

Our task is not to create an idyllic environment peopled by the poor.
 Our task is to create a decent environment peopled by the proud.
Robert S. McNamara, quoted in Reader's Digest, March 1973

INTERNATIONAL HEALTH

WHO Names Top 10 Health Risks

Government action, in concert with individual action, can increase healthy life expectancy by 5–10 years worldwide, concludes *The World Health Report 2002: Reducing Risks, Promoting Healthy Life*. The report summarizes one of the largest research projects ever undertaken by the World Health Organization (WHO), and identifies the 10 greatest risks to human health worldwide.

Twenty-five risks were initially ranked based on lost healthy life years. According to report coauthor Anthony Rodgers, codirector of the Clinical Trials Research Unit at the University of Auckland, New Zealand, this captures within a single measurement burden not just from premature death but also from life lived with disability. So although one of the foremost risks, iron deficiency, doesn't cause as many deaths as some other risks examined, its overall health impact puts it in the top 10.

"These types of reports give you a good handle on both chronic and infectious disease prevention," says George Rutherford, interim director of the Institute for Global Health, operated jointly by the University of California (UC), San Francisco, and UC Berkeley. He says the report will help health care providers to focus on primary prevention by identifying the initial causes of disease.

The report shows that surprisingly few risks cause 40% of global deaths and disease. The top 10 risks fall into two categories. Five of them—being underweight, unsafe sex, iron deficiency, indoor smoke from solid fuels, and unsafe water, sanitation, and hygiene—mainly affect populations in developing countries. The other five—high blood pressure, tobacco consumption, alcohol consumption, high

cholesterol, and obesity—can be grouped as contributors to heart disease and stroke, which kill more than 12 million people worldwide each year.

Until recently, cardiovascular diseases had been considered largely the encumbrance of the developed world. However, this study reveals that with an influx into developing nations of Western lifestyle risks—for example, alcohol consumption and increased use of processed foods—have come rapidly increasing rates of cardiovascular-related risks, resulting in a double burden of infectious and noninfectious disease.

Stark contrasts between the poor and rich are underlined by conclusions in the

Besides the top 10 risks, the report discusses a number of other environmentally related risks, such as inadequate and dangerous housing, lead exposure, and hazards that will be encountered in the future as a result of global warming. These include salination of freshwater supplies by rising sea levels, changes in the incidence of food- and waterborne infections, and altered dynamics of disease vectors.

John Swartzberg, a clinical professor of medicine at the UC Berkeley School of Public Health, says he is surprised that the report did not place more emphasis on vector control and global warming. With global warming, he points out, "the range of mosquitoes [would] dramatically increase, in terms of both latitude and how high the mosquitoes can go." He explains that these disease-bearing insects will put a much larger percentage of the world's population at risk for mosquito-borne disease, especially many of the substantial human populations in developing countries that live on high plateaus, areas currently not at high risk.

Despite that criticism, he says, "The World Health Organization has done an outstanding job on this report. I would highly endorse all of the conclusions." Edward V. Ohanian, director of the Health and Ecological Criteria Division of the U.S. Environmental Protection Agency Office of Water, further says the data in the report are "consistent with other estimates of the problem on a worldwide basis."

The next step for the WHO is to focus on identifying the interventions that would work best in each region, and communicating the necessary information to member states, working toward a better balance between disease prevention/treatment and increasing healthy life expectancy worldwide. The report cites a substantial increase in Asian tobacco taxes as an example of an action that has produced significant health benefits at a very low cost. **—Anne M. Rosenthal**

	10 Greatest Global Health Risks
	<ul style="list-style-type: none"> • being underweight • unsafe sex • iron deficiency • indoor smoke from solid fuels • unsafe water, sanitation, and hygiene • high blood pressure • tobacco consumption • alcohol consumption • high cholesterol • obesity
	
	
<small>Source: World Health Organization. 2002. The World Health Report 2002: Reducing Risks, Promoting Healthy Life. Geneva, Switzerland:World Health Organization.</small>	

report related to being underweight, which is prevalent in developing nations, and obesity, which is common in industrialized countries. About 170 million children in poor countries, lacking sufficient food or compromised by chronic disease, are underweight, with 3.4 million dying from this cause in the year 2000. Meanwhile, more than 300 million adults worldwide are clinically obese (defined by the WHO as having a body mass index of at least 30 kilograms per square meter), with obesity-related deaths at one-half million in 2002 in North America and Western Europe.

