

Health and environmental issues have been included in several high-level initiatives, including the United Nations Millennium Declaration, and regional interministerial conferences on health and the environment. Despite the visibility of these issues, the importance of environmental health interventions in preventing disease is not always fully appreciated. As the present analysis shows, modifying environmental risk factors for disease and injury could significantly reduce the disease burden of a country. Several conclusions emerge from this study, which are listed below under four main areas.

Nearly one quarter of the global disease burden is attributable to the modifiable environment

- Of the 102 major diseases reported in the World Health Report 2004 (WHO 2004a), 85 are partly caused by exposures to environmental risk factors. The environmental attributable fractions for the diseases varied widely, but, in total, environmental causes contributed to 24% of the number of years of healthy life lost to disease, and to 23% of the mortality associated with the diseases. Although this is a significant contribution to the overall disease burden, it is a conservative estimate because there is as yet no evidence for many diseases.
- For some diseases, the complexity of the causal pathways was sufficient reason to be excluded from this analysis, or for the attributable fractions not to reflect the true impacts. Although we made an attempt to capture many of these complex links, such as those diseases mediated by the environmental components of malnutrition and physical inactivity, some could not be included. Among them was the disease burden associated with changed, damaged or depleted ecosystems, which was not quantifiable, even though the associated health effects are readily apparent (WHO 2005b).

The environmental disease burden is not distributed evenly across the world, and some regions carry a disproportionately heavy burden for specific diseases.

- The differences arise from variations in exposures to environmental risks, and in access to health care.
- The largest differences were observed for infectious diseases, where total number of healthy life years lost per capita was 15-times higher in developing countries than in developed countries. The environmental burden of lower respiratory infections and diarrhoeal diseases was 120 and 150 times higher, respectively, in the most-impacted WHO subregions, as compared to those least impacted.

Developing regions carry a disproportionately heavy share of the environmental disease burden.



Public square in southeast Asia; inadequate access to, and management of, water and sanitation, impacts environmental health risks.

Credit: UNEP/Tarlok Chawala

On average, children in developing countries lost 8-times more healthy life years than their counterparts in developed countries from environmentally-related diseases. For some key diseases, the gap is far greater.



Children in Latin America stand by a dug out canoe full of freshly-caught fish; the poor in developing countries often are directly dependent on locally-available foods, and environmental degradation can threaten vital nutritional sources.

Credit: Sean Sprague/Still Pictures

- For noncommunicable diseases, there was no overall difference between developed and developing countries, but in countries of developed subregions per capita numbers of healthy life years lost from cardiovascular disease are up to 7-times higher than in countries of less developed subregions, and cancer rates are 4-times higher, when comparing best and least-performing regions.
- In developing countries, the per capita average number of healthy life years lost to injuries was roughly double that in developed countries, but differences were even larger at the subregional level. For road traffic accidents, there was a 15-fold difference between the best-performing and worst-performing subregions, and a 10-fold disparity for other unintentional injuries.
- The above results indicate that an important transition in environmental risk factors will occur as countries develop. For some diseases, such as malaria, the environmental disease burden is expected to decrease with development, but the burden will increase from other noncommunicable diseases, such as COPD, and approximate levels seen in the more developed regions of the world.

Children suffer a disproportionate share of the environmental health burden

- Globally, the per capita number of healthy life years lost to environmental risk factors was about 5-fold greater in children under five years of age than in the total population. The difference was even greater (7–10 -fold greater) for major diseases, such as upper and lower respiratory infections, diarrhoea, malaria and malnutrition. The differences would have been larger if the noncommunicable diseases rates for children had not been very low.
- On average, children in developing countries lost 8-times more healthy life years than their counterparts in developed countries, but for key diseases the differences were astounding. For childhood cluster diseases, the per capita rates in developing countries were over 70-times higher than in developed countries. At subregional level, the differential was greater than 25 for road traffic injuries, 140 for diarrhoeal diseases, and 800 for lower respiratory infections.
- Although these statistics are alarming, they do not capture the longer-term effects of exposures that occur at a young age, but do not manifest themselves as disease until years after the exposure.

Interventions can be cost-effective and have benefits that go well beyond health, and contribute to the overall well-being of communities.

- Many environmental health interventions are economically competitive with other kinds of health-sector interventions. Examples include phasing out leaded gasoline, which produces adverse effects on cognitive function and on the productivity of a country. Mental retardation caused by exposure to lead from all sources (not just from leaded gasoline) was estimated to be nearly 30-times higher in regions where leaded gasoline was still being used, compared with regions where leaded gasoline had been completely phased out.
- Environmental health interventions often yield benefits that go beyond the immediate health improvements. A key target of the Millennium Development Goals is halving the proportion of people without sustainable access to safe drinking water and sanitation by 2015. Globally, WHO has estimated that the overall economic benefits of meeting this target, essential to reducing rates for diarrhoea, intestinal nematode infections and malnutrition, would outweigh the investment cost by a ratio of 8:1 (WHO and UNICEF, 2005). In addition, it has been estimated that providing safe drinking-water and improved sanitation to a developing country household would result in an average gain of 60 minutes per household per day, e.g. in terms of time spent collecting water (WHO, 2004b). Safe sanitation also helps break the cycle whereby faecal-oral pathogens often infiltrate drinking-water. Consequent reductions in environmental pollution can not only benefit households, but also fisheries, the food industry, those engaged in water-based recreational activities, as well as the health sector (from avoided health-care costs), and the labour sector (from fewer work days lost to illness).
- Many of the actions affecting determinants of health come from outside the health sector, which highlights the importance of cooperation between sectors when undertaking activities to reduce the environmental health burden. Also, health-sector costs are increasing, and often demands cannot be met, so without cross-sector cooperation it is unlikely that progress will be sustainable in many health areas.

