encouraged to be ambassadors for health in their families and communities.

The concept of environmental health – a healthy environment for learning, coupled with a curriculum that reinforces the importance of safe environments in general – is one of the pillars of Health-Promoting Schools.

As yet, this concept has not been widely translated into day-to-day practice. However, the global movement Education for All recently called for the provision of clean water and decent sanitation facilities – separate for boys and girls – as a first step in creating a safe school environment. This opens up the potential for improving children’s health and environment overall.

A safe school

Features of a healthy school environment

Provision of basic necessities:
- Shelter
- Warmth, light and ventilation
- Water
- Food
- Toilets
- Emergency medical care

Protection from biological threats:
- Moulds
- Dirty water
- Unsafe food
- Vector-borne diseases
- Animal bites and stings

Protection from physical threats:
- Traffic accidents
- Violence and crime
- Injuries
- Radiation

Protection from chemical threats:
- Air pollution and tobacco smoke
- Water pollution
- Pesticides
- Hazardous waste
- Asbestos, paint and cleaning agents

The global network in one continent

Number of Health-Promoting Schools in Latin America 2001–2003

World Health Day over 2000
1001 – 2000
51 – 1000
50 and under
no data

The Caribbean forged ahead and created its own network of Health-Promoting Schools.
The discovery of a hole in the ozone layer over the Antarctic in 1985 sounded the alarm. Chlorofluorocarbons (CFCs), and other industrial chemicals released into the atmosphere, were destroying the stratospheric ozone, which shields the Earth from harmful ultraviolet (UV) radiation from the sun. Concern about the link between a thinning ozone layer and an increase in skin cancer prompted countries to sign the Montreal Protocol (1987) to phase out ozone-depleting substances.

While small doses of sunlight help the body produce vitamin D, excessive UV radiation damages the skin and eyes. Every year, more than 130,000 malignant melanomas, and between 2 million and 3 million non-melanoma skin cancers are diagnosed, particularly among fair-skinned people. Children are most at risk, as exposure to the sun during childhood appears to set the stage for the development of skin cancer later in life.

The Global Solar UV Index, reported on many weather forecasts, is a daily reminder to stay alert in the sun. Encouraging individuals to protect themselves – by seeking shade and wearing suitable clothes – remains the key to preventing 66,000 people from dying from skin cancer every year.

The Montreal Protocol has proved that the world can work together to solve global environmental problems. Hopefully, the lessons learned can help us meet even greater challenges today in order to preserve our planet’s health and our children’s health.
The world is getting hotter. Industry, vehicles and homes burn fossil fuels, releasing gases that trap the sun’s energy. These gases also change the weather: storms, floods and droughts are becoming more common. With the oceans warming and expanding, the sea level will rise, threatening coasts and small islands with flooding.

Children’s health will suffer as a result of heat waves, increased air pollution and floods. Higher temperatures will speed up the development of the malaria parasite, leading to higher malaria transmission rates. As rains fail, crops wither and livestock die; children will face starvation and diminishing water supplies for drinking and hygiene.

Climate change represents one of the greatest environmental and health equity challenges of our times: wealthy, energy-consuming nations are most responsible for global warming, yet vulnerable, low-income populations, least prepared for the impacts of climate change, are most at risk. The extent of climate change is uncertain, but this irreversible global experiment represents a gamble with our children’s future.

The failure of the global community to come together and implement a meaningful strategy to reduce greenhouse gas emissions does not breed optimism.

As a consequence of climate change, many of these major child diseases will become more widespread and severe.
Highs and Lows of Environmental Health

30 million sc Fossils of mosquitoes, found in Africa, illustrate that the vector for malaria was present well before Homo sapiens.

3000–1500 BC Stone water closets are built in the Palace of Krosos, Crete – the oldest example of flushing technology.

2000 BC Ancient Hindu source advises people to heat foul water by boiling and exposing it to sunlight.

476 AD Lead carbonate is added as a sweetener to wine and food. This, along with lead leaching into drinking water from leaded pipes and vessels, hastens the decline of the Roman Empire.