MATERIALS SCIENCE

New Paint: No Harm, No Foul?

The hulls of oceangoing ships traditionally have been coated with toxic paints containing heavy metals such as copper and tributyltin, active ingredients that work by poisoning hull-hugging marine organisms such as barnacles, tube worms, and algae. Nontoxic silicone-based alternatives are available, but they still foul, yet are harder to clean. They are also more expensive and less durable. Now, however, scientists at Cornell University in Ithaca, New York, have developed what may prove to be a more effective nontoxic hull paint.

The toxic metals in hull paints leach into water during normal use, maintenance, and application. They can work their way into the food chain, killing marine life and, because they bioaccumulate, possibly contaminating food fish, says David Guggenheim, vice president for conservation policy at The Ocean Conservancy, a Washington, D.C.-based environmental organization. Studies have further shown that tributyltin can disrupt the endocrine systems of marine shellfish.

Starting in 2003, worldwide law established by the International Maritime Organization forbids new application of tributyltin paint, the most potent of the common toxic hull paints and the type most often used on commercial vessels. By 2008 all ships must remove the material. And countries such as Canada and Denmark are starting to restrict copper paints, the kind most commonly used on recreational boats and the type used on virtually all U.S. Navy watercraft.

Yet some sort of hull treatment is vital to a ship's fuel efficiency, according to Stephen McElvany, an environmental quality program officer with the Office of Naval Research. Additional drag can waste 15–30% of the fuel used to power a ship. The additional drag also reduces ships' top speed and range. For the Navy fleet, that adds up to \$50–70 million dollars per year in wasted fuel. Guggenheim adds that, although antifouling paint can pollute, it

also serves an important environmental role—preventing invasive species from hitchhiking into new waters attached to a vessel's hull. This potential conflict between protecting sea life and slowing invasive species presents what Guggenheim calls “an environmental tradeoff that will no doubt need to be examined further.”

The Cornell group, led by materials science and engineering professor Christopher Ober, has developed a layered coating that may be more durable and more effective than currently available nontoxic hull paints. “There are really two parts of the fouling process,” Ober says. “There's the accumulation, and there's how easy it is to remove it. The reason our material seems so promising

is that it does both well.” Ober says that the challenge of an antifouling coating that works through physical—rather than chemical—processes is to be able to address the arsenal of adhesives that marine bacteria, animals, and plants use for sticking to surfaces.

Ober's solution is a bilayer coating that can be sprayed on or applied as a film. The base is a commercial copolymer rubber that provides a firm structural foundation. For the surface layer, Ober's group developed two types of liquid crystalline structures, both of which appear to work equally well, he says. One is a hydrophobic, fluorinated material, which repels water and so prevents fouling life from gaining a foothold. The other is a polyethylene glycol-based hydrophilic material, which forms a thin barrier of water that protects the surface and appears to discourage marine organisms from settling in. Both types also make it easier to clean off persistent organisms that do manage to stick.

Both variations of the coating are currently being tested on panels submerged in Hawaiian and Florida waters that teem with sea life, and patents are pending. If the paint performs as well as Ober predicts, it could be commercially manufactured within 12 months, he says.

“Although the challenge remains to produce a nontoxic coating that is more effective than copper-based materials, our results to date are promising,” Ober says. “However, there's nothing like a zone of death to make something fouling release.” —**Scott Fields**



A prettier picture. New paint spruces up both ships and the environment.

Corralling CAFOs

The U.S. EPA and USDA have announced significantly tighter rules for controlling runoff from concentrated animal feeding operations (CAFOs). The rules require approximately 15,000 large CAFOs to obtain permits for discharge, or potential discharge, of animal waste and wastewater. These operations must also develop and follow manure and wastewater release management plans. The rules outline requirements for land application of animal waste and eliminate permitting exceptions that have existed for certain types of CAFOs.

The EPA estimates the regulations will prevent the annual release of 166 million pounds of nutrients and 2.2 billion pounds of sediment into waterways and will reduce emissions of hydrogen sulfide by 12% and methane by 11%. The new rules were announced in December 2002.