Many environmental health interventions are economically competitive with other kinds of health-sector interventions.



Street Scene in Curitiba, Brazil, where intensive investment in sustainable transport, urban green spaces and urban waste and water management, has reduced environmental risks to health and improved quality of life.

Credit: GTZ

Reducing environmental risks to health also contributes to poverty reduction, while supporting other MDG goals such as access to education and gender equality.



Muslim girls in a classroom.

Credit: M. Nimsiri/UNEP/Still Pictures

Reducing the disease burden of environmental risk factors will contribute significantly to the Millennium Development Goals.

Many Millennium Development Goals (MDGs) have an environmental health component, some of which are highlighted below.

Goal 1 Eradicate extreme poverty and hunger

- Minimizing exposures to environmental risk factors indirectly contributes to reducing poverty, because many environmentally mediated diseases cause lost earnings. If occupational disease, injury or death eliminates the only source of income for a family, this leads to increased poverty and disease for the entire family.
- For developing regions, the mean per capita rate of healthy life years lost to childhood malnutrition is 12-times higher than for developed regions, and there is a 60-fold difference between the per capita rates for the WHO subregions with the highest and lowest malnutrition rates.

Goal 2 Achieve universal primary education

- Environmental health intervention helps to achieve this goal in several ways. Providing clean water and latrines at school (particularly latrines for girls) will encourage primary school students to come to school. Interventions that provide water and fuel for houses will also improve student attendance, because children (often girls) will not need to spend time collecting water and/or fuel for the home. Also, children often look after younger siblings who fall sick from polluted water, or from respiratory disease caused by burning solid fuels in poorly ventilated houses, causing them to miss school. Interventions to improve household ventilation, for example, or to provide clean water, will alleviate the health burden from these risk factors and free children from having to act as caregiver to younger siblings. This should help to improve school attendance and contribute to the MDG.

Goal 3 Promote gender equality and empower women

- Although there were no great differences between the overall rates of environmentally mediated diseases for men and for women, women are disadvantaged in many aspects. In developing countries, women are more likely to be involved in collecting safe water for the family, and in looking after children who may be sick from environmental risk factors such as polluted water or polluted indoor air (from using biomass fuels to cook and heat).

Time invested in these chores lost from activities that could improve the nutritional standard and health of the entire family. Interventions that alleviate such environmental risk factors would therefore free up some of the time women spend in roles such as caretaking and water collection, for income generation or educational activities. This, in turn, contributes to the MDG of empowering women and promoting gender equality.

Goal 4 Reduce child mortality

- The environmentally-linked mortality rate in children under five years of age was 180-times higher in the poorest performing region compared with that in the best performing region. Improving the environment could thus help to reach the MDG, to reduce by two thirds the mortality rate among children under five years old.

Goal 5 Improve maternal health

- Environmental interventions can contribute to this MDG by providing a safe home environment, which is of great importance to the health of children and pregnant mothers. An unprotected or contaminated home environment is a threat to the mother and her unborn child. Childbirth, for example, requires safe water and sanitary conditions.

Goal 6 Combat HIV/AIDS, malaria and other diseases

- Every year, there are over half a million deaths from malaria worldwide and over a quarter of a million deaths from HIV/AIDS that are related to environmental and occupational causes. Targeted environmental interventions could reduce the impact of major diseases such as these and help to achieve the MDG. Environmental interventions could also reduce the number of deaths from diarrhoea and lower respiratory infections by over 3 million each year. With the exception of HIV/AIDS, all of these diseases affect children in large number, and even HIV/AIDS can have a major indirect impact on the health of children.

Goal 7 Ensure environmental sustainability

- Providing sustainable sources of safe water and clean energy are key environmental interventions that contribute to this MDG. The potential health gains from these interventions can be appreciated from the global statistics for 2002: 1.1 billion people, mostly in developing countries, were still using potentially harmful sources of water, and 2.6 billion people lacked even a simple improved latrine (WHO and UNICEF, 2004). Diarrhoeal diseases, caused mainly by a lack of clean water and inadequate sanitation, contribute to nearly 1.7 million deaths a year.

Improving the environment can help reduce the child mortality rate, improve maternal health, and combat HIV/AIDS, malaria and other diseases.



Family life, The Phillipines.

Credit: Mark Edwards/Still Pictures

Both the health sector and non-health sector actors can, and should, take joint action to address environmentally-mediated causes of disease.

Over half of the world's population still relies on biomass fuels and coal to meet their energy needs, resulting in 1.5 million deaths a year from respiratory diseases (a combination of lower respiratory infections, chronic obstructive pulmonary disease and lung cancer) (WHO 2006b).

- Environmental interventions will likely have a great impact on improving the health of slum dwellers, who are among those most affected by the combined health hazards associated with polluted water, inadequate sanitation, urban ambient air pollution, and indoor air pollution from solid fuel use.

Goal 8 Develop a global partnership for development

In summary, environmental health interventions can make a valuable and sustainable contribution towards reducing the global disease burden and improving the well-being of people everywhere. Many interventions can be cost-effective and have benefits beyond improving people's health, benefits such as helping to alleviate poverty and reducing gender inequalities.

Both the health sector and non-health sector actors can, and need, to take joint action to effectively address environmentally-mediated causes of disease. To do this global partnerships are essential. Many such alliances already exist in the field of children's environmental health; occupational health; in joint health sector and environment sector linkages; and in actions in the water, chemical and air pollution sectors. Such global partnerships need to be strengthened and reinforced, harnessing the full range of policy tools, strategies and technologies that are already available – to achieve the interrelated goals of health, environmental sustainability, and development.



Slum housing poses various risks to health that need to be tackled together by the health and non-health sectors (Latin America).

Credit: Mark Edwards/Still Pictures