11th century The Persian physician Ibn Sina (Avicenna) advises travellers to boil or strain drinking water.

13th century Holy Roman Emperor Frederick II (1194–1280) installs pour-flush toilets in his Castel del Monte, inspired by Arab technology.

1589 In England, Sir John Harrington invents the water closet, but the invention is ignored until 1778, when Joseph Bramah begins marketing a patented closet.

1690s Paris is the first European city to build an extensive sewerage system.

1775 Percival Pott notes an elevated incidence of scrotal cancer in small boys assisting chimney sweeps.

1842 The British Royal Commission on Employment of Children in the Mines against all forms of malaria.

1843 In the USA, Oliver Wendell Holmes proclaims the importance of hand washing to control the spread of disease.

1854 Louis Pasteur discovers that heat removes undesirable organisms. Today, pasteurization is used to prevent the spoilage of milk and milk products.

1855 John Snow publishes On the Mode of Communication of Cholera, identifying dirty water supplies as the cause of cholera outbreaks in London.

1890s In Europe, mercury used in the felting process poisons hat workers, giving rise to the expression "mad as a hatter".

1908 The Swedish chemist Svante Arrhenius argues that the greenhouse effect from coal and petroleum use is warming the globe.

1940s Shortly after the Second World War, chloroquine is introduced as an effective prophylaxis and treatment against all forms of malaria.

1950 Poza Rica killer smog, caused by gas fumes from an oil refinery, leaves 23 dead and hundreds hospitalized in Mexico.

1959 Volvo introduces the three-point ("lap-and-shoulder") seat belt, invented by the Swede Nils Bohlin.

1962 Rachel Carson’s book Silent Spring, which issues grave warnings about pesticide use and predicts massive destruction of the planet’s ecosystems, launches the environmental movement in the USA.

1970 The USA introduces the first protective child car seat.

1973 Rice oil contaminated with polychlorinated biphenyls (PCBs) causes Yucheng ("oil-disease") in Taiwan, China. Children of affected women suffer developmental delays and behaviour problems.

1978–92 China’s National Improved Stoves Programme provides more than half of rural households with more efficient, cleaner cooking technologies. 185 million improved stoves help prevent pneumoconiosis and other respiratory infections – the biggest killer of Chinese children.

1984 Methyl isocyanate gas leaks from a Union Carbide pesticide plant in Bhopal, India, killing 8000 people and maiming many more. Most of the victims lived in squatter settlements near the plant.

1986 The Chernobyl nuclear reactor explodes. Radioactive materials severely contaminate large areas of Belarus and Ukraine and are spread by wind and rain all over Europe.


1990s In Europe, mercury used in the felting process poisons hat workers, giving rise to the expression "mad as a hatter".

1995 The installation of wells helps reduce child mortality in Bangladesh but exposes children to high levels of arsenic.


1997 The Kyoto Protocol sets targets for developed countries to reduce their emissions of greenhouse gases to combat global warming.

1970 Singapore bans smoking in buses, cinemas, theatres and other public places.

1976 The Swedish chemist Svante Arrhenius argues that the greenhouse effect from coal and petroleum use is warming the globe.

WHO Sub-Regions

The 192 Member States of the World Health Organization have been classified into five mortality strata according to their level of mortality in children under five years, and in males aged 15–59 years.

<table>
<thead>
<tr>
<th>Mortality strata</th>
<th>Child mortality</th>
<th>Adult male mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>very low</td>
<td>very low</td>
</tr>
<tr>
<td>B</td>
<td>low</td>
<td>high</td>
</tr>
<tr>
<td>C</td>
<td>high</td>
<td>high</td>
</tr>
<tr>
<td>D</td>
<td>high</td>
<td>very high</td>
</tr>
<tr>
<td>E</td>
<td>high</td>
<td>very high</td>
</tr>
</tbody>
</table>

These strata have been applied to countries within the six WHO regions, producing 14 sub-regions.