Olive Branch for Health?

In April 2003, the WHO and the International Solidarity Fund of Cities against Poverty launched a program to improve public health in Israel and the Occupied Palestinian Territory. Health officials from cities in the program areas will meet with their European counterparts for study tours, training activities, and workshops on public health, primary health care, and the health of vulnerable groups. Officials hope that Israeli and Palestinian municipal health officials will one day directly exchange ideas and expertise. WHO director-general Gro Harlem Brundtland said an earlier WHO program carried out in the Balkans played a vital role in promoting health and peace-building initiatives.

When the Phones Go Dead

As global sales of mobile phones surged in 2002 to over 400 million units, 10 major mobile phone manufacturers signed on to a Basel Convention-sponsored initiative for environmentally sound management of discarded phones. Mobile phones are made with plastics and metals such as lead, cadmium, mercury, gold, and copper. Much mobile phone disassembly takes place in developing countries, where sometimes 80% of the communications infrastructure is mobile phone-based, making these countries ripe for growth in mobile sales. A big challenge for this industry is to get consumers to actually dispose of their mobile phones at all. The initiative proposes development of financial and other incentives to encourage proper phone disposal.



INNOVATIVE TECHNOLOGIES

MODIS Operandi for Mapping Haze

Particles that are put into the air in one spot on the globe can wind up being inhaled thousands of miles away. Desert dust has traveled from Asia to the west coast of North America in sufficient amounts to influence air quality there, and clouds of carbon monoxide originating from grassland and forest fires in Africa and South America have reached Australia. These traveling particles, or aerosols, can have a potentially major impact not only on human health but also on climate and regional rainfall. A unique observational instrument called MODIS (Moderate-Resolution Imaging Spectroradiometer) now allows climatologists to study how aerosols move across the planet.

“MODIS was designed to track fine aerosols through the atmosphere,” says Yoram Kaufman, the principal investigator for MODIS aerosol research at the National Aeronautics and Space Administration (NASA). In 1999, when NASA launched Terra, the first of three Earth-observing satellites to study atmospheric pollution (among other things), MODIS technology was onboard. MODIS also is on the Aqua satellite launched in 2002.

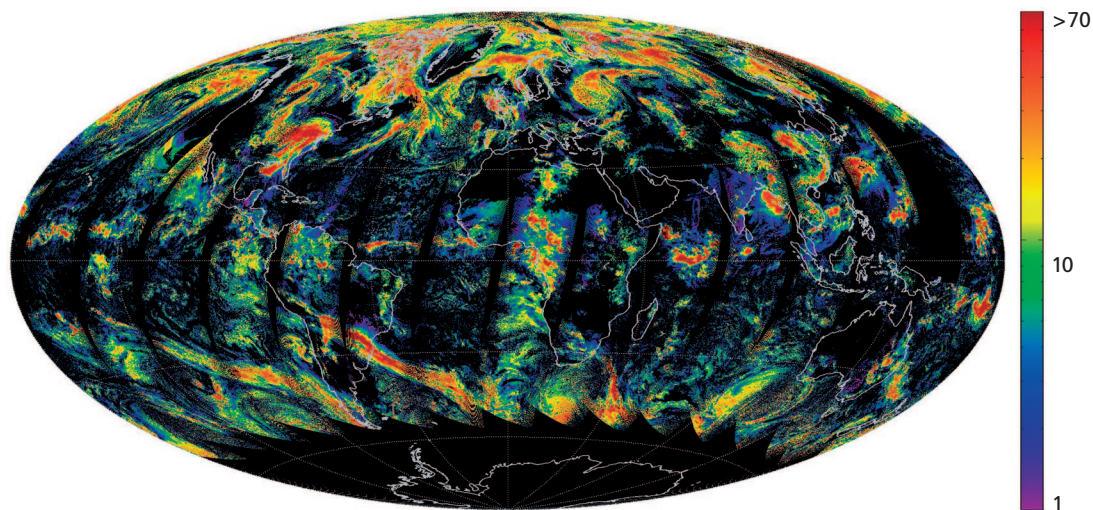
MODIS measures aerosol optical thickness (AOT), which indicates how much sunlight is prevented from traveling through the atmosphere. An AOT of 0.2 means that 20% of the overhead sunlight will be blocked by the aerosol layer—roughly equivalent to a mildly hazy day. By comparison, during the summer in Washington, D.C., the AOT typically ranges from 0.4 to 0.8.

aerosols that are produced by human activity are finer. MODIS therefore helps to distinguish between naturally occurring and anthropogenic aerosols, Tanré says.