Africa
- **Africa with high child** and high adult mortality
  - Algeria, Angola, Benin, Burundi, Cameroon, Cape Verde, Chad, Comoros, Equatorial Guinea, Eritrea, Gabon, Gambia, Guinea, Guinea-Bissau, Liberia, Madagascar, Mali, Mauritania, Mauritius, Niger, Nigeria, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Togo

- **Africa with very low child and very low adult mortality**
  - Botswana, Burundi, Central African Republic, Congo, Côte d’Ivoire, Democratic Republic of the Congo, Ethiopia, Eritrea, Kenya, Lesotho, Malawi, Mozambique, Namibia, Rwanda, South Africa, Swaziland, Uganda, United Republic of Tanzania, Zambia, Zimbabwe

The Americas
- **Americas with very low child and very low adult mortality**
  - Canada, Cuba, United States of America

- **Americas with low child and low adult mortality**
  - Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Brazil, Chile, Colombia, Costa Rica, Dominica, Dominican Republic, El Salvador, Grenada, Guyana, Honduras, Jamaica, Mexico, Panama, Paraguay, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, Uruguay, Venezuela (*Belarussian Republic of*)

- **Americas with high child and high adult mortality**
  - Bolivia, Ecuador, Guatemala, Haiti, Nicaragua, Peru

South-East Asia
- **South-East Asia with low child and low adult mortality**
  - Indonesia, Sri Lanka, Thailand

- **South-East Asia with high child and high adult mortality**
  - Bangladesh, Bhutan, Democratic People’s Republic of Korea, India, Maldives, Myanmar, Nepal, Timor-Leste

Europe
- **Europe with very low child** and very low adult mortality
  - Andorra, Austria, Belgium, Croatia, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Luxembourg, Malta, Monaco, Netherlands, Norway, Portugal, San Marino, Slovenia, Spain, Sweden, Switzerland, United Kingdom

- **Europe with low child and low adult mortality**
  - Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Bulgaria, Georgia, Romania, Russian Federation, Slovakia, Tajikistan, The former Yugoslav Republic of Macedonia, Serbia and Montenegro, Turkey, Turkmenistan, Uzbekistan

- **Europe with high child and high adult mortality**
  - Belarus, Estonia, Hungary, Kazakhstan, Latvia, Lithuania, Republic of Moldova, Russian Federation, Ukraine

The Eastern Mediterranean
- **Eastern Mediterranean with low child** and low adult mortality
  - Bahrain, Iran (*Islamic Republic of*), Jordan, Kuwait, Lebanon, Libyan Arab Jamahiriya, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, Turkey, United Arab Emirates

- **Eastern Mediterranean with high child** and high adult mortality
  - Afghanistan, Djibouti, Egypt*, Iraq, Morocco, Pakistan, Somalia, Sudan, Yemen

Western Pacific
- **Western Pacific with very low child** and very low adult mortality
  - Australia, Brunei Darussalam, Japan, New Zealand, Singapore

- **Western Pacific with low child and low adult mortality**

* Following improvements in child mortality over recent years, Egypt meets criteria for inclusion in sub-region Emr-B with low child and low adult mortality. Egypt has been included in Emr-B for the presentation of sub-regional totals for mortality and burden to ensure comparability with previous editions of The World Health Report and other WHO publications.

** Although Cambodia, the Lao People’s Democratic Republic, and Papua New Guinea meet criteria for high child mortality, they have been included in the Wpr-B sub-region with other developing countries of the Western Pacific Region for reporting purposes.
<p>| Country                  | Population 2002 | Gross National Income (US$) per capita 2002 | Child mortality under-five mortality per 1000 live births 2000 | Water % of households with access to improved water supply 2000 or latest available data | Child labour % of children aged 5–14 years who are working 2000 or latest available data | Sanitation % of households without access to improved sanitation 2000 or latest available data | Poisons centres modelled data in italics | Water collection % of population who must travel more than half an hour to fetch water 2001 or latest available data | Indoor smoke % of households using solid fuel for cooking 2000 or latest available data | Dioxins and furans mean concentration of TEQ units in vegetation (pg/g) 2004 | Country |
|-------------------------|-----------------|---------------------------------------------|-------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------|-------------------------|
| Afghanistan             | 22 930          |                                                | 50%                                                         | 13%                                                                              | 88%                                                                              |                                                      |                                                      |                                                      |                                                      |                                                      | Asia, Africa                         | Afghanistan             |
| Albania                 | 3 141           |                                                | 34%                                                         | 27%                                                                              | 97%                                                                              |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Albania                 |
| Algeria                 | 31 266          |                                                | 40%                                                         | 51%                                                                              | 89%                                                                              |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Algeria                 |
| Andorra                 | 69              |                                                | 19%                                                         | 5%                                                                               | 100%                                                                             |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Andorra                 |
| Angola                  | 13 184          |                                                | 54%                                                         | 262%                                                                             | 38%                                                                              |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Angola                  |
| Antigua and Barbuda     | 1 735           |                                                | 54%                                                         | 21%                                                                              | 91%                                                                              |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Antigua and Barbuda     |
| Argentina               | 37 981          |                                                | 32%                                                         | 19%                                                                              | 94%                                                                              |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Argentina               |
| Armenia                 | 3 072           |                                                | 28%                                                         | 37%                                                                               | 100%                                                                             |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Armenia                 |
| Australia               | 19 544          |                                                | 24%                                                         | 6%                                                                               | 100%                                                                             |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Australia               |
| Austria                 | 8 111           |                                                | 20%                                                         | 6%                                                                               | 100%                                                                             |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Austria                 |
| Azerbaijan              | 8 297           |                                                | 36%                                                         | 75%                                                                              | 78%                                                                              |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Azerbaijan              |
| Bahamas                 | 310             |                                                | 35%                                                         | 18%                                                                              | 97%                                                                              |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Bahamas                 |
| Bahrain                 | 708             |                                                | 34%                                                         | 13%                                                                              |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Bahrain                 |
| Bangladesh              | 143 809         |                                                | 45%                                                         | 82%                                                                              | 97%                                                                              |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Bangladesh              |
| Barbados                | 269             |                                                | 24%                                                         | 9%                                                                               | 100%                                                                             |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Barbados                |
| Belarus                 | 9 940           |                                                | 22%                                                         | 14%                                                                              | 100%                                                                             |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Belarus                 |
| Belgium                 | 10 296          |                                                | 21%                                                         | 6%                                                                               |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Belgium                 |
| Belize                  | 251             |                                                | 45%                                                         | 41%                                                                              | 92%                                                                              |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Belize                  |
| Benin                   | 6 558           |                                                | 53%                                                         | 161%                                                                             | 63%                                                                              |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Benin                   |
| Bhutan                  | 2 190           |                                                | 59%                                                         | 98%                                                                              | 62%                                                                              |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Bhutan                  |
| Bolivia                 | 8 645           |                                                | 45%                                                         | 80%                                                                              | 83%                                                                              |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Bolivia                 |
| Bosnia and Herzegovina  | 4 126           |                                                | 22%                                                         | 18%                                                                              |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Bosnia and Herzegovina |
| Botswana                | 1 770           |                                                | 47%                                                         | 93%                                                                              | 95%                                                                              |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Botswana                |
| Brazil                  | 176 257         |                                                | 34%                                                         | 84%                                                                              | 87%                                                                              |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Brazil                  |