But MODIS can paint only part of the atmospheric portrait, and so works best in conjunction with other, similar tools. For example, the system has a hard time detecting dust over the deserts of Asia because these regions reflect so much light, says Steven Massie, an atmospheric chemist with the National Center for Atmospheric Research. On the other hand, a tool known as the Total Ozone Mapping Spectrometer, or TOMS, can detect desert dust because it uses a different system to measure different wavelengths of light. Other systems provide complementary data on other pollutants. Measurements of Pollution in the Troposphere (MOPITT) is a system developed by the Canadian Space Agency to measure carbon monoxide and methane.

When MODIS data are combined with data from other satellite-based systems, such as TOMS, MOPITT, and Global Ozone Monitoring Experiment (a European-built and -launched instrument measuring ozone and nitrogen dioxide), it yields a more comprehensive atmospheric portrait. For example, says John Gille, head of the Global Observations, Modeling, and Optical Techniques Section of the National Center for Atmospheric Research and the principal U.S. investigator for MOPITT, scientists can use data from these different sources to study relationships between pollutant sources and their relative proportions and concentrations. They can also see how pollutants' sources impact their formation and the quantity of each formed relative to the other. Combining those data with wind data presents a clearer picture of how pollutants are transported through the atmosphere.

To understand the interaction of aerosols with water vapor in the atmosphere, one ideally would know the vertical distribution of



Imaging aerosols. MODIS/Terra technology allows scientists to map concentrations and dimensions of atmospheric aerosols in a variety of ways.

MODIS lets researchers determine the concentrations and dimensions of atmospheric aerosols. This, combined with knowledge of wind patterns and surface population distributions, can reveal sources of these pollutants. That will, in turn, tell how pollutants move across the Earth's surface, their residence time in certain areas, and the impact of other climatological factors, and will reveal more about how all of these different particulate forms interact.

MODIS yields information on the ratio between finer particles (with a radius roughly less than 0.5 micrometer) and coarser particles (1 micrometer and larger). This is important, says Didier Tanré, director of the Laboratoire d'Optique Atmosphérique at France's Université des Sciences et Technologies de Lille and one of the developers of the algorithms that power MODIS, because most of the

aerosols and moisture. Kaufman says that MODIS measures only the total column concentration of aerosols and water vapor. However, other instruments aboard the Aqua satellite compile moisture profiles, and other missions will use further technologies to compile the aerosol vertical profile. This will allow scientists to study the effect of moisture on aerosol particles.

“The dust particles are also an issue,” says Tanré. “They are not spherical, when our algorithm assumes they are. Aerosol models that are assumed in the algorithm may be improved.”

All that being said, Kaufman says, “I think MODIS is a very capable part of a valuable [observational satellite] program that's going to provide a greater understanding of our atmospheric dynamics over the coming years.” —Lance Frazer

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Development Gateway Foundation

Founded in 2001, the Washington, D.C.–based Development Gateway Foundation (DGF) takes advantage of new information and communications technologies (ICT) to help nations alleviate poverty and foster sustainable development. The DGF's activities encompass four main program areas: development and support of research and training centers in developing countries; annual ICT Development Forums, where global leaders meet to discuss practical ways to use ICT effectively; grants and investments; and the Development Gateway itself, an interactive resource located at <http://www.developmentgateway.org/>.

The DGF is a unique nonprofit partnership of more than 120 public and private entities from varied sectors who fund the Development Gateway and other foundation resources. Environmental and health agency members include Family Health International, the Program for Appropriate Technology in Health, the United Nations Environment Programme, and the World Health Organization. International funding agency members include the Food and Agriculture Organization of the United Nations, the International Monetary Fund, and the World Bank Group. Private-sector members include IBM and Microsoft Corporation. The Contributors page contains a complete listing of participants and links to their homepages.