| Brunei Darussalam       | 350             |                                                | 36%                                                         | 14%                                                                              |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Brunei Darussalam       |
| Bulgaria                | 7 965           |                                                | 19%                                                         | 100%                                                                             | 0%                                                                               |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Bulgaria                |
| Burkina Faso            | 12 634          |                                                | 56%                                                         | 235%                                                                             | 42%                                                                              |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Burkina Faso            |
| Burundi                 | 6 602           |                                                | 59%                                                         | 100%                                                                             | 78%                                                                              |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Burundi                 |
| Cambodia                | 13 810          |                                                | 50%                                                         | 134%                                                                             | 30%                                                                              |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Cambodia                |
| Cameroon                | 15 729          |                                                | 49%                                                         | 155%                                                                             | 58%                                                                              |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Cameroon                |
| Canada                  | 31 271          |                                                | 22%                                                         | 6%                                                                               | 100%                                                                             |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Canada                  |
| Cape Verde              | 454             |                                                | 48%                                                         | 40%                                                                              | 74%                                                                              |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Cape Verde              |
| Central African Rep.    | 3 819           |                                                | 50%                                                         | 179%                                                                             | 70%                                                                              |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Central African Rep.    |
| Chad                    | 8 348           |                                                | 53%                                                         | 193%                                                                             | 27%                                                                              |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Chad                    |
| Chile                   | 15 633          |                                                | 33%                                                         | 16%                                                                              | 93%                                                                              |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Chile                   |
| China                   | 1 294 067       |                                                | 29%                                                         | 37%                                                                              | 75%                                                                              |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | China                   |
| Colombia                | 43 526          |                                                | 38%                                                         | 24%                                                                              | 91%                                                                              |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Colombia                |
| Comoros                 | 747             |                                                | 49%                                                         | 82%                                                                              | 96%                                                                              |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Comoros                 |
| Congo                   | 3 633           |                                                | 53%                                                         | 106%                                                                             | 51%                                                                              |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Congo                   |
| Cook Islands            | 18              |                                                | 44%                                                         | 23%                                                                              | 100%                                                                             |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Cook Islands            |
| Costa Rica              | 4 084           |                                                | 37%                                                         | 100%                                                                             | 0%                                                                               |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Costa Rica              |
| Côte d’Ivoire           | 16 365          |                                                | 49%                                                         | 167%                                                                             | 81%                                                                              |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Côte d’Ivoire           |
| Croatia                 | 4 439           |                                                | 21%                                                         | 8%                                                                               |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Croatia                 |
| Cuba                    | 11 271          |                                                | 25%                                                         | 9%                                                                               | 91%                                                                              |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Cuba                    |
| Cyprus                  | 796             |                                                | 27%                                                         | 8%                                                                               | 100%                                                                             |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Cyprus                  |
| Czech Republic          | 10 246          |                                                | 19%                                                         | 5%                                                                               |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Czech Republic          |
| Denmark                 | 5 351           |                                                | 22%                                                         | 6%                                                                               | 100%                                                                             |                                                      |                                                      |                                                      |                                                      |                                                      |                                                      | Denmark                 |</p>
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<th>Country</th>
<th>Population 2002</th>
<th>Gross National Income (GNI) per capita 2002</th>
<th>Child mortality under-five mortality per 1000 live births 2000</th>
<th>Water collection % of households who must travel more than half an hour to fetch water 2001 or latest available data</th>
<th>Indoor smoke % of households using solid fuel for cooking 2000 or latest available data</th>
<th>Child labour % of children aged 5–14 years who are working 2001 or latest available data</th>
<th>Poisons centres number 2004</th>
<th>Dioxins and furans mean concentration of TEQ units in vegetation (pg/g) 2000</th>
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<th>Child mortality under-five mortality per 1000 live births 2000</th>
<th>Water % of households with access to improved water supply 2000 or latest available data</th>
<th>Sanitation % of households without access to improved sanitation 2000 or latest available data</th>
<th>Indoors smoke % of households using solid fuel for cooking 2000 or latest available data</th>
<th>Child labour % of children aged 5-14 years who are working 2000 or latest available data</th>
<th>Water collection % of population who must travel more than half an hour to fetch water 2001 or latest available data</th>
<th>Poisons centres number 2004</th>
<th>Dioxins and furans mean concentration of TEQ units in vegetation (pg/g) 2000</th>
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<tr>
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10 Passive Smoking: Children Protest