From its beginning, the Development Gateway has been configured to facilitate interactive information exchange (in English, Spanish, and French) among the donor community, researchers, ICT engineers and developers, advocacy groups, and national and international policy-making agencies. Four main pathways—Exchange Ideas & Knowledge, Find Development Projects, Explore Business Opportunities, and Access Country Gateways—guide users to the area of the website they wish to visit. Users can access online forums; look up resources on business opportunities, development projects, publications, and statistics for each of the approximately 200 nations in existence; scan an online global procurement market; and add their own content.

The Exchange Ideas & Knowledge section comprises public forums on each of 34 topics including environmental law, indigenous knowledge, urban development, and water resources management. Each topic page features an introduction, news, a calendar of related events, a programs and projects listing, a bulletin board including postings of job and grant announcements, and procurement notices. Each page also provides pertinent resources such as data and statistics, documents and reports, and organizations, networks, and people. Topic pages are supervised by members of contributing organizations who sign up to serve in this capacity, and by advisors who provide expert advice on particular subjects. These resource supervisors help manage the flow of content that is provided by their groups and other registered members.

The core of the Find Development Projects section is Accessible Information on Development Activities, or AiDA. This fully searchable information exchange of more than 400,000 records contains constantly updated historical and ongoing reports on the development activities of more than 200 major international development donors and other nongovernmental organizations. As the largest public information source of its kind, AiDA helps organizations quickly and easily obtain the information necessary to maintain optimal cooperation and coordination with other groups, and aids in the standardization of web development among development-related organizations.

Clicking the Explore Business Opportunities option takes the visitor to dgMarket. This page, provided in 11 languages including Dutch, Indonesian, Romanian, and Turkish, is where governments and other donors can directly post contract and procurement notices for development projects. Items are classified under 17 topics including agriculture and food, mining, urban development, environment, and health and population. The Access Country Gateways option is based around the 44 locally owned and managed public-private partnerships that work within individual developing countries, making up the Development Gateway. The introductory page for this section provides resources and news on country gateway efforts, while each country's gateway page describes that group's background and highlights of its work, as well as contact information and links to the partnership's website. —Erin E. Dooley

Taking a Shot at Lead

U.S. shooting enthusiasts fire more than 160 million pounds of lead shot and bullets into the soil at outdoor firing ranges each year. In January 2003, the Izaak Walton League, a Gaithersburg, Maryland–based conservation group, signed a memorandum of understanding with the U.S. EPA to promote EPA-recommended best management practices for lead at more than 100 outdoor shooting ranges across the country. These practices include reclaiming the lead and recycling it into new ammunition, which reduces the amount of virgin lead that must be mined. It also helps keep lead from accumulating in the soil, where it can pose a serious threat to human health, especially that of children.



Banking on Progress in Asia

From Azerbaijan to Vietnam, Asia is confronted with massive environmental degradation, caused largely by exponential population growth, along with expanding manufacturing and petroleum and mineral extraction. Yet despite an economic boom, Asia is still home to two-thirds of the world's poor. The Asian Development Bank, which works in 25 countries, has adopted a new Environment Policy that uses "pro-poor" initiatives to reduce poverty while building environmental sustainability. They include making the bank's poverty reduction approaches more attuned to good management of natural resources, supporting cooperation on transboundary pollution issues, helping countries build environmental considerations into economic growth, and integrating environmental considerations across all bank operations.

Good Scents—Bad Sense?

That pine or citrus scent left after cleaning may not be a sign of a healthier environment, according to recent unpublished studies led by Charles Weschler at Denmark's Technological University. The studies suggest that even tiny concentrations of fragrance oils released into indoor air from cleaning products can react with ozone, especially in small, poorly ventilated rooms, potentially causing short-term respiratory and dermal allergic responses. Proper ventilation during and after cleaning can prevent such health effects.

Even if a cleaning product is labeled "natural," it may not offer any protection in the way of hypoallergenicity; such labeling usually refers only to the origin of a product's ingredients and not to any effects or benefits from the usage of a product. Fragrance ingredients generally only serve a cosmetic purpose and add nothing to a product's cleaning abilities.