12 Child Injuries Are Preventable


A 5-year WHO strategy for road traffic injury prevention (as above).

13 Child Labour: Growing up too Quickly


15 Safe Food: Crucial for Child Development


Pollutants leaching in vegetation


Malhotra B. Results of the third round of the WHO-coordinated exposure study on levels of PCBs, PCDDs and PCDFs in human milk. Organochlorides (CoPp), 2002, 56:311-316.

Fetus at risk


Wow! on chemicals used in the European Union


Wow! on dioxins


Children dying on the job


Facts for children


14 Lead IQ Alert

16 Poisoning: Hidden Peril for Children


Wow! Unpublished data from Schmalwieser AW, Institute of Medical Physics and Ionizing Radiation Protection, University (as above). "Leaded gasoline for sale."

17 Getting the Lead Out


18 Healthy Schools: Empowering Children


19 Enjoying the Sun Safely


Unpublished data from Schmelzner AW, Institute of Medical Physics and Ionizing Radiation Protection, University (as above).

20 Global Warming

Index

accidents 12–13, 31–32
air pollution, 24–29
  indoor 10, 12, 24–25
  outdoor 28–29, 40, 46
alcohol 36
arsenicosis 22–23
asthma 24, 27, 28
breast milk 36
burns 27
carcinogens 23, 26
cataract 24
child labour 32–33
child mortality rate 8–9
chlorofluorocarbons (CFCs) 44
cholera 14
chronic obstructive pulmonary disease 24
climate change 12, 46
cooking on open fires 10–11, 24–25
diabetes 8
diarrhoea 8, 14, 16, 18, 36, 47
dioxins 36, 37
droughts 46
drowning 30, 31, 47
dysentery 14, 16
education 18, 32, 42
endocrine disruptors 12, 36, 37
fire 10, 24, 30, 31
floods 46, 47
fluorosis 22–23
food safety 36–37, 42
furans 36, 37

gasoline 34, 40–41
global warming see climate change
guinea worm 14

hazardous waste 10, 12
Health-Promoting Schools 42–43
heart 8, 27
heavy metals 28, 36, 38
HIV/AIDS 8
homes 12, 30
hookworm 16

hygiene 16, 12–13, 18, 46
industrialization 12, 28
injuries 12–13, 30–31, 32, 33
International Labour Organization Convention 182 32
intestinal worms 16
IQ 34, 40–41
Japanese encephalitis 20
kerosene 24
  injuries from 30, 38
lead 12–13, 34–35, 40–41
leishmaniasis 20
listeriosis 36
low birth weight 24
lymphatic filariasis 20
lymphoma 27
malaria 12–13, 20–21, 46, 47
malnutrition 8, 46, 47
measles 8
melanoma 44, 45
mercury 36, 38
middle ear infection 24, 27
Millennium Development Goals 8, 14, 16
Montreal Protocol 44

nutritional deficiencies 47

obesity 8
ozone depletion 12

perinatal diseases 8
persistent organic pollutants (POPs) 12, 28, 36
pesticides 32, 38
petrol see gasoline
pneumonia 8, 24, 27
poisonings 31, 32, 34–35, 38, 39
poisons centres 38–39
pollution
  air 10–11
  industrial 10
  urban 28, 12–13
respiratory conditions 8, 24, 27
road traffic accidents 30–31
sanitation 12–13, 15, 16–17
schistosomiasis 16, 20
school 12, 30, 42–43
  attendance 18, 32
seatbelts 30, 48
sewage connection 17, 19
skin cancer 44
solid fuel use 10–11, 24–25
sudden infant death syndrome 27
sun 44–45
time 18–19
tobacco smoke 26–27
toxoplasmosis 36
trachoma 16
typhoid 14

urbanization 12, 28
UV radiation 44–45

vaccination 9
vector-borne diseases 12–13, 20–21, 32 see also malaria
vehicle emissions 28–29

war 8
wastewater treatment 17
water, 14–23
contamination of 22–23, 34
fetching of 18–19
illnesses related to 14, 16, 20–21, 22–23
improved water supply 14–15, 19
lack of 12–13, 46
management of 21
treatment of 15

WHO Framework Convention on Tobacco Control (2003) 26
World Health Day 2003 43